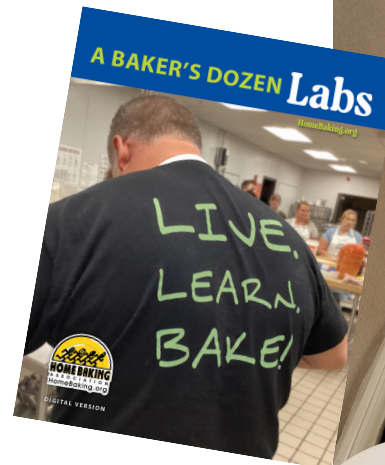


Build FCS Baking STEAM

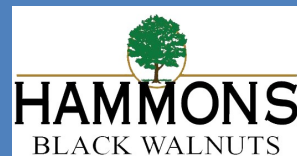
@Home, in Communities, Clubs and Careers



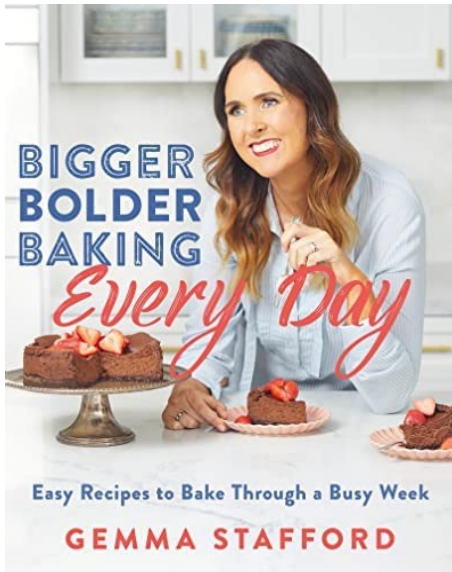
Sharon Davis,
Family & Consumer Sciences
Education- Program Director
HomeBaking.org



Baking STEAM, 4-H Congress



Associate Members



Essential Partners



Together we get the flour in the bowl with child and adult food educators and media for year round baking inspiration, resources for home, classroom, community and the future.

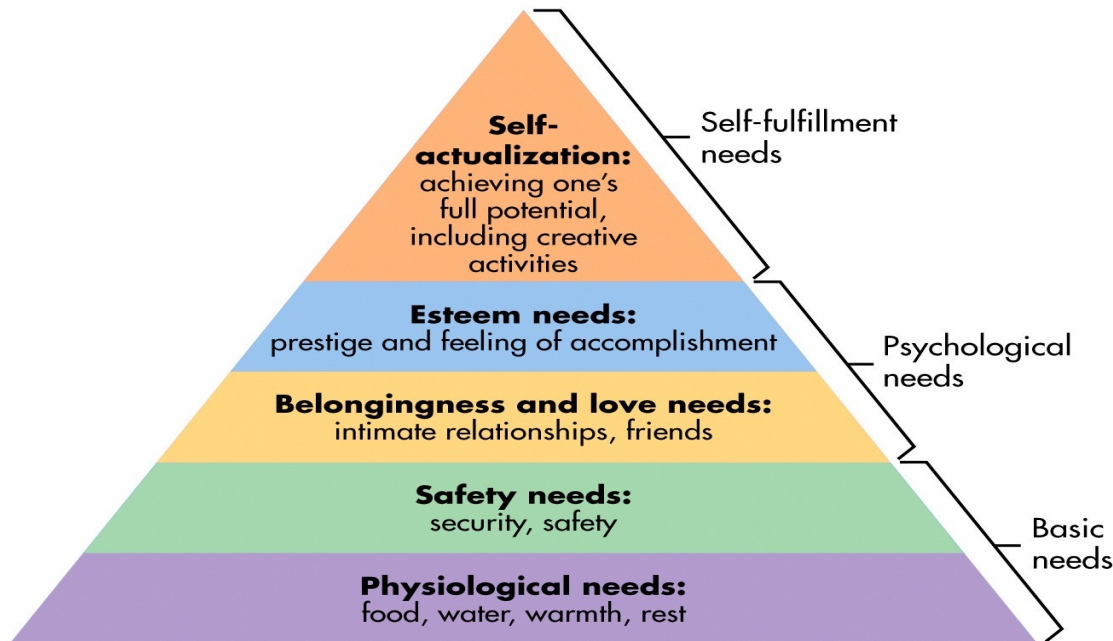
We Bake to Build Life

“To be a good cook means the economy of your great-grandmothers and the science of modern chemists.

It means much tasting and no wasting.

It means English thoroughness and Arabian hospitality.

It means in fine, that you are to see that every one has something nice to eat.” *Ruskin 1906, WOMAN’S FAVORITE COOKBOOK, Annie R Gregory*



→ Baking and cooking skills help
Achieve each level of
Maslow's
Hierarchy of Needs
→ Achieve personal, family life benefits
support work, careers



A Baking Bridge spans EVERYWhere You Bake – Home, community, school...to careers



	1st	2nd	3rd	Sum of 1st-2nd-3rd
At home from a parent or relative	61%	18%	14%	92%
Any social media	-	-	-	65%
TV baking/cooking shows	11%	26%	22%	58%
Watching videos online	8%	17%	21%	46%
Home Economics or Family and Consumer Sciences class	8%	19%	12%	39%
Early childhood program	3%	5%	8%	16%
Community program (eg 4-H, Scouts)	2%	4%	7%	14%
After school program	2%	5%	6%	13%
Career/ tech school class	2%	5%	6%	13%
STEM (science, technology, engineering, math) class	2%	3%	3%	8%
	100%	100%	100%	-



Fall 2022 Semester
KS State Univ. Baking
Science
Aaron Clanton, PhD
Instructor reports:

Two classes:
7 of 14 mention start
with home baking
28 students, 14 learned
baking from family
--mom/grandma
--FCS, 4-H

Q27: How or where did you first learn to bake?
Please select up to three of the first ways you
learned to bake. Total of 3,489 “votes” cast.



Mintel Consulting: September 2019





Baking & Milling:

27+ FCS Standards, Career Connections

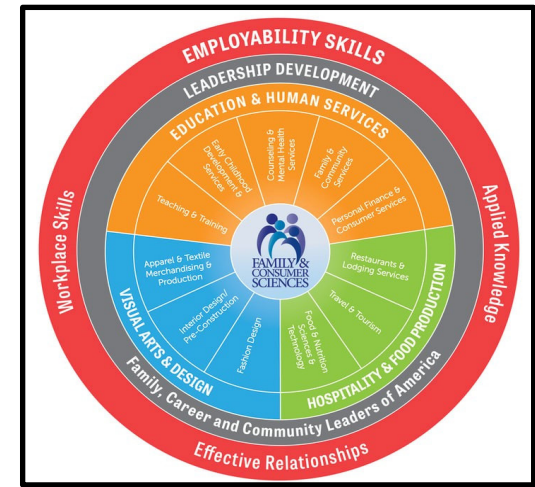
- Consumer sciences critical in social media age
- Life skills for health, wealth 0 to 105
- Relationship builder-Peers, family, community, work
- Calculate, control \$\$\$, resources, sustainability
- Test kitchen science--Substitute ingredients; sensory analysis; R&D new ingredients

↓sodium, sugars, “non-recognizable” additives

↑potassium, magnesium, calcium, iron, protein

↑Whole grains, antioxidants, plant-based, allergen free, fruits, veggies, pulses, seeds, natural preservatives

- Pathways to food sciences, hospitality, human services, consumer sciences



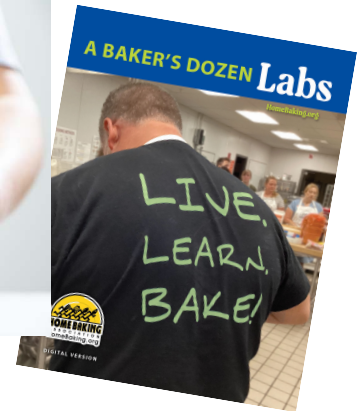
Home Baking Lessons, Labs align
LeadFCSEd 2018 National Standards, 3.0





Baking Home to Career Skills

Project time management
Problem solving, creativity, R&D
Visualization, communication
Reading, comprehension, application
Team building
Cultural/social diversity
Tech resources, computers, equipment
Food handling, safety, storage
Marketing skills, customer preferences, challenges



A Baker's Dozen Labs linked to FCS standards, FCCLA Community Connections, CTE Careers and 21st Century Learning.

- Northern Crops Institute – webinars- <https://www.northern-crops.com/education>
- KS State University Baking, Milling, Cereal Science grains@kstate.edu futureinbaking.com

What's a baker?

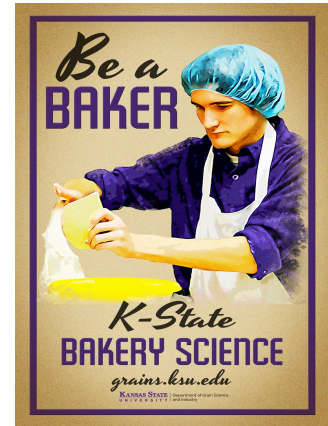
"Bakers mix ingredients according to recipes in order to make breads, pastries, and other baked goods." U.S. Labor industry's definition

Work locations:

- Home, communities 😊
- Test kitchens
- Commercial, wholesale, retail, stand alone, chains, supermarket, club stores
- Food services, restaurant
- Research & Development (R&D) – ingredients, bakery, mill

Training, Degrees, Classes: 4-H, School FACS...

- On-the-job, apprenticeships, B.S., M.S., PhD.
- Community colleges, Tech schools
- On-line platform, The Butter Book, The French Pastry School
- Kansas State University Baking and Milling Science, <https://www.futureinbaking.com/> <https://www.k-state.edu/academics/bakesci/>
- The Bread Lab, <https://www.kingarthurbaking.com/baking-school>
- International Baking Industry Expo (IBIE)- Sept, 2024, Las Vegas <http://www.retailbakersofamerica.org/home.html>



About YOU...



Stand if you...

- ☐ Bake
- ☐ Bake for 4-H, school, community
- ☐ Bake for family, friends
- ☐ Bake for special occasions
- ☐ Bake for sale
- ☐ Bake every week



What's *Baking STEAM*

- **Sciences** Crop and ingredient production suited to baker end uses; agriculture, milling, food and consumer sciences; packaging
- **Technologies** Agriculture, milling, processing, production, computers, thermometers, packaging, storage, computerization
- **Engineering** Equipment for producing ingredients, product production, mills, bakeries, packaging
- **Art** Product development and design; value-added presentation, packaging
- **Math** Measurement; consumer research, purchasing commodities; no waste- ingredient, labor, transportation or product; costing; local vs. transportation; sustainability; environmental impacts; markets



Let our creative team of scientists take your ideas from basic sketch to full commercialization.



Baking Sciences...*farm to oven.*

- Agriculture
- Baking
- Brewing
- Computer
- Consumer
- Food/Ingredient
- Grain or Cereal
- Milling
- Nutrition
- Safety
- Sensory



HomeBaking.org

6 SIMPLE Baking Food Safety Steps

- 1 Store raw flour, baking mixes, dough and eggs separately from ready-to-eat foods.
- 2 Before baking, tie back long hair, clean counters, assemble ingredients and equipment, wash hands, and apron up.
- 3 Keep separate the measuring, mixing and handling of unbaked batter or dough from cooling, serving and packaging of baked products.
- 4 Clean tools, work surfaces and equipment with hot, soapy water or in dishwasher.
- 5 Test baked products with wooden toothpick or cake tester and food thermometer at center to ensure products are completely baked. (See chart on back)
- 6 Wash hands before you taste, serve or package baked goods.

BAKING FOOD SAFETY guide
HomeBaking.org

BAKED GOODS TEMPERATURES

Maximize quality and confirm products are fully baked. Take an internal temperature at the center of the product when oven timer indicates it may be done. These temperatures confirm your product is fully baked:

- 150°F – Chesscakes (remove from oven at 150°F to avoid cracking; temperature should rise to 160°F as it cools to ensure bacteria are killed)
- 160°F – Quiche, meringue pies, bread pudding, baked custard, flan, molten chocolate cakes
- 165°F – Stuffing and casseroles, leftovers, chocolate cream pie, meat-, cheese- or poultry-filled breads like empanadas, pot pies, pasties, calzones, or bierocks
- 170-175°F – Custard and fruit pies, flan, crème brûlée
- 190-210°F – Yeast breads (soft rolls 190°F, crusty bread 210°F)
- 200-209°F – Most cakes, cupcakes, quick breads, scones, biscuits, pecan pie

After baking: Cool product on wire rack. Wash hands before handling products. Refrigerate egg-rich, cream- or meat-filled baked goods within two hours of baking. Yeast breads are best stored at room temperature or frozen if not eaten in one day.

HomeBaking.org

Baking STEAM is also about...

- **Home prep skills gained, not abandoned**
- **Control and pair ingredients** for “gut health, wellness, immunity, bioavailability...”
BakingBusiness, 8/31/21
- **Broader consumer concerns** *80% seek local, sustainable environmentally friendly ingredients*
- **Eco-friendly packaging**
<https://goodnaturedproducts.com/pages/bakery-packaging>
- **Innovations** “Upcycled” ingredients reducing food byproduct waste (grains, coffee fruit, legumes, nut shells, cocoa pulp)



“Over 30% of all food produced globally is lost or goes to waste...”
<https://www.upcycledfood.org/>

**good.
natured**
better everyday products

BLACK WALNUTS ARE SMALLER AND MORE FLAVORFUL THAN MOST COMMERCIAL VARIETIES AND ARE WORTH SEEKING OUT.
—CHEF SEAN SHERMAN IN NEW YORK TIMES COOKING

57% MORE PROTEIN THAN ENGLISH WALNUTS

67% OF CONSUMERS CONSIDER WILD FOODS CLOSER TO NATURE
—POWER OF WILD PORTLAND MARKETING

“EACH OCTOBER, ABOUT A HUNDRED THOUSAND PEOPLE COLLECT SOME TWENTY-FIVE MILLION POUNDS OF BLACK WALNUTS AND HAUL THEM TO 230 HULLING OPERATIONS RUN BY HAMMONS.”
—BILL BEAVER CORDER & SON

THE TRUFFLE OF NUTS
—CHEF MARK RICHARDSON OF DUBLEY'S ON SHORT

BLACK WALNUTS ARE A POPULAR SUPERFOOD, AND MODERN RESEARCH IS ONLY JUST SCRATCHING THE SURFACE WHEN IT COMES TO UNCOVERING THE POWERFUL NUTRITIONAL COMPONENTS THESE UNIQUE NUTS CONTAIN.
—KRYSTAL CRAWFORD, MD, MS BRAXE.COM

NUTRITIONAL FACTS:
HEART HEALTHY, GOOD SOURCE OF ARGONINE 60mg, GLUTEN FREE G/F

HAMMONS. BLACK WALNUTS
BLACK-WALNUTS.COM | 417.276.5181

Black Walnut Wedding Cookies
Source: Mildred Temkin (Servings: 50)

Ingredients
1/2 cup shortening
1/2 cup butter, softened
2 teaspoon salt
1 cup powdered sugar
2 spoons vanilla
2 flour
1/2 cup Hammons Black Walnuts, finely chopped/ground

HAMMONS. BLACK WALNUTS
Since 1946

Food Business News, 2/19/2021

Consumer Interest in Sustainability is Still Growing.

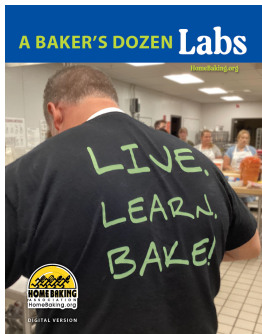
By Sam Danley Research Source, C.O.nxt, and Menu Matters

Ingredient Sciences

Flours...Leavening...Sugars...Fats...Liquids...Salt

Flour is NOT Just Flour

What types of flour are you familiar with?



Lab 3, Baking Science:
English Muffin Bread



Functions of Flour

- Forms structure of product
- Determines color, texture, and eating properties of baked food
- Viscoelastic properties, retains gas (bubbles)
- Absorbs water in dough or batter



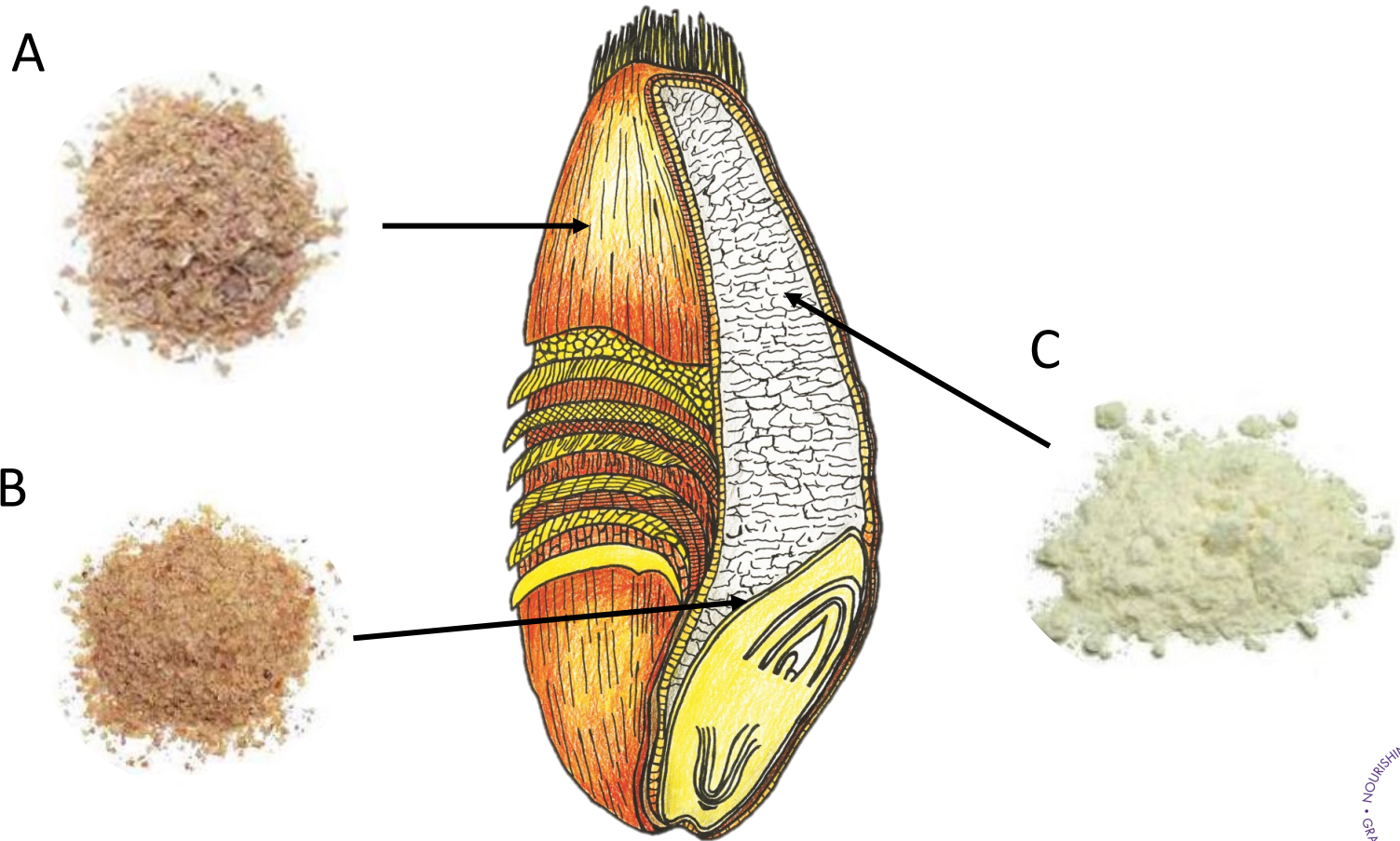
Start with Wheat

- Why should a baker care about wheat?
 - Flour comes from wheat
 - All wheat is not created equal
 - Therefore all flour is not created equal



Kernel of Wheat

- What are the 3 main parts of the wheat kernel?



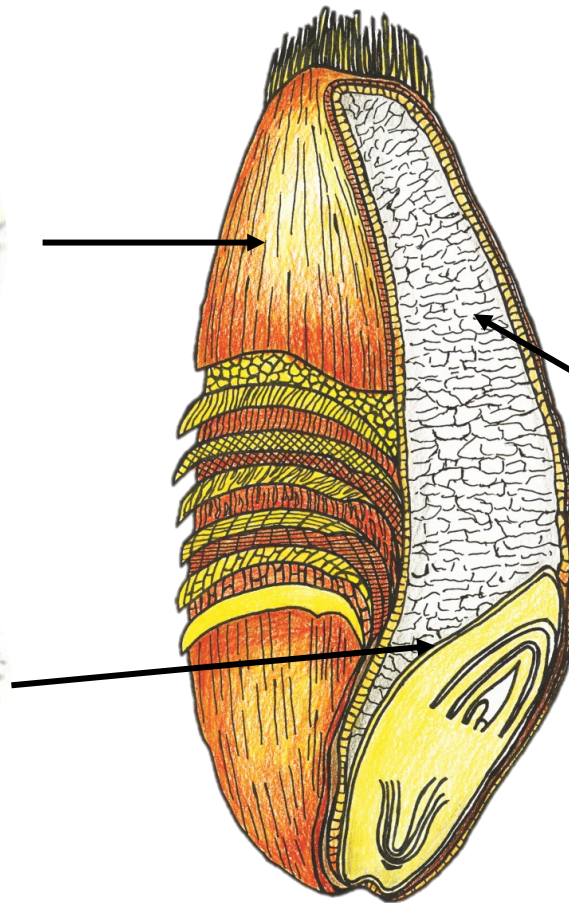
Kernel of Wheat

- What are the 3 main parts of the wheat kernel?

A – Bran



B - Germ



C - Endosperm



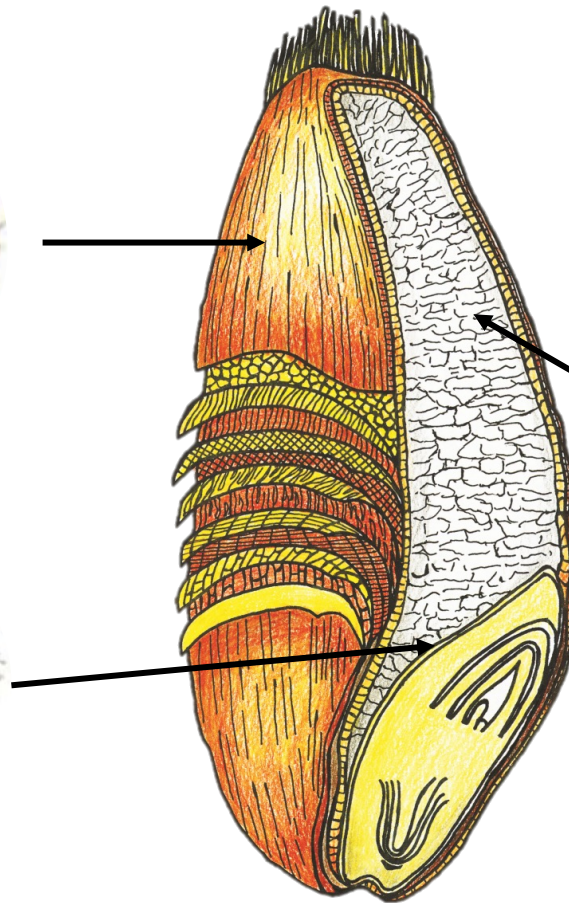
Kernel of Wheat

- Which part is the primary source of white, refined, wheat flour?

A – Bran



B - Germ



C - Endosperm



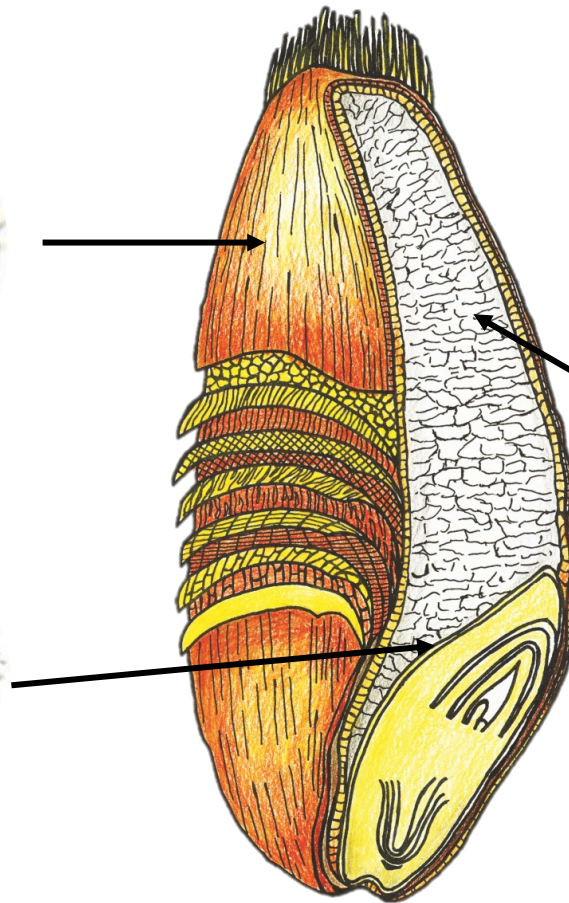
Kernel of Wheat

- Which part is the primary source of white (bleached or unbleached), enriched, wheat flour?

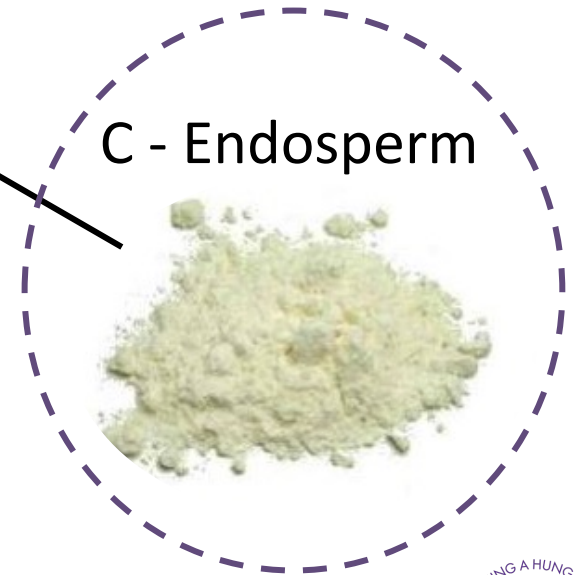
A – Bran



B - Germ



C - Endosperm



Wheat Classifications

- US wheats are grouped into classes by:
 - Kernel hardness
 - Hard vs. soft
 - Seed color
 - Red vs. white
 - Time of planting and harvesting
 - Winter vs. spring



U.S. Wheat Classes

HARD RED WINTER



Medium to high protein, medium hard endosperm, red bran, medium gluten content, mellow gluten. Used in pan breads, Asian noodles, hard rolls, flatbreads and general-purpose flour.

SOFT RED WINTER



Low protein content, soft endosperm, red bran, weak gluten. Used in pastries, cakes, cookies, crackers, pretzels and flat breads. Can also be used for blending.

HARD WHITE



Medium to high protein content, hard endosperm, white bran. Used in Asian noodles, whole wheat or high extraction flour applications, pan breads and flat breads.

HARD RED SPRING



Highest protein content, hard endosperm, red bran, strong gluten, high water absorption. Used in pan breads, hearth breads, rolls, croissants, bagels, hamburger buns, pizza crust and for blending.

SOFT WHITE



Low protein, low moisture wheat, soft endosperm, white bran, weak gluten. Used in pastries, cakes, biscuits, crackers, flat breads, Asian-style noodles and snack foods.

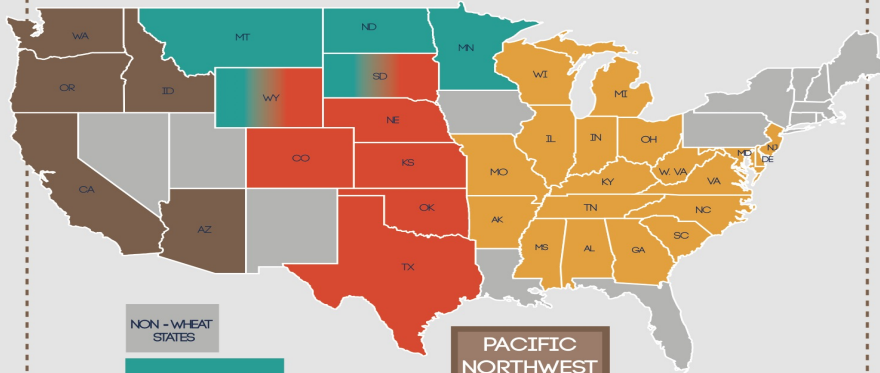
DURUM



Hardest of all wheats, high protein content, yellow endosperm, white bran. Used to make pasta, couscous and some Mediterranean breads.



WHERE OUR WHEAT GROWS



NON - WHEAT STATES

NORTHERN
HARD RED SPRING
HARD RED WINTER
DURUM

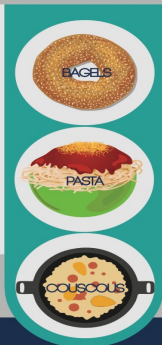
GREAT PLAINS
HARD RED WINTER
HARD WHITE WINTER
SOFT RED WINTER

PACIFIC NORTHWEST

SOFT WHITE WINTER
SOFT WHITE SPRING
HARD WHITE WINTER
HARD RED WINTER
HARD RED SPRING
HARD WHITE SPRING
DURUM

EASTERN
SOFT RED WINTER
SOFT WHITE WINTER

KEY PRODUCTS



ACREAGE

19,225,000 5,479,000
24,211,000 5,390,000

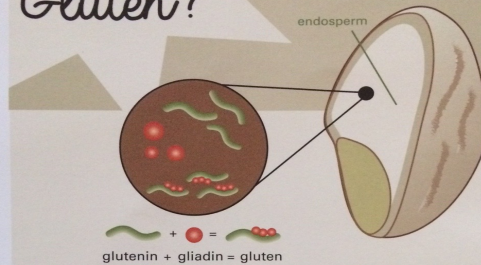
*ACREAGE REPORTED IN 2010

SOURCES:

NATIONAL ASSOCIATION OF WHEAT GROWERS, [HTTP://WWW.WHEATWORLD.ORG/WHEAT-10/WHEAT-PRODUCTION-MAP/](http://www.wheatworld.org/wheat-10/wheat-production-map/)
VECTEEZY, [HTTPS://WWW.VECTEEZY.COM](https://www.vecteezy.com)

What is Gluten?

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



Gluten-free items may contain more calories and sugars, so...

a *gluten-free* diet may cause you to *gain weight*!



1%

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

Around *one percent* of Americans have celiac disease.

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



INGREDIENT SUBSTITUTION guide

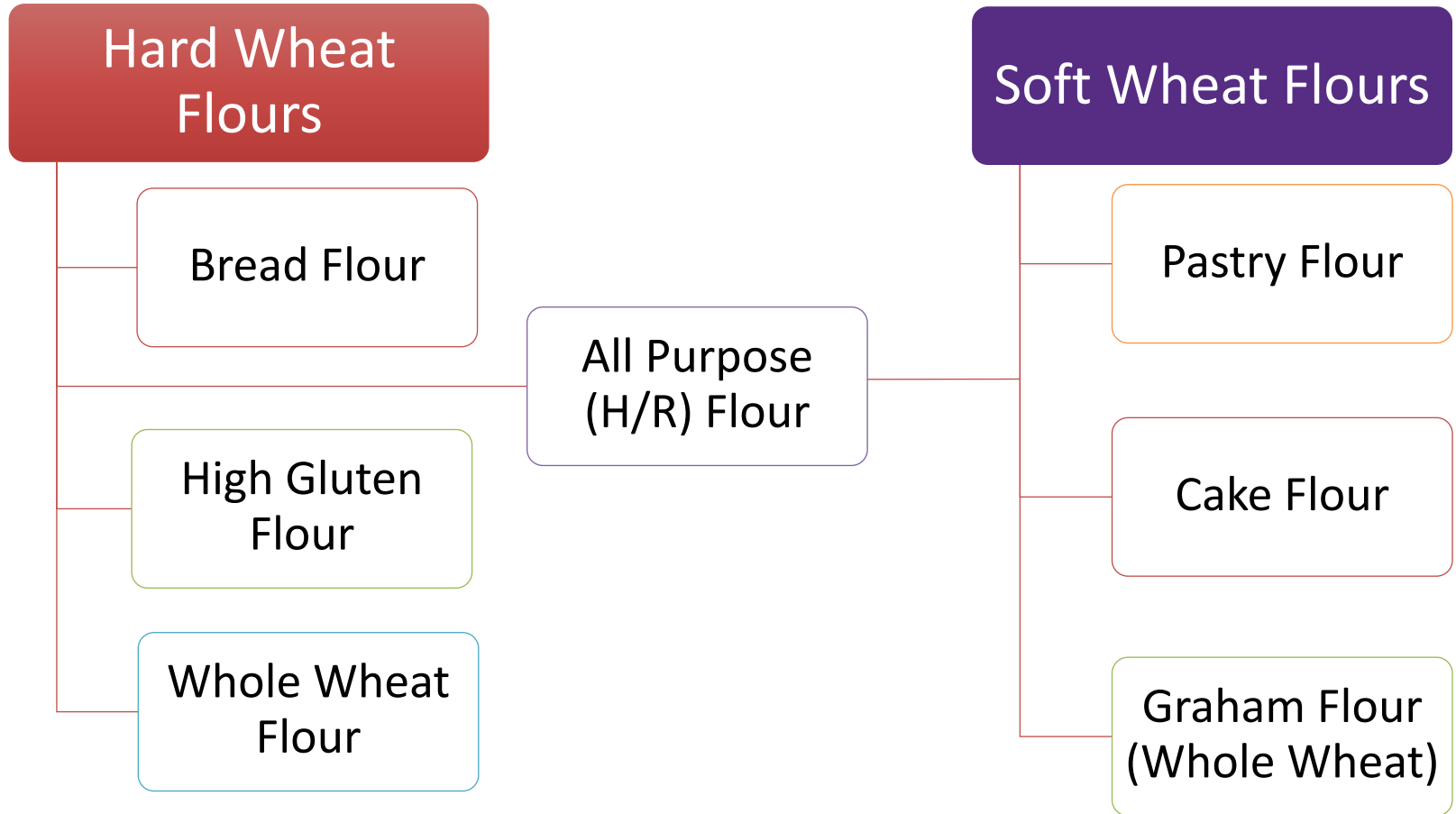
1 cup all-purpose flour	1/2 cup all-purpose flour + 1/2 cup whole wheat flour
1 cup all-purpose flour	1 cup + 2 Tbsp. cake flour
1 cup cake flour	3/4 cup (1 cup minus 2 Tbsp.) all-purpose flour + 2 Tbsp. corn starch
1 cup self-rising flour	1 cup cake or all-purpose flour + 1 1/2 tsp. baking powder + 1/2 tsp. salt
1 cup self-rising cornmeal	1/2 cup + 3 Tbsp. white or yellow cornmeal + 1 Tbsp. baking powder + 1/2 tsp. salt
1 pkg. (1/2 oz.) active dry yeast	2 1/2 tsp. (1/2 oz.) fast-rising yeast or 1 (1/2 oz.) cake compressed yeast
1 tsp. baking powder	1 tsp. baking soda + 1/2 tsp. cream of tartar
1 cup honey	1/2 cups sugar or 2 cups powdered sugar + 1/2 cup liquid
1 cup buttermilk or sour milk	1 Tbsp. lemon juice or vinegar plus milk to make 1 cup; stir and let stand 5 minutes or 1 cup plain yogurt thinned with milk
1 cup whole milk	1 cup skim milk + 2 Tbsp. melted butter or margarine
1 cup sour cream or crème fraîche	1 cup 2% or 10% plain Greek-style yogurt
1 Tbsp. cornstarch	2 Tbsp. all-purpose flour or 4 tsp. quick-cooking tapioca
1 cup packed brown sugar	1 cup white granulated sugar creamed with 2 Tbsp. molasses
1 ounce unsweetened chocolate	3 Tbsp. unsweetened cocoa plus 1 Tbsp. shortening
1 large egg	2 egg whites + 1/2 tsp. vegetable oil or 1 Tbsp. milled flax + 3 Tbsp. water or 1/4 cup soft tofu

(quick breads and cookies only)

HomeBaking.org • Tel. 785.478.3283



Types of Flour



Baking Science Experiment: Flour Absorption and Gluten Development

Question to test:

What difference(s) will you observe when substituting different flours one-for-one with all-purpose flour in a mixture?
Control: Mix each type of flour/water mixture for the same amount of time and at the same speed.

Student name(s): _____ Lab: _____ Date: _____

Our lab compared all-purpose flour with _____ flour _____ flour _____ flour

Hypothesis: _____

Lab Supplies:

- ☐ Choose 4 or more flours

Use 1/2 cup (2 oz. or 55 grams) of each flour

- ☐ All-purpose flour (bleached, unbleached)
- ☐ Cake or pastry flour
- ☐ Bread flour
- ☐ Whole wheat flour (hard red or white OR pastry/soft wheat)
- ☐ Corn starch
- ☐ Cornmeal, yellow or white
- ☐ Rye, barley, oat, sorghum, rice or other non-wheat flour
- ☐ Ultragrain® flour ultragrain.com
- ☐ Water (3 oz./85 ml)
- ☐ Measuring cups or scales
- ☐ Four or more bowls and electric mixers (use standard beaters, not dough hook).

Basic Experiment: What to do.

1. Scoop each type of flour out of its bag and into a separate bowl; label.
2. Stir each flour or cornmeal with a large spoon to "fluff" or unpack the particles.
3. Spoon flour into a 1/2 cup dry measuring cup, heaping it up, then level it off (do not pack, shake or push down on the flour in the cup); **OR**, use an ingredient scale and weigh 2 oz. or 55 grams of each flour.
4. Put each type of flour in a medium mixing bowl. Label with flour name. Use a liquid measuring cup or beaker, placed on a flat surface. Add 3 oz. (85 g/100ml) cold water.
5. Mix each flour and water mixture on LOW speed 1 minute; record observations. Continue mixing on MEDIUM speed 2 minutes. Record observations. **Be consistent in mixing speed and time.**

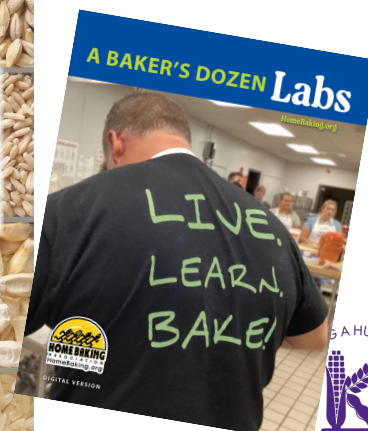
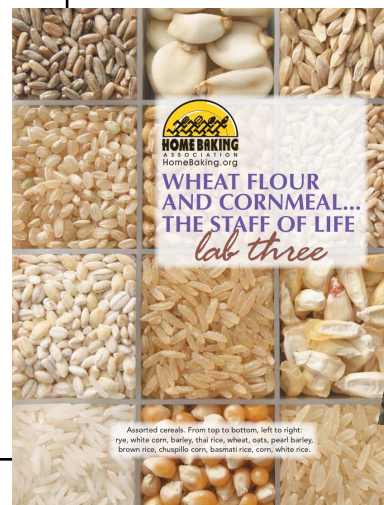
1, 2, 3 Report:

1. List the flour type(s) your lab compared.
2. Describe the differences found in the mixtures after 1 minute mixing and 3 minutes total mixing.
 - Use descriptions such as: how fluid or stiff; development of batter structure (gluten strands developing, lumpy, no strands), how much water was absorbed (stiff, fluid, medium stiff) batter/dough strength (hard to mix, not hard to mix)
3. Use the **Flour Chart** and the **Need to Know Flour Basics**, (p. 8) to help you hypothesize what differences you'll observe.

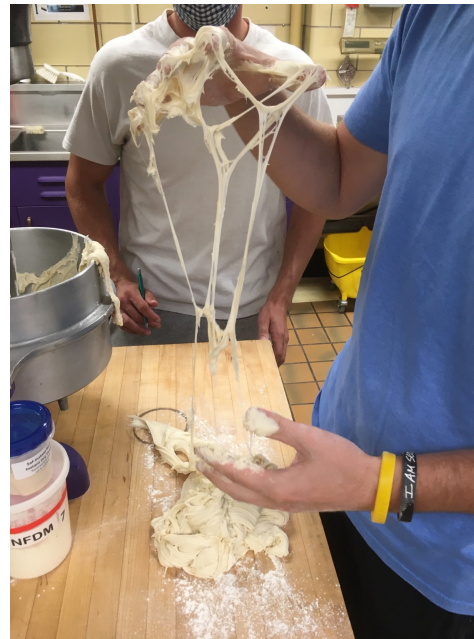
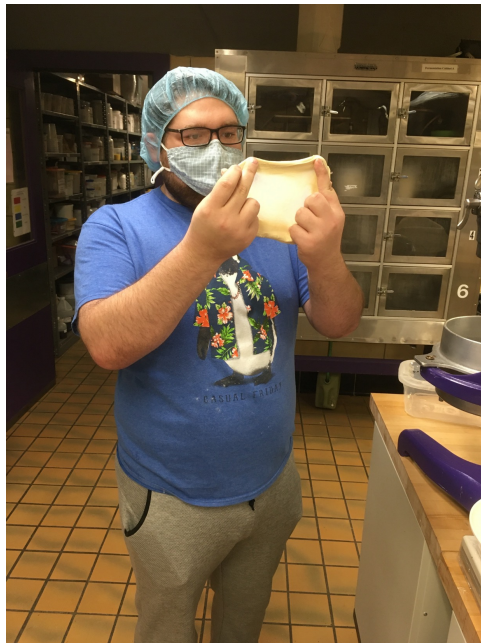
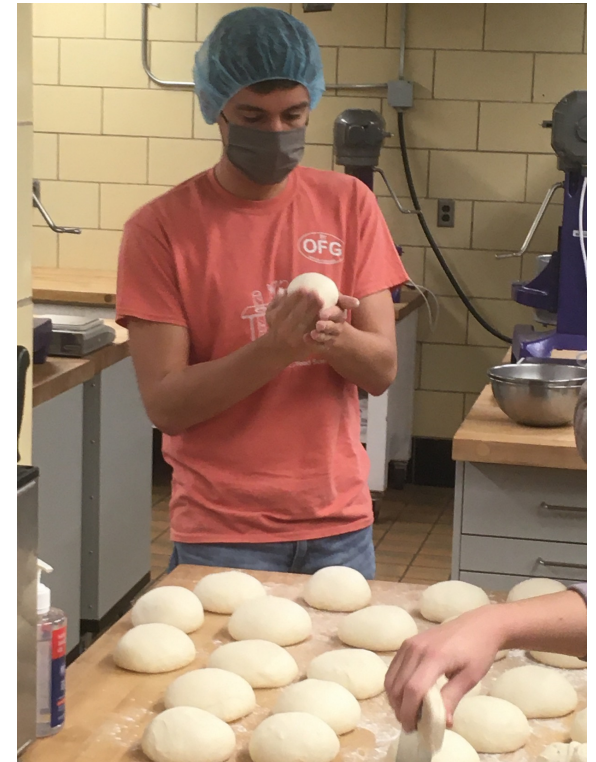
	One Minute Mixing	Three Minutes Mixing
Bowl 1: All-purpose flour (Control)		
Bowl 2: _____ flour		
Bowl 3: _____ flour		
Bowl 4: _____ flour		

Based on gluten structure developing as you mix, which flour is

1. Bread flour
2. All-purpose flour
3. Cake flour
4. Pastry flour
5. Whole red wheat
6. Whole white wheat

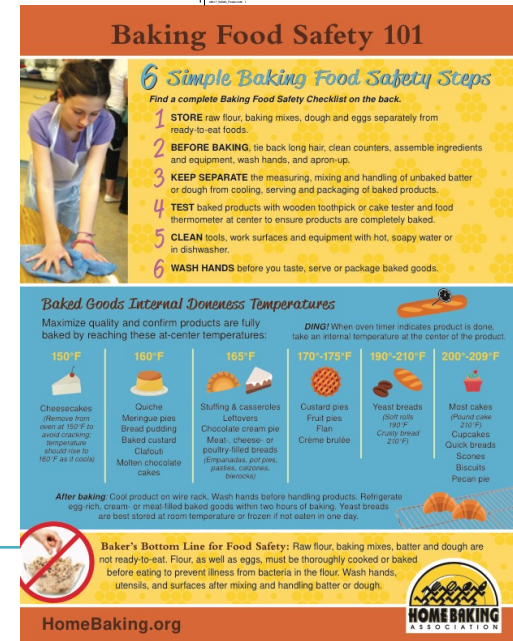


Baking Science Classes



Flour Food Safety Needs

HomeBaking.org/baking-food-safety/



Wheat, Corn, Oat and Milling Science: View wheat from Field to Table

https://www.youtube.com/watch?v=Kn-D_BiuOvU

How wheat is milled into flour, Flour Food Safety, <https://namamillers.org/consumer-resources/>

Blueberry Mug Muffin Baking Food Safety Lesson, www.HomeBaking.org/baking-food-safety/

Key Messages

Say No to Raw Dough

[Español](#) | [Print](#)

What You Need to Know

- Don't taste or eat raw (unbaked) dough or batter.
- Don't let children handle or play with raw dough, including play clay and dough for crafts.
- Uncooked flour and raw eggs can contain germs that can make you sick if you taste raw dough.
- Wash your hands, bowls, utensils, and countertops after handling raw flour, eggs, or dough.



[Read Harlee's story](#) to find out what happened when she got an *E. coli* infection from eating raw batter.



Raw Dough's a Raw Deal and Could Make You Sick

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[f Share](#)

[t Tweet](#)

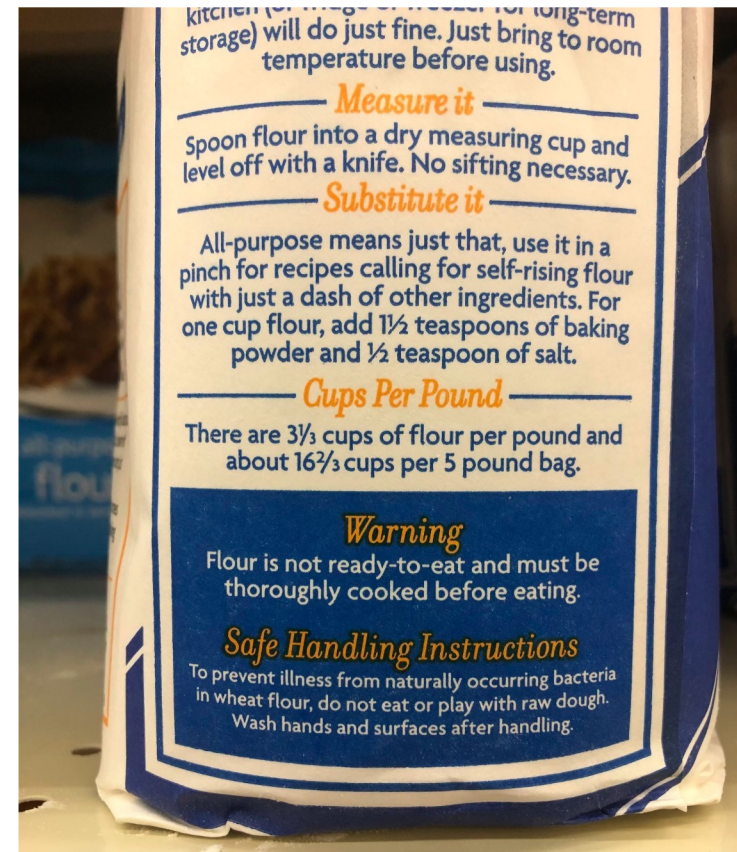
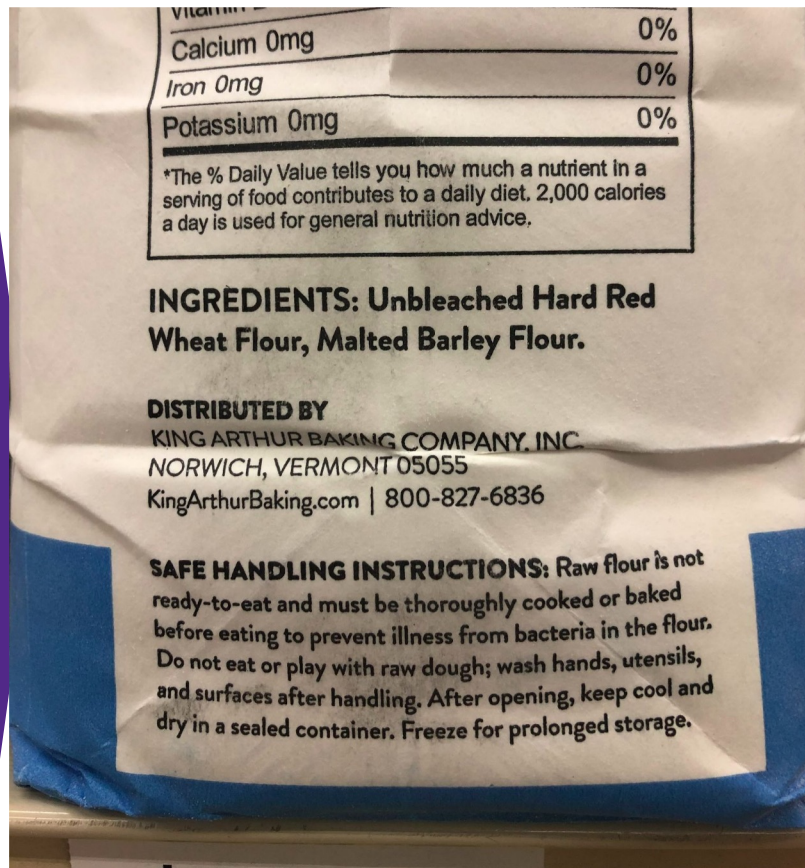
[e Email](#)



5 Important Things to Know About Flour

1. Flours most commonly used in home baking and cooking are made directly from raw grains.
2. Processing raw grains into flour does not kill harmful bacteria.
3. Many foods made with flour also contain raw eggs, which may contain harmful bacteria.
4. Cooking is the only way to be sure that foods made with flour and raw eggs are safe.
5. **Never eat or taste raw flour, dough, or batter.**





Identify some key reasons these labels have consumer compliance issues.



Partnership for
Food Safety
Education

Together: A Food Safe America

Hot Chocolate Cookies



SAFE
RECIPE
STYLEGUIDE



saferecipeguide.org

INGREDIENTS

- 1/2 cup unsalted butter
- 12 oz semi-sweet chocolate chips
- 1/4 cup Gerken's® Aristocrat Dutch Processed Cocoa Powder
- 1-1/2 cups all-purpose flour
- 1-1/2 tsp baking powder
- 1/4 tsp salt
- 1-1/4 cup light brown sugar, packed
- 3 large eggs, room temperature
- 2 tsp pure vanilla extract
- 8 oz dark chocolate, cut into 1/2" squares, plus more grated for garnish
- 12 large marshmallows, cut in half

INSTRUCTIONS

1. Wash hands with soap and water.
2. Combine butter and semi-sweet chocolate chips in a small sauce pan over medium-low heat. Stir constantly until chocolate is melted and smooth. Remove from heat and let cool for 10 minutes.
3. In a medium mixing bowl, whisk together cocoa powder, flour, baking powder and salt until combined.
4. In a large mixing bowl, beat brown sugar, eggs and vanilla on medium speed until smooth. Add cooled melted chocolate and beat until just combined. Add flour mixture in batches, beating on low speed until just combined, stopping to scrape down sides of bowl as needed. Wash hands with soap and water.
5. Don't eat raw dough or batter.
6. Cover and chill dough in refrigerator for 1-2 hours.
7. Wash hands with soap and water.
8. Preheat oven to 325°F. Line two baking sheets with parchment paper. Remove dough from refrigerator and scoop dough into 2-tablespoon sized mounds onto prepared baking sheet, spacing cookies 2-3 inches apart. Flatten cookies slightly. Wash hands after handling raw dough.
9. Bake cookies 10 minutes, until tops start to crack. Remove from oven and place a square of dark chocolate onto the center of each cookie. Top the dark chocolate with the marshmallow halves, cut side down, pressing down slightly into cookie. Return to oven for 4-5 minutes, until marshmallows soften.
10. Remove cookies from oven and let cool on baking sheet for 5 minutes before transferring to wire rack to cool completely. Top cookies with shaved dark chocolate and serve immediately.
11. Store in an airtight container for up to 1 week.

NOTES

This recipe was developed using the Safe Recipe Style Guide at SafeRecipeGuide.org.



Heat Is An Ingredient



And carefully measuring how much you add is the key to baking success for students and their families.

Use a digital thermometer to measure your **ingredient and process temperatures...**



Cutting in Butter
35 to 40°F



Creaming Butter
68 to 70°F



Dry Blend Yeast
(Water Temp)
120 to 130°F



Blooming Yeast
(Water Temp)
105 to 115°F

Use a digital thermometer to verify your **doneness temperatures...**



Cheesecake
145 to 150°F



**Quiche/Custard/
Cream Pie**
160 to 165°F



Brioche
180 to 190°F



Bagels
185 to 195°F



Sourdough
190 to 210°F



Yeast Breads
190 to 210°F



Rich Cake
200 to 205°F



Muffins
205 to 210°F



Light Cake
205 to 210°F

Measuring Baking Temperature

With ThermoWorks' Chef Earl Martin

[Learn more](#)



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

We need more Consumer & Food Science...

Critical thinking skills re: on-line information.

STILL out there...Cooking Light Magazine, Sara Tane— July 29,2016
<http://www.cookinglight.com/eating-smart/smart-choices/safe-to-eat-cookie-dough>

How you can safely eat raw dough...millions of hits...books

“Frequent flour recalls are starting to make everyone’s favorite part of cookie making (licking the bowl clean) seem life-threatening.

However if you take the time to toast your flour before

Using it in your recipe you not only kill any lingering

Bacteria, like E.coli, also adds delicious nutty flavor from toasting process.”

Provided pictorial step-by-step how-to, plus finished cookies to prove it didn’t change baking properties...



2 cups flour
Cookie sheet
350° F.
5 minutes



Related Key Messages



"Microwaves are an inconsistent way to heat food products. The low moisture in flour magnifies these inconsistencies and makes it difficult to reliably kill pathogenic microorganisms."



- Dr. Gordon Smith
Kansas State University
Grain Science & Industry Department

Leavening

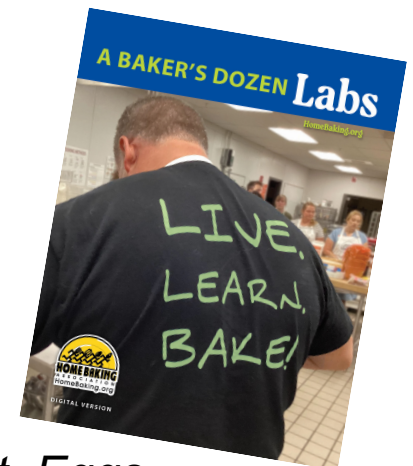
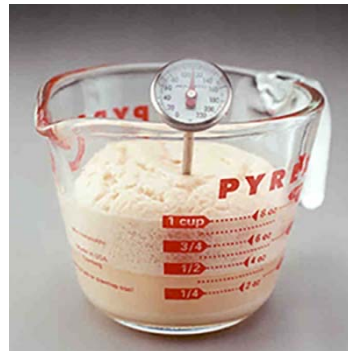
Leavening creates space in batter or dough- physically or with gas so the product will rise and/or have a light texture and bake evenly throughout.

Physically adding air (creaming, beating)

OR, an ingredient that adds, holds or produces gas in a dough or batter.

Leavening agents in baking are:

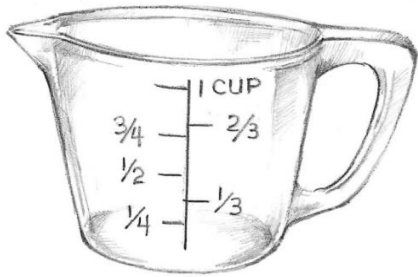
- Eggs
- Air
- Steam (heat + moisture in batter/dough)
- Baking Powder
- Baking Soda
- Cream of Tartar
- Yeast



Much more: A Bakers Dozen Labs, Lab 4, 6, 8- *Creating Lift, Yeast, Eggs*

Creating “Lift”

What feeds the yeast?



CONTROLS:

- 2 ¼ teaspoons (7g) quick rise dry yeast
- ½ c. (4 oz) 110°F -115°F water
- Fermentation time: 10 minutes

VARIABLES:

- #1: 1 teaspoon sugar
- #2: 1 teaspoon flour
- #3: 1 teaspoon salt
- #4: 1 teaspoon cinnamon



Sweeteners

Sugar

Agave

Stevia

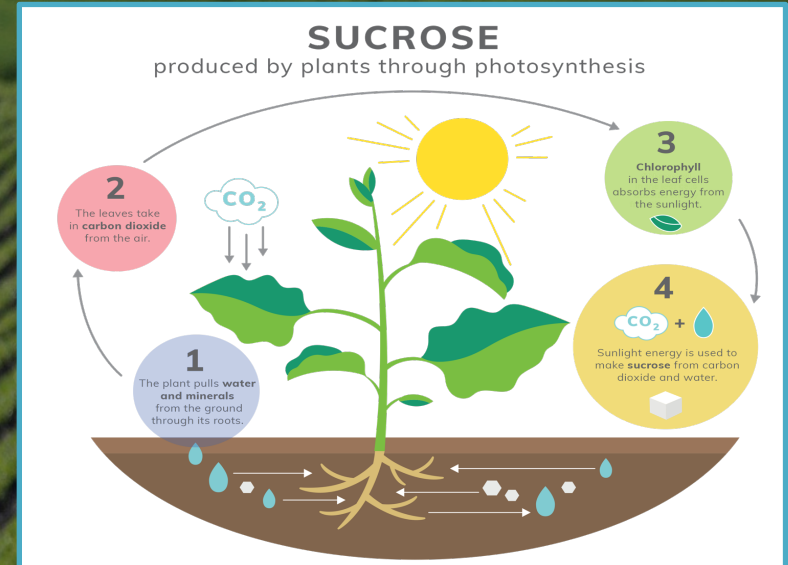
Honey

Molasses

Sorghum

*Is sugar a
NATURAL
ingredient?*









sugar is a
product of
photosynthesis

P. Courtney Gaine, PhD, R.D.

Where Does Sugar Come From?

6 QUICK FACTS

-  Cane Refinery Location
-  Sugarbeet Factory
-  Sugarbeet Growth
-  Sugarcane Growth

1

Sugar is grown and/or refined in **17 states** across the U.S.

2

Sugar beets grow best in places where the **temperatures are generally cooler.**

3

At sugar beet factories and sugar cane refineries across the country, the sugar from the plants is **purified into the sugar** shipped to grocery stores and food manufacturers.

5

Sugar beet factories are located near the farms to **shorten the distance farmers need to travel** with their beets.

6

Some raw **cane sugar** is also imported to the U.S. for refining.

4

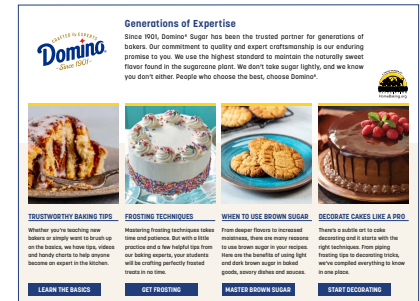
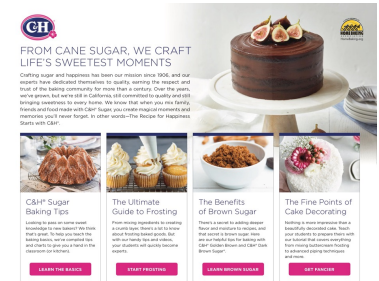
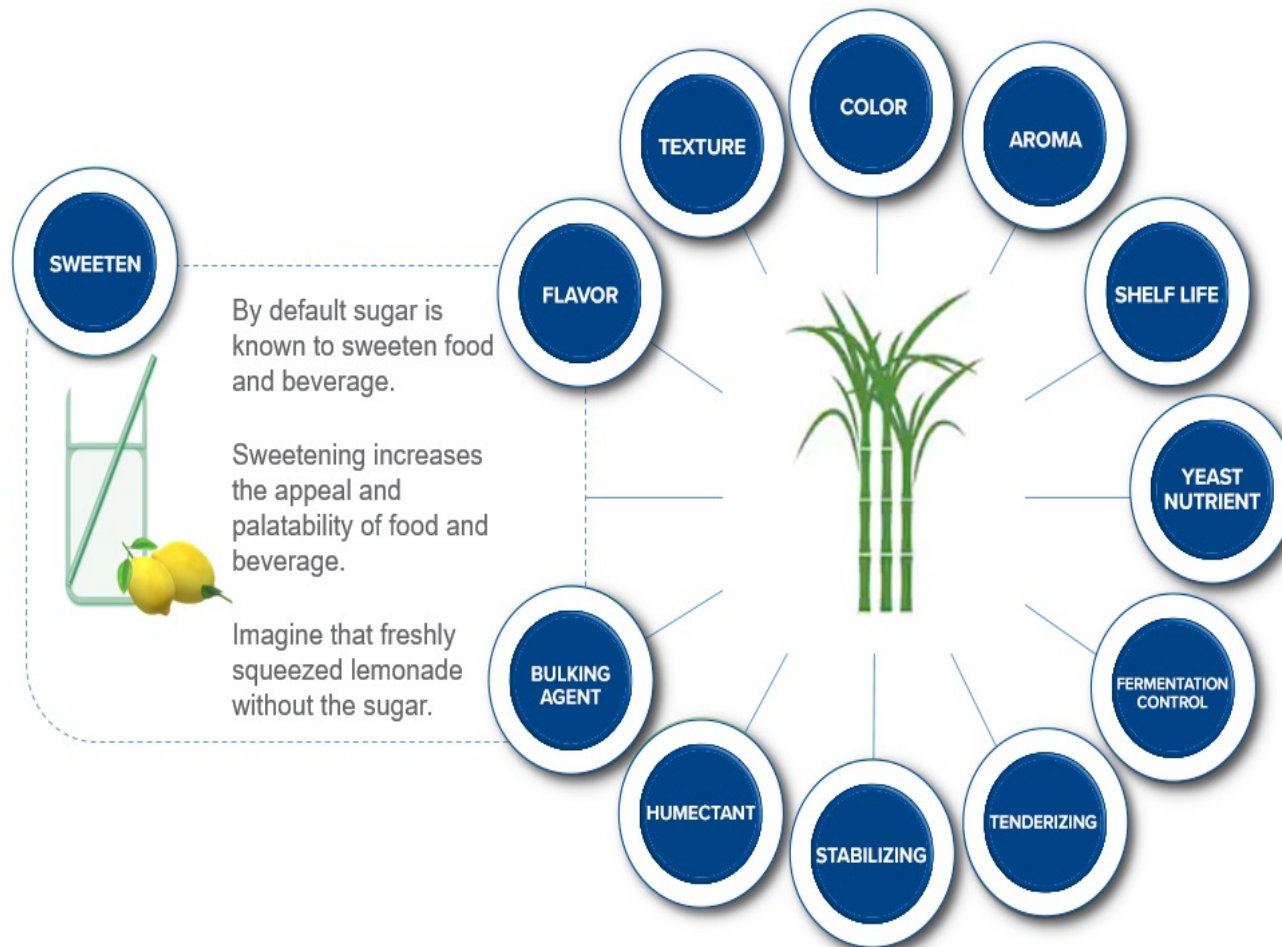
Sugar cane is grown in **warmer, tropical climates.**



STEAM Materials for Grades 7-12
K-12 Science, Technology, Engineering, Art and Math

[Resources | The Sugar Association](#)















Functional Properties of Sugar in Food and Beverage



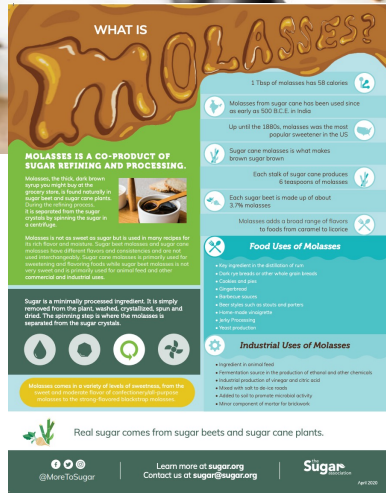
Download live-linked
Best Baking Guides
at HomeBaking.org



SUGAR'S FUNCTIONAL ROLES IN FOOD BEYOND SWEETNESS

		FLAVOR ENHANCER/ BALANCER, AROMA	BULK	TEXTURE/ MOUTHFEEL	SHELF-LIFE/ MICROBIAL STABILITY	FERMENTATION	FREEZING POINT DEPRESSION	COLOR	MOISTURE RETENTION
Dairy Products		●	●	●		●			
Whole-Grain, Fiber-Rich Breads & Cereals		●	●	●	●	●		●	●
Breads		●	●	●	●	●		●	●
Bakery Products		●	●	●	●			●	●
Salad Dressings, Rubs and Sauces		●	●	●	●				
Preserves & Pickling		●	●	●	●				
Jams & Jellies		●	●	●	●			●	
Canned Fruits & Vegetables		●	●	●	●			●	
Prepared Foods		●	●	●	●			●	●
Beverages		●	●	●	●				
Frozen Beverages		●	●	●			●		
Fermented Beverages		●	●	●		●			
Ice Cream		●	●	●			●		
Confectionery		●	●	●	●			●	●

All About Brown Sugar



- Produced from sugar cane molasses
- Sugar beet molasses is not for “food use”

Delivers

- Sweetness
- Color
- Flavor from molasses mixed with sugar crystals- dark, light, golden
- Moisture
- Complex flavors, micro-nutrients



Explore field to oven science and baking properties, recipes

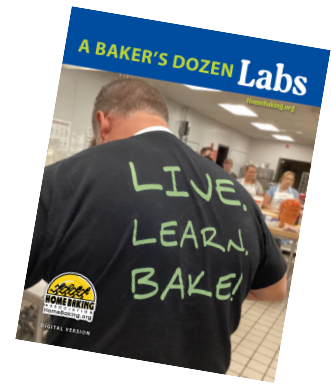
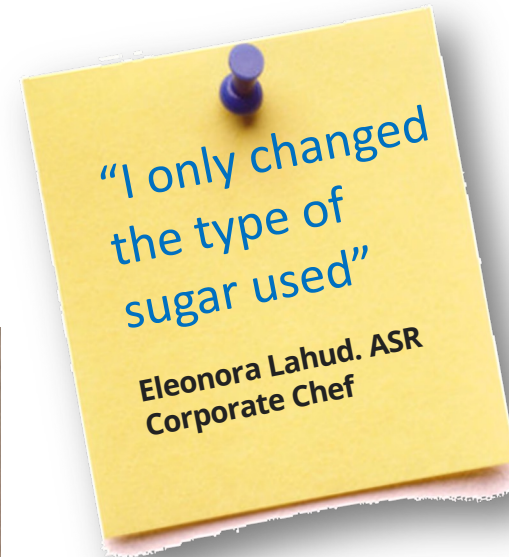
<https://www.chsugar.com/brown-sugar>

<https://www.dominosugar.com/brown-sugar>

[Sugar Resources for Educators | The Sugar Association](#)

Baking Science:

Sugar Applications in Cookies



Different types of sugars contribute to different characteristics in cookies. From adding distinctive flavor to acting as a humectant to help retain softness in special cookie varieties

- Variable in sucrose which most affects cookie production – ***granulation and amount of sugar in the formula***
- The coarser the granulation, the greater the spread of the cookie
- Less granulation (finer) tends to cause less spread since the sugars are completely dissolved in water
- Lab 7, Sweet! – Cookie Science PPT

Fats



Butter, solid shortening, margarine, oils (liquid at room temperature)

- Animal Source
 - Pork (lard)
 - Beef (tallow)
 - Milk (butter)
- Vegetable Source
 - Soybean (most common in US)
 - Cottonseed
 - Sunflower
 - Canola
 - Palm

TEMPERATURES matter

Melting point...creaming...cutting in...browned

Function

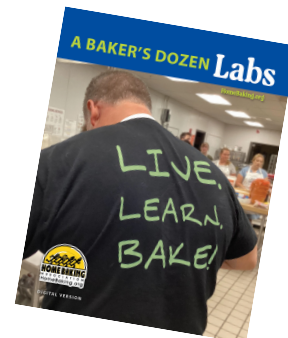
- Tenderizes product (primary)
- Aeration – entraps air during mixing to enhance cell structure development

Effects

Enhances mouth feel

Adds flavor (butter vs shortening)

Lubricates dough during forming



Lab 5, Flavor
Factor, Fats

Technology

Control processes, ingredients, time, temperatures
Essential for mixing, food safety, end quality, storage



Quality Baking Temperatures video, Chef Martin Earl

<https://www.thermoworks.com/home-baking-association>

EXAMPLES at home

- ✓ Creaming fats
- ✓ Cutting in fats
- ✓ Flour types for end products
- ✓ Rolling pastry, scones, cookie dough
- ✓ Beating egg whites or yolks
- ✓ Yeast fermentations
- ✓ Oven
- ✓ Product doneness = end quality
- ✓ Food Safety– no raw dough; internal temps
- ✓ Storing baked goods– less staling
- ✓ Freezing dough; baked goods



Milling Quality Labs



Pizza Dough Problem Solving Checklist

- ✓ When did the problem first occur?
- ✓ Are all ingredients weighed?
- ✓ Is the formula and method written down?
- ✓ Have employees been trained?
- ✓ What is the dough temperature?
- ✓ Is all the equipment calibrated?
- ✓ Is the dough properly rotated?

*Still having problems?
Call 1-800-361-6259 to
speak with a Technical
Solutions representative
today!*

 **Ardent Mills**
www.ardentmills.ca

GRAIN  CRAFT

The Science of Flour Milling



Looking for a scientific career? Students can study bakery science, feed science, or milling science at a university. Workers in these fields are in high demand throughout the food production industry!



Scan below to visit the North American Millers' Association website and learn all about flour milling!



GRAIN  CRAFT

graincraft.com/careers

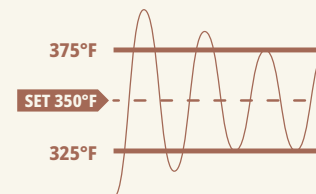
Ovens, DO Preheat

The Temperature and Time Connection

- Preheat oven – after the beep, wait 15 minutes to ensure oven has actually preheated
- Use an oven thermometer
- Type of pan matters!

Preheat Your Oven

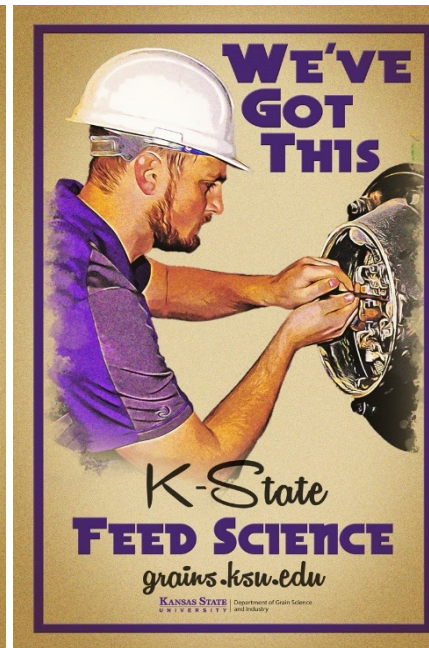
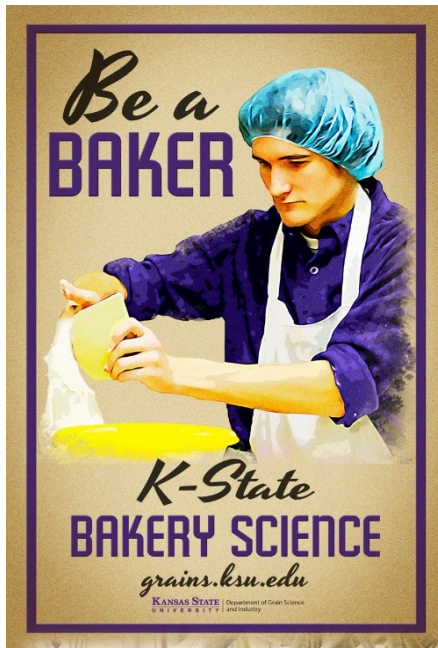
Giving your oven time to preheat is a critical, and often overlooked, step to becoming a successful baker. All ovens fluctuate above and below their set temperature. These fluctuations are large at first and settle down as the oven warms up. Be sure to let your oven preheat fully and wait an additional five minutes before baking.



ThermoWorks, Inc.
Utah, USA
801-756-7705
thermoworks.com

Engineering

Home bakers to careers



American Society of Baking, www.asbe.org
International Association of Operative Millers
www.iaom.org



Packaging for the times.



Plant-based
Compostable
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let's start kicking fossil fuels to the curb

Our good.natured® certified bakery packaging is 99% plant-based, contains no BPAs or other nasty chemicals and won't cost you an arm and a leg. Imagine that!

good.natured
better everyday products

No BPAs, phthalates or other nasty stuff

99% annually renewable plant-based materials

Up to 60% reduction in CO₂ emissions

♥ we've got it covered
♥ they've got it too
♥ well... not always

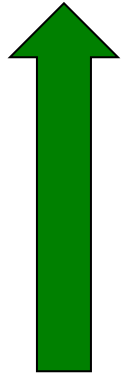
Feature	Our Stuff	Petro Plastic	Paper & Fiber	The Deets
Performance	♥	♥		As good or better than petro plastic, and 100% soggy-proof, unlike paper options.
Visibility	♥	♥		It's crystal clear. Your products will be so exposed, they'll blush. :-)
Contains no phthalates, BPAs, or other chemicals of concern	♥		♥	There's nasty stuff lurking in everyday food packaging. Fiber isn't always better.
Made from 99% annually renewable materials	♥		♥	Our raw ingredients grow back every year, not every kazillion years or so.
Lower CO ₂ emissions	♥		♥	Up to 60% reduction from cradle to gate. Processing fiber takes tons of water and energy, btw.
Recyclable	♥	♥	♥	We use up to 35% recycled material in our packaging.
Compostable	♥		♥	Breaks down within 180 days in an industrial composting facility. Surprise, not all fiber is compostable!
Made in North America	♥	♥	♥	Made close to home, which helps CO ₂ emissions too.

Want to learn more about our packaging and pricing?

1-877-286-0617 orders@goodnaturedproducts.com goodnaturedproducts.com



World Baking Market



Annual revenue
growth 2014-
2019 4.2%
4.8% projected
2019-2024

In 2019, 2,229,698
people were employed
globally in baking
With \$50 billion in
wages



127,329
locations
representing
82,378
companies



ON THE RISE

Careers in the
Wholesale Baking Industry

The wholesale baking industry mixes tradition and innovation to feed the world and the economy - generating some major dough while providing employment to over 1 million people in the U.S.



THERE ARE ENDLESS OPPORTUNITIES FOR YOU IN THE BAKING INDUSTRY

- Positions with baking companies, equipment manufacturers, ingredient suppliers, and milling companies include:
- Accounting/Finance
 - Administrative
 - Engineer
 - Food Safety Manager
 - Front Line Management
 - IT Professional
 - Line Production
 - Maintenance Mechanic
 - Miller
 - Plant Safety
 - Professional Driver
 - Quality Assurance Technician
 - Shipping/Distribution Professional

THE BAKING
INDUSTRY
EMPLOYS OVER
**1 MILLION
PEOPLE**

SEEKING MOTIVATED
LEADERS OF ALL
SKILL SETS TO
HELP US
**FEED THE
WORLD**

YOU DON'T NEED TO
BE A BAKER TO
**FIND A
CAREER
IN THE BAKING
INDUSTRY**



CONTACT THE BAKING INDUSTRY ALLIANCE TO LEARN ABOUT POSITIONS IN YOUR AREA
cdonnelly@americanbakers.org 202-789-0300 x115
BROUGHT TO YOU BY THE BAKING INDUSTRY ALLIANCE



@KSUGRAINSCI

- Industry Support
- Internships
- High Starting Salaries
- Active Bake Club
- Scholarships



HIGH-DEMAND CAREERS IN
BAKERY SCIENCE AND MANAGEMENT

Industry Career Opportunities



Production



Bakery Owner /
Manager



QA/QC



R&D / Product
Development



Sanitation / Food
Safety



Distribution



Sales



Ingredient Supplier



Equipment Supplier



Maintenance



Engineering



MILLING SCIENCE AND MANAGEMENT



Interests

Engineering Operations
Innovation & Technology
Feeding the World
Hands-On Experiences
Management

Skills

Critical Thinking
Leadership
Scientific Analysis
Effective Communication
Analytical

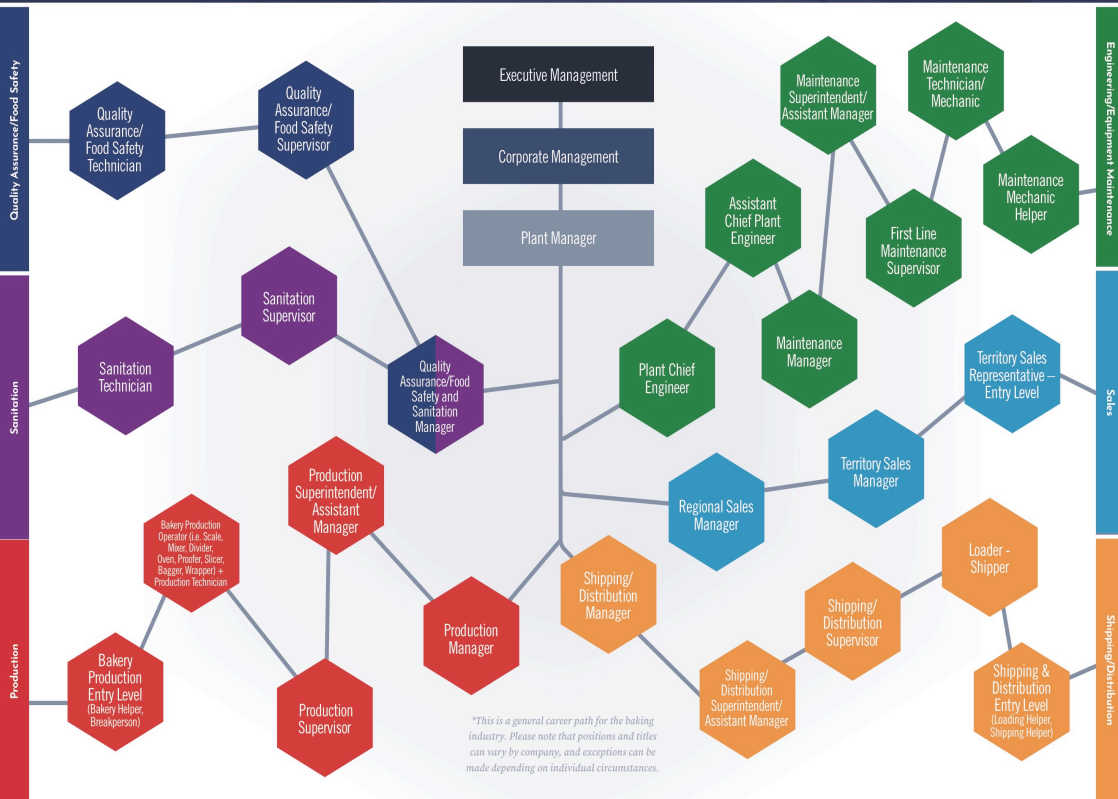
Possible Careers

Milling Operations Manager
Production Engineer
Quality Control Manager
Ingredient Procurement
Research & Development
Corporate Management
Equipment Engineering

BAKING WORKS

YOUR PATH TO A CAREER IN BAKING

Baking industry companies are hiring for thousands of jobs across the country. Where do you start your wholesale baking career? An individual's skill set, such as relevant manufacturing or baking-specific manufacturing experience, military background, technical training, and education level, may allow an applicant to start higher up the career path. One should consider their relevant skills and qualifications when referencing the baking industry career path.



The Bakers National Education Foundation provides video testimonials and connections to baking professionals
<https://www.futureinbaking.com/>

BAKING WORKS

YOUR PATH TO A CAREER IN BAKING

The baking industry has many career paths that all work together to create and deliver baked goods across the country. Each path has a special responsibility within the bakery.

Engineering/Equipment Maintenance	The engineering/equipment maintenance path is what helps keep the bakery operations running smoothly. The jobs in this path maintain building, machinery, and equipment to maximize efficient use of the bakery's production time.	Education level: This path requires an individual to have prior experience in the manufacturing sector or have received technical training and/or certifications. A candidate with a college degree or relevant military experience may qualify to start as a maintenance technician/mechanic position or higher.
Production	The production path is where the baked goods are made. The jobs in this path are responsible for executing the many stages necessary to create delicious and consistent baked goods for consumers.	Education level: A high school diploma or equivalent is preferred in an entry-level production position. A candidate with relevant prior manufacturing or military experience may qualify as a bakery production operator or production technician, or higher with prior manufacturing supervisory experience.
Shipping/Distribution	The shipping/distribution path handles the finished packaged baked goods and prepares them for shipping and distribution to the grocery retail and foodservice customers.	Education level: A high school diploma or equivalency is preferred in an entry-level shipping and distribution position. A candidate may qualify for a shipping distribution supervisor with relevant prior manufacturing or military experience.
Sales	The sales path handles the selling of products to existing and potential grocery retail and foodservice customers in the bakery's marketing area.	Education level: A high school diploma or equivalency is minimally required for a territory sales representative. Many of the positions within this path look for a relevant college degree.
Quality Assurance/Food Safety	The quality assurance/food safety path ensures the highest quality product is created. The jobs in this path implement food safety and quality programs consistent with corporate policies, industry standards, and regulatory requirements.	Education level: A high school diploma or equivalency is minimally required for a quality assurance/food safety technician. Many of the positions within this path look for a relevant college degree.
Sanitation	The sanitation path is responsible for ensuring and maintaining the highest cleaning standards of the bakery equipment and building.	Education level: A high school diploma or equivalency is minimally required for a sanitation technician. Some companies may require a relevant college degree or prior manufacturing experience.



BEYOND THESE IDENTIFIED PATHS ARE OTHER OPPORTUNITIES THAT ARE INTEGRAL TO BAKERY OPERATIONS

- Commercial Vehicle Driver
- Sales Route Professional
- Safety and Health
- Human Resources
- Finance/Accounting
- Informational Systems Technology
- Procurement & Sustainability

Explore Wholesale Baking Industry Career Opportunities at BakingWorks.org



Baker Top Qualities

Communication skills, team and leadership

Detail oriented

Math skills (basic)

Physical stamina; Physical strength

Problem solving

Top 3 Baking Skill deficiencies:

Same for bakers, maintenance/engineering and machine operators:

1. **Specific technical skills**
2. **Leadership skills**
3. **Problem solving/decision making skills**

The Workforce Gap US Commercial Baking. 2016



HBA Baking Immersion Tour, 2023

Dave Krishock

#BAkeACareer

#FutureInBaking

<https://www.futureinbaking.com/>



HBA Ed Award winner:

Delaine Stendahl,

Baking Science Labs, Whitehall H.S., WI



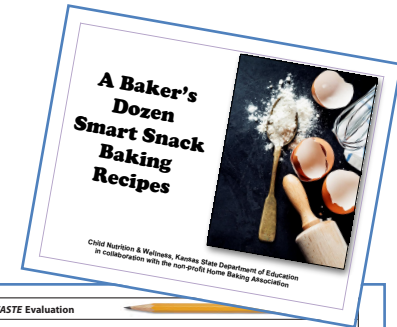
Plan Baking Labs, Purposeful Baking Projects

*to solve a problem, share experience or expertise, raise awareness
change behaviors.” Melinda Kolk, Creative Educator*

Apply Engineering Design Process Museum of Science in Boston

1. Identify problem--Do background research
2. Ideate- Construct a hypothesis how to accomplish
3. Plan—What will it take to make idea reality?
4. Create, measure results--Am I making progress?
5. No? What do I need to improve? Trouble shoot; re-test
Yes! Draw conclusions, communicate results
Cost, price, market

*Entrepreneurship Education... Meaningful Work-based Learning.
Techniques, January 2020.*



A MATTER OF TASTE Evaluation

Product name: _____ Age/Grade: _____ Date: _____

The food tasted: _____ very good _____ good _____ okay, but not my favorite _____ needs improvement

The food tasted: _____ sweet _____ bitter _____ salty _____ sour _____ not what I expected _____ just right

The color is: _____ great _____ too pale _____ too dark _____ not right for the product

The aroma (smell) is: _____ too strong _____ too weak _____ just right _____ not good

The product is: _____ too moist _____ moist _____ dry _____ crumbly

The food looks: _____ yummy _____ okay _____ not quite there yet

I would enjoy eating this food again: _____ yes _____ no _____ maybe

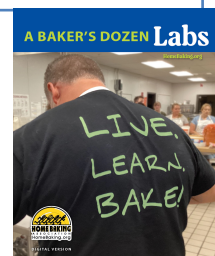
Comments: _____

HOME BAKING ASSOCIATION
www.homebaking.org

Baking Science Lab Variations Evaluation

LAB	TEXTURE	TENDERNESS	AROMA	FLAVOR	COLOR
LAB 1					
original					
LAB 2					
LAB 3					
LAB 4					
LAB 5					
LAB 6					

www.homebaking.org 4



Consumer Sensory analysis

Baking Labs @ Work



HBA/WA-FACSE
Baking STEAM
Workshop, 2023
New Tech Center
Spokane, WA

Pita Pocket Bread

Yield: 8 (2.75 oz/78g) pita

Ingredients	Measurement	Weight
Whole wheat flour	1 ¾ cups	6.25 oz/ 175g
Water, 80° F.	1 cup	8 oz/225 ml
Active dry yeast	2 ¼ teaspoons	¼ oz/7g
Salt	1 teaspoon	6 g
Olive or vegetable oil	1 tablespoon	3/8 oz/14g
Unbleached all-purpose flour	1 to 1 ¼ cups	4.25-5oz/120-140g

Nutrition Facts

Serving Size: 1 (78g)	
Calories 170	
% Daily Value	
Total Fat 1g	2%
Saturated Fat 0g	0%
Cholesterol 0mg	0%
Sodium 250mg	12%
Total Carbohydrate 34g	11%
Dietary Fiber 3g	12%
Sugars 0g	
Protein 0g	
Vitamin A 0%	Vitamin C 0%
Calcium 0%	Iron 10%

Directions:

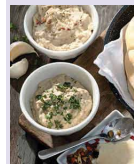
- Blend the whole wheat flour, water and yeast until well mixed, stirring about 2 minutes.
- Allow to stand, covered, about 5 minutes (until the dough begins to puff a little).
- Stir in the salt, oil and all-purpose flour, ½ cup at a time, until a rough, moist dough ball forms. Turn onto lightly floured counter, knead, adding only small amounts of flour while kneading.
- Knead until the dough is smooth, elastic and no longer needs flour to handle, about 5-7 minutes. NOTE: If too much flour is added and dough becomes too stiff, 1 tablespoon water may be kneaded in, repeating if needed, until the dough is moist and elastic.
- Place dough in a bowl, cover loosely with lid and let rest (ferment) 35-45 minutes in a draft free (78-82° F) place (unheated oven, cupboard, microwave oven).
- Punch down the dough. Form into a log and divide into 8 equal pieces. Shape these pieces into round, smooth balls (like dinner buns, see Lab 12) and cover with oiled or sprayed plastic wrap, or turn the bowl over them to prevent drying. Let rest 5-10 minutes.
- Place oven racks on bottom placements. Preheat oven to 475° to 500° F. (very hot). (This is not a mistake. In the mid-East, pita bake at 900° F.)
- Roll and flatten each round piece of dough until about 6-8 inches in diameter and ¼-inch thick. Let circles rest and re-roll if they spring back. Place on ungreased baking sheet pans, sprinkled lightly with cornmeal or parchment paper liners. Note: Another excellent option is to bake pita on heated baking stones. (Follow baking stone directions for use and care.)
- Bake very briefly—just until pita puff up, surface begins to brown and “freckle”—with color, two to four minutes. They will puff up and form the pocket as they bake.
- Cool pita on a wire cooling rack.

Source: Ethnic is Now. Sharon P. Davis, kswheat.com

Baker's Note: Do not open the oven door while baking—heat is lost and pita may not puff and form pockets. DO watch the pita puff with the oven light on through a glass door—it's great! If another pan is to be loaded and baked, be sure to let oven come back up to temperature before loading the next pita to bake.

Storage Tip: Pita are fresh only one day because they contain no sugar and little fat. (Wrap and freeze if not eaten the day they are baked.)

Have the class prepare Hummus to spread on their Pita! They may also learn to make Pita Chips – both at kingarthurfour.com/recipes/white-bean-hummus-recipe



Evaluating Pita

Have students label their lab's pita as “control,” “reduced salt,” or “no salt pita.”

Pita Lab Rubric

	Very acceptable	Okay	Improvement needed
Top and bottom crust	Evenly golden Not burned or pale	Edges browned	Very pale Greasy or doughy appearance Brown on only top OR bottom
Volume	Doubled in height	Raised somewhat	Baked height same as dough
Interior crumb	Tender	Moist and not too dry to eat	Dense, wet, crumbly or doughy Oily or greasy
Flavor	Rich, a little sweet Wheaty, pleasant	Pleasant flavor	Too much oil or fat flavor Coats mouth; unpleasant
Keeping quality after 1 day	Still flavorful Good aroma/moist	Edible but not best	Stale (dry; firm) Off flavor

Critical Thinking:

Shape, bake and sample pita, using rubric to evaluate. Apply Baker's percentage knowledge to answer questions 1-3:

- The range of salt level in yeast bread dough that is recommended is between 1% and 1.5% of the flour weight. (See Bakers percentage). What is the Bakers percent of salt in this pita dough? (A: 6g salt divided by 335g flour = 1.8%)
- Did the lab using less salt succeed? (A: If so, the sodium could be reduced in this product if flavor is okay.)
- In baking tests to reduce sodium in breads, untrained taste testers could not notice a flavor change between 1.7% and 2.1% salt (Bakers %). Does this seem true based on this lab? (A: Students should answer based on their evaluations.)

Consumer sciences critical thinking:

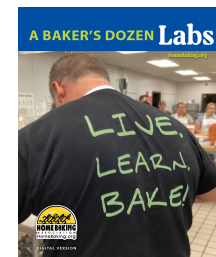
- In many countries, pita are eaten as a daily bread, even used instead of utensils. 8 or more pita may be consumed! How many grams of protein would 8 pita provide? (A: 60g – enough for an adult!)

- How many grain servings is one of the pita prepared in this lab? (A: 2.5.) How many grams whole grain? (A: Whole grain per pita=28 g.)
- Why is pita a great staple (look this word up if students don't know it) food? (A: Low in fat/no saturated fat; high in complex carbohydrates, low in sugar, not too high in sodium.)
- How does the product you made in lab compare to the store-bought pita? Compare Cost: \$ _____ at store. Homemade cost – \$ 0.80-\$1.00 for eight pita.
- Nutrition Facts label/ingredients: Commercially made pita are usually higher in sodium. Which is higher—the store purchased or made-by-you pita? (Be sure to compare an equal per serving weight.)
- Are the pita you made whole grain? (A: Yes, if recipe followed). Are the store-bought pita enriched or whole grain? (A: Answers vary.)
- Quality: Store bought are often stale or firm because pita have a very short shelf life. Do freshly made pita have more flavor? ____ yes ____ no
- Create a menu with pita. What would you serve inside, wrapped in or with your pita? (A: Consider preparing hummus or falafel to serve with the pita!)

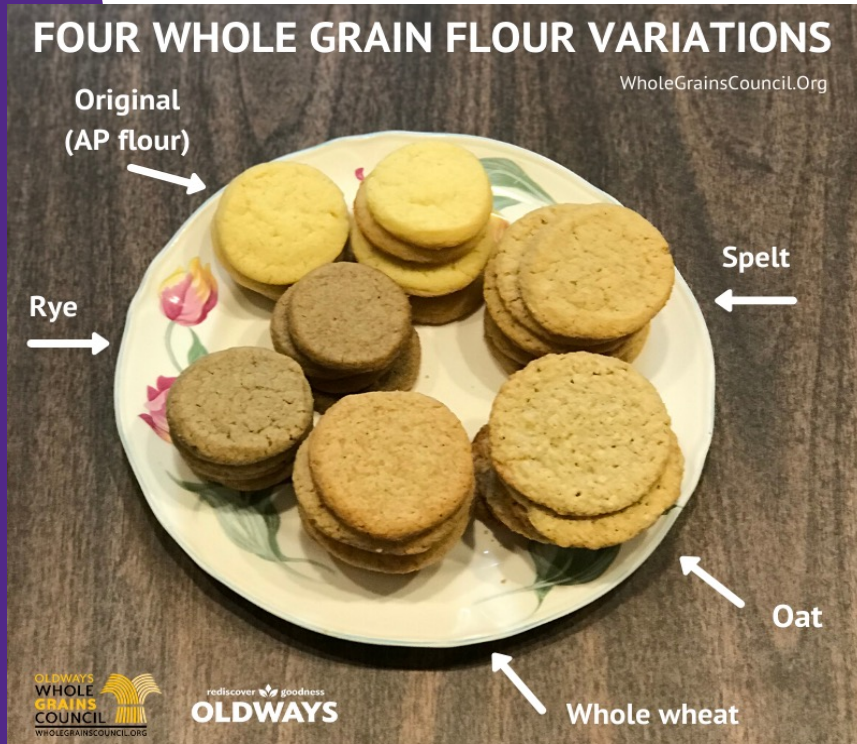
HomeBaking.org

A BAKER'S DOZEN Lab 10 – The Savor of Salt

11



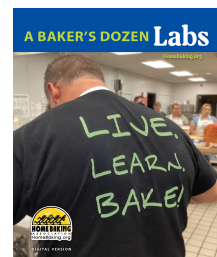
Develop Essential Baking Test Kitchen R&D Skills



Taste of Home Blog, 12/2019
www.WholeGrainsCouncil.org



Learn new methods...*tangzhong*.
Baker's Spotlight, Soft Flatbread, www.HomeBaking.org
www.redstaryeast.com Milk Bread



Conduct Consumer/Client/Test Market Sensory Analysis



Download Kitchen Science: Baking for Special Needs



A MATTER OF TASTE Evaluation

Product name: _____ Age/Grade: _____ Date: _____

The food tasted: _____ very good _____ good _____ okay, but not my favorite _____ needs improvement

The food tasted: _____ sweet _____ bitter _____ salty _____ sour _____ not what I expected _____ just right

The color is: _____ great _____ too pale _____ too dark _____ not right for the product

The aroma (smell) is: _____ too strong _____ moist _____ too weak _____ just right _____ not good

The product is: _____ too moist _____ moist _____ dry _____ crumbly

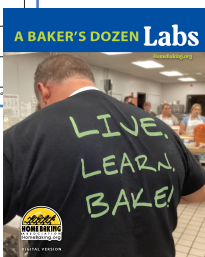
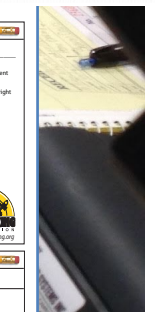
The food looks: _____ yummy _____ okay _____ not quite there yet

I would enjoy eating this food again: _____ yes _____ no _____ maybe

Comments: _____

Baking Science Lab Variations Evaluation

LAB	TEXTURE	TENDERNESS	AROMA	FLAVOR	COLOR
LAB 1					
original					
LAB 2					
LAB 3					
LAB 4					
LAB 5					
LAB 6					



Entrepreneurship Can begin at home...

DEPENDABLE
BAKES EVENLY, RETAINS HEAT
SO IT KEEPS FOOD WARMER,
LONGER & CLEANS EASILY

DURABLE
GLASS WILL NOT WARP OR STAIN

VERSATILE
BAKE, SERVE & STORE; CLEAR
GLASS ALLOWS YOU TO
SEE WHAT IS BAKING

WHY BAKE WITH GLASS?

GLASS VS. METAL BAKEWARE
RETAINS MOISTURE BETTER THAN METAL



DID YOU KNOW THE WORD TEMPERED MEANS:
A process in which glassware is subjected to sustained heating followed by rapid cooling to enhance strength and increase durability. [like your car windshield!]

BEST WAYS TO CARE FOR GLASS BAKEWARE

- CLEAN WITH NON-SCRATCH PADS AND CLEANSERS
- AVOID SEVERE TEMPERATURE CHANGES AND IMPACT WITH HARD OBJECTS
- ALWAYS USE OVEN MITTS
- USE ONLY IN PRE-HEATED CONVENTIONAL OVEN UP TO 425°F OR MICROWAVE OVENS
- DO NOT PLACE ON STOVETOP, UNDER BROILER OR IN TOASTER OVEN

AND ALSO, WHAT IS THIS?:
SODA-LIME-SILICATE GLASS: It is glass made of SODA LIME (70 SiO₂, 10 CoO, 15 Na₂O) and is the type of glass used to make Anchor Hocking bakeware.

WHY IS ANCHOR HOCKING GLASS MADE FROM SODA LIME SILICATE?

ANCHOR HOCKING BRAND'S TEMPERED SODA-LIME-SILICATE GLASS BAKEWARE IS STRONGER AND MORE DURABLE THAN BOROSILICATE BAKEWARE. IF IT HAPPENS TO BREAK, IT BREAKS INTO RELATIVELY SMALL PIECES GENERALLY LACKING SHARP EDGES. IT IS 100% RECYCLABLE.

ANCHOR HOCKING GLASS BAKEWARE COMPLIES WITH COOKWARE MANUFACTURERS ASSOCIATION'S ENGINEERING STANDARD OF EXCELLENCE

ANCHOR HOCKING





Baking yellow cake layers in glass
Research for Anchor Hocking
home baking test bakes
Sharon Davis.

Cake layer method or ingredient testing in KSU

Art

Add consumer appeal, \$\$\$, markets, bake for a benefit



Bake For Funds

There may be easier ways to raise funds, but there aren't many that can teach more to young people while building positive community support. By applying baking food safety (visit homebaking.org/baking-food-safety/), creativity, timely planning, thoughtful salesmanship and a unique approach, bake sales can be very profitable.

Join history. Bake sales are a part of American history. For centuries, people have "baked their best" for all kinds of local needs. Individuals and families became "known" for a special cake, pie, bread, cookie or ethnic baked good that was sold by auction, baskets, cake walks, special order, whole or by-the-slice where everyone got.

Promote locally- and fresh-baked. What's your personal or family's baked specialty? Identify a "hard-to-get" local or ethnic, gluten-free or vegan specialty you can bake and sell. Offer whole-grain smart snacks great for school and child care.

Tips for Success and Program Recognition

Check the calendar. Piggyback with sale-friendly events to avoid conflicts.

Bake sale recognized. Teachers can help with sale and "buy for the calendar."

Location. Choose a location that is safe, clean, and has good foot traffic.

Localities. Get the word out by using social media, flyers, and word of mouth.

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Soft Pretzels,
video <https://www.homebaking.org/video/>
L

In your Baking STEAM kit

View Julene shaping
Chai Ube Rosettes,
HomeBaking.org

- HBA MEMBERS, www.HomeBaking.org/members/
- National Festival of Breads Creative bakers, <https://nationalfestivalofbreads.com/recipes>
- *Kansas Wheat Bread Shaping for All Seasons* (right) <https://nationalfestivalofbreads.com/recipes/bread-shaping-0>
- *Dough Sculpting 101* video, lesson <https://www.homebaking.org/videos/>
- Baking STEAM workshops, Artisan Focaccia



Baking Science Classes Sculpt



Math Measurements Matters

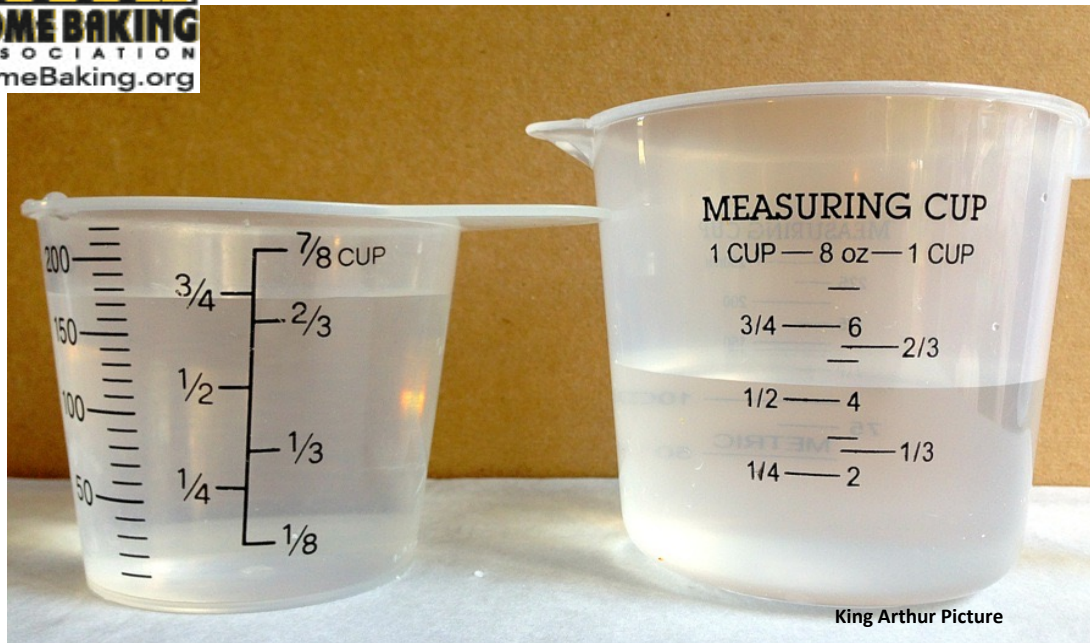
Tested recipes, consistent methods and quality

- **VOLUME:** Use *liquid* or *dry* measuring cup for those ingredients
- **Dry:** fluff, spoon, level
- **Liquids:** Place measuring cup on a flat surface
- Fill measuring cup to measure mark on cup
- **SCALES:** Digital scales best practice for *consistent* results and portioning



Scaling more accurate than measuring cups

Home tools and methods vary so widely failures happen.



King Arthur Picture

There are 6 ounces of water in each.
The cup on the left looks fairly accurate.
The one on the right? Not so much.
By weight, there is no guessing.

Dry volume: fluff, spoon, level



Weighing (Scaling) Ingredients Saves Time

By Volume:

1. Fill required measuring cups with ingredients. Level off.
2. Scrape contents into mixing bowl.

By Weight:

1. “Zero” out bowl weight.
2. Scoop ingredient directly from container into mixing bowl.
3. Zero out; add next ingredient by weight...zero, etc.



Weighing = Less Clean-up



Measurement Matters

Scoop, Spoon, Scale



Subject: Baking Measurements

Activity: Scoop, Spoon, Scale . Compare and evaluate dry measuring methods for accuracy.

Resources required: One 5-lb bag flour—half left in bag, half in large bowl
Stirring spoon; straight-edged scraper; electronic scale; mixing bowl
Two, 1-cup dry measuring cups; one, 1-cup liquid measuring cup

Introduction: To get the same great product each time, how you measure matters. Compare the results to discover how much it matters.

Directions: Have three volunteers each measure 1 cup the same flour, each using a different method. Weigh each cup of flour in a zero-balanced bowl on the scale.

Volunteer #1: Large bowl, spoon: Stir flour with spoon to loosen; lightly spoon flour into the 1-cup dry measuring cup until heaping full. Level off the flour using straight edge.

Volunteer #2: Scoop flour out of bag with 1-cup dry measuring cup; shake to “level”

Volunteer #3: Large bowl: Scoop flour with 1-cup liquid measuring cup, shake to level

Evaluate: What are the differences in weights between the three methods?
What method do test kitchens and professional bakers use?
(A: Method #1 and/or scales--1 cup all-purpose or whole wheat flour = 4.25 oz)

Extra minute? How much extra flour will you have if you use the method to measure 3 cups flour for bread?
How will the extra flour impact the recipe's result? (A: heavy, dry, crumbly)

View “How to Measure Flour”
1-minute video at HomeBaking.org
Glossary, Flour.



MINUTE ACTIVITIES

PAGE 33



5 MINUTE ACTIVITIES

Activities to break the ice, fill down time, or get students excited to learn!



How do you measure up?

Pour the flour from the bag into a medium-sized bowl. ▶



Fluff



Sprinkle



Sweep



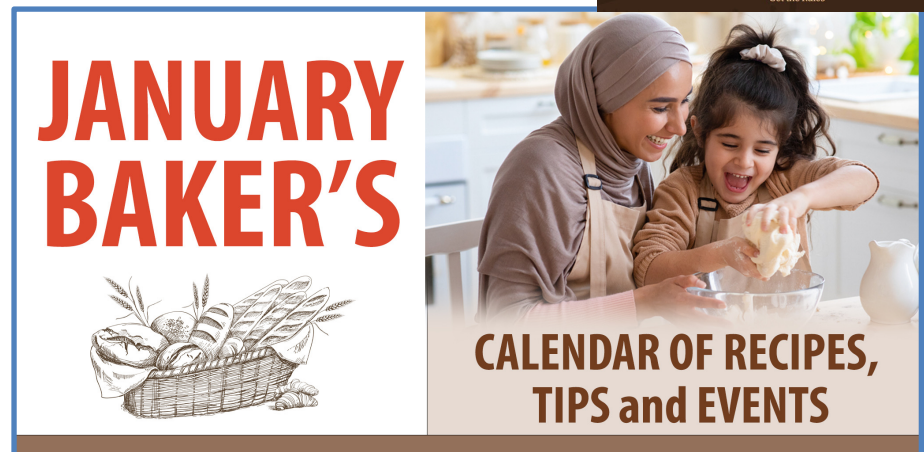
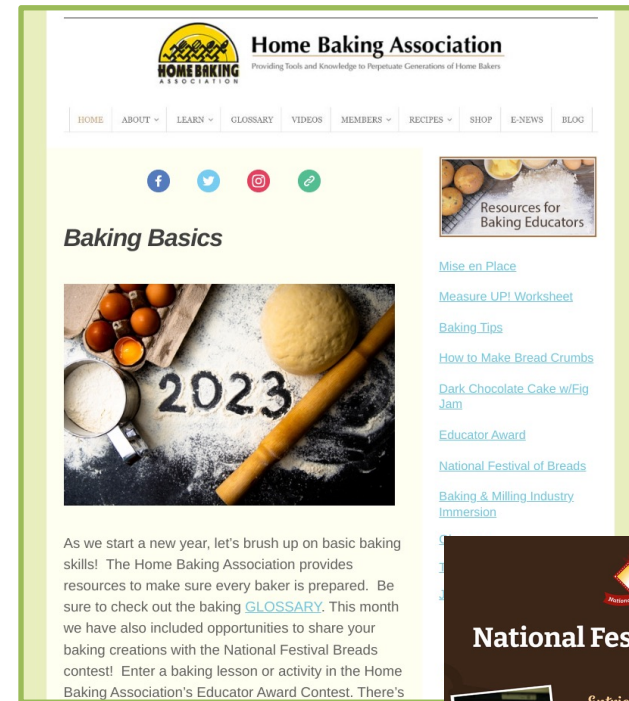
5-Minute Baking Activity, p. 23. HomeBaking.org

Equal Portions=Happy Customers



Get Baking News.

- Monthly E-News (122,000+)
- Monthly Baking Calendar How-to, Hospitality, Hacks
- Blog posts, Facebook, Twitter
- Baker's Spotlight





DIY \$kills Add Up

An unexpected \$400 bill would cause problems for 40% of U.S. HH and cause them to borrow money or owe on credit cards. Federal Reserve Study

Family of 4, Eats “Ready-To-Eat” 4 times weekly

\$ 36.00+ (drive through/carry out)

-15.00 cost of home meal for 4

21.00 saved per meal

X 208 meals per year eaten out

\$ 4,368 per year

X 18 years

\$78,624

There are 11 MM children who are food insecure daily in the U.S.

Nokidhungry.org

<https://cookingmatters.org/>

HOMEMADE PIZZA VS. TAKEOUT -
Why it Pays to DIY in the New Year
BROUGHT TO YOU BY Fleischmann's *Quick Rise*

It may be time to get back to the routine of cooking healthier meals at home again, but that doesn't mean they have to be boring! With Fleischmann's® Pizza Crust Yeast, you can bring the family together to take this staple to a whole new level by making it as tasty as any restaurant version with as many fresh ingredients as you'd like.

	TIME	COST	BETTER FOR YOU
DELIVERY / FROZEN PIZZA	It takes about 20 minutes for delivery chains to go from raw dough to fully baked pizza! - then factor in at least another 30 minutes for actual delivery for nearly 60 minutes from order to on your plate!	The cost of frozen pizza has gone up over the last several years, with certain brands priced at as much as \$12, while the average delivery pizza costs \$16.13. Add a standard \$1.50 delivery fee plus tipping the driver and the total cost is well above \$20.*	Many delivery pizza companies do not disclose crust ingredients* and frozen pizzas often include preservatives. Plus you don't know how fresh your ingredients are or where they come from!
HOMEMADE PIZZA	You can mix, knead, shape and bake your homemade pizza in just 30 minutes.*	Fleischmann's® Pizza Crust Yeast costs less than 80 cents per pizza, and when using ingredients on hand, or after a quick trip to the grocery store, the average price of a homemade pizza is easily under \$10.*	If you craft your own specialty pizza, you control the ingredients. Use garden-fresh vegetables and even a whole wheat or gluten free crust for a flavorful pizza that's less expensive and better for you.

FUN FACTS

Americans now spend **\$37 billion** a year on pizza† and on average, eat **100 acres** of pizza daily or **350 slices** per second.†

93% of Americans eat at least one pizza per month, making pizza the **No. 1** dinner choice in the U.S.‡

PEPPERONI is the most popular pizza topping in the U.S. - **251,770,000 lbs.** are consumed every year!§

Pile peppers, mushrooms, spinach, tomatoes and onions on your pizza and you're getting vitamin C and vitamin A, plus calcium from the cheese! For many nutrients in your tasty, cheesy pizza. ¶

*Source: © Fleischmann's® Pizza Crust Yeast. †Source: © National Pizza Association. ‡Source: © National Pizza Association. §Source: © National Pizza Association. ¶Source: © National Pizza Association.

Mealtime Solutions

Spend time together in the kitchen

Learn more





Mozzarella Mash

Carla Shaer, Illinois

Ingredient Superheros!

The Power Of Eggs

Ingredient Super Heroes

Delaine Stendahl, FCS, Whitehall H.S., WI

The Muffin Man and the Healthy Kids Act

Katie Brouwer, FCS, H.S., Story City, IA

Baking Clubs @ Work, Cheryl

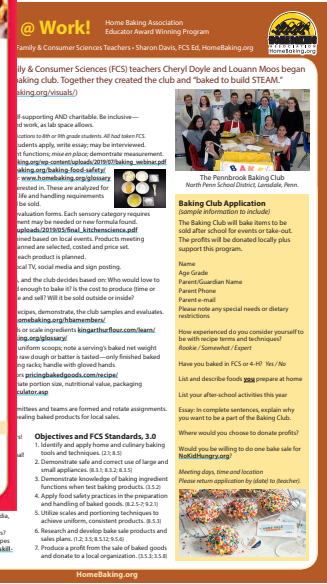
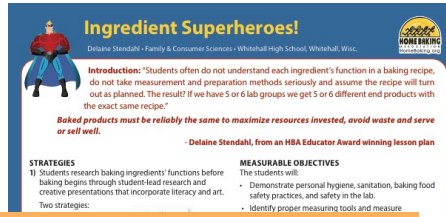
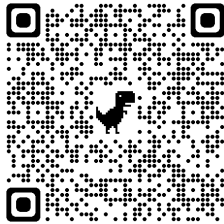
Doyle & Louann Moos, Pennbrook M.S., PA

Pastry Pizzazz

Marla Prusa, FCS, H.S., Howells, NE

Sugar Detectives!

Elizabeth Hagan, FCS, Bayard, IA



Promote, enter on-line, May 31, 2023

FREE Downloadables,
www.HomeBaking.org

Build Baking STEAM with us!

Thank you FCS!

hbadavis@gmail.com



[Chocolate Whole Wheat Waffles](#)