Integration

Addition

Fusion

Combining

Incorporation

Mixing

Blending

Inclusion
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LAYOUT AND DESIGN

THIS CURRICULUM IS A PROJECT OF:

WASHINGTON STATE UNIVERSITY
EXTENSION

Be a Food Scientist!

THE UNIVERSITY
OF ARIZONA
About Our Process

• National 4-H Council
• Inquiry-Based with a STE(M) focus
• Science Standards and Outcomes
Review and Evaluation

• National Peer Review
• Technical Review
• Activity Evaluation
• Outcome Evaluation
What was Important ...

- Approachable Science - STE
- Exploratory - “Hands-On”
- Low Cost Activities
- Personal Safety
- Take Home and Virtual Learning
What was Important ...

- Fun with Kitchen Science
- Science Career Development
- Integrating Food Safety, Nutrition and Food Science
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Unit 1 is just one part of exploring What’s on Your Plate! Be sure to check out the other units in this curriculum for more fun experiments you can eat!

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**Explore Food Science**
In the Facilitator Guide

SKILL LEVEL:
Beginner

LEARNER OUTCOMES
• Knows how to observe, describe, and apply scientific principles of gluten development.
• Understands and identifies how gluten development is controlled and used favorably in baked goods.

SUCCESS INDICATORS
• Able to follow written directions, measure and prepare formulations.
• Identifies protein components of gluten.

SUGGESTED GROUP SIZE
• 8–12 youth

TIME NEEDED:
Minimum of 60 minutes, preferably 90 minutes if group is 12 or larger.

SPACE
• Any setting with a work table is fine. At least one sink is mandatory. Each learner will need a workspace such as table, counter, or sink. Put towel at each workspace.

MATERIALS LIST
Supplies:
• Medium-size bowl for each learner.
• 1 cup dry measuring cup
• 1 cup liquid measuring cup
• Spoons or scoops for flour
• Plastic knife for leveling flour in measuring cup
• Wooden spoon for each learner
• Cutting board, plastic mat or table top for each learner to knead dough
• Towels—one for each workspace
• Sanitizing solution
• Hand soap
• Paper towels
• 1 piece large paper for writing out chemical reactions; tape for posting on wall
• 4 small paper plates
• Marking pen
• Pencils
• Cookie sheet and oven for variation

Food:
• Flour: Bread flour, all-purpose flour, cake flour and whole wheat flour
• One cup of one type of flour per learner (NOT each type of flour for each learner)
• Cool water supply; sink is necessary
• Bread: 3 types for sampling, such as: 100% whole wheat, multigrain, sourdough, gluten-free, etc.
• Wheat kernels, also called wheat berries. (Optional to show learners what wheat looks like. Usually available in a natural food store bulk bins.)

Printed Materials:
• Order Youth Science Journal for each learner
Eggs are Exceptional - The Right Heat for the Eggs You Eat

The Power of Protein Chemistry

Facilitator Guide

ACTIVITY 3.1 Eggs are Exceptional: The Right Heat for the Eggs You Eat

DURING THIS ACTIVITY, YOU WILL:
- Demonstrate how to crack and separate an egg.
- Identify the parts of an egg.
- Practice吏称 experiments: cracking and overheating scrambled eggs, preparing hard-boiled eggs, scrambled and poached eggs, and shelting egg salad.
- Support and encourage learners as they "see" and understand, and apply the science behind protein coagulation.

KEEP LEARNERS SAFE
- GENERAL RESTRICTIONS: No food or drink is permitted in the laboratory, which contains strong reagents and potentially dangerous equipment. The area is well-ventilated with large fume hoods, and the air is filtered. All employees must wear lab coats and gloves while working with chemicals.
- FOOD SAFETY: Keep food out of reach of learners, including those who do not have allergies or dietary restrictions. All students will wash their hands before and after handling food.
- Personal Safety: Wear safety glasses while working with chemicals. Wear sturdy shoes and remove jewelry. When handling eggs, be careful not to break them. Keep a fire extinguisher nearby. Use caution when using hot water.
- Chemical Exposure: Use only water to clean equipment. Do not use organic solvents.
- Blowtorch: Use a blowtorch to heat the eggs. Be careful not to overheat them.
In the Facilitator Guide

UNIT 1
ACTIVITY 1.1: Flour’s Secret Ingredient: Great Gobs of Gluten

5. Why do you think the breads have different tastes and textures? **Different flours, different recipes.**
Video Guides

Great Globs of Gluten
http://www.4-h.org/resource-library/curriculum/food-science/facilitator-guides/

Glossaries

Quick Links to Fight Bac!

Be a Food Scientist!
Experiential Learning Model

1. Experience
2. Share
3. Process
4. Generalize
5. Apply

Pfeiffer, J.W., & Jones, J.E., “Reference Guide to Handbooks and Annuals”
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Be a Food Scientist!
In the Youth Science Journal ...

- Inquiry Questions, Experiments, and Data Photos of Procedures
- Supporting Information, Virtual Learning Opportunities, Career Development, Food Science in a Minute Podcasts, Food Safety, Links with Nutrition
ACTIVITY 1.1: Flour’s Secret Ingredient: Great Globs of Gluten (cont.)

CLUE #3
Do the following three steps to reveal flour’s secret ingredient!

STEP 1
Take a small amount of each flour and rub it between your thumb and forefinger. Is it soft, smooth, rough, grainy? Is one coarser than another, heavier, whiter, darker? Describe your observations in the chart.

Flour Observation Chart

<table>
<thead>
<tr>
<th>TEXTURE OF FLOUR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All-purpose flour</td>
<td></td>
</tr>
<tr>
<td>Cake flour</td>
<td></td>
</tr>
<tr>
<td>Bread flour</td>
<td></td>
</tr>
<tr>
<td>Whole wheat flour</td>
<td></td>
</tr>
</tbody>
</table>
What You **SEE** & What You **FEEL**

**The Physical Reaction**
- Fruit or vegetable is cut, shredded, or grated
- Fruit or vegetable sample is exposed to air (oxygen)
- Untreated fruit and vegetable samples turn brown

**What Happens from a Food Scientist's Point of View**

**The Chemical Reaction**
- Phenolic compounds + oxidase enzyme from damaged cells mix together
- The above substances come into contact with air (oxygen)
- Oxidative reactions occur—melanin (brown pigment) is produced
Quick Response Code

- Learn More
- Videos of Commercial Processing
- Get Recipes
- Fight Bac!
- Personal Safety in the Kitchen
- Visit a Food Scientist
- Listen to a Podcast: Food & the World Environment
To purchase this curriculum

4-H Mall/Curriculum
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