# Fortified for Health

**Grade 3**

***Next Generation Science Standard: 3-5-ETS1-2***
Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.

**Application:** Through a process called fortification, vitamins and minerals are added to a food to make it more healthful and to help people meet their recommended daily intake of different nutrients. With this activity students will reenact an experiment to discover food fortification.

**Why our bodies need iron.** Iron is an important mineral that everyone needs. Iron helps make up our *hemoglobin*, which is the substance in red blood cells that carries oxygen from the lungs and throughout the body. If you don't have enough iron, your body can't make enough red blood cells. Not having enough iron is called *iron deficiency anemia*. Iron also plays a role in keeping our cells, skin, hair, and nails healthy.

**Materials for the class discussion:**
- container of fortified orange juice (For example, the container may say "with calcium" or "with vitamin D".)
- container of regular, nonfortified orange juice
- small disposable cups in two different colors

**Materials for the experiment:**
- box of whole grain wheat flakes cereal fortified with iron
- empty boxes from other types of cereal
- strong magnet
- small resealable plastic bags
- warm water

**Teacher preparation:**
Ask students to bring in empty cereal boxes.

**Note:** Test your whole grain wheat flake cereal in advance. Not all brands work equally well. Also be sure to use a strong magnet for maximum results.

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## Introducing the lesson:

Farmers around the world grow the food we enjoy every day. There are three basic steps to get food from the farm to the dinner table:

- *Production* involves growing the food on a farm.
- *Processing* is what happens to the food once it is ready to be picked. This could involve mixing or combining different ingredients. During this stage, food may be fortified with nutrients.
- *Transportation* involves taking the food to the store.

**Did you know?** Table salt was first fortified with iodine in the 1920s. Iodine is important so your body can moderate its metabolism (the rate at which it turns food into fuel) and it prevents a condition called *goiter*, which involves swelling of the thyroid. In some areas there is no iodine in the soil, and therefore no iodine in the crops. In states like Idaho, Oregon, Washington, and Montana, goiter once presented a significant public health risk. Iodized salt helps make sure everyone has enough iodine in their bodies.

## Lesson:

1. Farmers and manufacturers work to develop foods with better nutritional content. Discuss the term *fortification* with your students. Explain that vitamins and minerals can be added to a food to make it more healthful and to help people meet their recommended daily intake of different nutrients.
   **Ask students:**
   - What are some examples of fortification? *Adding fiber to foods to promote digestive health, adding calcium and vitamin D to promote bone health, adding omega-3 fatty acids to support heart health, etc.*
   - What is the purpose of fortification? *To provide more nutrients in the foods people eat.*

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2. One food that is fortified and sold in grocery stores year-round is orange juice. Show the class an orange juice container. Point out where it says "with calcium" or "with vitamin D." Cover the labels and give students samples of the two juices to taste, each in a different color of cup. Don't tell students which is which. **Ask students:**
   - Does fortified juice taste different than regular juice? *When nutrients or vitamins are added to foods, this may change the flavor and appearance. Since taste is a major factor in what people will or won't eat or drink, companies work to find the right balance between fortification and taste. They might conduct taste tests like this one to see if most people can tell the difference.*

3. Explain that another common fortified food is breakfast cereal. Show the class several empty cereal boxes. **Ask students:**
   - What information is on the box to let the customer know that the cereal may have been fortified? *Students will see words and phrases such as "plus omega-3s, good source of calcium and vitamin D, high in fiber, iron rich," etc.*

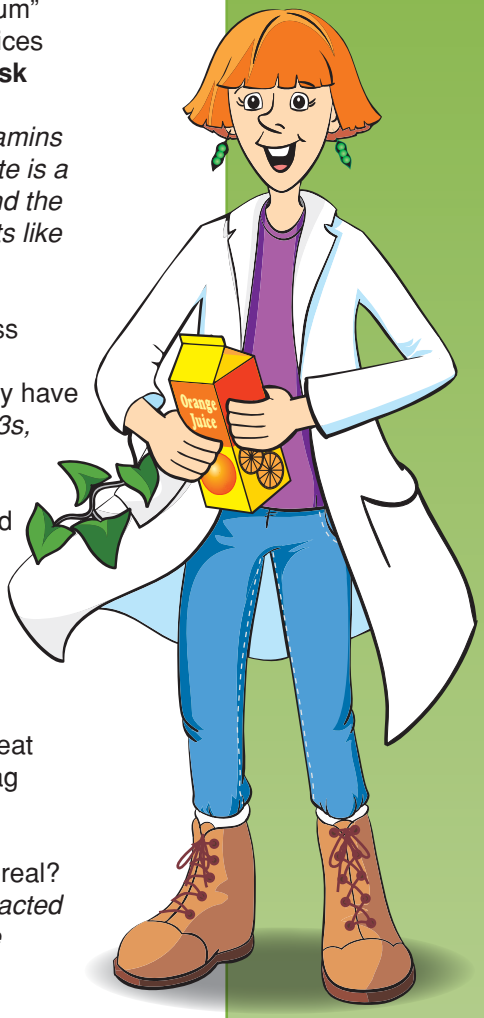
4. Next show students the box of whole grain wheat cereal fortified with iron and point out on the label where it says the cereal contains iron. **Ask students:**
   - Why do our bodies need iron? *Iron is a mineral. Our hemoglobin contains iron. Hemoglobin carries oxygen from our lungs throughout our bodies. Having too little hemoglobin is called* anemia*. Iron also helps our muscles store oxygen and helps our bodies digest food.*

5. Show the students a plastic bag containing about one cup of whole grain wheat cereal fortified with iron. Ask a student volunteer to crush the cereal in the bag using his or her hands. **Ask students:**
   - Can you see the iron that was added? *No.*
   - If we can't see the iron, how can we prove that it has been added to the cereal? *Encourage students to think about the traits of other metals, which are attracted to magnets. Lead students to see that a magnet can help detect iron in the cereal.*

6. Fill the bag about half full of warm water and seal it carefully. Be sure to leave an air pocket inside the bag. Shake the bag gently to mix the cereal and water.

7. After 30–60 minutes, invite students to watch as you place a strong magnet on the outside of the plastic bag. **Ask students:**
   - What did you observe? *Tiny black specks were attracted to where the magnet was. This is the iron in the fortified cereal.*

8. Allow small groups of students to use the bag and magnet to see the result up close.

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