

# FUEL YOUR GAME DAY - EVERY DAY IS GAME DAY



## ACTIVITY: THE SCIENCE OF YOGURT

### OVERVIEW

In this activity, students will experiment with how using different ingredients can influence the composition, taste, and pH of yogurt.

### TIME

Three 20–30-minute class periods

### PREPARATION

1. Gather the materials needed for student experiments listed in the Materials section below.
2. Upload a clean copy of The Scientific Method (with Yogurt!) included in this learning unit.

### MATERIALS

*Note: If materials are limited, see “The Yogurt Reaction” activity provided in this learning unit which calls for fewer materials.*

In addition to common classroom materials and an Internet connection, students will need:

- Large pot for heating milk (one for the whole class)
- A heat source (science lab hot plate; crock/insta pot; stove)
- 1 small thermos or other container with lid per group (for making lemon starter)
- 1 tea/dish towel for each group (to wrap the lemon starter overnight)
- 2 sterilized containers with lids per student group (mason jars, empty commercial yogurt containers with lids); Note: Containers can be smaller or larger depending on classroom budget and how much yogurt you wish each group to make.
- Milk (1/2 to 1 gallon, depending on how many groups you have and the size of your containers); Note: Use the same fat content milk as in the related demonstration if possible.
- Access to a microscope with 400x-1000x magnification (Note: if this is not available, limit observations to consistency and flavor, and inform students that there would be far fewer bacteria visible with the lemon starter.)
- pH meter or pH strips ([possible source](#)), used to measure acidity
- Large spoon for stirring and scooping yogurt
- Teaspoon measuring tool
- Sharp knife for (teacher) cutting lemon
- Candy or kitchen liquid thermometer
- Yogurt starter cultures or one small container of plain yogurt with active cultures
- One lemon for each small group
- Large cooler to keep yogurts warm overnight
- Spoons and small cups for student taste-testing of yogurt

## ACTIVITY PROCEDURE

### Step 1 (Day One)

Have students refer to, or recall, the questions they used for creating their scientific method plan to experiment with yogurt. Let them know that in this activity they will focus on how a change in starter culture might affect the bacteria, taste, consistency, and/or pH level of a homemade yogurt.

### Step 2

Have students work in small groups to [create a lemon starter](#) to incubate overnight (18-24 hours). Note: Teacher should cut the lemon slices for each group and store the knife appropriately before and after.

### Step 3

After setting the lemon starter to incubate, have students work in groups to complete their The Scientific Method (with Yogurt!) tables with how they will make their yogurt and how they think the lemon starter will affect the consistency, taste, and pH of the yogurt as compared to the original recipe they participated in creating in the lesson.

If you have uploaded digital versions of the Scientific Method document for each group, they can complete online for homework if there is not enough time in class.

*Note: If using this without having done the lesson, have students make their predictions based on observing the commercial yogurt starter they will use in the experiment (they can check their notes from the lesson to compare) to what they predict will be different using the lemon starter. Allow them a few minutes to observe and check the pH of the yogurt starter you have selected for the experiment.*

### Step 4 (Day Two)

Heat the milk to the appropriate temperature and let simmer for 10-20 minutes as in the lesson. Let cool to 112-115°F degrees.

Have each student group come to the stove/heat source and spoon the amount you have determined equally into their two containers.

Have students complete the steps to create two yogurt samples based on the original recipe in the lesson (provide them with a yogurt recipe handout (or project onscreen), with one sample using the original starter from the lesson and one sample using the lemon starter they created.

*Note: Confirm with students the appropriate ratio for starters to use based on the amount of milk they are using in their containers (2-3 teaspoons of starter, if using yogurt, for each cup of milk in the full batch; package directions if using powdered starter).*

### Student directions:

1. Blend each of the two milk samples provided by your teacher with one of the starters (one sample with the yogurt starter; one with the lemon starter). You should use 2-3 teaspoons of starter for each cup of milk in the sample. Confirm the amount of starter to use with your teacher before you add the milk.
2. Put the lid on your container, wrap in a tea/hand towel, and place in a cooler with a warm water bath or lined with a heating pad. Let sit for 6-12 hours and then transfer to a refrigerator.

### Step 5 (Day Three)

3. After several hours of letting the yogurt cool, check the consistency, taste, and pH of the yogurt and record your results.
4. If available, examine each of the two yogurt samples under a microscope and describe any differences in what you see regarding the presence of bacteria.

### Step 6

Have students complete their scientific method charts and discuss briefly what their next questions might be.

## REFLECTION

What have you learned about fermentation, bacteria, and the yogurt-making process that you think others your age should know?