Helpful Or Harmful?

Summary

In this lesson we will look at how microorganisms can be helpful and harmful.

Time Frame

2 class periods of 45 minutes each

Group Size

Small Groups

Life Skills

Communication

Materials

Ingredients: 1/2 c all-purpose flour, 1 pkg dry yeast, 1/2 c warm water, 2 Tbl sugar, 2 c whole wheat flour, 3/4 c warm water, 1 Tbl vegetable oil, 2 tsp salt, 1-2 c all-purpose flour;1 one-gallon Ziploc bag for each group;bread pan;PAM or something to grease bread pans;something to cover pans as dough rises;oven;knife for cutting bread;butter, jam, plastic knives *optional;napkins;chart paper and marker;Bread, Bread, Bread by Ann Morris; Germs Make Me Sick! by Melvin Berger

Background for Teachers

The ingredients are for one loaf of bread. Groups of 4-6 work well. Determine the amount of ingredients and pans you will need for your class size, or preferred size of groups.

You may prefer to prepare only two batches of bread as a class and prepare the bread in a bread machine or two.

Decide if you want to premeasure the indredients or have measuring cups/spoons for students to use. Students can help out by bringing some ingredients from home.

Intended Learning Outcomes

Students will be able to list and describe harmful and helpful aspects of microorganisms.

Instructional Procedures

Read Germs Make Me Sick! by Melvin Berger and Bread, Bread, Bread by Ann Morris. Ask students what the books have in common (germs and yeast used in bread are microorganisms). Explain that all living organisms are categorized into five kingdoms: Animalia, Plantae, Monera, Protista, and Fungi. Write Monera, Protista, and Fungi on the board and explain to students that these kingdoms contain microorganisms. Tell students that germs and bacteria belong to the kingdom Monera. Yeast is a one-celled plant belong to the kingdom Fungi.

Write harmful -vs- helpful on chart paper. List students' ideas of how microorganisms can be harmful and helpful under each word. Tell them that they are going to experiement with some helpful microorganisms. After we are done experimenting, we will come back to our list and see what we can add. Organize students into groups of 4-6. Alter the amount of yeast and sugar--leave sugar and yeast out, leave out yeast, leave out sugar, use half the amount called for, use twice as much sugar or yeast. Depending on your class size and how many groups you have, decide what alterations to assign each group. Make sure at least one group follows the recipe correctly. Predict how altering the amount of sugar and yeast will effect the bread. Have groups mix 1/2 cup flour, 1/2 cup warm water,

and their assigned amount of sugar and yeast in a one-gallon Ziploc bag. Close the bag and knead it with fingers until ingredients are completely blended. Leave bag closed and let the dough rest for 15 minutes. Then have groups add 2 cups whole wheat flour, 3/4 cup warm water, 1 Tbl vegetable oil, and 2 tsp salt. Mix well. Slowly add enough all-purpose flour to make a stiff dough (1-1/2 cups). Add more flour until dough no longer sticks to the bag. Leave the bag closed and let it reast for 10 minutes. Have students shape the dough and put it in a greased pan. Label the pans, so you know which one belongs to each group. Cover the dough and let it rise 45-60 minutes. Then bake 30-35 minutes at 400 degrees. Compare the loaves and discuss. What effect did altering the amount of sugar and yeast have on the loaves? Slice bread and serve with butter and jam. Did altering the ingredients effect the taste? Which loaf tastes the best? Worst? Refer back to the students' list of harmful and helpful aspects of microorganisms. Add more ideas to the list. (Some helpful ways microorganisms are used: to clean up oil spills, as antibiotics, food preparation- bread, yogurt, cottage cheese, as fertilizers, to decompose waste.)

Extensions

Make yogurt. Yogurt contains two microscopic bacteria: Streptococcus therophilus and Lactobacillus bulgaricus. Large amounts of these bacteria are inoculated into milk, and lactic acid develops rapidly. Ingredients: 1 3/4 c powdered milk, 4 c very warm water, 1/3 c plain yogurt containing active cultures, 5 one-cup containers with lids, such as jelly jars, or old yogurt containers.

Procedure: 1. Mix powdered milk and water. Stir until disolved. 2. Add small amount of milk to yogurt and mix until thin. 3. Mix thoroughly and pour into small containers with lids. Be sure to have students observe the liquid at this stage. 4. Use a small cooler for the incubation step. Fill the cooler with very wrm, not hot, water to 1 inch below the container lids. 5. Place containers in cooler, close lid tightly, and let stand 6-8 hours. Bacteria will multiply and cause yogurt to thicken. 6. Refrigerate and enjoy. You may want to add sugar, fruit, or jam for flavor.

Video: Magic School Bus In a Pickle. Covers pickling as a food preservation technique.

Contact USU Ag In The Classroom Coordinator, Debra Spielmaker, for a free poster kit, The Safe Food Journey, at 435-797-1657, Fax435-797-4002, debrasext.usu.edu, or http://ext.usu.edu/aitc. She also offers a course, Microorganisms, Good Guys & Bad Guys, that centers around sixth grade core. It is excellent!

Make cottage cheese using bacteria. Contact Debra at USU for a free loaner Cheese Kit complete with instructions or purchase for 10.

You can order a kit from Carolina Biological Supply on Food Spoilage with Chemical Preservatives. It is worth the money. Call 1-800-334-5551 for a catalog.

Have students research careers in microbiology.

Assessment Plan

Have students list and describe at least five harmful and five helpful aspects of microorganisms in their science journals.

Bibliography

Morris, Ann Bread, Bread, Bread (Scholastic, 1989) Berger, Melvin Germs Make Me Sick! (Harper Collins, 1995)

Authors

HEIDI KUNZLER