Activity Two – Microbes on My Mind

Instructional Procedures

Materials

- ☐ Grocery store newspaper advertisement
- ☐ Bread wrapper
- ☐ Label from a box of cereal
- ☐ Beef jerky package label
- ☐ Yogurt container
- ☐ Package from dried fruit
- ☐ Copies of Microbe Grocery List

1. Arrange the students in pairs.
2. Provide each pair with a grocery store advertisement and the "Microbe Grocery List."
3. Instruct them to find all the foods in the ad that have a relationship to microorganisms, and write them down. Remember foods like spaghetti sauce may contain mushrooms, and foods containing dough have yeast.
4. Ask each group to share with the class the food products they found in their ad. Did they miss any? Did other groups find the same products? Can these foods be spoiled by other microbes and make us sick?
5. Explain to students that virtually all foods can spoil or be contaminated. That is why you find food additives, or inhibitors, or preservatives in food, to keep them fresher or viable longer.
6. Read the labels of the food items listed in the materials list.

Ask the following questions:

1. Can you identify an ingredient that might be a food additive or preservative? (*Sometimes sugar, salt, or vinegar is added to a product to inhibit the growth of microorganisms, a chemical preservative may be added to do the same thing but will have little effect on the flavor of the food. For example, jelly is so sweet that few additives need to be added to preserve freshness; the sugar acts as a "natural" preservative, the same with pickles and vinegar.)*
2. Is the food preservative the same from item to item? *(No, because some food additives or inhibitors only work on certain microbes, see the Food Preservation Techniques Information page.)*

Microbe Grocery List

Look through a grocery store advertisement and see how many foods you can contain microorganisms or were produced with the help of microorganisms. Be sure to make the connection between vinegar and salad dressing. Many salad dressings may also include a thickener from algae. Pizza has dough, so it has yeast, etc. Are there any foods on sale, that without proper handling, may make you sick?

Common microbes found in foods
Bacteria: cheddar cheese, Swiss cheese, feta, sour cream, buttermilk, yogurt, vinegar
Fungi: blue cheese, mushrooms
Algae (Protista): ice cream, salad dressings
Yeast: bread, and other dough products

Food Items	Microbe Responsible	Price	Does this food product need special handling (i.e. refrig-eration) to keep from spoiling?

Food Preservation Techniques

Canning first destroys bacteria through heating and then the food is placed in a sterilized container and sealed.

Drying removes water from the food that bacteria need to grow and reproduce.

Freezing slows down the spoilage process by changing water into ice; a form that the bacteria cannot use.

Pasteurization destroys most of the existing spoilage organisms by heating the food to a high temperature for a short duration.

Pickling or fermentation (culturing) leaves the food with a higher level of acid, making it an inhospitable environment for spoilage bacteria.

Vacuum packaging uses a vacuum sealed, abrasion-resistant moisture-impermeable film that inhibits molds, yeasts, and bacterial growth on the surface of the things such as meat. Since there is no air in the package, vacuum-packaged meat will have a darker, purple color before being opened. Once the meat is exposed to oxygen, it will turn the familiar bright red color, because of the natural reactions within the package. Fresh vacuum-packaged meat will give off a slight odor when opened. the smell will dissipate within a few minutes. This should not be confused with spoilage.

Smoking adds smoke-born chemicals to food that help destroy potential spoilage organisms.

Chemical additives are designed to destroy spoilage organisms or inhibit their growth. Sugar and salt are examples of additives that have been in use for centuries. Both of these work by drawing water out of the spoilage organisms, thus preventing their growth.

UHT (ultra-high temperature) uses heat higher than pasteurization: then pressure is applied resulting in a sterile product.

Irradiation is a process that pasteurizes food by using energy, just like milk is pasteurized using heat. Irradiation DOES NOT make food radioactive. The food never touches a radioactive substance. Irradiation destroys insects, fungi, and bacteria. Fewer nutrients are lost during irradiation than in cooking and freezing. Food irradiation has been approved in 37 countries for more than 40 products. Astronauts have eaten irradiated foods for years.

Food additives are any substances added to food. Sugar, salt, and corn syrup are the most commonly used food additives. Food additives keep foods fresh, slow microbial growth, give desired texture and appearance, and aid in processing and preparation.