

Cheese-Making Project Instructions

Lesson Title: *The Ecology of Your Skin 3: The Body Food Connection*
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This plan is for the minimum classroom situation or even a science fair type project at home. If your school has more sophisticated supplies such as a pH meter, an autoclave, and laboratory glass and plastic ware, feel free to create a more elaborate protocol.

Containers:

Small jars such as baby food jars boiled along with their lids and then dried upside down and stored with lids on (This is sterile enough.)

OR

Plastic, disposable, sterile (enough) urinalysis cups with lids purchased from the pharmacy.

OR

Small, clear plastic, disposable drinking cups covered with saran wrap (if both are fresh from the package they are sterile enough).

The milk:

Use it right from a freshly opened container of whole milk.

Note: For those who have a microbiology course in their background and who recognize this as the famous "litmus milk test," please feel free to actually do the "litmus milk test" if you have all the supplies and equipment on hand.

The pH paper:

This is a common item in even the most minimum science lab. Alternatively, purchase some urinalysis test strips at the pharmacy. In addition to testing pH, these will do some other assays too. It might be fun to try to interpret the other tests. And an alternative to that is not testing pH at all.

Concerning the choice of bacteria:

You will add bacteria to milk. You will need to think ahead of time about what items to have on hand from which to get bacteria. These experiments will tend to favor lactic acid bacteria of the sort that are routinely consumed in yoghurt.

Sources of bacteria:

- Specks of soil from the school yard or a potted plant
- A little water from a thorough (but soapless) hand-washing

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- Some yoghurt or kefir (unflavored)
- Part of a tablet of “Probiotics,” a nutritional supplement of freeze-dried bacteria that can be purchased at a pharmacy.
- A little of some fermented food from one of the Asian cultures such as kimchi (Korean) or fermented fish sauce (Thai) or fermented soybeans (Chinese).
- The air in the classroom. Just leave the container open for 24 hours and then put the lid on and observe over the next few days.
- If you have access to cheese-making supplies, get some packets of freeze-dried bacteria and use tiny amounts.

Discarding the Experiments and Other Safety Concerns:

Some of the results of experiments will look and smell edible. For example, when you add yoghurt to milk, you will get yoghurt. However, it is considered to be a bad practice to eat anything at all in a microbiology lab so refrain from doing that!

Students with compromised immune systems (either from drug therapies or diseases) should seek advice from their doctors before participating in this exercise or in any project involving bacteria or fungi. If they are allowed to be present, it should probably be as observers in a group rather than handling the experiments directly.

Of great concern in any classroom is how to discard the finished experiments from microbiology classes. For these experiments, use modest amounts of milk so there will be less to throw away. Then, throw it away in a plastic lined trash can, quickly tied up and brought out to the dumpster!

Assembly

1. Pour milk into the container of choice, keeping the lid off only briefly.
2. Add a small amount of “inoculum”—the source of your bacteria. This might be a speck of soil or a small spoonful of water or food.
3. With lid either tight or loose (your choice), allow the milk to be fermented by the bacteria. Lactic acid-producing bacteria should be especially active. Leave the cultures at room temperature or any temperature of your choice. Decide whether they are to be in the light or the dark.
4. Observe on Day 1, 2, 3, 4, 5 and as long as you like. You can record your observations on the Cheese-Making Project Record Sheet.
5. On the first day of observation, have a class discussion to create a list of what should be observed. (It probably will be necessary to add to that list on days 2-5, as developments occur.) Using that list, you should fill in the table on the record sheet.