MCB 3020L **Lab Experiment 7**

What's in Yogurt?

A four lab session experiment

NOTE: You will need to bring in Stirred-type, Set-type or Activated Yogurt from a market...what is the difference between these types....you have to know this BEFORE you get your sample of yogurt. This is worth TWO bonus points. Your first quiz points will come from your hypothesis and experimental design (see below). This needs to be done BEFORE coming to lab.

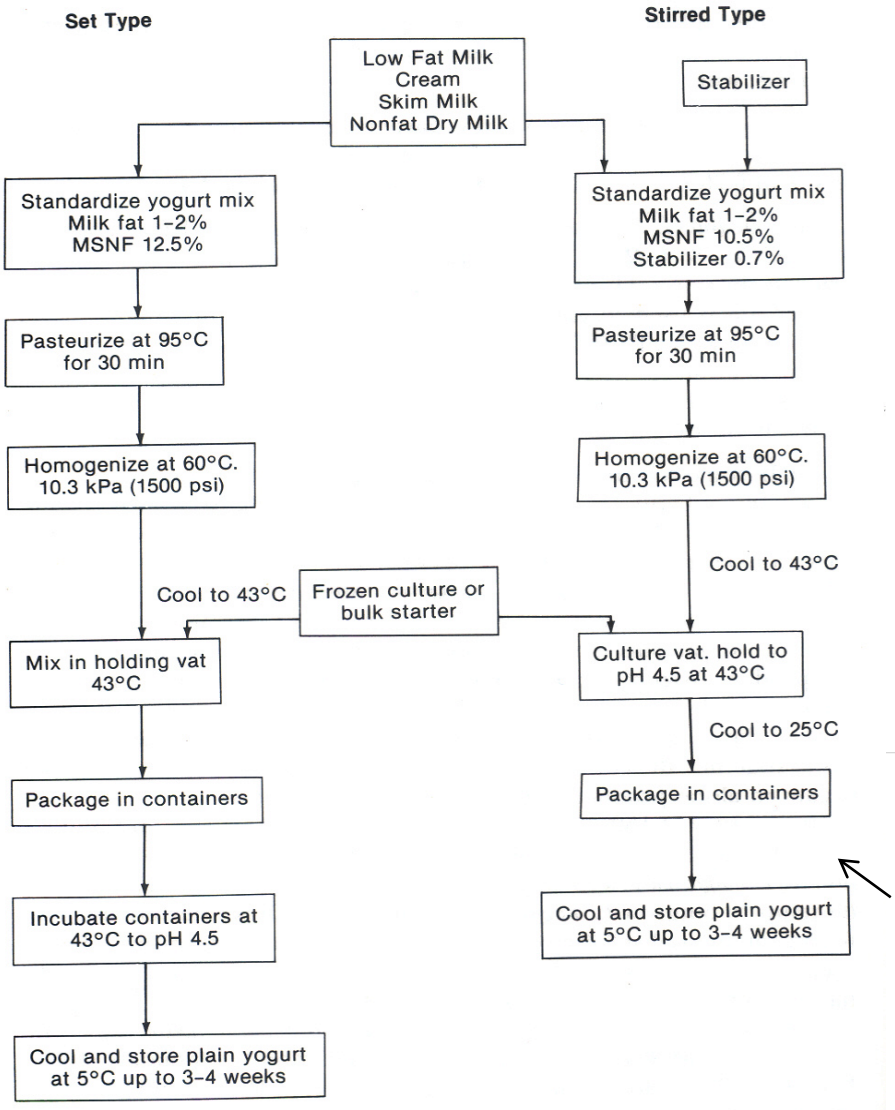
Yogurt is one of many fermented products from milk. Like most milk fermentations, the bacteria there are lactic acid bacteria (check out your text index for "yogurt"). This fermented milk product contains large numbers of these bacteria along with some contaminants. The three types of yogurt are Stirred, Set, and Activated. Stirred yogurt is fermented in a large vat while being actively stirred, and placed in containers after the process. Set yogurt is fermented in the same container the product is sold in. Activated yogurt have live cultures added after fermentation at the same time fruit is added (would this make it set or stirred?) You will be in charge of designing this experiment and isolating the bacteria that produced yogurt from your sample of yogurt.

Your assignment: Using the information given here, design a hypothesis and an experiment to test it. Your hypothesis and experimental design will be worth 5 quiz points in the first lab session. In addition to standard requirements, lab reports will be graded on scientific thought development, time management, creativity, and adherence to requirements. The following requirements MUST be met:

1. Your experiment must occupy the majority of four lab sessions, and conclude in the fourth session. You will get your experiment approved AND begin the experiment on the first lab session.
2. Your experiment must test a specific hypothesis.
3. Your hypothesis must involve yogurt and yogurt associated bacteria.
4. Your experimental design must be approved by the TA before you begin.
5. You must use the supplies listed at the end of this lab.
6. You must obtain a pure culture to use for future lab. This can be on the side or a main focus.
7. You must supply all yogurt sources.

Notes on the Figure (next page):

1. MSNF is milk solids non fat which is milk sugar (lactose) and proteins (mainly casein).
2. Stabilizers used vary with manufacturer: usually natural or modified gums (polysaccharides) or gelatin (solubilized animal bone protein)...these help thicken the yogurt. The classical fermentation does not use these.
3. Note that this is a **thermophilic** fermentation....that takes place in the Vat (stirred type) or in the Containers (set type) and therefore takes little time compared to the much longer cheese fermentations at cool temperatures. Normally the fermentation time at 43^{o}C is about 4 to 6 hours. Other cheese and wine fermentations can take days followed by months of secondary fermentations (develops characteristic flavors, improves quality).
4. While Pasteurization is fairly straight forward, the homogenizers are pumps that push the milk at high pressure through tiny holes at a warm temperature to break up the milk fat so that it is emulsified and won't separate out (float to the top).
5. While either fermentation type can have fruit or other flavors added, this is usually done with stirred type. Note that there are two types of ways fruit is added...what are they?



If fruit mixes are added here, if "activated" that culture is added here.

Materials Available per Pair:

Lab Session 1

1. 2 MRS agar plates
2. 2 Nutrient agar plates

Lab Session 2

1. 2 MRS agar plates
2. 2 Nutrient agar plates

Lab Session 3

1. 2 MRS agar plates
2. 2 Nutrient agar plates
3. CH-API strips

Available Every Session: Gram staining supplies, spread plating supplies, weigh boats, 200 and 1000 µl pipette tips. Other supplies may be available upon request.