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Making Yogurt at Home

Robert Hutkins, Research Food Scientist

Tangy, nutritious yogurt can be made at home with regular kitchen utensils, and often is less expensive than buying it. This NebGuide describes how.

The milk used to make yogurt contains a higher concentration of solids than normal milk. By increasing the solids content of the milk, a firm, rather than soft, end product results. Addition of nonfat dry milk (NFDM) is the easiest at-home method for doing this.

Yogurt is made by inoculating certain bacteria (starter culture), usually *Streptococcus thermophilus* and *Lactobacillus bulgaricus*, into milk. After inoculation, the milk is incubated at approximately 110°F ± 5°F until firm; the milk is coagulated by bacteria-produced lactic acid.

Starter Culture

Dry cultures for making yogurt can be purchased in some health food stores, but they are usually expensive. Dry cultures also may be purchased directly through the Internet. However, the easiest and least expensive way of obtaining a starter culture is to purchase plain yogurt at a grocery store. It should be plain – no fruit added. Fruit may contribute undesirable yeasts and bacteria to the yogurt, making it a poor starter culture.

You must use a brand of plain yogurt and the label must indicate the product contains a live culture. Most brands do contain live culture, but some brands of plain yogurt do not contain a live culture because the yogurt has been pasteurized.

To maintain a culture, save a small portion of yogurt (1 cup is enough for a 1-gallon batch) to use as a starter culture for the next batch. Be sure to refrigerate the starter culture in a clean, air-tight container.

Occasionally a culture may become contaminated, requiring a new culture. By using a new culture, the original flavor and a minimal coagulation time are retained.

Temperature

Accurate temperature control helps assure rapid coagulation and a good-tasting yogurt. A thermometer that measures temperature in the range of 90°F to 120°F should be adequate. A glass thermometer can be used, but may break easily. Thermometers are not needed with yogurt-making kits that are available at many specialty stores.

Ingredients

Yogurt can be made by using only nonfat dry milk (NFDM) and water, or by adding NFDM to skim milk, 2% milk or regular milk. Nonfat dry milk is commonly available in two forms, instant and regular. Ideally, the milk powder should be weighed to obtain the desired solids content (15 percent on a weight basis). Because weighing might not be possible in all home kitchens, measurements both by weight and volume are provided in the following recipes (*Table I*). For each recipe, the quantity of ingredients necessary for making either 1 quart or 1 gallon of yogurt is given.

Table I. Yogurt recipes.

Liquid Ingredient	*Dry Ingredient Nonfat Dry Milk*			
	By weight	*By volume*		
		Instant		*Regular*
Recipe 1				
1 gal water +	22.2 oz =	8 1/3 c	or	4 3/4 c
1 qt water +	5.6 oz =	2 c	or	1 1/4 c
Recipe 2				
1 gal skim milk +	10.4 oz =	4 c	or	2 1/4 c
1 qt skim milk +	2.6 oz =	1 c	or	1/2 c
Recipe 3				
1 gal 2% milk +	7.2 oz =	2 3/4 c	or	1 1/2 c
1 qt 2% milk +	1.8 oz =	3/4 c	or	1/3 c
Recipe 4				
1 gal regular milk +	4.8 oz =	1 3/4 c	or	1 c
1 qt regular milk +	1.2 oz =	1/2 c	or	1/4 c

gal = gallon c = cup
oz = ounce qt = quart

Method for Making Yogurt

1. Combine the appropriate quantities of liquid and dry ingredients given in *Table I* and mix thoroughly.
2. Heat this milk (with frequent stirring) in a saucepan or double boiler to just near boiling, then cool quickly to 110°F.

Discard any "skin" that may have formed on the milk. Sugar may be added to the milk before boiling, if desired. Heating the milk to boiling kills any undesirable bacteria that might be present and also changes the properties of the milk protein so that it gives the yogurt a firmer body and texture.

3. To 1 gallon of milk, add 1 cup of warm 110°F starter culture. Mix well but gently. Do not incorporate too much air. If too much air is mixed in, the starter culture will grow slowly.

4. Sanitize yogurt containers by rinsing with boiling water.

5. Pour milk into clean container(s) and cover with lid. If fruit is to be added to the yogurt, put in the bottom of the cup before adding the inoculated milk. The fruit should be at a temperature of 110°F. Incubate filled containers at 110°F. Do not stir the yogurt during this period. There are several ways to control temperature during incubation:

   a. Special yogurt-making equipment allows for careful temperature control without a thermometer and reduces the chances of failure.
   b. Yogurt containers can be kept warm in a gas oven with pilot light and electric bulb, or an electric oven with light bulb of sufficient wattage (approximately 100 watts).
   c. A Styrofoam box with light bulb may be used as an incubator.
   d. Another good way to control temperature is to place yogurt containers into pans of 110°F water in an oven or an electric frying pan. Set oven temperature at lowest point to maintain water temperature at 110°F.
   e. Wide-mouth thermos bottles, heating pads and sunny windows also have been used.

   Regardless of the method of temperature control used, determine ahead of time that the proper temperature can be maintained. To do this, place water or a container of water in the incubator and monitor its temperature with a thermometer.

6. Maintain 110°F temperature until the milk coagulates with a firm custard-like consistency (three to six hours). Check by gently tilting cup. Then refrigerate. It will keep for two to three weeks in the refrigerator. Enjoy!

Troubleshooting

1. **Problem:** Yogurt does not have a custard-like body but rather is soft and not smoothly solidified.

   Causes:
   a. Addition of starter culture to the milk before it has cooled down may kill the culture and prevent coagulation. **Solution:** Wait until the milk cools down to 110°F before inoculating.
   b. Both high and low incubation temperatures slow down culture growth and increase the amount of time necessary for coagulation. **Solution:** Use a thermometer to control temperature.
   c. Extended storage of the starter culture reduces the number of live bacteria in the culture. **Solution:** Use more starter culture in the recipe or obtain a new culture.
   d. Contamination of the culture with undesirable bacteria. **Solution:** Get a new culture. Also clean and sanitize yogurt containers each time yogurt is made.
   e. Omitted or added an insufficient amount of nonfat dry milk to the milk. **Solution:** Accurately measure or weigh the nonfat dry milk.
   f. Over-agitation before incubation may slow down starter activity. **Solution:** Combine starter culture and milk by mixing gently.

2. **Problem:** Yogurt tastes bad.
   Causes:
   a. Starter culture is contaminated. **Solution:** Obtain new culture.
   b. Yogurt has over-set or incubated too long. **Solution:** Refrigerate yogurt immediately after a firm coagulum has formed.
   c. Overheating of the milk causes an off-flavor. **Solution:** Do not overheat the milk.

3. **Problem:** Whey collects on the surface of the yogurt.
   Causes:
   a. Yogurt was over-set or incubated too long. **Solution**: Refrigerate yogurt immediately after a firm coagulum has formed.
   b. Yogurt was bumped, moved or stirred during incubation. **Solution:** Place yogurt in a quiet location where it will not be disturbed.

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