Supplemental Materials
for
Yogurt Making as a Tool To Understand the Food Fermentation Process for Nonscience Participants

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Appendix 1: YOGURT MAKING PROCEDURE

Presented at the Training/Workshop on Making Yogurt in the Parish of BMV Bogor Cathedral, The Region of Scared Heart of Jesus, Bogor, 26th May 2018.

Instructors
Widya Agustinah, M.Sc.
Meda Canti, M.Sc.
Renna Eliana Warjoto, M.Sc.

Contact person
Ir. Agustin W. Gunawan, M.Si.

Learning Objective
Each group can make yogurt from various types of milk and starter cultures.

Materials (for each group)
Prepared by the participants:
- 75 g of skim milk powder, plain
- 1 L of full cream pasteurized milk, plain
- ½ L of UHT full cream milk, plain
- ½ L of UHT low fat milk, plain
- 20 g of sugar (sucrose)
- 2 L of boiled water (or bottled water)
- 5 pc of rubber band
  For topping, we can use syrup or cut fruits
Prepared by the instructors:
- 100 mL of yogurt starter culture: *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus*, and commercial plain yogurt
- 1 pack of pH universal indicator

Equipment (for each group)
Prepared by the participants:
- 4 pc of large pan (size about 5L)
- 1 pc of kitchen stove or electric stove for cooking
- 5 pc of glass bottles and lids*
- 1 pc of digital scales
- 4 pcs of measuring cups*
- 2 pc of wood stirrer*
- 5 pc of stainless steel tablespoon*
- 1 pc of glass/plastic glass size 1L*
- 10 pc of plastic spoon for yogurt tasting
- 1 pc of duster
- 1 pack of small tissue paper
- 1 roll of aluminum foil
*Sanitation of equipment: washed with soap, rinsed with clean water, sterilized by soaking in boiling water, air-dried, sprayed with 70% v/v ethanol and air-dried

Prepared by the instructors:
- 2 pc of thermometer
- 1 pc of bottle of spray containing 70% v/v ethanol to sterilize equipment
- 5 pc of plastic container for yogurt tasting

Methods
Milk preparation
Milk A: Dissolve 75 g of skim milk powder into 500 ml boiled water and add 20 g of sugar. Stir until dissolved.
Milk B and C: Prepare 500 mL of full cream pasteurized milk
Milk D: Prepare 500 mL of UHT full cream milk
Milk E: Prepare 500 mL of UHT low fat milk

1. Milk A is put into a pan, then heated to 85 °C and stirred slowly to prevent scorching. Heating at 85 °C aims to kill pathogenic and spoilage bacteria. Alternative: put the same types of milk from all groups into 1 large pan, then heat.
2. Measure the temperature using a thermometer. After reaching 85 °C, let stand for 15 minutes while stirring. Turn off the stove after it reaches that temperature and time.
3. Milk B, C, D, and E are put into a separate pan and warmed to a temperature of 40°C. Measure the temperature with a thermometer.
4. Move each type of milk into a separate sanitized glass bottle. Measure the volume with a sanitized measuring cup. Let stand until milk reaches room temperature (28-30 °C).

Fermentation
1. Into each bottle, add yogurt starter cultures:
   a. Commercial plain yogurt: 20 ml for 500 mL of milk.
   b. Single-strain starter cultures: add 5 mL of *L. delbrueckii* ssp. *bulgaricus* and 5 mL of *S. thermophilus* for each 500 mL of milk.
2. Measure the initial pH with a pH universal indicator and record in the worksheet.
3. Cover the glass bottle with aluminum foil and tie it with a rubber band.
4. Incubation is done using an incubator at 37 °C for 12-18 hours until a firm coagulum is formed. Alternative: Incubation is done at at room temperature (28-30 °C) for 24 hours without shaking.
5. After the incubation period, observe the texture of the yogurt. When the curd is separated from the whey, stir the yogurt slowly until the texture has a smooth and runny consistency.
6. The finished yogurt can be consumed or stored. Measure the final pH of the yogurt. Observe the texture (consistency), taste, aroma, and color. Record the results on the worksheet.
7. Syrup and cut fruits can be added to the yogurt, then stirred until evenly distributed.
8. Storage of yogurt can be done in the refrigerator (4 °C) for 7-10 days.
Notes
Yogurt fermentation requires good personal hygiene and sanitation conditions. Sanitize all equipment that will have direct contact with the ingredients. Wash hair before working. Use a face mask while working and do not use body lotion / hand cream before working.

Happy working!
Appendix 2: WORKSHEET

Group : ………………………………………….

Complete the following table according to the experiment results.

Variety of ingredients to make yogurt

<table>
<thead>
<tr>
<th>Code</th>
<th>Milk</th>
<th>Starter*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Liquid skim milk (and sugar)</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Full cream pasteurized milk</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Full cream pasteurized milk</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>UHT full cream milk</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>UHT low fat milk</td>
<td></td>
</tr>
</tbody>
</table>

*Selection of starter:
X. Starter *L. bulgaricus* and *S. thermophiles* culture (Faculty of Biotechnology)
Y. Commercial yogurt: Biokul brand

Properties of yogurt

<table>
<thead>
<tr>
<th>Code</th>
<th>Initial pH</th>
<th>Final pH</th>
<th>Texture</th>
<th>Taste</th>
<th>Aroma</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
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</tbody>
</table>

Is there any difference among yogurt A, B, C, D, and E? Describe the difference!

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..................................................................................................................................................
..................................................................................................................................................

Which is your most preferred yogurt? Please state the reason.

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..................................................................................................................................................
Appendix 3: Questionnaire

(26 May 2018)

Instructions: Put a cross mark (X) on the answer which you find most appropriate.

1. Have you ever made yogurt at home?
   □ Yes  □ No

2. Do you think the process of making yogurt today is easy to do?
   □ Yes  □ No

3. After the training, do you want to make yogurt at home?
   □ Yes  □ No

4. Does this training activity provide you with new information and comprehension?
   □ Yes  □ No

5. Does this training activity of yogurt making interest you?
   □ Yes  □ No

6. What is your impression of today’s training instructors?
   Provide an assessment with scale 1-5
   1 : not satisfied
   2 : less satisfied
   3 : enough satisfied
   4 : satisfied
   5 : very satisfied
   □ 1  □ 2  □ 3  □ 4  □ 5

7. Please write any comments and suggestions for the training of yogurt-making