<table>
<thead>
<tr>
<th>Unit of Competency:</th>
<th>PROCESS FOOD BY SUGAR CONCENTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module No. 1</td>
<td>Module Title: PROCESSING FOOD BY SUGAR CONCENTRATION</td>
</tr>
</tbody>
</table>
# TABLE OF CONTENTS

**Module Title: Processing food by sugar concentration**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2-4</td>
</tr>
<tr>
<td>Lesson 1 - Prepare equipment, tools and utensils</td>
<td>5-9</td>
</tr>
<tr>
<td>Lesson 2 – Prepare the raw materials</td>
<td>10-17</td>
</tr>
<tr>
<td>Lesson 3 – Perform acid, pectin and sugar mixture</td>
<td>18-25</td>
</tr>
<tr>
<td>Lesson 4 – Cook jams, jellies, marmalades and preserves</td>
<td></td>
</tr>
<tr>
<td>Lesson 5 – Prepare production report</td>
<td></td>
</tr>
<tr>
<td>Self Check</td>
<td></td>
</tr>
<tr>
<td>Answer key</td>
<td></td>
</tr>
<tr>
<td>References</td>
<td></td>
</tr>
<tr>
<td>Acknowledgment</td>
<td></td>
</tr>
</tbody>
</table>
This module covers the knowledge, skills and attitudes required in processing food by sugar concentration such as preparing equipment, tools and utensils, preparing the raw materials, performing acid test, pectin, and sugar mixture, cooking sugar concentrates such as jellies, jam, marmalades and fruits and vegetable preserves, and preparing production report.

After completing this module, you should be able to:

LO 1. Prepare and use equipment, tools, materials and utensils;
LO 2. Prepare the raw materials;
LO 3. Perform acid, pectin and sugar mixture;
LO 4. Cook sugar concentrates; and
LO 5. Prepare production report.
LESSON 1

PREPARE EQUIPMENT, TOOLS AND UTENSILS FOR PROCESSING

INTRODUCTION

This lesson covers the preparation of tools, utensil and equipment required for processing food by sugar concentration with its cleaning and sanitizing standard methods.

ASSESSMENT CRITERIA

1. Equipment, tools and utensils for processing food by sugar concentration are prepared in accordance with the specified standards.
2. Equipment, tools and utensils are calibrated in accordance to standard specifications.
3. Equipment, tools and utensils are cleaned, sanitized and ready for use in processing food by sugar concentration.

PRE-TEST

Directions: Read the sentences carefully. Select the best answer and write the letter in your test notebook.

1. What is used to measure dry and liquid ingredients in small quantity?
   a. glass measuring cup  
   b. measuring cup  
   c. measuring spoon  
   d. weighing scale

2. Which of the following is used to strain liquids?
   a. colander  
   b. jelly bag  
   c. strainer  
   d. sieve

3. Which of the following is used for slicing fruits and vegetables into different sizes?
   a. french knife  
   b. food slicer  
   b. paring knife  
   d. table knife

4. How are processing tools, utensils, and equipment be sanitized?
   a. rinsing thoroughly in tap water  
   b. drying under the sun  
   c. soaking in chlorinated water  
   b. soaking in water with detergent

5. What is the step in preparing equipment that checks the accuracy of measurement?
   a. calibration  
   b. inventory  
   c. sanitation  
   d. repair
DEFINITION OF TERMS

1. PPM – parts per million, the normal method of expressing chlorine levels in sanitizing solutions.

2. Tools – These are devices for doing object designed to do a particular kind of work.

3. Equipment – the supplies and other items needed for a particular task or activity.

4. Utensil – implement or container used in food processing laboratory.

5. Sanitize – to clean something thoroughly by disinfecting or sterilizing to make it free from germs or microorganisms.

6. Disinfect – process of cleaning to prevent the growth of microorganism disease-carrying microorganisms and prevent contamination.

9. Calibrate – to test and adjust the accuracy of a measuring instrument or device.

10. Specification – the detailed description, dimensions and materials that is enough to provide the information about a product.
Information Sheet 1.1

FOOD PRESERVATION TOOLS, EQUIPMENT AND UTENSILS FOR PROCESSING FOOD BY SUGAR CONCENTRATION

Utensils used for processing food by sugar concentration

1. Colander – Used for rinsing or for blanching fruits and vegetables.
2. Casserole – Used for cooking jams, jellies marmalade and preserves.
3. Slicer – Used for slicing fruits and vegetable for marmalade.
4. Sterilized Canning Bottles – commonly used as primary packaging for sugar concentrated products.
5. Wooden Spoon – Used for stirring jams, jellies, marmalades and preserves while these products are still on fire. In spoon testing a wooden spoon is also is best to use.
6. Strainer – a mesh with handle that is used for staining off particles from fruit juices.

Knives used for processing food by sugar concentration

Apparatus used for processing food by sugar concentration
**Refractometer** – an instrument used for testing the degree of sugar present in fruit juice or extract.

1. Daylight plate
2. Prism
3. Scale adjustment screw
4. Eye piece
5. Screw driver
6. Dropper

**Digital Refractometer**

> Insert definition here

1. Prism
2. Stainless – Steel Sample Stage
3. Scale Button
4. START/OFF Button
Procedure on how to use a refractometer to determine fruit’s sugar level

1. Adjust the temperature of the prism
   Open the daylight plate, drop 2-3 of distilled on it, close the prism and allow the water to spread to the surface evenly. Wait for 30 seconds.

2. Place one or two drops of sample of fruit or vegetable juice on the prism.
   Distribute evenly the sample over the surface of the prism. Allow the sample to adjust on the prism temperature for approximately 30 seconds.

3. Draw the device near the bright source of light and look through the field vision.

4. Read the corresponding number on the scale.
   The line between the dark and light fields can be seen in the field vision. The scale expresses the percentage of sugar in the sample.
5. Open the prism and remove the sample with a piece of paper or clean wet cotton (use distilled water).

**Jelly Thermometer** – use to determine the jellying point.

Jelly thermometer is used by dipping the point of it in the jelly, it may also clip in the pan so that the temperature can be monitored.

**Equipment Used for Processing Food by Sugar Concentration**

**Functions of Equipment**

Knowing the parts and functions of equipment used in processing food ensures accuracy of use, operation and care for them. It is very easy to manipulate a particular device if he knows all its parts and their functions. Proper maintenance for the parts of any equipment can also be done if a processor is familiar with them.
**BLENDER**

Jars come in glass, plastic, or restaurant-style stainless steel and hold from 32-64 ounces. Or restaurant-style stainless steel and hold from 32-64 ounces.

Blending controls are available with three main options to control speed: a two speed-toggle switch, push buttons or electronic touch pads.

Most blender leads have a removable inner “plug” for adding ingredients or releasing steam, it doubles as a measuring cup.

A wide sturdy base is essential to reduce wobbling.

Blender in sugar concentration is used for making puree or mixing ingredients and liquids.

**Steam Jacketed Kettle**

Steam Jacket Kettle is used for cooking jam, jellies and other food concentrates.
These kettles consist of two-bowl like sections of welded aluminum, or stainless steel with an air circulation of steam. It may be stationary or tilting. When the steam is released inside the jacket, it condenses on the outside of the inner shell, thereby giving up its heat to the metal, from which it is then transferred to the food. The steam does not come directly in contact with the food being heated. Steam is commonly produced in remote steam boilers.

**Inspecting and Checking Condition of Equipment and Machines**

Before any equipment or machine is used, it must first be checked to make sure that it is very functional and in good condition. Checking and inspecting equipment and machines will guarantee that all their parts are intact and that no part is missing or defective. This will also assure that electric plugs and wirings are not defective and will not in any way cause problems or short circuits, electrocution or any form of accident. Regular checking and inspecting of equipment and machines will facilitate preventive maintenance which includes checking the following:

1. Machine temperature
2. Hydraulic fluid
3. Gear and surface condition
4. Crack
5. Leak detection
6. Vibration
7. Corrosion
8. Electric insulation

Washed tools and utensils must be air dried or wiped dried before storing them. They must be kept in clean racks or cabinets which are well ventilated and not subjected to drafts or rain. They should be arranged orderly, and properly labeled when possible for identification, easy access and use.

**LET US REMEMBER:**

It is important to prepare, clean and sanitize equipment, tools and utensils in processing foods by sugar concentration. In so doing, time and energy is saved and contamination is avoided.
SELF CHECK

Directions: Read the sentences carefully. Select the best answer and write the letter in your test notebook.

1. What is used to measure dry and liquid ingredients in small quantity?
   a. glass measuring cap    b. measuring cup
   c. measuring spoon        d. weighing scale

2. Which of the following is used to strain liquids?
   a. colander               b. jelly bag
   c. strainer               d. sieve

3. Which of the following is used for slicing fruits and vegetables into different sizes?
   a. french knife           b. food slicer
   c. paring knife           d. table knife

4. How are processing tools, utensils, and equipment sanitized?
   a. rinsing thoroughly in tap water
   b. drying under the sun
   c. rinsing thoroughly in water with detergent
   d. soaking in chlorinated water

5. What is the step in preparing equipment that covers the checking the accuracy of its certain measurement?
   a. calibration
   b. inventory
   c. sanitation
   d. repair

REFERENCES:

1. Fruit and Vegetables Processing, Revised Edition
2. Good Manufacturing Practices – Prepared by Industrial Technology Development Institute – DOST
3. Mendoza, Jose M., Philippine Foods, Their Processing and Manufacture pp. 100-108
4. Guzman, Alcantara de, A Module in Food Preservation Technology and Home Economics pp. 32-37
5. Guzman, Matilde P., Preservation of Philippine Foods pp. 122-136
Activity Sheet 1.1

TITLE: Clean and sanitize processing tools, utensils and equipment.

STEPS/PROCEDURE:

a. Demonstrate how to prepare calibrate and use the different tools, equipment, and utensils properly.

b. Demonstrate how to clean and sanitize processing tools, utensils and equipment following the correct procedure.

RESOURCES:

Food Processing Tools, Equipment and Utensils

REFERENCES:

1. Fruit and Vegetables Processing, Revised Edition
2. Good Manufacturing Practices – Prepared by Industrial Technology Development Institute – DOST
3. Mendoza, Jose M., Philippine Foods, Their Processing and Manufacture pp. 100-108
4. Guzman, Alcantara de, A Module in Food Preservation Technology and Home Economics pp. 32-37
5. Guzman, Matilde P., Preservation of Philippine Foods pp. 122-136
Lesson 2

Prepare the Raw Materials for Jellies, Jam, Marmalades and Preserves

Introduction

Lesson 2 focuses on the important things to consider in selecting, sorting and grading fruits/vegetables and to the preparation of raw materials for jellies, jams, marmalades and preserves.

Assessment Criteria

1. Fruits and vegetables are sorted, washed, peeled, sliced and cut according to required sizes and shapes.
2. Prepared fruits and vegetables for jelly and marmalade making are boiled to obtain desired juice extract.
3. Prepared fruits and vegetables for jam making are mixed with sugar.
4. Prepared fruits and vegetables to be preserved are cooked in syrup as specified.

Definition of Terms

Jelly Bag - used to strain juice from softened fruits and pulp
Pectin - water soluble substance obtained from fruits causing jellies to set
Plump - to moisten in liquid until full or round
Pulp - flesh of fruits/vegetables
Syrup - mixture of sugar and water
Information Sheet 2.1

JELLIES, JAMS, MARMALADE AND PRESERVES

Jelly is a soft, elastic, transparent food made from fruit juice boiled with sugar. Jam is a food made by boiling fruit pulp with sugar until thick. Marmalade is a clear, jelly-like mixture in which shreds or thin slices of fruits or peel are suspended. Preserves are whole small fruits or vegetables or pieces of large fruits or vegetables cooked in thick syrup until clear, plump and somewhat translucent.

Selection of fruits and vegetables for jellies, jams, marmalades and preserves

In sorting and grading fruits and vegetables, the following qualities must be considered:

1. Wholesomeness
2. Cleanliness
3. Freedom from undesirable substances
4. Degree of perfection in shapes
5. Uniformity of sizes
6. Freedom from blemishes
7. Desirable aroma, color, flavor and texture
8. Nutritive value

Pectin is significant in jelly making because this substance causes jelly to set.

A mixture of slightly under ripe and ripe fruits is best for jelly-making. They are high in acid and pectin content. If overripe fruits are used, the pectin changes into pectic acid. Pectic acid will not form into jelly. Too green fruits, on the other hand, will not have enough flavors.

**Table No. 1 Philippine Local Fruits That are Rich in Pectin**

<table>
<thead>
<tr>
<th>Local Name</th>
<th>Part of Fruits Used</th>
<th>Pectin Content (on a fresh condition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anonas</td>
<td>Pulp- ripe</td>
<td>2.14</td>
</tr>
<tr>
<td></td>
<td>Peeling- ripe</td>
<td>2.10</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>2.03</td>
</tr>
<tr>
<td>Green Bayabas</td>
<td>Whole fruit-ripe</td>
<td>1.41</td>
</tr>
<tr>
<td></td>
<td>Whole fruit- unripe</td>
<td>1.92</td>
</tr>
<tr>
<td>Red Bayabas</td>
<td>Whole fruit- ripe</td>
<td>1.52</td>
</tr>
<tr>
<td></td>
<td>Whole fruit- unripe</td>
<td>1.18</td>
</tr>
<tr>
<td>Kamatis</td>
<td>Whole Fruit- ripe</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>Whole fruit-unripe</td>
<td>0.72</td>
</tr>
<tr>
<td>Granada</td>
<td>Pulp- ripe</td>
<td>2.95</td>
</tr>
<tr>
<td></td>
<td>Seeds-ripe</td>
<td>1.89</td>
</tr>
<tr>
<td></td>
<td>Pulp-unripe</td>
<td>3.08</td>
</tr>
<tr>
<td>Fruit</td>
<td>Stage</td>
<td>Weight</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
<td>--------</td>
</tr>
<tr>
<td>Seeds</td>
<td>unripe</td>
<td>1.60</td>
</tr>
<tr>
<td>Guyabano</td>
<td>Pulp-ripe</td>
<td>2.14</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>1.77</td>
</tr>
<tr>
<td>Lokwat</td>
<td>Pulp-ripe</td>
<td>1.15</td>
</tr>
<tr>
<td></td>
<td>Peeling-ripe</td>
<td>4.72</td>
</tr>
<tr>
<td></td>
<td>Pulp-unripe</td>
<td>1.75</td>
</tr>
<tr>
<td></td>
<td>Peeling- unripe</td>
<td>5.31</td>
</tr>
<tr>
<td>Papaya</td>
<td>Pulp-ripe</td>
<td>1.95</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>3.32</td>
</tr>
<tr>
<td>Pili</td>
<td>Pulp-ripe</td>
<td>3.06</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>3.34</td>
</tr>
<tr>
<td>Rimas</td>
<td>Pulp-ripe</td>
<td>1.87</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>3.96</td>
</tr>
<tr>
<td>Saging-bungulan</td>
<td>Pulp-ripe</td>
<td>1.11</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>0.88</td>
</tr>
<tr>
<td>Saging-butuan</td>
<td>Pulp-ripe</td>
<td>1.49</td>
</tr>
<tr>
<td></td>
<td>Pulp-unripe</td>
<td>2.03</td>
</tr>
<tr>
<td>Saging-Gloria</td>
<td>Pulp-ripe</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>0.48</td>
</tr>
<tr>
<td>Saging- lakatan</td>
<td>Pulp-ripe</td>
<td>2.08</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>1.78</td>
</tr>
<tr>
<td>Saging-latundan</td>
<td>Pulp-ripe</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>2.97</td>
</tr>
<tr>
<td>Saging-morado</td>
<td>Pulp-ripe</td>
<td>1.30</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>1.42</td>
</tr>
<tr>
<td>Saging-saba</td>
<td>Pulp-ripe</td>
<td>1.72</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>1.58</td>
</tr>
<tr>
<td>Saging-ternate</td>
<td>Pulp-ripe</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>0.95</td>
</tr>
<tr>
<td>Santol</td>
<td>Pulp-ripe</td>
<td>2.63</td>
</tr>
<tr>
<td></td>
<td>Pulp- unripe</td>
<td>2.50</td>
</tr>
<tr>
<td>Siniguelas</td>
<td>Pulp and skin, ripe</td>
<td>2.52</td>
</tr>
</tbody>
</table>
Ingredients in jelly making

1. **Fruit.** Fruits for jelly making should have rich flavor. It should contain sufficient pectin and acid. Jelly formation is possible only with the proper pectin to sugar acid ratio.

2. **Pectin.** A water soluble substance found in some slightly under ripe fruits that cause jellies to set. Slightly under ripe fruit is capable of forming a gel when sugar and acid are in the right proportions. Some local fruits which have high pectin content in medium ripeness are guava (1.92), guyabano (1.77), santol (2.63), siniguelas (2.52), anonas (2.10) and chico (look for pectin content of chico).

3. **Acid.** It makes the jelly firm and rigid in structure and is essential for flavor and gel formation. Gel formation occurs from 2.5 to 3.5 pH value. The ideal pH value for successful gel formation is pH 3.2. Fruits differ in acidity. If the fruits used for making jelly has lacked in acid, it could be improved by adding commercial citric, tartaric acid, calamansi and lemon juice.

4. **Sugar.** *The formation of jelly, caused by pectin is agent by sugar.* Like acid, it controls the rigidity, strength of the jelly while acting as preservative at the same time. The amount of sugar needed to add will depend upon the acid and pectin content of fruit juice. If the solution has more acid, less sugar is required. High pectin content requires more sugar. ¾ cup of sugar is recommended for a cup of fruit juice. Less than this would give lower jelly strength. Always remember to mix the sugar to the juice before boiling. Refined sugar is recommended to used for jelly making.

Steps in preparing fruits/ vegetables for jelly-making

1. Thoroughly wash the fruit or vegetables in cold water.
2. Extract the juice from the fruit or slice into small pieces and place in a pan. Add enough water to barely cover the fruit.
3. Boil the fruit slowly until soft. Do not overcook because prolonged boiling reduces the jellying strength of the pectin and gives a cloudy juice.
4. Transfer the cooked pulp and juice into damp jelly bag and allow the juice to drain completely.

Extracting juice from the pulp. Extracting juice using a juicer
5. Test for pectin content.
6. Test for the fruit’s acidity.

**Steps in preparing fruits/vegetables for jam making**

1. Wash the fruits and vegetables thoroughly in running water.
2. Pare the fruits, chop finely.
3. Test for pectin content.
4. Test for the fruit’s acidity.

**Steps in preparing fruits/vegetable for marmalade making**

1. Wash the fruits or vegetables thoroughly in running water.
2. Peel fruits and slice the pulp or peel thinly. Generally, the juice and the slices are prepared separately. They are only mixed during the final boiling of the fruit and juice with sugar.
3. Place the slices or peeling in a stainless steel kettle and add enough water to barely cover.
4. Boil until soften.
5. To get the juice extract, transfer the cooked pulp into a jelly bag and allow dripping.
6. Test for the pectin content.
7. Test for the acid content.
8. Combine peel and juice. Add the required amount of sugar needed.

**Steps in preparing fruits/vegetables for making preserves**

1. Wash the fruits or vegetable thoroughly in running water.
2. Pare and cut them into uniform sizes and shapes or leave them whole if in small size.
3. Prepare syrup.

**LET US REMEMBER:**

In making jellies, jams, marmalades and preserves, carefully select and prepare the fruits/vegetables and other ingredients to be used in order to attain good results.

**REFERENCES:**

1. Food Processing – MATEA Based Textbooks
2. Fruit and Vegetables Processing Revised Edition
3. Secondary Processing Projects by Garcia, Ligaya B.
Activity Sheet 2.1

TITLE: Selecting and preparing fruits/vegetables for jam, jelly, marmalade and preserve making

STEPS/PROCEDURE:

Form groups of four. Each group will bring different kinds of fruits/vegetables. Demonstrate how to sort and grade fruits/vegetables according to prescribed qualities. After sorting the, prepare it for jelly, jam, marmalade and preserve making as had been discussed in this lesson.

RESOURCES:

Fruits/vegetables, Tools, Equipment, and Utensils for Processing Food by Sugar Concentration

REFERENCES:

1. Food Processing – MATEA Based Textbooks
2. Fruit and Vegetables Processing Revised Edition
3. Secondary Processing Projects by Garcia, Ligaya B.
LESSON 3

PREPARE ACID, PECTIN AND SUGAR MIXTURE
FOR JELLIES, JAMS AND MARMALADES

INTRODUCTION

This lesson discusses the preparation of acid, pectin, and sugar mixture for jellies, jams and marmalades. It includes pectin test and adjustment of sugar and acid concentrations for good result of product.

ASSESSMENT CRITERIA

1. Required amount of pectin, sugar and citric acid are measured according to specifications.
2. Measured pectin, acid and sugar are mixed with chopped fruit pulp/juice extract/pieces of fruits according to specifications.

DEFINITION OF TERMS

For better understanding of the lesson, take a look at the word meanings below.
1. Acid – a substance that makes the structure of jelly is firm and rigid.
2. Denatured Alcohol- a type of alcohol from wood that is used to determine the pectin content of fruit/vegetable juice. It is usually available in hard ware shops.
3. Gel – a colloidal dispersion of a solid in a liquid which may range from the nearly liquid to the solid state, but is typically a semi-solid and a jelly-like consistency.
4. Gel meter - is an instrument similar to a graduated pipette, where fruit juice is allowed to run down the Gel meter tube for one minute to test the pectin content.
Information Sheet 3.1

Pectin Content of Fruits and Vegetables

Testing Pectin Content

To find out if a fruit has high or low pectin content, any of the following tests may be performed:

1. **Cooking test** – Boil a small amount of juice with sugar. If gel sets, then it is rich in pectin.

2. **Alcohol test** – mix one tablespoon of fruit juice and two tablespoons of 95% denatured alcohol. The following result will determine the pectin content of the fruit juice.
   a. **Rich in pectin** – a transparent jelly – like lump is formed. Fruit juice rich in pectin
   b. **Moderate amount of pectin** – a jelly-like clot is not very firm and could be broken into two or more lumps.
   c. **Very little pectin content** – The clot could be broken into numerous small pieces or the juice is cloudy.

3. **Gel meter test** – in this test, fruit juice is allowed to run down into tube for one minute to test the pectin content.

   There are two indications in a gel meter that will show if the fruit has high or low pectin content.
   a. **Rich in pectin content** - the juice is thicker and runs down into the tube more slowly.
   b. **Low in pectin content** - the juice runs below one-half (½) mark of the gel meter after one minute.

Testing the Fruit Acidity

To test the acidity of fruits, mix one tablespoon of calamansi juice and one-half cup of water. The following result will determine the acidity of the fruit juice.

a. **High acid content** - if the taste is as sour as the solution of calamansi and water.

b. **Lack acid content** – if the taste of the solution is less sour.

*Jellying may be improved by adding acid in the form of calamansi or lemon juice and or commercial citric or tartaric acid.*

Combining juices that has low acidity to juices with high acidity will proportion the sour taste and correspond to desired quality.
Adjustment of Sugar and Acid Concentration

Jams, jellies and syrups must have the right sugar concentration. Fruit juices on the other hand, must have the desired sugar acid proportion to give the best quality products. Hence, knowing how to determine and adjust the sugar and acid concentration is important for the preparation of products.

A. Brix/Acid Ratio

The Brix/acid Ratio is sweetness – to – tartness relationship. It gives a ratio compared with unity which forms a comparative scale for the acceptability of juice concentrates. The Brix unit is the concentration of dissolved solids in an aqueous solution or the % Soluble solids (%SS). The acid unit is the concentration of citric acid in the citric juice.

B. Methods for Calculating Brix/Acids Ratio

1. Sugar Concentration

The Pearson Square Method is widely used to determine and calculate the degree Brix. Here is how it performs:

\[
\begin{align*}
\text{Initial } \% \text{ SS} & \quad \% \text{ Purity of Sugar} \\
\text{Desired SS} & \\
\text{(b) Difference between } \% \text{ purity sugar and desired } \% \text{ SS} & \quad \text{(a) Difference between initial } \% \text{ SS and desired Desired } \% \text{ SS}
\end{align*}
\]

Sample Calculation:

The % purity of sucrose is assumed to be 100%. Let us say you will make a syrup with the concentration of 65% and water is 0% SS. Given a certain weight of juice or water, you can determine the weight of needed sugar to add for obtaining the desired % SS by using the formula below:
(required brix) \( a \times \) (weight of juice or water) = required amount of sugar to be added
\( b \)
(desired concentration)

Problem:
How much sugar is needed to add if the water is 20 kg to make a syrup with 35° brix concentration?

Solution:

\[
\begin{align*}
\% \text{ SS water} & = 0 \\
\% \text{ purity of sugar} & = 100 \\
\text{Weight of water} & = 20 \text{ kgs.} \\
\text{Required } \circ \text{ Brix} & = 35
\end{align*}
\]

\[
\begin{align*}
\frac{35 \times 20}{65} & = 10.8 \text{ kgs of sugar}
\end{align*}
\]

Findings:
Therefore to get syrup with 35° brix concentration, add 10.8 kg sugar to 20 kg of water.

2. Acid Concentration

The % acid of fruit juices is called tritable acidity. Tritable is an important factor for flavor quality. The product may be rejected if too high in acid, if too low, the flavor is bland and unappealing. Hence, adjusting fruit juices to the desired acidity is important.

The acidity of fruit juices can be determined by titration. A certain weight of sample is tritable with 0.1 normal sodium hydroxide solutions gives light pink color.

The acid concentration can be determined by using this formula:
% of Acid = \frac{\text{Volume of NaOH} \times \text{Normality of NaOH} \times 0.6 \times 100}{\text{Weight of sample}}

The initial % acid must be known so that the fruit juice can be adjusted to desired acidity by using pearson square:

\[ \% \text{ Initial acid} \times \% \text{ purity of citric acid} = \text{Desired Acidity} \]

- (a) Difference between Initial % acid and desired % acid
- (b) Difference between % purity of acid and desired % acid

- Insert problem and on determining acid concentration

**Problem:**
- Insert problem and on determining acid concentration

**Solution:**

\[
\begin{align*}
\% \text{ initial acid} & \quad 0 \\
\text{Desired acid} & \quad 3.2 \% \\
\% \text{ purity of citric acid} & \quad 100 \% \\
\text{Weight of juice} & \quad 20 \text{ kg}
\end{align*}
\]

\[
\begin{align*}
15\% \times 100\% & = 3.2 \% \\
11.8\% \times 96.8\% & = 11.8 \times 20 \text{ kg} = 96.8\%
\end{align*}
\]
0.122% X 20kg = 2.44 kg

LET US REMEMBER:

It is important to test the pectin and acid content of fruits because the amount of sugar to be added will depend on the acid and pectin content of juice. As a general rule, the higher the acid content, the less sugar required; the higher the pectin content, the more sugar to add. For fruit juices that are rich in pectin, add ¾ to 1 cup sugar per cup of fruit juice is recommended. If fruit juices have moderate amount of pectin, add less sugar, Fruit juices with small pectin content should not be utilized for jelly making unless added with concentrated pectin that are available in the market.

To produce a product of good quality, one must test the pectin and acid contents of fruits when processing food by sugar concentration.

REFERENCES:

1. Fruit and Vegetable Processing, Revised Edition, pp.78-79
2. Philippine Foods, Their Processing and Manufacture, by Mendoza, Jose M. pp. 101-102
3. Preservation of the Philippine Foods
   By Leon, Sonia Y. de, Guzman, Martilde. , pp-123
Activity Sheet 3.1

TITLE: Prepare acid, pectin and sugar mixture for jellies, jams and marmalades

PROCEDURE:

The class will conduct a group activity. The group will select five kinds of local fruits or vegetables. Every group will have the testing for pectin and acid contents so that they will discover which among the local fruits and vegetables are best to use for jellies, jams, marmalades and preserves.

RESOURCES:

Local fruits and vegetables, denatured alcohol, and kitchen tools and utensils.

REFERENCES:

1. Fruit and Vegetable Processing, Revised Edition, pp.78-79
2. Philippine Foods, Their Processing and Manufacture, by Mendoza, Jose M. pp. 101-102
3. Preservation of the Philippine Foods
   By Leon, Sonia Y. de, Guzman, Martilde., pp-123
LESSON 4

COOK JAMS, JELLIES, MARMALADE, AND PRESERVES

INTRODUCTION

This lesson covers the specific method on processing jam, jellies, marmalades and preserves. Also included are the different tests for determining the end point and the characteristics of good finished products, possible problems, cause and prevention in the process of making sugar concentrated products are all here.

ASSESSMENT CRITERIA

1. Mixture is heated and cooked according to required consistency.
2. Desired endpoint is checked and tested as specified.

DEFINITION OF TERMS

1. crinkles - wrinkles
2. jellying point/setting point - point when sugar concentration reaches 60%
3. scum - a film covering on the surface of the jelly
Information Sheet 4.1

METHODS OF COOKING SUGAR-CONCENTRATED PRODUCTS

A. Jellies

1. Measure the required amount of sugar to be mixed with fruit juice - add ¾ to 1 cup sugar for every cup of juice. Stir to dissolve the sugar.
2. Strain to remove any lumps of sugar, scum or dirt.
3. Cook rapidly without stirring until jellying point is reached.
4. Skim and pour in sterilized jars while still hot.
5. Seal and label.

B. Jams

1. Cook the pulp until soft.
2. Add sugar when pulp is completely softened, otherwise the fruits becomes hard if the sugar is early added. The usual proportion is ½ to ¾ cup of sugar per cup of pulp. If the fruit is moderately rich in protein, add smaller amount.
3. Boil rapidly until the jam starts to set in. (The secret of making jam is cooking slowly before adding the sugar and rapidly afterwards.)
4. As the jam reaches setting point, turn fire off and remove the scum by scooping with a clean wooden spoon.
5. Pour the jam into sterilized jars while still hot.
6. Seal and label.

C. Marmalades

1. Measure the required amount of sugar to be mixed with fruit juice - add ¾ to 1 cup sugar for every cup of juice. Stir to dissolve the sugar.

*The amount of sugar needed depends on the composition of the juice. More sugar can be added to juices rich in pectin and acid than those deficient in one or both constituents.

2. Boil sugar, juice and peel/slices or chops of fruit until it reach the jellying point, usually at 104°C. A good marmalade should have a jelly-like consistency and not syrupy.
3. Pour marmalade into sterilized jars.
4. Seal and label.

D. Preserves

1. Prepare the kind of syrup needed for the fruit, you may select from these forms:

   a. Thin - 3 cups water to 1 cup sugar
   b. Medium - 2 cups water to 1 cup sugar
   c. Thick - 1 cup water to 1 cup sugar (good for sour fruits)
2. Drop the fruit into boiling syrup and cook until fruit is clear and tender. Make sure that the fruits are covered with the syrup so that the surface will not dry up and harden before the syrup is absorbed by the pieces.
3. Cook rapidly so that the preserve will look bright and attractive.
4. Drain fruits.
5. Arrange the cooked fruit in a sterilized jar and pour hot syrup.
6. Remove air bubbles.
8. Sterilized jars for 25 minutes in a boiling water.
10. Place jars upside down to test for leakage.
11. Label properly.

TESTING THE JELLYING POINT

One or both of the following tests may be used to make sure that the mixture has reached its jellying point.

1. **Bubble formation** – if large bubbles have briskly appears with small bubbles beneath.
2. **Cold Plate test** – put three drops of jelly in a cold plate, after a while, the consistency reached by the jelly will be reveal. Remove the pan from heat when doing this test

**Ways of Doing the Cold Plate Test**

a. **Cold plate test with water.** Pour a small amount of boiling syrup into a saucer with slight cold water. The jellying point is reached if the syrup forms a softball with crinkles. Lift it out from water and gently pushed by your finger, the ball should remain on its shape.

b. **Without water.** Cool a teaspoonful of jelly in a saucer. The jellying point has been reached if the surface of the syrup sets and crinkles when pushed with the finger.

3. **Spoon, sheet or flake test.** Dip a wooden spoon into the boiling jelly. Cool slightly. Lift and tilt the spoon until the syrup runs down the side.

*The jellying point has been reached if the jelly sets on the spoon, and the last two drops flows together and fall off the spoon as one sheet of flake.*
4. **Temperature test.** Before cooling the jelly, get the temperature of the boiling jelly. It will set when the juice heat is at 8° to 10° Farenheit, higher than the boiling point of water. The range is usually 119.5° to 222° Farenheit depending on the desired consistency.

CHARACTERISTICS OF A STANDARD FINISHED PRODUCT

A. **Jellies**
   1. Clear, transparent and attractive color.
   2. Forms are retained, quivers and do not flow when removed from their containers.
   3. Natural flavor and aroma of fruit is retained.
   4. Texture is tender.

B. **Jams**
   1. The color is bright, thick and smooth when spread.
   2. Natural flavor and aroma of fruit is retained.

C. **Marmalades**
   Has a jelly-like consistency and not syrupy.

D. **Preserves**
   1. Sparkling and glistening.
   2. Natural flavor and aroma of fruit is retained.
   3. Plump, soft and tender.

PROBLEMS IN JELLY MAKING:

Problems are likewise encountered in the process of making jelly. In Table 1 below, the different causes of failures in jelly making and their prevention are discussed.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Causes</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jelly is cloudy</td>
<td>1. Fruit used is deep green.</td>
<td>1. Fruit should be firm ripe.</td>
</tr>
<tr>
<td></td>
<td>2. Fruit may have been cooked to long before straining.</td>
<td>2. Fruit should be cooked only until it is tender.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>Causes</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jelly is cloudy</td>
<td>1. Fruit used is deep green.</td>
<td>1. Fruit should be firm ripe.</td>
</tr>
<tr>
<td></td>
<td>2. Fruit may have been cooked to long before straining.</td>
<td>2. Fruit should be cooked only until it is tender.</td>
</tr>
<tr>
<td>Juice may have been squeezed from fruit.</td>
<td>Drip the jelly through a cotton flannel bag to obtain clearest jelly.</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Jelly is poured into jar too slowly.</td>
<td>Next time, work more quickly.</td>
<td></td>
</tr>
<tr>
<td>A jelly mixture is allowed to stand before it was poured into jars.</td>
<td>Upon reaching jelly point, pour the mixture into jars and seal.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Using too much sugar.</th>
<th>Mix the sugar thoroughly in juice until completely dissolved.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The mixture has been cooked too little.</td>
<td>Cook a little longer.</td>
</tr>
<tr>
<td>The mixture may have been cooked too slowly or too long.</td>
<td>Long, slow cooking results in too much evaporation of the water content of the fruit.</td>
</tr>
<tr>
<td>Undissolved sugar which stuck to the pan was washed into the jelly as it was poured.</td>
<td>Ladle jelly into the jar instead of pouring it. Or, carefully wipe side of the pan to remove sugar crystals with a damp cloth before filing jars.</td>
</tr>
<tr>
<td>If jelly is grape, the crystals may be tartaric acid, the natural substance in grapes from which cream of tartar is made.</td>
<td>Allow juice to stand in refrigerator for several days; then strain it through two thicknesses of damp cheesecloth before preparing jelly. Use canned juice. If sediment is at bottom</td>
</tr>
</tbody>
</table>

Jelly contains glass like particles
<table>
<thead>
<tr>
<th>Jelly is low in fruit flavor</th>
<th>1. Fruit used has little flavor.</th>
<th>1. Use full flavored fruits; tree ripened ones are best.</th>
<th>2. Jelly was stored too long.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3. Storage area was too warm.</td>
<td>2. Jelly should not be stored for over a year.</td>
<td></td>
</tr>
<tr>
<td>Jelly has bubbles (may denote spoilage)</td>
<td>1. If bubbles are moving, jelly is spoiling; usually the airtight seal has been broken. (Do not eat).</td>
<td>1. Be sure to test for seal before storing jars.</td>
<td>2. If bubbles are standing still, utensil pouring jelly is not held close to top of jar or jelly is poured slowly.</td>
</tr>
<tr>
<td></td>
<td>2. Hold utensils close to top of jar and pour into air quickly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jelly “weeps”</td>
<td>1. Syneresis or “weeping” usually occur in quick-setting jellies and is due to the quality of acid and the quality of pectin in the fruit.</td>
<td>1. None</td>
<td>2. Storage conditions are not ideal.</td>
</tr>
<tr>
<td></td>
<td>2. Store in cool, dark and dry place.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jelly is tough or stiff</td>
<td>1. Too much pectin in fruit</td>
<td>1. Use fruit which is riper. If adding pectin, do not add as much.</td>
<td></td>
</tr>
</tbody>
</table>
2. Jelly is overcooked.

3. Prolonged cooking due to insufficient sugar used to reach jellying stage.

2. Cook just enough. Do not overcook.

3. When pectin is not added, ¾ cup of sugar per cup of juice is right amount for most fruits. When using measuring cup, level off sugar with straight edge of a knife.

| Jelly ferments | Yeasts grow on jelly when seal is not airtight (usually noticeable in jar sealed with paraffin) causing the jelly to breakthrough paraffin and to “weep” | Test for seal before storing jelly. |

| Jelly molds | Jar is not sealed properly, allowing mold to grow on surface of jelly. May denote spoilage; if growth of mold is heavy. Do not eat. | Use vacuum sealing nest time. Test for seal before storing jelly. |

**Problems in Jam-Making**

In Table 2 below, the different causes of failures in jam-making are enumerated.

**Table 2. Problems in Jam-Making**

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>CAUSE</th>
</tr>
</thead>
</table>
| Slack Jam | Prolonged boiling  
Too much acid  
Too little acid  
Too little pectin  
Presence of mineral salts in fruits  
Too much sugar in relation to pectin |
| Syneresis (Weeping or bleeding) | Too long boiling time  
Insufficient cooling after filling  
Use of discolored pulp  
Excessive use of buffers  
Contamination with metals |
<table>
<thead>
<tr>
<th>Biological causes and mechanical injury</th>
</tr>
</thead>
</table>

| Crystallization | Too much acid  
Too little acid  
Prolonged boiling  
Too much cream of tartar  
Too long standing in pan after cooking |
|-----------------|--------------------------------------------------|

| Hard or shrunken fruit  
(happens also in marmalade) | Very hard water used in pre-cooking fruit or peel  
Boiling of fruit or peel in heavy syrup with insufficient pre-cooking |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------|

| Mold and yeast growth | Excessive humidity of jam storage area  
Contamination prior to sealing of jars and bottles  
Low-soluble solid content of the product.  
The danger line is 65% slack jam |
|-----------------------|----------------------------------------------------------------------------------------------------------|

**How Fruits are made into sugar concentrated products?**

**Sample Recipes**

**Jellies**

1. **Santol Jelly**

   **Ingredients:**
   
   Santol fruit  
   Sugar

   **Procedure:**
   
   1. Prepare an equal amount of slightly under ripe and just ripe santol.
   2. Wash very well and blanch for about five minutes. Pare.
   3. Cut pulp into small pieces and place in pan together with the seeds.
   4. Add enough water to barely cover the fruit.
5. Boil gently until soft.

6. Pour into jelly bag to squeeze out the juice.

7. Allow to settle. For every cup of juice, add \( \frac{3}{4} \) to 1 cup of sugar.

8. Dissolve sugar by stirring.

9. Boil and strain again to get rid of undissolved sugar, scum or dirt.

10. Cook rapidly without stirring until jellying point is reached.

11. Skim and pour while still hot in sterilized jars.

12. Cool slightly and pour melted paraffin one-eighth inch thick.

13. Prick air bubbles that may appear in paraffin to ensure complete sealing.

14. Label & store.

2. Guava Jelly

Ingredients:

\[ \frac{3}{4} \text{ to } 1 \text{ cup of sugar for every cup of guava juice} \]
\[ 1 \text{ tablespoon calamansi juice for every cup of juice} \]

Procedure:

1. Prepare an equal mixture of slightly under ripe and ripe mature guavas.

2. Wash very well and remove blossom ends.

3. Cut into halves and quarters.

4. Place in an enamel or stainless steel kettle and add enough water to cover the fruit.

5. Boil gently until soft.

6. Place cooked fruit in a cheesecloth or jelly bag. Let juice drip from the bag.

7. Do not include pulp.

8. Add \( \frac{3}{4} \) to 1 cup of sugar and one tablespoon calamansi juice for each cup of guava juice.

9. Cook over strong fire until the jellying point is reached.

10. Pour while still hot into sterilized jars.
11. Pour melted paraffin one-eight inch thick before jelly is completely cooled.

12. Prick air bubbles that may appear in the paraffin to ensure complete sealing.

13. Label and store.

**Jams**

1. **Pineapple Jam**

   **Ingredients:**
   
   - 1 cup of sugar per cup of fruit pulp
   - Pineapple pulp

   **Procedure:**
   
   1. Use regular-size ripe pineapples.
   2. Peel the fruit and remove the eyes.
   3. Wash very well and grate in papaya grater or cut into small pieces and chop finely.
   4. To every cup of chopped or grated pulp, add one cup of sugar.
   5. Boil until thick.
   6. While still hot, pour into sterilized jars and seal tightly.
   7. Label and store.

2. **Mango Jam**

   **Ingredients:**
   
   - Mango pulp
   - ¾ cup of sugar per cup of fruit pulp
   - 1 tablespoon calamansi juice
   - 2 tablespoons glucose (optional)

   **Procedure:**
   
   1. Choose fully ripe mangoes.
   2. Wash very well. Slice and scoop out the flesh.
3. Mash the pulp or flesh and measure. Add sugar.

4. Place in pan and boil over strong fire, stir constantly.

5. After about three minutes, add kalamansi juice.

6. Continue stirring until mixture is thick.

7. Remove from heat and pour while still hot in sterilized jars.

8. Seal tightly.

9. Label and store.

**Marmalades**

**1. Santol Marmalade**

Ingredients:

1 cup of santol pulp
1 cup of santol juice
1-1/2 cups of sugar

Procedure:

1. Wash and blanch santol for about five minutes.

2. Pare, cut and remove seeds.

3. Chop the pulp finely and measure in cups.

4. Place seeds and skin in an enamel or stainless steel pan and pour enough water to just cover the fruit.

5. Simmer gently and strain the juice.

6. Combine juice with chopped pulp and measure. For every cup of combined pulp and juice, add ¾ cup of sugar.

7. Stir well to dissolve sugar.

8. Cook over strong fire until mixture thickens and until fruit pulp is clear and transparent.

9. Remove from heat, stir and skim alternately for three minutes.

10. Pour into sterilized jars while still hot and seal at once.
11. Label and store.

2. **Orange-Mango Marmalade**

Ingredients:

8 ripe mangoes  
2 oranges  
Peel of 1 orange  
Sugar

Procedure:

1. Wash, peel and scoop out flesh of mango with spoon.

2. Chop finely using a stainless steel knife.

3. Remove peel and seeds from orange.

4. Chop finely also using a stainless steel knife.

5. Shred the orange peel.

6. Combine chopped mango, orange pulp and peel in an enamel or stainless steel kettle. For every cup of the combined mixture, add ¾ to 1 cup of sugar.

7. Stir until sugar is completely dissolved.

8. Boil mixture rapidly while constantly stirring until thick.

9. Pour while still hot into sterilized jars.

10. Seal immediately, label and store

**Preserves**

1. **Banana Preserve**

Ingredients:

Banana, saba  
Sugar  
Water  
Citric acid

Procedure

2. Prepare syrup of two parts of sugar and one part of water. Cook the bananas in the syrup for 15 minutes.


4. The following day, drain bananas. Boil syrup for 15 minutes and add citric acid (1/4 tsp for every 4 cups syrup).

5. Pack bananas in preserving jars. Fill bottles with syrup. Remove bubbles; then, refill with syrup.

6. Half-seal sterilized jars for 25 minutes in boiling water or for 15 minutes in a pressure cooker. Seal tightly.

7. Label and store.

2. **Langka Preserve**

1. Remove seeds and cut both ends of the fleshy bulbs.

2. Wash and cook for 10 minutes in syrup (one part of sugar to two parts of water) soak in syrup.

3. Drain bulbs, pack in sterilized jars and pour boiling syrup.


5. Sterilize pint jars in boiling water for 30 minutes. Seal tightly. Place jars upside down to test for leakage.

6. Cool and label.

7. Store in cool dry place.

3. **Kamias Preserve**

1. Select big mature, firm kamias. Soak in lime water (one teaspoonful of lime to a liter of water) overnight.

2. Wash and boil in a copper vat or kettle with enough water to cover.

3. Stir once in a while. When the natural color of the kamias has set, remove from fire and soak in cold water for two hours.

4. Drain and press each one lightly to remove excess water. Prepare syrup made up of two parts of sugar and one part of water.

5. Boil kamias in the syrup for 30 minutes. Drain.

6. Pack in jars and pour syrup. Remove air bubbles and refill with syrup.
8. Label and store.

4. **Kundol preserve**

1. Select mature kundol. Peel thinly and slice into desired size and shape.
2. Soak in lime water (one teaspoon of lime to a liter of water) overnight.
3. Wash and blanch in boiling water for 10 minutes. Drop in cold water. Drain.
4. Boil in syrup (two parts of sugar and one part of water). Soak overnight.
5. Cook in syrup until thick. Drain and pack the kundol in preserving jars.
6. Fill with syrup. Half-seal and sterilize pint jars for 20 minutes in boiling water. Seal tightly; label and store.

**LET US REMEMBER:**

Following the prescribed procedure will eliminate the possibilities of failure in making jams, jellies and marmalades. It is a must for you to know how to test the jellying point of sugar concentrated products.

**SELF CHECK**

**DIRECTIONS:** Select the best answer from the four choices. Write the letter of the correct answer in your test notebook.

1. Which of the following is one of the steps followed in cooking jams?
   a. Add the sugar when pulp is completely softened.
   b. Cook rapidly without stirring until jellying point is reached.
   c. The sugar, juice and peel of sliced fruits are boiled to jellying point.
   d. Boil the fruit until soft.

2. How many cups of sugar is added if you have 15 cups water, if the ratio of thin syrup is 3:1 (3 cups water : to 1 cup sugar)?
   a. 3 cups sugar
   b. 4 cups sugar
   c. 5 cups sugar
   d. 6 cups sugar

3. Which of the following tests is used to determine jellying point?
   a. bubble formation
   b. cooking test
   c. jelmeter test
   d. pectin test

4. Which of the following is one of the causes of syneresis in jams?
   a. excessive use of buffers
   b. too little acid
   c. too little pectin
   d. too much sugar

5. Which of the following is one of the characteristics of a good preserve?
a. jelly-like consistency       c. plump, soft and tender
b. thick and smooth             d. not syrupy

REFERENCES:

1. Fruit and Vegetable Processing, Revised Edition pp.78-104
2. Food Processing – MATEA – Based Textbook pp.30-31
3. Philippine Foods, Their Processing and Manufacture
   By Mendoza, Jose M, pp. 100-113
Activity Sheet 4.1

TITLE: Cook jellies, jam, preserves and marmalades

STEPS/PROCEDURE:

Form a group of five. Each group will cook jellies, jam, preserves and marmalades using fruits/vegetables that are locally available. Prior cooking, perform any test of jellying point to produce good quality products.

RESOURCES:

Fruits, Vegetables, other ingredients, kitchen tools, equipment and utensils.

REFERENCES:

2. Fruit and Vegetable Processing, Revised Edition pp.78-104
4. Food Processing – MATEA – Based Textbook pp.30-31
5. Philippine Foods, Their Processing and Manufacture
   By Mendoza, Jose M, pp. 100-113
LESSON 5

PREPARE PRODUCTION REPORT

INTRODUCTION

This lesson deals with the preparation of production reports that are done after processing. This will help you to determine the potentials and abilities of your product to gain profits.

ASSESSMENT CRITERIA

1. Daily production report input, output and variances are documented according to enterprise requirements.
2. All production data gathered are recorded and presented according to the prescribed format.

LET US DEFINE:

1. Cost – expense
2. Cost of product – total expenses incurred in processing the product
3. Profit – gain
4. Unit cost – the cost of product per piece

PRE-TEST

Direction: Read the questions carefully. Select the best answer from the four choices and write the letter in your test notebook.

1. Why is it necessary to determine the unit cost of the product?
   a. to have plenty of sales  
   b. to know the cost of the product  
   c. to have profit in selling  
   d. to know the price at which one sells her product

2. How will you determine the unit cost of a certain product?
   a. cost of production divided by number of servings  
   b. cost of production divided by number of servings sold  
   c. cost of production minus sales  
   d. cost of production plus profit

3. How much is the net profit if the total sale is P 235.25 and the cost of the product is P 155.50?
   a. Php 79.25  
   b. Php 79.50  
   c. Php 79.75  
   d. Php 80.00
4. What items are added to determine the cost of product?
   a. ingredients and unit cost  
   b. ingredients and sales  
   c. ingredients and operating expenses  
   d. ingredients and profit

5. If the unit cost of a product is P20.00, how much is the selling price if 50% is added to the unit cost?
   a. 25.00  
   b. 30.00  
   c. 35.00  
   d. 40.00
**Information Sheet 5.1**

In a small-scale processing operation, the following information must be recorded properly:

1. Daily production. Record of the number of packs per product that is processed daily should be kept.
2. Daily sales. Every sale of the finished product should be recorded. A weekly inventory of the products not sold is important and this should be equivalent to the difference between the product produced and the amount sold for the week.
3. Daily expenses. All expenses incurred for the day like cost of ingredients, packaging materials, travel expense and others should be recorded.

**PROCEDURE FOR DETERMINING THE SELLING PRICE OF PROCESSED PRODUCTS**

The selling price of the product should be determined after computing all the expenses incurred. This is done to ensure that the seller does not lose in the selling enterprise.

The following steps and examples are of help in learning how to determine the selling price of the processed product.

1. List down all the food ingredients purchased.
2. Make a list of the operating expenses.
   a. Labor
   b. Gas/Fuel/Electricity
   c. Transportation
   d. Miscellaneous expenses (include all other items not included in number 1, like napkins, wrappers, etc.)
   e. Rentals, if any
3. List down all the expenses for ingredients and the operating expenses.
4. Determine the number of products yield.
5. Divide the total cost with the number of yield to get the cost per product/yield.
6. Decide how much you will add to each unit cost for the selling price. The percentage range from 15% - 40% of the food cost.

**EXAMPLE**

The recipe prepared is Pineapple Jam.

<table>
<thead>
<tr>
<th>Marketing List</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Ingredients :</strong></td>
</tr>
<tr>
<td>2 pcs. pineapple</td>
</tr>
<tr>
<td>1 kilo refined sugar</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
</tr>
</tbody>
</table>
B. Operating Expenses:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas (approx.)</td>
<td>10.00</td>
</tr>
<tr>
<td>Transportation</td>
<td>7.50</td>
</tr>
<tr>
<td>Misc. soap</td>
<td>1.00</td>
</tr>
<tr>
<td>3 preserving jars</td>
<td>20.00</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>Php 38.50</strong></td>
</tr>
</tbody>
</table>

C. Cost of A plus B

** Php 98.50

II. Number of Servings/yield: 3 bottles pineapple jam

III. Cost per serving/yield: Php 98.50 divided by 3 bottles pineapple jam =

- Php 32.83
- Php 32.85

IV. Selling Price: You can add from 15% to 40% of the food cost:

- 15% of 32.85 = 4.93 or 4.95
- 40% of 32.85 = 13.14 or 13.15

The selling price of pineapple jam can therefore range from Php 37.80 to Php 46.00.

The 15% increase in food cost will therefore mean a profit of P 4.95 per bottle, while 40% increase will net Php 13.15 per bottle sold.

**FINANCIAL RECORDING**

A sample of a simple record for a product prepared and sold is shown below:

<table>
<thead>
<tr>
<th>NAME OF PRODUCT: PINEAPPLE JAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE MANUFACTURED: November 22, 2011</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COST OF PRODUCT = Php 98.50</th>
<th>YIELD = 3</th>
<th>Sales= Php138.00</th>
<th>LESS= Php98.50</th>
<th>PROFIT = Php39.50</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ingredie</strong>nts**</td>
<td>Operatin **</td>
<td>Total</td>
<td>No. of serving/</td>
<td>Unit cost</td>
</tr>
<tr>
<td>nts**</td>
<td>g Expenses</td>
<td></td>
<td>yield</td>
<td>Per yield</td>
</tr>
<tr>
<td>Php 60.00</td>
<td>Php 38.50</td>
<td>Php 98.50</td>
<td>3 bottles</td>
<td>Php 32.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**LET US REMEMBER:**

Keeping a record of the expenses and income help the seller keep track of the business. It can tell where the money was spent the most and why; when one has made brisk business or not; and where one has to improve in terms of the expenses and sales.

**SELF CHECK**

**DIRECTIONS:** Read the questions carefully. Select the best answer from the four choices and write the letter in your test notebook.

1. Why is it necessary to determine the unit cost of the product?
   
   a. to have plenty of sales  
   b. to know the cost of the product  
   c. to have profit in selling  
   d. to know the price at which one sells her product

5. How will you determine the unit cost of a certain product?
   
   a. cost of production divided by number of servings  
   b. cost of production divided by number of servings sold  
   c. cost of production minus sales  
   d. cost of production plus profit

6. How much is the net profit if the total sales is P 235.25 and the cost of the product is P 155.50?

   a. Php 79.25  
   b. Php 79.50  
   c. Php 79.75  
   d. Php 80.00

7. What items are added to determine the cost of product?
   
   a. ingredients and unit cost  
   b. ingredients and sales  
   c. ingredients and operating expenses  
   d. ingredients and profit

5. If the unit cost of a product is P20.00, how much is the selling price if 50% is added to the unit cost?

   a. 25.00  
   b. 30.00  
   c. 35.00  
   d. 40.00

**REFERENCES:**

Homemaking for You and Me I (Foods and Nutrition) pp. 15-17  
Fruit and Vegetable Processing, Revised Edition pp 244-245
Activity Sheet 5.1

TITLE: Prepare Production Report

STEPS/PROCEDURE:

List down all the expenses incurred in processing your products. Then, compute the cost of production; the unit cost of each product; and determine your selling price. Make a record of your products made.

RESOURCES:

Record Notebook, ballpen, pad paper, calculator

REFERENCES:

Homemaking for You and Me I (Foods and Nutrition) pp. 15-17
Fruit and Vegetable Processing, Revised Edition pp 244-245
SELF CHECK

Directions: Read the following sentences carefully and select the letter of the correct answer. Write your answers in your test notebook.

1. What is bowl-shaped kitchen utensils with holes used for draining off liquids and rinsing foods?
   a. colander
   b. mixing bowl
   c. strainer
   d. bowl

2. Which of the following is used to strain liquids?
   a. colander
   b. jelly bag
   c. strainer
   d. a piece of cloth

8. What instrument is used to measure the pectin contents of fruits?
   a. jelmeter
   b. jelly thermometer
   c. refractometer
   d. candy thermometer

7. What equipment is used to filter the juices to a finer texture?
   a. blender
   b. centrifuge
   c. hydraulic press
   d. juice extractor

8. How is processing tools, utensils and equipment sanitized?
   a. rinsing thoroughly in tap water
   b. soaking in water with detergent
   c. soaking in 150-200 ppm chlorinated water
   d. Drying under the sun

10. What water-soluble substance is found in some slightly underripe fruits that causes jellies to set?
    a. acid
    b. pectin
    c. pulp
    d. sugar

11. Which of the following is made from fruit juice and pulp?
    a. jam
    b. jelly
    c. marmalade
    d. preserve
12. What product is made from fruit juice only?
   a. jam
   b. jelly
   c. marmalade
   d. preserve

13. Which of the following should be selected for jelly making?
   a. ripe fruits only
   b. slightly underripe only
   c. mixture slightly underripe and ripe fruit only
   d. overripe fruits only

14. Which of the following qualities must be considered in sorting fruits and vegetables for sugar concentrates?
   a. good odor
   b. tender
   c. uniformity of sizes
   d. palatability

15. What product is a clear-jelly-like mixture in which shreds or thin slices of fruits or peel are suspended?
   a. jelly
   b. jam
   c. marmalade
   d. preserve

16. How is the fruit pulp prepared for jam making?
   a. boiling
   b. chopping
   c. squeezing
   d. paring

17. Which of the following is one of the steps in preparing preserves?
   a. extracting the juice
   b. combining peel and juice
   c. cooking fruit in syrup
   d. testing pectin content

18. What substance makes jelly firm and rigid in structure?
   a. acid
   b. pectin
   c. sugar
   d. salt

19. How is alcohol test used to determine the pectin content of fruits?
   a. boil juice with denatured alcohol
   b. mix juice and denatured alcohol
   c. let juice and alcohol run down the jelometer tube
   d. drop juice into denatured alcohol
20. To test the fruit’s acidity, compare the fruit juice with the standard acid solution. How do you prepare the standard acid solution?
   a. mix 1 tablespoon calamansi juice to 6 tablespoons water
   b. mix 1 tablespoon calamansi juice to 7 tablespoons water
   c. mix 1 tablespoon calamansi juice to 8 tablespoons water
   d. mix 1 tablespoon calamansi juice to 10 tablespoons water

21. What ingredients determine the amount of sugar needed in jellies, jam and marmalade?
   a. fruit and pectin
   b. fruit and acid
   c. pectin and acid
   d. pectin and peel

22. Which of the following is one of the steps followed in making jams?
   a. add the sugar when pulp is completely softened
   b. cook rapidly without stirring until jellying point is reached
   c. the sugar, juice and peel of sliced fruits are boiled to jellying point
   d. boil the sugar syrup until thick

23. How many cups of sugar is added if you have 15 cups water, if the ratio of thin syrup is 3:1 (3 cups water to 1 cup sugar)
   a. 3 cups sugar
   b. 4 cups sugar
   c. 5 cups sugar
   d. 6 cups sugar

24. Which of the following tests is used to determine the jellying point?
   a. bubble formation
   b. cooking test
   c. jelmeter test
   d. pectin test

25. Which of the following is one of the causes of syneresis in jams?
   a. excessive use of buffers
   b. too little acid
   c. too little pectin
   d. too much sugar

26. Which of the following is one of the characteristics of a good preserve?
   a. jelly-like consistency
   b. thick and smooth
   c. plump, soft and tender
   d. not syrupy

27. How many cup of sugar is added if the fruit juice is rich in pectin
   a. ½ cup
28. What is the secret in making jam?
   a. boil rapidly before adding the sugar and slowly afterwards
   b. boil slowly before adding the sugar and rapidly afterwards
   c. add sugar and boil slowly
   d. add sugar and boil rapidly

29. Why should a seller determine the selling price of her product before selling it?
   a. to have plenty of sales
   b. to obtain the unit cost
   c. to know the price at which she sells her product
   d. to have profit in selling

30. How do you determine the unit cost of a certain product?
   a. cost of production divided by number of servings
   b. cost of production divided by number of servings sold
   c. cost of production minus sales
   d. cost of production plus profit

31. How much is the net profit if the total sales is P235.25 and the cost of the production is P155.50?
   a. P79.25
   b. P79.50
   c. P79.75
   d. P80.00

32. What items are added to determine the cost of product?
   a. ingredients and unit cost
   b. ingredients and sales
   c. ingredients and operating expenses
   d. ingredients and profit

33. How much is the cost of the recipe if the total expenses for ingredients is P75.00 and the total cost for operating expenses is P35,00?
   a. P105.00
   b. P110.00
   c. P115.00
   d. P120.00

34. How much is the total sales if 10 jars of jellies are sold for P25.00 per jar?
   a. P225.00
   b. P240.00
   c. P250.00
   d. P255.00

35. If the unit cost of a product is P20.00, how much is the selling price of 50% is added to the unit cost?
a. P30.00  
b. P40.00  
c. P45.00  
d. P50.00
COMPETENCY-BASED LEARNING MATERIAL

FOURTH YEAR

FOOD PROCESSING NC II

Unit of Competency: PACKAGE PROCESSED FOOD PRODUCT

Module No. 2 | Module Title: PACKAGING PROCESSED FOOD PRODUCTS
## TABLE OF CONTENTS

Module Title: Packaging Processed Food Products

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2-5</td>
</tr>
<tr>
<td>Lesson 1 - Prepare equipment, tools and materials</td>
<td>6-17</td>
</tr>
<tr>
<td>Lesson 2 – Undertake packaging of processed food products</td>
<td>18-28</td>
</tr>
<tr>
<td>Lesson 3 – Undertake post-packaging procedure</td>
<td>29-35</td>
</tr>
<tr>
<td>Self Check</td>
<td>36-38</td>
</tr>
<tr>
<td>Answer key</td>
<td>39</td>
</tr>
<tr>
<td>Reference</td>
<td>40</td>
</tr>
<tr>
<td>Acknowledgment</td>
<td>41</td>
</tr>
</tbody>
</table>
INTRODUCTION

This module covers the knowledge, skills and attitudes required in packaging processed food products such as preparing and packaging equipment, tools, and materials; packaging of processed food products; and post packaging procedures of processed food products.

SUMMARY OF LEARNING OUTCOMES:

After completing this module, you should be able to:

LO 1. Prepare packaging equipment, tools, and materials
LO 2. Undertake packaging of finished/processed food products and
LO 3. Perform post packaging procedures.

PRE-TEST

Direction:

Let’s find out how much you already know about packaging of processed food products. Read the questions carefully and select the letters of the correct answers. Write your answers in your test notebook.

1. What is the process of putting processed foods into containers?
   a. canning   c. packing
   b. packaging   d. wrapping

2. Which of the following is not a reason for packaging finished products?
   a. Protect processed foods against contamination.
   b. Make distribution of the products to various market outlets easier.
   c. Minimize damage to product while in transit.
   d. Identify the products.
3. Which of the following is a packaging tool?
   a. glass               c. flexible
   b. food scales         d. plastic

4. Which of the following is a packaging material?
   a. can sealer            c. cap seal
   b. plastic sealers      d. plastic protect cap sealer

5. What packaging material is used for heavy loads?
   a. corrugated carton    c. composite cans
   b. paper and paperboard d. plastic container

6. Which of the following is one of the oldest packaging materials for many food products like preserves, condiments, beverages and juice?
   a. indigenous materials c. metal containers
   b. glass container     d. carton

7. What packages are in demand nowadays and are used as alternatives to traditional packaging methods?
   a. bags                 c. jars
   b. flexible             d. pouches

8. What packaging material is appropriate for ham and bacon?
   a. cryovac films        c. PVC wraps
   b. PVDC – coated films  d. PE bags

9. What is the process of identifying or describing a product by placing printed or graphic materials on a container or wrapper?
   a. labeling             c. wrapping
   b. packaging            d. sealing

10. What is the most visible part of a package?
    a. container            c. label
    b. cover                d. wrapper
II – MODIFIED TRUE or FALSE

**Direction:** The underlined word in every sentence is wrong which makes the statement false. Look for the correct answer inside the boxes and write it in your test notebook.

1. Packaging means putting processed foods into the **box**.
2. Products are packaged to make distribution of the products to various market outlets **harder**.
3. **Capseal** is an equipment used to seal tin cans.
4. **Corrugated Carton** is a leak-proof and does not cause undesirable flavor and odor.
5. **Paper and paperboard** are indigenous packaging materials.
6. **Flexibles** are lighter and more resistant to corrosion.
7. **Composite containers** are pouches, bags, reels, sheets or strips made out of a single layer or combined layers of paper, foil and cellophane.
8. **Tags** are well-suited for the small, single-serve packs so popular nowadays.
9. **Labeling** is the most visible part of a package.
10. **Glass jars** are appropriate packaging material for dried and smoked fish.

III – IDENTIFICATION

**Direction:** Read the following sentences carefully. Select the correct answer inside the circle and write it in your test notebook.

1. Identifying a product by placing printed materials on a container or wrapper.

- Label
- Labeling
2. A part of a package that tells consumers about the product.

- Label
- Labeling

3. One of the items printed in a label.

- Net content
- Weight of package

4. Flexibles should be free from pinholes.

- Leak inspection
- Product testing

5. Products stored in the refrigerator.

- Jams and jellies
- Tocino and longganisa
LESSON 1

PREPARE PACKAGING EQUIPMENT, TOOLS AND MATERIALS

WHAT IS THIS LESSON ABOUT?

This lesson deals with packaging equipment, tools and materials. This includes the procedures in selecting and checking appropriate packaging materials.

ASSESSMENT CRITERIA:

1. Packaging materials are selected and checked according to the finished processed food products’ specifications.
2. Packaging materials of varying sizes are washed and sterilized in accordance with manufacturers’ specifications.
3. Appropriate tools and equipment are selected according to specified packing requirements.
4. Packaging equipment is checked and readied according to manufacturer’s specifications.
5. Operation of packaging equipment is monitored to ensure conformity with specified product.

PRE TEST

Directions: Carefully read the questions and choose the best answer from the options given. Write only the letter of your answer on your paper.

1. Which of the following is an importance of packaging?
   a. serves as a means of protecting the goods for transport
   b. enhances product market appeal
   c. both a and b
   d. advertise the product

2. What is the best packaging material for fish processed through canning?
   a. tin can
   b. polyethylene bag
   c. thermo-plastics
   d. paper board

3. If you are assigned to select packaging materials, which of these factors will you consider?
   a. appearance
   b. reliability
   c. composition
   d. all of these

4. Which of the following makes packaging material ideal for packaging finished/processed products?
a. ability to reduce bacterial spoilage
b. can prevent odor formation
c. cheap and recyclable
d. both a and b

5. If you process food by canning but you don’t have can sealer in the school, will you use tin cans?
   a. No, because they must be sealed with a can sealer.
   b. Yes.
   c. Maybe.
   d. I don’t know.

DEFINITION OF TERMS

1. Laminate - a product made by bonding together two or more layers of material or materials by adhesive through heat and pressure

2. Conformity – a behavior that agrees with accepted conventional standards.

3. Contamination – the act or process of making something impure or dirty by mixing harmful impurities into it or by putting it in contact with something harmful.

4. Corrosion – an act of wearing away gradually (by action of rust or chemicals)

5. Corrugated - wrinkled

6. Deterioration – lessening in quality, value or strength.

7. Indigenous – native

7. Laminate - a product made by bonding together two or more layers of material or materials by adhesive through heat and pressure

8. Output – the amount produced; yield

9. Packaging – wrapping or enclosure of food products in attractive and colorful materials for the purpose of preservation of the product as well as to make it appealing to the consumers or buyers.

10. Specification – standards or measures that have to be conformed to.

11. Sterilize – to kill all microorganisms in something or to make them incapable of causing spoilage.
Information Sheet 1.1

After manufacturing, processed foods are put into containers before they are marketed. Products are packaged for three reasons.

1. Protect the processed foods against contamination by organisms that cause spoilage.
2. Make distribution of the products to various market outlets easier.
3. Minimize damage to product while in transit.

Selection and Checking of Packaging Materials

Packaging serves as a container or a means of protecting goods for transport, distribution, storage, retailing and end-use, art, science and technology applied and important marketing tool in enhancing product market appeal.

Packaging materials are selected based on the kinds of processed products packed in them. Canned fish are usually packed in tin cans, aluminum cans, and glass jars. Fermented and pickled products require the use of bottles or glass jars as packaging materials. Fruit preserves, jams, jellies, and marmalades are packed in glass jars while dried and smoked fish are packed in wooden boxes, bamboo baskets, and polyethylene bags.

Before using any packaging material, they must be checked properly to make sure they are appropriate for the products processed. Checking them also ensures they are in perfect condition and will not in any way cause contamination to the product.

Packaging Tools and Equipment:

1. Packaging machinery/equipment/tools
2. Weighing scales
3. Food scales
4. Can sealer
5. Plastic sealer
6. Pulps finisher
7. Plastic protect cap sealer

How to Clean and Sanitize Packaging Tools, Equipment and Containers

Have food containers, packaging equipment and tools ready and thoroughly cleaned and sterilized before using. Thorough rinsing would not be enough for they may still contain yeast cells and spores.

Glass containers and similar containers that are thoroughly washed should be placed in boiling water for 15 minutes to be sterilized. Keep them warm until ready to use.
Packaging Materials for Finished Products:

1. Indigenous materials. Some usable indigenous packaging materials are mats, baskets and fiber craft items.

2. Glass containers. One of the oldest packaging materials for many food products like preserves, condiments, beverages and juices. It is leak-proof and does not cause undesirable flavor and odor. Glass jars may have either glass covers or metal screw caps. All glass jars are sealed with a safe-elastic rubber ring placed on the lid of the jar. Glass jars with metal screw caps (called mason-type jars) are sealed well after the metal caps are screwed down to the lid of the jar.

Classifications of Glass Containers According to Shape:

A. Bottles. They have narrow necks and are usually used for liquids like catsup, vinegar or small-sized solids.
B. Jars. They have wide mouths and very short, wide necks. They are used for liquids, solids and foods with thick paste-like or syrupy substances such as sweet preserves and jellies.

C. Tumblers. They have no necks like ordinary drinking glasses. They are commonly used for jellies, jams and peanut butter.

D. Jugs. They have short, narrow necks and ear lugs. They come in large sizes, usually half and one gallon sizes. They are commonly used for liquids such as juice containers.
3. Metal Containers. Metal cans compared to glass containers are easier to handle during storing and dispensing because they are lighter and unbreakable. The kinds of metal cans commonly used are standard tin-plate can, coated tin can, lightweight double-reduced tin-plates can and aluminum-coated can.

4. Plastic containers. Plastic jars are sometimes preferred over ones made of glass or metal. Plastic packages are lighter and more resistant to corrosion. Plastic containers are also less likely to break unlike glass containers. However, plastic containers have very low resistance to heat. These containers also tend to deteriorate, especially at low temperature. They are also less efficient as barrier to solids, liquids and gases. These packages which usually come in the form of jugs, tumblers, based-like containers, etc. are used for fruit concentrates, vinegar and even catsup.

5. Paper and Paperboard. Paper is primarily made into bags, wrappers and labels. It is also an important part of laminates. Paperboard is made into cartons, multipack carriers, tags, composite cans and drums.
6. Corrugated Carton. Single-faced corrugated boards generally consist of two linerboard layers and a corrugated layer. Double-wall or triple-wall boards which contain the corresponding number of corrugated layers are used for heavy loads. Clay-coated or top-white linerboards with nicely printed exteriors are ideal for shipping fruit.

7. Flexibles. These are pouches, bags, reels, sheets or strips made out of a single layer or combined layers of paper, film, foil or cellophane.

Flexibles are in demand because of the following advantages:

a. Low package cost
b. They are an affordable and attractive alternative to traditional packaging methods.
c. They are well-suited for the small, single-serve packs so popular nowadays
8. Composite Cans/Containers. These consist of two dissimilar materials such as spirally wound or convoluted cardboard with metal or plastic ends. Examples of products packed in such containers are cheese balls and imported potato chips.

Other Packaging Components:

1. Capseal. Capseal is a popular tamper-evident packaging material made usually from shrinkable plastics like PVC. Manufacturers of food products in jars or bottles are big users.

2. Label. The most visible part of a package is the label. It says everything to know about the product—brand, weight, producer, usage, instruction, special qualities, expiry dates, etc.
3. Tags. These are usually made of paperboard, serving to some extent the function of labels. When products are displayed by hanging, tags are used.

4. Cushion. It is an important material for transporting fragile or easily crushed materials. To “cushion” means to protect products from environmental shocks and vibration. Many materials can be considered as cushioning materials—corrugated cartons, paperboard linings, shredded or crumpled paper, sawdust, wooden shavings, plastic bubbles, etc.

Appropriate Packaging Materials for Some Processed Products:


3. Dried and Smoked Fish – Polyester – polyethylene (PET/PE), polyethylene (0.002 in. thick), wooden boxes, baskets, used cartons, jute sacks, woven plastic sacks and old newspapers are still widely used packages for dried and smoked fish.

4. Heat–processed fish and shellfish – when cans are used for heat–processed fish and shellfish and other high protein foods, can interiors
should be applied with sulfur absorbent lacquer. This will prevent iron sulfuration.


6. Ham and Bacon – PVDC – coated film (recommended for vacuum packing) and “Cryovac” films.

7. Emulsified Products (Frankfurters, Hotdog, Salami, Spiced Ham, Ham Sausage, etc.) PE effectively eliminates discoloration due to drying out, PVDC – coated films.

8. Fermented Sausages – PVDC – coated films


10. Fruit jellies, jams and marmalades – jars, bottles, vacuum – sealed glass or tin containers.

11. Vinegar and Wine - bottles

LET US REMEMBER:

Proper packaging retains most, if not all, the essential qualities and nutrients of food. It is therefore important to select appropriate packaging materials for processed food products.

SELF CHECK

Directions: Carefully read the questions and choose the best answer from the options given. Write only the letter of your answer on your paper.

1. Which of the following is an importance of packaging?
   a. serves as a means of protecting the goods for transport
   b. enhances product market appeal
   c. both a and b
   d. advertise the product

2. What is the best packaging material for fish processed through canning?
   a. tin can
   b. polyethylene bag
   c. thermo-plastics
   d. paper board

3. If you are assigned to select packaging materials, which of these factors will you consider?
   a. appearance
   b. reliability
   c. composition
   d. all of these
4. Which of the following makes packaging material ideal for packaging finished/processed products?
   a. ability to reduce bacterial spoilage
   b. can prevent odor formation
   c. cheap and recyclable
   d. both a and b

5. If you process food by canning but you don’t have can sealer in the school, will you use tin cans?
   a. No, because they must be sealed with a can sealer.
   b. Yes.
   c. Maybe.
   d. I don’t know.

**RESOURCES:**

Packaging tools, Materials and Equipments.

**REFERENCES:**

1. Fruit and Vegetable Processing, Revised Edition, pp.232-238
2. Brochure – Know Your Food Manufacturing Industry
Activity Sheet 1.1

**TITLE:** Prepare packaging materials

**STEPS/PROCEDURES:**

Each student identify appropriate packaging equipment, tools, and materials to pack processed food and prepare them for use.

**RESOURCES:**

Packaging tools, Materials and Equipments.

**REFERENCES:**

1. Fruit and Vegetable Processing, Revised Edition, pp.232-238
2. Brochure – Know Your Food Manufacturing Industry
LESSON 2

UNDERTAKE PACKAGING OF FINISHED/PROCESSED FOOD PRODUCTS

INTRODUCTION

The lesson deals on how to undertake packaging of finished/processed food products. This includes methods of packaging canned, salted, cured, fermented, pickled, and food processed by sugar concentration according to standard specification.

ASSESSMENT CRITERIA:

1. Cooled cured products are placed in appropriate packaging materials.
2. Salted eggs are placed in trays/boxes in accordance with specifications.
3. Fermented/pickled products are packaged and sealed hermetically according to enterprise requirements.
4. Cooled processed products are wrapped clean according to specifications.
5. Canned/bottled products are sealed hermetically according to approved specifications.
6. Sugar concentrated finished products are hot packed in dry sterile glass bottles.
7. Dried/dehydrated food materials are packed in appropriate packaging materials.

PRE-TEST

Directions: Carefully read the questions. Select the best answer from the options given. Write only the letter of your answer.

1. Which of the following methods is involved in packaging finished/processed products
   a. storing in corrugated fiberboard boxes
   b. storing in wooden boxes
   c. both a and b
   d. none of these

2. If you are assigned to pack smoked fish, which of these will you do?
   a. pack in tin cans
   b. pack in glass jars

18
c. pack in plastic bags  

3. When selecting packaging materials, which of these characteristics will you consider?
   a. odor and gas proof  
   b. sturdy
   c. inert  
   d. all of these

4. If you are to pack fermented products, what do you think is the most ideal packaging material?
   a. plastic bottles  
   b. plastic bottles with caps
   c. tin cans  
   d. plastic laminates

5. What is the best packaging material for pickled products?
   a. glass bottles  
   b. tin cans
   c. glass jars  
   d. plastic bottles

**DEFINITION OF TERMS:**

1. inert – non-reactive; not readily change by chemical or biological reaction.

2. corrugated – formed by gluing one or more fluted sheets of paper board to one or more flat sheets of liner board.
Information Sheet 2.1

FORMS OF FOOD PACKAGING

Packaging is an activity of designing and producing the container or wrapper for the product. The container or wrapper is called the package. The package may either be primary, secondary, and tertiary or the shipping package.

1. **Primary package** – is that which comes in contact with the food itself, e.g., a tin can for packaging mango juice. The product in its primary container as in the example cited may be used for retail sale.

2. **Secondary package** – is the material that protects the primary package, such as carton overwraps for products in pouches. The secondary package is that which appears on the product shelf for retail sale.

3. **Tertiary package** – or shipping package refers to the package used for storage, identification and transport.
FUNCTIONS OF PACKAGING

A. Food packaging aims “to contain, protect, preserve, inform, and sell”. When a package “contains” it holds the product within and thus “protects and preserves” this same product. Specifically, the food package should protect the product from spoilage or damage which may either be one of the following:

1. Chemical
   Chemical spoilage or damage may be caused by contact of the food with air, light, heat, and contaminating gases. This type of spoilage may be manifested in the product as browning due to the reactions between proteins and sugars, rancidity due to fat oxidation when excess fat or oil is released by the food, or other chemical reactions which may lead to off flavors or off odors.

2. Physical
   Physical spoilage or damage results from contamination by dirt and other foreign materials, infestation by insects, rodents, and other pests. Loss or gain of moisture also constitutes physical damage. E.g., is when a crisp snack item losses its crispness, or when dry powders such as sugar start to cake or lump due to moisture.

3. Microbial
   Microbial damage results from contamination by microorganisms because of conditions of pH, presence of oxygen, water activity (Aw), temperature, and nutrients favorable to microbial growth. If a package is able to protect the food from such spoilage or damage, then it would have “preserved” its contents.
Convenience is also tied up to the “contain” function since handling is made easier or more convenient for the consumer.

B. Packaging as marketing tool

The factors that contributed to the use of packaging as an effective marketing tool are as follows:

1. Self-service all around the world. An increasing number of products are sold on a self-service basis at supermarkets and discount houses. The package must now perform a sales task. It must attract attention, describe the product features, give the consumer confidence, and make a favorable overall impression.

2. Manufacturer’s income. Rising income of manufacturers mean that consumers are to pay a little extra for the convenience, appearance, dependability, and prestige of better packages.

3. Company and Brand image. Companies recognize the power of well-designed packages to contribute to instant consumer recognition of the company or brand.

4. Innovational opportunity. New packages can bring large benefits to consumers and profits to producers. In many cases, product innovation may be replaced by simple changes in packaging to again attract new consumers.

A package, with its corresponding label, has been referred to as a “silent salesmen”. In the same way that a salesperson uses his verbal skills to convince a potential buyer to purchase his goods, the package, with the complete information on its label, coupled with an attractive design will “silently” convince the potential buyer to purchase the product.

C. Packaging to inform.

Another basic function of food packaging is to “inform”. This function is best shown by the use of properly made labels (in conformance to the labeling requirements/regulations of the country of origin) that serve as the source of information needed by the consumer.
UNDERTAKING PACKAGING OF DIFFERENT PROCESSED PRODUCTS

Placing cooled cured products in appropriate packaging material

Placing salted eggs in trays/boxes
Packaging and sealing fermented/pickled products

Wrapping cooled processed products
Sealing canned/bottled products hermetically

Packing sugar concentrated finished products
SANITARY FOOD PROCESSING AND PACKAGING PRACTICES

The following are some basic rules that must be observed by food processors:

1. Hands should be washed thoroughly with soap and water. A disinfectant solution of chlorinated water should be available for rinsing the hands before handling food. Wearing rings, bracelets, and wrist watches during processing should be avoided as these can be the sources of contamination.

2. Whenever possible, food must not be handled directly during preparation and packing.

3. Packing materials must never be handled directly particularly on the side that shall be in direct contact with the food.

4. Food processors should be properly dressed. The use of gowns, aprons, head caps or hairnets, masks, rubber boots and gloves are ideal. This prevents contamination of the food by foreign matters from the handler’s body like hair, dust and germs extracted from the nose and mouth. However, for small scale industries, clean and light color shirts and caps or hairnets would be efficient.

5. Smoking in the preparation, processing, and packing area should never be allowed. Smoke can be absorbed in the food or the ashes and cigarette butts may get into the food. Spitting and blowing of the nose should never be done within the premises of the plant. These unhealthy habits contribute to contamination and spread of disease.
SELF CHECK

Directions: Carefully read the questions. Select the best answer from the options given. Write only the letter of your answer.

1. Which of the following methods is involved in packaging finished/processed products
   a. storing in corrugated fiberboard boxes
   b. storing in wooden boxes
   c. both a and b
   d. none of these

2. If you are assigned to pack smoked fish, which of these will you do?
   a. pack in tin cans
   b. pack in glass jars
   c. pack in plastic bags
   d. pack in bamboo baskets or wooden boxes

3. When selecting packaging materials, which of these characteristics will you consider?
   a. odor and gas proof
   b. sturdy
   c. inert
   d. all of these

4. If you are to pack fermented products, what do you think is the most ideal packaging material?
   a. plastic bottles
   b. plastic bottles with caps
   c. tin cans
   d. plastic laminates

5. What is the best packaging material for pickled products?
   a. glass bottles
   b. tin cans
   c. glass jars
   d. plastic bottles
Activity Sheet 2.1

**TITLE:** Package and seal cooled processed products.

**STEPS/PROCEDURES:**
Identify the packaging materials used in each processed product given.

**RESOURCES:**

1. Packaging tools, Materials and Equipments.
2. Processed foods such as:
   - Cooled cured products
   - Salted eggs
   - Fermented/pickled products
   - Cooled processed products
   - Canned/bottled products
   - Sugar concentrated finished products
   - Dried/dehydrated food materials

**REFERENCES:**

1. Fruit and Vegetable Processing, Revised Edition, pp.232-238
2. Brochure – Know Your Food Manufacturing Industry
LESSON 3

PERFORM POST-PACKAGING PROCEDURES

INTRODUCTION

This lesson focuses on undertaking post-packaging procedures. This lesson includes labeling processed food products, checking condition and storing packaged processed food products.

ASSESSMENT CRITERIA:

1. Packaged processed food products are sealed and labeled according to specifications.
2. Condition of packed processed food products is checked to ensure conformity with specified outputs.
3. Packaged processed food products are stored according to required temperature and humidity.

PRE-TEST

Direction: Read the following sentences carefully. Select the correct answer inside the circle and write it in your test notebook.

1. Identifying a product by placing printed materials on a container or wrapper.
   - Label
   - Labeling

2. A part of a package that tells consumers about the product.
   - Label
   - Labeling
3. One of the items printed in a label.

- **Net content**
- **Weight of package**

4. Flexibles should be free from pinholes.

- **Leak inspection**
- **Product testing**

5. Products stored in the refrigerator.

- **Jams and jellies**
- **Tocino and longganisa**

**DEFINITION OF TERMS**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. breakage</td>
<td>state of being broken</td>
</tr>
<tr>
<td>2. cracks</td>
<td>to split or break</td>
</tr>
<tr>
<td>3. leak</td>
<td>to let a liquid, etc. enter or escape undesirably, as through a hole or crack.</td>
</tr>
<tr>
<td>4. pinholes</td>
<td>a minute punctured made by or as by a pin.</td>
</tr>
<tr>
<td>5. slip</td>
<td>a small piece of paper for jotting down memoranda, a record, etc.</td>
</tr>
</tbody>
</table>
Information Sheet 3.1

Labeling Packaged Processed Food Products

**Labeling is** defined as identifying or describing a product by placing printed or graphic materials on the container or wrapper.

A label is a slip of printed or written material attached to the container or wrapper that states the contents and gives other information about a product.

A packaged food is labeled mainly to tell the consumer what the product is. Labels identify the manufacturer of each product and tell about its quality in terms of taste and nutritive value. Labeling, therefore, is a very important consideration since it contributes to the marketability of the goods.

Starting March 1, 1989, compliance with the Labeling Law shall be strictly enforced. Containers of articles sold should have the following information, when applicable.

1. **Name of food/product**
   The name shall indicate the true nature of the food, normally specific and not generic and shall be prominently printed on the principal display panel.

2. **Name and address of Manufacturer, Repacker or Distributor and Country of Manufacture**
   The name and address of the person or company whose name appears on the label, the name must be qualified by “Manufactured for” or “Packed for”. The country of origin shall be indicated if the product is being exported or imported.

3. **List of ingredients**
   A complete list of ingredients shall be printed on the panel in descending order of proportion. The ingredients used should be specified as shown below:
   Ingredients: mango halves sugar and water

4. **Net content or net weight**
   a. If the content is in liquid form, indicate the weight in cc. (Cubic centimeters) or ml. (millimeters)
   b. If solid or semi-solid, indicate the weight in grams
   c. If solid, such as mango halves or pineapple slices, indicate by numerical count (e.g., 6 pineapple slices, 4 mango halves, etc.)

5. **Other relevant information on other materials used in the manufacture of the food**
   a. Artificial coloring or flavoring additives may be indicated as; “artificially flavored” or artificial flavor added.
   b. “Preservative added: Sodium Benzoate”
c. Other food additives used may be specified as citric acid added, alum added, etc.
d. If alcohol is contained in the product, a separate statement of the alcohol content: 15% or 30% proof.

6. Open-date marking/Expiry date for specific products to give information on the suitability of the food for human consumption.

7. Nutrition Facts are required to be stated in the label to determine the nutritive/health values of the product especially if the product is rich in protein and calcium.

8. Vignette is an illustration or picture that may attract the attention of the buyers to purchase the product, however it is optional.

9. Brand name for identification of the manufacturers, however it is optional.

Manufacturers may give additional information other than those required by law such as:

1. picture of the food in its actual size, color and shape;
2. information regarding the size of the container number of pieces, cupfuls or servings;
3. style of packing;
4. recipes using the products; and
5. direction for use or suggestions on how best to prepare the product for serving.

Condition of Packaged Finished Food Products

Condition of packaged finished/processed food products must be checked to ensure conformity with specified outputs.

Condition of packaged products may be checked through the following methods:

1. Leak inspection

   Test for proper seals.

   As soon as jars are cooled, test them to see if they are hermetically sealed. Turn each jar partly over in your hands to see if it leaks. To test jars with metal lids, tap center of lid with a spoon. A clean ringing sound means a good seal. A dull note however does not always mean a poor seal. If there is no leakage, store jars and watch for signs of spoilage
Canned foods should be free from leaks, metal contamination and entrance of air. Glass containers must be free from breakage and cracks and flexible should be free from pinholes.

2. Checking of print labels

Labels of processed products should describe truthfully the actual contents of the product.

3. Product testing

Food should look good and taste good. It should not be spoiled or damaged and should be safe and free from harmful ingredients.

Storing Packaged Processed Food Products

Dried and dehydrated foods should be guarded against moisture, light, air, foreign odors and pests. They should be stored in a cool, dry place.

Sugar concentrates, pickled and fermented products must be stored in a cool, dark and dry place.

Products such as ham, bacon, tocino, longanisa, sausage and tapa should be refrigerated.

LET US REMEMBER:

Labeling is an important aspect of food packaging. Regulations on the labeling of food products are aimed at protecting consumers against misbranding and adulteration.

SELF CHECK

Direction: Read the following sentences carefully. Select the correct answer inside the circle and write it in your test notebook.

1. Identifying a product by placing printed materials on a container or wrapper.

   • Label
   • Labeling
2. A part of a package that tells consumers about the product.

- Label
- Labeling

3. One of the items printed in a label.

- Net content
- Weight of package

4. Flexibles should be free from pinholes.

- Leak inspection
- Product testing

5. Products stored in the refrigerator.

- Jams and jellies
- Tocino and longganisa
**Activity Sheet 3.1**

**TITLE:** Labeling Finished Products

**STEPS/PROCEDURE:**

Design a label for your processed products. Indicate all necessary information required in the label.

**RESOURCES:**

1. Labeling materials such as paper, pentel pen, ballpen, glue, stickers, coloring pen, tags, adhesive tapes, paperboard.

2. Computer hardware and software for designing product labels.

**REFERENCES:**

1. Fruit and Vegetable Processing, Revised Edition
2. Brochure – Know Your Food Manufacturing Industry
3. Homemaking For You and Me – Food Management and Consumerism
4. A module in Food Preservation Technology and Home Economics by Guzman, Ines Alcantara de; pp.01-00
SELF CHECK

I. Multiple Choices

**Direction:** Read the questions carefully and select the letters of the correct answers. Write your answers in your note book.

1. What is the process of putting processed foods into containers?
   - a. canning
   - b. packaging
   - c. packing
   - d. wrapping

2. Which of the following is **not** a reason for packaging finished products?
   - e. Protect processed foods against contamination.
   - f. Make distribution of the products to various market outlets easier.
   - g. Minimize damage to product while in transit.
   - h. Identify the products.

3. Which of the following is a packaging tool?
   - a. glass
   - b. food scales
   - c. flexible
   - d. plastic

4. Which of the following is a packaging material?
   - a. can sealer
   - b. plastic sealers
   - c. cap seal
   - d. plastic protect cap sealer

5. What packaging material is used for heavy loads?
   - a. corrugated carton
   - b. paper and paperboard
   - c. composite cans
   - d. plastic container

6. Which of the following is one of the oldest packaging materials for many food products like preserves, condiments, beverages and juice?
   - a. indigenous materials
   - b. glass container
   - c. metal containers
   - d. carton

7. What packages are in demand nowadays and are used as alternatives to traditional packaging methods?
   - a. bags
   - b. flexible
   - c. jars
   - d. pouches

8. What packaging material is appropriate for ham and bacon?
   - a. cryovac films
   - b. PVDC – coated films
   - c. PVC wraps
   - d. PE bags
9. What is the process of identifying or describing a product by placing printed or graphic materials on a container or wrapper?
   a. labeling  
   b. packaging  
   c. wrapping  
   d. sealing

10. What is the most visible part of a package?
   a. container  
   b. cover  
   c. label  
   d. wrapper

II – MODIFIED TRUE or FALSE

Direction: The underlined word in every sentence is wrong which makes the statement false. Look for the correct answer inside the boxes and write it in your test notebook.

1. Packaging means putting processed foods into the box.
2. Products are packaged to make distribution of the products to various market outlets harder.
3. Capsel is an equipment used to seal tin cans.
4. Corrugated Carton is a leak-proof and does not cause undesirable flavor and odor.
5. Paper and paperboard are indigenous packaging materials.
6. Flexibles are lighter and more resistant to corrosion.
7. Composite containers are pouches, bags, reels, sheets or strips made out of a single layer or combined layers of soft paper, foil and cellophane.
8. Tags are well-suited for the small, single-serve packs so popular nowadays.
9. Labeling is the most visible part of a package.
10. Glass jars are appropriate packaging material for dried and smoked fish.
III – IDENTIFICATION

Direction: Read the following sentences carefully. Select the correct answer inside the circle and write it in your test notebook.

1. Identifying a product by placing printed materials on a container or wrapper.

   • Label
   • Labeling

2. A part of a package that tells consumers about the product.

   • Label
   • Labeling

3. One of the items printed in a label.

   • Net content
   • Weight of package

4. Flexibles should be free from pinholes.

   • Leak inspection
   • Product testing

5. Products stored in the refrigerator.

   • Jams and jellies
   • Tocino and longganisa
KEY TO CORRECTIONS

PRE-TEST/POST TEST

I -
1. b
2. d
3. b
4. c
5. a
6. b
7. b
8. a/b
9. a
10. c

II -
1. containers
2. easier
3. can sealer
4. glass
5. mats
6. plastic container
7. flexibles
8. flexibles
9. label
10. Polyethylene

III -
1. labeling
2. label
3. net content
4. leak inspection
5. tocino and longanisa

Lesson 1
1. c
2. a
3. d
4. d
5. a

Lesson 2
1. c
2. d
3. d
4. b
5. c

Lesson 3
1. labeling
2. label
3. net content
4. leak inspection
5. tocino and longanisa
REFERENCES:

1. Fruit and Vegetable Processing, Revised Edition, pp.232-238
2. Brochure – Know Your Food Manufacturing Industry
3. Internet
ACKNOWLEDGMENT

The Department of Education wishes to extend appreciation to the representatives of the different Secondary Technical-Vocational Schools who shared their expertise in developing the Competency-Based Curriculum (CBC) and Competency Learning Matrix Materials (CBLM) on April 14-19, 2008, refinement and packaging at the Development Academy of the Philippines, Tagaytay City and the refinement of CBC-CLM at the Marikina Hotel, Marikina City on April 20-25, 2009, in the integration of evaluation results/recommendations by the IMCS editors/evaluators on November 21-25, 2011, and the finalization and packaging of learning materials on December 5-9, 2011 at the Development Academy of the Philippines, Tagaytay City.

This learning material was developed, enhanced and refined by the following personnel:

**FISH PROCESSING:**

**EVELYN RAPACON**
*Solana Fresh Water Fishery School*

**DELIA DEMAVIVAS**
*Davao del Sur School of Fisheries*

**ROSALINDA PASCUA**
*Bataan School of Fisheries*

**GLORIA C. TABAGOC**
*Clarencio Calagos Memorial School of Fisheries*

**ZENAIDA DELANTAR**
*Obando School of Fisheries*

**CRISTINA CHUA**
*Bataan School of Fisheries*

**NENITA DELA CRUZ**
*Malolos Marine Fishery School and Laboratory*

**LEONORA ESPADA** – English
*Bataan School of Fisheries*

**TERESITA MAMUGAY** – Science
*Davao del Sur School of Fisheries*

**RONALDO MANAHAN**
*Malolos Marine Fishery School and Laboratory*
FOOD PROCESSING:

CLARITA ANTONIO  
*Jones Rural School- Main*

JOSEFINA SUMALLO  
*Samar National Pilot School of Agriculture*

LOLITA TEODOSIO  
*Fortunato F. Halili National Agricultural School*

ERLINDA IFURUNG  
*Alcala Rural School*

CRISTINA DEL ROSARIO – *English*  
*Fortunato F. Halili National Agricultural School*

NORMA TAOPO – *Science*  
*Floridablanca National Agricultural School*

ANABELL MENGULLO – *Math*  
*Samar National Pilot School of Agriculture*

Integration of Evaluation Results/Recommendations by the IMCS editors/evaluators and Finalization and Packaging of Learning Materials:

NELDA V. ALMENDRAS  
*Tanauan School of Fisheries*

ROWENA T. BUSTAMANTE  
*Eduardo Cojuangco National Vocational High School*

PEDELINA O. HUEVOS  
*Tagum National Trade School*

MARJORIE D. MENDEZ  
*Siniloan National High School*