



## Practical Exercise 7

# Standardization of milk

### Objectives

To understand method for milk standardization

### Principle

According to the Food Safety and Standard Rules (2011), different types of liquid milk (market milk) are sold in the market. The minimum fat and SNF requirements for such milks is given in Table 7.1. So, the raw milk received at the dairy processing plant has to be adjusted to requested level of fat and SNF so that the particular type of milk confirms the regulatory standards.

**Table 7.1. Minimum requirements of different classes of milk sold in Indian market**

| Class of milk     | Milk fat    | Milk solids-not-fat (SNF) |
|-------------------|-------------|---------------------------|
|                   | Minimum (%) |                           |
| Double toned milk | 1.5         | 9.0                       |
| Toned milk        | 3.0         | 8.5                       |
| Recombined milk   | 3.0         | 8.5                       |
| Standardized milk | 4.5         | 8.5                       |
| Full cream milk   | 6.0         | 9.0                       |



Basically, there are two methods by which whole milk can be standardized. They are: (i) removal of excess fat by separation, (ii) addition of skim milk or skim milk powder and water. In non-availability of whole milk, skim milk powder and cream or white butter (butter that doesn't contain salt) or butter oil can also be used for standardization. For standardization of a single component i.e, fat or SNF of milk, "Pearson's square" method is used. However, for standardization of both fat and SNF, algebraic method is commonly used.

## Objective

To prepare full cream or standardized or toned or double toned milk from given raw materials.

## Principle

For standardization of milk either for fat or SNF, "Pearson's square" method is commonly used. At first, it is necessary to know the relative amounts and fat or SNF contents of all raw materials that should be mixed together to give a product with desired fat or SNF content. The principle of Pearson's square method is illustrated in Fig. 1. It consists of drawing a square and placing the desired fat or SNF at the centre of the square (C). At the left hand corners of the square, fat or SNF percentage of given raw materials is placed. The material containing highest fat or SNF content (A) is placed at the top left corner and the lowest fat or SNF content (B) is placed at the bottom left corner of the square. The difference between the number in the centre and the number at the top left corner is placed at the bottom right corner of the square (A-C). Similarly, the difference between the number in the centre and the number at the bottom left corner is placed at the top right corner of the square (B-C). These two values placed at the right represent the proportions or relative amounts of the given raw materials to be mixed. The top right value represents the amount of the product at top left corner while the bottom right value represents the amount of the product at the bottom left corner. The two new values obtained on the right corners are summed to obtain a third value  $[(A-C) + (B-C)]$  which represents proportion of the desired final product.

## Materials required

Stainless steel multipurpose vat and other containers, weighing balance, stirrers, bottles, lactometer, thermometers, buffalo milk or cow milk or skim milk of known composition,



skim milk powder and/or cream or butter oil or white butter of known composition and fat testing kit (comprising Gerber centrifuge, Gerber acid, amyl alcohol, butyrometer, rubber cork, key for opening and closing the butyrometer with cork).

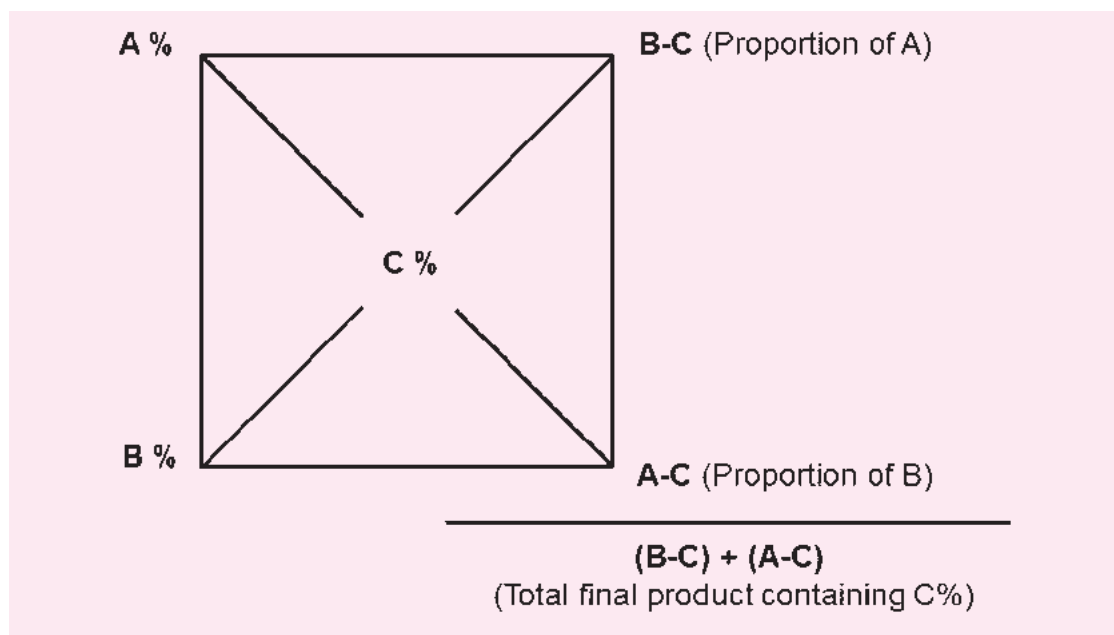


Fig.7.1. Illustration of Pearson's square method

## Procedure

1. Determine the fat and SNF of raw materials chosen.
2. Calculate the quantity of cream, milk, skim milk or skim powder required in the standardized milk.
3. Weigh each ingredient separately.
4. Mix the ingredients thoroughly in a multipurpose vat.
5. In case SNF level is to be raised, mix skim milk powder while constantly stirring the contents in the vat.
6. Pasteurize the product by the batch or HTST process and cool below 4-5°C.
7. Fill the milk in clean sterile bottle or polyethylene pouches and cap or seal as the case may be.
8. Store milk around 4-5°C till distribution.



## Observations

The following observations should be recorded:

1. Composition of ingredients

| Item             | Fat (%) | SNF (%) |
|------------------|---------|---------|
| Milk             |         |         |
| Cream            |         |         |
| Skim milk        |         |         |
| Skim milk powder |         |         |
| White butter     |         |         |

2. Quantity of ingredients

| Item               | Quantity (Kg) |
|--------------------|---------------|
| Cow / Buffalo milk |               |
| Skim milk          |               |
| Skim milk powder   |               |
| Cream              |               |
| White butter       |               |

3. Type of milk prepared: \_\_\_\_\_

4. Quantity of milk prepared: \_\_\_\_\_ Kg

5. Composition of milk prepared

|       |  |
|-------|--|
| Fat % |  |
| SNF % |  |

6. Quantity of milk packed: \_\_\_\_\_ Kg

7. Loss of milk: \_\_\_\_\_ Kg

8. Temperature of storage of milk: \_\_\_\_\_ °C



## Results

1. Quantity of \_\_\_\_\_ milk packed \_\_\_\_\_ Kgs
2. Percent loss of milk is \_\_\_\_\_

## REVIEW QUESTIONS

1. What do you understand by milk standardization?
2. Explain the principle for standardization of milk?
3. Give minimum fat/SNF toned and double toned milk?
4. Give minimum fat/SNF standardized and full cream milk?
5. Describe procedure for preparation of standardized and full cream milk.