
EXPERIMENT 1 IDENTIFICATION OF SOURCES FOR MILK LOSSES DURING PROCESSING OF MILK AND PREPARATION OF MILK PRODUCTS

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1.1 INTRODUCTION

Purpose: Identification of sources of milk/milk solids losses is required for exercising control measures to prevent these losses during various milk handling operations. Each dairy plant has a specific design characteristic and therefore, extent of losses from various sources may vary from plant to plant, which could be analysed to prepare an effective checklist.

Importance: In milks and milk products manufacturing process, milk component has the maximum bearing on the total manufacturing cost. Hence, an effective planning to arrest milk losses is an essential management tool. A systematic approach is required to identify sources of milk losses in each unit operation in dairy plants. An effective check listing in this context becomes a useful guide while monitoring and exercising control measures towards minimizing milk losses.

1.2 OBJECTIVES

- 1 to acquaint with the practical approach and methodology to identify various sources of milk losses in a dairy plant; and
- 1 to prepare an effective checklist to serves as practical guide for controlling the milk solids losses during milk handling in a dairy plant.

1.3 EXPERIMENT

i. Principle

Dairy operations involve various unit operations such as chilling, heating, reconstitution, separation and homogenization etc. in processing of milk. Conserved commodities like milk powder, white butter and butter oil are also used to standardize milk solids depending upon the requirement of raw or processed milk.

A reduction in milk solids output from that of input is a loss during the processing and handling. Causes of milk solids loss may be numerous depending upon the various prevailing factors like design of processing line, selection of equipments, operational control, accuracy of testing etc. Most of these are controllable and has practical significance in the operations' management & control system of a dairy plant. Milk solids loss occurs mainly in five forms 1) As leakage and spillage 2) Sticking to the equipment contact surface 3) Spoilage as defective or discarded product 4) During flushing and 5) Inaccurate testing and weighing of inputs and finished products.

ii. Requirements

- i) **Experimental Requirements:** A small bulk cooler, chilling center, liquid milk processing or multi-product dairy plant, a closed system to be earmarked with definite boundary in which input and output of the system are identified and measured for determining the milk solids losses during the operation.
- ii) Machinery / Instrument requirements:
 - a) Balance tank as input point of dairy operation,
 - b) Dairy equipments such as pump, conveyor cans/crates, Chiller, pasteurizer, cream separator, standardizer or clarifier, homogenizer, insulated tank etc.
 - c) Instruments and testing devices: milk quantum measuring device like dipstick, digital indicator, weigh scale. Gerber test kit with centrifuge, butyrometer, pipette, lactometer, water bath and thermometer.
- iii) Chemicals /Materials requirement: Conserved commodity like milk powder, white butter and butter oil; Gerber acid, amyl alcohol etc.

iii. Procedure

- a) Take the opening balance of all the storage tanks, in-process materials and finished products lying in the production floor and test their composition.
- b) Clean all the tanks, pipelines and equipments. Ensure that fittings and accessories are in their place. All the input materials like milk, milk powder, white butter, butter oil etc. are available for the experiment. Start the plant operations
- c) Measure and test composition of the materials/ingredients used in the processing and manufacture of milk products
- d) Monitor the milk line, weighing, testing and processing equipments for accuracy and milk spillage. Note as observation.

- e) Once the inputs are exhausted take the equipment on potable water. Before shutting the equipment, flush it.
- f) Measure and record the closing balance of all the raw materials/ingredient, in-process and finished products lying on the floor and transferred to store.
- g) Find out the difference between materials used and final output achieved in terms of milk solids (milk fat and milk solid- not- fat)
- h) Find out the above losses in terms of percentage.

iv. Observations: Observe and record in the followings Table-1.1

Table-1.1 : Recording of Measurements for Quantity and Composition

S.No.	Processing steps	Input materials		Process Output		Remarks
		Qty	Composition	Qty	Composition	
1	Reception					
2	Chilling & storage					
3	Milk processing					
4	Reconstitution					
4	Milk packing					
5	Cold storage & dispatch					
6	Cream separation					
7	Butter section					
8	Ghee section					
9	Milk condensing & drying unit					
10	Other milk products					
11	Finished product in store					

v. Results: Based on the above observations:

- a) Milk solids losses in the dairy plant is analyzed as follows:

S.No.	Section	Process	Equipment	Milk Solids loss Fat Loss + SNF Loss
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Total Milk Solids Loss = _____

- b) Prepare a check- list of major sources of milk solids losses from the above result as given below:

Check List for Controlling Milk Solids Losses

Sr. No	Section	Process/Equipment	Parameter to be monitored
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1.4 PRECAUTIONS

1. Since milk is a perishable commodity. The status of its acidity, after reconstitution, fat percent in the cream, temperature at churning do have bearing on the milk solids losses. Such technological factors should be considered with care while conducting the experiment and preparing checklist.
2. Devices used for volume, weight and composition measurement should be properly calibrated.
3. Dairy operations are of process type and hence all the measuring / testing devices should be readily available. If possible, in-line measuring /testing devices / instruments should be used.
4. Operations are carried out throughout the day, hence special care is to be taken to note milk loss points during off working hours.
5. The study should be conducted under the guidance of experienced dairy professional.