



RQF LEVEL 4



FOPCB403

FOOD PROCESSING

Cream and Butter Making

TRAINER'S MANUAL

October, 2024



CREAM AND BUTTER MAKING

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ACRONYMS

%: Percentage

°C: Degree Celsius

CB: Cream and Butter

CBT/CBA: Competence Based Training/ Assessment

CIP: Cleaning In Place

COP: Cleaning Out of Place

FDA: Food and Drug Administration

FOP: Food Processing

Kg: Kilogram

KOICA: Korea International Cooperation Agency

Ltd: Limited

pH: Potential on Hydrogen

PPE: Personal Protective Equipment

Psi: Pounds per Square Inch

Rpm: Rotations Per Minute

RTB: Rwanda TVET Board

SOPs: Standard Operating Procedures

TQUM Project: TVET Quality Management Project

TVET: Technical Vocation Education and Training

INTRODUCTION

This trainer's manual includes all the methodologies required to effectively deliver the module titled " **Cream and Butter making**. "Trainees enrolled in this module will engage in practical activities designed to develop and enhance their competencies.

The development of this training manual followed the Competency-Based Training and Assessment (CBT/A) approach, offering ample practical opportunities that mirror real-life situations.

The trainer's manual is organized into Learning Outcomes, which is broken down into indicative content that includes both theoretical and practical activities. It provides detailed information on the key competencies required for each learning outcome, along with the objectives to be achieved.

As a trainer, you will begin by asking questions related to the activities to encourage critical thinking and guide trainees toward real-world applications in the labor market. The manual also outlines essential information such as learning hours, didactic materials, and suggested methodologies.

This manual outlines the procedures and methodologies for guiding trainees through various activities as detailed in their respective trainee manuals. The activities included in this training manual are designed to offer students opportunities for both individual and group work. Upon completing all activities, you will assist trainees in conducting a formative assessment known as the end learning outcome assessment. Ensure that students review the key reading and the points to remember section.

MODULE CODE AND TITLE: FOPCB 403 CREAM AND BUTTER MAKING

Learning Outcome 1: Prepare Tools, Materials, Equipment and Workplace

Learning Outcome 2: Prepare Cream

Learning Outcome 3: Churn Cream

Learning Outcome 4: Package Cream and Butter

Learning Outcome 1: Prepare Tools, Materials, Equipment and Workplace



Indicative Contents

- 1.1 Selection of Materials, Tools and Equipment for Cream and Butter Making**
- 1.2 Cleaning of Tools, Equipment and Workplace for Cream and Butter Making**
- 1.3 Arrangement of Workplace for Cream and Butter Making**
- 1.4 Preparation of Ingredients for Cream and Butter Making**

Key Competencies for Learning Outcome 1: Prepare Tools, Materials, Equipment and Workplace

Knowledge	Skills	Attitudes
• Description of tools and equipment used in cream and butter making • Description of cleaning agent • Description of cleaning methods and techniques • Description of ingredients used in cream and butter making	• Selecting tools, equipment and materials used in cream and butter making • Adjusting tools and equipment used in cream and butter making • Preparing cleaning products • Cleaning work area • Checking of cleaning effectiveness • Arranging the work area for cream and butter-making Preparing ingredients used in cream and butter-making.	• Being careful when using sharp and electric connected tools and equipment • Being attentive when using cleaning products as some can be harmful to life • Being accurate while preparing ingredients • Being protective when mixing cleaning products Being a team worker while selecting and using of cleaning agent



Duration: 10 hrs

Learning Outcome 1 objectives:



By the end of the learning outcome, trainee will be able to:

1. Describe properly tools and equipment used in cream and butter making
2. Select properly materials, tools, and equipment used in cream and butter making
3. Adjust correctly tools and equipment used in cream and butter making
4. Describe clearly cleaning methods and techniques used in workplace
5. Describe properly cleaning agent used in in workplace, tools and equipment
6. Prepare correctly cleaning products used in workplace, tools and equipment
7. Clean effectively tools, equipment, and workplace according to cleaning methods and techniques
8. Check properly cleaning effectiveness according to the methods of checking cleanliness
9. Arrange properly workplace for cream and butter making
10. Describe correctly ingredients used in cream and butter-making



Resources

Equipment	Tools	Materials
• Weighing Balance • Cooler • Cream Separator • Churner • Pasteurizer • Homogenizer • Milk Tank • Lacto Scan • Milk Cans • Sealing Machine • Filling Machine	• Lactometer • Thermometer • pH Meter • Milk Gun • Spoon • Measuring Cylinder • Filters • Funnel • Bunsen Burner • Cup • Pipette • Beaker • Plate • Calculator • Milk Sampler	• Ingredient: Milk, skim milk, cream, thickening agents, starter culture, salt, Coloring. • Reagents: alcohol, distilled water • Cleaning agent: water, detergents, disinfectant, sanitizer • Packaging materials

	• Cleaning tools	
 Advance Preparation: Before delivering this learning outcome, you are recommended to: • Avail materials, tools, and equipment and make sure that they are in good working condition, and verify if materials are not expired • Prepare teaching aids and didactic materials (manuals/guides, task sheets, photos, audio-visuels, protocols) related to cream and butter-making • Make sure that both the classroom and workshop are available		



Indicative content 1.1: Selection of Materials, tools and equipment for cream and butter making



Duration: 2 hrs



Theoretical Activity 1.1.1: Description of tools and equipment used in cream and butter making.



Notes to the trainer:

- Trainer may use small groups to describe tools, and equipment used in cream and butter making
- The use of drawings, pictures, or videos as didactic materials and catalogues while describing tools, and equipment used in cream and butter making is required.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to answer the following questions:

- Based on your knowledge, what are the tools and equipment used in cream and butter making and predict their use.
- What do you understand by the safety precautions of tools and equipment used to make cream and butter?

Step 2: Ask trainee to write the findings on paper, flip charts, Blackboard, or whiteboard.

Step 3: Facilitate trainees to present their findings and choose the correct answers.

Step 4: Provide the expert view and clarify ideas by using didactic materials

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key reading 1.1.1 in the trainee manual



Points to Remember

- The specific tools and equipment used can vary depending on the scale of production and the desired butter type (e.g., salted, unsalted, cultured). Larger commercial butter production facilities may use more automated and specialized equipment.



Practical Activity 1.1.2: Selecting and adjusting tools, equipment used in cream and butter making



Notes to the trainer

- The trainer may have been supposed to demonstrate how to select and adjust tools, and equipment used in cream and butter-making.
- Avail tools and equipment for cream and butter-making.



Key steps:

While delivering this activity, pass through the following steps:

Step1. Ask trainees to go to cream and butter workshop to select and adjust tools, and equipment used in cream and butter making.

Step2. Explain the task and provide clear work instructions (PPE, Time allocated)

Step3. Demonstrate how to select and adjust tools, and equipment used in cream and butter making. While demonstrating, explain the adjustment procedures.

Step4. Ask trainees to select and adjust tools, and equipment used in cream and butter making and monitor the procedures.

Step5. Verify whether tools and equipment are correctly adjusted and provide feedback where necessary.

Step6. Ask trainees to read key reading 1.1.2 in the trainee manual.

Step7. Ask trainees to perform the task provided in the application of Learning 1.1.



Points to Remember

- Selecting the right tools and equipment for cream and butter making is crucial for efficiency, quality, and safety.
- By carefully selecting and adjusting your tools and equipment, you can optimize the cream and butter-making process and produce high-quality products.



Theoretical Activity 1.1.3: Description of ingredient used in cream and butter making.



Notes to the trainer:

- Trainer may use small group to describe ingredients used in cream and butter making
- The use of drawings, pictures, or videos as didactic materials and catalogs while describing ingredients used in cream and butter making is required.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to answer the following questions:

- i. Based on your knowledge, what are the types of ingredients used in cream and butter making
- ii. What are the roles of ingredients used in making cream and butte?

Step 2: Ask trainees to write the findings on paper, flip charts, Blackboard, or whiteboard.

Step 3: Facilitate trainees to present their findings and choose the correct answers.

Step 4: Provide the expert view and clarify ideas by using didactic materials

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key reading 1.1.3 in the trainee manual.



Points to Remember

- The specific ingredients and their quantities can vary depending on the desired butter type, production method, and regional preferences.



Practical Activity 1.1.4: Selecting ingredient used in cream and butter making



Notes to the trainer

- The trainer may should demonstrate how to select ingredients used in cream and butter-making
- Avail ingredients used in cream and butter and verify if they are not expired



Key steps:

While delivering this activity, pass through the following steps:

- Step1.** Introduce the activity and ask trainees to go to cream and butter workshop to select ingredients to be used in cream and butter making.
- Step2.** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step3.** Demonstrate how to select ingredients used in cream and butter making. While demonstrating, explain the selection criteria.
- Step4.** Ask trainees to select ingredients used in cream and butter making and monitor the procedures.
- Step5.** Verify whether ingredients are correctly selected and provide feedback where necessary.
- Step6.** Ask trainees to read key reading 1.1.4 in the trainee manual.
- Step7.** Ask trainees to perform the task provided in the application of Learning 1.1



Points to Remember

- Ensure that none of the ingredients are expired.
- By carefully selecting high-quality, fresh ingredients, you can ensure the production of delicious and flavourful cream and butter.



Theoretical Activity 1.1.5: Description of cleaning agent used in cream and butter making.



Notes to the trainer:

- Trainer may use small group to describe cleaning agent used in cream and butter making
- The use of drawings, pictures, or videos as didactic materials and catalogues while describing cleaning agents used in cream and butter making.
- Avail cleaning agent for cream and butter making.



Key steps:

While delivering this activity, pass through the following steps:

- Step1.** Introduce the activity and ask trainees to answer the following questions:
- Step2.** Based on your knowledge, Identify the types of cleaning agents and directions for using cleaning products as used in cream and butter-making
- Step3.** What do you understand by the safety precautions of cleaning products to users as used in cream and butter-making?
- Step4.** Ask trainees to write the findings on paper, flip chart, Blackboard, or whiteboard.
- Step5.** Facilitate trainees to present their findings and choose the correct answers.
- Step6.** Provide the expert view and clarify ideas by using didactic materials
- Step7.** Address any questions or concerns.
- Step8.** Ask trainees to read the key reading 1.1.5 in the trainee manual



Points to Remember

- Select the most appropriate cleaning agents for your cream and butter-making operations based on a hygienic environment and ensuring safety.



Practical Activity 1.1.6: Selecting cleaning agent used in cream and butter making



Notes to the trainer

- The trainer may demonstrate how to select cleaning agents used in cream and butter-making.
- Avail cleaning agent for cleaning processing workshop.



Key steps:

While delivering this activity, pass through the following steps:

- Step1.** Introduce the activity and ask trainees to go to cream and butter workshop to select the cleaning agents to be used in workshop of cream and butter making.

- Step2.** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step3.** Demonstrate how to select cleaning agents used in cream and butter making. While demonstrating, explain the selection criteria.
- Step4.** Ask trainees to select a cleaning agent used in cream and butter making and monitor the procedures.
- Step5.** Verify whether cleaning agents are correctly selected and provide feedback where necessary.
- Step6.** Ask trainees to read key reading 1.1.6 in the trainee manual
- Step7.** Ask trainees to perform the task provided in the application of Learning 1.1



Points to Remember

- By following proper cleaning and sanitization procedures with the appropriate cleaning agents, you can maintain a hygienic environment and ensure the safety of your cream and butter products.



Theoretical Activity 1.1.7: Description of packaging material in cream and butter making.



Notes to the trainer:

- Trainer may form a small group to describe packaging material used in cream and butter making
- The use of drawings, pictures, or videos as didactic materials and catalogue while describing packaging material used in cream and butter making.
- Avail packaging material for cream and butter making.



Key steps:

While delivering this activity, pass through the following steps:

- Step1.** Introduce the activity and ask trainees to answer the following questions:
Based on your knowledge, Identify the types of packaging material used in cream and butter-making.
- Step2.** Ask trainee to write the findings on paper, flip chart, Blackboard, or whiteboard.
- Step3.** Facilitate trainees to present their findings and choose the correct answers.
- Step4.** Provide the expert view and clarify ideas by using didactic materials
- Step5.** Address any questions or concerns.
- Step6.** Ask trainees to read the key reading 1.1.7 in the trainee manual.



Points to Remember

- Choosing the right packaging material is essential for preserving the quality, freshness, and safety of cream and butter products.



Practical Activity 1.1.8: Selecting packaging material used in cream and butter



Notes to the trainer

- The trainer may have been supposed to demonstrate how to select packaging material used in cream and butter-making
- Avail packaging material for cream and butter making



Key steps:

While delivering this activity, pass through the following steps:

Step1. Introduce the activity and ask trainees to go to cream and butter workshop and select packaging material to be used in cream and butter making.

Step2. Explain the task and provide clear work instructions (PPE, Time allocated)

Step3. Demonstrate how to select packaging material used in cream and butter making. While demonstrating, explain the selection criteria.

Step4. Ask trainees to select packaging material used in cream and butter making and monitor the procedures.

Step5. Verify whether packaging materials are correctly selected and provide feedback where necessary.

Step6. Ask trainees to read key reading 1.1.8 in the trainee manual

Step7. Ask trainees to perform the task provided in the application of Learning 1.1



Points to Remember

- Ensure that all packaging materials are available and in good working condition
- By selecting appropriate packaging materials, you can help maintain the quality and safety of your cream and butter products while meeting consumer demands and environmental concerns.



Application of learning 1.1.

Ask the trainees to go in cream and butter workshop to select tools, materials, and equipment and make proper adjustments for tools and equipment.

Checklist:

SN	Criteria	Indicators	Observation	
			Yes	No
1	Tools, equipment, and material used in cream and butter making are properly selected	1.1 Tools and equipment are selected		
		1.2. Cleaning agent are selected		
		1.3. Ingredient are selected		
		1.4 packaging material are selected		
2	Tools and equipment used in cream and butter are appropriately adjusted	2.1. Cream separator is adjusted		
		2.2. Butter churner is adjusted		
		2.3. Homogenizer is adjusted		



Indicative content 1.2: Cleaning of tools, equipment, and workplace for cream and butter making



Duration: 2 hrs



Theoretical Activity 1.2.1: Description of cleaning workplace



Notes to the trainer:

- Trainer may form a small group to describe cleaning workplace used in cream and butter making
- The use of videos as didactic materials and catalogue while describing cleaning the workplace used in cream and butter making.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to answer the following questions:

- Based on your knowledge, what are the purposes of cleaning tools, equipment, and workplace?
- According to your experience, explain the cleaning methods and techniques used in the workplace of cream and butter making.

Step 2: Ask trainees to write the findings on paper, flip chart, Blackboard, or whiteboard.

Step 3: Facilitate trainees to present their findings and choose the correct answers.

Step 4: Provide the expert view and clarify ideas by using didactic materials

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key reading 1.2.1 in the trainee manual.



Points to Remember

- A clean and organized workplace is essential for productivity, safety, and a positive work environment.



Practical Activity 1.2.2: Cleaning the workplace used in cream and butter making

Notes to the trainer

- The trainer may demonstrate how to Clean the workplace used in cream and butter making.
- Avail workplace of cream and butter making to be cleaned.



Key steps:

While delivering this activity, pass through the following steps:

- Step1.** Introduce the activity and ask trainees to go to cream and butter workshop and then Clean the workplace to be used in cream and butter making.
- Step2.** Explain the task and provide clear work instructions (Task, PPE, Time allocated)
- Step3.** Demonstrate how to Clean the workplace used in cream and butter making. While demonstrating, explain the selection criteria.
- Step4.** Ask trainees to Clean the workplace used in cream and butter making and monitor the procedures.
- Step5.** Verify whether the workplace is correctly cleaned and provide feedback where necessary.
- Step6.** Ask trainees to read key reading 1.2.2 in the trainee manual.
- Step7.** Ask trainees to perform the task provided in the application of Learning 1.2



Points to Remember

- By following cleaning practices and maintaining a clean and sanitized workplace. It can help to prevent contamination, ensure the safety of your products, and comply with food safety regulations.



Application of learning 1.2.

Ask the trainees to go in cream and butter workshop, to clean tools, equipment and the workplace.

Checklist:

SN	Criteria	Indicators	Observation	
			Yes	No
1 2	Tools and equipment used in cream and butter making are properly cleaned	1.1 Personal Protective Equipment (PPE) are used		
		1.2. Cleaning tools are used		
		1.3 Cleaning methods are applied		
		1.4 Cleaning techniques are performed		
		1.5 Cleaning procedure are respected		



Indicative content 1.3: Arrangement of the workplace for cream and butter making



Duration: .2. hrs



Practical Activity 1.3.1: Arranging the workplace used in cream and butter making

Notes to the trainer

- The trainer may demonstrate how to arrange the workplace used in cream and butter making.
- Avail disorganized workplace for cream and butter making.



Key steps:

While delivering this activity, pass through the following steps:

- Step1.** Introduce the activity and ask trainees to go to cream and butter workshop and then arrange the workplace to be used in cream and butter making.
- Step2.** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step3.** Demonstrate how to arrange the workplace used in cream and butter making. While demonstrating, respect the arrangement criteria.
- Step4.** Ask trainees to arrange the workplace used in cream and butter making and monitor the procedures.
- Step5.** Verify whether the workplace is correctly arranged and provide feedback where necessary.
- Step6.** Ask trainees to read key reading 1.3.1 in the trainee manual.
- Step7.** Ask trainees to perform the task provided in the application of Learning 1.3



Points to Remember

- Create a workplace arrangement that is efficient, safe, and conducive to the production of high-quality cream and butter.



Practical Activity 1.3.2: Checking cleaning effectiveness



Notes to the trainer

- The trainer may demonstrate how to check cleaning effectiveness.
- Avail tools, equipment, and materials needed to use in checking cleaning effectiveness.



Key steps:

While delivering this activity, pass through the following steps:

- Step1.** Introduce the activity and ask trainees to go to cream and butter workshop and then check cleaning effectiveness. S
- Step2.** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step3.** Demonstrate how to check the effectiveness of cleaning by respecting the checking methods.
- Step4.** Ask trainees to check the effectiveness of cleaning and monitor the procedures.
- Step5.** Verify whether the effectiveness of cleaning is correctly checked and provide feedback where necessary.
- Step6.** Ask trainees to read key readings 1.3.2 in the trainee manual.
- Step7.** Ask trainees to perform the task provided in the application of Learning 1.3



Points to Remember

- Monitor the effectiveness of cleaning procedures and ensure a hygienic workplace.



Application of learning 1.3.

Ask the trainees to go in cream and butter workshop, to arrange the workplace and make proper checking of cleaning effectiveness.

Checklist

SN	Criteria	Indicators	Observation	
			Yes	No
1	Workarea used in cream and butter making are properly arranged	1.1. Arrangement criteria are respected		
		1.2. Tools and equipment are arranged		
2	Cleaning effectiveness are well Checked	2.1. vision inspection is performed		
		2.2.SWAB Test is performed		
		2.3 PH test is performed		
		2.4 Phenolphthalein test is performed		



Indicative content 1.4: Preparation of ingredients for cream and butter making



Duration: .2. hrs



Practical Activity 1.4.1: Preparing of ingredients used in cream and butter making

Notes to the trainer

- The trainer may have demonstrated how to prepare ingredients used in cream and butter making.
- Avail all ingredients used in cream and butter making.



Key steps:

While delivering this activity, pass through the following steps:

Step1. Introduce the activity and ask trainees to go to cream and butter workshop to prepare ingredients used in cream and butter making.

Step2. Explain the task and provide clear work instructions (PPE, Time allocated)

Step3. Demonstrate how ingredients used in cream and butter making are prepared by respecting the procedures.

Step4. Ask trainees to prepare ingredients used in cream and butter making and monitor the procedures.

Step5. Verify whether the ingredients are correctly prepared and provide feedback where necessary.

Step6. Ask trainees to read key reading 1.4.1 in the trainee manual.

Step7. Ask trainees to perform the task provided in the application of Learning 1.4



Points to Remember

- Ensure that your ingredients are properly prepared for the cream and butter-making process, leading to a high-quality finished product.



Application of learning 1.4.

Ask the trainee to go in cream and butter workshop, to prepare ingredients.

Checklist:

Criteria	Indicators	Observation	
		Yes	No
Ingredients used in cream and butter making are properly prepared	1.1. Milk weighing is properly performed		
	1.2. Filtration of milk is properly performed		
	1.3. Milk preheating is properly performed.		
	1.4. Thickening agents are well prepared		
	1.5. Neutralizers are properly prepared		
	1.6. Starter cultures are properly prepared		
	1.7. Salt is well prepared		



Learning Outcome 1 end assessment

Theoretical assessment

Q1. Choose the letter corresponding to the appropriate description of butter ingredients:

1. What is the primary purpose of adding salt to butter?
 - a) To improve its flavor and shelf life.
 - b) To increase its nutritional value.
 - c) To make it easier to spread.
 - d) To prevent the butter from melting.

Answers: A) To improve its flavor and shelf life.

2. Starter cultures are used in butter making to:
 - a) Add color to the butter.
 - b) Increase the butter's shelf life.
 - c) Ferment the cream and develop flavor.
 - d) Adjust the butter's pH.

Answers: C) Ferment the cream and develop flavor.

3. Which of the following is **NOT** a permitted ingredient for butter making?
 - a) Sodium chloride
 - b) Starter cultures
 - c) Artificial sweeteners
 - d) Potable water

Answers: C) Artificial sweeteners.

4. Annatto and carotene are added to butter to:
 - a) Improve its flavor.
 - b) Increase its shelf life.
 - c) Give it a yellow color.
 - d) Adjust its pH.

Answers: C) Give it a yellow color.

5. Neutralizers are used in butter making to:
 - a) Improve its flavor.
 - b) Adjust its pH.
 - c) Increase its shelf life.
 - d) All the above.

Answers: D) All of the above.

6. The following are the equipment used in cream and butter making except:
 - a) Homogenizer

- b) Churning machine
- c) Oven
- d) Separator

Answer: C. Oven

Q2. The table below contains the purpose of filtration in **Column A** corresponding to its explanation in **Column B**. Match using letter column A and column B.

ANSWER	COLUMN A	COLUMN B
1.....	1. Equipment Protection	A. Effective filtration can help detect health issues in dairy cattle by filtering out somatic cells and bacteria, which can indicate mastitis or other infections.
2.....	2. Health Monitoring:	B. It removes solid particles such as dirt, hair, and other debris that may be present in raw milk. This is essential for maintaining hygiene standards.
3.....	3. Quality Assurance	C. By removing particulates, filtration protects milking equipment from damage and wear, thus prolonging its lifespan

Answer:

1= C

2= A

3= B

Q3. Read the statement below and answer **TRUE** if it is correct and **False** if it is wrong:

- a. Thickening agents are food additives used to modify the properties of cream and butter such as viscosity and texture. **TRUE**
- b. Gelatine is a protein derived from animal collagen. It is used in cream and butter making as a starter culture in cream and butter products. **False**
- c. Starter cultures of harmless lactic acid and or flavor-producing bacteria: Starter cultures are used to ferment the cream and produce the characteristic flavor and texture of butter. **TRUE**

Practical assessment

Your school needs to produce cream and butter that may show the parents and children in the open day. Asks trainees to go to the food processing workshop to perform the following task within 2 hours. All necessary tools and equipment are available in the workshop.

1. Select tools, equipment, and materials will be used in cream and butter making.
2. Clean work area of cream and butter making.

Checklist:

Criteria	Indicators	Observation	
		Yes	No
1. Tools ,equipment and material used in cream and butter making are properly selected	1.1 Safety precautions are respected		
	1.2 Tools, equipment, and materials are selected		
	1.3 cleaning agent are selected		
	1.4 Ingredient are selected		
2.tools and equipment are effectively cleaned	2.1.Cleaning products are prepared		
	2.2. Cleaning methods are applied		
	2.3. Cleaning techniques are applied		
2. Checking and arrangement of the work area are well done	2.1 Visual inspection is performed		
	2.2 Phenolphthalein indicator test is performed		
	2.3 Work area is arranged		

END



Further information to the trainer

Early, R. (2012). Dairy products and milk-based food ingredients. In *Natural food additives, ingredients and flavourings* (pp. 417-445). Woodhead Publishing.

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Learning Outcome 2: Prepare Cream



Indicative Contents

2.1 Separation of, Milk for Cream-Making

2.2 Pasteurization of Cream

2.3 Cooling Cream

Key Competencies for Learning Outcome 2: Make cream

Knowledge	Skills	Attitudes
• Description of milk separation principles • Description of factors affecting separation of milk • Description of milk standardization • Description of types of cream and skim milk • Description of pasteurization techniques • Description of cooling conditions	• Separating milk • Adjusting of fat content • Pasteurizing of cream • Homogenizing of cream • Adding thickening agents • Cooling Cream • Checking the quality of cream	• Being attentive when separating milk • Being protective when using pasteurizer • Being honest when checking the quality of the cream • Being organized while using the workshop • Being committed while pasteurizing and homogenizing the cream • Being attentive while adding ingredients in a cream



Duration: 15 hrs

Learning outcome 2 objectives:



By the end of the learning outcome, trainee will be able to:

1. Describe properly milk separation principles according to separation techniques
2. Describe properly the factors affecting the separation of milk
3. Separate appropriately milk into cream and skim milk according to separation techniques
4. Describe properly milk standardization according to the types of cream
5. Adjust appropriately fat content according to the types of cream
6. Describe properly pasteurization techniques according to the conditions needed
7. Pasteurize appropriately cream according to product specifications
8. Homogenize appropriately cream according to product specifications
9. Add properly thickening agents in cream according to the types of cream
10. Cool effectively cream according to the temperature of the packaging
11. Check properly the quality parameters of cream according to product specifications



Resources

Equipment	Tools	Materials
• Cream separator • Pasteurizer • Homogenizer • Milk Tank • Milk Cans • Refrigerator • Cooking Stove • Packing Machine	• Spoon • Wooden Spoon • Jars • Thermometer • Balance • pH meter	• Milk • Thickening Agents • Packaging Materials • Labels



Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail tools and equipment and make sure that they are in good working condition
- Verify if materials are not expired
- Prepare teaching aids and didactic materials related to cream and butter making



Indicative content 2.1: Separation of milk for cream making



Duration: 6 hrs



Theoretical Activity 2.1.1: Description of milk separation principles



Notes to the trainer:

- Trainer may form a small group to describe milk separation principles
- The use of videos as didactic materials and catalogue while describing milk separation is required.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to answer the following questions:

- Based on your knowledge, how is milk separation performed?
- What is your understanding of the factors that influence milk separation?

Step 2: Ask trainees to write the findings on paper, flip chart, Blackboard, or whiteboard.

Step 3: Facilitate trainees to present their findings and choose the correct answers.

Step 4: Provide the expert view and clarify ideas by using didactic materials

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key reading 2.1.1 in the trainee manual.



Points to Remember

- The separator's design and operating conditions play a crucial role in achieving efficient and accurate separation.



Practical Activity 2.1.2: Separating milk



Notes to the trainer

- The trainer may have supposed to demonstrate milk separation techniques used in cream and butter
- The trainer is recommended to avail tools and equipment used in separation of milk



Key steps:

While delivering this activity, pass through the following steps:

Step1. Ask trainees to go in cream and butter workshop to separate milk using separation techniques.

Step2. Explain the task and provide clear work instruction (PPE, Time allocated)

Step3. Demonstrate how milk is separated used different techniques. While demonstrating, explain the procedures.

Step4. Ask trainees to separate milk using those techniques and monitor the process.

Step5. Verify whether milk is well separated and provide feedbacks where necessary.

Step6. Ask trainees to read key reading 2.1.2 in trainee manual.

Step7. Ask trainees to perform the task provided in application of learning 2.1.



Points to Remember

- Milk separation techniques are crucial for various dairy processing applications, including cream extraction and skim milk production.



Theoretical Activity 2.1.3: Description of types of cream and skim milk



Notes to the trainer:

- Trainer may form a small group to describe the types of cream and skim milk
- The use of drawings, pictures, or videos as didactic materials and catalogue while describing the types of cream and skim milk.



Key steps:

While delivering this activity, pass through the following steps:

Step1. Introduce the activity and ask trainees to answer the following questions:

- i. Based on your knowledge, describe the types of cream and skim milk

Step2. Ask trainees to write the findings on paper, flip chart, Blackboard, or whiteboard.

Step3. Facilitate trainees to present their findings and choose the correct answers.

Step4. Provide the expert view and clarify ideas by using didactic materials

Step5. Address any questions or concerns.

Step6. Ask trainees to read the key reading 2.1.3 in the trainee manual.



Points to Remember

- Cream and skim milk are both derived from milk but have different fat content levels
- Choosing between cream and skim milk often depends on personal preference, dietary needs, and the intended use.



Theoretical Activity 2.1.4: Description of cream standardization methods



Notes to the trainer:

- Trainer may form a small group to describe cream standardization methods.
- The use of drawings, pictures, or videos as didactic materials and catalogue while describing methods of cream standardization.



Key steps:

While delivering this activity, pass through the following steps:

Step1: Introduce the activity and ask trainees to answer the following questions:

- i. Based on your knowledge, describe the methods of cream standardization

Step 2: Ask trainees to write the findings on paper, flip chart, Blackboard, or whiteboard.

Step 3: Facilitate trainees to present their findings and choose the correct answers.

Step 4: Provide the expert view and clarify ideas by using didactic materials

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key reading 2.1.4 in the trainee manual.



Points to Remember

- Cream standardization is often done to ensure consistency, meet nutritional guidelines, or comply with regulatory requirements.
- The choice of cream standardization method depends on factors such as the product type, desired fat content, and the specific properties of the product.



Practical Activity 2.1.5: Adjust fat content in cream



Notes to the trainer

- The trainer may demonstrate how adjusting fat of cream is done.
- The trainer is recommended to avail tools equipment and materials for fat adjustment in the workshop.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Ask trainees to go in cream and butter workshop to standardize the cream.
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how the cream is standardized by explaining the selection procedures.
- Step 4:** Ask trainees to standardize the cream and monitor the procedures.
- Step 5:** Verify whether the cream is standardized and provide feedback where necessary.
- Step 6:** Ask trainees to read key reading 2.1.5 in the trainee manual
- Step 7:** Ask trainees to perform the task provided in the application of Learning 2.1



Points to Remember

- Cream standardization is often done to ensure consistency of the final product and to meet specific market requirements.
- The choice of standardization method depends on factors such as the desired fat content, the volume of cream to be processed, and the desired level of precision.

Ask the trainees to go in cream and butter workshop, to separate milk and make proper standardization of cream.

Checklist:

SN	Criteria	Indicators	Observation	
			Yes	No
1	Milk is well-separated	1.1 Separator is used		
		1.3. Cream is obtained		
		1.4. skim milk is obtained		
2	Cream is well-standardized	2.1. Fat is tested		
		2.2. The amount of skim milk to be added is calculated		
		2.3: Fat in cream is raised/lowed according to customer needs		



Indicative content 2.2: Pasteurization of cream



Duration: 5 hrs



Practical Activity 2.2.1: Pasteurizing of cream



Notes to the trainer

- The trainer may demonstrate how the pasteurization of cream is done.
- The trainer is recommended to avail tools, equipment, and material for cream pasteurization in the workshop



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in cream and butter workshop to pasteurize the cream.

Step 2: Explain the task and provide clear work instructions (PPE, Time allocated)

Step 3: Demonstrate how cream is pasteurized. While demonstrating, explain the purposes, techniques, and procedures of cream pasteurization.

Step 4: Ask trainees to pasteurize the cream and monitor the procedures.

Step 5: Verify whether the cream is pasteurized and provide feedback where necessary.

Step 6: Ask trainees to read key reading 2.2.1 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 2.2



Points to Remember

- Pasteurization is a crucial step in ensuring the safety and shelf life of dairy products.
- Pasteurization is a vital step in the production of safe and high-quality cream.



Practical Activity 2.2.2: Homogenizing pasteurized cream



Notes to the trainer

- The trainer may demonstrate how the homogenization of pasteurized cream is done.
- The trainer is recommended to avail tools and equipment for cream homogenization in the workshop



Key steps:

While delivering this activity, pass through the following steps:

Step1. Introduce the activity and ask trainees to go in cream and butter workshop to homogenize the pasteurized cream.

Step2. Explain the task and provide clear work instructions (PPE, Time allocated)

Step3. Demonstrate how cream is homogenized. While demonstrating, explain the purposes, conditions, and procedures of homogenization.

Step4. Ask trainees to homogenize the cream and monitor the procedures.

Step5. Verify whether the cream is homogenized and provide feedback where necessary.

Step6. Ask trainees to read key reading 2.2.2 in the trainee manual

Step7. Ask trainees to perform the task provided in the application of Learning 2.2



Points to Remember

- Homogenization is typically carried out after pasteurization to ensure that the cream is safe and free from harmful bacteria before being processed further.



Practical Activity 2.2.3: Adding thickening agents in cream



Notes to the trainer

- The trainer may demonstrate how thickening agents are added to the cream.
- The trainer is recommended to avail thickening agents in the workshop



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in cream and butter workshop to add thickening agents to the cream.

Step 2: Explain the task and provide clear work instructions (PPE, Time allocated)

Step 3: Demonstrate how thickening agents are added to the cream. While demonstrating, explain the procedures of adding those thickening agents.

Step 4: Ask trainees to add thickening agents to the cream and monitor the procedures.

Step 5: Verify whether thickening agents are well added to the cream and provide feedback where necessary.

Step 6: Ask trainees to read key reading 2.2.3 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 2.2



Points to Remember

- When adding thickening agents to cream, it's important to follow the manufacturer's instructions carefully to ensure proper usage and avoid any adverse effects on the product's texture or flavor.



Application of learning 2.2.

Ask trainees to go in cream and butter workshop, to pasteurize, homogenize cream and make proper addition of thickening agents in cream.

Checklist:

SN	Criteria	Indicators	Observation	
			Yes	No
1	Cream is well-pasteurized	1.1 Temperature is respected		
		1.2. Time is respected		
2	Cream is well-homogenized	2.1. Pressure is respected		
		2.2. Temperature is respected		
3	Thickening agents are well-added	3.1. The ratio of thickening agent is measured		
		3.2. Thickening agent is well added		



Indicative content 2.3: Cooling Cream



Duration: 4 hrs



Practical Activity 2.3.1: Cooling cream



Notes to the trainer

- The trainer may have supposed to demonstrate how cooling of cream is performed.
- The trainer is recommended to avail tools and equipment for cooling of cream in the workshop.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in cream and butter workshop to cool cream.

Step 2: Explain the task and provide clear work instructions (PPE, Time allocated)

Step 3: Demonstrate how the cream is cooled. While demonstrating, explain the purposes, conditions, and procedures of cooling cream.

Step 4: Ask trainees to cool the cream and monitor the procedures.

Step 5: Verify whether the cream is cooled and provide feedback where necessary.

Step 6: Ask trainees to read key reading 2.3.1 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 2.3



Points to Remember

- By following appropriate cooling methods and temperature guidelines, ensure that your products meet the highest standards of quality.



Practical Activity 2.3.2. Checking the quality parameters of cream



Notes to the trainer

- The trainer may demonstrate how the quality of the cream is checked.
- The trainer is recommended to avail tools and equipment for checking the quality of cream in the workshop



Key steps:

While delivering this activity, pass through the following steps:

Step1. Introduce the activity and ask trainees to go in cream and butter workshop to check the quality of the cream.

Step2. Explain the task and provide clear work instructions (PPE, Time allocated)

Step3. Demonstrate the quality of the cream is checked. While demonstrating, explain the procedures for checking the quality of cream.

Step4. Ask trainees to check the quality of the cream and monitor the procedures.

Step5. Verify whether the cream is well-checked and provide feedback where necessary.

Step6. Ask trainees to read key reading 2.3.2 in the trainee manual

Step7. Ask trainees to perform the task provided in the application of Learning 2.3



Points to Remember

- By regularly checking the quality parameters, ensure that your cream meets the highest standards of safety and quality.



Application of learning 2.3.

Ask trainees to go in cream and butter workshop, to cool cream and make a proper checking of the quality parameters of cream.

Checklist

SN	Criteria	Indicators	Observation	
			Yes	No
1	Cream is well-cooled	1.1 Temperature for marketed cream is respected		
		1.2. Temperature for inoculated cream is respected		
2	The quality parameters of the cream are well-checked	2.1. Fat content is checked		
		2.2. Acidity is checked		
		2.3. Sensory attributes are well checked		



Learning outcome 2 end assessment

Theoretical assessment

Q1. Read carefully the statement below and answer **True** if the statement is correct or **False** if the statement is wrong.

- a) Pasteurization is a necessary step in the neutralization process for butter making. **False**
- b) Higher pasteurization temperatures generally result in more pronounced changes to the chemical composition of the cream. **True**
- c) Fat globules in raw cream are generally more uniform in size and shape compared to those in pasteurized cream. **True**
- d) Homogenization improves the whipping ability of cream. **True**
- e) The number of homogenization passes can affect the size of fat globules. **True**
- f) A higher homogenization temperature is always better. **False**

Q2. Read the following statement and fill in the gaps of the missing term using the following: (inhibit, desirable, crystallization, progress, harder).

- a) Cooling the cream promotes the _____ of fat molecules.
- b) Cooling the cream to a lower temperature will produce a _____ butter.
- c) Cooling the cream helps to _____ the growth of bacteria.
- d) The goal of cooling cream for sour cream butter production is to promote the growth of _____ bacteria.
- e) Acidity testing is used to determine the _____ of fermentation in sour cream butter production.

Answer:

- a) Cooling the cream promotes the **crystallization** of fat molecules.
- b) Cooling the cream to a lower temperature will produce a **harder** butter.
- c) Cooling the cream helps to **inhibit** the growth of bacteria.
- d) The goal of cooling cream for sour cream butter production is to promote the growth of **desirable** bacteria.
- e) Acidity testing is used to determine the **progress** of fermentation in sour cream butter production.

Q3. Choose the letter corresponding to the appropriate description of quality parameters of cream:

- a) A widely used method for measuring fat content in cream that involves centrifugation is:
 - i. Babcock Method
 - ii. Gerber Method

- iii. pH Meter
 - iv. Titratable Acidity
- b) A low pH value in cream indicates:
 - i. High-fat content
 - ii. Increased acidity
 - iii. Decreased acidity
 - iv. No change in acidity
- c) Sensory evaluation of cream includes:
 - i. Visual inspection only
 - ii. Aroma and taste evaluation only
 - iii. Texture evaluation only
 - iv. Visual inspection, aroma and taste evaluation, and texture evaluation
- d) The cooked flavor in cream is caused by:
 - i. Improper milk pasteurization
 - ii. Excessive heating during processing
 - iii. Moisture in the package
 - iv. Acid development
- e) To prevent a rancid or bitter flavor in cream, it is important to:
 - i. Use sour milk
 - ii. Avoid pasteurization
 - iii. Ensure proper milk pasteurization and packaging
 - iv. Increase acidity
- f) The essential steps for producing high-quality cream include:
 - i. Clean milk production, cooling, separation, and storage
 - ii. Pasteurization only
 - iii. Heating and cooling
 - iv. Flavoring and coloring
- g) Titratable acidity is expressed as:
 - i. A percentage of lactic acid
 - ii. A pH value
 - iii. A volume measurement
 - iv. A temperature
- h) A sour or highly acidic flavor in cream is often caused by:
 - i. Proper milk pasteurization
 - ii. Using fresh, sweet milk
 - iii. Neutralization
 - iv. Acid development

Answer:

a) i. b) ii. c) iv. d) ii. e) iii. f) i. g) i. h) iv.

Q4. A dairy plant produces 1000 liters of cream per day with a fat content of 4.0%. They need to standardize it to 3.5% for sale as whipping cream. Calculate the amount of skim milk needed and the total volume of standardized cream produced

Answer:

Answer

1. Understanding the Problem:

- We have 1000 liters of cream with a 4.0% fat content.
- We need to standardize it to 3.5% fat content.

2. Setting Up the Equation:

Let:

- X = Volume of skim milk added.
- The total volume of standardized cream will be: $1000 + X$ liters
- The fat content of the standardized cream = $(1000 * 4.0\%) + (X * 0.1\%) = (1000 + X) * 3.5\%$

3. Solving for X:

Expanding the equation:

$$40 + 0.1X = 3500 + 3.5X$$

Combining like terms:

$$3.4x = 3460$$

Dividing both sides by 3.4:

$$X = 3460 / 3.4$$

Calculating the value:

$$X \approx 1017.65$$

- **Determining the Amounts:**
 - ✦ **Skim milk needed: Approximately 1017.65 liters**
 - ✦ **Total volume of standardized cream: $1000 + 1017.65 = 2017.65$ liters**

Therefore, the dairy plant needs to add approximately 1017.65 liters of skim milk to the 1000 liters of cream to standardize it to 3.5%. The total volume of standardized cream produced will be 2017.65 liters.

Practical assessment

Your school is planning to host the parents during the meeting. They want a cream that may be used to coat bread during the coffee break. You are requested to go to the cream and butter workshop to perform the events below within 4 hours. All necessary tools and equipment are available in the workshop.

Task: Make half and half cream stored in five cans of 500 ml each one.

Checklist:

SN	Criteria	Indicator	Scores	
			YES	NO
1.	Milk is well-separated	1.1. Temperature of separation is respected		
		1.2. A separator is used		
		1.3. Methods of separation are respected		
2.	Cream is well standardized	2.1. The fat content is well-measured		
		2.2. The ratio of skim milk is well-determined		
		2.2. The skim milk is well added/removed		
3.	Cream is well pasteurized	3.1. The temperature is respected		
		3.2. The time is respected		
4.	Cream is well cooled	4.1. Temperature is respected		
		4.3. Time is well respected		

END



Further information to the trainer

Early, R. (2012). Dairy products and milk-based food ingredients. In *Natural food additives, ingredients, and flavourings* (pp. 417-445). Woodhead Publishing.

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Learning Outcome 3: Churn the Cream



Indicative Contents

3.1 Ageing Cream

3.2 Centrifugation of Cream

3.3 Washing of Butter

3.4 Pressing/Kneading/Working of Butter

Key Competencies for Learning Outcome 3: Churning of Butter

Knowledge	Skills	Attitudes
• Description of cream fermentation • Description of cream centrifugation principles • Description of ingredients added in butter • Description of factors affecting the quality and yield of butter	• Ageing cream • Checking Cream specifications for butter making • Fermenting cream • Centrifuging cream • Washing butter • Pressing/Kneading/working of butter • Checking the quality parameters of pressed butter	• Being patient when ageing cream • Being a decision-maker when checking the cream specification • Being responsible for fermenting and centrifuging cream • Being hard working when kneading/pressing/working butter • Being committed while checking the quality of pressed butter



Duration: 20 hrs

Learning Outcome 3 objectives:



By the end of the learning outcome, trainee will be able to:

1. Age properly cream according to aging conditions
2. Check properly cream specifications for butter-making
3. Describe appropriately cream fermentation according to cream specification of butter
4. Ferment correctly cream according to butter specifications
5. Neutralize properly cream according to butter specifications
6. Describe properly cream centrifugation principles according to methods used
7. Centrifuge correctly cream according to churning principles
8. Wash properly butters according to the butter production protocol
9. Press/knead properly butter according to the quality parameters of the butter
10. Describe properly the factors affecting the quality and yield of butter
11. Check properly the quality of butter according to butter specification



Resources

Equipment	Tools	Materials
• Pressing machine • Churner	• Cheesecloth • Muslim cloth	• Salimeter • P H meter • lactometer • Thermometer • moisture analyzer or moisture meter



Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail tools and equipment and make sure that they are in good working condition
- Prepare teaching aids and didactic materials (manuals/guides, task sheets, photos, audio-visuals, protocols) related to cream and butter making



Indicative content 3.1: Ageing cream



Duration: 5 hrs



Practical Activity 3.1.1: Ageing cream and checking cream specifications for butter making



Notes to the trainer

- The trainer may demonstrate how the ageing of cream and check the cream specifications of butter making is done.
- The trainer is recommended to avail tools and equipment for the ageing of cream in the workshop



Key steps:

While delivering this activity, pass through the following steps:

Step1. Introduce the activity and ask trainees to go in cream and butter workshop to age cream and check cream specifications for butter making.

Step2. Explain the task and provide clear work instructions (PPE, Time allocated)

Step3. Demonstrate how ageing cream and checking cream specification is done. While demonstrating, explain the procedures of ageing cream and checking cream specifications for butter making.

Step4. Ask trainees to age cream and check the cream specifications for butter making and monitor the procedures.

Step5. Verify whether the cream is aged and provide feedback where necessary.

Step6. Ask trainees to read key reading 3.1.1 in the trainee manual

Step7. Ask trainees to perform the task provided in the application of Learning 3.1



Points to Remember

- By carefully ageing cream and checking its specifications, butter makers can produce high-quality butter with a superior flavor and texture.



Practical Activity 3.1.2: Fermenting cream



Notes to the trainer

- The trainer may demonstrate how fermenting cream is done.
- The trainer is recommended to avail tools and equipment for fermentation of cream in the workshop



Key steps:

While delivering this activity, pass through the following steps:

- Step1.** Introduce the activity and ask trainees to go in cream and butter workshop to ferment the cream used for butter making.
- Step2.** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step3.** Demonstrate how fermentation of cream is done. While demonstrating, explain the procedures of cream fermentation.
- Step4.** Ask trainees to ferment cream and monitor the procedures.
- Step5.** Verify whether the cream is fermented and provide feedback where necessary.
- Step6.** Ask trainees to read key reading 3.1.2 in the trainee manual
- Step7.** Ask trainees to perform the task provided in the application of Learning 3.1



Points to Remember

- Fermenting cream is a method that has been used to produce delicious and nutritious dairy products.



Application of learning 3.1.

In the school cream and butter workshop, ask trainees to go to age cream and make a proper checking of cream specifications for butter making.

Checklist:

SN	Criteria	Indicators	Observation	
			Yes	No
1	Ageing of the cream is well done	1.1 Temperature is respected		
		1.2. Time is respected		
2	The specifications of cream for butter making are well-checked	2.1. Fat content is checked		
		2.2. Acidity is checked		
		2.3. Sensory attributes are checked		
3	Cream is well-fermented	3.1. Starter cultures are added		
		3.2. Temperature is respected		
		3.3. time is respected		



Indicative content 3.2: Centrifugation of cream



Duration: 5 hrs



Practical Activity 3.2.1: Centrifuging cream



Notes to the trainer

- The trainer may have been supposed to demonstrate how centrifugation of cream is performed
- The trainer is recommended to avail tools and equipment for centrifugation of cream in the workshop



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in cream and butter workshop to centrifuge the cream.

Step 2: Explain the task and provide clear work instructions (PPE, Time allocated)

Step 3: Demonstrate how centrifugation of cream is done. While demonstrating, explain the procedures of cream centrifugation.

Step 4: Ask trainees to centrifuge the cream and monitor the procedures.

Step 5: Verify whether the cream is centrifuged and provide feedback where necessary.

Step 6: Ask trainees to read key reading 3.2.1 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 3.2



Points to Remember

- With the right techniques and ingredients, churning can result in a delicious and high-quality butter product.



Application of learning 3.2.

In the school cream and butter workshop, ask trainees to go to centrifuge cream.

Checklist:

SN	Criteria	Indicators		
			Yes	No
1	Cream is well centrifuged	1.1 A churner is prepared and filled		
		1.2. Temperature is respected		
		1.3. Pressure is respected		



Indicative content 3.3: Washing of butter



Duration: 5 hrs



Practical Activity 3.3.1: Washing butter



Notes to the trainer

- The trainer may demonstrate how washing of butter is done.
- The trainer is recommended to avail tools and equipment for washing butter in the workshop



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in cream and butter workshop to wash the butter.

Step 2: Explain the task and provide clear work instructions (PPE, Time allocated)

Step 3: Demonstrate butter washing is done. While demonstrating, explain the procedures of washing butter.

Step 4: Ask trainees to wash butter and monitor the procedures.

Step 5: Verify whether the cream is centrifuged and provide feedback where necessary.

Step 6: Ask trainees to read key reading 3.3.1 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 3.3



Points to Remember

- By carefully washing butter, producers can ensure that their product meets the highest standards of quality and taste.



Application of learning 3.3.

ask trainees to go in cream and butter workshop, to wash the butter.

Checklist:

SN	Criteria	Indicators	Observation	
			Yes	No
1	Butter is well-washed	1.1. The temperature of cold water is respected		
		1.2. Cold water is used		
		1.3. Buttermilk is removed		



Indicative content 3.4: Pressing/Kneading/working of butter



Duration: 5 hrs



Practical Activity 3.4.1: Pressing/Kneading/working of butter



Notes to the trainer

- The trainer may have been supposed to demonstrate how pressing/Kneading/working of butter is done.
- The trainer is recommended to avail tools and equipment for Pressing/Kneading/working of butter in the workshop



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in cream and butter workshop to Press/Knead/work of butter.

Step 2: Explain the task and provide clear work instructions (PPE, Time allocated)

Step 3: Demonstrate how the Pressing/Kneading/working of butter is done. While demonstrating, explain the procedures of Pressing/Kneading/working of butter.

Step 4: Ask trainees to Press/Knead/work of butter and monitor the procedures.

Step 5: Verify whether the cream is Pressed/Kneaded/worked of butter and provide feedback where necessary.

Step 6: Ask trainees to read key reading 3.4.1 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 3.4



Points to Remember

- By carefully pressing, kneading, or working butter, producers can ensure that their product has the desired texture, flavor, and shelf life.
- The specific method used may depend on the desired texture, flavor, and appearance of the butter. Some butter makers may combine different techniques to achieve the desired result.



Practical Activity 3.4.2: Checking the quality parameters of pressed butter



Notes to the trainer

- The trainer may demonstrate how to check the quality parameters of pressed butter
- The trainer is recommended to avail tools and equipment for checking the quality parameters of pressed butter in the workshop.



Key steps:

While delivering this activity, pass through the following steps:

Step1. Introduce the activity and ask trainees to go in cream and butter workshop to check the quality parameters of pressed butter.

Step2. the task and provide clear work instructions (PPE, Time allocated)

Step3. Demonstrate how checking the quality parameters of pressed butter is done. While demonstrating, explain the procedures of checking the quality parameters of pressed butter.

Step4. Ask trainees to check the quality parameters of pressed butter and monitor the procedures.

Step5. Verify whether checking the quality parameters of pressed butter is done and provide feedback where necessary.

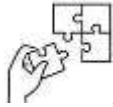
Step6. Ask trainees to read key reading 3.4.2 in the trainee manual

Step7. Ask trainees to perform the task provided in the application of learning 3.4



Points to Remember

- By regularly checking these quality parameters, butter producers can ensure that their product meets the highest standards of safety and quality.



Application of learning 3.4.

In the school cream and butter workshop, ask trainees to go to press/knead/work butter and make a proper checking of quality parameters of pressed butter.

Checklist:

S/N	Criteria	Indicators	Observation	
			Yes	No
1	Kneading/pressing/working is well done	1.1. Pressing methods are used		
		1.2. Salt is added and distributed		
		1.3. Moisture is distributed		
2	Quality parameters are well-checked	2.1. Fat content is checked		
		2.2. Acidity is checked		
		2.3. Sensory attributes are checked		



Learning outcome 3 end assessment

Theoretical assessment

Q1. Read carefully the statement below and answer **True** if the statement is correct or **False** if the statement is wrong.

- a) Cream ageing is a process that involves heating the cream to a high temperature. **False**
- b) The main purpose of cream ageing is to develop flavour. **False**
- c) Cream ripening involves raising the pH of the cream. **True**
- d) Cream for butter making should have a fat content of around 20%. **False**
- e) Pasteurization is done to improve the flavor of the cream. **False**
- f) Kneading is a process that involves mixing butter with other ingredients. **False.**
- g) Working butter increases its air content. **True.**
- h) Vacuum working is used to increase the air content in butter. **False**
- i) Pre-heating cream to a higher temperature can improve butter yield. **True.**
- j) A higher churning temperature leads to a firmer butter texture. **False.**
- k) Adding salt to butter can improve its shelf life. **True.**
- l) Butter overrun refers to the increase in weight of butter compared to the original cream. **True.**
- m) The salt used in butter making should be fine-grained. **False.**

Q2. Fill the missing term in the blank space (**pH, promote, pasteurization sweet, fresh, soda, lime, 33, 40, reduce, churning**)

- a) Cream ageing is a controlled temperature and agitation process that occurs before_____ and after _____.
- b) Cream ripening involves lowering the pH of the cream to _____ flavor development.
- c) Cream for butter making should have a fat content of _____ to _____%.
- d) The cream should be _____ and _____ to ensure good butter quality.
- e) _____ can be used to monitor the progress of cream fermentation.
- f) The main objective of cream neutralization is to _____ the acidity of the cream.
- g) _____ and _____ are common cream neutralizers.

Answer:

- a. **Pasteurization , churning**
- b. **promote**
- c. **33, 40**
- d. **sweet, fresh**
- e. **pH**
- f. **reduce**
- g. **soda, lime**

Q3. Choose the letter corresponding to the appropriate description of butter churning:

- 1. What is the primary purpose of churning cream?
 - A. To separate cream into butter and buttermilk

- B. To increase the fat content of cream
- C. To improve the flavor of the cream

Answer: A. To separate cream into butter and buttermilk

2. Which of the following is not a step involved in the churning process?
- A. Adding salt to the butter
 - B. Draining the buttermilk
 - C. Rotating the churn

Answer: A. Adding salt to the butter

3. What is the liquid byproduct of the churning process?
- A. Butter
 - B. Buttermilk
 - C. Whey

Answer: B. Buttermilk

4. Which factor has the greatest impact on the churning time?
- A. The temperature of the cream
 - B. The amount of cream in the churn
 - C. The type of churn

Answer: A. The temperature of the cream

5. A higher acidity in cream typically leads to:
- A. A longer churning time
 - B. A shorter churning time
 - C. No change in churning time

Answer: B. A shorter churning time

6. What is the optimal churning temperature range?
- A. 5-7°C
 - B. 9-11°C
 - C. 13-15°C

Answer: B. 9-11°C

7. After churning, the butter is often worked to:
- A. Remove excess moisture
 - B. Improve its texture
 - C. Both A and B

Answer: C. Both A and B

8. What is the purpose of draining the buttermilk from the churn?
- A. To increase the fat content of the butter

- B. To improve the flavor of the butter
- C. To separate the butter from the liquid phase

Answer: C. To separate the butter from the liquid phase

9. Which of the following factors can affect fat loss in buttermilk?

- A. The size of the fat globules
- B. The acidity of the cream
- C. Both A and B

Answer: C. Both A and B

10. A poorly aged cream can lead to:

- A. Increased fat loss in buttermilk
- B. A longer churning time
- C. Both A and B

Answer: C. Both A and B

11. What is the typical moisture content range for commercial butter?

- A. 10-12%
- B. 13-16%
- C. 17-19%

Answer: B. 13-16%

12. Why is butter perishable?

- A. It is high in sugar content
- B. It has a low pH
- C. It is susceptible to mold growth and rancidity

Answer: C. It is susceptible to mold growth and rancidity

13. What is the ideal fat content of pressed butter?

- A. 75-80%
- B. 80-82%
- C. 85-87%

Answer: B. 80-82%

14. The color of butter should be:

- A. Dark yellow
- B. Uniform light, pale yellow
- C. White

Answer: B. Uniform light, pale yellow

15. Butter should have a:

- A. Strong, pungent flavor
- B. Pleasant, rich, and creamy taste
- C. Sour and bitter taste

Answer: B. Pleasant, rich, and creamy taste

16. Sweet cream butter is made from:

- A. non-acidified cream
- B. Partially acidified cream
- C. Ripened cream

Answer: A. non-acidified cream

17. Unsalted butter is typically used for:

- A. Table consumption
- B. Making other dairy products
- C. Both A and B

Answer: B. Making other dairy products

18. Cultured butter has a:

- A. Sweet and mild flavor
- B. Fuller and slightly nutty flavor
- C. Bitter and sour flavor

Answer: B. Fuller and slightly nutty flavor

19. Ghee is a type of butter that is:

- A. Clarified and had a higher smoke point
- B. Unsalted and has a lower fat content
- C. Whipped and is easier to spread

Answer: A. Clarified and had a higher smoke point

20. Spreadable butter is a blend of:

- A. Butter and milk
- B. Butter and vegetable oil
- C. Butter and cheese

Answer: B. Butter and vegetable oil

Practical assessment

There is a celebration of Teacher's Day at your school. They want to use butter during the frying of Irish potato cheeps. You are requested to go to the cream and butter workshop to perform the following task within 4 hours. All necessary tools and equipment are available in the workshop.

Task1: Churn cream to produce 5 kg of butter

Task 2: Wash and knead the butter obtained

Checklist:

SN	Criteria	Indicator	Scores	
			YES	NO
1.	Cream is well churned	1.1. Temperature of churning is respected		
		1.2. A churner is well filled		
		1.3. Pressure of churning is respected		
2	Butter is well washed	2.1. Cold water is used		
		2.2. Buttermilk is removed		
3	Butter is well kneaded	3.1. kneading methods are used		
		3.2. Salt is well-added and distributed		

END



Further information to the trainer

Early, R. (2012). Dairy products and milk-based food ingredients. In *Natural food additives, ingredients and flavourings* (pp. 417-445). Woodhead Publishing.

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Learning Outcome 4: Package the Cream and Butter



Indicative Contents

4.1. Packaging Of Cream and Butter

4.2. Preservation Of Cream and Butter

4.3. Record Keeping in Cream and Butter Production

Key Competencies for Learning Outcome 4: Package the Cream and Butter

Knowledge	Skills	Attitudes
• Description of levels of packaging • Description of labelling information requirements • Description of preservation conditions of butter • Description of shrinkage defects • Description of record keeping in cream and butter production	• Packaging of cream and butter • Preserving cream and butter • Labelling cream and butter • Keeping a record of cream and butter production	• Being attentive while packaging cream and butter • Being protective while packaging cream and butter • Being honest when preserving cream and butter • Being an effective communicator when keeping a record of cream and butter



Duration: 5 hrs

Learning Outcome 4 objectives:



By the end of the learning outcome, trainee will be able to:

1. Describe properly levels of packaging in cream and butter-making
2. Package properly cream and butter according to the standards
3. Describe properly labelling information according to the requirements
4. Label clearly cream and butter according to the requirements
5. Describe effectively preservation conditions of butter according to the standards
6. Preserve properly cream and butter according to the standards

7. Describe clearly shrinkage defects that can occur to butter making

8. Describe properly record keeping in cream and butter making



Resources

Equipment	Tools	Materials
• Gerber tube • Packaging machine • PPE • Tables • Sinks • Stainless steel table	• Spoon • Measuring Cylinder • Filters • First Aid Kit • Bunsen Burner • Cup • Thermometer • Micropipette • Beaker • Colony Counter • Plate, Calculator • Milk Sampler • Labelling Machine	• Cream • Butter • Plastic • Aluminium Foil • Wax Paper • Labels • Record Forms • Pens, Detergents • Disinfectant • Sanitizer • Alcohol



Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail a classroom and workshop
- Avail materials, tools, and equipment and make sure that they are in good working condition and verify if they are not expired
- Prepare teaching aids and didactic materials (manuals/guides, task sheets, photos, audio-visuals, protocols) related to cream and butter making



Indicative content 4.1: Packaging of Cream and butter



Duration: 2 hrs



Theoretical Activity 4.1.1: Description of packaging of cream and butter



Notes to the trainer:

- Trainer may form a small group to describe the packaging of cream and butter
- The use of drawings, pictures, or videos as didactic materials and catalogue while describing packaging in cream and butter is required.
- Avail packaging for cream and butter.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session and ask trainees to answer the following questions:

- i. What do you understand by purpose of packaging and labelling cream and butter?
- ii. What should be the levels of packaging for cream and butter-making?
- iii. What do you know about the labelling information requirement for the cream and butter package?

Step 2: Ask trainees to write the findings on papers, flip chart, blackboard or white boards.

Step 3: Facilitate trainees to present their findings

Step 4: Provide expert view and clarify ideas using didactic materials

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key reading 1.1.1 in trainee manual.



Points to Remember

- Before making cream and butter, make sure that the package and label are available.



Practical Activity 4.1.2: Applying cream and butter packaging procedure



Notes to the trainer

- The trainer may demonstrate how to apply the packaging procedure in cream and butter-making.
- Avail catalogue, images, and illustrations as didactic material for cream and butter making.
- Avail package for packaging cream and butter making.



Key steps:

While delivering this activity, pass through the following steps:

Step1. Introduce the activity and ask trainees to go in cream and butter workshop, to apply the packaging procedure of cream and butter

Step2. Explain the task and provide clear work instructions (PPE, Time allocated)

Step3. Demonstrate how to apply packaging in cream and butter making. While demonstrating, the packaging procedure.

Step4. Ask trainees to apply the packaging procedure in cream and butter making and monitor the procedures.

Step5. Verify whether the packaging is correctly applied and provide feedback where necessary.

Step6. Ask trainees to read key reading 4.1.2 in the trainee manual

Step7. Ask trainees to perform the task provided in the application of Learning 4.1



Points to Remember

- While packaging cream and butter all packages must be sterilized and packaging procedures must be respected



Application of learning 4.1.

In the school cream and butter workshop, ask trainees to go to package and label packaging material of cream and butter.

Checklist:

SN	Criteria	Indicators	Observation	
			Yes	No
1	The packaging procedure for cream and butter making is properly applied	1.1 Cleaning and sanitizing packaging materials and equipment are performed		
		1.2 Filling containers with the product is performed		
		1.3 Sealing of packaging material is performed.		
		1.4 Labelling of packaging material is performed.		
2	Labelling procedures are well respected	2.1 Design of labels are created		
		2.2 information are mentioned		
		2.3 labels on the package are affixed		



Indicative content 4.2: Preservation of cream and butter making



Duration: 2 hrs



Theoretical Activity 4.2.1: Description of preservation in cream and butter



Notes to the trainer:

- Trainer may form a small group to describe the preservation of cream and butter
- The use of drawings, pictures, or videos as didactic materials and catalogue while describing preservation in cream and butter is required.
- Avail preservatives for cream and butter.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session and ask trainees to answer the following questions:

- i. What do you understand by the purpose of preserving cream and butter?
- ii. What are the ideal preservation conditions for cream and butter production?
- iii. What do you know about shrinkage defects in butter and the preventive measure to avoid them?

Step 2: Ask trainees to write the findings on papers, flip chart, blackboard or white boards

Step 3: Facilitate trainees to present their findings

Step 4: Provide expert view and clarify ideas using didactic materials

Step 5: Address any questions or concerns

Step 6: Ask trainees to read the key reading 4.2.1 in trainee manual.



Points to Remember

- While making cream and butter preservation condition must be respected
- While making cream and butter preventive measure of shrinkage defect must be applied



Indicative content 4.3: Record keeping in cream and butter production



Duration: 1 hrs



Theoretical Activity 4.3.1: Description of records keeping in cream and butter production



Notes to the trainer:

- Trainer may form a small group to describe record keeping of cream and butter
- The use of drawings, pictures, or videos as didactic materials and catalogue while describing records keeping in cream and butter is required.
- Avail records keeping for cream and butter.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the session and ask trainees to answer the following questions:

- i. How would you explain the purpose of maintaining records in cream production?
- ii. What do you know about record keeping for fat content and critical parameters in the production of cream and butter?
- iii. What is the recommend method for maintaining records in the production of cream and butter?

Step 2: Ask trainees to write the findings on paper, flip charts, blackboard, or whiteboards

Step 3: Facilitate trainees to present their findings

Step 4: Provide an expert view and clarify ideas using didactic materials

Step 5: Address any questions or concerns

Step 6: Ask trainees to read the key reading 4.3.1 in the trainee manual.



Points to Remember

- While making the cream and butter, make sure that all responsible data are recorded.



Learning outcome 4 end assessment

Theoretical assessment

Q1. Q1. Fill the empty space with an appropriate term found as the purpose of packaging cream and butter and related to their meaning. (information transmission, physical contaminant, marketing, distribution, convenience, physical protection, environment friendly)

- a.: the objects enclosed in the package may require protection from, among other things, mechanical shock, vibration, electrostatic discharge, compression, temperature, ...
- b.: Packages and labels communicate how to use, transport, recycle, or dispose of the package or product.
- c.: Packaging and labels can be used by marketers to encourage potential buyers to purchase a product.
- d.: Packages can have features that add convenience in distribution, handling, stacking, display, sale, opening, reclosing, using, dispensing, reusing, recycling, and ease of disposal.

Answer:

- a. Physical protection
- b. Information transmission
- c. Marketing
- d. Convenience

Q2. The following are the purposes of the preservation of cream and butter except:

- a. Extending Shelf Life
- b. Maintaining Quality
- c. Increase growth of microorganism
- d. Facilitating Seasonal Use
- e. Economic Efficiency

Answer: C increase growth of microorganism

Q3. Read the following statement and answer **True** if it is correct and **False** if it is wrong.

- a. Record keeping in cream and butter production is primarily for aesthetic purposes.
False.
- b. Raw material records include information about milk procurement and ingredient inventory.
True

- c. Electronic record-keeping methods are less efficient than hardcopy methods.
False
- d. Hardcopy records are more secure and take up less storage space than electronic records.
False.
- e. Lot tracing and recall records are essential for traceability in cream and butter production.
True
- f. Relative humidity is not important for the storage of milk, cream, and butter.
False.

Q4. Read the following statement and choose the correct answer

I. What is the primary cause of rancidity in butter?

- a) Bacterial growth
- b) Mold growth
- c) Oxidation of fats
- d) High humidity

Answer c: Oxidation of fats

II. Which of the following storage methods provides the longest shelf life for butter?

- a. Refrigeration in its original packaging
- b. Storage in an airtight container at room temperature
- c. Freezing at or below -18°C (0°F)
- d. Storage in the refrigerator door

Answer c) Freezing at or below -18°C (0°F)

III. What is the ideal relative humidity for butter storage?

- a. High humidity (above 80%)
- b. Low humidity (around 20-30%)
- c. Moderate humidity (around 40-50%)
- d. Low humidity (around 60-70%)

Answer d) Low humidity (around 60-70%)

Practical assessment

Your school plan to go to exhibition of agriculture and animal products. They want one carton of cream and one carton of butter that contain twelve pieces in each. You are requested to go to the cream and butter workshop to perform the following task within 2 hours. All necessary tools and equipment are available in the workshop.

Task 1: Fill and seal cream in can of 500 ml, and pack 1kg of butter in plastic package.

Task 2: Label cream and butter containers

Task 3: Store the products in carton.

Checklist:

SN	Criteria	Indicator	Observation	
			Yes	No
1.	Cream and butter are correctly packaged	1.1 Cream and butter packaging procedures are applied		
		1.2 levels of packaging are identified		
		1.3 labelling information is applied		
2	Cream and butter are correctly preserved	2.1 Use of Fresh Sweet Cream is respected		
		2.2 Pasteurization is done		
		2.3 Churning temperatures are monitored		
		2.4. washing butter is done		
		2.5 salting is performed		
3	Record keeping of cream and butter production is performed	3. 1. Information to include in the records are identified		
		3.2. Method of record keeping is applied		
		3.3 Record is kept		

END



Further information to the trainer

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