



RQF LEVEL 4



FOPCM403
FOOD PROCESSING

Semi-Hard Cheese Making

TRAINER'S MANUAL

October, 2024



SEMI-HARD CHEESE MAKING

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ACRONYMS

°C: Degree Celsius

°F: Degree Fahrenheit

CBT/A: Competence Based Training/ Assessment

CIP: Cleaning in Place

COP: Cleaning Out of Place

HTST: High Temperature Short Time

KOICA: Korea International Cooperation Agency

LTLT: Low-Temperature-Short-Time

PPE: Personal Protective Equipment

RTB: Rwanda TVET Board

TQUM Project: TVET Quality Management Project

TVET: Technical Vocational Education Training

INTRODUCTION

This trainer's manual includes all the methodologies required to effectively deliver the module titled "**Semi-Hard Cheese 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 trainees 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: FOPCM403 SEMI-HARD CHEESE MAKING

Learning Outcome 1: Prepare tools, material, equipment and workplace

Learning Outcome 2: Form curds

Learning Outcome 3: Treat the curd

Learning Outcome 4: Store the ripened cheese

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



Indicative contents

1.1 Selection of tools and equipment used in semi-hard cheese making

1.2 Selection of materials used in semi-hard cheese making

1.3 Cleaning of workplace, tools and equipment

1.4 Arranging workplace for semi-hard cheese making

1.5 Preparation of Ingredient used in semi-hard cheese making

Key Competencies for Learning Outcome 1: Prepare tools, materials, equipment, and workplace.

Knowledge	Skills	Attitudes
• Description of tools and equipment used in semi-hard cheese • Description of cleaning product used in semi-hard cheese making • Description of ingredients used in semi-hard cheese • Description of packaging materials used in semi-hard cheese making	• Selecting tools and equipment • Adjusting tools and equipment • Selecting materials • Using cleaning products • Cleaning workplace, tools, and equipment • Arranging workplace • Checking the cleanliness of the workplace • Preparing ingredients	• Being careful when using sharp tools and equipment • Being attentive while using cleaning products • Being accurate while preparing ingredients



Duration: 10 hrs

Learning Outcome 1 objectives:



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

1. Describe correctly tools, materials and equipment used in semi-hard cheese making
2. Select properly materials, tools and equipment used in semi-hard cheese-making
3. Describe correctly cleaning product used in semi-hard cheese making
4. Use effectively cleaning products in cleaning the workplace
5. Identify properly the specification of raw milk for semi-hard cheese making
6. Differentiate properly the main ingredients and optional ingredients used in semi-hard cheese-making
7. Describe clearly the types of packaging materials used in semi-hard cheese-making
8. Clean effectively tools, equipment, and workplace
9. Arrange correctly workplace for semi-hard cheese-making
10. Check effectively the cleanliness of tools, equipment, and workplace
11. Prepare effectively ingredients used in semi-hard cheese-making



Resources

Equipment	Tools	Materials
• Milk Pasteurizer • Milk Homogenizer • Cheese Vat • Curd Knife • Milk Pump • Cheese Press • Cheese Molds • Brining Container • Curd Cutter • Cooking Stove • Sause Pan • Packaging Vacuum Machine • PPE • Scales	• Thermometer • pH Meter • Milk Sampler • Measuring Cylinder • Mops and Brushes • Washing Machine • Pressure Cleaner • Sweepers • Buckets • Crates • Trolley • Scales • Dust Bin • Filters	• Raw milk • Salt • Starter culture • Rennet • Calcium chloride • Annatto • Cheesecloth • Packaging materials: cheese wax paper, synthetic plastic films, Cheese wax, and cheese label. • Cleaning products: alkaline cleaners, acid

• Milk Cans • Ageing Shelves • Refrigerator		cleaners, detergents, Sanitizer, Water • Reagents: Resazurin tablets, alcohol, distilled water, dye indicators, alkaline phosphatase kit
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Advance Preparation

Before delivering this learning outcome, you are recommended to:

- Avail materials and verify if they are not expired
- Avail tools and equipment that they are in good working condition
- Prepare teaching aids and didactic materials (manuals/guides, photos, audio-visuals, protocols.) related to preparation of tools, materials, equipment and workplace for semi-hard cheese making



Indicative content 1.1: Selection of Tools and Equipment Used in Semi-Hard Cheese-Making.



Duration: 2 hrs



Theoretical Activity 1.1.1: Description of tools and equipment used in Semi-hard cheese



Notes to the trainer:

Trainer may use:

- Small groups to describe tools and equipment used in semi-hard cheese making,
- Didactic materials such as drawings and pictures related to the description of tools, and equipment.



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. List tools and equipment used in semi-hard cheese making
 - ii. What are the use of tools and equipment used in semi-hard cheese making?
- Step 2:** Ask trainees to write the answer on paper, flip charts, the blackboard or a whiteboard
- Step 3:** Facilitate trainees to present their answers 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 key reading 1.1.1 in the trainee manual



Points to Remember

- A **cheese vat** holds milk during the initial stage of cheese-making, while a **cheese press** removes excess whey and hardens the curd.



Practical Activity 1.1.2: Adjustment and functionality of tools and equipment



Notes to the trainer

- The trainer may demonstrate how to adjust tools, and equipment used in semi-hard cheese making.
- For the effective delivery, it is recommended to:
 - ✓ Avail illustrations and tutorial video as didactic materials related to adjustment of tool and equipment for semi-hard cheese making.
 - ✓ Avail all catalogue/user guide or manual of tools and equipment to be adjusted.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the cheese processing workshop to adjust tools and equipment used in semi-hard cheese-making
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to adjust tools and equipment while demonstrating explain the procedure for adjusting
- Step 4:** Ask trainees to adjust tools and equipment used in semi-hard cheese making and monitor the procedures
- Step 5:** Verify whether tools and equipment used in semi-hard cheese are correctly adjusted and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 1.1.2. in trainee manual



Points to Remember

- When adjusting tools and equipment **always follow the manufacturer's specifications and guidelines**. This ensures that adjustments are made correctly for optimal performance and safety.



Practical Activity 1.1.3: Selecting tools and equipment



Notes to the trainer

- The trainer may facilitate this activity by individual based, and you are supposed to demonstrate how to select tools, and equipment used in semi hard cheese making
- For the effective delivery, it is recommended to avail all tools and equipment to be selected



Key steps:

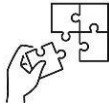
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the Cheese processing workshop and select tools and equipment to be used in semi-hard cheese-making
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to select tools and equipment while demonstrating, explain the selection criteria
- Step 4:** Ask trainees to select tools and equipment used in semi-hard cheese making and monitor the activity
- Step 5:** Verify whether tools and equipment used in semi-hard cheese are correctly selected and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 1.1.3. in trainee manual
- Step 7:** Ask trainees to perform the task provided in application of learning 1.1



Points to Remember

- Criteria to select tools and equipment involve regulatory compliance.



Application of learning 1.1.

In the school cheese processing workshop, request each trainee to select and adjust tools and equipment that shall be used in semi-hard cheese making.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Tools and equipment are effectively selected	1.1. Tools are selected		
		1.2. Equipment is selected		
2	Tools and equipment are correctly adjusted	1.3. Tools are adjusted		
		1.4. Equipment is adjusted		
3	Safety precautions are properly respected	1.5. Safety precaution is respected		



Indicative content 1.2: Selection of Materials Used in Semi-Hard Cheese Making



Duration: 2 hrs



Theoretical Activity 1.2.1: Description of types of cleaning products used in Semi-hard cheese making



Notes to the trainer:

Trainer may:

- Use small groups to describe types of cleaning products used in semi-hard cheese making,
- Use didactic material such as pictures related to description of types of cleaning products.



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. What are the types of cleaning products used in semi-hard cheese-making?
- Step 2:** Ask trainees to write the answers on paper, flip charts, or blackboards.
- Step 3:** Facilitate trainees to present provided answers 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 key reading 1.2.1 in the trainee manual



Points to Remember

- Detergent and sanitizer are cleaning products used in semi-hard cheese-making



Practical Activity 1.2.2: Selecting of cleaning products used in semi hard



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to select cleaning products in semi-hard cheese making

- For effective delivery it is recommended avail all cleaning products used in semi-hard cheese making with labels.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the cheese processing workshop to select cleaning products to be used in the cleaning workshop for making semi-hard cheese
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to select cleaning products and explain the selection criteria
- Step 4:** Ask trainees to select cleaning products used in the cleaning workshop for making semi-hard cheese making and monitor the activity
- Step 5:** Verify whether cleaning products used in semi-hard cheese are correctly selected and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 1.2.2. in trainee manual



Points to Remember

- Cleaning products should be of food grade and the effectiveness of cleaning products are criterion for choosing cleaning products



Practical Activity 1.2.3: Preparing cleaning products



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to prepare cleaning products used to clean the work area of semi-hard cheese making
- For effective delivery it is recommended to:
 - ✓ Avail labels, and protocols of cleaning products as didactic materials
 - ✓ Avail all cleaning products used in semi-hard cheese making.
 - ✓ Avail tools that will be used during the measurement of cleaning products



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the Cheese processing workshop to prepare cleaning products used in the cleaning workshop for making semi-hard cheese
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to prepare cleaning products and explain the procedure
- Step 4:** Ask trainees to prepare cleaning products used in the cleaning workshop for making semi-hard cheese and monitor the activity
- Step 5:** Verify whether cleaning products used in the cleaning workshop for making semi-hard cheese are correctly prepared and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 1.2.3. in trainee manual



Points to Remember

- Always read and follow the label instructions for cleaning products, use appropriate PPE, and ensure proper ventilation to protect yourself and others from potential hazards.



Theoretical Activity 1.2.4: Description of ingredients used in Semi-hard cheese making

Notes to the trainer:

Trainer may use:

- Small groups to describe ingredients used in semi-hard cheese making, and
- Didactic materials such as samples of milk, rennet, salt and cheese culture used in semi-hard cheese 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:
- i. Differentiate by giving examples of optional ingredients from the main ingredients used in semi-hard cheese making.
 - ii. What are the specifications of raw milk used in semi-hard cheese making?
- Step 2:** Ask trainees to write their findings on paper, flip charts, blackboards, 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 key reading 1.2.4 in the trainee manual



Points to Remember

- The main ingredients in semi-hard cheese making are required to create the fundamental structure and characteristics of the semi-hard cheese.



Practical Activity 1.2.5: Selecting ingredients used in semi-hard making



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to select ingredients used in semi-hard cheese making
- For effective delivery it is recommended to avail all ingredients used in semi-hard cheese making.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the Cheese processing workshop and select ingredients used for making semi-hard cheese
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to select ingredients and explain the selection criteria
- Step 4:** Facilitate trainees to select ingredients used for making semi-hard cheese and monitor the activity
- Step 5:** Verify whether ingredients used for making semi-hard cheese are correctly selected and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 1.2.5. in trainee manual



Points to Remember

- Prioritize high-quality whole milk (at least 4% fat), select appropriate mesophilic starter cultures for flavor, choose the right type and strength of rennet for curd formation, and carefully balance salt for flavor and preservation when making semi-hard cheese.



Theoretical Activity 1.2.6: Description of types of packaging materials used in Semi-hard cheese making



Notes to the trainer:

- Trainer may use small groups to describe packaging materials used in semi-hard cheese making also didactic materials such as samples of packaging materials, and pictures related to the description of packaging materials are required.



Key steps:

While delivering this activity, pass through the following steps:

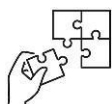
- Step 1:** Introduce the activity and ask trainees to answer the following questions:
 - i. Differentiate types of packaging materials used in semi-hard cheese making
- Step 2:** Ask trainee to write their findings the answers on paper, flip charts, and blackboards.
- Step 3:** Facilitate trainees present their answers 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 key reading 1.2.6 in the trainee manual
- Step 7:** Ask trainees to perform the application of learning 1.2. in trainee manual



Points to Remember

- Packaging material for semi-hard cheese should be an excellent barrier against oxygen, and moisture and should be light



Application of learning 1.2.

In the school cheese processing workshop, request each trainee to select all materials used in semi-hard cheese making.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Cleaning products are properly selected	1.1. Selection criteria are respected		
2	Cleaning products are prepared	2.1 Protocol is set		
		2.2 Measuring is performed		
		2.3 Products are packed and labelled		
3	Ingredients are correctly selected	3.1 Selection criteria are respected		
4	Packaging materials are correctly selected	4.1 Selection criteria are respected		



Indicative content 1.3: Cleaning of Workplace, Tools, and Equipment.



Duration: 2 hrs



Practical Activity 1.3.1.: Cleaning workplace for semi-hard cheese making



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to clean the work area of semi-hard cheese making.
- For effective delivery it is recommended to:
 - ✓ Avail flowchart of cleaning work area
 - ✓ Avail all cleaning products, tools, and equipment used in cleaning work areas in semi-hard cheese making.



Key steps:

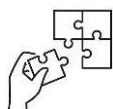
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the Cheese processing workshop and clean workplace in semi-hard cheese making
- Step 2:** Explain the task and provide clear work instructions (Task, PPE, Time allocated)
- Step 3:** Demonstrate how to clean workplace and explain the purpose of cleaning
- Step 4:** Facilitate trainees to clean workplace and monitor the activity
- Step 5:** Verify whether workplace is correctly cleaned and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 1.3.1. in trainee manual
- Step 7:** Ask trainees to perform application of learning 1.3. in trainee manual



Points to Remember

- Wet cleaning is a method of cleaning that uses water whereas dry cleaning is a method of cleaning without water.



Application of learning 1.3.

In the school cheese processing workshop, request each trainee to clean the work area, tools, and equipment for semi-hard cheese making.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Cleaning methods are properly applied	1.1 Wet cleaning is applied		
		1.2 Dry cleaning is applied		
2	Cleaning techniques are correctly applied	2.1 Cleaning in place is applied		
		2.2 Cleaning out the place is applied		



Indicative content 1.4: Arrange a Workplace for Semi-hard Cheese-Making



Duration: 2 hrs



Practical Activity 1.4.1.: Arranging of workplace for semi -hard cheese making



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to arrange workplace
- For effective delivery it is recommended to:
 - ✓ Avail standard operating procedures, images, and illustrations as didactic materials,
 - ✓ Avail all tools, equipment and materials used in semi-hard cheese making workshop.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the Cheese processing workshop to arrange the workplace for semi-hard cheese making
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to arrange the workplace used in semi-hard cheese making and explain the criteria and procedures
- Step 4:** Facilitate trainees to arrange a workplace used for semi-hard cheese making and monitor the activity
- Step 5:** Verify whether the workplace for semi-hard cheese making is correctly arranged and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 1.4.1. in trainee manual



Points to Remember

- Processing line refers to the series of steps used to turn milk into a finished semi-hard cheese.



Practical Activity 1.4.2: Checking cleanliness of workplace



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to check the cleanliness of the workplace
- For effective delivery it is recommended to:
 - ✓ avail standard operating procedures for semi-hard cheese making as didactic materials,
 - ✓ Avail all tools, equipment, and materials that shall be used while checking the cleanliness of the workshop.



Key steps:

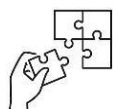
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the Cheese processing workshop to check the cleanliness of the workplace in semi-hard cheese making
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to check the cleanliness of the workplace used in semi-hard cheese making and explain procedures
- Step 4:** Facilitate trainees to check the cleanliness of the workplace used in semi-hard cheese making and monitor the activity
- Step 5:** Verify whether the cleanliness of the workplace used in semi-hard cheese making is correctly checked and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 1.4.2. in trainee manual
- Step 7:** Ask trainees to perform the application of learning 1.4. in trainee manual



Points to Remember

- Visual inspection is a common method of checking cleanliness where trained personnel walk through the workplace, and examine surfaces, equipment, and common areas for cleanliness.



Application of learning 1.4.

In the school cheese processing workshop, request each trainee to arrange the workplace, tools, and equipment and check the cleanliness of the semi-hard cheese making workshop.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Arrangement criteria are effectively respected	1.1 Tools are arranged		
		1.2 Equipment is arranged		
		1.3 Materials are arranged		
2	Cleanliness is well-checked	2.1 Method of checking cleanliness is applied		



Indicative content 1.5: Preparation of Ingredients Used in Semi-Hard Cheese-Making



Duration: 2 hrs



Theoretical Activity 1.5.1: Description of techniques of preparation of ingredients used in semi-hard cheese making



Notes to the trainer:

- Trainer may use small groups to describe techniques of preparation of ingredients used in semi-hard cheese making and didactic material such as tutorial video related to the description of techniques of preparation of ingredients are 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. Explain the term filtration and weighing used during the preparation of ingredients
- Step 2:** Ask trainees to write the answers on paper, flip charts, and blackboard.
- Step 3:** Facilitate trainees to present their answers and choose correct answers.
- Step 4:** Provide the expert view and clarify ideas by using didactic materials.
- Step 5:** Ask trainees to read key reading 1.5.1 in the trainee manual



Points to Remember

- Accuracy in measuring ingredients is crucial for proper curd formation and consistent cheese quality.



Practical Activity 1.5.2.: Filtering and weighing of raw milk



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to filter and weigh raw milk for effective delivery it is recommended to avail standard operating procedures, images, and illustrations as didactic materials, and avail all tools, equipment, and materials used to filter and weigh raw milk.



Key steps:

While delivering this activity, pass through the following steps:

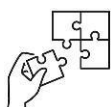
- Step 1:** Introduce the activity and ask trainees to go to the cheese processing workshop to filter and weigh the ingredients used in semi-hard cheese-making
- Step 2:** Explain the task and provide clear work instructions (Task, PPE, Time allocated)
- Step 3:** Demonstrate how to filter and weigh ingredients used in semi-hard cheese making and explain the criteria and procedures
- Step 4:** Ask trainees to filter and weigh ingredients used in semi-hard cheese making and monitor the activity
- Step 5:** Verify whether ingredients used in semi-hard cheese making are correctly filtered and weighed and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 1.5.2. in trainee manual
- Step 7:** Ask trainees to perform the task provided in the application of Learning 1.5



Points to Remember

One of the procedures of weighing is to gather the necessary equipment:

- Use a digital kitchen scale that can measure in grams or ounces. Ensure it is calibrated correctly before use.
- Have clean containers ready to hold your ingredients while weighing. These could be bowls or measuring cups.



Application of learning 1.5.

In the school cheese processing workshop, request each trainee to filter and weigh ingredients for semi-hard cheese-making.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Raw milk is well-filtered	1.1 Raw milk is filtered		
2	Ingredients are correctly weighed	1.2 Ingredient are weighed		



Learning Outcome 1 end assessment

Theoretical assessment

1. Choose the correct answer:

I. The following are tools used in semi-hard cheese making except:

- a. Lactometer
- b. Colon counter
- c. Homogenizer
- d. Balance

Answer: b

I. The following statement are the purpose of workplace arrangement except:

- a. Facilitate worker movement
- b. Facilitate quality control and supervision
- c. Prevent confusion in the workplace
- d. Facilitate cross-contamination
- e. Good presentation of the work area

Answer: d

II. One of the packaging materials is not used in semi-hard cheese making:

- a. Vacuum sealed bags
- b. Parchment paper
- c. Wax coating
- d. calcium foil

Answer: d

2. Match the following tools and equipment with their uses

Answer	Equipment/tools	Uses
a-5	a. Lactometer	1. Is used to measure the acidity of whey, helping monitor the cheese-making process.
b-1	b. pH –meter	2. Used for storing cheese during aging
C-3	c. Lactometer	3. Used to measure or control temperature
d-4	d. Thermometer	4. Used to measure the density of milk for cheese
e-2	e. Aging container	5. Is used to measure the acidity of whey during cheese making.

3. What is the amount of water that shall be needed to dilute 10kg alkaline detergent if 1l dilutes 50g of alkaline detergent?

Answer

Given:

Amount of alkaline detergent to be diluted: 10kg

Amount of alkaline detergent that has been diluted: 50g

Amount of water used: 1l

Unknown:

Amount of water to dilute 10kg of alkaline detergent

Solution:

10kg.....10000g

50g of alkaline detergent requires 1l of water

1g of alkaline detergent is required $\frac{1l \text{ of water}}{50g \text{ of alkaline detergent}}$

10000g of alkaline detergent requires $\frac{1l \text{ of water} \times 10000g \text{ of alkaline detergent}}{50g \text{ of alkaline detergent}} =$
200l of water

4. Differentiate by example the main ingredient and additional ingredient that are used in semi-hard cheese-making

Answer

Main ingredient	additional ingredients
Raw milk	Starter Culture
	Rennet
	Calcium chloride
	Salt
	Anatto
	Ripening Agents

5. Fill the method used to check the cleanliness by referring to its definition:

- a. The most common method is, where trained personnel walk through the workplace, examining surfaces, equipment, and common areas for cleanliness.
- b.is an indicator that turns pink in the presence of alkalinity
- c.involves testing the pH of your cleaning solutions to ensure they are within the range.

Answer:

- a. Visual inspection
- b. Phenolphthalein
- c. Acidity test

6. Differentiate the 2 cleaning techniques used in semi-hard cheese-making

Answer

Cleaning-in-place (CIP): This is a method of cleaning equipment without disassembling parts by running sanitizing chemicals, heat, and water through process equipment such as pipes and pipelines, etc.

Cleaning out of place (COP): This is a method of cleaning equipment disassembled. It is used when the parts of equipment cannot be cleaned effectively in place, or are difficult to clean.

7. In the production of semi-hard cheese, rennet is the main ingredient used as enzymatic coagulant of milk, typically in small amounts ranging from 0.003% to 0.005%. As Cheese makers calculate the specific range of rennet needed to coagulate 400 liters of raw milk.

Answer:

Lower range (0.003%):

$$\frac{0.003 \times 400 \text{ liters}}{100}$$

=0.012 liters=12milliliters=12grams

Upper range (0.005%):

$$\frac{0.005 \times 400 \text{ liters}}{100}$$

=0.02 liters=20milliliters=20grams

Therefore, the range of rennet required to coagulate 400 liters of raw milk is **12 grams to 20 grams**.

Practical assessment

In cheese processing workshop at school, you need to produce Gouda cheese for the event of welcoming new students. Request trainees to go to the workshop to perform the following tasks:

1. Select tools, equipment, and materials for semi-hard cheese-making
2. Clean tools, equipment, and workplace for semi-hard cheese making
3. Arrange a workplace for semi-hard cheese making
4. Prepare ingredients for semi-hard cheese making

Checklist:

Criteria	Indicators	Observation	
		Yes	No
1. Tools and equipment used for semi-hard cheese making are properly selected	1.1 Tools and equipment are identified		
	1.2 Tools and equipment are adjusted		
	1.3 Safety precautions for using tools and equipment are respected		
2. Material for semi-hard cheese is correctly selected	2.1. Cleaning products are selected		
	2.2. Main ingredient is selected		
	2.3. Optional ingredients are selected		
	2.4. Packaging materials are selected		
3. Workplace, tools, and equipment are properly cleaned	3.1. cleaning methods are applied		
	3.2. Cleaning techniques are applied		
4. The workplace for semi-hard cheese is correctly arranged	4.1. standard operating procedures are respected		
	4.2. the visual inspection method is applied		
	4.3. phenolphthalein method is applied		
5. ingredients used in semi-hard cheese are correctly prepared	5.1. raw milk is filtered		
	5.2. ingredients are weighed		
	5.3. ratio of ingredients is respected		



Further information to the trainer

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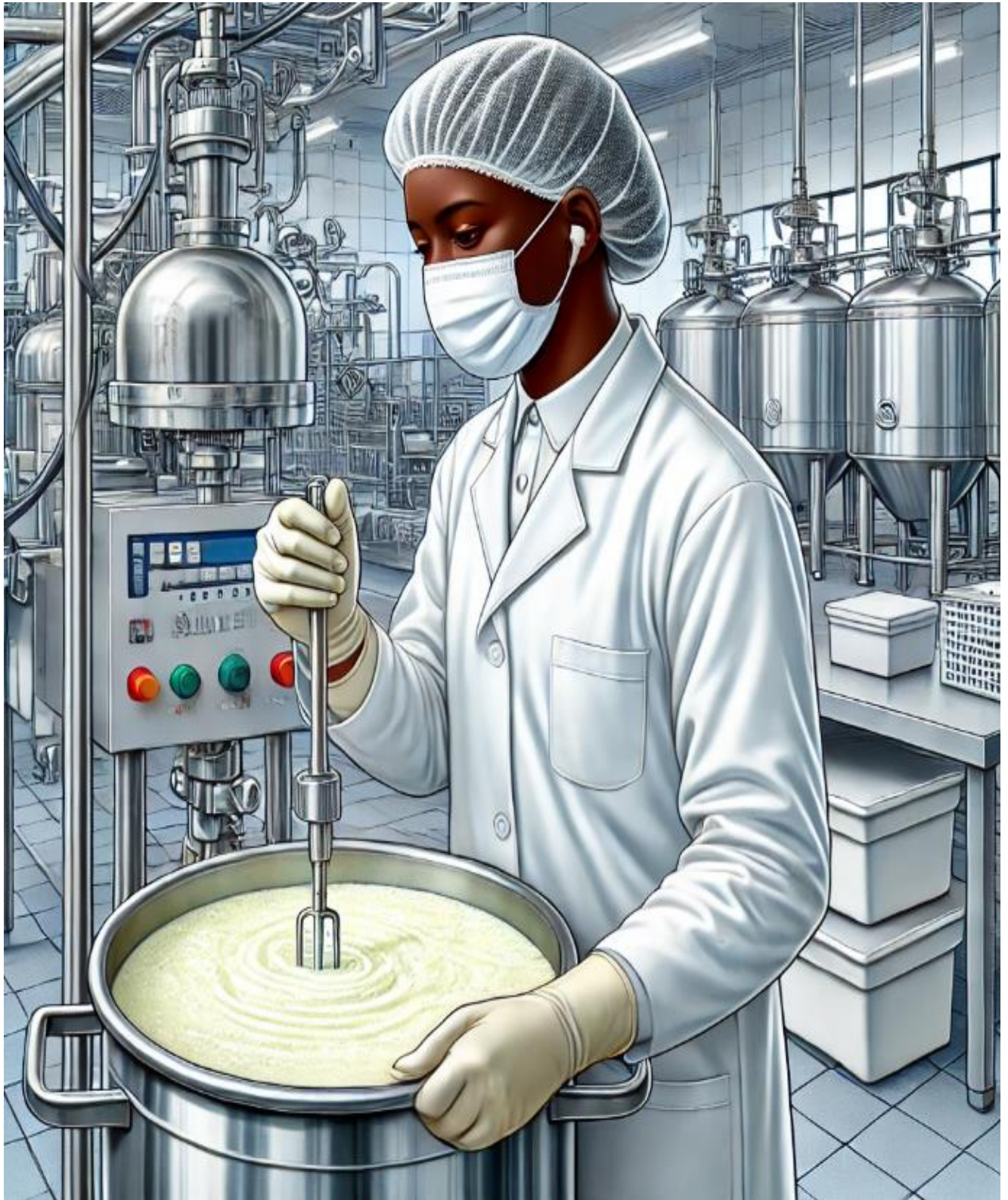
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Learning Outcome 2: Form Curds



Indicative contents

2.1 Pasteurization of milk for semi-hard cheese-making

2.2 Coagulation of pasteurized milk for semi-hard cheese-making

2.3 Cutting of curd

Key Competencies for Learning Outcome 2: Form curds.

Knowledge	Skills	Attitudes
• Description of pasteurization • Description of milk fermentation • Description of curd cutting techniques	• Pasteurizing milk • Inoculating milk • Incubating milk • Cutting of curd	• Paying attention while pasteurizing milk • Being carefully while inoculating milk • Being time manager while incubating milk



Duration: 15 hrs

Learning outcome 2 objectives:



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

1. Describe correctly pasteurization of milk in semi-hard cheese-making
2. pasteurize effectively milk for making semi-hard cheese
3. Inoculate correctly milk during semi-hard cheese-making
4. Incubate effectively milk in semi-hard cheese-making
5. Cut correctly curd for semi-hard cheese-making



Resources

Equipment	Tools	Materials
• Milk Pasteurizer • Cheese Vat • Curd Knife • Curd Cutter • Cooking Stove • Saucepan • Water Bath • Incubator • PPE • Scales • Refrigerator	• Thermometer • pH Meter • Curd knife • Curd cutter	• Ingredient: Raw milk, Starter culture, Rennet, Calcium chloride, Lipase, Annatto, potassium nitrate • Reagents: alkaline phosphatase kit



Indicative content 2.1: Pasteurization of Milk for Semi-Hard Cheese-Making



Duration: 5 hrs



Theoretical Activity 2.1.1: Description of milk pasteurization used in semi-hard cheese making



Notes to the trainer:

- Trainer may use small groups to describe pasteurization of milk



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. What is pasteurization?
 - ii. Enumerate the purpose of pasteurization
 - iii. Differentiate method of pasteurization used in semi-hard cheese making
- Step 2:** Ask trainees to write the findings on paper, flip charts, and blackboard.
- Step 3:** Facilitate trainees 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 key reading 2.1.1 in the trainee manual for a comprehensive understanding.



Points to Remember

- The 2 main pasteurization methods used for semi-hard cheese making are: High-Temperature Short Time (HTST) and Low-Temperature Long Time (LTLT).



Practical Activity 2.1.2: Pasteurizing milk for semi-hard cheese



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to Pasteurize milk for semi-hard cheese, for effective delivery it is recommended to avail milk and pasteurizer to pasteurize milk.



Key steps:

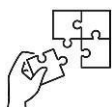
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the Cheese processing workshop and pasteurize milk for semi-hard cheese-making
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to pasteurize milk and explain the procedure
- Step 4:** Facilitate trainees to pasteurize milk and monitor the procedures
- Step 5:** Verify whether milk is well pasteurized and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 2.1.2. in trainee manual
- Step 7:** Ask trainees to perform application of learning 2.1



Points to Remember

- Pasteurization conditions are time and temperature where pasteurization at 72-75°C lasts for 15 seconds and Pasteurization at 63-65°C lasts for 30 minutes.



Application of learning 2.1.

In the school cheese processing workshop, request each trainee to pasteurize 2 liters of raw milk for semi-hard cheese making.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	The milk for cheese is properly pasteurized	1.1 clean and sanitized pasteurizer is used		
		1.2 Continuous stirring of milk is done		
		1.3 Pasteurization technique is applied		
2	Milk pasteurization conditions are appropriately monitored	2.1 Pasteurization time is respected		
		2.2 Pasteurization temperature is respected		
		2.3 Holding time is respected		



Indicative content 2.2: Coagulation of Pasteurized Milk for Semi-hard Cheese Making



Duration: 10 hrs



Practical Activity 2.2.1.: Cooling of pasteurized milk



Notes to the trainer

The trainer to facilitate this activity by demonstrating how to cool pasteurized milk, for effective delivery, it is recommended to avail thermometer and cooling tank used to cool pasteurized milk.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the cheese processing workshop and cool pasteurized milk

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

Step 3: Demonstrate how to cool pasteurized milk

Step 4: Ask trainees to cool pasteurized milk and monitor the activity

Step 5: Verify whether pasteurized milk is correctly cooled and provide feedback where necessary

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



Points to Remember

- Pasteurized milk shall be cooled at 32-35⁰C for semi-hard cheese-making.



Theoretical Activity 2.2.2: Description of milk fermentation



Notes to the trainer:

- Trainer may use small groups to describe milk fermentation



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. What is milk fermentation?
 - ii. What is the purpose of fermentation?
- Step 2:** Ask trainees to write the findings on paper, flip charts, and blackboard.
- 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 key reading 2.2.2 in the trainee manual



Points to Remember

- Milk fermentation not only enhances flavor and texture but also offers several health benefits.



Practical Activity 2.2.3: Inoculating and renneting of milk



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to inoculate cooled milk,
- for effective delivery it is recommended to avail:
 - ✓ starter culture to inoculate milk, and rennet to coagulate milk
 - ✓ tools used to inoculate milk for semi-hard cheese.



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the cheese processing workshop and inoculate and renneting cooled milk
- Step 2:** Explain the task and provide clear work instructions (Task, PPE, Time allocated)
- Step 3:** Demonstrate how to inoculate and coagulate cooled milk and explain the procedure
- Step 4:** Ask trainees to inoculate and coagulate cooled milk and monitor the procedures
- Step 5:** Verify whether milk is well inoculated and coagulated provide feedback where necessary
- Step 6:** Ask trainees to read key reading 2.2.3. in trainee manual



Points to Remember

- **Inoculation temperature:** Maintain the same incubation temperature as chosen for renneting (around 32-35°C/90-95°F)
- **Rennet (enzyme) addition:** Rennet cleaves specific milk proteins (caseins), causing them to link together and form a gel network (coagulum).



Practical Activity 2.2.4: Incubating milk



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to incubate milk, for effective delivery, it is recommended to avail incubator to incubate inoculated milk



Key steps:

While delivering this activity, pass through the following steps:

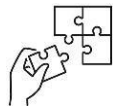
- Step 1:** Introduce the activity and ask trainees to go to a cheese processing workshop and incubate milk
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to incubate milk and explain the procedure

- Step 4:** Facilitate trainees to incubate milk and monitor activity
- Step 5:** Verify whether milk is correctly incubated and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 2.2.4. in trainee manual
- Step 7:** Ask trainees to perform the task provided in the application of Learning 2.2



Points to Remember

- Incubation condition is temperature of 32-35°C for 30-45 min



Application of learning 2.2.

In the school cheese processing workshop, request each trainee to coagulate the pasteurized milk for semi-hard cheese-making.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Pasteurized milk is properly cooled	1.1 Cooling temperature is respected		
2	Inoculation is correctly performed	2.1 Inoculation temperature is respected		
3	Renneting is effectively performed	3.1 Enzymatic coagulation is performed		
		3.2 Acidic coagulation is performed		
4	Incubation condition is correctly performed	4.1 Time is respected		
		4.2 Incubation temperature is respected		



Indicative content 2.3: Cutting of Curds



Duration: 2 hrs



Practical Activity 2.3.1: Cutting coagulum



Notes to the trainer

- The trainer may facilitate this activity by demonstrating how to cut the coagulum for effective delivery it is recommended to avail coagulum, curd knife/cutter and curds ladle.



Key steps:

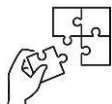
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the Cheese processing workshop and cut coagulum
- Step 2:** Explain the task and provide clear work instructions (PPE, Time allocated)
- Step 3:** Demonstrate how to cut coagulum and explain the cutting techniques
- Step 4:** Facilitate trainees to cut coagulum and monitor the activity
- Step 5:** Verify whether the coagulum is appropriately cut and provide feedback where necessary
- Step 6:** Ask trainees to read key reading 2.3.1. in trainee manual
- Step 7:** Ask trainees to perform the task provided in the application of Learning 2.3



Points to Remember

- Techniques of cutting coagulum are knife cutting, harp cutting, and mechanical cutting.



Application of learning 2.2.

In the school cheese processing workshop, prepare coagulum from 2 liters of raw milk and request each trainee to cut coagulum.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Cutting of coagulum is properly performed	1.1 Cutting tools are selected and cleaned		
		2.2 Cutting techniques are applied		
		2.3 Curds size are respected		



Learning Outcome 2 end assessment

Theoretical assessment

1. Differentiate pasteurization method used in semi-hard cheese-making

Answer:

High-Temperature Short-Time (HTST)

This method heats the milk to a high temperature (72°C -75°C) for a short time (15 seconds). HTST is the most common method used commercially due to its efficiency and effectiveness.

Low-Temperature Long-Time (LTLT)

This method heats the milk to a lower temperature (63°C-65°C) for a longer time (30 minutes). LTL is sometimes preferred for cheese making because it may retain more of the milk's natural flavor and nutrients.

2. After reading the following statement related to pasteurization, answer **True** if the statement is correct or **False** if the statement is incorrect.

i. Pasteurization is a heat treatment process applied to milk to eliminate harmful pathogens and extend its shelf life.

Answer: True

ii. Pasteurization helps to ensure safety by eliminating useful bacteria like lactic acid bacteria.

Answer: False

iii. Rapid cooling helps to prevent surviving bacteria from multiplying.

Answer: True

iv. Milk used for semi-hard cheese making is pasteurized at 63°C- 65°C for 15 Seconds.

Answer: False

3. Match the following inoculation techniques to the way it is applied

Answer	Inoculation techniques	Applied way
a..3	a. Direct vat inoculation	1. Convenient option, reconstituted in sterile water before adding to milk.
b..2	b. Direct-to-milk inoculation	2. Cultures are added directly to the milk during milking or processing
c..1	c. Frozen or freeze-dried cultures	3. Starter cultures are directly added to the milk vat.

4. Differentiate inoculation from incubation.

Answer:

Inoculation refers to adding a starter culture, incubation refers to culturing starter culture at favourable conditions for them to grow

5. Enumerate techniques of cutting curd.

Answer:

- ✓ Knife cutting.
- ✓ Harp cutting
- ✓ Mechanical cutting

Practical assessment

Your school produces gouda cheese for the event of welcoming new students. Request trainees to go to the cheese processing workshop to form curds for making gouda cheese.

Checklist:

SN	Criteria	Indicators	Observation	
			Yes	No
1	1. Raw milk is well pasteurized	1.1. pasteurization method is selected		
		1.2. pasteurization conditions are monitored		
2	2. pasteurized milk are well coagulated	2.1. pasteurized milk is cooled		
		2.2. inoculation techniques are applied		
		2.3. Rennet is used		
		2.4. incubation conditions are monitored		
3	3. curds are properly cut	3.1 Cutting tools are selected and cleaned		
		3.2 Cutting techniques are applied		
		3.3 Curds size is respected		



Further information to the trainer

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Learning Outcome 3: Treat the Curds



Indicative contents

3.1 Wheying of the curds

3.2 Monitoring of curds pH

3.3 Pressing of semi-hard cheese curds

3.4 Brining of semi-hard cheese

Key Competencies for Learning Outcome 3 : Treat the curds

Knowledge	Skills	Attitudes
• Description of pressing techniques in semi in semi-hard cheese • Description of brining of semi-hard cheese	• Stirring curds • wheying • Washing curds • Measuring pH • Molding semi-hard cheese curds • Pressing semi-hard cheese curds • Brining semi-hard cheese	• Being careful while wheying and pressing curd • Paying attention while stirring and washing the curd for semi-hard cheese • Being accurate while prepare brine solution for brining semi-hard cheese



Duration: 15 hrs

Learning Outcome 3 objectives:



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

1. Stir properly the curds for semi-hard cheese
2. Wash properly the curds for semi-hard cheese
3. whey properly the curd according to cheese specification
4. Monitor correctly pH of curds according to cheese specification
5. Mold correctly the curd for semi-hard cheese
6. Describe properly the pressing techniques of semi-hard cheese
7. Press effectively the curds according to cheese specification
8. Describe clearly the brining of semi-hard cheese
9. Brine properly the cheese according to cheese specification



Resources

Equipment	Tools	Materials
• Cheese Vat • Cheese Press • Brining Container • Cooking Stove • Sause Pan • PPE • Milk Cans • Measuring Equipment	• Thermometer • pH-Meter • Brushes • Scales • Buckets • Stirrer • Sweepers • Cheese Molds • Dust Bin	• Treated water • Salt • Cheese cloth



Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Have a well-prepared curd after cutting
- Prepare sample flow chart, protocol, tutorial video to be used as didactic materials
- Have a well-organized workshop for semi-hard cheese-making



Indicative content 3.1: Wheying of the Curds



Duration: 5 hrs



Practical Activity 3.1.1: stirring curd for semi-hard cheese making



Notes to the trainer

- Avail a well-prepared curd after cutting
- The trainer may demonstrate how to stir the curd for semi-hard cheese.
- The trainer avail tutorial videos, protocol and flowchart as didactic materials



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the cheese processing workshop to stir the curds for cheese
- Step 2:** Explain the tasks and provide clear work instruction (Time allocated and PPE)
- Step 3:** Demonstrate how to stir the curd for semi-hard cheese
- Step 4:** Ask trainee to stir curds for semi-hard and monitor activity
- Step 5:** Verify whether the curd is properly stirred and provide feedback where necessary
- Step 6:** Ask trainee to read Key Reading 3.1.1 in trainee manual.



Points to Remember

- **Consistent temperature control and gentle stirring** are essential for effective whey removal. Proper temperature management helps expel whey and influences the final texture and flavor of the cheese, while gentle stirring prevents curd clumping and ensures even whey drainage.



Practical Activity 3.1.2: washing and wheying curd for semi-hard cheese making



Notes to the trainer

- Avail stirred and cooked curds
- The trainer may demonstrate how to wash and whey the curds for semi-hard cheese.
- The trainer avail tutorial videos, protocol and flowchart as didactic materials



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the cheese workshop to wash and whey the curds for cheese
- Step 2:** Explain the tasks and provide clear work instruction (Time allocated and PPE)
- Step 3:** Demonstrate how to wash and whey the curd for semi-hard cheese
- Step 4:** Ask trainee to wash and whey curds for semi-hard and monitor activity
- Step 5:** Verify whether the curd is properly washed and wheyed and provide feedback where necessary
- Step 6:** Ask trainee to read Key Reading 3.1.2 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in Application of Learning 3.1.



Points to Remember

- **Wheying of the curds:** refers to the process of separating the whey from the curds in cheese-making. where the solid curd separates from the liquid whey.
- Proper temperature management helps expel whey and influences the final texture and flavor of the cheese.



Application of learning 3.1

In the school workshop, prepare the curd from 2 liters of raw milk, and ask trainees to whey the curd.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Equipment and tools are well-set	1.1 Thermometer is set		
		1.2 Scoop are set		
		1. 3 Whey containers are set		
2	Safety and hygiene are properly-followed	2.1 Hand are cleaned		
		2.2 Work areas are cleaned		
		2.3 Personal protective equipment is used		
3	The curds are properly-heated or washed	3.1 water temperature is monitored Hot		
		3.2 water is added	.	
		3.3 Curds temperature is respected		
4	Curds are effectively -drained	4.1 The curds are stirred		
		5.1 Whey is drained		



Indicative content 3.2: Monitoring of Curds pH



Duration: 2 hrs



Practical Activity 3.2.1: Measuring curds pH



Notes to the trainer:

- Avail a well-prepared curd after cutting
- Avail a pH-meter which is good working condition
- The trainer may demonstrate how measure pH of curd
- Avail a well-organized workshop



Key steps:

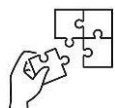
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the cheese processing workshop to measure the pH of curds
- Step 2:** Explain the tasks and provide clear work instruction (Time allocated and PPE)
- Step 3:** Demonstrate how to measure the pH of curd
- Step 4:** Ask trainee to measure the pH of curd and monitor procedure
- Step 5:** Check if the pH is correctly measured and provide feedback where necessary
- Step 6:** Ask trainee to read Key Reading 3.2.1 in trainee manual.
- Step 7:** Ask trainees to perform the task provided in Application of Learning 3.2.



Points to Remember

- **Proper calibration and maintenance of the pH meter** are essential for obtaining accurate pH readings. This ensures consistent quality and control over the cheese-making process, allowing you to make necessary adjustments based on precise measurements.



Application of learning 3.2. Measure curds curd pH of cheese

In the school cheese processing workshop, request each trainee to measure the pH of curds.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	pH of curds is correctly measured	1.1 pH Meter is turned on		
		1.2 Appropriate modes of measurement are selected		
		1.3 Probe is inserted		
		1.4 pH Meter is stabilized		
		1.5 pH Meter readings are recorded		



Indicative content 3.3: Pressing of Semi-Hard Cheese Curds



Duration: 5 hrs



Theoretical Activity 3.3.1: Description of cheese pressing process



Notes to the trainer:

- The trainer may deliver this content by organizing trainees into small groups and describe pressing techniques



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity to the trainee and ask them to answer the following question:

- What do you understand by Cheese molding?
- What do you understand by Cheese pressing?
- What are the techniques of pressing cheese and their advantages?

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

Step 3: Ask trainee to present their findings to you or the entire class.

Step 4: Open the floor for questions and provide further clarification. Address any uncertainties requests about the cheese pressing process and its implications.

Step 5: Ask trainees to read Key Reading 3.3.1 in trainee Manual



Points to Remember

- Choosing the right pressing technique manual, hydraulic, pneumatic, or mechanical ensures proper curd formation, moisture reduction, and flavor development. Each method has specific advantages and is suited for different production scales and cheese types.



Practical Activity 3.3.2: Pressing curds for cheese



Notes to the trainer

- Avail a well-prepared curd after wheying
- The trainer may demonstrate how to press curd for cheese
- Avail a well-organized workshop



Key steps:

While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainees to go to the cheese workshop to press the curd for cheese
- Step 2:** Explain the task and provide clear work instruction (PPE, Time allocated)
- Step 3:** Demonstrate how to press the curd for cheese. While demonstrating explaining the pressing procedures.
- Step 4:** Ask trainees to press the curd, and monitor the activity
- Step 5:** Verify whether the curd is properly pressed and provide feedback where necessary
- Step 6:** Ask trainee to read the key reading 3.3.2. in trainee manual
- Step 7:** Ask trainees to perform the task provided in application of learning 3.2



Points to Remember

- **Consistent monitoring and precise adjustment of pressure and temperature** are essential for achieving the desired cheese texture and quality. This prevents over-compression or under-compression of curds, which can affect the final product.



Application of learning 3.3. Press curd for cheese

In the school cheese processing workshop, prepare curd from 15 liters of milk and request each trainee to press the curds.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Curds are effectively loaded in molds	1.1 Molds are selected and cleaned		
		1.2 Curds are loaded		
2	Curds are effectively pressed	2.1 The initial pressure is applied		
		2.2 Pressure is increased		
3	The process is properly monitored	3.1 Temperature is monitored		
		3.2 Pressure is monitored		
		3.3 Time is monitored		



Indicative content 3.4: Brining of Semi-Hard Cheese



Duration: 3 hrs



Practical Activity 3.4.1: Brining semi-hard cheese



Notes to the trainer

- Avail a well molded cheese
- The trainer may demonstrate how to brine semi-hard cheese.
- Avail a well-organized Workshop.



Key steps:

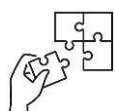
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainee to go in the cheese processing workshop to brine semi-hard cheese
- Step 2:** Explain the task and provide clear work instruction (PPE, Time allocated)
- Step 3:** Demonstrate how to brine semi-hard cheese. While demonstrating, explain the brining procedures.
- Step 4:** Ask trainees to brine the cheese and monitor the procedures
- Step 5:** Verify whether the cheese is properly brined and provide feedback where necessary.
- Step 6:** Ask trainees to read key reading 3.4.1 in trainee manual
- Step 7:** Ask trainees to perform the task provided in application of learning 3.4



Points to Remember

- Proper control of the brine solution's salt concentration and the duration of brining are essential for achieving the desired flavor, texture, and preservation qualities of the cheese. This ensures the cheese develops the right taste, texture, and shelf life.
- Consistent monitoring and detailed documentation of brining conditions such as brine concentration, temperature, and immersion time are essential for achieving the desired cheese quality and uniformity.



Application of learning 3.4.

In the school cheese processing workshop, prepare 4 pieces of cheese with 500gr for each and request each trainee to brine the cheese.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Materials, tools, and equipment are correctly prepared	1.1 Salt is prepared		
		1.2 Water is prepared		
		1.3 Thermometer is prepared		
		1.4 Container for brining are prepared		
2	Brine solutions are correctly prepared	2.1 Salt are used		
		2.2 Water is used		
		2.3 Concentration is respected		
		2.4 Temperature is respected		
		2.5 pH range is respected		
3	Brining conditions are effectively monitored	3.1 Cheese are loaded		
		3.2 Time is monitored		
		3.3 Temperature is monitored		
		3.4 Brine quality is monitored		
4	Post-brining steps are effectively followed	4.1 Cheese is drained		
		5.2 Cheese are dried		

		4.3 Cheese is stored		
5	Quality of cheese is effectively checked	5.1 Salting uniformity is checked		
		5.2 Texture is checked		
		5.3 Rind formation is checked		



Learning outcome 3 end assessment

Theoretical assessment

1. Match cheese-making process or technique in column A with its corresponding purpose or description in column B.

Answers	Process	Purpose or description
1-B	1. Wheying of the curds	a. To remove unwanted lactose and acidity, influencing final cheese flavor and texture.
2-E	2. Stirring of curds	b. To separate the liquid whey from the solid curd mass, controlling acidity and lactose content.
3-A	3. Washing of curds	c. To ensure consistent quality by controlling acidity, avoiding defects, and maintaining texture.
4-C	4. Monitoring pH in Semi-Hard Cheese Making	d. To shape curds, remove excess whey, and ensure uniform texture by applying controlled pressure
5-D	5. Pressing of Semi-Hard Cheese Curds	e. To develop curd structure, release whey, prevent clumping, and optimize temperature distribution.
6-F	6. Brining of Semi-Hard Cheese	f. To enhance flavor, preserve cheese, and develop texture through salt absorption and moisture control.

2. Circle the correct answer in the following statement
- i. What are cheese curds primarily composed of?

- a. Water and milk sugars
- b. Solid particles of protein and fats
- c. Only milk sugars
- d. Excess liquid whey

Answer: b

- ii. Which of the following is **NOT** a purpose of the wheying process?

- a. To manage whey fat and ensure a balanced fat content

- b. To provide desired shapes and sizes for the cheese
- c. To control the moisture content, affecting aging and texture
- d. To control the final acidity and lactose content of the cheese

Answer: b

iii. Which pressing technique involves using weights to apply pressure to curds?

- a. Hydraulic cheese pressing
- b. Pneumatic cheese pressing
- c. Mechanical cheese pressing
- d. Manual cheese pressing

Answer: d

iv. How does pneumatic cheese pressing achieve uniform pressing of curds?

- a. By using manual weights
- b. Through a mechanical system with gears and levers
- c. By applying air pressure to compress the curds
- d. By using a hydraulic system to apply pressure

Answer: c

v. Which one of the following is the purpose of using a brine solution in cheese making?

- a. To increase the cheese's moisture content
- b. To enhance flavor, improve texture and preserve the cheese
- c. To speed up the cheese aging process
- d. To add color to the cheese

Answer: b

vi. What is the typical salt concentration range for a brine solution used in cheese making?

- a. 5-10% salt by weight
- b. 10-15% salt by weight
- c. 20-25% salt by weight
- d. 30-35% salt by weight

Answer: b

vii. Which one of the following is a characteristic of imperfect semi-hard cheese?

- a. Perfectly consistent color and texture
- b. Off-odors such as ammonia or sourness
- c. Smooth, creamy texture
- d. Ideal pH levels for the cheese type

Answer: b

3. How does stirring curds contribute to the cheese-making process?

Answer:

Stirring curds serves several important functions:

- ✓ Preventing Matting and Clumping
- ✓ Releasing Whey and Promoting Drainage
- ✓ Developing Curd Structure
- ✓ Optimizing Temperature Distribution
- ✓ Removing Excess Acidity

4. How does brining affect semi-hard cheese, and what factors influence the brining process?

Answer:

Brining affects semi-hard cheese in several ways:

- ✓ Flavor Development
- ✓ Preservation
- ✓ Texture Development

Factors influencing the brining process include:

- ✓ Salt Concentration
- ✓ Water Treatment
- ✓ Brine Solution Density
- ✓ pH of Brine
- ✓ Brining Time and Temperature

5. What are the factors influence the duration and pressure applied during pressing?

Answers:

- ✓ Type of cheese
- ✓ Size of cheese
- ✓ Moisture content
- ✓ Specific recipe requirements.

6. What are the main pressing techniques for semi-hard cheese?

Answer:

- ✓ Manual pressing
- ✓ Hydraulic pressing
- ✓ Pneumatic pressing
- ✓ Mechanical pressing

7. What is the effect of not stirring curds properly?

Answer: Not stirring properly can lead to uneven texture, excess moisture, and potential clumping, which impacts the quality of the final cheese.

8. What actions should be taken if pH readings are outside the desired range of semi-hard cheese?

Answer: Adjustments such as modifying temperature, acidification, or rennet dosage may be necessary to bring pH levels within the desired range.

9. How does heating the curds help in the wheying process?

Answer: Heating curds helps expel whey and firm up the curds, which affects the final flavor and texture of the cheese.

Practical assessment

Your school produces Gouda cheese for school event, the coordinator of the event rises the complaints on the past supplies regarding to the quality of the supplied cheese, specifically mentioning issues with poor texture, a bitter taste, and inadequate salt content. Request the trainee to go in cheese processing workshop to whey curds, press the curd and brine the cheese. All necessary materials and equipment are available in the school workshop.

Checklist:

SN	Criteria	Indicator	Observation	
			Yes	No
1	Wheying is performed according to wheying procedures	1.1 Equipment and tools are correctly set		
		1.2 Safety and hygiene are effectively followed		
		1.3 Curds are effectively heated/washed		
		1.4 Curds are properly stirred		
		1.5 Whey is properly drained		
2	pH is monitored according to cheese specification	2.1 pH Meter is correctly prepared		
		2.2 Probe is correctly inserted		
		2.3 pH Meter is correctly stabilized		
		2.4 pH Meter reading is correctly recorded		
3	Pressing is performed according to cheese specification	3.1 Curds are effectively loaded		
		3.2 Initial pressure is correctly applied		
		3.3 Pressure is properly increased		
		3.4 Pressing process is well monitored		
4	Brining is performed according to cheese specification	4.1 Materials, tools and equipment are properly selected and cleaned		
		4.2 Brine solution is correctly prepared		
		4.3 Cheese is properly loaded in brining container		
		4.4 Brining conditions are properly monitored		
		4.5 Post-brining step is effectively performed		
		4.6 Quality of cheese is effectively checked		
		4.7 Result is correctly recorded		

END



Further information to the trainer

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Lucey, J. A., & Horne, D. S. (2022). *Dairy Processing and Quality Assurance* (2nd ed.). Wiley-Blackwell.

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Learning Outcome 4: Store the Ripened Cheese



Indicative contents

4.1 Aging of semi-hard cheese

4.2 Record keeping

Key Competencies for Learning Outcome 4: Store the ripened cheese

Knowledge	Skills	Attitudes
• Description of aging semi-hard cheese • Description of quality parameter of cheese during aging • Description of imperfect semi-hard cheese	• Aging semi-hard cheese • Checking quality of cheese • Packing cheese • Washing cheese • Drying cheese • Waxing cheese • Labelling cheese • Storing cheese • Keeping records for semi-hard cheese production	• Being careful while using packing machine • Pay attention while monitoring aging condition • Being accountable while keeping record of semi-hard cheese



Duration: 10 hrs

Learning outcome 4 objectives:



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

1. Describe clearly aging of semi-hard cheese
2. Age properly the cheese according to aging condition
3. Identify properly the imperfect of semi-hard cheese
4. Check correctly the quality of semi-hard cheese
5. Perform effectively the pre-packaging activity of cheese
6. Pack properly the cheese according to packaging specification
7. Label properly the cheese according to cheese specification
8. Monitor effectively the storage condition of semi-hard cheese
9. Keep properly the record of semi-hard cheese making



Resources

Equipment	Tools	Materials
• PPE • Packaging Vacuum machine • Scales • Incubator • Shelves • Timber • Autoclave • Refrigerator • Labelling machine • Wood shelves	• Thermometer • PH Meter • Cheese Sampler • Brushes • Trolley • Scales • Petri- Dishes • Inoculated Loops • Basin • Baskets • Computer • Hygrometer	• Packaging materials: cheese wax paper, synthetic plastic films, cheese wax, cheese label. • Reagents: Culture media • Cleaned Water • Notebooks



Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Have a well-prepared cheese after pressing
- Have a well-organized workshop for semi-hard cheese-making
- Ensure that tools and equipment are available and make sure that they are in good working conditions
- Prepare sample drawings (illustrations, Pictures or video) to be used as didactic materials related to storing the ripened cheese



Indicative content 4.1: Aging of Semi Hard Cheese



Duration: 8 hrs



Practical Activity 4.1.1: Aging semi-hard cheese



Notes to the trainer

- Avail a well-prepared cheese after pressing
- Trainer may demonstrate the aging of semi-hard cheese
- Avail a well-organized workshop



Key steps:

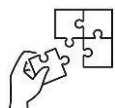
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainee to go to cheese processing workshop to age semi hard cheese
- Step 2:** Explain the task and provide clear work instruction (PPE, Time allocated)
- Step 3:** Demonstrate how to age semi-hard cheese while demonstrating explain the purpose of aging cheese
- Step 4:** Ask trainees to age the cheese and monitor the procedures
- Step 5:** Verify whether the cheese is well aged and provide feedback where necessary
- Step 6:** Ask trainee to ready key reading 4.1.1. in trainee manual
- Step 7:** Ask trainees to perform the task provided in application of learning 4.1



Points to Remember

- Maintain a consistent aging temperature generally between 50-55°F (10-13°C) and relative humidity around 80-85% to ensure proper development of flavor, texture, and rind. These conditions help to prevent the cheese from drying out or becoming too moist and support the growth of beneficial molds and bacteria.
- Regularly turn the cheese to ensure even aging and prevent issues such as sticking or uneven rind development. Conduct frequent visual and sensory checks to monitor the cheese's rind, texture, and moisture content, and make necessary adjustments to temperature and humidity to maintain optimal aging conditions.



Application of learning 4.1.

In the school cheese processing workshop, request each trainee to age the cheese.

Checklist

SN	Criteria	Indicator	Score	
			Yes	No
1	Cheese is effectively Cooled and Rested	1.1 Cheese is cooled		
		1.2 Cheese is rested		
2	Aging condition are effectively controlled	2.1 Temperature is controlled		
		2.2 Humidity is controlled		
3	Cheese is well turned and handled	3.1 Natural rinds are formed		
		3.2 Cheese is turned		
		3.3 Cheese are handled		
4	Cheese surfaces are properly washed	4.1 warm water is used		
		4.2 Cheese surfaces are cleaned		
5	The quality of aged cheese is effectively checked	5.1 Cheese is matured		
		5.2 Appearance is checked		
		5.2 Texture is checked		
		5.3 Flavour is checked		



Practical Activity 4.1.2: Packaging the cheese



Notes to the trainer

- Avail a well-aged cheese
- Avail packaging materials for semi-hard cheese
- Trainer may demonstrate how to package the cheese
- Avail a well-organized workshop



Key steps:

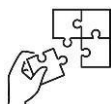
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainee to go to the cheese processing workshop to package the cheese
- Step 2:** Explain the task and provide clear work instruction (PPE, Time allocated)
- Step 3:** Demonstrate how to package the cheese while demonstrating explain the procedure of packaging the cheese
- Step 4:** Ask trainee to package the cheese and monitor the activity
- Step 5:** Verify whether the cheese is well packaged and provide feedback where necessary.
- Step 6:** Ask trainee to read the key reading 4.1.3. in trainee manual
- Step 7:** Ask trainees to perform the task provided in application 4.2



Points to Remember

- **Proper pre-packaging handling, including washing and drying,** is crucial for preventing contamination and excess moisture, which can affect the cheese's quality and shelf. Effective washing removes surface contaminants, while thorough drying prevents life moisture from becoming trapped inside the packaging, which could lead to spoilage
- **Correct labeling and packing techniques** are essential for product identification, regulatory compliance, and maintaining the cheese's quality during storage and distribution. Proper labeling ensures consumers receive all necessary information, while effective packing techniques like vacuum sealing and parchment wrapping help preserve the cheese's texture and extend its shelf life



Application of learning 4.2.

In the school cheese processing workshop, request each trainee to package the cheese.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Pre-packaging handling activities are well performed	1.1 Washing is performed		
		1.2 Drying is performed		
		1.3 Waxing is performed		
2	Cutting and shaping are well-performed	2.1 Cutting is performed		
		2.2 Shaping is performed		
3	Packing techniques are well-applied	3.1 Vacuum Packaging is applied		
		3.2 Wrapping in Parchment is applied		
4	Labelling is effectively performed	4.1 Labelling information is indicated		



Practical Activity 4.1.4: Storing the cheese



Notes to the trainer

- Avail a well packaged cheese
- Trainer may demonstrate how to store the cheese
- Avail a well-organized storage room for cheese



Key steps:

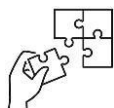
While delivering this activity, pass through the following steps:

- Step 1:** Introduce the activity and ask trainee to go the cheese processing workshop to store the cheese
- Step 2:** Explain the task and provide clear work instruction (PPE, Time allocated)
- Step 3:** Demonstrate how to store the cheese while demonstrating explain the procedure of storing
- Step 4:** Ask trainee to store the cheese and monitor the activity
- Step 5:** Verify whether the cheese is stored properly and provide feedback where necessary
- Step 6:** Ask trainee to read the key reading 4.1.4.in trainee manual
- Step 7:** Ask trainee to perform the task provided in application of learning 4.3



Points to Remember

- **Maintaining a stable temperature** (between 40-55°F or 4-13°C) and **proper humidity levels** (75-85%) is essential to preserving the cheese's quality and preventing spoilage. Consistent conditions prevent issues such as moisture build-up, mold growth, and changes in texture and flavour.



Application of learning 4.3.

In the school cheese processing workshop, request each trainee to age, package and store the cheese. Tools, materials and equipment are available in workshop.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Cheese is effectively Cooled and Rested	1.1 Cheese is cooled		
		1.2 Cheese is rested		
2	Aging condition are well-controlled	2.1 Temperature is controlled		
		2.2 Humidity is controlled		
3	Rind textures are well-formed	3.1 Natural rinds are formed		
4	Cheese is well turned and handled	4.1 Cheese is turned		
		4.2 Cheese are handled		
5	Cheese is effectively matured	5.1 Cheese is matured		
6	Cheese surfaces are well-cleaned	6.1 Cheese surfaces are cleaned		
7	The final quality is effectively checked	7.1 Appearance is checked		
		7.2 Texture is checked		
		7.3 Flavour is checked		
8	Pre-packaging handling activities are well performed	8.1 Washing is performed		
		8.2 Drying is performed		
		8.3 Waxing is performed		
9	Cutting and shaping are well-performed	9.1 Cutting is performed		
		9.2 Shaping is performed		
10	Packing techniques are well-applied	10.1 Vacuum Packaging is applied		

		10.2 Wrapping in Parchment is applied		
11	Labelling is effectively performed	11.1 Labelling information is indicated		
12	Packed cheese is inspected	12.1 Damage packages are inspected		
13	Temperature is well controlled	13.1 Optimum temperatures are sated		
		13.2 Temperature fluctuation is avoided		
14	Humidity is controlled	14.1 Optimum humidity is sated		
		14.2 Hygrometer is used		
15	Cheese is stored	15.1 Refrigerator is used		
		4.2 Sunlight is avoided		



Indicative content 4.2: Record Keeping



Duration: 8hrs



Theoretical Activity 4.2.1: Describing record keeping of semi-hard cheese



Notes to the trainer:

- Trainer may create or gather charts as didactic material
- The trainer may deliver this content by organizing trainees into small groups for interactive discussion.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainee to discuss on the following statement:

- Production detail records
- Quality control records
- General information records

Step 2: Ask trainee to write their findings on paper, flip chart, the blackboard, or a whiteboard

Step 3: Ask trainees to present their findings to you or the entire class

Step 4: Open the floor for questions and provide positive feedback on their presentations

Step 5: Ask trainees to read Key Reading 4.2.1 in the trainee manual



Points to Remember

- **Accurate and consistent record-keeping** is essential for maintaining the quality, safety, and compliance of semi-hard cheese production. It ensures that all production data, storage conditions, quality checks, and inventory levels are precisely documented and easily accessible.



Learning outcome 4 end assessment

Theoretical assessment

1. Circle the correct answer in the following statement
 - i. Which one of the following is purpose of aging semi-hard cheese?
 - a. To increase the cheese's shelf life
 - b. To develop the cheese's flavor, texture, and aroma
 - c. To reduce the cheese's moisture content
 - d. To enhance the cheese's visual appearance

Answer: b

- ii. What is the ideal temperature range for aging semi-hard cheese?
 - a. 30-40°F (0-4°C)
 - b. 40-55°F (4-13°C)
 - c. 55-70°F (13-21°C)
 - d. 70-85°F (21-29°C)

Answer: b

- iii. Which of the following is a common pre-packaging handling activity for semi-hard cheese?
 - a. Cooking
 - b. Cutting
 - c. Washing
 - d. Labeling

Answer: c

- iv. What packaging method involves placing the cheese in an air-tight bag and removing the air?
 - a. Wrapping in parchment
 - b. Vacuum packaging
 - c. Waxing
 - d. Sealing

Answer: b

2. How does regular turning affect the aging process of semi-hard cheese?

Answers: Regular turning ensures even aging and prevents sticking or uneven rind development.

3. What are some common characteristics of imperfect semi-hard cheese?

Answer:

Common characteristics include discoloration, abnormal texture (e.g., excessively soft or crumbly), off-odors, off-tastes, and pH imbalances.

4. What are the pre-packaging handling activities for semi-hard cheese?

Answer:

Pre-packaging activities include washing, drying and waxing

5. Why might parchment wrapping be used for some semi-hard cheeses?

Answer: Parchment wrapping allows the cheese to "breathe," preventing excessive moisture build up and maintaining natural rind development.

6. What information is typically required on a label for semi-hard cheese?

Answer:

Required information includes:

- ✓ the product names
- ✓ ingredients list
- ✓ net weight
- ✓ Production date
- ✓ Expiration date
- ✓ Manufacturer's name
- ✓ Address
- ✓ Allergen information

7. Why is it important to avoid fluctuations in temperature when storing cheese?

Answer: Fluctuations can lead to condensation, spoilage, and affect the cheese's quality and texture.

8. How does the aging time of semi-hard cheese affect its flavor?

Answer: Longer aging times generally lead to more intense and complex flavors as enzymes and bacteria continue to break down proteins and fats.

9. What are the benefits of conducting a final inspection of semi-hard cheese before distribution?

Answer: Final inspections ensure that the cheese meets quality standards for appearance, texture, and flavor, helping to maintain customer satisfaction and product consistency.

10. Why is it essential to document the source of milk used in cheese production?

Answer: Documenting the source of milk is important for quality control and traceability. It allows producers to track the origin of the milk, which is vital for ensuring consistency in cheese quality and addressing any issues related to milk quality or safety

Practical assessment

Your school produces Gouda cheese for school event, the coordinator of the event rise complaints about the past supplies regarding to the quality of the supplied cheese, specifically mentioning issues with poor sensory property. Request the trainee to go in cheese processing workshop to age, package and store the cheese. All necessary materials and equipment are available in the school workshop.

Checklist:

SN	Criteria	Indicator	Score	
			Yes	No
1	Cheese are properly aged according to aging condition	1.1 Cheese is effectively cooled and rested		
		1.2 Aging environments are properly controlled		
		1.3 Rind textures are effectively formed		
		1.4 The Aging process is properly monitored		
		1.5 Cheese is properly matured		
		1.6 Cheese surfaces are effectively cleaned		
		1.7 Final quality is effectively checked		
2	Cheese are packed properly according to packaging specification	2.1 Pre-packaging handling activities are appropriately performed		
		2.2 Cutting and shaping are correctly performed		
		2.3 Packing techniques are appropriately applied		
		2.4 Labelling is effectively performed		
3	Cheese is properly stored according to storage conditions	3.1 Packed cheese are properly inspected		
		3.2 Temperature is effectively controlled		
		3.3 Humidity is effectively controlled		
		3.4 Cheese is properly stored		

END



Further information to the trainer

Fox, P. F., McSweeney, P. L. H., Cogan, T. M., & Guinee, T. P. (2017). Cheese: Chemistry, physics and microbiology (4th ed.). Elsevier.

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