



RQF LEVEL 5



FOPPM503

FOOD PROCESSING

Powdered Milk Making

TRAINER'S MANUAL

October, 2024



POWDERED MILK MAKING

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COORDINATION TEAM

RWAMASIRABO Aimable

MARIA Bernadette M. Ramos

NTAHONTUYE Felix

Production Team

Authoring and Review

GUKUNDA Theogene

UWIRINGIYIMANA Jean Damascene

Validation

HABIYAKARE KALINDA Heritier

TWAGIRAYEZU Jean de Dieu

GIRANEZA Marie Jeanne

Conception, Adaptation and Editorial works

HATEGEKIMANA Olivier

GANZA Jean Francois Regis

HARELIMANA Wilson

NZABIRINDA Aimable

DUKUZIMANA Therese

NIYONKURU Sylvestre

MINANI Aloys

Formatting, Graphics, Illustrations, and infographics

YEONWOO Choe

SUA Lim

SAEM Lee

SOYEON Kim

WONYEONG Jeong

NYIRANTEZIMANA Odette

TUYUMVIRE Pacifique

Financial and Technical support

KOICA through TQUM Project

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ACRONYMS

%: Percent

°C: Degree Celsius

°F: Degree Fahrenheit

N/9: Normality concentration of 0.11

CBT/A: Competency-Based Training/Assessment

CIP: 1. Clean in Place

CLR: Correct Lactometer Reading

CMT: California mastitis test

COP: Cleaning out of place

FDA: Food and Drugs Authorities

FIC: Food Information to Consumers

FIFO: First In first Out

g: gram

H₂O₂: peroxide

HPH: High pressure homogenization

hrs: hours

HTST: High-temperature, short-time

Kg: kilogram

KOICA: Korea International Cooperation Agency

ml: Milliliter

PPE: Personal Protective Equipment

RO: Reverse Osmosis

RQF: Rwanda Qualification Framework

RSB: Rwanda Standard Board

RTB: Rwanda TVET Board

SCC: Somatic Cell Count

TBC: Total bacteria count

TCC: Total Coliform Count

TQUM: TVET Quality Management Project

TS: Total Solid

TVET: Technical and Vocational Education and Training

UHT: Ultra-High Temperature

UV: Ultraviolet

WHO: World Health Organization

INTRODUCTION

This trainer's manual includes all the methodologies required to effectively deliver the module titled " **Powdered Milk 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 trainees review the key reading and the points to remember section.

MODULE CODE AND TITLE: FOPPM503 POWDERED MILK MAKING

Learning Outcome 1: Pre-treat raw milk

Learning Outcome 2: Perform milk drying

Learning Outcome 3: Store powdered milk

Learning Outcome 1: Pre-treat Raw Milk



Indicative contents

1.1 Preparing tools, equipment and materials used in powdered milk plant

1.2 Receiving Raw milk

1.3 Standardizing milk

1.4 Pasteurizing milk

Key Competencies for Learning Outcome 1: Treatment of Raw Milk

Knowledge	Skills	Attitudes
• Identification of tools and equipment used in powdered milk making • Identification of materials used in powdered milk making • Description of functionality of machines used in powdered milk plant • Description of the types of pasteurization • Description of milk standardization	• Cleaning tools and equipment used in powdered milk making • Receiving Raw milk • Adjusting milk fat content • Pasteurizing milk • Checking the effectiveness of pasteurization • Homogenizing pasteurized milk	• Being committed when selecting tools, equipment and materials • Being attentive when using cleaning products as some can be harmful to life • Being careful while using powdered milk making machine • Being honest while receiving milk • Being decision maker when receiving raw milk • Being accurate while standardizing milk



Duration: 15 hrs

Learning outcome 1 objectives:



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

1. Identify correctly materials, tools and equipment used in powdered milk making
2. Describe properly the functionality of machines used in powdered milk plant
3. Clean effectively tools and equipment according to cleaning methods
4. Receive properly raw milk according to acceptance criteria
5. Describe properly milk standardization according to the desired type of powdered milk
6. Adjust properly milk fat content according to the desired type of powdered milk
7. Pasteurize effectively milk according the pasteurization conditions
8. Describe correctly the types of pasteurization
9. Check properly the pasteurization effectiveness as applied in powdered milk making
10. Homogenize adequately the pasteurized milk according to homogenization methods



Resources

Equipment	Tools	Materials
• Lacto scan • Incubator • PPE • Weighing balance • Titration apparatus • Autoclave • Fire extinguisher • Tables • Pasteurizer • Homogenizer • Separator	• Lactometer • Thermometer • pH meter • Alcoholmeter • Brush • Mops • Bucket • Broom • Spoon • Measuring cylinder • Filters	• Raw milk • Cleaning agent • Ethyl alcohol • Distilled water • Resazurin tablets • Sulphuric acid • Iso-amyl alcohol • CMT kits • Aflatoxin test kits • Sodium hydroxide N/9, • Phenolphthalein

• Vacuum evaporators • Dryers • Refrigerator • Freezer • Milk cooling tank • Centrifuge	• Bunsen burner • Waste bin • Petri dish • Micropipette • Beaker • Colony counter • Milk sampler • Alcohol gun	• Antibiotic kit • Detergent • Disinfectant • All-purpose cleaner • Alkaline phosphatase kit • Glass cleaner
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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, and verify if materials are not expired.
- Prepare teaching aids and didactic materials (manuals/guides, task sheets, photos, audio-visuals, protocols) related to powdered milk making.
- Make sure that both classroom and workshop are available
- Avail raw milk.



Indicative content 1.1: Preparing Tools, Equipment and Materials Used in Powdered Milk Plant



Duration: 3 hrs



Theoretical Activity 1.1.1: Identification of tools and equipment used in powdered milk making



Notes to the trainer:

- Trainer may use small groups to identify tools, and equipment used in powdered milk making.
- The use of drawings, pictures, or videos as didactic materials and catalogues while identifying tools and equipment related to powdered milk 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:

- Identify the tools and equipment used in powdered milk making.

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

Step 3: Facilitate trainees to present their findings.

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

- Tools and equipment used can vary depending on the scale of production, the desired product quality, and the regulations in place.
- Efficient operation of these tools ensures high product quality and hygiene throughout the process



Theoretical Activity 1.1.2: Identification of materials used in powdered milk making



Notes to the trainer:

- Trainer may use small groups to identify materials used in powdered milk making
- The use of drawings, pictures, or videos as didactic materials and catalogues while identifying materials related to powdered milk 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. Identify materials used in powdered milk making.

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

Step 3: Facilitate trainees to present their findings.

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 1.1.2 in the trainee manual



Points to Remember

The specific ingredients and materials used can vary depending on the intended use of the powdered milk, regional regulations, and consumer preferences.



Practical Activity 1.1.3: Cleaning tools and equipment used in powdered milk making



Notes to the trainer

- The trainer may demonstrate how to clean tools and equipment used in powdered milk making.
- Avail tools and equipment in the workplace to be cleaned.

- Avail cleaning agents, which are not expired.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to clean tools and equipment used in powdered milk making.

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

Step 3: Demonstrate how to clean tools and equipment used in powdered milk making. While demonstrating, explain each step.

Step 4: Ask trainees to clean the tools and equipment used in powdered milk making and monitor the activity.

Step 5: Verify whether tools and equipment are correctly cleaned and provide feedback where necessary.

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

Step 7: Ask trainees to perform the task provided in the application of Learning 1.1



Points to Remember

- By following proper cleaning protocols and using appropriate tools and agents, manufacturers can ensure the safety and quality of their powdered milk products.



Theoretical Activity 1.1.4: Description of functionality of machines used in powdered milk plant



Notes to the trainer:

- Trainer may use small group to describe functionality of machines used in powdered milk making.
- The use of drawings, pictures, or videos as didactic materials and catalogues while describing the functionality of machines related to powdered milk 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. Describe the functionality of machines used in powdered milk making.

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

Step 3: Facilitate trainees to present their findings.

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

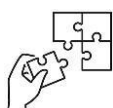
Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key reading 1.1.4 in the trainee manual.



Points to Remember

- These machines work together in a coordinated manner to ensure efficient production, from the raw milk to the final powdered milk product.
- Each step requires precise control of temperature, moisture, and air to maintain product quality and safety.



Application of learning 1.1.

Ask trainees to go to the workshop for powdered milk making to clean tools and equipment.

Checklist

SN	Criteria	Indicators	Yes	No
1	Tools and equipment are well cleaned	1.1 Personal Protective Equipment (PPE) are properly neat, and clean		
		1.2. Clean In Place (CIP) is performed		
		1.3. Clean Out Place (COP) is performed		
		1.4. Cleaning products are well mixed		



Indicative content 1.2: Receiving Raw Milk



Duration: 6 hrs



Practical Activity 1.2.1: Testing raw milk



Notes to the trainer

- The trainer may demonstrate how to test milk to be used in powdered milk making
- Avail tools and equipment in testing 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 powdered milk-making workshop to test raw milk used in powdered milk making.

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

Step 3: Demonstrate how to test raw milk to be used in powdered milk making. While demonstrating, explain the procedures.

Step 4: Ask trainees to test raw milk to be used in powdered milk making and monitor the activity.

Step 5: Verify whether raw milk is well tested and provide feedback where necessary.

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

Step 7: Ask trainees to perform the task provided in the application of Learning 1.2



Points to Remember

- Regular testing ensure that only high-quality milk is used in the production of dairy products including powdered milk, and it helps to maintain the overall safety and consistency of the dairy supply chain.



Practical Activity 1.2.2: Grading raw milk



Notes to the trainer

- The trainer may demonstrate how to grade raw milk used in powdered milk making.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to grade raw milk used in powdered milk making.

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

Step 3: Demonstrate how to grade raw milk used in powdered milk making. While demonstrating, explain each step.

Step 4: Ask trainees to grade raw milk used in powdered milk making and monitor the activity.

Step 5: Verify whether raw milk is well graded and provide feedback where necessary.

Step 6: Ask trainees to read key reading 1.2.2 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 1.2



Points to Remember

- Grading raw milk ensures that it meets safety, quality, and compositional standards.



Practical Activity 1.2.3: Weighing, filtration and storing of raw milk



Notes to the trainer

- The trainer may demonstrate how to weigh, filtrate and store raw milk use in powdered milk making.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to weigh, filtrate and store raw milk use in powdered milk making.

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

Step 3: Demonstrate how to weigh, filtrate and store raw milk use in powdered milk making. While demonstrating, explain the procedures.

Step 4: Ask trainees to weigh, filtrate and store raw milk use in powdered milk making and monitor the activity.

Step 5: Verify whether raw milk is well weighed, filtrated and stored and provide feedback where necessary.

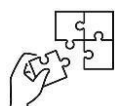
Step 6: Ask trainees to read key reading 1.2.3 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 1.2



Points to Remember

- By carefully weighing, filtering, and storing raw milk, dairy processors maintain the high quality and safety standards necessary for producing products such as powdered milk



Application of learning 1.2.

Ask trainees to go to the workshop of powdered milk making to receive raw milk.

Checklist

SN	Criteria	Indicators	Yes	No
1	Preliminary raw milk test are well performed	1.1 Organoleptic parameters are evaluated		
		1.2. Acidity is tested		
		1.3. Mastitis is tested		
		1.4. Density is measured		
2	Milk is well graded	2.1. Milk is graded to their categories		
		2.2. Milk is graded according to their composition		
3	Weighing, filtration and storing of raw milk is properly performed	3.1. Raw milk is weighed		
		3.2. Raw milk is filtrated		
		3.3. Raw milk is stored		



Indicative content 1.3: Standardizing Milk



Duration: 3 hrs



Theoretical Activity 1.3.1: Description of milk standardization



Notes to the trainer:

- Trainer may use small groups to describe milk standardization.
- The use of drawings, pictures, or videos as didactic materials and catalogues related to milk standardization.



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 do you understand by milk standardization?
- II. What is the purpose of milk standardization?
- III. Suggest any standardization methods that may use in milk standardization.

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

Step 3: Facilitate trainees to present their findings.

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 1.3.1 in the trainee manual



Points to Remember

- Milk standardization is a critical process in dairy production that involves adjusting the fat and solids-not-fat content of milk to meet legal standards and produce uniform, high-quality dairy products.



Practical Activity 1.3.2 Adjusting milk fat content



Notes to the trainer

- The trainer may demonstrate how to adjust milk fat content in raw milk use in powdered milk making.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to adjust milk fat content in raw milk used in powdered milk making.

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

Step 3: Demonstrate how to adjust milk fat content to be used in powdered milk making. While demonstrating, explain each step.

Step 4: Ask trainees to adjust milk fat content to be used in powdered milk making and monitor the activity.

Step 5: Verify whether milk fat content is well adjusted and provide feedback where necessary.

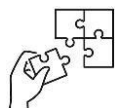
Step 6: Ask trainees to read key reading 1.3.2 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 1.3



Points to Remember

- Adjusting milk fat content is an essential part of dairy processing that enables the production of a variety of milk products to meet consumer preferences and regulatory standards.



Application of learning 1.3.

Ask trainees to go to the workshop of powdered milk making to standardize raw milk used in powdered milk making.

Checklist

SN	Criteria	Indicators	Yes	No
1	Milk fat is well standardized	1.1. Milk is separated		
		1.2. Separation methods are applied		
		1.3. Cream used is calculated		
		1.4. Skim milk used is calculated		
		1.3. Fat content is adjusted in milk		



Indicative content 1.4: Pasteurizing Milk



Duration: 3 hrs



Practical Activity 1.4.1: Pasteurizing milk



Notes to the trainer

- The trainer may demonstrate how to pasteurize milk to be used in powdered milk making.
- Avail tools and equipment used in milk pasteurization.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to pasteurize milk used in powdered milk making.

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

Step 3: Demonstrate how to pasteurize milk used in powdered milk making. While demonstrating, explain each step.

Step 4: Ask trainees to pasteurize milk used in powdered milk making and monitor the activity.

Step 5: Verify whether milk is well pasteurized and provide feedback where necessary.

Step 6: Ask trainees to read key reading 1.4.1 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 1.4



Points to Remember

- By using heat to destroy harmful bacteria and extend shelf life, dairy producers can supply safe, nutritious milk that retains much of its original flavor and nutritional value.



Practical Activity 1.4.2: Checking the effectiveness of pasteurization



Notes to the trainer

- The trainer may suppose to demonstrate how to check the effectiveness of pasteurize milk to be used in powdered milk making
- Avail alkaline phosphatase test kit and peroxidase test kit to be used for ensuring the effectiveness of pasteurization.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to check the effectiveness of pasteurization to be used in powdered milk making.

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

Step 3: Demonstrate how to check the effectiveness of pasteurization used in powdered milk making. While demonstrating, explain each step.

Step 4: Ask trainees to check the effectiveness of pasteurization used in powdered milk making and monitor the activity.

Step 5: Verify if the effectiveness of pasteurization is well checked and provide feedback where necessary.

Step 6: Ask trainees to read key reading 1.4.2 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 1.4



Points to Remember

- Ensuring the effectiveness of pasteurization involves a combination of real-time temperature monitoring, enzyme tests like the phosphatase test, microbiological testing, and chemical or sensory evaluation.



Practical Activity 1.4.3: Homogenizing pasteurized milk



Notes to the trainer

- The trainer may demonstrate how to homogenize pasteurized milk used in powdered milk making.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to homogenize pasteurized milk used in powdered milk making.

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

Step 3: Demonstrate how to homogenize pasteurized milk used in powdered milk making. While demonstrating, explain each step.

Step 4: Ask trainees to homogenize pasteurized milk used in powdered milk making and monitor the activity.

Step 5: Verify whether if pasteurized milk is well homogenized and provide feedback where necessary.

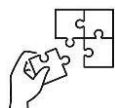
Step 6: Ask trainees to read key reading 1.4.3 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 1.4



Points to Remember

- Homogenization has become a standard practice in most commercial milk production, ensuring high-quality milk for a wide range of dairy products as fat globules diameters are reduced and homogeneously distributed throughout the milk.



Application of learning 1.4.

Ask trainees to go to the workshop of powdered milk making to pasteurize and homogenize the milk.

Checklist

SN	Criteria	Indicators	Yes	No
1	Milk is well pasteurized	1.1. Temperature is respected		
		1.2. Time is respected		
		1.3. The effectiveness of pasteurization is checked		
2	Milk is well homogenized	2.1. Pressure is applied		
		2.2. Homogenization temperature is respected		
		2.3. Fat particles are reduced		
		2.4. Fat particles are homogeneously distributed		



Learning outcome 1 end assessment

Theoretical assessment

Q1. Read the following statement related to materials used in powdered milk making and answer **True** if statement is **correct**, and **False** if the statement is **wrong**:

- a) Skimmed milk is used in powdered milk to increase the fat content.

Answer: False

- b) Cleaning product like Caustic Soda is effective to remove grease and oil from equipment.

Answer: True

- c) Antioxidants are added to powdered milk to increase its protein content.

Answer: False

- d) Cardboard boxes are used to protect powdered milk during transportation.

Answer: True

- e) Powdered milk is only packaged in plastic bags for bulk storage.

Answer: False

Q2. The following are descriptions relating to cleaning of workplace for powdered milk making workshop. **Choose the correct answer by encircling the correct letter:**

- a) Why is selection of cleaning agent being important in microbial control?

- i) To change the color of the milk
- ii) To reduce microbial contamination on surfaces
- iii) To improve the smell of the cleaning agent
- iv) To increase the acidity of the milk

Answer: ii) To reduce microbial contamination on surfaces

- b) Which one of the following cleaning agents is commonly used for microbial control?

- i) Sodium hydroxide
- ii) Peracetic acid
- iii) Nitric acid
- iv) Water

Answer: b) Peracetic acid

c) Which cleaning technique is used for internal equipment like pipes and tanks without disassembling them?

- i) Cleaning out of place (COP)
- ii) Clean-in-place (CIP)
- iii) Spray cleaning
- iv) Soaking

Answer: ii) Clean-in-place (CIP)

d) Which one of the cleaning technique involves in disassembling equipment to clean external parts and areas that CIP cannot reach?

- i) Clean-in-place (CIP)
- ii) Spray cleaning
- iii) Cleaning out of place (COP)
- iv) Soaking

Answer: iii) Cleaning out of place (COP)

e) Which cleaning uses high-pressure spray nozzles to clean equipment surfaces?

- i) Soaking
- ii) Spray cleaning
- iii) Scrubbing
- iv) Rinsing

Answer: ii) Spray cleaning

Q3. Read the following statement related to receiving raw milk and fill in the provided space by the appropriate term/number in brackets: (**alcohol, adulteration, somatic cell count, 1.32, 1.26, bacteria, fat, water, mastitis**).

a. A low _____ in raw milk indicates healthy cows and a reduced risk of mastitis.

Answer: A low **somatic cell count** in raw milk indicates healthy cows and a reduced risk of mastitis.

b. The milk should be stored and transported at a temperature that prevents _____ growth.

Answer: The milk should be stored and transported at a temperature that prevents **bacterial** growth.

- c. The _____ test is mainly used to detect the degree of acidity in the milk by checking for coagulation.

Answer: The **alcohol** test is mainly used to detect the degree of acidity in the milk by checking for coagulation.

- d. The _____ test is used to check for inflammation of the mammary glands in cows, which can affect milk quality.

Answer: The **mastitis/somatic cell count** test is used to check for inflammation of the mammary glands in cows, which can affect milk quality.

- e. If the specific gravity of milk at 15°C is below _____, it may indicate the addition of water to the milk.

Answer: If the specific gravity of milk at 15°C is below **1.026**, it may indicate the addition of water to the milk.

- f. Preliminary raw milk tests help ensure the milk is safe for human consumption by identifying spoilage and detecting _____.

Answer: Preliminary raw milk tests help ensure the milk is safe for human consumption by identifying spoilage and detecting **adulteration**.

Q4 Match pre-treat raw milk terminologies in **Column A**, with their descriptions in **Column B**; and **write the letter corresponding to the correct description in provided space**.

Answer	Column A	Column B
.....b.....	1. Purpose of Homogenization	a. Uses high-frequency sound waves to break down fat globules.
.....d.....	2. High-Pressure Homogenization	b. Ensures a consistent texture throughout the milk.
.....a.....	3. Ultrasonic Homogenization	c. Simple, cost-effective for smaller setups.
.....c.....	4. Mechanical Homogenization	d. Most common method, forcing milk through a narrow orifice.
.....e.....	5. Improved Texture	e. Creates a smoother, more uniform appearance for milk products.
.....f.....	6. Alkaline Phosphatase Test	f. Used to check if milk has been pasteurized effectively.
.....g.....	7. Peroxidase Test	g. Uses a reagent to detect enzyme activity indicating pasteurization effectiveness.

.....h.....	8. Extended Shelf Life	h. Prevents the separation of fat globules, extending shelf life.
.....i....	9. Ultrasonic Homogenization Advantage	i. Gentler process that preserves milk's taste and nutritional value.

Q5. What is the function of alkaline phosphatase test?

Answer: Alkaline phosphatase test is used to indicate whether milk is adequately pasteurized or whether it is contaminated with raw milk after pasteurization.

END

Practical assessment

The production unit of XYZ School requested to supply pasteurized milk of reduced fat content with 2.5 % to their client A&B Hotel. Ask trainees to go to the powdered milk-making workshop to receive raw milk, standardize and pasteurize milk. The activity will be performed within four (4) hours. All necessary tools and equipment are available in the workshop.

Checklist:

SN	Criteria	Indicator	Scores	
			Yes	No
1.	Preliminary raw milk test are well performed	1.1. Organoleptic parameters are evaluated		
		1.2. Acidity is tested		
		1.3. Density is measured		
		1.4. Mastitis is tested		
		1.5. Milk is weighed		
		1.6. Milk is filtrated		
		1.7. Milk is stored		
2.	Raw milk is well standardized	2.1. Milk is separated		
		2.2. Cream and skimmed milk rate is accurately calculated		
		2.3. Fat content is adjusted		
3.	Milk is properly pasteurized	3.1. Pasteurization temperature is respected		
		3.2. Pasteurization time is respected		
		3.3. Effectiveness of pasteurization is checked		
		3.4. Homogenization temperature is respected		
		3.5. Homogenization pressure is applied		
		3.6. Fats are distributed in milk		

END



Further information to the trainer

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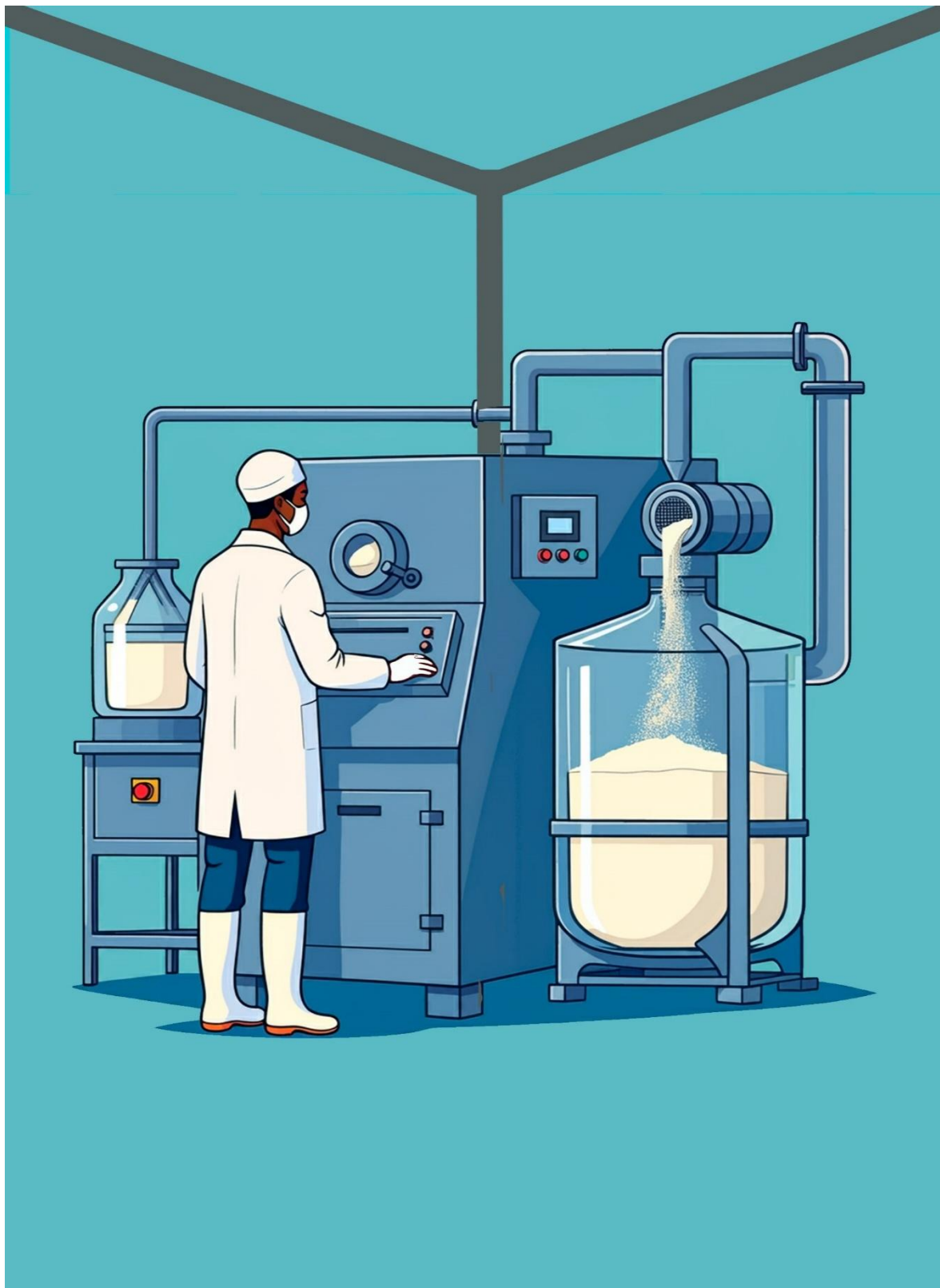
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Learning Outcome 2: Perform Milk Drying



Indicative contents

2.1. Concentrating Milk

2.2. Drying Concentrated Milk

Key Competencies for Learning Outcome 2: Perform Milk Drying

Knowledge	Skills	Attitudes
• Description the types of concentrated milk and their specifications • Identification the factors that affect dryness of milk • Description of Powdered milk specifications • Description of the yield of the milk powder	• Concentrating the milk • Drying the concentrated milk • Analysing the quality of concentrated milk and powdered milk	• Paying attention when concentrating and drying the milk • Being honest while analysing the quality of concentrated milk and powdered milk • Being accurate while calculating the yield of the milk powder • Being decision maker when analysing the quality of concentrated and powdered milk



Duration: 25hrs

Learning outcome 2 objectives:



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

1. Describe appropriately the types of concentrated milk and their specifications
2. Concentrate properly milk according to concentration methods
3. Dry properly the concentrated milk according to drying methods
4. Identify properly the factors affecting the dryness of the milk powder
5. Describe clearly powdered milk specifications according to their types
6. Determine properly the yield of the milk powder according to the products needed
7. Analyse effectively the quality of concentrated milk and milk powder according to their types



Resources

Equipment	Tools	Materials
• Milk atomizer, • Spray dryer, • roller/drum dryer, • freezer, • falling film • evaporators, • storage tank, • fluidized bed cooler, • pneumatic conveyor, • boiler, • oven	• Thermometer, • Timer, • Moisture meter, • Calculator	• Concentrated milk



Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail a classroom and workshop
- Avail tools and equipment for milk drying
- Avail pasteurized and homogenised milk

- Prepare teaching aids and didactic materials (manuals/guides, photos, videos, protocols) related to milk drying.



Indicative content 2.1: Concentrating Milk



Duration: 8hrs



Theoretical Activity 2.1.1: Description the types of concentrated milk



Notes to the trainer:

- Trainer may form a small group to describe the types of concentrating milk
- The use of drawings, pictures, or videos as didactic materials and catalogue related to concentrated 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. According to your understanding, what should be the purpose of concentrating milk?
- II. What should be the types of concentrating milk.

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

Step 3: Facilitate trainees to present their findings.

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 specific specifications, such as nutritional content and caloric values, may vary depending on the brand and type of products. Always refer to the product label for the most accurate information.



Practical Activity 2.1.2: Performing milk concentration



Notes to the trainer

- The trainer may demonstrate how the concentration of milk is performed.
- Avail tools and equipment used in milk concentration.
- Prepare a field visit in the dairy industry that process concentrated milk.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to concentrate milk.

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

Step 3: Demonstrate how to concentrate milk. While demonstrating, explain each step.

Step 4: Ask trainees to concentrate milk used in powdered milk and monitor the activity.

Step 5: Verify whether the milk is concentrated properly and provide feedback where necessary.

Step 6: Ask trainees to read key reading 2.1.2 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning **2.1**



Points to Remember

- Thermal evaporation is traditional and cost-effective, freeze concentration preserves quality, and reverse osmosis is energy-efficient and nutrient-friendly.



Practical Activity 2.1.3 Analysing the quality of concentrated milk



Notes to the trainer

- The trainer may demonstrate how to analyse quality of concentrated milk.
- Avail tools and equipment used to analyse quality of concentrated milk.
- Avail the protocol of analysing the different parameters of concentrated milk.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to analyse the quality of concentrated milk.

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

Step 3: Demonstrate how to analyse the quality of concentrated milk. While demonstrating, explain each step.

Step 4: Ask trainees to analyse the quality of concentrated milk and monitor the activity.

Step 5: Verify whether if concentrated milk is well analysed and provide feedback where necessary.

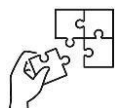
Step 6: Ask trainees to read key reading 2.1.3 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 2.1



Points to Remember

- By conducting quality analysis, manufacturers can ensure that their concentrated milk products meet the highest standards of safety, nutritional value, and consumer satisfaction.



Application of learning 2.1.

Ask trainees to go to the powdered milk making workshop, to concentrate pasteurized milk and analyse its quality parameters used in powdered milk making.

SN	Criteria	Indicators	Yes	No
1	Pasteurized milk are well concentrated	1.1. The milk concentration method is applied		
		1.2. Milk concentration equipment are well operated		
		1.3. Milk concentration rate is achieved		
2	Concentrated milk are effectively analysed	2.1. Physical parameters are evaluated		
		2.2. Chemical parameters are analysed		



Indicative content 2.2: Drying Concentrated Milk



Duration: 17 hrs



Practical Activity 2.2.1: Drying of concentrated milk



Notes to the trainer

- The trainer may demonstrate how drying concentrated milk is performed.
- Avail tools and equipment used in drying concentrated milk.
- Prepare a field visit to the dairy industry that process powdered milk.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to the powdered milk making workshop to dry the concentrated milk.

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

Step 3: Demonstrate how drying milk is performed. While demonstrating, explain each step.

Step 4: Ask trainees to dry milk by using different methods and monitor the activity.

Step 5: Verify whether the milk is dried 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

- Each drying method has specific applications depending on the desired product characteristics, with spray drying being the most common for producing high-quality milk powder for general consumption.



Theoretical Activity 2.2.2: Identification of the factors that affect dryness of milk and description of powdered milk specifications



Notes to the trainer:

Trainer may use small groups; to identify the factors affecting dryness of milk and describe powdered milk specifications.



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 should be the factors affecting dryness of milk?
- ii. Suggest the specifications of powdered milk.

Step 2: Ask trainees to write their findings on paper or flip charts.

Step 3: Facilitate trainees to present their findings.

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 2.2.2 in the trainee manual.



Points to Remember

- The specific specifications for powdered milk can vary depending on the intended use, such as infant formula, baking, or beverage applications. It's essential to consult the product label or relevant standards for detailed information.



Theoretical Activity 2.2.3.: Determination of the yield of the milk powder



Notes to the trainer:

Trainer may use small groups to describe the determination of the yield of the milk powder.



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 should be the factors affecting the yield of the milk powder?
- II. How can you calculate the yield of the milk powder?

Step 2: Ask trainees to write their findings on paper or flip charts.

Step 3: Facilitate trainees to present their findings.

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 2.2.3 in the trainee manual



Points to Remember

- By carefully considering these factors and employing appropriate methods, manufacturers can effectively determine and optimize the yield of milk powder.



Practical Activity 2.2.4: Analysing the quality of powdered milk



Notes to the trainer

- The trainer may demonstrate how to analyse quality of powdered milk.
- Avail tools and equipment used to analyse quality of powdered milk.
- The trainer may have the protocol for analysing the different parameters of powdered milk.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to analyse the quality of powdered milk

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

Step 3: Demonstrate how to analyse the quality of powdered milk. While demonstrating, explain each step.

Step 4: Ask trainees to analyse the quality of powdered milk and monitor the activity.

Step 5: Verify whether if powdered milk is well analysed and provide feedback where necessary.

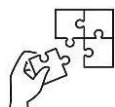
Step 6: Ask trainees to read key reading 2.2.4 in the trainee manual

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



Points to Remember

- By conducting quality analysis, manufacturers can ensure that their powdered milk products meet the highest standards of safety, nutritional value, and consumer satisfaction.



Application of learning 2.2.

Ask trainees to go to the powdered milk making workshop, to dry concentrated milk and analyse the quality of powdered milk.

Checklist

SN	Criteria	Indicators	Yes	No
1	Concentrated milk is well dried	1.1. Milk drying method is applied		
		1.2. Milk equipment are operated		
		1.3. Powdered dryness is achieved		
2	Powdered milk is effectively analysed	2.1. Physical parameters are evaluated		
		2.2. Chemical parameters are analysed		



Learning outcome 2 end assessment

Theoretical assessment

- I. Read the statement below related to the types of concentrating milk and their specifications and answer **True** if it is **correct** and **False** if it is **wrong**:

1. Concentrating milk helps reduce transportation costs by increasing the water content.

Answer: False

2. Evaporated milk contains added sugar, making it sweeter than regular milk.

Answer: False

3. Whey powder is derived from the liquid left over after curdling milk in cheese production.

Answer: True

4. Sweetened condensed milk typically has a thicker texture than evaporated milk.

Answer: True

5. Powdered milk has nearly all the water removed, making it ideal for long-term storage.

Answer: True

- II. The following are descriptions relating to drying of milk. **Choose the appropriate description by encircling the letter corresponding to the correct answer:**

1. Which drying method involves removing the water by sublimation?

- a. Spray drying
- b. Freeze drying
- c. Roller drying
- d. Thermal evaporation

Answer: b

2. Which one of the following factors does **NOT** affect dryness of milk powder?

- a. Temperature
- b. Time
- c. Drying method
- d. Milk's original fat content

Answer: d

- III. Match the type of concentrated milk in **Column A**, with their descriptions in **Column B**; and **write the letter corresponding to the correct description in provided space.**

Answer	Column A	Column B
--------	----------	----------

...a...	1. Sweetened condensed milk	a. Contains added sugar and has a thick consistency
...b....	2. Evaporated milk	b. Concentrated milk with a high water content
...c....	3. Powdered milk	c. Milk that has been dried to a powder form
...e.	4. Buttermilk powder	d. Powdered form of whey
...d..	5. Whey powder	e. Powdered from buttermilk

III. What is the amount of moisture content in:

- a) Concentrated
- b) powdered milk

Answer:

b) Whole milk powder usually contains around 3-5 % moisture

a) Sweetened condensed milk generally contains around 25 % moisture.

IV. Differentiate spray drying from roller drying.

Answer:

Spray drying: Liquid is atomized into tiny droplets and sprayed into a hot chamber. The rapid evaporation of water results in a dried powder.

Roller drying: Liquid is spread onto a heated rotating drum. The heat evaporates the water, leaving a dried film that is scraped off.

V. Use the following data and Calculate the yield of powdered milk:

Raw milk: 1000 kg

Solids content: 12%

Powdered milk moisture: 3%

Evaporation efficiency: 90%

Spray drying efficiency: 88%

Answer:

Data: Raw milk= 1000 kg Solids content: =12% Powdered milk moisture: 3%=0.03

Evaporation efficiency= 90%=0.9 Spray drying efficiency= 88%=0.88

Formula: Overall yield = Raw milk*Solids content*(1-powdered milk moisture %)*evaporation efficiency*spray efficiency

Solution: Overall yield = 1000 Kg*12*(1-0.03)*0.9*0.88=285.12kg

Practical assessment

SSISO nursery school signed a supply contract with AYACU dairy milk processing Ltd. to supply powdered milk to feed their pupils. The AYACU dairy milk processing Ltd. must supply 5kg of powdered milk as sample. Ask trainees to go to the powdered milk-making workshop to produce 5kg of powdered milk. This activity will be performed within four (4) hours and all required tools and equipment are available in the workshop.

Checklist

SN	Criteria	Indicator	Scores	
			Yes	No
1	Pasteurized milk are well concentrated	1.1. The milk concentration method is applied		
		1.2. Milk concentration equipment are operated		
		1.3. Milk concentration rate is achieved		
2	Concentrated milk are effectively analysed	2.1. Physical parameters are evaluated		
		2.2. Chemical parameters are analysed		
3	Concentrated milk is well dried	3.1. Milk drying method is applied		
		3.2. Milk equipment are operated		
		3.3. Powdered dryness is achieved		
4	Powdered milk is effectively analysed	4.1. Physical parameters are evaluated		
		4.2. Chemical parameters are analysed		

END



Further information to the trainer

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Learning Outcome 3: Store powdered milk



Indicative contents

3.1 Packaging of powdered milk

3.2 Labelling of packaged milk powder

3.3 Storing powdered milk

Key Competencies for Learning Outcome 3: Storing powdered milk

Knowledge	Skills	Attitudes
• Description of pre-packaging standard of the powdered milk products • Identification of the factors that affect packaging of powdered milk • Description of the requirements of a good packaging material for powdered milk • Description of the standards for labelling package powdered milk • Description of the information appearing on the powdered milk label • Description of the storage requirements of powdered milk	• Packaging of powdered milk • Labelling of the package powdered milk • Store powdered milk	• Being attentive while packaging powdered milk • Being an effective communicator when labelling the package of powdered milk • Being protective while storing powdered milk



Duration: 10 hrs

Learning outcome 3 objectives:



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

1. Describe properly the pre-packaging standard of the powdered milk products
2. Identify properly the factors that affect packaging of powdered milk
3. Describe correctly the requirements of a good packaging material for powdered milk
4. Package properly powdered milk according to the standards
5. Describe correctly the standards for labelling package powdered milk
6. Describe properly the information appearing on the powdered milk label
7. Label properly the package of powdered milk according to the standards
8. Describe correctly the storage requirements of powdered milk
9. Store properly the powdered milk according to the storage requirements



Resources

Equipment	Tools	Materials
• PPE, • filling machines, • sealing machine, • labelling machine	• Balance, • moisture meter • sampler	• Powdered milk, • Metal cans, • plastic container, • Multilayer pouches, • paper bags



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
- Prepare teaching aids and didactic materials (manuals/guides, task sheets, photos, audio-visuals, protocols) related to storing of powdered milk making



Indicative content 3.1: Packaging of Powdered Milk



Duration: 5 hrs



Theoretical Activity 3.1.1: Description of pre-packaging standard of the powdered milk products



Notes to the trainer:

- Trainer may use small groups to describe pre-packaging standard of the powdered milk 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. According to your knowledge, what are the purposes of packaging powdered milk
- ii. Describe the pre-packaging standard of the powdered milk products.

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

Step 3: Facilitate trainees to present their findings.

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 3.1.1 in the trainee manual



Points to Remember

- These pre-packaging standards ensure that powdered milk remains safe, nutritious, and fresh from the manufacturing process to the consumer's hands.



Theoretical Activity 3.1.2: Identification of the factors that affect packaging of powdered milk



Notes to the trainer:

- Trainer may use small groups to identify the factors that affect packaging of powdered milk.



Key steps:

While delivering this activity, pass through the following steps:

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

- According to your knowledge, identify of the factors that affect packaging of powdered milk

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

Step 3: Facilitate trainees to present their findings.

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 3.1.2 in the trainee manual



Points to Remember

- The factors considered to ensure that powdered milk packaging not only protects the product but also meets market demands, safety regulations, and environmental considerations.



Theoretical Activity 3.1.3: Description of the requirements of a good packaging material for powdered milk



Notes to the trainer:

- Trainer may use small groups to describe the requirements of a good packaging material for powdered milk.



Key steps:

While delivering this activity, pass through the following steps:

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

- i. According to your knowledge, what are the requirements of a good packaging material for powdered milk?

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

Step 3: Facilitate trainees to present their findings.

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 3.1.3 in the trainee manual



Points to Remember

- By meeting these requirements, packaging materials for powdered milk can effectively preserve product quality and safety while ensuring consumer satisfaction.



Practical Activity 3.1.4: Packaging of powdered milk



Notes to the trainer

- The trainer may demonstrate how to package powdered milk.
- Avail packaging materials.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to package powdered milk.

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

Step 3: Demonstrate how to package powdered milk. While demonstrating, explain each step.

Step 4: Ask trainees to package powdered milk and monitor the activity.

Step 5: Verify whether powdered milk is well packaged and provide feedback where necessary.

Step 6: Ask trainees to read key reading 3.1.4 in the trainee manual

Step 7: Ask trainees to perform the task provided in the application of Learning 3.1



Points to Remember

- Effective packaging of powdered milk requires materials and designs that protect the product from moisture, oxygen, light, and contamination while offering durability and convenience for consumers.
- The packaging must also comply with food safety regulations and be designed to meet environmental concerns, increasingly focusing on recyclability and sustainability.



Application of learning 3.1.

In your school, ask trainees to go to the powdered milk making workshop to pack five (5) cans of processed powdered milk; each contains 1000g.

Checklist

SN	Criteria	Indicators	Observation	
			Yes	No
1	Packaging material are well selected	1.1 Packaging materials (cans) is selected		
		1.2 Can quantity capacity (1000g) is respected		
2	Packaging material is well prepared	2.1 Cans are cleaned		
		2.2 Cans are sterilized		
3	Powdered milk is properly packaged	3.1 Equipment are cleaned		
		3.2 Equipment is sterilized		
		3.3 Filling containers with the product is performed		
		3.4 Sealing of packaging material is done		



Indicative content 3.2: Labelling of Packaged Milk Powder



Duration: 3 hrs



Theoretical Activity 3.2.1: Description of the standards for labelling packaged powdered milk



Notes to the trainer:

- Trainer may use small groups to describe the description of the standards for labelling package-powdered 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. According to your knowledge, describe the purpose of labelling
- ii. Based to your knowledge, describe the standards for labelling package-powdered milk.

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

Step 3: Facilitate trainees to present their findings.

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 3.2.1 in the trainee manual



Points to Remember

- By adhering to these labelling standards, manufacturers ensure that powdered milk products are marketed transparently, safely, and in compliance with local and international regulations.



Theoretical Activity 3.2.2: Description of the information appearing on the powdered milk label



Notes to the trainer:

- Trainer may use small groups to describe of the information appearing on the powdered milk label.



Key steps:

While delivering this activity, pass through the following steps:

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

- I. According to your knowledge, describe the information appearing on the powdered milk label

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

Step 3: Facilitate trainees to present their findings.

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 3.2.2 in the trainee manual



Points to Remember

- This comprehensive labelling ensures that consumers have all the necessary information to use powdered milk safely and appropriately while complying with food safety regulations.



Practical Activity 3.2.3: Labelling of the package of powdered milk



Notes to the trainer

- The trainer may demonstrate how to label the packaged powdered milk.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to label the packaged powdered milk.

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

Step 3: Demonstrate how to label the package of powdered milk. While demonstrating, explain each step.

Step 4: Ask trainees to label the packaged powdered milk and monitor the activity.

Step 5: Verify whether the package of powdered milk is well labelled and provide feedback where necessary.

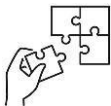
Step 6: Ask trainees to read key reading 3.2.3 in the trainee manual

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



Points to Remember

- By ensuring that all these elements are present and clearly displayed, manufacturers comply with food safety regulations, while consumers receive the necessary information to use the product safely and appropriately.



Application of learning 3.2.

In your school, ask trainees to go to the powdered milk making workshop to label packaged can contains 1000g of processed powdered milk.

Checklist

SN	Criteria	Indicators	Observation	
			Yes	No
1	packaged powdered milk is well labelled	1.1 Label is well designed		
		1.2 Name of product is mentioned		
		1.3 Manufacturer's address is mentioned		
		1.4 Manufacturing date & Expired date is mentioned		
		1.5 Net content is indicated		
		1.6 Composition analysis is declared		
		1.7 Preparation instructions is mentioned		
		1.8 Storage conditions is stated		
		1.9 Country of origin is declared		
		1.10 Labels are attached to the packaged powdered milk container		

End



Indicative content 3.3: Storing Powdered Milk



Duration: 2 hrs



Theoretical Activity 3.3.1: Description of the storage requirements of powdered milk



Notes to the trainer:

- Trainer may use small groups to describe the storage requirements of powdered 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:

- Based to your knowledge, what are the purposes of storing powdered milk?
- According to your knowledge, describe the storage requirements of powdered milk.

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

Step 3: Facilitate trainees to present their findings.

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 3.3.1 in the trainee manual



Points to Remember

- By following these storage guidelines, you can maximize the shelf life and quality of powdered milk, ensuring it remains safe and nutritious for use.



Practical Activity 3.3.2: Storing powdered milk



Notes to the trainer

- The trainer may demonstrate how to store packaged powdered milk.



Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go to the powdered milk making workshop to store powdered milk.

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

Step 3: Demonstrate how to store packaged powdered milk. While demonstrating, explain the procedures.

Step 4: Ask trainees to store powdered milk and monitor the activity.

Step 5: Verify whether powdered milk is well stored and provide feedback where necessary.

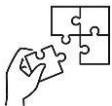
Step 6: Ask trainees to read key reading 3.3.2 in the trainee manual

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



Points to Remember

- By following these storage procedures, you can help ensure the quality, safety, and longevity of your powdered milk.



Application of learning 3.3.

Ask trainees to go to the powdered milk making workshop to store packaged powdered milk.

Checklist

SN	Criteria	Indicators	Observation	
			Yes	No
1	Powdered milk are well stored	1.1 Requirements to store powdered milk are followed		
		1.2 Storage conditions are respected		
		1.3 Storing temperature is monitored		
		1.4 Relative humidity range is maintained		
		1.5 Absence of light is respected		
		1.6 Storage procedures are used		



Learning outcome 3 end assessment

Theoretical assessment

1. Read the following statement related to packaging of powdered milk making and answer **True** if statement is **correct** and **False** if the statement is **wrong**:

a) Packaging powdered milk has no effect on preventing oxidation or protecting the product from air exposure.

Answer: False

b) Proper packaging of powdered milk does not help prevent microbial contamination.

Answer: False

c) Packaging powdered milk makes it easier to transport and store without contamination or spillage.

Answer: True

d) Proper sealing and sterilization of packaging equipment is unnecessary for powdered milk products.

Answer: False

e) Packaging for powdered milk should be designed to ensure safety and prevent accidental spills or leaks.

Answer: True

2. Read the following statement related to packaging of powdered milk and fill in the provided space the appropriate terminologies in brackets: (**Light, mechanical, chemical, moisture, cost, oxygen, laminated, heat, pouches, rigid**).

a. The packaging material for powdered milk should provide a _____ barrier to prevent the ingress of moisture and avoid spoilage and clumping of the product.

Answer: Moisture

b. To prevent rancidity, the packaging must also serve as an _____ barrier to block oxygen from reaching the powdered milk.

Answer: Oxygen

c. A _____ barrier is necessary to block light and prevent the degradation of sensitive nutrients like vitamins in the powdered milk.

Answer: Light

d. The packaging should possess _____ strength to withstand transportation and handling without tearing or breaking.

Answer: Mechanical

e. The packaging material must exhibit _____ inertness to ensure it is food-safe and does not react with the powdered milk.

Answer: Chemical

- f. Common packaging materials for powdered milk include _____ films, which are made by combining different layers of materials like polyethylene and aluminum foil.

Answer: Laminated

- g. _____ containers can be made of plastic, metal, or cardboard and offer good protection but may be heavier and more expensive than flexible packaging.

Answer: Rigid

- h. _____ are typically made of flexible materials such as polyethylene or polypropylene, making them lightweight, convenient, and cost-effective for powdered milk.

Answer: Pouches

3. Match the packaging procedure step in Column A, with their descriptions in Column B; and write the letter corresponding to the correct description in provided space.

Answer	Column A	Column B
.....C.....	1. Preparation and Cleaning	A. Accurately weigh the desired amount of powdered milk for each package.
.....F.....	2. Filling	B. Store packaging materials in a clean and dry environment.
.....E.....	3. Sealing	C. Clean and sanitize packaging equipment, ensuring no contaminants are present.
.....D.....	4. Coding and Labelling	D. Apply codes and labels with product information and traceability.
.....B.....	5. Inspection and Quality Control	E. Ensure seals are intact and verify package weights.
...A.....	6. Packaging Material Handling	F. Use filling machines to transfer the powdered milk into containers.
.....G.....	7. Product Storage	G. Store the packaged powdered milk under appropriate temperature and humidity.
...H.....	8. Shipping and Distribution	H. Pack and arrange for transportation, ensuring proper handling during transit.

Practical assessment

Your school plan to go to the exhibition of agriculture and animal products. They want five cans of powdered milk. Ask trainees to go to the powdered milk making workshop to pack five (5) cans of powdered milk, each contain 5kg, label and store packaged

powdered milk within 3 hours. All necessary tools and equipment are available in the workshop.

Checklist

SN	Criteria	Indicators	Observation	
			Yes	No
1	Packaging material are well selected	1.1 Packaging materials (cans) is selected		
		1.2 Can quantity capacity (5kg) is respected		
2	Packaging material is well prepared	2.1 Cans are cleaned		
		2.2 Cans are sterilized		
3	Powdered milk is properly packaged	3.1 Equipment are cleaned		
		3.2 Equipment is sterilized		
		3.3 Filling containers with the product is performed		
		3.4 Sealing of packaging material is done		
4	packaged powdered milk is well labelled	4.1 Label is well designed		
		4.2 Name of product is mentioned		
		4.3 Manufacturer's address is mentioned		
		4.4 Manufacturing date & Expired date is mentioned		
		4.5 Net content is indicated		
		4.6 Composition is declared		
		4.7 Preparation instructions is mentioned		
		4.8 Storage conditions is stated		
		4.9 Country of origin is declared		
		4.10 Labels are attached to the packaged powdered milk container		
5	Powdered milk is well stored	5.1 Storing temperature is monitored		
		5.2 Relative humidity range is maintained		

		5.3 Lighting is respected		
		5.4 Storing room is well arranged		

END



Further information to the trainer

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