



RQF LEVEL 5



FOPPA503

FOOD PROCESSING

Pasta Making

TRAINEE'S MANUAL

October, 2024



PASTA MAKING



AUTHOR'S NOTE PAGE (COPYRIGHT)

The competent development body of this manual is Rwanda TVET Board ©, reproduce with permission.

All rights reserved.

- This work has been produced initially with the Rwanda TVET Board with the support from KOICA through TQUM Project
- This work has copyright, but permission is given to all the Administrative and Academic Staff of the RTB and TVET Schools to make copies by photocopying or other duplicating processes for use at their own workplaces.
- This permission does not extend to making of copies for use outside the immediate environment for which they are made, nor making copies for hire or resale to third parties.
- The views expressed in this version of the work do not necessarily represent the views of RTB. The competent body does not give warranty nor accept any liability
- RTB owns the copyright to the trainee and trainer's manuals. Training providers may reproduce these training manuals in part or in full for training purposes only. Acknowledgment of RTB copyright must be included on any reproductions. Any other use of the manuals must be referred to the RTB.

© **Rwanda TVET Board**

Copies available from:

- *HQs: Rwanda TVET Board-RTB*
- *Web: www.rtb.gov.rw*
- **KIGALI-RWANDA**

Original published version: October 2024

ACKNOWLEDGEMENTS

The publisher would like to thank the following for their assistance in the elaboration of this training manual:

Rwanda TVET Board (RTB) extends its appreciation to all parties who contributed to the development of the trainer and trainee's manuals for the TVET Certificate V in Food Processing, specifically for the module **"FOPPA503: Pasta Making"**.

We extend our gratitude to KOICA Rwanda for its contribution to the development of these training manuals and for its ongoing support of the TVET system in Rwanda.

We extend our gratitude to the TQUM Project for its financial and technical support in the development of these training manuals.

We would also like to acknowledge the valuable contributions of all TVET trainers and industry practitioners in the development of this training manual.

The management of Rwanda TVET Board extends its appreciation to both its staff and the staff of the TQUM Project for their efforts in coordinating these activities.

This training manual was developed:

Under Rwanda TVET Board (RTB) guiding policies and directives



Under Financial and Technical support of



COORDINATION TEAM

RWAMASIRABO Aimable

MARIA Bernadette M. Ramos

NTAHONTUYE Felix

Production Team

Authoring and Review

NSHUTIYIMANA Abel

MUKANEZA Germaine

Validation

ISINGIZWE Jean De Dieu

RUVUGO Jean Claude

Conception, Adaptation and Editorial works

HATEGEKIMANA Olivier

GANZA Jean Francois Regis

HARELIMANA Wilson

NZABIRINDA Aimable

DUKUZIMANA Therese

NIYONKURU Sylvestre

NDAGIJIMANA Vincent

Formatting, Graphics, Illustrations, and infographics

YEONWOO Choe

SUA Lim

SAEM Lee

SOYEON Kim

WONYEONG Jeong

NYIRANTEZIMANA Odette

BAYAVUGIYIKI Theogene

Financial and Technical support

KOICA through TQUM Project

TABLE OF CONTENT

AUTHOR'S NOTE PAGE (COPYRIGHT)	iii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENT	vii
ACRONYMS	ix
INTRODUCTION	1
MODULE CODE AND TITLE: FOPPA503 PASTA MAKING	2
Learning Outcome 1: Prepare Workplace and Ingredients	3
Key Competencies For Learning Outcome 1: Prepare Workplace and Ingredients	4
Indicative Content 1.1: Selecting Tools and Equipment for Pasta Making	6
Indicative Content 1.2: Selecting Cleaning Agents used in Pasta Making	19
Indicative Content 1.3: Selecting Ingredients Used In Pasta Making	24
Indicative Content 1.4: Selecting Pasta Packaging Materials	28
Indicative Content 1.5: Arranging Workplace for Pasta Making	34
Indicative Content 1.6: Preparing the Ingredients for Pasta Making	44
Learning outcome 1 end assessment	48
Reference	51
Learning Outcome 2: Make Fresh Pasta	52
Key Competencies for Learning Outcome 2 : Make Fresh Pasta	53
Indicative Content 2.1: Making Dough for Pasta	55
Indicative Content 2.2: Checking Quality Parameters of Dough	67
Indicative Content 2.3: Performing Extrusion of the Dough for Pasta Making	71
Learning outcome 2 end assessment	82
Reference	85
Learning Outcome 3: Preserve Pasta	86
Key Competencies for Learning Outcome 3 : Preserve Pasta	87
Indicative content 3.1: Drying Fresh Pasta	89
Indicative Content 3.2: Cooling of Pasta	94
Indicative Content 3.3: Checking Pasta Quality	98
Indicative content 3.4: Packaging of Pasta	102
Indicative Content 3.5: Storing Pasta	105

Learning outcome 3 end assessment -----	108
Reference-----	111

ACRONYMS

%: Percent

°C: Degree celcius

Nº: Number

ATP: Adenosine Triphosphate

CFU: Colony Forming Units

CIP: Clean In Place

COP: Clean Out Place

CBT/A: Competency Based Training/Assessment

FOP: Food Processing

FOPPA503: Food Processing, Pasta Making Level5, Version 3

KOICA: Korea International Cooperation Agency

MAP: Modified Atmosphere Packaging

PE: Polyethylene

PH: potential Hydrogen

PP: Polypropylene

PPE: Personal Protective Equipment

PVC: Polyvinyl Chloride

RTB: Rwanda TVET Board

SOPs: Standard Operating Procedures

TQUM Project: TVET Quality Management Project

TVET: Technical and Vocational Education and Training

INTRODUCTION

This trainee's manual includes all the knowledge and skills required in food processing specifically for the module of "**Pasta 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 trainee'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 trainee, you will start by addressing questions related to the activities, which are designed to foster critical thinking and guide you towards practical applications in the labor market. The manual also provides essential information, including learning hours, required materials, and key tasks to complete throughout the learning process.

All activities included in this training manual are designed to facilitate both individual and group work. After completing the activities, you will conduct a formative assessment, referred to as the end learning outcome assessment. Ensure that you thoroughly review the key readings and the 'Points to Remember' section.

MODULE CODE AND TITLE: FOPPA503 PASTA MAKING

Learning Outcome 1: Prepare Workplace and Ingredients.

Learning Outcome 2: Make Fresh Pasta.

Learning Outcome 3: Preserve Pasta.

Learning Outcome 1: Prepare Workplace and Ingredients



Indicative contents

- 1.1. Selecting Tools and Equipment for Pasta Making**
- 1.2. Selecting Cleaning Agents used in Pasta Making**
- 1.3. Selecting Ingredients used in Pasta Making**
- 1.4. Selecting Pasta Packaging Materials**
- 1.5. Arranging Workplace for Pasta Making**
- 1.6. Preparing the Ingredients for Pasta Making**

Key Competencies For Learning Outcome 1: Prepare Workplace and Ingredients

Knowledge	Skills	Attitudes
• Description of Tools and Equipment Used in Pasta Making. • Description of Cleaning Agents Used in Pasta Making • Description of ingredient used in pasta making • Description of pasta packaging materials	• Selecting and adjusting of tools and equipment used in pasta making • Selecting cleaning agent used in pasta making • Selecting ingredients used in pasta making • Selecting the paste Packaging materials • Cleaning the workplace, tools and equipment • Checking cleanliness of workplace, tools and equipment • Preparing the ingredients used in pasta making	• Being committed while selecting tools, equipment and materials • Being careful when using cleaning agent • Being accountable while weighing ingredient • Being carefully while checking workplace cleanliness • Being vigilant while checking the quality of ingredient



Duration: 15 hrs

Learning outcome 1 objectives:



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

1. Describe correctly the tools and equipment used in pasta making according to their intended use.
2. Select properly the tools and equipment for pasta making according to the intended use.
3. Describe clearly the cleaning agent based on their types
4. Select properly the cleaning agents based on their types
5. Describe properly ingredients used in pasta making based on their intended use.
6. Select properly ingredients used in pasta making based on the selection criteria.
7. Describe properly the pasta packaging materials based on the types
8. Select properly the pasta packaging materials based on the types
9. Clean effectively the workplace, tools and equipment for pasta making
10. Check effectively cleanliness of workplace according to checking methods
11. Prepare properly the ingredients used in pasta making



Resources

Equipment	Tools	Materials
• High pressure washer machine • Working table • Sifting machine • weighing balances • dough mixer • pasta machine (Extruder) • oven dryer • drying rack • cooler • packaging machine • high pressure washer • PPE	• Cleaning tools • weighing tools • knives • sieves • Ravioli cutters • gnocchi boards • spaghetti rollers • rolling pin cutters • waste bin	• Cleaning agent • wheat flour • Eggs • salt • sugar • oil • spices • packaging materials • water



Indicative Content 1.1: Selecting Tools and Equipment for Pasta Making



Duration: 3hrs



Theoretical Activity 1.1.1: Description of tools and equipment used in pasta making



Tasks:

1. You are requested to answer the following questions related to the description of tools and equipment used in pastry making
 - i. What do you understand by pasta product?
 - ii. What could be the tools and equipment used in pasta making?
 - iii. What do you know about Safety precautions of tools and equipment used in pasta making?
2. Provide answer to the asked question and Write your findings on paper, flip chart, Blackboard, or whiteboard.
3. Present the findings/answers to the whole class.
4. For more clarification, read the **key readings 1.1.1.**

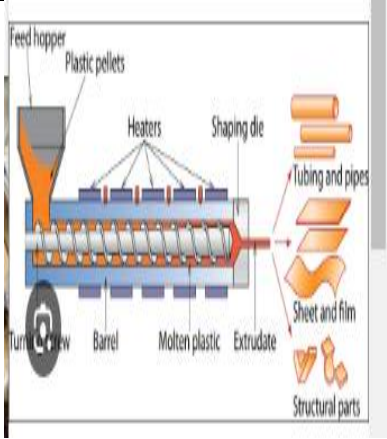


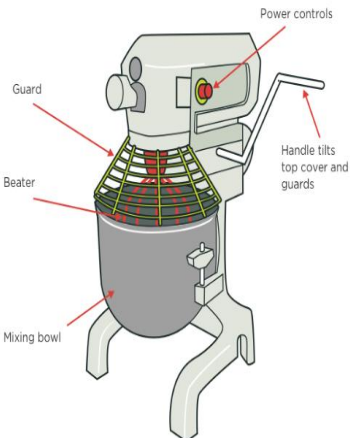
Key readings 1.1.1.: Description of tools and equipment used in pasta making

- **What do you understand by pasta product?**

Pasta products are a category of food typically made from an unleavened dough that primarily consists of wheat flour mixed with water or eggs. This dough is then shaped into various forms and cooked by boiling or baking. The traditional pasta is predominantly made from durum wheat, which is known for its high gluten content, giving pasta its characteristic texture and ability to hold sauces. However, the definition of pasta has expanded to include alternatives suitable for gluten-free diets, such as those made from rice flour or legumes like beans and lentils.

- The tools and equipment used in pasta making

S/ N	Name of tools or equipment	Image	description
	Pasta Machine (Extruder)	 The diagram illustrates the operation of a pasta extruder. It starts with a 'Feed hopper' at the top left, which feeds 'Plastic pellets' into a 'Barrel'. The barrel is heated by 'Heaters' and contains a 'Turn screw' for mixing. The resulting 'Molten plastic' is pushed through a 'Shaping die' to create an 'Extrudate'. This extrudate can then be formed into various shapes: 'Tubing and pipes', 'Sheet and film', or 'Structural parts'.	• The pasta machine extrudes the mixed dough into various shapes such as spaghetti, macaroni. • This equipment uses molds to form pasta shapes while simultaneously cutting them to desired lengths. The extruder applies pressure to ensure uniformity in thickness and texture across batches.

2.	Dough Mixer	 The diagram shows a stand-mounted dough mixer. It features a large, rounded mixing bowl at the base. Above the bowl is a central shaft with a beater attachment. A safety guard is positioned around the beater. To the right of the bowl, there are power controls (a switch and a dial) and a handle that can be used to tilt the top cover and guards. Labels with red arrows point to each of these components: 'Guard', 'Beater', 'Mixing bowl', 'Power controls', and 'Handle tilts top cover and guards'.	• The dough mixer combines all ingredients uniformly to create a consistent dough. • Depending on the type of mixer (e.g., spiral mixer or planetary mixer), it can handle different batch sizes and types of dough. • Proper mixing ensures that gluten develops adequately, which contributes to the elasticity and strength of the pasta.
----	--------------------	--	--

3.	Oven Dryer		• The oven dryer is employed to remove moisture from freshly made pasta before packaging. • Proper drying extends shelf life by inhibiting microbial growth while preserving flavor and texture. • The drying process must be carefully controlled; too much heat can damage the pasta's structure.
4.	Drying Rack		1. Drying racks are used for placing fresh pasta after it has been shaped but before it undergoes drying in an oven or air-

			drying process. 2.They allow air circulation around each piece of pasta, ensuring even drying without sticking together.
5.	High Pressure Washer Machine		1.The high pressure washer machine is utilized for cleaning equipment and surfaces in the pasta production area. 2.It effectively removes flour, dough residues, and other contaminants from machinery and workspaces, ensuring a hygienic environment

			that meets food safety standards.
6.	Sifting Machine		1. sifting machine is used to separate flour from impurities such as bran or foreign particles. This ensures that only fine flour is used in the pasta-making process, which is crucial for achieving the desired texture and quality of the final product.
7.	Weighing Balances		1. Weighing balances are essential for accurately measuring ingredients such as flour, water, eggs, and salt. Precision in measurements is critical in pasta making because even

			slight variations can affect the dough's consistency and ultimately the quality of the pasta produced. Digital balances provide quick readings and can often store multiple measurements for efficiency.
8	Working Table		The working table provides a flat, stable surface where ingredients are mixed, kneaded, and shaped into pasta. It is designed to facilitate the preparation process by allowing easy access to tools and materials.

9.	Cooler		1. After drying or cooking processes, coolers are used to bring down temperatures quickly before packaging or further processing. 2. Rapid cooling helps maintain quality by preventing condensation that could lead to spoilage or mold growth on products.
10.	Packaging Machine		The packaging machine automates the packing process for finished pasta products into bags or boxes for distribution. It ensures that products are sealed

			properly to maintain freshness while also labeling them according to regulatory requirements regarding ingredients and nutritional information.
10 .	Personal Protective Equipment (PPE)	 The illustration shows a person from the waist up, wearing a white protective suit. Red checkmarks and labels point to various pieces of PPE: 'Wear Your Head Cap' (top left), 'Wear Your Mouth Mask' (top right), 'Wear Your Smocks' (middle left), 'Wear Your Gloves' (middle right), 'Wear Your Coat' (bottom left), and 'Wear Your Safety Shoes' (bottom right).	PPE includes items like gloves, aprons, masks, and hairnets worn by workers during the pasta-making process to ensure personal safety as well as food safety standards compliance. PPE protects workers from potential hazards associated with handling raw

			ingredients while also preventing contamination of food products. Probability that this answer is correct: 95%
• Safety precautions of tools and equipment ✓ Train all employees extensively. ✓ Wear personal protective equipment. ✓ Do not wear hazardous clothing. ✓ Never force machines to cooperate. ✓ Never work alone. ✓ Keep walkways and exits clear. ✓ Keep workspaces clear. ✓ Inspect machines before each use.			



Practical Activity 1.1.2: Selecting and adjusting tools and equipment



Task:

- 1: You are requested to go to the pasta-making workshop, to select and adjust tools and equipment
- 2: Apply safety precautions (wear PPE).
- 3: Present out criteria and procedure for selecting and adjusting pasta making tools and equipment.
- 4: Referring to selecting, adjusting and procedures provided on task 2, select and adjust pasta making tools and equipment.
- 5: Present your work to the trainer and the whole class. Ask for clarification where necessary
- 6: Read key reading **1.1.2**.
- 7: Perform the task provided in the application of **Learning 1.1**



Key readings 1.1.2: Selecting and adjusting tools and equipment

- **Selection Criteria of Tools and Equipment Used in Pasta Making**

When selecting tools and equipment for pasta making, several criteria should be considered to ensure efficiency, quality, and ease of use. Here's a detailed breakdown of the selection criteria based on various stages of the pasta-making process:

- ✓ **Tools for Dough making**

- ✚ **Material Quality:** Tools like wooden boards should be made from high-quality wood that can absorb moisture and provide warmth during kneading. This helps achieve the right dough consistency.

- ✚ **Size and Surface Area:** A large wooden surface is essential for rolling out dough. The size allows ample space to work with larger sheets of pasta without sticking.

- ✚ **Precision Measurement:** A kitchen scale is crucial for accurate measurements; as precise ratios of ingredients lead to better dough consistency.

- ✚ **Ease of Handling:** Ergonomic designs in tools like bench scrapers make it easier to handle sticky dough and transfer ingredients without hassle.

- ✓ **Tools for Making Pasta**

- ✚ **Type of Machine:** When choosing between hand-cranked or electric pasta machines, consider the volume of pasta you plan to make. Hand-cranked machines are often sufficient for home cooks, while electric models are better suited for larger batches.

✚ **Durability and Construction:** Look for machines made from durable materials such as stainless steel that can withstand frequent use without breaking down.

✚ **Versatility:** Machines that come with multiple attachments allow you to create various types of pasta shapes, enhancing your culinary options.

✚ **Ease of Use:** Consider how user-friendly the machine is; simpler mechanisms will encourage more frequent use.

✓ **Tools for Storing and Drying Pasta**

✚ **Airflow Design:** Drying racks should facilitate airflow around the pasta to prevent sticking and ensure even drying. This is especially important for long noodles like fettuccine.

✚ **Storage Capacity:** Ensure that any storage solution, such as sheet pans or drying trays, has enough capacity to hold all your prepared pasta without overloading.

✚ **Material Safety:** Choose food-safe materials that won't react with the pasta or impart unwanted flavors during storage.

✓ **Tools for Cooking Pasta**

✚ **Heat Distribution:** Stockpots should have good heat conductivity to ensure even cooking. Materials like stainless steel or aluminum are preferred.

✚ **Size Appropriateness:** The pot should be large enough to accommodate the amount of water needed to cook the pasta properly without overcrowding it.

✚ **Ease of Handling:** Features like comfortable handles on pots and strainers (like spider strainers) help manage hot contents safely during cooking.

• **Functionality and adjustment**

Adjusting the extruder used in pasta production involves several key steps that ensure the machine operates effectively and produces high-quality extruded pasta. Here's a detailed breakdown of how to make these adjustments:

✓ **Selecting the Right Die:** The first step in adjusting your extruder is connecting the appropriate die to the extruder machine for the shape of pasta you wish to produce.

✓ **Feeding Dough into the Extruder:** When feeding dough into the extruder:

✚ Break up your kneaded dough into smaller pieces that fit through the top window of the machine.

✚ Feed these pieces gradually while rotating the crank at a consistent speed.

✚ Monitor how well each piece is being extruded; if there are issues like clogging or uneven shapes; consider adjusting either your dough consistency or how much you are feeding at once.

✓ **Crank Speed Adjustment:** The speed at which you turn the crank(original) can also affect extrusion quality

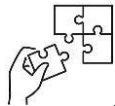
✓ **Retain The Fresh Pasta**

✓ **Cleaning and Maintenance:** Regular cleaning and maintenance are essential after using extruder machine.



Points to Remember

- While making the pasta product you must have extruder machine.
- Before making pasta, make sure that all ingredient is available and respect safety precaution of using tools and equipment.
- Safety precaution of using tools and equipment must be followed
- Before making pasta product, make sure that tools and equipment are safe and in good working condition



Application of learning 1.1.

You are requested to go in pasta making workshop to select and adjust tools and equipment used in pasta making.



Indicative Content 1.2: Selecting Cleaning Agents used in Pasta Making



Duration: 2hrs



Theoretical Activity 1.2.1: Description of cleaning products used in cleaning the workplace, tools and equipment



Tasks:

- 1: You are requested to answer the following questions:
 - I. Suggest cleaning products that should be used in cleaning the workplace, tools and equipment?
 - II. What do you know about safety precautions of cleaning products to user?
 - III. Suggest the direction for use of cleaning products while you are cleaning the workplace?
- 2: Provide the answers to the asked question by writing them on papers, flip chart.
- 3: Present the findings/answers to the whole class
- 4: Ask the trainer for clarification if any
- 5: For more clarification, read the key readings 1.2.1.



Key readings 1.2.1: Description of cleaning products used in cleaning the workplace, tools and equipment

• Cleaning products used in cleaning the workplace, tools and equipment in pasta making

✓ Types of cleaning products

✚ **Detergents:** These are cleaning products used to remove food debris, grease and dirt. They cannot kill bacteria and microorganisms.

Examples includes: Alkaline cleaner diverse suma tera L56)

A good detergent should have the following properties:

- Able to soften water completely
- Completely soluble in water
- Non-corrosive to surfaces (metals and buildings)
- Non-toxic and biodegradable
- Economical in use
- Good wetting or penetrating ability
- Emulsifying ability on fat
- Dissolving ability on food solids
- Scale and rust removing properties

Note: Any substance which, either alone or in a mixture, substitutes physicochemical energy for some of the mechanical energy required for removing dirt can be classified as a detergent.

 **Disinfectants:** These are used to destroy the harmful bacteria which can remain on articles and cause food contamination and cross-contamination. Disinfectants include diluted bleaches and antibacterial solutions.

Example like bleach solution

 **Water:** is referred as universal solvent, and this is the prime agent in cleaning process. However, though an excellent solvent, water alone is not an effective cleaner.

Function of water in cleaning:

- It is used as solvent
- Pre-rinse to remove large soil particles
- Can aid in softening soil on surface
- Transport of cleaning agent to all area of cleaning
- Transport of suspended soil away from the area

✓ **Safety precautions of cleaning products to user**

 The following are precaution of cleaning product to user:

- Warning workers not to mix cleaning products that contain bleach and ammonia (cleaning products that contain bleach and ammonia can cause severe lung damage or death.)
- Making sure that workers know which cleaning chemicals must be diluted and how to correctly dilute.
- Provide proper protective equipment needed, such as gloves and goggles
- Ensuring that all containers of cleaning products and chemicals are labelled to identify their contents and hazards
- Operating ventilation systems as needed during cleaning tasks to allow sufficient air flow and prevent build-up of hazardous vapours.
- Providing workers with a place to wash up after using cleaning chemicals.

 Many factors influence whether a cleaning chemical will cause health problems

- Chemical ingredients of the cleaning product;
- How the cleaning product is being used or stored;
- Whether the cleaning product comes in contact with the skin; and
- Whether vapours and/or gases are released

 Effect of cleaning products on health:

- Irritating to the skin or can cause rashes
- Cause severe burns if splashed on the skin or in the eyes.

- Mists, vapours and/or gases from cleaning chemicals can irritate the eyes, nose, throat and lungs which in turn cause: Sore throat, Coughing, Trouble breathing (wheezing)

- Chemicals in some cleaning products can cause asthma

Direction for use of cleaning products

- Before starting to clean, read product and equipment labels and usage instructions.
- Wear recommended Personal Protective Equipment (PPE) which may include rubber or surgical type gloves, goggles, dust mask or respirator, earplugs, or other equipment.
- Follow the instructions.
- Check the expiration date of the cleaning product.
- Provide good ventilation while cleaning.



Practical Activity 1.2.2: Selecting cleaning products



Task:

- 1: You are requested to go in pasta making workshop to select cleaning products
- 2: Apply safety measures at workplace.
- 3: Select the cleaning products by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 1.2.2.
- 6: Perform the task provided in application of learning 1.2



Key readings 1.2.2.: Selecting cleaning products

- **Selection criteria of cleaning products**

When selecting cleaning products for the cleaning the workplace, tools and equipment you should take into consideration with the following criteria:

- ✓ **Food contact surfaces**

The type of food contact surface is an important consideration when determining what types of cleaners and practices to use. Typical materials found in food processing plants include stainless steel, plastic etc... Equipment design and plant layout should be considered from a clean-ability perspective.

- ✓ **Solubility of cleaning agents:**

During selection you should also select the cleaning agent which should be able to be dissolved or remove residues or contaminants from equipment and facility surfaces, while not damaging, corroding, or degrading the materials

✓ **Compatibility of cleaning agents:**

Cleaning agent should be not reacting with residues, contaminants, or not form harmful by products.

✓ **Safety:**

Cleaning agent should not pose any health or environmental hazards to workers, products or surrounding environment. It should have a low toxicity, volatility, flammability, and reactivity.

✓ **Cleaning methods:**

The cleaning method refers to how the cleaning methods is applied, circulated, splayed or wiped on the equipment or facility surfaces and it will affect the contact time, temperature, pressure, and concentration of the cleaning agent.

✓ **Cleaning Frequency:**

The cleaning frequency determines how often the equipment or facility is cleaned and has an effect on the accumulation, degradation, and removal of residues or contaminants.

✓ **Cleaning Performance:**

Is key criteria, it is evaluated by acceptance criteria such as visual inspection, Swab sampling, rinse sampling or analytical testing and tells you well the cleaning agent removes residues or contaminants from the equipment or facility.

● **Steps of selecting cleaning products**

- ✓ List the cleaning products needed based on the activity to be done
- ✓ Present a list of available cleaning products that can fulfil the task needs
- ✓ Follow the safety guidelines for handling cleaning products
- ✓ Hands-on selection or physically handle and assess cleaning products
- ✓ Make decisions on the most appropriate cleaning products



Points to Remember

- The cleaning products should be in form of liquid, powder and solid
- You are recommended to read and understand careful the guide lines of using cleaning product which is written on label before using it.
- Wear properly PPEs while you are using cleaning products
- Consider the surface to be cleaned while you are selecting cleaning products to use
- Follow the safety guidelines for handling the cleaning products



Application of learning 1.2.

You are requested to go in your school's workshop for pasta making and select cleaning products used in cleaning workplace, tools and equipment.



Indicative Content 1.3: Selecting Ingredients Used In Pasta Making



Duration: 2hrs



Practical Activity 1.3.1: Selecting ingredients used in making the pasta



Task:

- 1: You are requested to go in pasta making workshop to select ingredients used in making the pasta
- 2: Apply safety measures at workplace.
- 3: Select the ingredients by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 1.3.1.
- 6: Perform the task provided in application of learning 1.3



Key readings 1.3.1.: Selecting ingredients used in making the pasta

✓ Types and functions of ingredients used in pasta making

N ^o	Type of ingredient	Ingredient function and description
1	Semolina flour, 00 type flour and all-purpose wheat flour	✚ Semolina is flour made from a specific variety of wheat known as durum. Durum wheat has an exceptionally high protein content, high gluten, giving it a very dense, chewy texture and the carotenoid pigment lutein, which gives the yellow colour to the pasta. For this reason, semolina is most often used to make pasta. ✚ This hardness also happens to correspond with its protein content, which is around 13 percent (as compared with all-purpose flour, which in general semolina flour has a protein content of 12-13 percent and has a low elasticity and higher plasticity than most flour that is used for pasta. ✚ Type 00 pasta flour is a favourite choice of flour when making pasta and you want to achieve a smooth texture and softer bite. If you want a rougher texture to hold sauces

		better, mix it 50/50 or 25/75 with semolina durum wheat flour, all-purpose flour or bread flour. Both soft and hard wheat can be used for type 00 flour. What you are looking for is hard wheat type 00 pasta flour. Soft wheats type 00: 12/13% protein, a softer wheat milled with a very fine-grind. A great choice if you want pasta with a smoother texture. ✚ All-purpose flour has protein (around 11-12%) and gluten in all-purpose flour is quite comparable to the flour that is traditionally used for making pasta, both type 00 and semolina.
2	Salt	Added to the dough to enhance flavour
3	Water	Used sparingly if needed to adjust dough consistency, especially when not using eggs (in water-based pasta doughs)
4	Eggs	✚ Adds richness, colour, and structure. Usually, large eggs are used. ✚ Some recipes might use just the egg yolks for a richer dough.
5	Olive oil (optional)	Adds a little extra smoothness to the dough and makes it easier to knead.

- **Selection criteria for ingredient used in pasta making**

- ✓ **Bulk Density of Flour**

The bulk density of a good material is important in relation to its packaging. For a reduction of paste thickness, a high bulk density is desirable and this is an important factor in convalescence and child feeding.

- ✓ **Water absorption capacity of flour**

Absorption measures the amount of water that can be absorbed by a given quantity of flour.

Measurements of absorption are done to determine the amount of water the dough can absorb, which in turn indicates dough yield and shelf life. It is important for certain product characteristics, **such as moistness of the product, starch retro gradation, and product staling.**

- ✓ **Oil Absorption Capacity of Flour**

It is important for the development of new food products as well as the storage stability, particularly for flavour binding and in the development of oxidative rancidity.

The mechanism of oil absorption can be explained as a physical entrapment of oil related to the non-polar side chains of proteins. Both the protein content and the type of protein contribute to the oil retaining properties of food materials.

✓ **Foaming and Emulsifying Property of Flour**

This characteristic is an important parameter when developing formulations for bakery products. Research has proved that the amount of native protein in the flour and the nature of the protein influence the foaming stability of the flour.

✓ **Apparent viscosity**

The particle size distributions can influence the viscosity of the dispersion. Small particle size flour dispersions tend to be more uniform and offer higher resistance due to the inter particle friction resulting in viscosity of the dispersion. Solubility is another important factor that influences the viscosity of the dispersion. It should also be noted that starch granules also absorb water. The amount absorbed depends on the condition of the starch granules, since damaged granules absorb higher amounts of water than do native granules.

✓ **Texture of flour**

Wheat varieties are called soft or weak if gluten content is low, and are called hard or strong or bread flour, is high in gluten, with **12% to 14%** gluten content, and its dough has elastic toughness that holds its shape well once baked.

✓ **Shelf-life**

The specific shelf life depends on the type of flour, its ingredients and how you store. The white flours are stored at room temperature they should be discarded after three months; if stored at cooler house temperature, it can last six months while in a fridge, the flour has one year, and in the freezer it has two. Whole wheat or whole grain flours have more of the natural oils that can spoil, so discard after one month at regular room temperature, three months at a cooler house temperature, six months in the fridge, or one year in the freezer. Shelf life of whole wheat flour is shorter compared to white flour due to the presence of lipids and lipid degrading enzymes.

✓ **Colour**

The colour of flour is influenced by a broad range of variables, from wheat variety to aging, and from milling practices to bleaching and maturing agents, creating a spectrum of colours ranging from brownish grey to creamy yellow to the whitest white.

✓ **Flavour**

The flavour profile varies the types of flour.

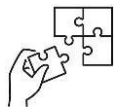
✓ **Steps of selecting cleaning products**

- ✓ List the ingredients needed based on the type of pasta to be processed
- ✓ Present a list of available ingredients that can fulfil the task needs
- ✓ Follow the safety guidelines for handling ingredients
- ✓ Hands-on selection or physically handle and assess ingredients
- ✓ Make decisions on the most appropriate ingredients



Points to Remember

- The most flour used in making pasta is semolina because has high protein, high gluten which gives the chewy texture, carotenoid pigment and yellow colour to the pasta.
- Water and wheat flour are the main ingredients used to make pasta others are optional
- For getting best pasta better to flour which has 12-14% of gluten content



Application of learning 1.3.

You are requested to go in your school's workshop for pasta making and select ingredients used in pasta making.



Indicative Content 1.4: Selecting Pasta Packaging Materials



Duration: 2hrs



Theoretical Activity 1.4.1: Description of pasta packaging materials



Tasks:

- 1: You are requested to answer the following questions:
 - I. Suggest Types of packaging materials that should be used in pasta packaging?
 - II. What do you know about function of packaging materials?
- 2: Provide the answers to the asked question by writing them on papers, flip chart.
- 3: Present the findings/answers to the whole class
- 4: Ask the trainer for clarification if any
- 5: For more clarification, read the key readings 1.4.1.



Key readings 1.4.1.: Description of pasta packaging materials

- **Types of Packaging Materials for Dried Pasta Packaging**

- ✓ **Plastic Packaging**

Plastic is one of the most common materials used for packaging dried pasta. It offers several advantages, including:

- ✚ **Moisture Barrier:** Plastic films can effectively prevent moisture from entering the package, which is crucial for maintaining the quality and shelf life of dried pasta.
- ✚ **Lightweight:** Plastic packaging is lightweight, reducing shipping costs and making it easier for consumers to handle.
- ✚ **Cost-Effective:** The production costs for plastic packaging are generally lower compared to other materials, making it an economical choice for manufacturers.
- ✚ **Variety of Options:** Different types of plastics (such as polyethylene and polypropylene) can be used depending on the specific requirements like transparency or strength.

- ✓ **Paperboard Boxes**

Paperboard boxes are another popular option for dried pasta packaging. They provide several benefits:

- ✚ **Sustainability:** Paperboard is often made from renewable resources and can be recycled, appealing to environmentally conscious consumers.
- ✚ **Printability:** The surface of paperboard allows for high-quality printing, which can enhance branding and provide important product information.
- ✚ **Structural Integrity:** Paperboard provides good protection against physical damage during transportation and storage.

✓ **Glass Containers**

Although less common due to cost considerations, glass containers offer unique advantages:

- ✚ **Inert Material:** Glass does not react with food products, ensuring that there are no chemical leachates that could affect the pasta's quality.
- ✚ **Reusability:** Glass containers can be reused by consumers, promoting sustainability.
- ✚ **Aesthetic Appeal:** Glass packaging can enhance the visual appeal of the product on store shelves.

✓ **Biodegradable Films**

With increasing environmental concerns, biodegradable films are gaining popularity as a sustainable alternative:

- ✚ **Eco-Friendly Option:** These films break down more easily in landfills compared to traditional plastics, reducing environmental impact.
- ✚ **Functional Properties:** Many biodegradable films offer similar barrier properties as conventional plastics, making them suitable for food packaging.

• **Types of Packaging Materials for fresh Pasta Packaging**

When considering packaging materials for fresh pasta, several factors must be taken into account, including preservation of freshness, prevention of contamination, shelf life extension, and sustainability. Below are the types of packaging materials that are commonly used in the industry:

✓ **Plastic Films**

Plastic films are widely used for packaging fresh pasta due to their flexibility and ability to create airtight seals. They can be made from various polymers such as polyethylene (PE), polypropylene (PP), or polyvinyl chloride (PVC).

- ✚ **Barrier Properties:** These films can provide excellent barrier properties against moisture and oxygen, which helps in maintaining the quality and extending the shelf life of fresh pasta.
- ✚ **Transparency:** Clear plastic films allow consumers to see the product, which can enhance its appeal.
- ✚ **Customization:** They can be printed with branding and nutritional information.

✓ **Biodegradable Plastics**

With increasing environmental concerns, biodegradable plastics are becoming more popular for food packaging.

- ✚ **Sustainability:** These materials break down more easily in the environment compared to traditional plastics.
- ✚ **Performance:** Many biodegradable options still offer good barrier properties suitable for fresh pasta.

✓ **Cardboard Boxes with Liners**

Cardboard boxes lined with plastic or wax coatings can also be used for fresh pasta packaging.

- ✚ Structural Integrity: Cardboard provides strength and protection during transport.

- ✚ Recyclability: Cardboard is generally recyclable, making it a more sustainable option when combined with eco-friendly liners.

✓ **Glass Containers**

While less common due to weight considerations, glass containers can be an option for premium fresh pasta products.

- ✚ Non-reactive Material: Glass does not interact with food substances, ensuring purity.

- ✚ Reusability: Glass containers can be reused by consumers, promoting sustainability.

• **Functions of Packaging Materials**

Packaging materials serve several essential functions in the supply chain, contributing to the overall effectiveness of product delivery and consumer satisfaction. The primary functions of packaging can be categorized into several key areas:

✓ **Protection**

The foremost function of packaging is to protect the product from damage during transportation, storage, and handling. This includes safeguarding against physical impacts, environmental factors such as moisture and temperature changes, and contamination from external sources. For example, protective packaging materials like bubble wrap or foam inserts are often used for fragile items to prevent breakage.

✓ **Storage**

Packaging also plays a critical role in ensuring that products remain safe during storage. It must keep the contents secure from dust, debris, and other environmental hazards for varying durations

✓ **Transport**

Efficient transport is another vital function of packaging. It must be designed to allow easy handling and movement by both humans and machines. This includes considerations for size, weight, and stacking capabilities to optimize shipping logistics. For instance, standardized box sizes help streamline loading processes onto trucks or shipping containers.

✓ **Sales Promotion**

Packaging serves as a marketing tool that promotes the product at the point of sale. Attractive designs, colors, logos, and branding elements on packaging can influence consumer purchasing decisions by making products stand out on crowded shelves. Effective promotional packaging communicates brand identity and can evoke emotional responses from consumers.

✓ **Information**

Packaging provides essential information about the product to consumers. This includes details such as ingredients, usage instructions, expiration dates, safety warnings, and nutritional information (for food products). Clear labeling helps consumers make informed choices before purchasing.

✓ **Convenience**

Convenience is an important aspect of packaging design that enhances user experience. Features such as resealable closures or easy-to-carry handles improve usability for consumers while also facilitating easier storage at home.

✓ **Assurance**

Packaging assures consumers about the quality of the product inside through its structural integrity and design features that indicate freshness or tamper evident. This assurance builds trust between brands and consumers.

✓ **Disposal**

Modern packaging increasingly incorporates sustainability considerations by informing users about proper disposal methods; whether through recycling or composting; thereby minimizing environmental impact.



Practical Activity 1.4.2: Selecting pasta packaging materials



Task:

- 1: You are requested to go in pasta making workshop to select pasta packaging used in making the pasta
- 2: Apply safety measures at workplace.
- 3: Select the pasta packaging by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 1.4.2.
- 6: Perform the task provided in application of learning 1.4



Key readings 1.4.2: Selecting pasta packaging materials

- **Selection Criteria of Pasta Packaging Materials**

When selecting packaging materials for pasta, several key criteria must be considered to ensure the product's quality, safety, and marketability. Here's a detailed breakdown of these criteria:

- ✓ **Food-Grade Compliance** The primary requirement for any pasta packaging material is that it must be food-grade. This means the materials used should not

transfer harmful substances to the pasta and must comply with food safety regulations set by authorities such as the Food and Drug Administration (FDA). Common food-grade materials include plastic bags, vacuum-sealed pouches, and sealed containers that protect against moisture, air, and contaminants.

- ✓ **Durability** is crucial in protecting pasta during transit and storage. The chosen packaging must withstand various environmental factors such as moisture, pests, and physical damage. It should also maintain its integrity throughout the supply chain to ensure that the pasta reaches consumers in perfect condition.
- ✓ **Shelf Life Preservation:** Packaging materials should effectively preserve the shelf life of pasta by providing adequate barrier properties against oxygen and moisture. Vacuum-sealed pouches are particularly effective in extending shelf life by preventing freezer burn and maintaining freshness.
- ✓ **Portion Sizes:** Consideration of portion sizes is essential when designing packaging for pasta products. Packaging can be tailored based on weight or serving sizes, which helps in meeting consumer preferences while ensuring proper labelling.
- ✓ **Labelling Requirements** Proper, labelling is vital for informing consumers about the product's contents, nutritional information, cooking instructions, and allergen warnings. The packaging design should facilitate clear communication while adhering to regulatory guidelines regarding ingredient disclosure.
- ✓ **Eco-Friendliness:** With increasing consumer awareness about sustainability, selecting eco-friendly packaging options has become important. Businesses are encouraged to explore biodegradable or recyclable materials that reduce environmental impact while appealing to eco-conscious customers.
- ✓ **Cost-Effectiveness:** cost considerations cannot be overlooked when selecting packaging materials for pasta products. Businesses need to balance quality with affordability to ensure they remain competitive while providing value to their customers.



Points to Remember

- Make sure that all pasta packaging material are safe and acceptable by regulation
- During pasta packaging material we must respect the safety precaution of cleaning product



Application of learning 1.4.

You are requested to go to school's workshop for pasta making and select packaging material used in pasta making.



Indicative Content 1.5: Arranging Workplace for Pasta Making



Duration: 4hrs



Theoretical Activity 1.5.1: Description of arrangement criteria of tools and equipment



Tasks:

- 1: You are requested to answer the following questions:
 - I. What do you know about pasta product flow chart?
 - II. What do you know about standard operating procedures (SOPs)?
- 2: Provide the answers to the asked question by writing them on papers, flip chart.
- 3: Present the findings/answers to the whole class
- 4: Ask the trainer for clarification if any
- 5: For more clarification, read the key readings 1.5.1



Key readings 1.5.1.: Description of arrangement criteria of tools and equipment

- **Product (spaghetti and macaroni) flow chart**

1. **Raw Material Handling**

- ✚ Receive semolina flour, water, and any optional additives (e.g., vitamins, colors).
- ✚ Inspect and store raw materials in proper conditions.



2. **Mixing and Kneading**

- ✚ Measure and combine semolina and water in the correct proportions.
- ✚ Knead the mixture into a uniform dough.



3. **Extrusion**

- ✚ Pass the dough through extruders with specific dies to form the desired pasta shapes:
 - **Spaghetti:** Long, thin strands.
 - **Macaroni:** Short, hollow tubes, often curved.



4. **Cutting**

- ✚ Cut the extruded pasta to the required lengths:
 - **Spaghetti:** Standard strand lengths.
 - **Macaroni:** Specific short lengths.



5. Pre-Drying

- ✚ Gently reduce surface moisture to stabilize the pasta shape.



6. Drying

- ✚ Transfer pasta to drying chambers with controlled temperature and humidity.
- ✚ Gradually dry to reduce moisture content to safe levels (around 12-13%).



7. Cooling

- ✚ Cool dried pasta to ambient temperature to avoid condensation during packaging.



8. Quality Control

- ✚ Inspect pasta for texture, moisture content, uniform shape, and absence of defects.



9. Packaging

- ✚ Pack pasta into appropriate packaging (e.g., sealed bags or boxes).
- ✚ Label with product information, expiration date, and batch numbers.



10. Storage and Distribution

- ✚ Store finished products in a cool, dry warehouse.
- ✚ Distribute to retailers, wholesalers, or directly to customers.

• Standard operating procedures (SOPs)

SOPs are crucial for maintaining hygiene, safety, and efficiency.

Purpose

Clearly state the objective of the SOP, such as ensuring that all tools and equipment are properly cleaned and sanitized to prevent contamination and maintain product quality.

✓ **Scope**

Define the areas, equipment, and tools covered by the SOP. This might include work surfaces, machinery, utensils, and any other items that come into contact with food.

✓ **Responsibilities**

- ✚ Identify the personnel responsible for carrying out the cleaning procedures, such as specific roles (e.g., cleaning staff, machine operators) and their duties.
- ✚ Assign responsibilities for monitoring and verifying that the SOP is followed correctly.

✓ **Materials and Equipment**

- ✚ List all cleaning materials and tools required, including brushes, scrapers, cleaning agents, sanitizers, protective gear, etc.
- ✚ Specify the correct type and concentration of cleaning chemicals to be used.

✓ **Cleaning and Sanitization Procedures**

- ✚ **Preparation:** Instructions for preparing the area and equipment for cleaning, such as removing any remaining food product and disassembling equipment if necessary.
- ✚ **Cleaning:** Detailed steps for scrubbing, brushing, and washing surfaces and equipment. Include techniques for reaching difficult areas and specific instructions for different types of equipment.
- ✚ **Sanitization:** Guidelines for applying sanitizers, including contact time and concentration. Ensure that the process is thorough to eliminate pathogens.
- ✚ **Rinsing:** Instructions for rinsing off cleaning agents and sanitizers, if required.
- ✚ **Drying:** Procedures for air drying or using towels, ensuring that no moisture remains that could promote bacterial growth.
- ✚ **Reassembly:** If equipment was disassembled, provide steps for correct reassembly.

✓ **Safety Considerations**

- ✚ Outline the safety precautions that must be taken, such as wearing gloves, goggles, and other protective equipment.
- ✚ Highlight any potential hazards associated with the cleaning agents used and how to handle them safely.

✓ **Waste Disposal**

Provide instructions for the proper disposal of waste generated during the cleaning process, such as dirty water, used cleaning materials, and food scraps.

✓ **Frequency**

Specify how often the cleaning procedures should be performed (e.g., after each production shift, daily, weekly).

✓ **Verification and Documentation**

- ✚ Detail how the effectiveness of the cleaning process will be verified (e.g., visual inspections, swab tests).
- ✚ Include a log or checklist for personnel to sign off once cleaning has been completed, ensuring accountability.

✓ **Training**

- ✚ Indicate that all relevant personnel must be trained in the SOP and understand its importance.
- ✚ Provide guidelines for ongoing training and updates to the SOP.

✓ **Review and Updates**

Outline how often the SOP should be reviewed and updated to reflect changes in equipment, processes, or regulatory requirements.

Example Section for Cleaning a pasta extruder machine:

- ✚ **Step 1:** Disassemble the extruder carefully, removing all removable parts.
- ✚ **Step 2:** Scrub all parts with a stiff-bristled brush using hot soapy water.
- ✚ **Step 3:** Rinse all parts thoroughly with clean water.
- ✚ **Step 4:** Apply a food-safe sanitizer, ensuring all parts are covered.
- ✚ **Step 5:** Allow the parts to air dry completely before reassembling.



Practical Activity 1.5.2: Cleaning the workplace, tools and equipment



Task:

- 1: You are requested to go in pasta making workshop to clean the workplace, tools and equipment used in making the pasta
- 2: Apply safety measures at workplace.
- 3: Clean the workplace, tools and equipment by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 1.5.2.
- 6: Perform the task provided in application of learning 1.5



Key readings 1.5.2.: Cleaning the workplace, tools and equipment

- **Purpose of work area arrangement**
 - ✓ **Maximize Efficiency:** Arranging tools, equipment, and workstations in a logical, organized manner reduces unnecessary movement and time spent searching for items, allowing workers to complete tasks faster.
 - ✓ **Improve Safety:** A well-organized work area minimizes hazards by keeping tools and materials in designated spaces, reducing clutter, and preventing accidents such as trips or equipment mishandling.
 - ✓ **Enhance Productivity:** When everything is placed for easy access and workflow is streamlined, employees can work faster with less frustration, leading to higher output.
 - ✓ **Quality Control:** Organized workspaces facilitate better focus and accuracy, contributing to consistent product quality. For example, in food preparation, this can prevent cross-contamination.
 - ✓ **Ergonomics:** Proper arrangement reduces strain and fatigue by ensuring workers maintain proper posture and minimize repetitive movements.
 - ✓ **Compliance with Standards:** In industries such as food production, work area organization may be required to meet hygiene and safety regulations.
- **Cleaning methods of tools and equipment**

Cleaning methods of tools and equipment are:

- ✓ **Dry cleaning:** is a method of cleaning without using water.
- ✓ **Wet cleaning:** is a method of cleaning by using water.
- **Cleaning techniques of tools and equipment**
 - ✓ **Clean-In-Place (CIP)** is the process of cleaning which does not require disassembling of equipment.

✓ **Clean-Out-Place (COP)** is defined as the process which involves the partially or total disassembling of equipment. It is manual washing techniques used for cleaning small equipment, tools and utensils and areas of food processing that wouldn't be cleaned by a CIP system.

- **Steps of cleaning the workplace, tools and equipment**

- ✓ Pre-rinsing: this initial step involves rinsing the surfaces or equipment with water to remove loose debris, dirt and residues.
- ✓ Caustic treatment: caustic treatments help to breakdown and dissolve organic materials like grease, oils and proteins. This step is crucial for removing stubborn residues that water alone cannot address
- ✓ Intermediate rinsing: an intermediate rinse with water removes the caustic solution and any loosened debris. This step ensures that no caustic residues remain.
- ✓ Acidic treatment: this often, containing substances like phosphoric acid or citric acid. This helps to dissolve inorganic residues such as scale and mineral deposits that may have built up. It also helps neutralize any remaining caustic residues.
- ✓ Intermediate rinsing: rinse with water is performed after acidic treatment to remove the acidic solution and any dissolved residues.
- ✓ Disinfection: this step involves applying a disinfectant to kill any remaining microorganisms.
- ✓ Final Rinsing: the final rinse with water removes any remaining disinfectant and residues from the previous cleaning steps.

- **Steps of cleaning used in CIP**

- ✓ Pre-rinsing with warm water for about 10 minutes.
- ✓ Circulation of an alkaline detergent solution (0.5 – 1.5%) for about 30 minutes at 75°C.
- ✓ Rinsing out alkaline detergent with warm water for about 5 minutes.
- ✓ Circulation of (nitric) acid solution (0.5 – 1.0 %) for about 20 minutes at 70°C.
- ✓ Post-rinsing with cold water.
- ✓ Gradual cooling with cold water for about 8 minutes.



Practical Activity 1.5.3: Checking cleanliness of workplace, tools and equipment



Task:

- 1: You are requested to go in pasta making workshop to check the cleanliness of workplace, tools and equipment used in making the pasta
- 2: Apply safety measures at workplace.
- 3: Check the cleanliness of workplace, tools and equipment by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 1.5.3.
- 6: Perform the task provided in application of learning 1.5



Key readings 1.5.3.: Checking cleanliness of workplace, tools and equipment

- **Visual inspection**

Steps of performing vision inspection:

- ✓ **Inspect the Surfaces**

-  **Look for Residue:** Carefully examine all surfaces, including equipment, utensils, and work areas, for any visible food particles, grease, stains, or cleaning agent residues.

-  **Check cracks and corners:** Pay special attention to corners, cracks, and joints where residues are more likely to accumulate and may be harder to see.

-  **Inspect High-Contact Areas:** Focus on areas that come into direct contact with food, such as cutting boards, grinders, and mixing bowls. These should be particularly clean.

-  **Examine for Biofilm:** Watch for any slimy or sticky substances, which could indicate the presence of biofilm (a collection of bacteria that can form on surfaces).

- ✓ **Corrective Action**

-  If any residues or contaminants are found during the inspection, the affected area should be cleaned again following the appropriate procedures.

-  Re-inspect the area after re-cleaning to ensure that it meets cleanliness standards.

- **SWAB test**

Steps of performing SWAB test:

- ✓ **Preparation**

-  **Gather Materials:** Ensure you have sterile swabs, appropriate testing kits (e.g., ATP testing or microbiological swabs), sterile gloves, and containers for samples.

✚ **Label the Samples** Label swab tubes or containers with the date, time, and location of the surface to be tested for accurate tracking.

✚ **Wear Gloves:** Put on sterile gloves to avoid contaminating the sample with bacteria from your hands.

✓ **Select the Surface Area**

Identify the specific surface or equipment that needs to be tested. High-risk areas like food contact surfaces, equipment, or high-touch areas are commonly swabbed.

✓ **Swabbing the Surface**

✚ **Moisten the Swab (if required):** Depending on the test type, moisten the swab with a sterile solution provided in the kit to improve sample collection.

✚ **Swab the Surface:** Rub the swab firmly across the defined surface area, usually a 10 cm x 10 cm (100 cm²) square. Move the swab in a zigzag or "S" pattern to cover the entire surface evenly.

✚ **Swab Both Directions:** Swab in both horizontal and vertical directions to ensure thorough sampling.

✓ **Testing**

✚ **ATP Testing:** If using an ATP (adenosine triphosphate) bioluminescence test, insert the swab into the device for immediate results, indicating the level of organic material present on the surface.

✚ **Microbiological Testing:** If testing for bacteria or other microorganisms, the swabs will be incubated at the lab, where the growth of microorganisms will be monitored.

✓ **Interpreting Results**

✚ **Total Aerobic Bacterial Count :**

- Clean surface: ≤100 Colony Forming Units (CFU) per cm².
- Acceptable but requires cleaning: 100–1,000 CFU/cm².
- Unacceptable: >1,000 CFU/cm².

✚ **Pathogens (e.g., Salmonella, Listeria, E. coli):**

Acceptable: 0 CFU (pathogens should not be detected on food contact surfaces)

✓ **Action Based on Results**

✚ If the test shows contamination above acceptable levels, corrective action such as re-cleaning and re-testing should be taken.

✚ Keep records of the results for audits, regulatory compliance, or continuous improvement.

• **Acidity test**

Steps to perform this acidity test method:

✓ **Prepare the pH Testing Equipment**

Ensure you have the necessary pH testing equipment, such as pH test strips or a calibrated pH meter. If using a pH meter, calibrate it according to the manufacturer's instructions using standard buffer solutions.

✓ **Collect a Sample**

 **Surface Swabbing:** Moisten a sterile swab or cloth with distilled water. Wipe the surface of the equipment or area being tested to collect any residual liquid or dry residue.

 **Rinse Sampling:** Alternatively, you can rinse the surface with a small amount of distilled water and collect the rinse water in a clean container for testing.

✓ **Test the pH**

 Using pH Strips:

- Dip the pH strip into the collected sample or press it against the moist swab.
- Wait for the colour on the strip to stabilize, usually within a few seconds.
- Compare the colour on the strip to the pH scale provided with the strips to determine the pH level.

 Using a pH Meter:

- Immerse the pH meter's probe into the sample or place the probe directly on the moistened surface.
- Allow the reading to stabilize, which may take a few seconds.
- Record the pH value displayed on the meter.

✓ **Interpret the Results**

Acceptable Range: The pH of a clean surface, when tested with distilled water, should be close to neutral (pH 7). Deviations from this (**e.g., below pH 6 or above pH 8**) may indicate that acidic or alkaline residues are still present, need for additional rinsing or cleaning.

✓ **Document the Findings**

Record the pH readings, the areas tested, and any actions taken (e.g., additional cleaning). This documentation helps in maintaining a record of cleanliness and ensuring compliance with hygiene standards.

✓ **Take Corrective Action if Necessary**

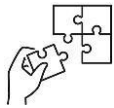
 If the pH test indicates the presence of residues, repeat the cleaning and rinsing procedures for the affected areas.

 Re-test the surface until the pH readings fall within the acceptable neutral range



Points to Remember

- You are recommended to use hygienic water while you are cleaning the workplace, tools and equipment
- Remember to use appropriate cleaning products depending on the surface you are going to clean
- You are recommended to use hot and cold water when you are cleaning the workplace, tools and equipment
- You are recommended to re-clean the surface when there are any residues found during the inspection
- Remember to re-inspect the area after re-cleaning to ensure that it meets cleanliness standards



Application of learning 1.5.

You are requested to go in school's workshop of pasta making to clean workplace, tools and equipment and checking the cleanliness of the workplace.



Indicative Content 1.6: Preparing the Ingredients for Pasta Making



Duration: 2hrs



Practical Activity 1.6.1: Preparing the ingredients used in pasta making



Task:

- 1: You are requested to go in pasta making workshop to prepare the ingredients used in making the pasta
- 2: Apply safety measures at workplace.
- 3: Prepare the ingredients used in pasta making by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 1.6.1.
- 6: Perform the task provided in application of learning 1.6



Key readings 1.6.1: Preparing the ingredients used in pasta making

- **Purpose of ingredients preparation**

- ✓ **Understanding Functionality:** Each ingredient has a distinct role in pasta making: flour provides structure, eggs add richness, and water aids hydration.

- ✓ **Ensuring Ingredient Balance:** For example, if you want a firmer pasta, you may use more semolina flour; for a softer texture, you might adjust the egg-to-flour ratio.

- ✓ **Achieving Desired Texture:** For instance, eggs contribute to tenderness and richness, while water makes the dough more elastic. Understanding this allows for tailored adjustments to suit the type of pasta being made (e.g., softer for filled pasta, firmer for long noodles).

- ✓ **Customization and Innovation:** For example, you could substitute certain ingredients for dietary reasons (e.g., gluten-free flour) while still maintaining a balanced dough.

- ✓ **Preventing Mistakes:** Checking each ingredient's role helps prevent common mistakes, such as adding too much water, leading to sticky dough, or using the wrong type of flour.

- ✓ **Improving Cooking Techniques:** knowing that flour provides gluten structure may lead you to knead the dough for the right amount of time to develop elasticity.

- **Checking quality of ingredients**

To check the quality of ingredients used in pasta making, you can consider the following criteria for each key ingredient:

- ✓ **Flour**

- ✚ **Visual Inspection:** Look for a consistent colour (usually white to pale yellow,

depending on the type of flour). It should be free of lumps, dark spots, or signs of insects.

✚ Smell: Fresh flour has a mild, neutral, or slightly nutty smell. If it smells musty or rancid, it is no longer good to use.

✚ Touch: Quality flour should feel soft and powdery. Any grittiness or clumping indicates it may have absorbed moisture, which can affect the dough's texture.

✓ **Eggs:**

✚ Freshness Test (Float Test): Place the egg in a bowl of water. A fresh egg sinks and lays flat, while an old egg will float or stand upright, indicating it has gone bad.

✚ Shell Condition: Inspect the shell for cracks or discoloration. A cracked shell can allow bacteria to enter, compromising the egg's safety.

✚ Check After Cracking: Fresh eggs have a firm, round yolk and thick egg whites. A watery egg white and flattened yolk indicate the egg is old.

✚ Smell: A spoiled egg gives off a sulphur-like, rotten smell once cracked.

✓ **Water:**

✚ Clarity: The water should be clear and free of particles. Cloudy water or water with impurities may affect the texture and taste of the pasta.

✚ Taste: Use water with a neutral taste to avoid any unwanted flavours being transferred to the pasta.

✓ **Salt (if used):**

✚ Texture: Salt should be free-flowing and not clumped together, which would indicate moisture contamination.

✚ Purity: Check the ingredient list to ensure there are no unnecessary additives or anti-caking agents in the salt, especially if you are using natural sea or kosher salt.

✓ **Olive Oil (if used):**

✚ Colour: Quality olive oil is typically clear with shades ranging from golden to green. Cloudiness or sediment can indicate the oil has been improperly stored.

✚ Smell: Good olive oil has a fresh, fruity aroma. If the oil smells musty, rancid, or metallic, it has gone bad.

✚ Taste: A quick taste can confirm the freshness. Rancid olive oil will have an unpleasant, off-putting flavour.

• **Ratios of ingredients**

✓ Wheat semolina and water are mixed by the ratio of 3 to 1.

✓ Water should be pure, with no off-flavour and suitable for drinking.

✓ For egg noodles, eggs are added in the form of fresh eggs, frozen eggs, dry eggs, egg yolks or dry egg solids. If eggs are added to the mixture, the amount of water reduced

• **Weighing the ingredients**

Below are the steps and procedures for weighing the main ingredients used in pasta making:

✓ **Weighing the Flour**

Step 1: Place the Container: Place an empty bowl or container on the scale.

Step 2: Tare the Scale: Press the tare button to reset the scale to zero, eliminating the weight of the container.

Step 3: Add Flour: Slowly add flour to the bowl until you reach the required weight for your recipe.

Step 4: Check and Adjust: Once the desired weight is reached, check for any excess flour. Remove or add as needed.

✓ **Weighing the Eggs**

Step 1: Crack the Eggs: Crack the eggs into a separate container or bowl.

Step 2: Tare the Scale: Place the container with the cracked eggs on the scale and press the tare button to zero out the weight.

Step 3: Add Eggs to the Mix: Weigh the eggs to match your recipe's requirements (if a specific weight is provided, such as in grams). If the recipe calls for eggs by count (e.g., 2 large eggs), you can use the average weight of a large egg (about 50 grams each) to estimate.

✓ **Weighing Water**

Step 1: Prepare a Measuring Cup: Place a measuring cup on the scale and press the tare button to zero it out.

Step 2: Measure Water: Add water until you reach the required weight. Many recipes provide liquid measurements in millilitres, but with water, 1 millilitre equals 1 gram, so you can weigh directly in grams.

✓ **Weighing Salt**

Step 1: Use a Small Bowl: Place a small container or dish on the scale and tare it.

Step 2: Add Salt: Carefully add the required amount of salt according to the recipe. Salt is typically measured in small quantities (grams or teaspoons), so be precise.

✓ **Weighing Olive Oil (if used)**

Step 1: Use a Small Measuring Cup or Bowl: Place the container on the scale and tare it to zero.

Step 2: Add Olive Oil: Pour the olive oil until the desired weight is achieved. Like water, olive oil is usually measured by volume but can also be weighed for precision.

NOTE:

✚ If you are weighing multiple ingredients in the same container (such as when making the dough), always use the tare function to zero out the scale after each ingredient is added.

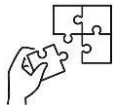
✚ Sift Before Weighing (if required): If your recipe calls for sifted flour, sift it before weighing for accurate measurement.

 **Calibrate Your Scale:** Regularly check and calibrate your kitchen scale for accuracy, especially if you use it frequently.



Points to Remember

- You are recommended to check the quality of ingredients to ensure that are safe
- Calibrate the weighing scale before use it, in order to weigh the ingredients accurately
- Remember to sift the flour before weighing



Application of learning 1.6.

You are requested to go in your school's workshop of pasta making to check the quality of ingredients and to weigh the ingredients used in pasta making.



Learning outcome 1 end assessment

Written assessment

Q1. Fill the following statements with appropriate tools or equipment from the given list (mops, sweepers, washing machine, extruder, dough mixer, drying rack, packaging machine, weighing balances)

- a) are used for cleaning and drying floors in the processing area
- b) are used to remove dry debris such as dust, crumbs, or small pieces of pasta from floors
- c) drying racks are used for placing fresh pasta after it has been shaped but before it undergoes drying in an oven or air-drying process.
- d) are essential for accurately measuring ingredients such as flour, water, eggs, and salt.
- e) automates the packing process for finished pasta products into bags or boxes for distribution.

Q2. Answer by true or false based on the meaning of the following statements

- a) The primary purpose of adjustment is to optimize performance, improve accuracy, or adapt the tool or equipment to a particular job or condition.
- b) It is important to follow user manuals while you are adjusting tools or equipment
- c) Wearing appropriate Personal Protective Equipment (PPE) isn't crucial while you are selecting the cleaning products
- d) Detergents are cleaning products used to remove food debris, grease and dirt. They cannot kill bacteria and microorganisms.
- e) Chemical ingredients of the cleaning product are not one among many factors that influence whether a cleaning chemical will cause health problems.

Q3. Circle the answer to the following statements

- a) The following are selection criteria of ingredient used in pasta making except:
 - i. Bulk density of flour
 - ii. Water absorption capacity of flour
 - iii. Apparent viscosity
 - iv. Texture of flour
 - v. Spaghetti
- b) The following are types of packaging materials for dried pasta except:
 - i. Plastic packaging
 - ii. Paperboard boxes
 - iii. Glass containers
 - iv. Biodegradable films
 - v. Plastic films
- c) The following are functions of packaging materials used to package pasta except:
 - i. Protection

- ii. Helps in storage
 - iii. Helps in transportation
 - iv. Providing products information
 - v. Portions size
- d) The following are the purpose of work area arrangement except
- i. Maximize efficiency
 - ii. Improve safety
 - iii. Enhance productivity
 - iv. Quality control
 - v. Clean-Out-Place

Q4. Match the following types of ingredients which is in column A with it's checking quality/quality parameters which is in column B.

Answers	column A	column B
1.....	1. Flour	a. Freshness Test (Float Test): Place it in a bowl of water. A fresh one sinks and lays flat, while an old one will float or stand upright, indicating it has gone bad.
2.....	2. Eggs	b. Look for a consistent colour (usually white to pale yellow). It should be free of lumps, dark spots, or signs of insects.
3.....	3. Water	c. Should be free-flowing and not clumped together, which would indicate moisture contamination.
4.....	4. Salt	d. Use one with a neutral taste to avoid any unwanted flavours being transferred to the pasta.

Practical assessment

Your school needs to produce the pasta to be eaten by the parents and children in the open day. You are asked to go to the pasta making workshop to perform the following task within 2 hours all resources needed are available in the workshop.

Task 1: Select materials, tools and equipment used in pasta making

Task2: Adjust tools and equipment used in pasta making

Task 3: Clean the workplace, tools and equipment

Task 4: Check the cleanliness of the workplace (by using vision inspection, acidity test and SWAB test)

Task 5: Prepare (check the quality of ingredients and weigh ingredients using 2kg of wheat flour) used in making pasta

END



Reference

- Bresciani, A., Pagani, M. A., & Marti, A. (2022). Pasta-making process: A narrative review on the relation between process variables and pasta quality. *Foods*, 11(3), 256.
- Bustos, M. C., Perez, G. T., & Leon, A. E. (2015). Structure and quality of pasta enriched with functional ingredients. *RSC Advances*, 5(39), 30780–30792.
- Gull, A., Prasad, K., & Kumar, P. (2017). Quality changes in functional pasta during storage in two different packaging materials: LDPE and BOPP. *Journal of Food Processing and Preservation*, 41(5), e13115.
- Jackson, L. S., Al-Taher, F. M., Moorman, M., DeVries, J. W., Tippet, R., Swanson, K. M., & Gendel, S. M. (2008). Cleaning and other control and validation strategies to prevent allergen cross-contact in food-processing operations. *Journal of Food Protection*, 71(2), 445–458.
- Soliman, M. H. A. (2020). 5S: A practical guide to visualizing and organizing workplaces to improve productivity. Mohammed Hamed Ahmed Soliman.

Learning Outcome 2: Make Fresh Pasta



Indicative contents

2.1 Making Dough for Pasta

2.2 Checking Quality Parameters of Dough

2.3 Performing Extrusion of the Dough for Pasta Making

Key Competencies for Learning Outcome 2 : Make Fresh Pasta

Knowledge	Skills	Attitudes
• Description of pasta dough quality parameters • Identification of type of pasta • Description of physical changes of dough that occur during extrusion	• Mixing the ingredients used in pasta making • kneading and resting dough for pasta • Checking the quality of dough • Extruding the dough for pasta making	• Being careful while making dough • Being vigilant while checking the quality of dough • Being accountable while extruding the dough



Duration: 20 hrs

Learning outcome 2 objectives:



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

1. Mix properly the ingredients used in making the pasta according to the mixing techniques
2. Knead and rest appropriately the dough according to the kneading techniques and resting conditions
3. Describe correctly pasta dough quality parameters
4. Check properly the quality of dough according to the quality parameters
5. Describe correctly the dough extrusion according to the types of pasta products
6. Extrude appropriately the dough according to the extrusion methods
7. Describe correctly physical changes of dough that occur during extrusion



Resources

Equipment	Tools	Materials
• Working table, • Mixing bowl, • Pasta machine (Extruder)	• Knives, • Ravioli cutters, • Gnocchi boards, • Spaghetti rollers, • Rolling pin cutters, • Waste bin	• wheat flour, • Eggs, • Salt, • Oil, • Spices



Indicative Content 2.1: Making Dough for Pasta



Duration: 7hrs



Practical Activity 2.1.1: Mixing ingredients for pasta dough



Task:

- 1: You are requested to go in pasta making workshop to mix ingredients used in making the pasta
- 2: Apply safety measures at workplace.
- 3: Mixing the ingredients by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 2.1.1.
- 6: Perform the task provided in application of learning 2.1



Key readings 2.1.1. Mixing ingredients for pasta dough

- **Purposes of Mixing Ingredients for Pasta Making**

When making pasta, the mixing of ingredients serves several critical purposes that contribute to the final texture, flavour, and overall quality of the pasta. Here's a detailed breakdown of these purposes:

- ✓ **Hydration of Flour:** Mixing the flour with wet ingredients (such as eggs and oil) allows the flour to absorb moisture. This hydration is essential for gluten development, which gives pasta its structure and chewiness. Proper hydration ensures that the dough becomes pliable and easy to work with.
- ✓ **Gluten Development:** As the ingredients are mixed, gluten proteins in the flour begin to bond and form a network. This gluten network is crucial for providing elasticity and strength to the pasta dough. The more you knead and mix, the stronger this network becomes, allowing the pasta to hold its shape during cooking.
- ✓ **Incorporation of Ingredients:** Mixing ensures that all ingredients are evenly distributed throughout the dough. This includes not only flour but also eggs, salt, and any additional flavourings or fats (like olive oil). Even distribution is vital for consistent flavour and texture in each bite of pasta.
- ✓ **Texture Improvement:** The mixing process helps achieve a specific texture in the dough. For instance, using egg yolks adds richness and contributes to a silkier texture in fresh pasta compared to water-based doughs. The right balance of wet and dry ingredients results in a smooth, cohesive dough that can be rolled out easily.

- ✓ **Temperature Control:** Mixing by hand or using a machine can help control the temperature of the dough. If too much heat is generated during mixing (especially when using machines), it can affect gluten formation negatively. Keeping an eye on temperature helps maintain optimal conditions for dough development.
- ✓ **Resting Period Preparation:** After mixing, allowing the dough to rest is crucial as it lets the gluten relax and makes rolling out easier. The initial mixing prepares the dough for this resting phase by ensuring it has reached an adequate consistency before being set aside.
- **Mixing techniques**
- ✓ **Mixing Dough using hand**



Wash your hands before mixing. Mixing requires working the flour between your bare hands, so wash them and dry them well before you begin. Remove your rings and other jewellery that might get caught in the dough.

- ✚ Combine the Flour and Salt: Whisk together the flour and salt with a fork in a medium mixing bowl.
- ✚ Add the Eggs: Create a deep well in the middle of the flour and crack the eggs into this well. Whisk the eggs with the fork to combine.
- ✚ Begin Combining the Flour and Eggs: As you whisk the eggs, begin gradually pulling in flour from the bottom and sides of the bowl. Don't rush this step. At first, the eggs will start to look like a slurry. Once enough flour has been added, it will start forming a very soft dough. Don't worry if you haven't used all the flour. Use your hands to bring the shaggy mass of dough into a ball. When all the flour is combined, if the dough is still sticky, sprinkle more flour over the dough, a little at a time, and mix it in.

Note: Dried pasta made from semolina flour, water, and salt and is easily stored dry because it contains no eggs.

✓ **Mixing dough by electric mixer (Stand mixer or food processor)**

 Step 1: Gather Ingredients

You will need:

300 g all-purpose flour

3 large eggs

1 large egg yolk

A pinch of salt (optional)

Water (if needed, in small amounts)

 Step 2: Prepare the Mixer

Attach the flat beater to your electric mixer.

Ensure that the mixer bowl is clean and dry.

 Step 3: Combine Ingredients

Crack the eggs and egg yolk into the mixing bowl.

Add a pinch of salt if desired.

Gradually add about 75-80% of the flour into the bowl while mixing on low speed (speed setting around 2).

 Step 4: Mix Until Combined

Allow the mixer to run for about 30 seconds until the mixture starts to come together. The dough should begin forming a rough mass.

 Step 5: Adjust Flour as Needed

If the dough appears too sticky, gradually add more flour until it reaches a non-sticky consistency. Avoid adding too much flour at once to prevent making the dough tough.

 Step 6: Switch to Dough Hook

Once combined, switch from the flat beater to the dough hook attachment.

✓ **Differences and resemblance of using hand mixing vs. Electric mixing in pasta making**

When it comes to pasta making, the method of mixing the ingredients can significantly influence the final product. Both hand mixing and electric mixing have their unique characteristics, advantages, and disadvantages. Below is a detailed comparison of these two methods.

SN	Hand mixer	Electrical mixer
1.	Hand mixing involves using your hands to combine flour, eggs, and other ingredients. This method allows for greater tactile feedback, enabling the	In contrast, electric mixers provide a more uniform mixing process. They often come with various attachments that can knead dough effectively without much manual effort.

	cook to feel the texture of the dough as it comes together. The cook can adjust the amount of flour or liquid based on how the dough feels, which is particularly important in pasta making where humidity and flour type can vary.	However, this method may lack the nuanced control that hand mixing offers since it relies on pre-set speeds and times.
	The development of gluten is crucial in pasta making as it affects the elasticity and chewiness of the final product. Hand mixing allows for gradual incorporation of ingredients, which can lead to better gluten formation through careful kneading techniques like folding and stretching.	Electric mixers can also develop gluten efficiently but may do so too quickly if not monitored closely. Over-kneading in an electric mixer can lead to tough pasta due to excessive gluten development. Therefore, timing and observation are essential when using an electric mixer.
2	On the other hand, hand mixing takes longer due to the physical effort required for kneading by hand. However, some cooks argue that this time spent contributes positively to flavor development and	Electric mixers generally save time compared to hand mixing because they automate much of the labor-intensive process involved in kneading dough. For those who make large batches of pasta or require quick preparation times, an

	overall satisfaction with the cooking process.	electric mixer can be advantageous.
3	Hand mixing requires more direct handling of ingredients which might lead to a messier workspace but allows for immediate adjustments without needing additional equipment.	Using an electric mixer tends to be cleaner since it minimizes direct contact with flour and egg mixtures; however, cleanup may involve disassembling parts of the machine after use.
4	Some chefs believe that hand-mixed pasta has superior flavour due to more controlled incorporation of air into the dough during kneading and a slower process that allows flavours from eggs or added ingredients to meld better	Electric mixers may not allow for this same level of interaction between ingredients as they tend to mix at higher speeds which could inhibit flavour integration.



Practical Activity 2.1.2: Kneading and rest the dough for pasta making



Task:

- 1: You are requested to go in pasta making workshop to knead and rest the dough used in making the pasta
- 2: Apply safety measures at workplace.
- 3: knead and rest the dough by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 2.1.2.
- 6: Perform the task provided in application of learning 2.1



Key readings 2.1.2.: Kneading and rest the dough for pasta making

- **Purpose of Kneading the Dough for Pasta Making**

Kneading pasta dough serves several essential purposes that contribute to the final texture and quality of the pasta. Here's a detailed breakdown of these purposes:

- ✓ **Gluten Development**

The primary purpose of kneading is to develop gluten, which is a network of proteins formed when flour is mixed with water. In pasta making, gluten provides structure and elasticity to the dough. This elasticity allows the dough to stretch without tearing, which is crucial for rolling it out into thin sheets or shapes. The more you knead, the stronger and more elastic the gluten network becomes.

- ✓ **Hydration of Ingredients**

Kneading helps ensure that all ingredients are evenly hydrated. When flour is mixed with eggs or water, it needs time and motion to absorb moisture fully. Kneading distributes moisture throughout the dough, leading to a consistent texture. This hydration process also contributes to the overall pliability of the dough, making it easier to work with.

- ✓ **Texture Improvement**

Through kneading, the dough transforms from a rough mixture into a smooth and supple consistency. A well-kneaded pasta dough should feel soft and slightly tacky but not sticky. This smooth texture is vital for achieving a pleasant mouthfeel in the finished pasta product.

- **Dough kneading techniques**

- ✓ **Rolling Techniques steps**

- ✚ Preparation for Rolling: After resting, divide your dough into manageable pieces (usually halves or quarters). Keep unused portions covered to prevent drying out.

- ✚ Dusting with Flour: Lightly dust your work surface with semolina or all-purpose flour to prevent sticking during rolling.
- ✚ Flattening the Dough: Take one piece of dough and flatten it slightly with your hands into an oval shape before using a rolling pin.
- ✚ Rolling Out: Using a wooden rolling pin, start from the center of the oval and roll outward toward one edge, then return to the center and roll toward another edge. Rotate the dough frequently to maintain an even thickness.
- ✚ Dealing with Spring back: If you notice that your dough is springing back as you roll it out:
 1. Allow it to rest for an additional 5-10 minutes.
 2. Ensure that you are applying even pressure while rolling.
 3. Dust lightly with more flour if necessary to prevent sticking.
 4. Avoid overworking any single area; instead, keep moving around the dough.

Benefits of Rolling as Kneading

Using rolling as a kneading technique offers several advantages:

- Even Texture: Rolling applies uniform pressure across the entire surface of the dough, promoting consistent gluten development throughout.
- Less Physical Strain: For those who may have difficulty with traditional hand-kneading due to physical limitations, rolling provides an alternative that requires less effort.
- Time Efficiency: The process of rolling can be quicker than extensive hand-kneading, especially when working with larger batches of dough.

✓ Folding technique

Folding is often used in conjunction with rolling out pasta sheets, especially when using a pasta machine. This method helps further develop gluten while ensuring an even thickness throughout the sheet.

Preparation for Folding: After rolling out your pasta sheet to its desired thickness, take one end of the sheet and fold it towards the centre.

Folding technique steps:

- ✚ Forming the Dough Ball: Once the mixture is cohesive enough, gather it into a ball.
- ✚ Folding: Flatten the dough slightly with your palm. Then fold one edge over towards the centre of the dough ball.
- ✚ Rotating: Rotate the dough 90 degrees and fold another edge over towards the centre.
- ✚ Repeating: Continue this process for about 5-10 minutes. Each time you fold, apply gentle pressure with your palms to help develop gluten.
- ✚ The folding technique helps align gluten strands in layers, enhancing elasticity

✓ Stretching techniques

Stretching techniques steps

- ✚ Initial Stretching: After folding, take one end of the dough and gently stretch it away from you while keeping the other end anchored on the work surface.
- ✚ Folding Over: Once stretched (to about twice its length), fold it back onto itself.
- ✚ Turning: Rotate the dough again by 90 degrees and repeat the stretching process.
- ✚ Continuing Stretching: Perform this stretching and folding sequence for an additional 5-10 minutes.

• Difference Between Folding, Stretching, and Rolling as Kneading Techniques for Pasta Dough

Kneading is a crucial step in the preparation of pasta dough, as it develops gluten, which gives the pasta its structure and texture. The techniques of folding, stretching, and rolling each serve distinct purposes in this process.

✓ Folding

Folding involves taking one section of the dough and bringing it over to the other side. This technique is often used to incorporate air into the dough while also helping to align gluten strands.

- ✚ Purpose: The primary goal of folding is to create layers within the dough that can help improve its elasticity and strength. This technique is particularly useful when making fresh pasta that requires a tender yet resilient texture.
- ✚ Process: To fold pasta dough, you typically flatten it slightly with your hands or a rolling pin, then lift one edge and fold it over itself. This can be repeated several times, allowing for rest periods in between to prevent the gluten from becoming too tight.
- ✚ Benefits: Folding helps maintain moisture within the dough while also allowing for even distribution of ingredients like salt or eggs. It creates a more uniform texture without overworking the dough.

✓ Stretching

Stretching involves pulling the dough gently to elongate it without tearing. This technique is essential for developing gluten fibers effectively.

- ✚ Purpose: The main aim of stretching is to increase the extensibility of the dough, which allows it to be shaped into various forms such as sheets or shapes like fettuccine or ravioli.
- ✚ Process: To stretch pasta dough, you can use your hands or a rolling pin. Start by pressing down on the center of the dough and gradually pull outward from there, rotating as needed to maintain an even thickness.
- ✚ Benefits: Stretching helps create a smooth surface on the pasta while ensuring that it remains pliable enough for shaping. It also aids in achieving a thin consistency necessary for certain types of pasta.

✓ **Rolling**

Rolling refers to using a rolling pin or a pasta machine to flatten out the dough uniformly into sheets or specific shapes.

✚ **Purpose:** The goal of rolling is to achieve an even thickness across the entire piece of dough, which is critical for cooking consistency and overall quality.

✚ **Process:** When rolling out pasta dough, start with a small portion and flatten it slightly before using a rolling pin or machine. Roll from the center outward in all directions until you reach your desired thickness (usually around 1/16 inch for most pastas).

✚ **Benefits:** Rolling allows for precise control over thickness and ensures that all parts of the pasta cook evenly. It also helps integrate any additional ingredients like herbs or spices uniformly throughout the dough.

● **Similarities of folding, Stretching, and Rolling as Kneading Techniques for Pasta Dough**

✓ **Gluten Development:** All three techniques aim to develop gluten in different ways: folding creates layers, stretching aligns gluten strands, and rolling compresses them.

✓ **Texture Improvement:** Each method contributes to improving the overall texture of pasta by creating a balance between elasticity and tenderness.

✓ **Incorporation of Air:** Folding introduces air pockets; stretching maintains air distribution; rolling ensures an even texture throughout.

✓ **Uniformity:** These techniques help achieve uniformity in thickness and consistency across different shapes of pasta.

✓ **Flexibility:** Mastery of these techniques allows for greater flexibility in creating various types of pasta dishes with desired textures.



Practical Activity 2.1.3: Resting dough for pasta



Task:

- 1: You are requested to go in pasta making workshop to rest the dough used in making the pasta
- 2: Apply safety measures at workplace.
- 3: Resting of dough by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 2.1.3.
- 6: Perform the task provided in application of learning 2.1



Key readings 2.1.3.: Resting dough for pasta

- **Purpose of Resting Dough for Pasta Making**

- ✓ **Gluten Relaxation:** After kneading, the gluten strands are tightly bound and can make the dough feel stiff and difficult to work with. Allowing the dough to rest gives these gluten strands time to relax, resulting in a more pliable and manageable dough that can be rolled out easily without snapping back.
- ✓ **Hydration:** Resting allows for better hydration of the flour particles. During this time, water penetrates more thoroughly into the flour, leading to a more uniform dough consistency. This hydration is vital for achieving a smooth texture in the finished pasta.
- ✓ **Improved Texture:** A well-rested dough yields pasta that has a desirable bite or “al dente” quality when cooked. If you skip this resting period, you may end up with pasta that is tough or rubbery rather than tender and chewy.
- ✓ **Timing Considerations:** The ideal resting time varies depending on the type of flour used and environmental factors like humidity and temperature. Generally, resting times can range from 30 minutes to several hours, with some recipes suggesting overnight resting for optimal results.
- ✓ **Visual Cues:** Observing visual changes in the dough can help determine if it has rested adequately. A well-rested dough will appear smoother and taut compared to its initial lumpy state after kneading

- **Procedure of Resting the Pasta Dough**

Resting pasta dough is a crucial step in the pasta-making process, as it allows the gluten to relax and the flour to fully hydrate. This results in a dough that is easier to roll out and yields a better texture in the final product. Here’s a detailed step-by-step procedure for resting pasta dough:

Step 1: Prepare Your Dough

After mixing your ingredients (flour, eggs, and any additional components), knead the dough until it becomes smooth and elastic. This typically takes about 5-10 minutes of kneading by hand or using a stand mixer.

Step 2: Shape the Dough

Once kneaded, shape the dough into a ball or flatten it into a disk. The shape is not critical but should be compact enough to wrap easily.

Step 3: Wrap the Dough

Wrap the shaped dough tightly in plastic wrap. This prevents it from drying out during the resting period. Alternatively, you can cover it with a clean kitchen towel if you prefer.

Step 4: Let It Rest

Allow the wrapped dough to rest at room temperature for **at least 30 minutes**. This resting time can vary; some recipes suggest up to an hour for optimal results. The key is to ensure that it remains covered during this time.

Step 5: Check Before Rolling

After resting, unwrap the dough and check its texture. It should feel softer and more pliable than before. If it feels too sticky, you can lightly dust it with flour before rolling out.

Step 6: Proceed with Rolling

Once rested, you can proceed to roll out your pasta using either a rolling pin or a pasta machine, depending on your preference

- **Resting Pasta Dough Conditions**

When making fresh pasta, resting the dough is a crucial step that significantly affects the final texture and workability of the pasta. The resting period allows the gluten in the dough to relax, which makes it easier to roll out and shape. Here are the conditions and considerations for resting pasta dough:

- ✓ **Duration of Resting:**

It is generally recommended to let pasta dough rest for at least **30 minutes**, but it can be beneficial to rest it for up to **2-3 hours** or even longer if needed. This resting time allows the flour to fully hydrate and the gluten structure to stabilize.

- ✓ **Temperature:**

The dough should be rested at **room temperature**. If you need to prepare it ahead of time, you can refrigerate it, but it's essential to bring it back to room temperature before rolling it out. Cold dough can become too stiff and difficult to work with.

- ✓ **Covering the Dough:**

To prevent the dough from drying out during the resting period, it should be tightly wrapped in **plastic wrap**, or alternatively covered with a clean towel or an inverted bowl. This covering helps maintain moisture levels within the dough.

- ✓ **Hydration:**

During kneading, hydration occurs as water from eggs (in egg-based pasta) or water added (in eggless pasta) interacts with flour particles. The resting phase allows this hydration process to complete, resulting in a smoother and more pliable dough.

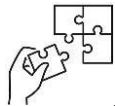
✓ **Impact on Texture:**

A well-rested pasta dough will have a softer texture that is easier to roll out into thin sheets without tearing. This results in a finished product that has a desirable al dente bite when cooked.



Points to Remember

- Safety precaution must be respected while using dough mixer
- Nail must be cut and use cleaned hand while using hand mixing
- Electricity should be available when using electrical mixing
- While kneading pasta dough, kneading techniques must be respected
- Rested dough must be covered in order to preserve moisture
- Resting condition must be controlled during resting period



Application of learning 2.1.

You are requested to go in school's workshop for pasta making perform the following Task:

1. To mix ingredient used in pasta making.
2. To knead dough for pasta making
3. To rest the dough for pasta making



Indicative Content 2.2: Checking Quality Parameters of Dough



Duration: 3hrs



Practical Activity 2.2.2: Checking the quality of dough



Task:

- 1: You are requested to go in pasta making workshop to check the quality of dough used in making the pasta
- 2: Apply safety measures at workplace.
- 3: Check the checking the quality of dough by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 2.2.2.
- 6: Perform the task provided in application of learning 2.2



Key readings 2.2.2.: Checking the quality of dough

- **Purpose of Dough Quality Checking in Pasta Making**
- ✓ **Ensuring Consistency in Texture and Structure**

One of the primary purposes of dough quality checking in pasta making is to ensure that the texture and structure of the dough are consistent. The quality of the flour used the hydration level, and the mixing process all contribute to the final product's texture. By checking these parameters, manufacturers can maintain a uniform texture across batches, which is crucial for consumer satisfaction. A consistent dough will yield pasta that cooks evenly and has a desirable bite or "al dente" quality.

- ✓ **Assessing Hydration Levels**

Hydration is a critical factor in pasta making, as it affects gluten development and overall dough elasticity. Quality checks should include measuring the moisture content of the dough to ensure it falls within an optimal range (typically around 30-35% water relative to flour weight). If the hydration level is too low, the pasta may be brittle; if too high, it may become sticky and difficult to handle. Regular checks help in adjusting water addition during mixing.

- ✓ **Evaluating Gluten Development**

Gluten formation is essential for providing structure and chewiness to pasta. Dough quality checks should involve evaluating gluten development through techniques such as the windowpane test, where a small piece of dough is stretched to see if it forms a thin membrane without tearing. Proper gluten development ensures that the pasta maintains its shape during cooking and provides a satisfying

texture.

✓ **Monitoring Dough Temperature**

The temperature of the dough during mixing can significantly affect its quality.

Higher temperatures can lead to overdevelopment of gluten or even denature proteins, affecting flavor and texture negatively. Quality checks should include monitoring dough temperature throughout processing to ensure it remains within an ideal range (generally around 20-25°C). This helps prevent issues related to fermentation or spoilage.

✓ **Identifying Contaminants or Foreign Materials**

Quality checking also serves as a means to identify any contaminants or foreign materials that may have inadvertently entered the production process. This includes checking for unwanted particles in flour or other ingredients that could compromise food safety or product integrity.

✓ **Optimizing Production Efficiency**

Regular quality checks allow manufacturers to optimize their production processes by identifying any deviations from standard operating procedures early on. This proactive approach minimizes waste due to defective batches and ensures that resources are used efficiently.

• **Pasta dough quality parameters**

✓ **Pasta dough parameters are:**

Extensibility

Extensibility refers to the ability of the pasta dough to stretch without breaking. This property is crucial for shaping pasta into various forms such as sheets for lasagna or strands for spaghetti. Extensibility is influenced by the type of flour used; for instance, high-gluten flours tend to have greater extensibility due to their higher protein content, which contributes to gluten formation. The presence of water also plays a significant role; adequate hydration allows gluten proteins to align and form a network that can stretch effectively.

In practical terms, extensibility can be measured using a test called the “dough extensibility test,” where a sample of dough is pulled until it breaks. The distance it stretches before breaking indicates its extensibility.

Elasticity

Elasticity describes the ability of pasta dough to return to its original shape after being deformed. This property is essential for maintaining the structure of pasta during cooking. Elasticity is closely related to the gluten network formed during kneading; stronger gluten networks provide better elasticity.

The balance between elasticity and extensibility is critical; if dough is too elastic, it may not stretch adequately for shaping, while if it is too extensible, it may not hold its shape during cooking. The ratio of gliadin (which contributes to elasticity) and glutenin (which contributes to extensibility) in flour affects this balance.

Viscosity

Viscosity measures the resistance of pasta dough to flow under stress. It reflects how easily the dough can be manipulated during processing. High viscosity indicates that the dough will resist deformation more than low-viscosity doughs. Factors influencing viscosity include moisture content and temperature; as temperature increases, viscosity typically decreases due to reduced intermolecular forces.

In practical applications, viscosity can be assessed using viscometers that measure how much force is required to move a blade through the dough at a constant speed.

Stickiness

Stickiness refers to how much the pasta dough adheres to surfaces or itself when handled. High stickiness can complicate processing because it makes handling difficult and can lead to clumping or tearing during shaping. Stickiness arises from moisture content and flour composition; flours with higher levels of certain proteins or starches may exhibit increased stickiness.

To evaluate stickiness quantitatively, tests such as texture profile analysis (TPA) can be employed, measuring how much force is needed to separate two pieces of dough.

Resistance to Deformation

Resistance to deformation encompasses both elasticity and viscosity but focuses specifically on how well the dough maintains its shape under applied forces. This property ensures that pasta retains its form during cooking without becoming mushy or losing structural integrity.

Factors affecting resistance include hydration levels (too much water can weaken structure), kneading time (which develops gluten), and resting time (allowing gluten relaxation). A well-balanced resistance allows for optimal cooking performance where pasta remains al dente rather than disintegrating.

● **Steps for checking the quality of dough used in pasta making**

✓ **Visual Inspection**

Begin by examining the dough's appearance. It should have a smooth, even texture without any cracks or dry spots. The color should be consistent, typically a pale yellow if using eggs.

✓ **Texture Test**

Take a small piece of dough and pinch it between your fingers. The dough should feel pliable and elastic, not overly sticky or dry. It should bounce back slightly when pressed.

✓ **Gluten Development Check**

Perform a windowpane test: Stretch a small piece of dough between your fingers. If it can stretch thin enough to let light through without tearing, the gluten has developed properly.

✓ **Kneading Consistency**

After kneading, the dough should feel soft and smooth to the touch. If it feels too tacky, you may need to incorporate more flour; if it's too dry and crumbly, add a few drops of water or olive oil.

✓ **Resting Period Evaluation**

Allow the dough to rest for at least 30 minutes after kneading. After resting, check if it has become more pliable and easier to work with.

✓ **Rolling Test**

Roll out a portion of the dough using a pasta machine or rolling pin. The dough should roll out easily without tearing or sticking excessively to the surface.

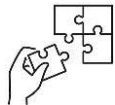
✓ **Cooking Test**

Finally, cook a small piece of the rolled-out pasta in boiling salted water for 1-3 minutes. The cooked pasta should be tender yet firm (al dente) and hold its shape without falling apart.



Points to Remember

- You are recommended to check the quality of dough by referring on the quality parameters mentioned in trainee manual
- Maintain the hygiene while you are checking the quality of pasta dough



Application of learning 2.2.

You are requested to go in school's workshop for pasta making to check the quality of dough used in pasta making.



Indicative Content 2.3: Performing Extrusion of the Dough for Pasta Making



Duration: 10hrs



Theoretical Activity 2.3.1: Description of dough extrusion



Tasks:

- 1: You are requested to answer the following questions:
 - i. What do you know about pasta extrusion?
 - ii. Suggest any type of pasta do you know?
- 2: Provide the answers to the asked question by writing them on papers, flip chart.
- 3: Present the findings/answers to the whole class
- 4: Ask the trainer for clarification if any
- 5: For more clarification, read the key readings 2.3.1



Key readings 2.3.1.: Description of dough extrusion

- **Purpose of performing extrusion**

Extruding pasta dough is a process used to shape the dough into various pasta forms by pushing it through a die under pressure.

The main purposes of extruding pasta dough are:

- ✓ **Consistent Shape and Size:** Extrusion ensures that the pasta comes out in uniform shapes and sizes, which is important for even cooking.
- ✓ **Efficiency in Production:** Extruding allows for quick and large-scale production of pasta, especially for shapes that would be time-consuming to make by hand, like penne, fusilli, or macaroni.
- ✓ **Texture Creation:** The extrusion process can affect the texture of the pasta. For example, using bronze dies can create a rougher surface, which helps sauce cling better to the pasta.
- ✓ **Customization:** It allows manufacturers and chefs to create a wide range of pasta shapes by simply changing the die, providing versatility in the types of pasta that can be made.
- ✓ Forces the dough through the die
- ✓ Kneads the dough into a homogeneous mass,
- ✓ Controls the rate of production
- ✓ Influences the overall quality of the finished product

- **Types of pasta products based on shape/size**

Pasta comes in a wide variety of shapes and sizes, each suited for different types of sauces, dishes, and textures.

Here are some common types of pasta:

✓ **Long Pasta**

+ **Spaghetti:** Thin, long strands that pair well with light, smooth sauces like marinara or olive oil-based sauces.



+ **Fettuccine:** Flat, ribbon-like strands, slightly wider than spaghetti, often served with heavier sauces like Alfredo or Bolognese.



+ **Linguine:** Similar to spaghetti but slightly flatter, often paired with seafood-based sauces or lighter olive oil sauces.



+ **Vermicelli:** is a type of long, thin pasta that is similar to spaghetti but slightly thinner. The name "vermicelli" means "little worms" in Italian, referring to its fine, string-like appearance.



+ **Noodles:** Noodles are a type of food made from unleavened dough, which is typically stretched, rolled, or extruded into thin, long strips or strings. Noodles are

a staple in many cultures, especially in Asia, but they can vary significantly in ingredients, shape, and preparation methods across different cuisines.



✓ **Short Pasta**

✚ **Penne:** Tubular pasta with diagonally cut ends. Great with hearty, chunky sauces like meat or vegetable ragu.



✚ **Rigatoni:** Larger, ridged tubes that hold onto sauces well, commonly used in baked pasta dishes.



✚ **Farfalle (Bow-tie):** Shaped like a bow-tie, works well with lighter tomato or cream sauces, and often used in salads.



 **Macaroni:** macaroni is a type of short, tubular pasta made from durum wheat. It is characterized by its small, curved shape, though straight varieties also exist. Macaroni is a versatile pasta commonly used in a variety of dishes, with one of the most popular being macaroni.



Practical Activity 2.3.2: Extruding the dough for pasta making



Task:

- 1: You are requested to go in pasta making workshop to pasta dough
- 2: Apply safety measures at workplace.
- 3: Extrude the pasta dough by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 2.3.2.
- 6: Perform the task provided in application of learning 2.3



Key readings 2.3.2.: Extruding the dough for pasta making

- **Application of extrusion methods**
- ✓ **Cold Extruders**

When using cold extrusion for pasta making, the process involves forcing pasta dough through a die to create various shapes, such as spaghetti, macaroni, or fusilli. Cold extrusion operates at or near room temperature, preserving the dough's integrity without heat damage.

✚ **The following are step-by-step guide for using cold extrusion to make pasta:**

➤ **Prepare the Dough**

❖ **Ingredients:** Combine semolina flour (durum wheat) with water. Optionally, eggs or other ingredients can be added, depending on the pasta type (e.g., egg pasta).

❖ **Mixing:** Knead the dough until it's homogenous, firm, and smooth. The consistency should be slightly stiff, not too wet or sticky. You can use a dough mixer for larger batches.

❖ **Resting:** Allow the dough to rest for **15-30 minutes** at room temperature. This helps hydrate the flour and relax the gluten, making extrusion smoother.

➤ **Set Up the Extruder**

❖ **Clean and Prepare the Extruder:** Ensure the extruder and die are clean and dry. Lubricate any moving parts (if required) and check that the machine is functioning properly.

❖ **Select the Die:** Attach the desired die for the shape of pasta you want to produce (e.g., macaroni, penne, or spaghetti). The die determines the shape and texture of the pasta.

❖ **Die Material:** Some artisanal extruders use bronze dies, which create a rougher surface on the pasta, ideal for holding sauces. For smoother surfaces, a Teflon-coated die might be used.

➤ **Load the Dough**

❖ **Feeding the Dough:** Cut the rested dough into smaller pieces and feed them into the hopper of the extruder.

❖ **Adjust the Dough Consistency:** If the dough is too dry and cracks during extrusion, adjust by adding a small amount of water. If it is too sticky, add a little flour to reach the correct texture.

➤ **Extrude the Pasta**

❖ **Start the Extruder:** Turn on the extruder, and the machine will begin to push the dough through the die.

❖ **Monitor the Process:** Watch the pasta as it emerges to ensure consistent shape and texture. The pasta should come out smooth without cracks or breaks.

❖ **Cutting:** For short pasta like penne or fusilli, use an automatic or manual cutter

to cut the pasta into the desired lengths as it extrudes. For long pasta like spaghetti or fettuccine, allow the pasta to come out in long strands before cutting to length manually.

The conditions related to cold extrusion:

Cold extrusion occurs at or near room temperature, typically used for making fresh pasta

➤ **Temperature:**

❖ **Dough Temperature:** Kept at or slightly above room temperature, typically **20°C to 30°C** (68°F to 86°F).

❖ **Extruder Temperature:** The machine components (like the extrusion chamber) are kept cool to prevent any rise in temperature from friction. The aim is to avoid any cooking or denaturing of the dough's gluten structure.

➤ **Pressure:**

Moderate pressure is used, generally **20 to 50 bars** (300 to 725 psi). The pressure should be enough to push the dough through the die without damaging the gluten structure.

➤ **Extrusion Speed:**

❖ Low to moderate speeds are used to ensure that the pasta is extruded smoothly without generating excessive friction or heat.

❖ Slower speeds allow for better control over the final product's texture and shape.

✓ **Hot Extruders**

Hot extrusion is a process used for shaping pasta where the dough is subjected to higher temperatures during extrusion. This method is typically used in industrial pasta production to increase efficiency and produce a variety of pasta shapes quickly.

Step-by-step guide for hot extruding pasta:

➤ **Prepare the Dough**

❖ **Ingredients:** Mix semolina flour (durum wheat) with water. For enriched pasta, eggs or other ingredients (like vegetable purees) may be added.

❖ **Mixing:** Use an industrial dough mixer to knead the dough until it has a consistent, firm, and smooth texture. The dough should be neither too wet nor too dry to ensure a successful extrusion.

❖ **Resting:** Let the dough rest for 10-30 minutes at room temperature to help hydrate the flour and relax the gluten, making the extrusion smoother.

➤ **Preheat the Extruder**

❖ **Temperature Settings:** Hot extrusion involves preheating the extrusion machine to temperatures between **30°C and 90°C (86°F to 194°F)**, depending on the type of pasta and machine specifications.

❖ **Preheat the Die:** Ensure the extrusion die is preheated to prevent the dough from sticking or cooling too quickly, which can disrupt the shaping process.

➤ **Set Up the Extruder**

❖ **Choose the Die:** Select the appropriate die for the desired pasta shape (e.g., macaroni, penne, fusilli, etc.). The die determines the pasta's shape and surface texture.

❖ **Attach the Die:** Securely attach the die to the extruder, ensuring it's well-aligned to avoid irregular pasta shapes.

➤ **Load the Dough into the Extruder**

❖ **Feeding the Dough:** Break the rested dough into smaller pieces or rolls and feed them into the hopper of the extruder.

❖ **Feeding Consistency:** Ensure a steady and uniform feeding of dough into the machine to prevent interruptions in the extrusion process.

➤ **Extrude the Pasta**

❖ **Extrusion Process:** Turn on the extruder and set it to the desired speed and pressure settings. The dough is pushed through the heated extrusion chamber and forced through the die, shaping it into the chosen pasta form.

❖ **Maintain Temperature:** Ensure the machine's temperature remains stable throughout the process. The heat softens the dough slightly, allowing it to flow through the die smoothly, which can also enhance its texture and elasticity.

❖ **Continuous Monitoring:** Monitor the pasta as it emerges from the extruder. Ensure it has a consistent shape, size, and texture.

➤ **Cutting the Pasta**

❖ **Automatic Cutting:** For short pasta like penne, macaroni, or rigatoni, the extruder typically comes with an automatic cutting mechanism that slices the pasta to the desired length as it extrudes.

❖ **Manual Cutting:** For long pasta like spaghetti or linguine, cut the strands manually to the required length.

🔥 **The conditions related to hot extrusion:**

Hot extrusion involves higher temperatures and is generally used in industrial pasta production for greater efficiency.

➤ **Temperature:**

❖ **Dough Temperature:** The dough is often warmed to 30°C to 90°C (86°F to 194°F) in the extrusion chamber, which slightly softens the dough and makes it easier to extrude.

❖ **Extruder Temperature:** The extruder components, particularly the barrel and die, are often heated. This aids in shaping the dough without creating cracks or breaks, as well as speeding up production.

❖ **Typical extrusion barrel temperatures** are 50°C to 90°C (122°F to 194°F), depending on the type of pasta.

➤ **Pressure:**

Higher pressure is used, typically 50 to 100 bars (725 to 1,450 psi), to force the dough through the die.

The pressure is adjusted according to the dough consistency, moisture content, and desired pasta shape.

➤ **Extrusion Speed:**

Hot extrusion processes typically operate at higher speeds than cold extrusion. The heat helps the dough flow more easily through the die, which allows faster production.

Faster speeds can be achieved while maintaining the integrity of the pasta shape, particularly for large-scale production.

➤ **Time**

Extrusion method	Retention time in the barrel	Factor
Cold extrusion	30 second to 2 minutes	Lower temperature Lower speed / Pressure
Hot extrusion	10 second to 1 minutes	High temperature / High speed/pressure
Condition	Cold extrusion	
Temperature	20 ⁰ c to 30 ⁰ c (68 ⁰ F to 86 ⁰ F)	30 ⁰ c to 90 ⁰ c (86 ⁰ F to 194 ⁰ F)
Pressure	20 to 50 bars(300 to 725psi)	50 to 100 bars(725 to 1450psi)
Moisture content	28-35%	25-30%
Extrusion speed	Low to moderated	Moderated to high
Die selection	Bronze or Teflon(often bronze	Teflon –coated dies
Cooling	No additional cooling needed post extrusion	Requires cooling post -extrusion



Theoretical Activity 2.3.3: Description of physical changes that occur during extrusion

Tasks:

1. You are requested to answer the following questions:
 - i. Suggest any physical changes that should be occur during extrusion
2. Provide the answers to the asked question by writing them on papers, flip chart.
3. Present the findings/answers to the whole class
4. Ask the trainer for clarification if any.
5. For more clarification, read the key readings 2.3.3



Key readings 2.3.3.: Description of physical changes that occur during extrusion

- **Physical changes that occur during extrusion**

Extrusion involves forcing a material through a die to shape it into a continuous profile, and several physical changes occur during this process, including changes in density, expansion, texture, colour, and design.

- ✓ **Density**

- ✚ **Compaction:** As the material is pushed through the extrusion die, it undergoes compression, which increases its density. The pressure applied during the process forces the material particles closer together, reducing the volume and increasing the mass per unit volume.

- ✚ **Expansion/Relaxation Post-Extrusion:** After exiting the die, depending on the material and process (especially in food or foam extrusion), the product may expand as pressure decreases, reducing density.

- ✚ **Temperature Effects:** Higher temperatures can lead to lower density due to material softening or gas formation.

- ✓ **Expansion**

- ✚ **Thermal Expansion:** Materials can expand when subjected to heat during extrusion, resulting in a change in volume. This is common in food processing, where water vapour or gas expands the structure, or in foam extrusion, where the material "puffs" upon exiting the die.

- ✚ **Elastic Recovery:** After extrusion, some materials recover partially from the deformation caused by the pressure, leading to slight expansion.

- ✚ **Die Swell:** In polymers, the phenomenon known as "die swell" occurs when the material expands upon exiting the die due to the relaxation of stresses applied during extrusion.

✓ Texture

✚ **Material Flow and Shear:** The texture of the extruded product is affected by the shear forces during the process, which can align fibres or polymers, creating a smoother or more fibrous texture.

✚ **Cooling and Solidification:** As the material cools, it solidifies, locking in the texture developed during extrusion. For food products, this can result in a crispy, crunchy, or chewy texture depending on the conditions.

✚ **Porosity Formation:** If gases are introduced or moisture is rapidly evaporated, the material may become porous, leading to a lighter, airy texture (common in snacks like puffed cereals).

✓ Colour

✚ **Heat-Induced Colour Changes:** High temperatures during extrusion can alter the colour of the material. For food products, browning reactions (like the Maillard reaction) may occur, darkening the product.

✚ **Oxidation:** Exposure to air during extrusion, especially at high temperatures, may cause oxidation, leading to discoloration in food, plastics, or metals.

✚ **Pigment Dispersion:** In the case of extruding coloured materials (like plastic or dough), the process affects how evenly pigment or dyes are dispersed, influencing the final colour uniformity.

✓ Design

✚ **Die Shape and Size:** The design of the extruded product is determined by the die's shape. As the material is forced through, it takes on the cross-sectional profile of the die, whether circular, square, or a more complex design.

✚ **Post-Extrusion Shaping:** Some materials may undergo further shaping after extrusion, such as bending, cutting, or embossing, which adds to the complexity of the design.

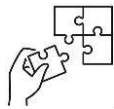
✚ **Shrinkage or Expansion:** Post-extrusion changes in volume due to cooling or material relaxation can alter the final dimensions, affecting the accuracy of the design.



Points to Remember

- Extrusion of dough is conducted for the purpose of achieving the desired shape of the pasta
- Die is a part of extruder machine where the pasta is extruding out
- Pasta are classified into long and short
- Type of pasta depending on the shape

- Cold and hot extruders are methods of extrusion used in pasta making
- Mixing the ingredients by the purpose of making the dough homogenous, firm and smooth
- Cold extruder using the temperature of 20-30 °c while hot extruder using 30-90°c
- Extrusion involves forcing a material through a die to shape it into a continuous profile
- High temperature of extruder can lead to lower density due to material softening or gas formation
- Low extrusion temperature of extruder during pasta processing can result in softer texture, higher moisture retention, and longer drying times, all of which affect the overall quality and production efficiency.



Application of learning 2.3.

You are asked to go to pasta making school workshop to extrude the fresh pasta by using cold and hot extrusion methods.



Learning outcome 2 end assessment

Written assessment

Q1. Fill the following statements with appropriate purposes of mixing ingredients from the given list (Hydration of Flour, Gluten Development, Incorporation of Ingredients, Texture Improvement, Temperature Control and resting period preparation)

- a)..... Mixing the flour with wet ingredients (such as eggs and oil) allows the flour to absorb moisture.
- b)..... as the ingredients are mixed, gluten proteins in the flour begin to bond and form a network.
- c)..... mixing ensures that all ingredients are evenly distributed throughout the dough.
- d)..... the mixing process helps achieve a specific texture in the dough
- e)..... mixing by hand or using a machine can help control the temperature of the dough.

Q2. Answer by true or false based on the meaning of the following statements

- a) Hand mixing involves using your hands to combine flour, eggs, and other ingredients.
- b) The development of gluten is crucial in pasta making as it affects the elasticity and chewiness of the final product.
- c) Electric mixers can also develop gluten efficiently but may do so too quickly if monitored closely.
- d) The primary purpose of kneading is to develop gluten, which is a network of carbohydrate formed when flour is mixed with water.
- e) The primary goal of folding as kneading technique is to create layers within the dough that can help improve its elasticity and strength.
- f) To cook a small piece of the rolled-out pasta in boiling salted water for 1-3 minutes is used in checking the quality of dough used in pasta making.

Q3. Circle the answer to the following statements

- a) The following are similarities of folding, stretching, and rolling as kneading techniques for pasta dough except:
 - i. Gluten Development
 - ii. Texture Improvement
 - iii. Incorporation of Air
 - iv. Uniformity in thickness
 - v. Less Physical Strain
- b) The following are kneading techniques used in making pasta except:
 - i. Stretching
 - ii. Folding
 - iii. Rolling

- iv. Mixing
- c) The following are the ingredients used in making pasta except:
 - i. Durum wheat flour
 - ii. Eggs
 - iii. Water
 - iv. Maize flour
- d) The following are the quality parameters of pasta dough except:
 - i. Extensibility
 - ii. Elasticity
 - iii. Viscosity
 - iv. Stickiness
 - v. Resistance to formation

Q4. Match the following types of pasta, which is in column A with its meaning which is in column B.

Answers	column A	column B
1.	1. Spaghetti	a. Shaped like a bow-tie, works well with lighter tomato or cream sauces, and often used in salads
2.	2. Fettuccine	b. Larger, ridged tubes that hold onto sauces well, commonly used in baked pasta dishes
3.	3. Linguine	c. Tubular pasta with diagonally cut ends. Great with hearty, chunky sauces like meat or vegetable ragu.
4.	4. Vermicelli	d. are a type of food made from unleavened dough, which is typically stretched, rolled, or extruded into thin, long strips or strings
5.	5. Noodles	e. is a type of long, thin pasta that is similar to spaghetti but slightly thinner.
6.	6. Penne	f. Similar to spaghetti but slightly flatter, often paired with seafood-based sauces or lighter olive oil sauces
7.	7. Rigatoni	g. Thin, long strands that pair well with light, smooth sauces like marinara or olive oil-based sauces.
8.	8. Farfalle (bow-Tie)	k. Flat, ribbon-like strands, slightly wider than spaghetti, often served

		with heavier sauces like Alfredo or Bolognese
--	--	---

Practical assessment

Your school is planning to host the parents during the meeting. They want a pasta to be sold to their stakeholder after meeting. You are asked to go in workshop for pasta making to make 1kg of fresh spaghetti and 1kg of macaroni within 4 hours. All necessary tools and equipment are available in the workshop.

Task 1: Making dough used in fresh spaghetti and macaroni

Task2: Checking the quality of dough used in fresh spaghetti and macaroni

Task 3: Performing fresh spaghetti and macaroni extrusion

END



Reference

- Bresciani, A., Pagani, M. A., & Marti, A. (2022). *Pasta-making process: A narrative review on the relation between process variables and pasta quality*. *Foods*, 11(3), 256.
- Pagani, M. A., Resmini, P., & Dalbon, G. (1989). *Influence of the extrusion process on characteristics and structure of pasta*. *Food Structure*, 8(2), 2.
- Sarghini, F., Romano, A., & Masi, P. (2016). *Experimental analysis and numerical simulation of pasta dough extrusion process*. *Journal of Food Engineering*, 176, 56-70.
- Ziobro, R., Korus, J., Witczak, M., & Juszczak, L. (2012). *Influence of modified starches on properties of gluten-free dough and bread. Part II: Quality and staling of gluten-free bread*. *Food Hydrocolloids*, 29(1), 68-74.

Learning Outcome 3: Preserve Pasta



Indicative contents

- 3.1. Drying Fresh Pasta**
- 3.2. Cooling the Pasta**
- 3.3. Checking the Pasta Quality**
- 3.4. Packaging of Pasta**
- 3.5. Storing of Pasta**

Key Competencies for Learning Outcome 3 : Preserve Pasta

Knowledge	Skills	Attitudes
• Identification of drying, cooling, checking quality and packaging purposes for pasta • Description of factors affecting pasta drying • Identification of labelling information of pasta • Description of storage requirements for pasta	• Drying fresh pasta by air, sun, oven drying and food dehydrator • Cooling the pasta • Checking the pasta quality by physical appearance and moisture content • Packaging the pasta	• Being accountable when drying the pasta • Being careful when cooling the pasta • Being vigilant when checking the pasta quality • Being careful when packaging the pasta • Being attentive while storing the pasta



Duration: 15 hrs

Learning outcome 3 objectives:



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

1. Identify correctly drying, cooling, checking quality and packaging purposes for pasta
2. Describe correctly the factors affecting pasta drying
3. Dry effectively fresh pasta according to the drying methods
4. Cool properly the pasta according to the cooling techniques
5. Check appropriately the pasta quality based on physical appearance and moisture content
6. Package properly the pasta
7. Identify correctly the labelling information for pasta
8. Describe correctly the storage requirements for pasta



Resources

Equipment	Tools	Materials
• Projector, • Whiteboard, • Chalkboard, • Food dehydrator, • Oven dryer, • Drying rack, • Cooler, • Packaging machine	• Knives, • Waste bin • Moist meter	• Packaging materials, • Scotch, Glue, and • Labels, • Flipchart, • Marker pen, • Chalks



Indicative content 3.1: Drying Fresh Pasta



Duration: 3hrs



Theoretical Activity 3.1.1: Description of pasta drying



Tasks:

- 1: You are requested to answer the following questions:
 - i. What should you understand about the purpose of pasta drying during pasta making?
 - ii. Suggest the different factor affecting pasta drying during pasta making?
- 2: Provide the answers on papers, flip chart.
- 3: Present the findings/answers to the whole class
- 4: Ask the trainer for clarification if any
- 5: For more clarification, read the key readings 3.1.1.



Key readings 3.1.1.: Description of pasta drying

- **Purpose of pasta drying**

✓ **Preservation of Freshness:** Fresh pasta contains a significant amount of moisture, which can lead to spoilage if not consumed quickly. By drying pasta, the moisture content is reduced significantly, which helps to inhibit the growth of bacteria and mold. This preservation allows dried pasta to have a longer shelf life compared to fresh pasta, making it more convenient for storage and use over time.

✓ **Texture Improvement:** Drying affects the texture of the pasta. When pasta is dried, it undergoes changes in its starch structure. The drying process causes the starches to gelatinize and then harden as they cool down. This results in a firmer texture when cooked, which many people prefer over the softer texture of fresh pasta. Dried pasta also tends to hold sauces better due to its surface characteristics after drying.

✓ **Cooking Properties:** The drying process alters how pasta cooks. Dried pasta typically requires a longer cooking time than fresh pasta because it has absorbed less water during its preparation.

✓ **Flavor Concentration:** While fresh pasta has a delicate flavor profile, drying can concentrate flavors by reducing moisture content and allowing for more intense flavors when cooked with sauces or other ingredients. This concentration can enhance the overall taste experience when consuming dried pasta dishes.

✓ **Economic Factors:** From an economic standpoint, producing dried pasta allows manufacturers to create products that can be distributed widely without

concerns about spoilage during transport and storage. This aspect makes dried pasta an economically viable product for both producers and consumers.

✓ **Versatility in Culinary Applications:** Dried pasta offers versatility in various culinary applications since it can be stored for long periods without refrigeration and used as needed in different recipes ranging from soups to casseroles or traditional Italian dishes like spaghetti or lasagna.

✓ **Factors affecting pasta drying**

✓ **Humidity Levels:** Humidity in the air can significantly affect how quickly pasta dries. On particularly humid days, moisture in the air can cause pasta to dry too slowly, leading to a sticky texture. Conversely, if the environment is too dry, it may cause the pasta to crack during the drying process.

✓ **Temperature:** The temperature of the room where the pasta is drying plays a vital role. Warmer environments promote faster drying, which can be beneficial; however, if it's excessively hot, it may lead to uneven drying or cracking. Ideally, a warm but not overly hot space is best for drying fresh pasta.

✓ **Thickness of Dough:** The thickness of the pasta dough directly impacts its drying time. Thicker pieces will take longer to dry compared to thinner strands or sheets. When rolling out dough, achieving a uniform thickness helps ensure even drying.

✓ **Type of Pasta:** Different types of pasta require different drying times and methods. For example, filled pastas like ravioli need to be dried differently than long noodles like fettuccine or tagliatelle due to their structure and moisture content.

✓ **Airflow:** Good airflow around the pasta is essential for effective drying. If pasta strands are crowded together or stacked on top of each other, they may not dry evenly and could stick together. Using a drying rack or hanging them in nests allows for better air circulation.

✓ **Surface Preparation:** The surface on which pasta is laid out for drying should be floured adequately to prevent sticking. Insufficient flour can lead to clumping and uneven texture as moisture is retained between strands.

✓ **Duration of Drying:** The length of time that pasta is allowed to dry before cooking also affects its final texture and shape retention during cooking. Following recommended drying times based on specific types of pasta ensures optimal results



Practical Activity 3.1.2: Applying pasta drying methods



Task:

- 1: You are requested to go in pasta making workshop to apply pasta-drying methods.
- 2: Apply safety measures at workplace.
- 3: Apply pasta drying method by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 3.1.2.
- 6: Perform the task provided in application of learning 3.1



Key readings 3.1.2.: Applying pasta drying methods

- **Pasta drying methods**

The primary goal of drying pasta is to **reduce moisture content**, which helps in **preserving** the pasta for longer periods and enhances its **texture during cooking**.

There are four common pasta-drying methods, which are **air-drying, sun drying, using a food dehydrator, and oven drying**.

- ✓ **Air-Drying**

Air-drying is one of the simplest methods for drying pasta. This process involves hanging the pasta in a well-ventilated area at room temperature.

The following are steps used to perform air drying:

✚ **Preparation:** After shaping the pasta (e.g., fettuccine, tagliatelle), ensure that it is not sticking together. Dust it lightly with flour if necessary.

✚ **Hanging:** Use a pasta drying rack or hang the strands over a clean rod or wire. Ensure there is enough space between each strand to allow air circulation.

✚ **Environment:** Choose a dry, warm area with low humidity and good airflow. Avoid direct sunlight as it can cause uneven drying and affect the color and texture of the pasta.

✚ **Duration:** Allow the pasta to dry for 12 to 24 hours, depending on thickness and humidity levels. The pasta should be hard and brittle when fully dried

Note:

- **Time Required:** Depending on humidity levels and air circulation, air-drying can take anywhere from 12 hours to several days. The ideal humidity level for effective air-drying is below 60%.
- **Benefits:** This method preserves the flavor and texture of the pasta without introducing additional heat that could alter its properties.
- **Considerations:** Air-drying requires patience and suitable environmental conditions; high humidity can lead to mold growth.

✓ **Sun-Drying**

Sun-drying utilizes natural sunlight to remove moisture from pasta. This method is effective in hot, dry climates but requires careful monitoring.

The following are steps used to perform sun drying:

- ✚ **Preparation:** Similar to air-drying, ensure that the pasta is shaped properly and not clumped together.
- ✚ **Setting Up:** Lay the pasta out on clean screens or trays that allow airflow underneath. Avoid using plastic as it can trap moisture.
- ✚ **Sun Exposure:** Place the trays in direct sunlight during peak hours (usually between **10 AM and 4 PM**). Cover with cheesecloth or thin fabric to protect from insects while allowing airflow.
- ✚ **Monitoring:** Check regularly for moisture content; this method can take anywhere from several hours to a couple of days based on weather conditions.
- ✚ **Storage:** Once dried completely, store in airtight containers away from light

NOTE:

- **Time Required:** Sun-drying can take anywhere from 4 hours to an entire day depending on sunlight intensity and outdoor conditions.
- **Benefits:** This method is energy-efficient as it relies solely on solar energy and imparts a unique flavor profile due to exposure to natural elements.
- **Considerations:** Weather variability can affect this method; cloudy or humid days may prolong drying time or lead to spoilage if not monitored closely.

✓ **Food Dehydrators**

A food dehydrator provides controlled heat and airflow for consistent drying results.

The following are steps used to perform food dehydrators:

- ✚ **Preparation:** Shape your pasta as desired and ensure no pieces are stuck together.
- ✚ **Loading the Dehydrator:** Place the pasta in a single layer on dehydrator trays without overcrowding them.
- ✚ **Temperature Setting:** Set the dehydrator temperature typically between 130°F (54°C) to 140°F (60°C).
- ✚ **Drying Time:** Depending on thickness, drying may take about 1 to 4 hours. Check periodically until they reach a brittle texture.
- ✚ **Cooling & Storage:** Allow dried pasta to cool before storing in airtight container

NOTE:

- **Time Required:** Using a food dehydrator typically takes about 6-8 hours at temperatures ranging from 130°F (54°C) to 140°F (60°C).
- **Benefits:** This method allows for precise temperature control which minimizes the risk of overcooking while ensuring thorough moisture removal.
- **Considerations:** A food dehydrator requires an initial investment but offers consistent results regardless of external weather conditions.

✓ Oven Drying

Oven drying is another efficient method for drying pasta quickly using heat from an oven.

The following are steps used to perform oven drying:

-  **Preparation:** Shape your pasta as desired and ensure no pieces are stuck together.
-  **Loading the Dehydrator:** Place the pasta in a single layer on dehydrator trays without overcrowding them.
-  **Temperature Setting:** Set the dehydrator temperature typically between 130°F (54°C) to 140°F (60°C).
-  **Drying Time:** Depending on thickness, drying may take about 1 to 4 hours. Check periodically until they reach a brittle texture.
-  **Cooling & Storage:** Allow dried pasta to cool before storing in airtight container

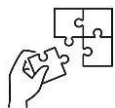
NOTE:

- **Time Required:** Oven drying usually takes about 1-2 hours depending on thickness and moisture content of the pasta being dried.
- **Benefits:** This method is fast compared to others and allows for large batches of pasta to be dried simultaneously under controlled conditions.



Points to Remember

- During pasta drying the factors affecting drying condition must be respected in order to produce the product of good quality.
- While drying pasta the air drying method must be followed to preserve the flavour of final product.



Application of learning 3.1.

You are requested to go in school's workshop for pasta making to apply drying methods used in drying the pasta.



Indicative Content 3.2: Cooling of Pasta



Duration: 3hrs



Practical Activity 3.2.1: Cooling the pasta



Task:

1. You are requested to go in pasta making workshop to cool the pasta
2. Apply safety measures at workplace
3. Cool the pasta by following the work instructions
4. Present your work to the trainer, workshop assistant or classmate
5. Read the key reading 3.2.1
6. Perform the task provided in application of learning 3.2



Key readings 3.2.1.: Cooling the pasta

- **Purpose of pasta cooling**

- ✓ **Cooling pasta after drying serves the following purposes:**

- ✚ **Prevents Condensation:** When pasta comes out of a drying process (which often involves heat), cooling it ensures that moisture or condensation doesn't form when it's stored. Any moisture on the dried pasta could lead to spoilage or mould.

- ✚ **Stabilizes the Pasta:** Cooling the pasta after drying helps it acclimate to room temperature, which stabilizes its texture and hardness. This makes it more resilient for storage and handling.

- ✚ **Prepares for Packaging:** Before packaging, cooling the pasta ensures that it's at the proper temperature to prevent it from softening or breaking down in airtight packaging. Heat can create an environment where the pasta is more likely to get damaged or lose its structure.

- ✚ **Maintains Quality:** Sudden changes in temperature can cause cracking or brittleness in dried pasta. Allowing it to cool gradually helps maintain its overall quality and durability during storage or transport.

- **Oven dried pasta cooling techniques**

Oven-dried pasta cooling refers to the process of allowing pasta that has been dried in an oven to return to room temperature after the drying process.

- ✓ **Spreading pasta on a flat surface**

Spreading pasta on a flat surface to cool is a simple technique often used for cooling freshly cooked pasta or dried pasta after oven-drying.

Steps for spreading Pasta on a Flat Surface for Cooling

Select a Flat Surface

- Choose a Clean Surface: Use a clean countertop, baking sheet, cutting board, or large tray.
- Use a Cooling Rack or Towel (Optional): For better air circulation, you can place a cooling rack or a clean kitchen towel on the flat surface.

Prepare the Pasta

- Cooked Pasta: After boiling the pasta, drain it well in a colander to remove excess water. Optionally, you can rinse it with cold water to stop the cooking process, especially if you're making pasta for a cold dish.
- Dried Pasta (after oven-drying): If you've oven-dried your pasta, ensure it's completely dry before transferring it to the flat surface.

Spread the Pasta

- Lay Pasta Evenly: Spread the pasta in a single, even layer on the surface. For long pasta like spaghetti or linguine, separate the strands gently. For short pasta (penne, farfalle, etc.), ensure the pieces are not piled on top of each other.
- Avoid Overlapping: Spread the pasta out to prevent it from sticking together and to allow even air exposure.

Let It Cool

- Room Temperature Cooling: Leave the pasta at room temperature to cool down. Depending on the quantity of pasta and the room conditions, this may take anywhere from 10-20 minutes for cooked pasta.
- Fan (Optional): If you need to speed up the cooling process, you can place a fan nearby to blow air over the pasta.

✓ **Slow cooling in a cool, dry place**

Slow cooling in a cool, dry place consists by the following steps:

Remove from Oven

Take the baked pasta out of the oven carefully using oven mitts.

Transfer to Cooling Rack

Immediately transfer the hot pasta to a wire cooling rack. This allows air to circulate around the pasta, helping it cool evenly.

Spread Out the Pasta

If you have multiple layers or a large batch, spread the pasta out in a single layer as much as possible to facilitate even cooling.

Let It Cool Gradually

Allow the pasta to cool at room temperature for about 30 minutes. Avoid placing it in the fridge as this can cause moisture to accumulate and lead to clumping.

Store in a Dry Place

After the pasta has cooled to room temperature, transfer it to an airtight container or a resealable plastic bag. Make sure the container is in a dry place to prevent moisture absorption.

Optional Drying

If you want to dry the pasta further, you can place it in a single layer on a clean kitchen towel or parchment paper and let it air dry for an additional 1-2 hours, depending on the humidity level in your environment.

✓ **Using a fan or air conditioner**

If you are cooling pasta after drying it, using a fan or air conditioner can help remove excess moisture and speed up the cooling process before storage.

The steps to follow are:

Dry the Pasta First:

- Allow the pasta to air-dry after cooking if needed. Spread it out on a clean surface, drying rack, or parchment paper for an hour or so, depending on the humidity and the type of pasta.

- If making fresh pasta, the drying step might take longer, typically 1-3 hours.

Prepare the Pasta for Cooling:

- After the drying stage, ensure the pasta is not overly sticky or wet. It should be mostly dry but might retain a slight warmth.

- Spread the dried pasta on a baking sheet or a clean surface again to cool.

Position Near a Fan or Air Conditioner:

- Place the dried pasta near a fan or under an air conditioner to cool it more quickly.

- Ensure the fan or AC is set at a gentle level, so it doesn't blow the pasta away or dry it out excessively.

Toss Occasionally:

- Gently toss the pasta every 5-10 minutes to ensure even cooling. This will also prevent the pasta from clumping together.

Monitor for Desired Temperature:

- Keep an eye on the pasta and check for coolness by touching it to ensure its reached room temperature.

Store or Serve:

- Once the pasta is completely cooled, it can be stored in an airtight container if you plan to use it later. If serving soon, proceed with your recipe.

Important Tips:

- Be cautious with fan speed or air conditioner settings to avoid drying out the pasta too much, especially for fresh pasta.

- Ensure the pasta is dry and at room temperature before storing, as moisture can lead to spoilage.

• **Pasta cooling conditions (time, temperature)**

When pasta is dried, cooling it properly is essential for maintaining its texture and preventing moisture condensation, which can lead to spoilage.

✓ **Time:**

 **Initial cooling phase:** After drying, pasta should be cooled gradually to avoid

thermal shock, which could cause cracks or brittleness. The cooling time is typically 1-3 hours, depending on the pasta type, quantity, and drying techniques.

✓ **Temperature:**

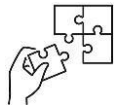
✚ **Post-drying temperature:** The pasta should be cooled from its drying temperature (which can be as high as “40-70°C (104-158°F)”, depending on the drying method/technique down to room temperature (around 20-25°C / 68-77°F) in a controlled environment.

✚ **Storage temperature:** Once cooled, pasta should be stored at a temperature below 25°C (77°F), with humidity levels below 65%, to prevent moisture reabsorption.



Points to Remember

- Cooling pasta after drying is crucial as it help in maintaining its texture and preventing moisture condensation which can lead to spoilage
- Maintain the hygiene while cooling the pasta
- When cooling the pasta respect the cooling conditions (time and temperature) in order to achieve the quality of final product



Application of learning 3.2.

You are requested to go to school pasta-making workshop to cool the pasta.



Indicative Content 3.3: Checking Pasta Quality



Duration: 3hrs



Practical Activity 3.3.1: Checking the pasta quality



Task:

1. You are requested to go in pasta making workshop to check the quality of pasta
2. Apply safety measures at workplace
3. Check the quality of pasta by following the work instructions
4. Present your work to the trainer, workshop assistant or classmate
5. Read the key reading 3.3.1
6. Perform the task provided in application of learning 3.3



Key Readings 3.3.1.: Checking The Pasta Quality

- **Purpose Of Checking Pasta Quality**

Checking The Quality Of Pasta Is Important To Ensure It Meets Desired Standards In Texture, Flavour, And Appearance, Particularly In Industrial Production Or Professional Cooking.

The Following Are The Purposes:

- ✓ **Texture Evaluation:** To Ensure The Pasta Has The Right Firmness Or Softness, Depending On The Type And Purpose.
- ✓ **Cooking Performance:** Quality Checks Ensure Pasta Cooks Evenly, Maintains Its Shape, And Doesn't Become Sticky Or Mushy After Boiling.
- ✓ **Visual Appeal:** Uniform Colour, Smooth Surface, And Consistent Size And Shape Are Signs Of High-Quality Pasta.
- ✓ **Moisture Content:** Proper Moisture Levels In Dried Pasta Prevent Spoilage, Ensuring A Longer Shelf Life.
- ✓ **Durability In Handling:** Checking For Cracks Or Brittleness Ensures Pasta Can Be Packaged, Transported, And Cooked Without Breaking.
- ✓ **Taste And Aroma:** Ensures The Pasta Has A Neutral Or Slightly Wheat-Like Taste And Doesn't Carry Any Off-Flavours From Production.
- ✓ **Nutritional Quality:** Some Pasta Is Fortified Or Made With Whole Grains, And Checking The Quality Ensures The Nutritional Content Matches The Product Claims.
- ✓ **Consistency In Production:** Regular Quality Checks Help Maintain Consistency Across Batches, Leading To Reliable Product Performance.

- **Conduct Pasta Quality Checking**

✓ **Physical Appearance (Colour, Shape, Defect)**

🌈 **Colour**

Golden-Yellow: High-Quality Pasta Has A Uniform Golden-Yellow Colour, Typical Of Durum Wheat Semolina. Discoloration, Such As Dark Spots, Might Indicate Contamination, Oxidation, Or Poor-Quality Raw Materials.

🌈 **Shape And Size Uniformity**

➤ **Consistency In Shape:** High-Quality Pasta Should Have Consistent And Uniform Shapes.

➤ **No Deformation:** Well-Made Pasta Should Retain Its Shape During Handling, Drying, And Packaging.

🌈 **Absence Of Defects**

➤ **No Blemishes Or Spots:** Pasta Should Be Free Of Black Spots, White Streaks, Or Other Visible Defects, Which May Indicate Poor Manufacturing Or The Presence Of Impurities.

➤ **No Cracks:** Pasta Should Not Have Cracks, Which Can Lead To Breakage During Cooking Or Packaging.

✓ **Moisture Content**

Procedures Of Checking The Moisture Content Of Pasta

🌈 **Method 1: Using A Moisture Analyser (Lab Method)**

This Is The Most Accurate Way To Measure The Moisture Content Of Pasta, Often Used In Food Laboratories.

Step 1: Gather Equipment

- Moisture Analyser Or Drying Oven With An Accurate Scale.
- Sample Containers That Can Withstand High Temperatures.
- Desiccator (For The Drying Oven Method).

Step 2: Prepare The Pasta Sample

- **Weigh The Sample:** Accurately Weigh A Small Portion Of The Pasta (E.G., 5-10 Grams) Using A Digital Scale.
- **Crush The Pasta (Optional):** If Dealing With Large Pasta Shapes, Crush The Pasta Into Smaller Pieces For Faster Drying And More Accurate Results.

Step 3: Dry The Sample

- **Moisture Analyser Method:** Place The Pasta Sample In The Analyser, Which Will Heat The Sample And Record The Weight Loss Due To Moisture Evaporation. The Machine Automatically Calculates The Moisture Content.
- **Drying Oven Method:**
 - Preheat The Oven To 105°C (221°F).
 - Place The Sample In A Container And Weigh It.
 - Place The Sample In The Oven For 2-3 Hours, Or Until It Reaches A Constant Weight.

- Remove The Sample, Cool It in A Desiccator, And Weigh It Again.

Step 4: Calculate Moisture Content

Use The Following Formula to Calculate The Moisture Content Manually If Using A Drying Oven:

$$\text{Moisture content(\%)} = \frac{\text{Initial weight} - \text{Final Weight}}{\text{Initial weight}} \times 100$$

The Difference Between The Initial And Final Weights Represents The Water Loss, Which Is The Moisture Content.

Method 2: Simple Drying Method (Home Method)

This Method Can Give An Approximate Moisture Content If You Don't Have Access To Lab Equipment.

Step 1: Prepare The Equipment

- Oven Capable Of Maintaining A Low Temperature (105°C Or 221°F).
- Accurate Kitchen Scale.
- Aluminium Foil Or A Heat-Resistant Container.

Step 2: Weigh The Pasta Sample

Weigh A Small Pasta Sample (Around 10 Grams) Before Drying. Record The Weight.

Step 3: Dry The Sample

- Preheat The Oven To 105°C.
- Place The Pasta On The Foil Or In The Container.
- Bake The Pasta For About 2-3 Hours, Or Until The Weight Of The Sample Stops Changing (Indicating The Moisture Has Been Removed).
- Remove From The Oven, Let It Cool For A Few Minutes, And Weigh The Sample Again.

Step 4: Calculate Moisture Content

Use The Same Formula As The Lab Method To Calculate The Moisture Content:

$$\text{Moisture content(\%)} = \frac{\text{Initial weight} - \text{Final Weight}}{\text{Initial weight}}$$

Method 3: Using A Moisture Meter (Rapid Field Test)

Step 1: Prepare The Sample

Crush or Grind a Small Amount of Pasta (If Necessary) To Fit into The Moisture Meter's Test Chamber.

Step 2: Calibrate The Device

Set The Moisture Meter According to The Type of Pasta You're Testing (Check The Device's Manual).

Step 3: Insert The Sample

Place The Sample Inside the Meter's Chamber and Start the Test.

Step 4: Read The Results

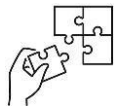
The Moisture Meter Will Give a Direct Moisture Content Reading, Usually in Percentages.

NOTE:

Dried Pasta Should Have a Moisture Content of Around **10-12%**. Pasta With A Higher Moisture Content Can Spoil More Quickly, While Overly Dry Pasta Can Crack.

**Points to Remember**

- Checking pasta quality is recommended due to helps in ensuring that pasta meets the desired standards of texture, flavour and appearance
- Colour of pasta depending on the type of wheat flour used as a main ingredient
- Standard moisture content of the pasta is in range of 10-12%

**Application of learning 3.3.**

You are asked to go to school pasta-making workshop to check the quality of pasta.



Indicative content 3.4: Packaging of Pasta



Duration: 3hrs



Practical Activity 3.4.1: Packaging the pasta



Task:

- 1: You are requested to go in pasta making workshop to perform pasta-packaging process
- 2: Apply safety measures at workplace.
- 3: Perform pasta packaging process by following the work instructions
- 4: Present your work to the trainer, workshop assistant or classmate
- 5: Read the key reading 3.4.1.
- 6: Perform the task provided in application of learning 3.4



Key readings 3.4.1.: Packaging the pasta

- ✓ **Purpose of Pasta Packaging**
- ✓ **Protection from External Factors:** Pasta packaging must shield the product from environmental factors such as moisture, air, light, and contaminants. This is particularly crucial for pre-cooked and fresh varieties, which are more susceptible to spoilage compared to dried pasta.
- ✓ **Information Display:** Packaging serves as a medium to convey vital information to consumers. This includes ingredients, nutritional facts, preparation instructions, and any other mandatory labeling requirements. The design must accommodate this information clearly and attractively.
- ✓ **Product Recognition:** Given the vast variety of pasta shapes and types available in the market, effective packaging allows consumers to easily identify the product they desire. This can be achieved through visual elements like images or windows that showcase the pasta shape.
- ✓ **Convenience Features:** Many modern pasta packages include resealable options or portion control features to enhance usability for consumers. This is particularly important for single households or those who may not use an entire package at once.
- ✓ **Sustainability Considerations:** With growing awareness around environmental issues, there is an increasing demand for sustainable packaging solutions. Manufacturers are exploring materials that are recyclable or biodegradable while still providing adequate protection for the pasta.
- ✓ **Market Positioning:** The choice of packaging can also reflect the quality and positioning of the product in the market. High-quality pastas may use premium

materials and designs that communicate luxury, while everyday products might opt for simpler packaging solutions.

✓ **Shelf Stability:** Proper packaging ensures that pasta maintains its quality over time on store shelves and during transportation to consumers' homes. It must be robust enough to withstand handling without damage

✓ **Packaging Process in Pasta Making**

✓ **Weighing the Product:** The packaging process begins with weighing the dried pasta to ensure that each package contains the correct amount. This is typically done using automated scales that can measure the product accurately and efficiently.

✓ **Transfer to Packaging System:** Once weighed, the pasta is transferred to a mechanical system designed for packaging. This system often includes buckets or conveyors that move the pasta towards the packaging station.

✓ **Filling Packages:** At the packaging station, the pasta is filled into various types of packages, which may include cellophane bags or boxes. For long pasta, a horizontal cartoner system is commonly used where buckets pour the pasta into cartons as they move along a conveyor belt.

✓ **Sealing Packages:** After filling, the packages are sealed to ensure freshness and prevent moisture from entering. This sealing process can involve heat sealing for plastic bags or adhesive sealing for boxes.

✓ **Quality Control Checks** Once sealed, packages undergo quality control checks to detect any open flaps or foreign materials that may have entered during packaging. Automated systems often perform these checks to maintain high standards.

✓ **Final Weight Check:** A final weight check is conducted to ensure that each package meets regulatory requirements and company standards for weight accuracy.

✓ **Packing into Cases:** Finally, the packaged pasta is placed into larger cases for shipping and distribution. These cases are designed for easy stacking and transport while protecting the fragile contents inside.

✓ **Labelling Information Found on Pasta Product Label**

When examining a pasta product label, several key pieces of information are typically included to help consumers make informed choices. Below is a detailed breakdown of the labelling information you can expect to find:

✓ **Brand Name and Ingredients:**

The label must prominently display the brand name along with a comprehensive list of ingredients. This list is typically organized in descending order by weight, ensuring transparency regarding what is included in the product.

✓ **Type of Pasta and Drying Method**

Labels must indicate whether the pasta is refined, (semi-wholemeal), or wholemeal. This classification helps consumers understand the nutritional profile of the pasta they are purchasing. Furthermore, details about the drying method such as

temperature and duration should be provided (e.g., “dried at temperatures below 38°C for 72 to 144 hours”). This information highlights how processing affects flavour and cooking quality.

✓ **Nutritional Information**

Nutritional facts are crucial for consumers monitoring their dietary intake. The label will typically include information on calories, fats (saturated and trans), carbohydrates, sugars, fiber, protein, vitamins, and minerals per serving size.

✓ **Expiration Date**

Most pasta labels will also feature an expiration or best-before date to inform consumers about product freshness.

✓ **Storage Instructions**

Proper storage guidelines may be included to maintain product quality over time (e.g., “store in a cool, dry place below 18°C”).

✓ **Ingredient List**

A comprehensive list of ingredients must be provided in descending order by weight. This includes any additives or preservatives used in the pasta.

✓ **Allergen Information**

Any potential allergens present in the product must be clearly stated to protect consumers with food sensitivities or allergies.

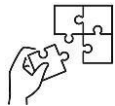
✓ **Manufacturer Information**

The name and location of the manufacturer should be listed on the label for transparency regarding who produced the product.



Points to Remember

- Make sure that all information on label are mentioned
- Packaging process must be respected



Application of learning 3.4.

You are asked as a trainee to go school pasta making workshop and package the pasta.



Indicative Content 3.5: Storing Pasta



Duration: 3hrs



Theoretical Activity 3.5.1: Description of storage requirements



Tasks:

- 1: You are requested to answer the following questions:
 - i. What do you know about the storage conditions of pasta?
 - ii. Suggest the stock arrangement used in storing the pasta
- 2: Provide the answers on papers, flip chart.
- 3: Present the findings/answers to the whole class
- 4: Ask the trainer for clarification if any
- 5: For more clarification, read the key readings 3.5.1.



Key readings 3.5.1.: Description of storage requirements

- **Storage conditions of pasta**

The storage conditions of pasta depend on its type (dry or fresh) and are designed to maintain its quality, texture, and safety.

- ✓ **Dry Pasta:**

- ✚ **Temperature:** Store at room temperature, ideally between 18–24°C (64–75°F).

- ✚ **Humidity:** Must be kept in a low-humidity environment. Moisture can cause the pasta to become soggy or moldy.

- ✚ **Storage Containers:** Keep dry pasta in its original sealed packaging, or transfer to an airtight container once opened to protect it from air, moisture, and pests.

- ✚ **Light Exposure:** Avoid direct sunlight, as it can degrade the pasta over time.

- ✚ **Shelf Life:** Dry pasta can last for 1–2 years in proper conditions.

- ✓ **Fresh Pasta:**

- ✚ **Temperature:** Refrigerate at or below 4°C (40°F). Fresh pasta is perishable and must stay cool to prevent spoilage.

- ✚ **Humidity:** Store in an airtight container or wrap tightly in plastic wrap to prevent the pasta from drying out.

- ✚ **Storage Containers:** Use sealed containers or vacuum-sealed bags to protect it from air and moisture.

- ✚ **Freezing:** For longer storage, freeze fresh pasta for up to 2–3 months. Lay the pasta in a single layer on a tray to freeze, then transfer to airtight freezer bags or containers.

- ✚ **Shelf Life:** Fresh pasta lasts 2–3 days in the refrigerator.

- **Stock arrangement of pasta**

A well arrangement of stock can help you quickly find what you need while ensuring that the pasta remains in optimal condition.

The following detailed guide on how to arrange your pasta stock effectively:

- ✓ **Categorization by Type**

- ✚ **Dry Pasta:** Group all dry pasta varieties together. This includes spaghetti, penne, fusilli, and other shapes.

- ✚ **Fresh Pasta:** Keep fresh pasta separate from dry pasta due to its different storage requirements.

- ✓ **Use of Airtight Containers**

- ✚ Transfer dry pasta into airtight containers to protect against moisture and pests. Clear containers are ideal as they allow you to see the contents easily.

- ✚ Label each container with the type of pasta and the date of storage for easy identification.

- ✓ **Shelving Arrangement**

- ✚ **Top Shelf:** Place less frequently used items or larger bulk packages on the top shelf.

- ✚ **Middle Shelf:** Store commonly used pastas at eye level for easy access. This could include popular shapes like spaghetti and penne.

- ✚ **Bottom Shelf:** Reserve this space for heavier items or bulk packages that may be cumbersome to lift.

- ✓ **Rotation System**

- ✚ Implement a First In, First Out (FIFO) system where older stock is placed in front and newer stock is stored behind it. This ensures that older products are used first before they expire.

- ✓ **Accessibility Considerations**

- ✚ Keep frequently used types of pasta within easy reach, while less common varieties can be stored further back or higher up.

- ✚ If space allows, consider using baskets or bins for smaller types of pasta like orzo or couscous to prevent them from getting lost among larger packages.

- ✓ **Avoiding Cross-Contamination**

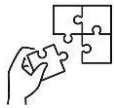
- ✚ Ensure that all containers are clean and dry before storing any type of pasta.

- ✚ Avoid placing opened packages directly on shelves; instead, use containers to minimize exposure to air and potential contaminants.
- ✓ **Monitoring Storage Conditions**
- ✚ Regularly check the storage area for signs of pests or moisture damage.
- ✚ Maintain a consistent temperature in your pantry; ideally below 70°F (21°C) and away from direct sunlight.



Points to Remember

- While storing the pasta basing on the type of pasta either dry or fresh
- The shelf life of fresh and dry pasta should be based on the storing techniques (room temperature, refrigeration and freezing)
- Use First In First Out system while making rotation of stock for using older products before the new products



Application of learning 3.5.

You are requested to go in pasta making workshop to store pasta.



Learning outcome 3 end assessment

Theoretical assessment

Q1. Fill the blank space by using appropriate purposes and factors affecting drying pasta (Preservation of Freshness, Texture Improvement, Cooking Properties, Flavor Concentration, Economic Factors, Temperature, types of pasta, Humidity and Airflow)

- a. Fresh pasta contains a significant amount of moisture, which can lead to spoilage if not consumed quickly.
- b. When pasta is dried, it undergoes changes in its starch structure.
- c. Dried pasta typically requires a longer cooking time than fresh pasta because it has absorbed less water during its preparation.
- d. This concentration can enhance the overall taste experience when consuming dried pasta dishes.
- e. This aspect makes dried pasta an economically viable product for both producers and consumers
- f.of the room where the pasta is drying plays a vital role. Warmer environments promote faster drying, which can be beneficial; however, if it's excessively hot, it may lead to uneven drying or cracking.
- g. Differentrequire different drying times and methods. For example, filled pastas like ravioli need to be dried differently than long noodles like fettuccine or tagliatelle due to their structure and moisture content.
- h.in the air can significantly affect how quickly pasta dries. On particularly humid days, moisture in the air can cause pasta to dry too slowly, leading to a sticky texture.

Q2. Read the following statements and answer by true if it is correct or false if it is wrong

- a. Air-drying is one of the simplest method for drying pasta?
- b. Oven drying usually takes about 1-2 hours depending on thickness and moisture content of the pasta being dried
- c. Sun-drying utilizes artificial energy to remove moisture from pasta
- d. Oven drying is another efficient method for drying pasta quickly using heat from a refrigerator?
- e. Cooling the pasta after drying helps it acclimate to room temperature, which stabilizes its texture and hardness. This makes it more resilient for storage and handling.
- f. If you're cooling pasta after drying it, using a fan or air conditioner can help remove excess moisture and speed up the cooling process before storage.
- g. When pasta is dried, cooling it properly is essential for maintaining its texture and providing moisture, which can lead to live long of the pasta.
- h. Once pasta cooled, should be stored at a temperature below 25°C (77°F), with humidity levels below 65%, to prevent moisture reabsorption.

Q3. Encircle the correct answer from the following statements

- a. The following are purposes of checking pasta quality EXCEPT:
- i. Texture evaluation
 - ii. Checking the cooking performance
 - iii. Ensuring the moisture content of pasta
 - iv. Checking for cracks or brittleness of pasta
 - v. To decline the shelf life of pasta
- b. The following are physical quality parameters of pasta EXCEPT:
- i. Color
 - ii. Shape and size
 - iii. Absence of defects
 - iv. Moisture content
- c. The following are the storage conditions of pasta EXCEPT:
- i. Temperature
 - ii. Humidity
 - iii. Storage container
 - iv. cooking time
 - v. Shelf life
- d. The following are the criteria to consider while arranging the pasta stock EXCEPT:
- i. Pasta type categorization
 - ii. Shelving arrangement
 - iii. Rotation system
 - iv. Accessibility considerations
 - vi. type of wheat flour

Q4. Match the following packaging process of pasta in column A with its meaning in column B, write the letter corresponding to the correct answer

Answers	column A	column B
1.....	1. Weighing the Product	a. the pasta is transferred to a mechanical system designed for packaging. This system often includes buckets or conveyors that move the pasta towards the packaging station.
2.....	2. Transfer to Packaging System	b. The packaging process begins with weighing the dried pasta to ensure that each package contains the correct amount.
3.....	3. Filling packages	c. the packages are sealed to ensure freshness and prevent moisture from entering.

4.....	4. Sealing packages	d. the pasta is filled into various types of packages, which may include cellophane bags or boxes.
5.....	5. Quality Control Checks	e. A final weight check is conducted to ensure that each package meets regulatory requirements and company standards for weight accuracy.
6.....	6. Final weight check	f. packages undergo quality control checks to detect any open flaps or foreign materials that may have entered during packaging.
7.....	7. Packing into cases	g. the packaged pasta is placed into larger cases for shipping and distribution

Practical assessment

Your school plan to go to exhibition of food processing products. They want one 1 kg of spaghetti and 1kg of macaroni. You are asked to go in pasta making workshop to preserve 1kg of spaghetti and 1kg of macaroni. all resources needed are available in the workshop.

Task 1: Dry spaghetti and macaroni.

Task2: Cool the dried spaghetti and macaroni.

Task 3: Checking the quality of spaghetti and macaroni. (colour, shape, defects and moisture content)

Task4: Fill and seal and label the package

END



Reference

- Ficco, D. B. M., De Simone, V., De Leonardis, A. M., Giovanniello, V., Del Nobile, M. A., Padalino, L., ... & De Vita, P. (2016). Use of purple durum wheat to produce naturally functional fresh and dry pasta. *Food Chemistry*, 205, 187-195.
- Juneja, V. K., Golden, C. E., Mishra, A., Harrison, M. A., & Mohr, T. B. (2019). Predictive model for growth of *Bacillus cereus* at temperatures applicable to cooling of cooked pasta. *Journal of food science*, 84(3), 590-598.
- Cole, M. E. (1991). Prediction and measurement of pasta quality. *International journal of food science & technology*, 26(2), 133-151.
- Gull, A., Prasad, K., & Kumar, P. (2017). Quality changes in functional pasta during storage in two different packaging materials: LDPE and BOPP. *Journal of Food Processing and Preservation*, 41(5), e13115.
- Bresciani, A., Pagani, M. A., & Marti, A. (2022). Pasta-making process: A narrative review on the relation between process variables and pasta quality. *Foods*, 11(3), 256.



October, 2024