TVET CERTIFICATE III in Food processing

Pastry Making

FOPPM302

Make Pastry

Competence

**Credits: 8** **Learning hours: 80**

**Sector: Agriculture and Food processing**

**Sub-sector: Food processing**

**Module Note Issue date:** November, 2020

## Purpose statement

Many Rwandese consume pastry products every day, therefore many pastry processing units are focusing on satisfying the demand. The pastries add value to raw material found in Rwanda by processing flour into cakes, biscuits and doughnuts. Pastries still lack skilled staff, thus equipping learners with pastry skills is a great opportunity to increase employment. The competence is for learners who have completed successfully the certificate III. At the end of the competence, learners will be able to make pastry products such as cake, biscuits and doughnuts. Learners will work in pastry industry performing tasks including preparation of the work area and equipment, and processing the dough into cakes, biscuits, chapatti and doughnuts. They are expected to perform these tasks respecting food quality and safety standards under minimum supervision.

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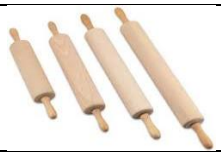
# Learning Unit 1 – Prepare the work area for processing pastry

## LO 1.1 – Describe work area

Topic 1: Selection of equipment and tools

Selection of equipment and tools depends on the types of products

**Table1.Type and use of equipment and tools used in pasty making**

| | | |
|---|---|---|
| Knives |  | A knife is used to cut a dough into small pieces |
| Dough mixer |  | It is used to make a homogenous dough, ingredients are put in water and then mixing is done until a consistent non mixture is obtained |
| Rolling pins |  | A rolling pin is a cylindrical food preparation utensil used to shape and flatten dough. Most of time it is made from wood |
| Trolley |  | It is used to transport and convey the dough from mixing area to cutting table |
| Bucket |  | It is used to transport the flour and dough. It can also be used to transport water and other ingredients |
| Cutters |  | It is used to cut dough in small parts/pieces |
| Blender |  | A blender works by using rapidly rotating blades to cut and break down the big particles of flours or sugar into fine ones. |
| Electronic balance |  | It is used to weigh small quantity of ingredients |
| Mechanic balance |  | It weighs more than 1 kilo of ingredients |
| Sieves |  | It is used to separate flour particles based on their sizes. |

Topic 2: Processing flowchart

Bakery businesses are food processors of largely wheat based products cooked in insulated heated space, the bakery ovens. These can be of vastly different sizes, and be suitable for baking a variety of products. Cakes, Biscuits follow different processes.

Broadly, all units will follow similar system flow of material through processing, and a control point for food safety is equally important for all units.

Topic 3: Identification of critical points

Critical control point: A critical control point is any step in which hazards can be prevented, eliminated or reduced to acceptable levels. Example: Mixing, Baking and frying. CCP's are usually practices/procedures which, when not done correctly, are the leading causes of foodborne illness outbreaks

## LO 1.2 – Select cleaning products.

Topic 1: Selection of cleaning products

**Cleaning** is removal soils from surfaces

**Cleaning agents** are substances (usually liquids, powders, sprays, or granules) used to remove dirt, including dust, stains, bad smells, and clutter on surfaces. Purposes of cleaning agents include health, beauty, removing offensive odor, and avoiding the spread of dirt and contaminants to oneself and others. Some cleaning agents can kill bacteria and clean at the same time.

Topic 2 : Localization of cleaning products

- Cleaning products must be clearly labelled, and stored safely away from food service areas, this will help processor understand his/her legal obligations when storing cleaning products at work.
- One of the most important aspects of storing cleaning products is making sure they are clearly labelled. It is so easy for cleaning products to be mixed up and confused with other items.
- Cleaning products usually arrive from your supplier in bulk containers. These usually act as the permanent storage containers and must be clearly marked with:

- ✓ Name of the chemical
- ✓ Pictogram code
- ✓ Signal word
- ✓ Hazard Statement

## Topic3: Identification of critical points

Critical control point: A critical control point is any step in which hazards can be prevented, eliminated or reduced to acceptable levels. CCP's are usually practices/procedures which, when not done correctly, are the leading causes of foodborne illness outbreaks.

Some examples of critical control points in pastry making

- Procurement and quality inspection of ingredients
- Storage of ingredients
- Mixing
- Kneading
- Moulding
- Proofing
- Baking /frying
- Slicing
- Packaging
- Packaging of finished product

## Topic 4: Identification of cleaning products

Cleaning agents are normally water solutions that might be **acidic**, **alkaline,** or **neutral**, depending on the use. Cleaning agents may also be solvent-based or solvent-containing and are then called **degreasers**.

- ✓ **Acidic:** Acidic cleaning agents are mainly used for removal of inorganic deposits like scaling; hard water deposits and rust stains. **Hydrochloric acid** (also called muriatic acid) is a common mineral acid typically used for concrete. **Vinegar** can also be used to clean hard surfaces and remove calcium deposits.
- ✓ Alkaline: Alkaline cleaning agents contain strong bases like sodium hydroxide or potassium hydroxide. Alkaline cleaners dissolve fats, oils and protein based substances. **Bleach** (pH 12) and **Ammonia** (pH 11) are common alkaline cleaning agents.
- ✓ **Neutral**: Neutral washing agents are pH-neutral and based on non-ionic surfactants that disperse different types of dirt.
- ✓ Degreaser: Cleaning agents specially made for removal of grease are called degreasers.

## Topic 5: Objectives of cleaning

For all cleaning /disinfection/sanitation activities, the objectives of the cleaning should be clearly defined, e.g.:

- ✓ To control hazardous microorganisms;
- ✓ To control food chemical contamination;
- ✓ To control foreign body contamination;
- ✓ To control allergen cross contact;
- ✓ To control ingredient / residue / colour / flavour at product changeover;
- ✓ To avoid pest infestation;
- ✓ To control chemical residues from cleaning / sanitation regimes;
- ✓ To assure mechanical operations of equipment
- ✓ To improve process efficiency (e.g. heat transfer efficiency);
- ✓ To assure occupational safety;
- ✓ To satisfy local regulatory requirements;
- ✓ To meet specific customer requirements;
- ✓ To meet GFSI (Global Food Safety Initiative) requirements.

## Topic 6:Hazard and safety of cleaning products to user

Many factors influence whether a cleaning product will cause health problems. Some important factors to consider include:

- Chemical ingredients of the cleaning product;
- How the cleaning product is being used or stored;
- Ventilation in the area where the cleaning product is used;
- Whether there are splashes and spills;
- Whether the cleaning product comes in contact with the skin; and
- Whether mists, vapours and/or gases are released.

Chemicals in some cleaning products can be irritating to the skin or can cause rashes. Cleaning products that contain corrosive chemicals can 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. Symptoms may include burning eyes, sore throat, coughing, trouble breathing and wheezing. Chemicals in some cleaning products can cause asthma or trigger asthma attacks. Some cleaning products contain hazardous chemicals that can enter the body through skin contact or from breathing gases into the lungs. Mixing cleaning products that contain bleach and ammonia can cause severe lung damage or death.

## LO 1.3 – Clean the work area

### Topic 1: Different cleaning techniques

- **Cleaning techniques:**
  - ✓ **Cleaning in Place (CIP)**: Cleaning in Place (CIP) is system of cleaning the interior surface of pipelines, vessels, filters, process equipment and associated things without dismantling. Juice processing plants that require high level of hygiene rely on CIP. Cleaning-In-Place (CIP) involves the jetting or spraying of surfaces or circulation of cleaning solutions through the plant under conditions of increased turbulence and flow velocity.
  - ✓ **Cleaning out of Place (COP):** It is manual washing techniques used for cleaning equipment and area of food processing that wouldn't be touched by a CIP system**.**

### Topic 2: Standard operating procedures (SOPs) for cleaning

**SOP** is a set of written instructions that document a food manufacturer's routine or repetitive activity. For all sanitation-related processes, jobs or activities, the term **SSOP** (Sanitation **SOP**) is reserved. Each cleaning product must have its standard operation procedures that food industry cleaners should follow.

Cleaning is a complex process and it is a defined and systematic approach which is required to ensure that it is conducted correctly. This approach takes the form of Standard Sanitation Operating Procedure (SSOP), usually a legal requirement and a fundamental GFSI requirement. The collection of these cleaning procedures forms a Cleaning Plan or Programme which is specific to a facility.

A typical SSOP includes the following:

- ✓ Cleaning frequency / duration / sequence;
- ✓ Cleaning agents, sanitizers and disinfectants used (ensuring they are food-grade and fit-for-purpose);
- ✓ Cleaning process parameters (equipment used, concentration of chemicals, time, temperature, physical parameters);
- ✓ Safety requirements (assembled / disassembled equipment list requirements to protect adjacent lines / products);
- ✓ Responsibilities, documentation, visual aids, training / qualification requirements;
- ✓ Necessary monitoring or verification activities.

Topic3 : Hygienic precautions to avoid the contamination

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.

- Warning workers not to mix cleaning products that contain bleach and ammonia;
- Making sure that workers know which cleaning chemicals must be diluted and how correctly dilution is.
- Thoroughly reviewing and training workers on the use, storage and emergency spill procedures for cleaning chemicals;
- Reviewing the proper protective equipment needed, such as gloves and goggles, and providing the proper protective equipment to the workers using the cleaning product;
- Ensuring that all containers of cleaning products and chemicals are labeled 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; and

Providing workers with a place to wash up after using cleaning chemicals

## Topic 4 : Equipment and materials arrangement

- ✓ Line arrangement: equipment and materials are on the straight line
- ✓ Round arrangement: equipment and materials are arranged in the circular arrangement
- ✓ Square arrangement: The are arranged according to the square

## Topic 5 : Controlling pest in work area

- Pests pose a major threat to food safety and suitability of food as they are inherently drawn towards food. The food industry is one of the most vulnerable segments which cannot do without pest control to maintain their high levels of food safety. Pests are carriers of a wide variety of disease causing bacteria, viruses and a host of other microorganisms causing health adverse effects to staff involved in the processing and handling of food, to consumers.

Some pests which are found commonly across a majority of food industries are rodents, cockroaches, flies, birds and beetles

- ❖ **Pest control program is needed to be implemented for the following reasons:**
  - ✓ Pest infestation can across where there are bleeding sites and a supply of food;
  - ✓ They damage food materials and food packaging materials;
  - ✓ They are source of microorganisms that spread diseases through a transfer of pathogens
  - ✓ They can cause the bad reputation and loss of credit to food industry and
  - ✓ The Prosecution and closure of food industry due to the poor pest control program.
- ❖ **The measures to be taken for pest control in food industry**
  - The interior walls may contain as less as possible cracks
  - The exterior windows have to be provided with the insect screen
  - The unloading and loading gates have to be closed after loading and unloading
  - The company and the outside company needs to kept neat and clean
  - The apparatus and rooms that are not used need to be clean
  - The prolonged staying of a pool of water has to be avoided in the surrounding of a company
  - The placement of baits, traps in, and the surrounding of the company

- Insects killers have to be placed where necessary; especially on unloading and loading platforms and where their direct entrance to outside or cleaning zone
- The ultra-violets lamps are often used and yearly replaced according to manufacturer instructions.

## LO 1.4 – Check the work place

### Topic 1: Parameters for visual inspection

**Visual Inspection is the best verification method of workplace appearance**. It concerned with checking if the visible debris, soil build-up, undesirable colour on equipment and surface, biological growth (i.e., mould) and undesirable odour

- ✓ Inspection
- ✓ Daily, weekly, monthly
- ✓ Checking flowchart

### Topic 2: Effective use of the chemicals and materials

- **Cleaning** is the process of using detergent and water to remove visible dust, grease, dirt, stains and odors from all surfaces, fixtures (i.e. benches and sinks), utensils and equipment.
- **Sanitizing** is the process of killing food poisoning bacteria (what you cannot see) and is achieved by using heat and/or chemicals. Sanitizing is appropriate for food contact surface sanitizing (dishes, utensils, cutting boards, high chair trays, tables. Technician must make sure that any sanitizer used is 'food grade' – safe for food contact surfaces.
- **Disinfecting**: Appropriate for use on non- food contact surfaces such as windows, ceilings, walls, door and cabinet handles, toilets, and sinks used for toileting routines including knobs and basins.
- The washing substances that can be used for this field are:
- **Alkali** (caustic soda, ash soda) **Acids, surfactants**, **Detergents (Soap) and disinfectants.**
- The chemicals used for cleaning and disinfection must be approved for food industry (food grades).The dosage of cleaning products must be seen on the label because each cleaning product contain its indication for use.

- The cleaning products must fit to human health, to assure that they cannot cause some problems like skin lesions
    - ✓ Reading and follow advise of using on the label
    - ✓ Careful handling
    - ✓ Checking chemical product symbol

Topic 3: Wastes are removed to ovoid contamination

Waste disposal systems & facilities shall be provided so that there is no risk of contaminating food or potable water supply.

Drains shall be designed to meet expected flow loads, constructed & located so to prevent accumulation and back flow of waste water.

Drains should be located so that they can be effectively cleaned & inspected. Drainage & sewage system shall be equipped with appropriate traps and vents to effectively capture contaminants such as sewer gases, pests etc.

No manhole should be situated inside any food processing area. Drains like rainwater pipes, if inside, should be constructed of impervious rust proof material and should be covered. These shall not open in food processing area.

There should be facilities for separate storage of biodegradable & non-biodegradable wastes. Wherever existing, refuse stores shall be designed and managed in such a way as to enable them to be kept clean and free form animals and pests.

Topic 4: Employees are health and safety

The following practices should be conducted by employees to ensure personal hygiene:

- Physical health should be maintained and protected through practice proper nutrition and physical cleanliness
- Illness should be reported to the employer before working with food so that work adjustments can be made to protect food from the employee's illness or disease.
- Hygiene work habits should be developed to eliminated potential food contamination

- During the work shift, hands should be washed after using the toilet, handling garbage or other soiled materials; handling uncooked muscles, egg products, or dairy products, handling money, smoking, coughing, or sneezing.
- Personal cleanliness should be maintained by daily bathing and use deodorants, washing hair at least twice a week, cleaning fingers daily, using a hat or hair net while handling food, and wearing clean underclothing and uniforms.
- Employee hands should not touch food service equipment and utensils. Disposable gloves should be used when contact is necessary.
- Rules such as no smoking should be followed, and other precautions related to potential contamination should be taken.

Employers should emphasize hygienic practices of employees as follows:

- Employees should provide training in food handling and personal hygiene
- A regular inspection of employees and their work habits should be conducted. Violations of practices should be handled as disciplinary violations.
- Incentives for superior hygiene and sanitary practices should be provided.

Some equipments and tools are hazardous when they are sharp-edged. They can wound the operator. Other can break if they are not well utilized.

The manufacture of foodstuffs from starches and sugars is done in bakeries and biscuit, pastry and cake-making establishments. The safety and health hazards presented by the raw materials, the plant and equipment and the manufacturing processes in these plants are similar.

## Topic 5: Workplace rules and regulation

There are certain workplace conduct rules and regulations that should be followed no matter the political climate or the area in which the work site is located. While Federal laws cover many of the acceptable conduct activities allowed in the workplace, most conflicts could be avoided by following basic common sense.

**Golden rule**: When employees are considerate of their fellow workers, they rarely conflict with Federal laws or company policies. The Golden Rule can be used as a guide to acceptable behavior in the workplace. It is better torespect the space of fellow employees

and keep personal opinions that don't have anything to do with work to yourself. A working environment built on mutual respect can provide a pleasant work experience for everyone.

**Stay sober**: Employees are hired for their skills and talents and their ability to perform their duties competently. Drugs and alcohol impair an individual's abilities. The use of drugs on the job is illegal and written into company manuals. Federal law allows employers to seek drug testing with no warning when the practice is clearly written in the company policy manual and employees waive their rights upon employment. Most company policy manuals forbid intoxication in the workplace, which is a rule that adheres to common sense principles as well.

**Employee theft**: Clichés often are ubiquitous because in many cases they are true. "Honesty is the best policy" is another of those sayings that are spelled out in the handbook given to most new employees in business and should be the mantra of every working person. Dishonesty on job applications is often discovered, causing embarrassment and termination. Direct stealing of goods or money from an employer can lead to imprisonment and loss of valuable licenses and certifications. Wasting time, making personal calls on company time and taking items such as office supplies is illegal and should be avoided.

**Individual Rights**: Sexual harassment and religious discrimination are expressly forbidden under Federal law in all workplaces. Creating an environment that is unsafe, hostile or uncomfortable for an employee, whether it is overt or subtle, is an important regulation is also an important rule to remember. Sexual harassment includes comments as well as inappropriate pictures or posters hung in plain view. Employees cannot be ridiculed or discriminated against because of their religious beliefs either.

Stalking as a behavior is also strictly forbidden. Stalking refers to repeated harassing or threatening behavior by an individual, such as following a person, appearing at a person's home, office, or place of business, making harassing phone calls, or even leaving unwanted messages (including written or electronic).

**Basic Workplace Rules**:

Follow Reporting Structure*:* One of the most important things to consider at work is the reporting structure; violating the accepted practices can create ill-will with your supervisors

and mark you as unprofessional. When you start a job, ask about the chain of command and commit it to memory. During the course of your employment, follow the hierarchy when reporting a problem or bringing up a new idea, starting with your immediate supervisor and moving up. Establish a paper trail for a record of your good faith efforts.

**Be Respectful:** No matter which job you hold in a company, it's important to be respectful of clients, vendors and coworkers. Show respect for religious beliefs, lifestyle choices, and personal property and work styles. Communicate openly and politely, and avoid getting into emotionally driven confrontations. In any given office or situation, respectful behavior helps establish a professional reputation.

**Leave Personal problems at Home:** All employees have their own personal viewpoints and problems. When you arrive at work, leave your issues at the door so they do not affect your professional life. Avoid discussing in detail sensitive topics like politics, relationship issues or financial woes.

**Minimize Personal Communications:** With the quick availability of texting, cell phone calls and social media, it can be tempting to spend a disproportionate amount of time participating in personal communication during work hours. Limit your use of these technologies to avoid the perception that you waste company time or do not get enough work done.

## Topic 6: Recommendation of health and safety to employees

The following practices should be conducted by employees to ensure personal hygiene:

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## Topic 7:Accessibility fire fighters

A **firefighter** is a rescuer extensively trained in fire fighting, primarily to extinguish hazardous fires that threaten life, property, and the environment as well as to rescue people and in some cases or jurisdictions also animals from dangerous situations.

The basic tasks of firelighters include: fire suppression, rescue, fire prevention, basic first aid, and investigations.

## Topic 8: Adequate lighting

Adequate natural or artificial lighting should be provided to carry out operations in a hygienic manner. Lighting fixtures should be covered to prevent breakages of electrical fittings to contaminate food. Safety lighting is required for the bakery and the escape routes. Storage areas and social areas should be equipped with escape route orientation lighting.

Lights should be enclosed where possible, particularly if there is a risk of breakage or open food is being handled. eg diffusers, plastic sleeves or plastic coated fluorescent tubes.

Lights used in extremes of temperature. eg in freezers or ovens, should be capable of withstanding the conditions. Light fittings should be located so as to minimise the risk of contact and damage. All walk-in chillers and freezers irrespective of size should have lights which operate independent of the door.

# Learning Unit 2 – Prepare Materials and Equipment for pastry products

## LO 2.1 – Select materials and equipment

Topic 1 : Types of equipment for the processing (technical specification)

Generally, tools and equipments are classified according to their usage as follow:

**A. OVENS**

Convection ovens

Rotary ovens

Deck or Cabinet

Microwave

Rotary egg beater

**B. CUTTING TOOLS**

Pastry blender

Pastry wheel

Biscuit and doughnut cutter

Kitchen shear

Chopping boards

Paring knife

**E. MIXING TOOLS**

Mixing Bowls

Wooden spoon

Rubber scrapper

Oven Electric and handy mixer

**C. PREPARATORY TOOLS**

Flour sifter

Grater

Pastry brush

Rolling pin Jelly

Pastry cloth

Pastry tips

Utility tray

Molders

**D. MEASURING TOOLS**

Measuring cups

Measuring spoons

Weighing scale

Measuring cups for liquid ingredients

Timer

**F. BAKING PANS**

Tube center pan

Muffin pan

Cake pans (round, square,

Spatula rectangle, or heart shaped)

Roll pan

Bundt pan

Custard cup

Griddle pans

Pop over pans

1. **Baking wares –** are made of glass or metal containers for batter and dough with various sizes and shapes

***Cake pans*** - comes in different sizes and shapes and may be Round Square rectangular Or heart shaped.

**2. Tube centre pan**– deeper than a round pan and with a hollow centre and it is removable after baking the cake.

***3. Muffin pan***- has 12 formed cups for baking muffins and cup cakes

***4. Pop over pan***– is used for cooking

***5. Jelly roll pan***– is shallow rectangular pan used for baking rolls

**6. Bundt pan**– is a round pan with scalloped sides used for baking elegant and special cakes

**7. Biscuit and doughnut cutter –** is used to cut and shape biscuit or doughnut.

**8. Cutting tools –** include a knife and chopping board that are used to cut glazed fruit, nuts, or other ingredients in baking.

**9. Electric mixer –** is used for different baking procedure for beating, stirring and blending.

10. **Kitchen shears -** are used to slice rolls and delicate cakes.

**11. Measuring spoons –** consist of a set of measuring spoons used to measure small quantities of ingredients.

**12. Paring knife** – is used to pare or cut dough into different sizes.

13. **Timer –** is used to in timing baked products, the rising of yeast and to check the doneness of cakes.

14. **Pastry bag or piping bag:** An often cone-shaped bag that is used to make an even stream of dough, frosting, or flavoured substance to form a structure, decorate a baked item, or fill a pastry with a custard, cream, jelly, or other filling.

**15. Ovens** are the workhorses of the bakery and pastry shop and are essential for producing the

Bakery products. Ovens are enclosed spaces in which food is heated, usually by hot air

Several kinds of ovens are used in baking.

**DECK OVENS** are so called because the items to be baked either on sheet pans or in the case of some bread freestanding are placed directly on the bottom, or deck of oven. This is also called **STACK OVEN**because several may be stacked on top of one another. Breads are baked directly on the floor of the oven and not in pans. Deck oven for baking bread are equipped with steam ejector.

**A. RACK OVEN**

Itis a large oven into which entire racks full of sheet pans can be wheeled for baking.

DECK OVEN

RACK OVEN

**B. MECHANICAL OVEN**

The food is in motion while it bakes in this type of oven. The most common types are a revolving oven, in which his mechanism is like that of aFerris wheel. The mechanical action eliminates the problem of hot spots or unevenbaking because the mechanism rotates throughout the oven. Because of its size it isespecially used in high volume operations. It can also be equipped with steamejector.

### C. CONVECTION OVEN

It contains fans that circulate the air and distribute the heat rapidly throughout the interior. Strong forced air can distort the shape of the productsmade with batter and soft dough.

Content /Topic3: Attractive and sanitary equipment

Bakers rely on an array of machines to prepare their goods efficiently, such as mixers, dough shelters. In some cases, it may be a challenge to take a machine apart and keep it clean. Still, it's important to take the time to perform these tasks on a regular basis, so pieces of food aren't left inside.

It's particularly vital to keep proofing cabinets clean. These warm environments are ideal for allowing bread to rise before baking, but they can also be hospitable spots for

bacteria. Bakeries should have a policy of washing out proofing cabinets with warm water and mild soap on a daily basis.

Cleaning out storage and properly disposing of waste keeps a bakery running smoothly.

- Content/Topic 4:Electricity consumption

Oven Electric ovens that are used regularly can be significant consumers of energy in households. Consumers who make regular use of their ovens should carefully consider their choice of oven before making a decision to purchase.

- To protect consumers from purchasing inefficient electric ovens, Minimum Energy Performance Standards (MEPS) have been set for electric ovens. Currently, only large electric ovens with an Energy Efficiency Rating of Class B or better can be sold. With regards to small/medium electric ovens, an Energy Efficiency Rating of Class A or better can be sold.
- The larger an electric oven, the more energy required to heat the oven space. As a result, the most important decision to be made when purchasing an electric oven from an energy efficiency perspective is what size oven to purchase. Ideally, consumers should purchase the smallest oven that meets their baking and roasting needs.

## LO 2.2 – Clean the equipment

Topic 1: Cleaning products

- **Water**: Called the universal solvent, water is the basis for all surface cleaners. Water is a good solvent by itself it has the ability to clean many soiled surfaces. Cleaning with water alone is the yardstick by which we measure the effect of cleaning chemicals. Other active ingredients are added to enhance the effect. Detergents aid water in removing soil.
- **Detergents**: soap in a liquid form that attracts and washes away grease, dirt and debris from the surface. Detergents do not kill bacteria e.g. Soap (liquid or solid).
- **Sanitizers:** chemicals that are used after detergents. Sanitizers will kill and reduce the number of bacteria and spores.

## **LO 2.3 –** 2 .3 Use equipment

Topic 1 : SOPs(standard operation procedures) for each equipment

Before working, it is recommended to carefully read and understand the operation of the tools and equipment from their labels or manuals. Standards for that must be followed even if some small changes can occur purposively without breaking principals.

Topic2: Maintenance and adjustment

Establishing a preventive maintenance program helps to ensure that all equipment and tools function as intended. Failure to perform maintenance activities during production may increase the risk of microbial contamination. Preventive maintenance includes periodic examination and maintenance of tools and equipment. Saving money is one good reason in performing preventive maintenance

- ✓ Adjust temperature of equipment
- ✓ Time adjustment
- ✓ Frequency of equipment
- ✓ Volume adjustment

## **LO 2.4 –** Check the equipment

Topic 1: Parameters of visual inspection

**Visual Inspection** (Best Verification Method)

Surface appearance: visible debris, soil build-up, color of equipment surface (white films, stains, etc.), biological growth (i.e., mold) and odor

Topic 2: Safety of equipment

The safety of tools and equipment is not only the concern of the management, but of the workers who use the equipment as well. Proper maintenance and safety of tools and equipment are important for the following reasons:

1. Good quality of service. Modern equipment has built-in controls, thermometers and timing and regulating devices. A breakdown of these devices may affect the quality of the food being prepared and caused slowdown in production and service.

2. Sanitation. Mechanical function of equipment like the refrigerator and freezers encourages the development of disease causing bacteria. Negligence of their cleanliness leads to the growth of food-borne bacteria.

3. Fire prevention. Grease and dirt that gather in stove rims and hoods are fire hazards. Daily inspection of grease collecting equipment will minimize the danger of fire.

4. Safety. Most food service accident happens in the kitchen. This is due to lack of knowledge and training of food worker in the use of tools and equipment.

5. Less cost of production. Expenses will be minimized if tools and equipment are in good condition

## Topic 3: Checking of the cleanliness of equipments

- **Visual Inspection** (Best Verification Method)

Surface appearance: visible debris, soil build-up, color of equipment surface (white films, stains, etc.), biological growth (i.e., mold) and odor

- **ATP testing**.

Adenosine Triphosphate is the enzyme that carries chemical energy around living cells. The presence of ATP on a surface indicates that there's life, and in a food processing environment "life" also means potentially dangerous microorganisms

With this type of tests, first a sanitized surface is swabbed. The sample is then activated with an enzyme called *luciferase* (the one that makes fireflies glow in the dark). The amount of light that is produced by the reaction (measured with a portable device) will be a direct indication of the amount of ATP.

The effectiveness of ATP testing is also its limit, meaning that it will be ineffective with non-living cells, such as yeast extract.

- **Riboflavin testing**

Riboflavin (known as vitamin $B_2$) is a quick, effective and food-grade way to uncover them. Before cleaning, the whole surface or at least the difficult to clean part of the surface is sprayed with a riboflavin and dye solution, which becomes fluorescent under UV light. After the cleaning is done, the operator will check with a UV lamp if any areas remained untouched.

**Others**

- Aerobic plate count
- SWAB Method
- Surface contact technique
- Indicator and dye reduction test
- Petrifilms plate
- Endotoxin detection

# Learning Unit 3 – Process the dough into cake

## LO 3.1 – Mould the dough

Topic 1: Ingredients for cake making

**Flour:** The gelatinized starch and coagulated protein provide: Body (crumb), Structural support,

Protein through coagulation and Starch through gelatinization.

Little or no gluten development is desirable in cake making as it would toughen the cake. However, flour is the major ingredient and it must have some gluten forming properties to give the cake its characteristic structure.

The following ranges of flours are those most commonly used in cake and/or sponge making:

**Soft cake flours** are normally used in making cakes, however good results may be obtained using plain flour.

**Cake flours** have lower gluten content (7–8.5%) than other flours. They are finer than other flours and give soft, yielding gluten which does not toughen when mixed.

**High-ratio flour,** finely milled soft flour, bleached and chlorinated.

The bleaching or maturing treatment to which this flour is subjected has a tenderizing effect on the gluten, and the finer grains enable more moisture to be carried in the batter, for instance, emulsified sponge.

Due to the lower pH in High Ratio flour the starch gelatinizes at lower temperatures, this could be beneficial in terms of baking times.

**Bakers' flour** is used in cakes where a stronger structure is required, for example, rich fruit cakes. Bakers' flour is often mixed with corn flour or wheaten starch to achieve lower gluten content and create a shorter and finer texture, only use up to half of the quantity of flour.

**Fats or Shortening agents: shortening** is the term used in bread and pastry making where they put the ratio of fat, which will reduce the extensibility of gluten that is, is to make the gluten stands shorter.

- ✓ Softens texture of cake
- ✓ Shortens the crumb (gluten)
- ✓ Improves eating quality
- ✓ Improves keeping quality
- ✓ Gives improved crust color

Assists primary aeration, that is, in the creaming stages for sugar batter or flour batter mixes.

There are various grades and types of cake margarines and shortenings used in cake making, as well as butter.

The fat in a cake batter tenderizes the gluten and starch particles, making the crumb moist and tender. It also traps air during the beating process, which aids in the aerating of the batter and the cake.

If a High Ratio fat is used it is necessary to also use High Ratio flour to gain the entire benefit to incorporate increased amounts of liquid and sugar into the cake mixture

**Sugar**

Icing sugar, white sugar, Brown sugar, yellow sugar, Golden Syrup and Honey

**Functions of sugar:**

- ✓ Softens crumb (gluten) and egg proteins
- ✓ Sweetens
- ✓ Gives crumb whiteness and crust color
- ✓ Assists in aeration

- ✓ Aids to keeping qualities (attracts moisture)
- ✓ Affects symmetry.

As well as sweetening, sugar has a tenderizing effect on the gluten and egg proteins, resulting in a soft, moist crumb. It also helps to hold moisture in the baked cake, slowing drying and staling.

**Caster sugar** has the advantage of dissolving more readily in cake batters. A sifted brown sugar may be used for some cakes, but the texture of the finished product will be changed. Syrups of various kinds are also used, for example, honey, but the cake, although remaining moist for a longer period will be heavier, as the sharp edges of sugar crystals help incorporate air during the creaming stage. This creates greater volume and softer crumb

**Eggs**

- ✓ Moisten ( as it contain liquid)
- ✓ Aerate (whole egg or egg white is beaten it entraps air which aids in the aerating process).
- ✓ Bind. Eggs help to form the structure of a cake because of their protein content which coagulates when heated, and the lecithin' in egg yolk acts as an emulsifier of the fat in the batter.

**Egg also provides:**

- ✓ Structure
- ✓ Nutritional value ( Vit D and Proteins)
- ✓ Improved eating quality
- ✓ Improved keeping quality
- ✓ Color.

Eggs also contribute greatly to color and flavor. **1 kg of eggs aerates one kg of flour.**

**Liquid**

When liquid is used in cakes it is usually some form of milk (liquid whole milk and/or skim milk or full cream/skim milk powder) and water. Liquid helps to bring about the binding of the dry ingredients.

- ✓ Affects symmetry
- ✓ Increases volume
- ✓ Opens texture
- ✓ Tenderizes.

Generally, milk or water, optimum amount is used to get the right batter consistency. Too much will yield in very soft and moisture. The cake with an inadequate amount of water will provide dry and stale quickly.

**Baking powder**

Baking powder is a combination of two main ingredients - one alkaline (bicarbonate of soda) and one acidic (cream of tartar).Baking powder serves as leavening agent. It is any chemical or mixture of chemical which, when moistened and heated, generates gas usually ($CO_2$) which will aerate bread and cakes. Ideally the residual salts of the reaction should be tasteless and without odour. The baking powder must comply with the Food and Drugs Act of the country in which it is used.

**Milk powder**

Functions of milk powder

- ✓ Lactose, increases sweetness and crust color
- ✓ Increased water content
- ✓ Contributes to the flavor
- ✓ Assisting in aeration and influencing volume
- ✓ Milk-fat enhances the shelf-life of the product.

Skim or full cream milk powder can be used. Generally, products made with milk, produce cakes with better volume, better color and longer keeping qualities, than those with water.

In modern cake manufacture where emulsifiers are used, the use of egg produces superior cakes to those made with eggs only.

Milk powder should be sieved with the flour and baking powder to ensure even distribution.

**Emulsifiers/stabilizers**

- ✓ Lower ingredient cost possible, due to possibility to lower the egg quantity
- ✓ Shorter mixing time
- ✓ Better stability of the batter
- ✓ Moister sponges
- ✓ Better keeping qualities
- ✓ Finer and more uniform texture.

**Flavors**

Every ingredient used contributes and imparts its own flavors to the overall flavor of the products, i.e. Butter has a different flavor than cake margarine; brown sugar taste different to caster sugar and milk imparts different flavors than water.

As well as the natural flavors of the ingredients in the basic recipe other natural or synthetic flavors can be added to impart specific flavors.

Traditional cake making flavors are: Lemon, Vanilla, Almond, Orange, Vanilla and mixed spice

**Food Colors:**

The use of color is important as the use of flavor. The eyes appeal of the product is enhanced by the use of color. The correct color should be used to complement directly the flavor added in the product.

The following are the guidelines for the use of coloring materials:

a) To supplement deficiencies in color, e.g. yellow color is used to conceal the lack of butter and eggs in dough.

b) To increase the eye appeal and to complement a definite flavor.

c) To introduce varieties and interest to decorated products.

For a color to be acceptable for use in food stuffs, the main condition being that it should be harmless to the human health.

The three primary colors red, yellow and blue will produce secondary colors when mixed. Thus yellow with blue forms green, yellow with red forms orange, red with blue forms violet, yellow with red and blue forms chocolate or brown.

Thus the typical cake ingredients are flour, sugar, eggs, butter ,a liquid such as milk or water, and leavening agents, such as baking soda and/or baking powder. Common additional ingredients and flavourings include dried or fresh fruit, cocoa, and extracts such as vanilla

## Topic 2 : Selection of the dough for cake

By definition, a cake is a **'sweet baked'** product usually containing flour, sugar, eggs and fat. Other typical ingredients are flavoring agents, liquids and leaveners or raising agents, such as baking powder or baking soda. The dough for cake also called "Batter" is mixture of flour and liquid, usually combined with other ingredients that can be stirred with a spoon and is thin enough to pour or drop from a spoon. After mixing, the dough of cake must be soft, tender, moist, light, and homogeneous and must have good colour, flavour and texture.

## Topic 3 : Mould specifications

The mould should be heat resistant, easy to clean, attractive and disposable. Cake tins and moulds come in an immense variety of shapes and sizes. The tins and moulds have the function to give a special shape to the dough or cake batter after baking or cooling. They can be made of aluminium, stainless steel, coated steel and steel. Moulds which do not go into the oven are made of a synthetic material. After use clean them with a clean cloth and plastic scrapper. Metal tins or moulds can be put together after cooling down. Baking pans and baking sheets come in an immense variety of shapes and sizes. They can be single pans or attached by several pans. For crispy products you can use perforated pans or sheets. These pans allow better circulation of hot air. They can be made of black iron, tin plate, aluminium, aluminized steel and blued steel.

**Examples of some moulds**

| Code | Specifications | Material | Thickness | Coating |
|---|---|---|---|---|
| MY31153 | 80*80*80mm | Aluminium Alloy | 1.2mm | Anode |
| MY31163 | 120*120*120mm | Aluminium Alloy | 1.2mm | Anode |

| Code | Specifications | Material | Thickness | Coating |
|---|---|---|---|---|
| MY33201 | 96*66*40mm | Aluminium Alloy | 1.0mm | Teflon |

| Code | Specifications | Material | Thickness | Coating |
|---|---|---|---|---|
| DZ3001 | 124*80*63mm | Alusteel | 0.6mm | Teflon |

- ConTopic4 : Techniques of coating the moulds

During moulding, it is better to take attention because the baked cake can adhere to the sides and bottom of baking pan. So the cake pans (moulds) must be coated before moulding because a prepared pan allows the baked cake to be removed easily from the pan.

- **grease-and-flour method**

It is used for fluted tube pans.

**STEPS**

1. **Select a lubricant to coat the pan with and grease sides and corners.**

   - Coat the pan with **butter**. Using butter on the interior surface of the pan will result in a **darker crust** that has a hint of butter flavour. Either **melt the butter** and apply it to the pan using a pastry brush or paper towel and rub it over the surface.

- Spray the pan with a **vegetable oil spray**. Using spray to coat the pan is a fast solution to preparing the baking pan. This method applies a very light coating of oil to the surface of the pan which is ideal for those looking for healthier alternatives when baking.

**2.** Line the grease-coated pan.

Flour the pan and distribute flour evenly .When pan is completely greased, sprinkle a couple of spoonful of all-purpose **flour** into the bottom of it. When baking a chocolate cake, consider using **unsweetened cocoa powder** instead of flour for a nice deep brown colour.

- Line a Pan with Waxed Paper or Parchment Paper

The extra step of lining the bottom of the pan with waxed or parchment paper is an even surer method for getting the cake out of the pan. This method is used for cakes baked in flat-bottom pans.

Step 1: Trace the pan

After greasing the pan (following the steps above), the pan is set on a piece of waxed or parchment paper and trace around it with a pencil.

Step 2: Cut paper

With a clean pair of kitchen scissors, cut just inside the traced line on the paper.

Step 3: Fit paper, then grease and flour

Fit the cut piece of paper into the pan, pressing it into the corners and smoothing out any wrinkles or bubbles. Grease the top of the paper and then flour the pan

**Pour the batter evenly into the prepared pans.** Fill the pans 2/3 of the way full, as the cake will rise during baking. Gently tap the cake pan on the counter top to release any large air bubbles in the batter.

## LO 3.2 – Bake the cake

/Topic 1: Monitoring baking parameters (time, temperature, ventilation, convection)

Solid heat of 150ºC–180ºC will depend on cake size and thickness. Oven should be 'solid' heat (bring to temperature and stabilise by holding at this temperature for 15-20 minutes before placing cakes in oven). To prevent premature colouring of cake surfaces, they may be covered with sheets of clean paper or a baking tray may be placed on top of the cakes for approximately 50% of the baking time. To test when cakes are baked, use a thermometer to determine the internal temperature. The baking process is complete when the centre of the product has reached gelatinisation temperature (87ºC–90ºC). Further baking beyond this point will only dry the product and reduce shelf life.A fine skewer may be inserted into the cake which should come out clean if cake is baked.Do not remove cakes from tins until cold to avoid damage. Cold cakes should be wrapped as soon as possible. In order to keep pliability in the product so it can be rolled it can be cooked at a higher temperature. Gelatinisation and coagulation will happen quicker and there is less drying out of the product. After cooling it can be moulded or rolled easier

Baking times will vary according to a number of conditions:

- Size and shape of items
- Uniformity of depositing
- Type and distribution of oven heat
- Recovery temperature of oven
- Damper control
- Capacity of the baking chamber

A fine skewer may be inserted into the cake, which should come out clean if cake is baked
Or gently insert a toothpick in the centre of the cake. If it comes out clean or with a few small crumbs on it, the cake is done but if it comes coated with butter, it is not done.

Topic 2: Colours, volume of well baked cake

Colour of the product when it is finally removed from the oven is important to the visual appeal of the product. Colour stimulates the senses and encourages the customer to purchase.

Topic 3: Cooling techniques

- Cakes need to cool properly before they are handled. If a cake has not cooled enough, it will be **difficult** to leave the pan. Some of the cakes may stick to the pan, or half of the cake will come out, and the other half will stay attached. Removing a cake from the pan too soon or too late can drastically change the **appearance** and **texture** of the cake.
- Wire cooling racks are perfect for cake to cool on after they are removed from baking pans, because the wire cooling racks allow air to circulate all around the cakes while it cools. Cooling time is **1-2** hours depending on the size of cakes.

Content/Topic 3:Quality parameters of the cake:

- **Organoleptic test**

  **Colour:** Golden brown

  **Taste:** sweet with no bitter taste.

  **Flavour:** delicately pleasing

- **Physical test**

Cake has a surface that is uniform, free from cracks. Their volume increases while the weight decrease because of water evaporation during baking.

## LO 3.3 – Pack and store the cake

Topic 1: Packaging Techniques

- **Primary technique** consists of packaging food product in primary or sales packaging material i. e. packaging conceived so as to constitute a sales unit to the final user .The packaging material is therefore, in direct contact with the product. It provides the initial and usually the major protective barrier. Examples of primary packages include metal

cans, glass bottles and plastic pouches. It is frequently the only primary package which the consumer sees and purchases at retail outlets and use.

- **Secondary technique** consists of packaging food product in grouped packaging or secondary packaging, i. e. packaging conceived so as to constitute at the point of purchase a grouping of a certain number of sales units for instance a corrugated fibre-board case or shipping container, contains a number of primary packages. It is the physical distribution carrier and is sometimes so designed as it can be used in retail outlets for the display of primary packages.
- **Tertiary technique** involves the usage of transport packaging or tertiary packaging i. e. packaging conceived so as to facilitate handling and transport of a number of sales units. A tertiary package is made up of a number of secondary packages, the common example being a stretch-wrapped pallet of corrugated cases.

Topic 2 :Packaging materials(Nature and quality)

Only food grade packaging material (printed/unprinted) should be used for wrapping and packaging of food items. The food grade certificate/ declaration should be checked during receiving of the materials.

- Packaging material should also be kept and stored under hygienic conditions in a room
  Intended for the purpose.
- All the products should be labeled according to the Food Labeling Act.
- Immediately after packaging and proper labeling, the products should be placed in the rooms provided for storage under required temperature and humidity conditions.
- Temperature and relative humidity of the storage area should be maintained to optimum
  required level.

## Topic 3: Purpose of labelling

The most important roles of the label include:

- Persuading the buyer to purchase the product.
- Informing the customer about the product; contents, ingredients, weight, shelf-life etc. The label must also comply with any local labelling regulations, which vary depending on the country and the product.
- Informing the buyer about storing the food, e.g. frozen food or foods that need refrigeration after opening.
- Informing the customer how to use the food product

## Topic3: Techniques of labelling

**Applied Labelling**: It is types of labelling at which all information is pointed on the paper which is applied on the bottle.

**Direct Labelling:** it is types labelling at which all the information is printed on the package.

## Content /Topic4: Storage conditions and monitoring

Baked shells can be stored in a protected cool and dry environment for up to one week. Freezing is best done soon after the product is baked as it is important to retain a percentage of moisture for satisfactory results. Products which are very dry will crumble and break very easily when thawed.

## Topic5: Safety measures during packaging and storage

- Packing room temperature is to be maintained at 22-24$^0$C
- Packers handling naked cakes to use sterilized gloves. Disinfectant solutions to be used by all packers as and when required
- The cakes have a shelf life of 2-5 days depending on the type of product and the storage

  Conditions

# Learning Unit 4 – Process the dough into biscuits

## LO 4.1 – Mould the batter

### Topic1: What is biscuit?

Biscuits are a baked product, usually made from wheat flour together with fat and sugar. They are made in a variety of shapes and sizes and may contain dried fruits, nuts and food colours. They are a dry product, usually with a golden brown colour and a crisp texture. For rapid baking, the thickness of the biscuit is usually not more than 3-4mm. The biscuits have a shelf life of several months when stored properly in a cool dry place. Biscuit is a low moisture bakery product. Moisture content of biscuit is typically below 4% depending upon its weight, thickness and shape.


**Fig. Biscuit**

- Topic 2: Biscuit characteristics

**Biscuits**characterized by:

- ✓ High **sugar** content,
- ✓ High in **shortening**,
- ✓ Low in **water,**
- ✓ Delicate **texture,**
- ✓ **Crisp** but **tender crust**

## Topic 3: Mould the dough for biscuit making

After mixing together all ingredients used in biscuit making and obtaining the **soft, light** dough/batter; the followed steps is to mould the dough by **kneading, rolling and cutting.**

**Knead the dough.** The sticky dough is turned onto a floured baking surface and is kneaded slightly by using hand but kneading more can cause the biscuits to lose their light, flaky qualities.

**Roll out the dough:** On the same floured surface where the dough is kneaded, it is rolled out to the desired thickness about 1/2 to 3/4-inch (1inch=2.5cm) thick by using a roller and gets the uniformly flat dough.

**Cut out biscuits.** By using a biscuit cutter of desired shape, the flattened dough is cut into different small biscuits and then transferred to a lightly floured baking sheet by leaving a small space between each other so they cook evenly. Re-combine the leftover dough into another ball, roll it flat, and repeat.

## Topic4: Techniques of coating the moulds

During moulding, it is better to take attention because the baked biscuit can adhere to the sides and bottom of baking pan. So the biscuit pans (moulds) must be coated before moulding because a prepared pan allows the baked biscuit to be removed easily from the pan.

- **grease-and-flour method**

It is used for fluted tube pans.

**STEPS**

**1.Select a lubricant to coat the pan with and grease sides and corners.**

- Coat the pan with **butter**. Using butter on the interior surface of the pan will result in a **darker crust** that has a hint of butter flavor. Either **melt the butter** and apply it to the pan using a pastry brush or paper towel and rub it over the surface.
- Spray the pan with a **vegetable oil spray**. Using spray to coat the pan is a fast solution to preparing the baking pan. This method applies a very light coating of oil to the surface of the pan which is ideal for those looking for healthier alternatives when baking.

**3.** Line the grease-coated pan.

Flour the pan and distribute flour evenly .When pan is completely greased, sprinkle a couple of spoonfuls of all-purpose **flour** into the bottom of it. When baking a chocolate biscuit, consider using **unsweetened cocoa powder** instead of flour for a nice deep brown color.

- **Line a Pan with Waxed Paper or Parchment Paper**

The extra step of lining the bottom of the pan with waxed or parchment paper is an even surer method for getting the biscuit out of the pan. This method is used for biscuit baked in flat-bottom pans.

Step 1: Trace the pan

After greasing the pan (following the steps above), the pan is set on a piece of waxed or parchment paper and trace around it with a pencil.

Step 2: Cut paper

With a clean pair of kitchen scissors, cut just inside the traced line on the paper.

Step 3: Fit paper, then grease and flour

Fit the cut piece of paper into the pan, pressing it into the corners and smoothing out any wrinkles or bubbles. Grease the top of the paper and then flour the pan.

## LO 4.2 – Bake the biscuits

### Topic 1: Pre-heating of the oven

Firstly, before baking the biscuits it is better to start by pre-heating the oven to the baking temperature and then place the sheet in the pre-heated oven and bake at **200-230ºC for 15-20min** depending on the size and thickness of biscuits.

### Topic 2: Baking parameters

Place the pans on the center rack of the preheated oven and bake by controlling baking **parameters** which are**: Temperature, time and ventilation.** Biscuit is baked **on low temperature** and **long time** in order to bake well the internal part. The length of baking time and temperature depend on the size of biscuit done. But in general it is over **180ºC** and between **25-30 min** for the small biscuit and between **1-2 hours** for the big one**.**

It is essential to control the time and temperature of baking as they affect the colour, texture, flavour and moistness of the product.

Baking times will vary according to a number of conditions:

- Size and shape of items
- Uniformity of depositing
- Type and distribution of oven heat
- Recovery temperature of oven
- Damper control

Capacity of the baking chamber

### Topic3: Oven setting

The oven door should not be opened during the baking of biscuit. This introduces cooler air and may cause the biscuit to sink, which spoils the appearance and the texture. Solid heat of 180ºC will depend on cake size and thickness. Oven should be solid heat (bring to

temperature and stabilize by holding at this temperature for25-30 minutes before placing cakes in oven).

To prevent premature colouring of biscuit surfaces, they may be covered with sheets of clean paper or a baking tray may be placed on top of the biscuit.

### Topic 4: Cooling techniques

Biscuit need to cool properly before they are handled. If a biscuit has not cooled enough, it will be **difficult** to leave the pan. Some of the Biscuit may stick to the pan, or half of the biscuit will come out, and the other half will stay attached. Removing a biscuit from the pan too soon or too late can drastically change the **appearance** and **texture** of the biscuit.

Wire cooling racks are perfect for biscuits to cool on after they are removed from baking pans, because the wire cooling racks allow air to circulate all around the biscuits while it cools. Cooling time is **1-2** hours depending on the size of biscuits.

### Topic 5: Quality characteristics of biscuit

- ✓ Texture: open, flaky, short, depending on the product
- ✓ Density/volume: low density gives more volume and a lighter bite
- ✓ Bite/mouth feel: crispiness, softness, hardness, crunchiness
- ✓ Flavour: many flavours and fillings are heat susceptible and the protection of the flavours and texture of the fillings needs consideration for the baking process.

## LO 4.3 – Pack and store the biscuit

### Topic 1: pack and store the biscuit

The products should be properly cooled before packing into moisture proof bags. Biscuits containing a high proportion of fat or with a cream filling require a more complex type of packaging. Small scale processors should investigate the availability and cost of packaging before making these products

**Loss of Crispness**: Biscuits have a low moisture content, high fat level and are fragile in nature. Hence, they have to be protected from these three aspects. Since the biscuits consists

of wheat flour, fat and shortening, sugar, salt and flavouring agents they are pre-dominantly sensitive to water vapour interchanges (moisture) and oxygen reactions. They generally have an initial moisture content of 2-3% equilibrating to 10-15% RH. The critical moisture level from the point of loss of crispness varies between 4 to 6%.

**Rancidity:** Another requirement due to high fat is the prevention of rancidity. When fat gets exposed to moisture and atmosphere, it gets oxidized and this results in rancidity and lowering of shelf-life. Fruits and nuts used are also susceptible to oxidation in presence of oxygen. Hence the packaging material must be grease resistant to prevent seepage of fat and staining of the pack and have low oxygen permeability to prevent oxidation and rancidity of the fat.

Light is also detrimental to colours or cause oxidation of fats leading to rancidity producing undesirable off-flavours. In such cases, opaque packaging material is used.

Biscuits are susceptible to tainting by inks, adhesives and coatings used in the packaging material. The packaging material, therefore, should be free of residual solvents etc; to avoid development of off-flavours. There are several basic requirements of a package intended to contain bakery products.

These include:

- Water vapour permeability of packages
- Oxygen exchange from within and outside a package
- Aroma impermeability characteristics of packaging materials
- Resistance to seepage of fats and oils
- Protection against deteriorative visible and ultra-violet radiation
- Good printability and appearance
- Physical, mechanical protection to the products against shocks, crushing and vibrations
- Compatibility and safety of the packages

A variety of flexible packaging materials are used for packing biscuits due to advantages such as functionality, lower cost, printability, light weight, savings in freight and other such factors.

Flexible Packaging Materials: The oldest flexible film to be used was cellophane because of its excellent gas barrier properties and heat sealability. Cellophane became less popular when it became too expensive and with the introduction of new materials with better properties.

Today most of the biscuits are packed in flexible laminates of composite structures, where every component fulfills a specific function. These laminates have desirable properties such as moisture barrier, gas barrier heat sealability, printability characteristics, high production and overall economy.

## Learning Unit 5 – Process the dough into doughnuts

Doughnuts are a snack food made from deep-fried sweet dough. Usually circular with a hole in the middle, but also made in the shape of balls, fingers and stars. Hot doughnuts may be dusted with sugar and spice; cold doughnuts may be glazed with icing.

Doughnut is a deep-fried piece of dough or batter. Doughnuts are a form of fried bread that originated in Eastern Africa in the Swahili coastal areas of Kenya and Tanzania. It is still popular in the region, as it is convenient to make.

Chemically raised doughnuts are made with ingredients such as flour, baking powder, salt, liquid, and varying amounts of eggs, milk, sugar, butter and other flavorings. This type of doughnut uses baking powder in the batter to leaven the dough.

Yeast-leavened doughnuts are made with ingredients that include flour, butter, milk, sugar, salt, water, yeast, eggs or egg whites, and flavorings.

Yeast doughnuts and cake doughnuts contain most of the same ingredients; however, their structural differences arise from the type of flour and leavening agent used. In cake doughnuts, cake flour is used, and the resulting doughnut is denser because cake flour has a relatively low gluten content of about 7 to 8 percent. (Baumann, 2007) In yeast doughnuts, a flour with a higher protein content of about 9 to 12 percent is used, resulting in a doughnut that is lighter and more airy. In addition, yeast doughnuts utilize yeast as a leavening agent. Specifically, “Yeast cells are thoroughly distributed throughout the dough and begin to feed on the sugar that is present… carbon dioxide gas is generated, which

raises the dough, making it light and porous." Whereas this process is biological, the leavening process in cake doughnuts is chemical. In cake doughnuts, the most common leavening agent is baking powder. Baking powder is essentially "baking soda with acid added. This neutralizes the base and produces more $CO_2$ according to the following equation: $NaHCO_3 + H+ \rightarrow Na+ + H_2O + CO_2$."

**LO 5.1 –Mould the dough for doughnuts**

A mold or mould is a container used in various techniques of food preparation to shape the finished dish.

This step consists of addition of dough into moulds or pans for further baking step. These should
be preferably made with stainless steel of food grade material and use of plastic should be avoided.

After obtaining the dough, the followed step is moulding. The dough is **kneaded** by hands until the dough is smooth but elastic. Then Set the dough into a greased covered bowl or to a floured surface and covering to rise (resting) for **15min.**

On a floured surface, **roll** the dough out until it's about 0.5 inch (1.3 cm) thick. Cut with a floured doughnut cutter, or cut into doughnut shapes by hand or by knives then transfer to a lightly floured sheet or table by leaving a small space between each other so they leaven evenly

**Ingredients for doughnuts**

**Flour**: Soft wheat flour and not cake flour is used. It provides structure without excessive toughness. Flour levels are 55–65% of the total mix weight.

**Sugar**: Provides sweetness, acts as tenderizing agents, accelerates browning, binds moisture to assist with extending shelf life and affects fat absorption.

**Nonfat dry milk**: Added at levels up to 4%* acts as binder and structure builder, provides crust browning and prevents excessive fat absorption by forming a protein seal.

**Egg yolk**: Dried egg yolk is the most functional version, as egg whites or whole eggs tend to add toughness. Egg yolk provides richness and tenderness to dough and improves eating quality.

**Fats**: Total fat content is derived from either amount added to mix or fat absorbed during frying. Total fat content is 20–25%, which affects tenderness, richness of eating properties and shelf life. There is direct relationship between amount of fat in the mix and amount of fat absorbed during frying.

**Salt:** Salt added at 1–1.5%* to enhance flavour.

**Lecithin**: Functional emulsifier which controls fat absorption, aids controls of batter flow and symmetry, and acts as a wetting agent to improve mixing.

**Mould inhibitors:** Commonly used are sodium diacetate, sodium propionate, potassium sorbate and sorbic acid.

Topic1 :Selection of the dough for doughnuts

After mixing the dough of doughnuts must be thick, malleable, sometimes elastic paste made out of any grains, leguminous or chestnut crops. Dough is typically made by mixing flour with a small amount of water and/or other liquid, and sometimes includes yeast or other leavening agents as well as other ingredients such as various fats or flavorings.

## LO 5.2 – Leaven the dough

**Leavening agents are the substances that cause foaming action (gas or bubbles) that**

**Leavening**: doughnut leavening systems are much faster acting than typical cake baking powder systems as they have a shortened exposure time to baking temperatures. Need to be stable in the dry mix, during floor time and provide maximum leavening during fry time. Example of a leavening blend consists of relatively fast acting acidulant, e.g. sodium acid pyrophosphate (SAPP) and slower acting acidulant, sodium aluminum phosphate (SALP), monocalcium phosphate with a sodium bicarbonate base.

- During this stage, cut doughnuts are conditioned for transfer to the fryer. The quality of yeast-leavened doughnuts can be affected by improper proofing conditions. Proofing is essential for controlling symmetry, volume, fat absorption. Proofing is done **at ambient temperature** for **30–45 minutes up to 1h.** Dough will be ready when you can press a finger into it and the indentation stays. This step of proofing should be done for yeast-leavened doughnuts not for doughnuts

Topic1 :Leavening temperature and time conditioning

Such parameters are:

- **Temperature** is key for triggering leavening (acid-base in baking powder) reactions and controlling their rates.
- **Solubility** of leavening agents (base and acid pair in baking powder). For solutes and dissolved solids, the lower the temperature, the lower the solubility.
- **Water availability** is essential for the leavening acids to dissociate and solubilize.

Topic2 :Methods of dough fermentation (Straight and sponge)

- **Straight method**

The ways of mixing dough most used by bakers are probably those known as “straight dough “and " sponge dough." Straight dough, or "offhand" dough, as it is sometimes called, is made by mixing all the materials at one time, and then setting the mass in a warm place to rise for ten hours or more before baking. It requires more yeast and stronger flour than other methods in which the yeast is allowed to grow in an especially favorable medium before being mixed with the main dough, and needs a longer time to rise, but on the other hand gives an unusually large yield in bread. It is convenient in family bread making, especially when strong, compressed yeast is used, as the dough can be mixed overnight and baked in the morning. Some wholesale bakers dislike it because the dough is stiff and hard to knead, because the large quantities of materials used at one time require extensive kneading apparatus, and because the bread is usually coarse in texture, with a raw, grainy taste, due to the strong flours used.

- **Sponge method**

Sponge dough.—This method is best adapted to fancy working, and makes equally good crusty loaves or light biscuit. To make the "sponge," as the bread mixture is commonly called, the yeast is allowed to work for eight or ten hours in a portion of the flour or water. This is then mixed with the remaining materials and left to rise a few hours before baking. The sponge is "slacker"—that is, contains more moisture than offhand dough—and thus gives the yeast a better chance to work. Bakers usually set their sponge with a strong flour, which gives a light, elastic quality; a little salt is put into it to prevent lactic fermentation. A

weaker flour may be used in the second mixing, as the greater part of the gas has already been given off in the sponge, and no great pressure will come on the newly added gluten. If strong flour be used instead, the bread yield will be greater, but the soft, sweet flavor imparted by the weaker kinds will be replaced by the harsh taste noticed in bread made from offhand dough. Great care must be taken to mix the second lot of flour in thoroughly, or the bread will be full of hard lumps on which the yeast has had no effect. Sponge made bread usually rises evenly and well, and can be worked into almost any shape. It has the further advantage of keeping well. It requires longer labor than the method described before.

After mixing a dough in the way he considers most desirable, the baker sets it in a warm place to rise. Here the yeast continues to work and the gas given off stretches the spaces between the particles of dough. If the gas is allowed to go on increasing until its pressure is greater than the elasticity of the gluten can resist, the latter breaks apart, leaving large holes throughout the dough. If such "overproved" dough is kneaded a little before it is put into the oven the excessive gas will be forced out and the holes will be more regular.

## **LO 5.3 –** Fry the moulded dough into doughnuts

The important step as the fat becomes the ‘pan’, heat transfer medium and a major product ingredient. **Heat the oil in a deep fryer until oil reaches a temperature of175℃-180°C.**Use a kitchen thermometer for maximum precision. To avoid a greasy taste, heat the oil up on medium high for five minutes, and then gently reduce the heat until thermometer reads 175℃-180°C.Frying Oil temperature ranges from 188 to 193°C and affects doughnut volume, crust color, spread and fat absorption.

**Slide the doughnuts into the oil carefully and** turn the doughnuts over when they float up to the surface. Fry evenly on both sides until golden brown. Thus, Doughnuts are fried in two stages with first stage (before turning) being slightly hotter and longer than the second stage

**Remove doughnuts from oil and let drain on a wire rack.** Make sure any excess oil drips off.

## Topic1: Quality and quantity of oil

Doughnuts also require oil (usually vegetable oil) for frying. The doughnuts float in vegetable oil around 355 degrees to 360 degrees fahrenheit. They fry one side of the doughnut at a time then when one side is done the machine flips them over so it can fry the other side. They fry them for a certain amount of time to make sure they get the right taste and texture.

Donut attributes most dependent on oil selection:

- Color: Some oils will brown the donut exterior more quickly than others.
- External texture/mouthfeel: Either oily, dry or waxy.
- Oils weeping: Can create greasy mouthfeel and/or unappealing visual.
- Adherence of glazes or powdered sugar: If too greasy, toppings will be absorbed or not stick to the surface of the donut.

Palm oil is the basic work horse of donut frying since partially hydrogenated oils have been banned. The saturated fat content in palm oil contributes to the oil setting up on the donut surface, which helps the adhesion of powdered sugar, glazes or other toppings. Palm oil can be blended with liquid oil or other hard fats or be interesterified to create or enhance functional attributes, such as adjusted melt points, change flavor profile or alter crystallization.

## Topic2:Time and temperature monitoring

The temperature varies175℃-180°C in five min

## Topic3 : Quality parameters of the doughnuts:

- ✓ Organoleptic tests
  1. **Colour:** Golden brown
  2. **Taste:** sweet with no bitter taste.
  3. **Flavour:** good smel
- ✓ Physical tests: Cake has a surface that is uniform, free from cracks.

Topic3: Method of frying

It is important to drop just a certain amount of raw doughnuts into the grease at a time. If too many are placed in the fryer at one time, the oil temperature is drastically lowered, fry time is longer, and the doughnuts absorb too much oil. The frying oil is the most expensive ingredient in the production process, and if the doughnuts absorb too much oil, it reduces the profit margin on the batch. As the doughnuts move through the fryer, they are flipped over by a mechanism. After two minutes, the doughnuts have moved completely through the fryer and are forced into the mechanism that applies glaze.

Topic 4:Cooling techniques

Doughnut need to cool properly before they are handled.

Cooling time is **1-2** hours depending on the size of doughnut.

## LO 5.4 – Pack and store the doughnuts

After frying doughnuts are cooled to an internal temperature of 32–35C. During cooling additional moisture losses occur and doughnuts firm to allow handling for coating and packaging. If doughnuts are not properly cooled then the product will be too tender and moist, allowing breakage, breakdown of coating and weeping in the packaging.

Doughnuts can be coated with a glaze or powdered sugar which, apart from making the doughnut more attractive, also improve the eating quality of the doughnut by providing sweetness.

A typical coating sugar may be made up of 76–87% dextrose, 5–8% shortening and 8–16% starch.

Glazed doughnuts must be allowed to dry and cool to room temperature before being packaged, ideally in packaging with ventilation. They should not be packed too tightly as this will cause the glaze to weep.

Topic 1 : Packaging materials and Techniques

Only food grade packaging material (printed/unprinted) should be used for wrapping and packaging of food items. The food grade certificate/ declaration should be checked during receiving of the materials.

- Packaging material should also be kept and stored under hygienic conditions in a room
  intended for the purpose.
- All the products should be labeled according to the Food Labeling Act.
- Immediately after packaging and proper labeling, the products should be placed in the rooms provided for storage under required temperature and humidity conditions.
- Temperature and relative humidity of the storage area should be maintained to optimum
  required level.
- FIFO system should be applied for dispatch of all products.

Topic2 : Storage conditions and monitoring

Packaged dry mix is made to specifications and checked at the processing plant. Perishables must be purchased fresh and quickly used. The yeast brew must be precisely mixed and used within 12 hours. It is essential for employees to carefully monitor all intervals of time for kneading, resting, proofing, and frying.

Temperatures for proofing, baking, and frying machinery, liquid ingredients, and the production room are carefully monitored and maintained. Particularly important is adding the right temperature of water to the yeast brew and pre-packaged mix so the yeast is not inhibited or killed. The proofer must be precisely set at the right temperature—not too hot but warm enough to activate the yeast—or the yeast will be killed and the doughnuts will not rise. The fryer temperature is carefully determined so that the doughnuts will not absorb too much oil and be greasy. Employees must watch the ambient room temperature very carefully. If it is too hot in the room, it affects the rising of the yeast and may require re-calibration of the temperature of other machinery.

Finally, employees' senses tell them much about the quality of the dough. They can tell by the feel of the dough after it is mixed if the dough is spongy and the yeast is rising properly. Watching the doughnuts plump up in the proofer indicates the temperature is just right. They watch for the appropriate color of the frying doughnuts to ensure they're not overcooked. Occasionally, the manager may pull a doughnut off the drying conveyor and pull it apart to see if it is too greasy.

After cooling, doughnuts are packed into paper package and stored at room temperature for 2-3 days.

Topic3: Safety measures during packaging and storage

- Packing room temperature is to be maintained at 22-24$^0$C
- Packers handling naked cakes to use sterilized gloves. Disinfectant solutions to be used by all packers as and when required
- The doughnut have a shelf life of 2-5 days depending on the type of product and the storage conditions.

## Learning Unit 6 – Process the dough into the chapatti process

Chapatti is made using soft dough comprising wheat flour, without /with fat or oil, salt and water.It is more finely ground than most western-style whole wheat flours.

Chapatti dough is typically prepared with flour, fat or oil, salt and water, kneaded with the knuckles of the hand made into a fist and left to proof for at least 10 or 15 minutes to an hour for the gluten in the dough to develop. After proofing, the dough becomes softer and more pliable.

Small portions of the dough are pinched off and formed into round balls that are pressed between the two palms to form discs which are then dipped into flour and rolled out on a circular rolling board, using a rolling pin known as a velan or belan, into a flat disc.

The rolled-out dough is then thrown on the preheated dry tava and fried on both sides. Chapatis made in domestic kitchens are usually not larger than 15 centimeters (6 in) to 18 centimeters (7 in) in diameter.

### LO 6.1 – Shape the dough for chapatti

The shape of the rolling pin also varies from region to region. Some households simply use a kitchen worktop as a sort of pastry board, but round flat-topped "boards" made of wood, stone, or stainless steel are available specifically for rolling out chapatti.

Chapatti doughs are shaped into equal spheres, of around 1.5 inch diameter.

The dough was divided into equal portions and rolled into a round sheet (12 cm in diameter and about 2 mm in thickness).

Topic1 : Selection of the dough for chapatti

Hard and soft wheat flours, which were used in the study, resulted in good and poor quality chapattis respectively. Gluten was isolated and interchanged among the two whole wheat flours and studied by scanning electron microscopy for its influence on structural characteristics of dough and its relation to chapatti-making quality.

Greater film forming ability of gluten in hard wheat flour dough manifested in long and bulky starch strands interwoven with protein matrix in its chapatti crumb. Higher moisture retention and starch gelatinization as a consequence of greater film forming ability of gluten in hard wheat flour resulted in pliable and soft textured chapatti.

The chapattis prepared from hard wheat flour due to their greater film forming ability of gluten gives more pliable and soft textured chapatti.

These qualities of chapatti rely on dough characteristics which are largely affected by quantitative and qualitative variation of gluten proteins and interactions between gliadin and glutenin fractions. The gluten plays a key role in influencing the quality of chapatti by experimenting fractionation and constituent exchange technique.

Topic2 : Shape specifications

Flat, circular shape,

Topic3 : Techniques of Shaping

The recipe and technique for making Chapattis will vary from house to house. Small portions of the dough (35g each ball to make 8 chapattis) are pinched off and formed into round balls. These are pressed between the two palms to form discs which are then dipped into flour and rolled out on a circular rolling board (you could use a large chopping board ) using a rolling pin known as velan into a perfect circle .

Topic4 : Greasing or flouring techniques

Greasing and flouring the pans keeps treat from sticking to the pan. Before starting Greasing or flouring, make sure the pan or pans used are clean and dry.

Use a good quality solid vegetable shortening when greasing pans. a folded paper towel can be used to grease the pan, but chapatti maker can also use a brand-spanking-new, never been used, 2-inch wide paintbrush. If maker choose this method of application, use the brush specifically and only for greasing pans. Maker can also use silicone pastry

brushes. Whichever type of applicator maker use, make sure the grease completely covers the inside of the pan.

- ✓ Add the Flour:

  Once the pan is completely greased, add about one teaspoonful of flour to the pan. The measurement doesn't have to be exact. Chapatti maker can just guess on the amount of flour, but don't overdo it.

- ✓ Flour the Bottom:

  With the pan bottom parallel to the kitchen counter, gently shake the pan back and forth. This will help to evenly disburse the flour in the bottom of the pan.

- ✓ Flour the Sides:

  To flour the sides of the pan:

- Tilt the pan up on its side
- While holding the pan in one hand, gently tap it with the flat part of other palm, as if tapping a tambourine.
- Once one side is floured, continue to turn and tap the pan until each side is covered with flour.

If maker is flouring another already greased pan, hold the first pan over the second pan. Then tap the excess flour into that pan by gently tapping the bottom of the first pan. Add additional flour to that pan, if necessary.

If maker is not flouring a second pan, tap out the excess either into the trash or the sink. If it's going into the sink, be sure to rinse it immediately. If left for a while, wet flour tends to harden, making cleanup more extensive.

## Topic5 : Shape adjustment

After kneading the dough for chapattis, what apparatus or mechanism can be used to ensure that the pieces used for making individual chapattis are of exactly same size/shape/weight?

- ✓ Mechanism process used are:
- make it into a ball
- try to cut it into two or four equal parts, depending on the size.
- roll each of those parts into a log / cylinder.
- cut each of those in half, thirds, or smaller portions if you're comfortable.

- narrower logs are easier to portion into more parts; it's best to cut in half, then half repeat steps 3 & 4 until you have the desired number of portions.

Topic6 : Thickness achievement

The size and thickness of chapattis vary from region to region .Chapattis are prepared by mixing whole wheat flour and water, followed by sheeting the dough to about 1.5 mm thickness and cutting it into 150 mm diameter discs.

## LO 6.2 – Frying the shaped dough

Place circular chapatti sheet(s) in a hot pan and fry each side until it's golden brown on the medium heat, and repeat for all the rolled out chapattis and place in a plastic wrap or container and cover to serve.

Topic1: Quality and quantity of oil

They float on **water** but are not soluble in it; they are greasy to the touch, and have lubricating properties; they are not readily volatile; and may be burned without leaving any residue, i.e., ash.

- Topic2: Time and temperature monitoring

✓ **Cooking Method :**pan-frying

✓ Heat the oil in a deep fryer, large saucepan or wok, to 180°C at this temperature chapatti will become crisp and golden and rise to the top if placed in it. Place a filled chapatti in the hot oil and spoon over a little oil over the top, cook each side for around 15 seconds.

- Topic3 : Quality parameters of the chapatti:

The main quality factors are colour, texture and aroma of the product. Each depends on the correct weighing and mixing of ingredients, rolling to uniform thickness and accurate control over frying time and temperature.

✓ Organoleptic tests and Physical tests:

- Texture: soft, firm
- Flavor: fried flavor
- Color: golden/brown
- Burn spots on the surface of **chapatti**.

- Circular form
- Desired thickness

✓ Why do chapattis become hard?

If the dough or the rolled chapattis lose too much moisture while and after cooking, chapatti maker might end up with rubbery, or worse, crusty chapattis that are straight out of a nightmare. Therefore, to make soft chapattis, maker must ensure that they trap enough moisture inside them even after the cooking process is complete. Here are the steps you can follow to make soft and puffed chapattis.

Adding a little oil to the wheat flour will result in soft and tasty chapattis as the oil lends conductivity to the flour. It will help the chapattis heat up faster when on the pan without losing a lot of moisture.

- Topic5 : Method of frying

Pan frying or pan-frying is the common Method used to chapatti making.

Pan frying or pan-frying is a form of frying food characterized by the use of minimal cooking oil or fat (compared to shallow frying or deep frying), typically using just enough to lubricate the pan.

This method improve flavor of chapatti and retain moisture of chapatti.

- Topic6 : Adjustment of the equipment parameters

Adjustment of equipment is key point before making/process chapatti to reach the standard of chapatti by focus on capacity, electrical power of equipment or tools and size and thickness of chapatti procced.

- Topic7 : pre- heat the fryer

Heat a pan before adding oil or butter, then add sheeted chapatti after the oil becomes hot. Because adding the oil to a hot pan keeps the chapatti from sticking to the pan.

Some cooks recommend **heating** the **pan before** putting **oil** in.

Others **put** the **oil** into a cold **pan** and **heat** both together. If

the **oil** isn't **hot** enough, the chapatti will soak it up instead of sizzling in it, and it won't taste as good.

- Topic8 : Monitoring frying parameters (time, temperature)

  Check the frying time and temperature of oil before adding chapattis and time can be checked during frying (150-180 degree Celsius for 15-20 seconds)

  The frying temperature and time are also controlled by flavor, color……

- Topic9 :Colors, volume of well fried chapatti

  The color of well fried chapatti is brown sometime golden according to ingredient used, volume of chapatti influenced by process (during resting the dough of chapatti) even the wheat flour properties.

## LO 6.3 – Wrap and store the chapatti

✓ **Polybag**

Put chapattis in a polybag and store in the freezer. When you have to use them, leave them out for about an hour to defrost, sprinkle a few drops of water on the surface and heat them in the microwave. Alternatively, toast them one by one on a pan after applying oil on both sides.

✓ **Aluminium Foil**

Wrap the chapatti in aluminium foil and store in an airtight container to keep them fresh for a whole week.

Chapattis can be stored in aluminum foil for few hours / one week in the refrigerator / 1-3 months in the freezer.

- Topic1 : Wrapping techniques

**Storing Aluminum-Wrapped Chapatis in the Refrigerator**

✓ Chapattis can also be stored in the refrigerator when wrapped in foil.

✓ Allow the chapattis to cool to room temperature before wrapping in the foil.

✓ Stack a pile of 15 chapattis.

✓ Take a 20 inch aluminum sheet and place on a plate / counter.

✓ Place the chapattis in the center of the foil sheet leaving equal volume of foil on the sides.

✓ Bring the right side of foil over the stacked chapattis.

- ✓ Then from the left side, take the foil and get to the center and fold.
- ✓ The top and bottom of the foil paper can now be folded at the center.
- ✓ Release any trapped air in the package.
- ✓ Then lock the wrapped chapattis in a plastic bag having a zip / seal.
- ✓ They can be stored in aluminum foil for a week in the refrigerator.

**Storing Aluminum-Wrapped Chapattis in the Freezer**

- ✓ To preserve the chapattis for longer duration in aluminum foil, they can be placed in the freezer section of the refrigerator.
- ✓ Wax paper can be placed in between chapattis and then covered in foil and then packed in plastic bags having a seal.
- ✓ A pile of 6 chapattis with wax paper between single chapatis can be input and wrapped in foil and put in zip seal bags.
- ✓ Squeeze out the air bubbles and then seal the bag.
- ✓ They will remain fresh in the freezer for a period of 1-3 months

**Reheating Foil-wrapped Chapattis in the Oven**

- ✓ To reheat the chapattis, the oven can be used.
- ✓ Chapattis can also be reheated or warmed while covered in foil in the oven.
- ✓ The aluminum wrapped chapattis can be placed in the oven for 6-7 minutes at 250 degrees Farenheit or 120 degrees Celsius to warm them.
- ✓ Alternatively, the oven can be pre-heated to 350 degrees Farenheit and the chapatis can be heated for 12-15 minutes in the oven.

Reheating Foil-wrapped Chapattis in the Microwave Oven

- ✓ The chapattis can also be made hot in the microwave.
- ✓ The foil covered chapattis can be put in the microwave on a microwavable plate for 20 seconds.

- Topic2 : Wrapping materials(Nature and quality)

Cardboard Boxes, Paper Cones, Paper Bags, aliminiumfoil,etc

- Topic3 : Cooling techniques

Cooling chapatti can be done at room temperature, in freezer, in refrigerator or wraped chapatti by aliminium can be cold by using ice.

- Topic4 : Techniques of labelling

Labelling can be done by hand, sealing machine.

- Topic5 : Storage conditions and monitoring

The principles of preservation for chapatti are:

✓ to destroy enzymes and contaminating micro-organisms by heat during frying

✓ To remove water from the crust to inhibit moulds. He expected shelf life is 3-5 days. The method of processing involves mixing ingredients to form a uniform dough, and 'dry' frying in oil to set the structure of the dough and develop the characteristic flavours, aromas and colour of the product(chapatti).

- Topic6 : Safety measures during packaging storage

The main problem during storage is mould growth and chapattis should be stored in a dry, well ventilated and cool place. When left in the open air chapattis dry out to form a hard, unacceptable product. Packaging is used to prevent contamination by dirt, insects etc. Chapattis should not be packaged hot into plastic bags as moisture vapour will condense on the inside of the bag, wet the product and cause mould growth. The weight of each chapatti is determined by the weight of dough pieces and this should be made uniform from batch to batch. A suitable packaging material is a polythene bag which is usually tied in a knot instead of heat sealing.

- **Equipment:**

✓ Electric mixer (optional)

✓ Rolling pins

✓ Scales (0-100g)

✓ Cooling racks

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