TVET CERTIFICATE IV IN FOOD PROCESSING

BREAD MAKING

FOPBM401

Make Bread

Competence

Credits: 6

Learning hours: 60

Sector: Agriculture and Food Processing

Sub-sector: Food Processing

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Purpose statement

The Rwandan cereal industry is developing at an accelerated rate. Therefore, it will soon need technicians in cereal flour processing. It is in this context that a competence on bread making has been developed. At the end of the competence, the learner will be able to prepare the work area and equipment for bread making and process dough into bread. The learner will have marketable hands-on skills in bread making. He may be employed in the bakeries or self-employed and create jobs. He will contribute to the development of new high-quality bread products on the market and to the value addition of cereals. This will also help in bread product diversification.

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Learning Unit 1: Prepare the work area for bread making

LO 1.1. Describe the work area

- **Topic 1:** bread making

Bread is the product of baking a mixture of flour, water, salt, yeast and other ingredients. The basic process involves mixing of ingredients until the flour is converted into a stiff paste or dough, followed by baking the dough into a loaf.

The aims of the bread making processes are to produce dough that will rise easily and have properties required to make good bread for the consumer.

To make good bread, dough made by any process must be extensible enough for it to relax and to expand while it is rising. A good dough is extensible if it will stretch out when pulled. It also must be elastic, that is, have the strength to hold the gases produced while rising, and stable enough to hold its shape and cell structure.

Two proteins present in flour (gliadin and glutenin) form gluten when mixed with water. It is gluten that gives dough these special properties. Gluten is essential for bread making and influences the mixing, kneading and baking properties of dough. When you first start to bake bread, learning to mix the ingredients is very important

- **Topic 2:** Processing flowchart for bread making

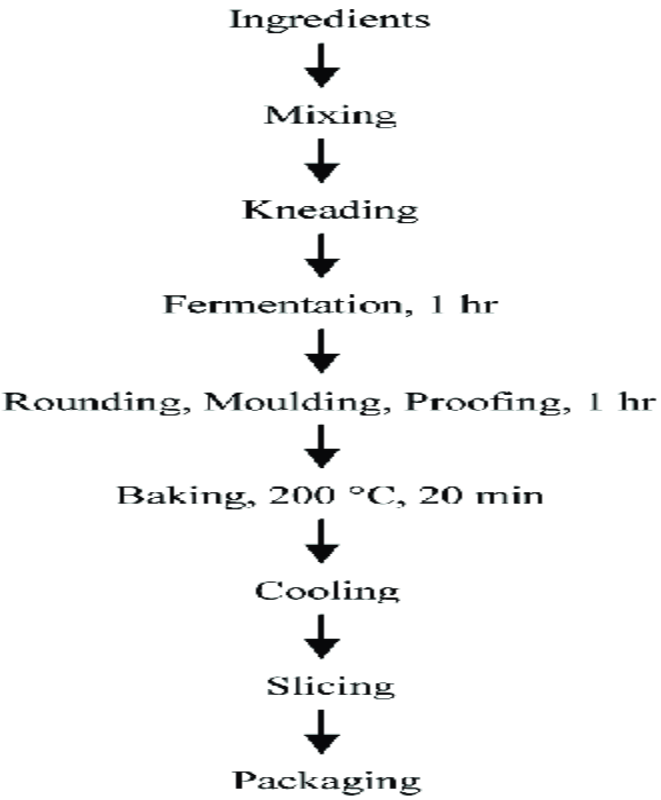
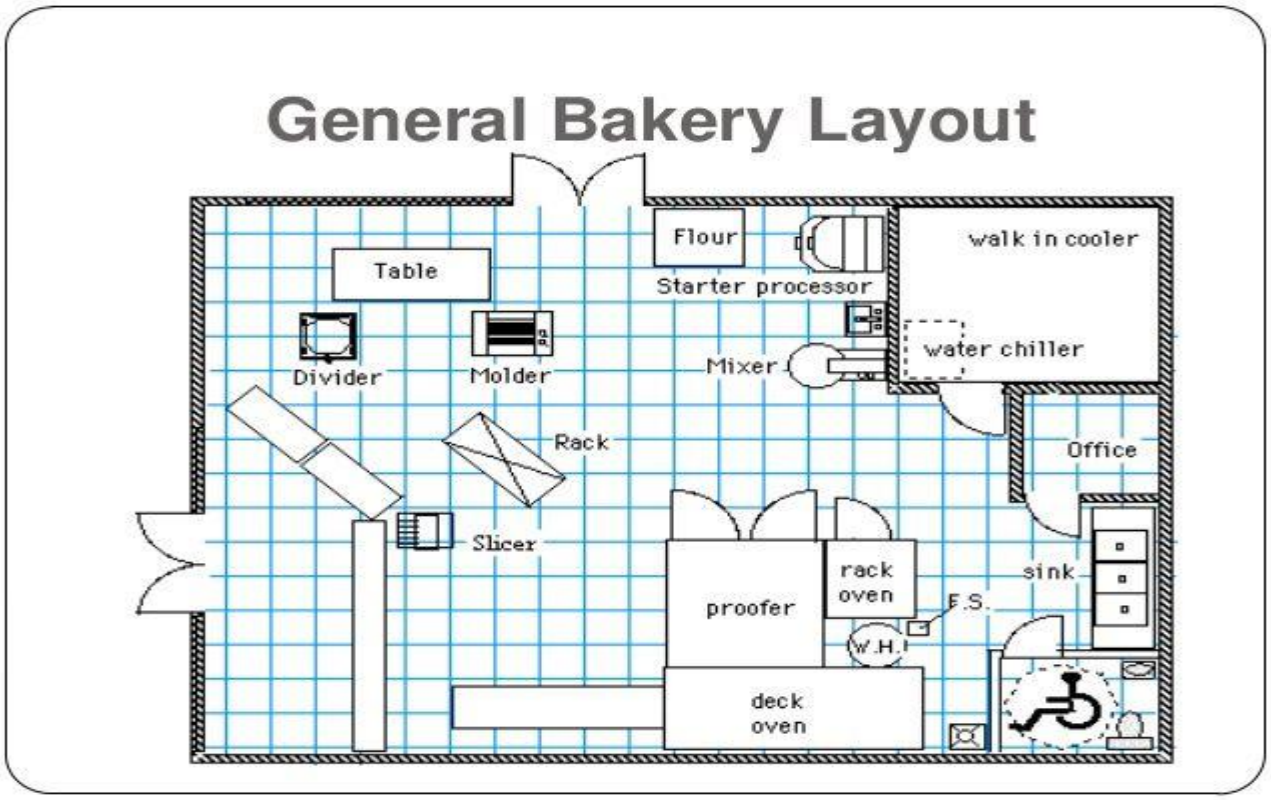


Fig. Bread Processing flowchart

- **Topic 3**: Localization of equipment

Fig. Equipment in a bakery



- **Topic 4:** Identification of critical points

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. To determine CCP's ask the following questions:

- At this step in preparation can food become contaminated and/or can contamination increase?
- Can this hazard be prevented through corrective action(s)?
- Can this hazard be prevented, eliminated or reduced by steps taken later in the preparation process?
- Can you monitor the CCP?
- How will you measure the CCP?
- Can you document the CCP

Critical control points in bread making include:

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

LO 1.2 – Select cleaning products

- **Topic 1:** Definition of terms

Cleaning is a critical step within the food production industry to maintain and further ensure food safety and quality standards. As mentioned above, it is generally considered as part of the Pre-Requisite Program (PRPs) or preventative controls. Cleaning can include the use of detergents and can be combined with disinfectants / sanitizers Various methods of cleaning, with or without disinfection / sanitation are typically practiced.

- ✓ **Cleaning** is removes soils from surfaces
- ✓ **Sanitizing** is process of killing 99.9% of basic germs and bacteria such as E. coli and salmonella in place such as food contact surface.(kill 99.9 of germs and bacteria)
- ✓ **Disinfecting:** is the process of killing harmful pathogenic organism or rendering then inert. Inert: it is means to slow or make stable, having no action or power to move, or being unreactive. (Kill 100% of germs, bacteria and viruses)

- **Topic 2:** Types of cleaning agents

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.

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 3**: 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;

LO 1.3 Clean the work area

- **Topic 1:** Cleaning methods and techniques

❖ **Cleaning methods:**

Cleaning can be either:

- ✓ **Dry:** Cleaning without using liquid water like using brushes, hot steam or using high pressure air.
- ✓ **Wet cleaning:** Cleaning using water as a solvent of cleaning agents.

❖ **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 small equipment, tools and utensils and area of food processing that wouldn't be touched by a CIP system.

- **Topic 2:** Standard Operating Procedure (SOPs) for cleaning

Cleaning is a complex process, a defined and systematic approach is required to ensure 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 Program 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.

- **Topic 3:** Cleaning procedure

Table 1: Cleaning procedure

Step	Description
Gross Clean/Preparation	This step is most often omitted by food companies. This prevents effective cleaning of plant surfaces due to food residues remaining. Negative impacts include: ✓ Protection of surfaces and bacteria from the action of detergents ✓ Reaction with and consumption of the detergent ✓ Holding bacteria and resulting in recontamination of the surface

	A poor gross clean is the single biggest reason for poor or inconsistent bacterial counts on surfaces and for high bacterial contamination in aerosols caused by rinsing. A well designed cleaning procedure will provide for the removal of all food pieces greater than a fingernail before applying detergent. Ideally this should be done dry by hand, scrapping or other physical method. The collected material should be placed in waste receptacles and removed from the area. All ingredients, food and packaging materials should also be removed from the area prior to gross cleaning.
Pre-rinsing	The purpose of this step is to remove deposits which cannot be easily removed by picking, scrapping or other manual form of gross cleaning. Excess water should be removed following pre-rinsing to avoid dilution of the detergent in the following step.
Detergent Application	The purpose of the detergent is to remove the layers of proteins, greases and other food deposits that remain on surfaces. Detergents are not designed to remove large pieces of food deposits or thick layers of fat. It is in these layers that bacteria can survive and grow and make the use of a disinfectant pointless. Foam should be conducted carefully and methodically and there should be a check to ensure that all surfaces have been covered. Detergents should be made up and used according to the suppliers instructions and appropriate time should be allowed for the detergent to work.
Post Rinsing	The purpose of post rinsing is to remove the remaining food deposits. Care should be taken to minimize the amount of splash and aerosol formed which may re-contaminate surfaces. After post rinsing the surface should be free of all visible deposits, layers of soiling and residues of detergent. Any

	residues of detergent may neutralize the action of any subsequent disinfectant. Any pools or accumulations of water should be removed following post rinse.
Disinfection	Disinfection should only be carried out on a visually clean, well rinsed surface, with minimal amounts of water. Direct food contact surfaces should be disinfected at least daily with other surfaces disinfected on a regular basis. Disinfect-ants should be used safely according to the supplier's instructions.
Terminal Rinsing	Most disinfectants are safe to leave on non-food contact surfaces without final rinsing. In some sections of the food industry there is a requirement to rinse food contact surfaces with water after disinfection. The standard of the water is important to ensure that the disinfected surface is not re-contaminated.

- **Topic 4:** Validation of cleaning procedure

Once a cleaning procedure has been established it is essential that it is validated. This means answering the question is the procedure as documented capable of controlling the identified hazards? This may include bacterial pathogens or allergens. The method of validating a cleaning procedure is as follows:

- Document the cleaning procedure as it actually exists. At this point you are not concerned with whether it meets specific requirements. This should be done on the job and in conjunction with those who perform the cleaning.
- Identify the general and specific hazards of concern, e.g. pathogens, allergens, etc.
- Identify the monitoring program, e.g. visual, ATP, chemical testing, etc. This will include the standard to be achieved and specific sampling points based on an assessment of risk.

- Conduct the cleaning program as documented a number of times and follow up with the monitoring checks.
- Confirm that the procedure as documented is capable of meeting the monitoring criteria.
- If the procedure is not capable, modify the cleaning method or correct the issue.
- Repeat the above process until the documented cleaning procedure is confirmed as capable of meeting the standard (verified) and approve the procedure.
- Conduct training of employees against the procedure and implement the monitoring pro-gram.
- Retain full records of the above data and process including conclusions.

- **Topic 5:** Checking the cleanliness of the work place

  - ✓ **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 2 – Prepare materials and Equipment

LO 2.1 – Select material and equipment for bread making

- Topic 1: Equipment used in bread making

Sieve

Drum sieve is mostly used to sieve the flour and the size of the mesh through which it will be sieved will depend upon the type of flour being used. The whole meal flour will be sieved through a coarse mesh as one does not want to sieve the bran and other nutritious things away from the flour.

Weighing Scale

Preferably a digital weighing scale is better, as the accuracy of the ingredients is very important.

Fig. Digital weighing scale

Baking Trays

Often known as sheet pans, these can be of iron, or Teflon coated for non-stick

Fig. Baking trays

Bread Molds

These are containers of various shapes and sizes. These are often sold by the volume they are intended for.

Fig. Bread moulds

Proving Cabinets (proofer)

Electric, gas, and pressure steam models of proving cabinets are available. In a proving cabinet, water is heated with a heating element. It maintains the temperature of 25°C and humidity of 90 per cent.

Fig. Proving cabinet

Dough Mixers

Various kinds of dough mixers are used to knead the dough. Spiral dough mixers are used in which the dough hook and the bowl both move in opposite directions, so that the dough is automatically scraped while making the dough. They are also tuned to two speeds: slow and high. as most of the bread recipes call for mixing dough's at particular speeds for the optimum development of gluten.

Fig. Dough mixer

Dough Divider

Equipment used for dividing the dough into equal sizes and portions. It is also used for shaping them into round balls.

Fig. Dough divider

Ovens

Baking oven, with steam attachment for better baking.

Fig. Baking oven

Dough Scorers

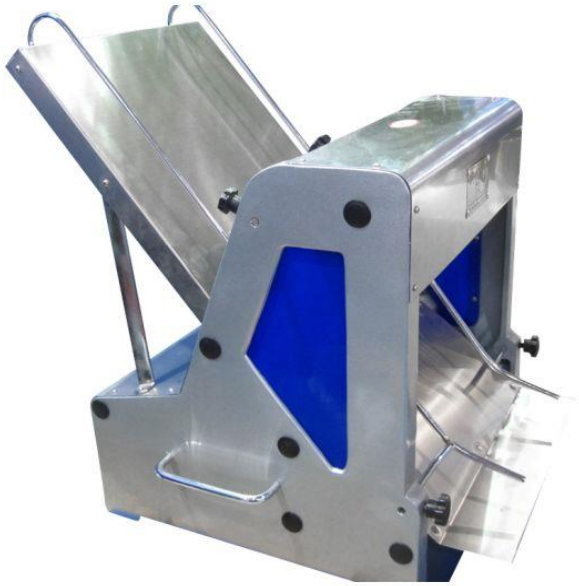
A piece of equipment having a sharp surgical blade in the end, to score the breads at an angle before baking.


DORCO
STAINLESS
BLADE
HQ
DORCO

Dough Scrapers

Available in plastic or steel, they are used to scrape the dough's and also to cut the dough for scaling.

Bread slicer



LO 2.2 – Cleaning the equipment

- **Topic 1:** Hygienic design requirements

Hygienic design requires bakery equipment to:

1. Be easily cleaned (i.e., allow for straightforward dry/wet cleaning)
2. Provide easy access for inspection and maintenance
3. Allow simple disassembly and reassembly of parts
4. Be designed, constructed, and installed so as to preserve food safety

- **Topic 2:** Cleaning techniques

In the practice, its is easier if the machinery/equipment is classified as open or closed equipment. This way, the design, construction, installation, cleaning, maintenance, and food safety conditions can be better planned and managed:

Open equipment

Open equipment is that which cannot be cleaned in place (CIP), and in which the products being processed or handled are not fully enclosed (i.e., isolated from the plant environment) by a continuous wall (e.g., piping, vacuum cavities, tubing, barrels).

Open equipment often requires:

1. Cleaning out of place (COP)
2. Manual cleaning
3. Immersion cleaning

Open equipment must be manually dismantled for cleaning. Such tasks can be performed with open plant cleaning (OPC) techniques, like foam cleaning and rinsing with medium-pressure systems (e.g., up to 40 bar). Dismantled machine parts can be cleaned in COP baths. The time required will depend mostly on validation of microbiological monitoring results. The time will vary depending on the available cleaning equipment and utensils.

Closed Equipment

Equipment designed and constructed with its components fitted together tightly with no openings whatsoever to permit the entry of external agents (i.e., soil, human contact), and there is no possibility for accessing/touching the products held or contained by direct contact without prior dismantling.

In contrast to open equipment, closed equipment usually processes, handles, and conveys liquid and semi-solid products (e.g., process water, cleaning solutions, low-viscosity syrups, dough in bulk).

Closed equipment must be cleaned in place (CIP) due to its access restrictions and typically confined spaces.

CIP includes the following general procedures or considerations:[5]

1. Pre-washing (rinsing with water)
2. Alkaline clean
3. Rinse
4. Acid clean
5. Rinse
6. Disinfection
7. Final rinse

Learning Unit 3 – Process the dough into Bread

LO 3.1 – Mould the dough

- **Topic 1:** Selection of the dough for bread making

Basically, there are two methods for making bread dough:

A. Straight Dough Method

This method consists of simply combining the ingredients and mixing them. The yeast may or may not first be activated by mixing with sugar and warm water. The temperature of the water should not exceed 136 °F (58 °C) or the yeast may be killed. Once the ingredients are mixed, the dough is kneaded until smooth and elastic. Kneading time depends on the type of dough being made.

B. Sponge Method

This method has two stages. **First** the yeast, liquid and about half the flour are mixed to a batter called a sponge. This is left to rise until it becomes foamy and has increased in volume to double or more. In the **second stage**, the rest of the flour plus any fat, salt and sugar are added and the dough is kneaded and allowed to rise. This gives the bread a lighter texture

and a slightly different flavour. This should not be confused with sourdough bread in which a "starter" is used to make the bread and reserved for later use. The sponge method is particularly useful in improving the texture of heavy dough like rye.

- **Topic 2:** Dough handling properties

One of the goals of the mixing process in bread making is to achieve an optimum and proper balance of dough handling properties. There are 4 major dough handling properties:

- **Extensibility:** Ability of the dough to be stretched, extended or elongated when forces, stress and pressures are applied to it. A certain amount of extensibility is necessary for a dough to be moulded into different shapes. An extensible dough has the ability to stretch (expand) as the gas pressure from yeast fermentation builds up.
- **Elasticity:** Ability of the dough to regain its original shape after a deforming force has been applied and removed. Simply put, it is the ability of a dough to spring back when it is stretched.
- **Resistance to deformation (tenacity):** Ability of the dough to resist deformation when being stretched. A dough with too much tenacity is difficult to work with during makeup. Laminated doughs that are too tenacious are often difficult to roll out.
- **Stickiness:** Ability of the dough to stick to the surfaces which they come into contact with. Dough needs to have minimum stickiness to be properly shaped and conveyed during makeup stages. In most cases, dough stickiness is the least desired property given the operational and cleaning issues that a bakery has to deal with. The simplest way of modifying the stickiness of dough is by increasing or decreasing water absorption.

- **Topic 3:** Procedure of dough making (Mixing ingredients)

When making bread it greatly helps to mix the dry ingredients first (without any filling though such as raisins, etc.) before adding the wet ingredients (such as water, butter, milk). Mixing doesn't cost any effort/energy as long as there are no wet ingredients. So not adding the wet while still mixing the dry saves effort.

Even mixing should be done with care. Yeast can be killed if the moisture added is too hot. Take warm water, but only as warm as you can touch and drink. Boiling water or any water well above 40°C will kill the yeast.

- **Topic 4:** Kneading

After mixing the ingredients, the dough is kneaded. By kneading the dough the network of gluten is formed and air bubbles are created, where the carbon dioxide (CO_2), formed by fermentation, can accumulate. Because the ingredients absorb a lot of moisture the dough becomes elastic. After kneading for a longer period of time a gluten network is formed and the dough will become less elastic and tough. The dough will be extendible and will get a silky appearance. When the dough is kneaded for too long, it will become sticky and fall apart. The structure of the dough has to be strong enough so a wafer-thin film can be formed. During the kneading process the temperature of the dough rises to 27°C.

- **Topic 5:** Rising (First or bulk fermentation)

Also called Proofing is the process of leaving the dough in the machine for 30 to 50 minutes at a steady temperature of 27°C. Because of this the yeast cells are given time to multiply, produce CO_2 and alcohol. This results in an increased size of the dough and the gluten network becoming more elastic again. The proofing process ends when the size of the dough is approximately doubled.

- **Topic 6:** Shaping

The actual shaping is your last chance at touching the dough. In firm and decisive moves, mold the bread into the shape you are after. The goal is to build a shape that can keep its form as it rises and has good surface tension, this will help it expand and open beautifully when baked in the oven.

The best way to learn shaping is by practice, and then some more practice.

LO 3.2 – Proof the dough for bread

- **Topic 1:** Meaning

In bread making, **proofing** (also called **proving**) is a step in the preparation of yeast bread and other baked goods where the dough is allowed to rest and rise a final time before baking. During this rest period, yeast ferments the dough and produces gases, thereby leavening the dough.

If yeasted dough isn't allowed to proof, the yeast can't release carbon dioxide, and the gluten won't stretch to hold the air bubbles. Proofing is an essential part of bread baking and other applications that rely on yeast to create air pockets, such as making croissants. What's most important in the proofing step is to make sure the dough is neither over

proofed (where it's proofed up so much that it eventually collapses, causing the layers to separate and the butter in croissants to leak) or under proofed (which will result in a tight crumb and you won't get those fluffy, flaky layers).

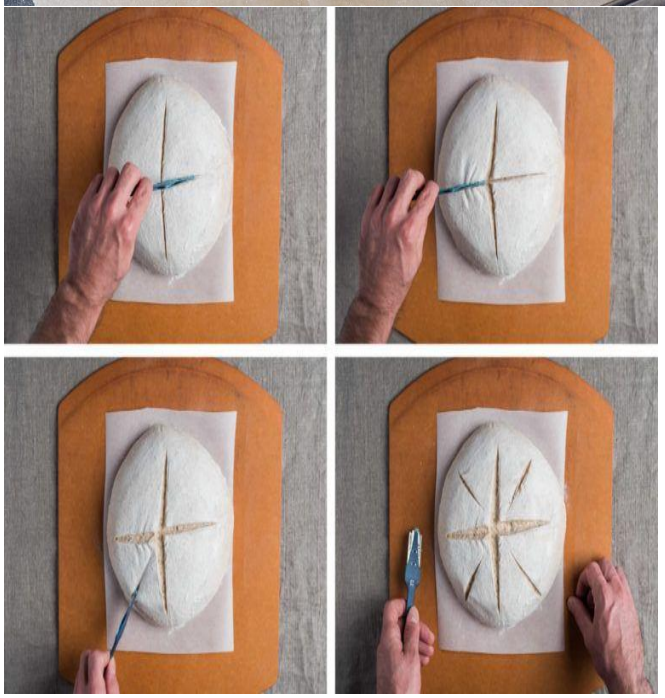
- **Topic 2:** Procedure

- ✓ Keep hands and other surfaces lightly floured and/or oiled to prevent sticking.
- ✓ Use proofing containers that allow dough room to rise; they should be at least two or three times the size of the dough.
- ✓ The ideal environment for a cold proof is around 50°F, while a room-temperature proof is considered around 75°F. If dough gets too warm during the bulk fermentation, the yeast will expand more quickly than the gluten structure. The gluten structure won't be able to keep up with fermentation and air bubbles will collapse on themselves. Do not proof dough above 115°F. On the other hand, if yeast gets too cold (40°F), it will go dormant. Be gentle with dough when folding and shaping, so that you don't deflate any gas bubbles.
- ✓ Consider retarding dough by proofing it at a colder temperature (around 50°F), which will slow down the rise and help develop flavors.
- ✓ Cover dough with a plastic bag or cloth during proofing to prevent the dough from drying out or forming a skin

- **Topic 3:** Scoring

This is also a step which is easily overlooked! Scoring is nothing more than making a nice pattern on top of your bread. You have to do this right before baking. Besides the fact that it gives your bread a personal touch or makes it easier to differentiate different bread types, it also has an actual function during baking. Because of the shaping of the bread, you've given the bread strength. But, when the

bread is put into the oven, you want it to be able to rise and expand. By scoring the bread, it has more space to open up.



LO 3.3 – Bake the bread

- **Topic 1:** Meaning

Baking is the final step in making yeast-leavened (bread, buns, rolls, crackers) and chemically-leavened products (cakes, cookies). It's a thermal process that uses an oven, which transfers heat to the dough pieces via:

- Conduction through heated surfaces
- Convection through hot air
- Radiation from heat sources such as flames

The heat in turn activates a series of physicochemical changes, responsible for transforming the raw dough into a baked good with a firm, dry crust and a soft crumb.

- **Topic 2:** What happen during dough baking?

In general, there are three major stages in the baking process: expansion of the dough, drying of the surface, and crust browning. These can be subdivided into the following stages (in the order of temperature increase

1. **Formation and expansion of gases (oven spring)**. A rapid rise in volume takes place at the beginning of baking at a core temperature of 35–70°C (95–158°F). This rise creates the oven spring. Five events occur simultaneously to produce the oven spring in the first 5–8 minutes of baking:
    - Yeast reaches its maximum fermentation rate and generates carbon dioxide, CO_2 gas (CO_2 is also produced by chemical leavening).
    - Release of carbon dioxide gas from the saturated liquid dough phase into the surrounding gas cells.
    - Expansion of the gasses trapped in cells (nitrogen from air and CO_2) and generated during mixing, makeup, and proofing.
    - Evaporation of water/ethanol mixture.
2. **Killing of yeast and other microorganisms**. This usually occurs at an internal temperature of 60–70°C (140–160°F) where the cells can no longer contribute to the gas production or volume increase.
3. **Gelatinization of starch**. At 76°C (170°F), starch begins to gelatinize as granules become fully swollen with local free water. Thanks to starch gelatinization and protein denaturation, the dough is converted into bread and a structure is set.
4. **Coagulation/denaturation of gluten (egg or other) proteins** that make up the continuous phase. From 60 to 70°C (140 to 160°F), the proteins begin to denature. As

a consequence, gluten becomes increasingly tough and stiff as it irreversibly forms a gel. Moisture loss also imparts rigidity to the product being baked.

5. **Inactivation of enzymes** in the dough (naturally-occurring or added) at 80–95°C (176–203°F).
6. **Crust formation and browning** (non-enzymatic browning reactions and caramelization). **Maillard browning** takes place above 105°C (220°F) and requires the presence of a reducing sugar together with an amino acid. Sugars caramelize at 160°C (320°F).

- **Topic 3:** Baking procedures

Preheating the Oven

It is important to set and preheat the oven to the proper temperature as called for in the bread recipe. Most breads require a specific baking temperature that must remain constant to achieve the proper results. Many basic breads, containing only flour, water, and yeast, are baked at high temperatures, usually 400ºF and above, while breads containing enrichments, such as eggs, milk, or butter, are baked at lower temperatures. Some bread recipes call for the dough to be placed in a very hot oven for a short time and then the temperature is lowered for the remainder of the baking time. This technique simulates the cooking temperatures of old-fashioned wood-fired masonry ovens in which the bread dough received an initial blast of very hot air followed by a gradual cooling after removal of the embers.

Baking Process

The heat of the oven transforms the moisture in the bread dough into steam causing the bread to rise rapidly. The yeast in the dough continues to produce carbon dioxide gas, contributing to the rising action of the baking bread. Usually within the first 10 minutes of baking, the temperature of the dough has increased to a level that kills the active yeast cells, ending the rising action. The final shape and size of the bread is set and the crust begins to form. The oven door should not be opened before this stage is

completed. Further baking allows the natural sugars in the dough to caramelize, which results in the golden-brown color that is characteristic of many varieties of bread.

- **Topic 4:** Adding moisture while baking

The level of moisture in the oven is an important factor in achieving proper results when baking bread. Moisture, in the form of steam, allows the bread to form a thin, golden crust while allowing the interior to remain soft and moist. It is often beneficial to add moisture to the oven either before the bread is placed in the oven or during the baking process. There are a number of methods for adding moisture to the oven.

- **Method One:** In ovens equipped with two racks, one of the racks can be placed in the lowest position in the oven and then covered with unglazed tiles, such as terra cotta. The tiles should be positioned so that there is a gap between the tiles and the sides of the oven to maintain proper air circulation in the oven. The tiles hold the heat and moisture in the oven, creating bread with a crispy crust that simulates hearth-baked breads.

- **Method Two:** A spray bottle can be used to apply a mist of water directly to the oven. After the bread is placed in the preheated oven, spray the sides of the oven with water and immediately close the door. The water will quickly form steam, raising the moisture level of the oven. Caution must be exercised to ensure that excess water does not come into contact with the electrical components of the oven (heating coils, fan, etc.). This is especially important with the oven light, which may explode if the cold water strikes it. Water can be sprayed into the oven several times during baking, but it must be done quickly and the oven door must be closed immediately to maintain the heat.

- **Method Three:** A third method for adding moisture is to place a dish of ice cubes into the oven. It is best if the dish is made of glass or ceramic and it should be place on the bottom rack or on the oven floor while the oven preheats. Carefully remove the dish from the oven after all of the ice is melted (usually within 10 to 15 minutes).

- **Method Four:** Place a metal pan on the lower rack or floor of the oven while the oven preheats. Two or three minutes before the bread is placed in the oven, pour a cup of

water into the hot pan, which will immediately generate steam. Care must be taken when pouring the water so that the steam does not scald your skin.

- **Topic 5:** Temperature control

Oven temperature is one of the key **baking parameters**. It can be measured, modified, and controlled in order to influence process conditions directly, thereby affecting a product's final characteristics

LO 3.3 – Package and store the bread

- **Topic 1:** Packaging materials

First of all, let's first understand the role of bread packaging, in order to ensure that the bread quality meets the hygiene requirements, the bread after cooling or slicing should be packaged immediately.

1. Keep the bread clean and avoid contamination during storage and transportation.
2. Prevent the bread from hardening and extend the shelf life. From the factory to the consumer, the bread needs to be stored and transported for a period of time. As the starch

ages and the water evaporates, the bread will harden. After the bread is packaged, it can avoid a lot of moisture loss and keep the bread fresh.

3. Increase the aesthetics of the product. Beautiful packaging can attract consumers' attention, highlight product features, and expand consumption.

There are many types of bread packaging, which are divided into folding packaging, shrink packaging, and bag packaging.

- **Topic 2:** Storage conditions

By keeping the bread in a cool and dark place, it will last longer and stay fresh.

Heat, humidity and light are all bad for bread but great for fungi or mold, so consider your fridge your best bet to keep bread fresh and yummy.

Tightly sealing the bread also helps slow the molding process. Gently push along the outside of the plastic bag to rid the bag of air and tie it back up with that little wire thing punctured finger on when first opened it. Place homemade or bakery-purchased loaves in sealable bags.

Bread will stay fresh longer, no matter what type it is.

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