**WEEK 8 YEAR 12 HOME ECONOMICS**

**STRAND: HEC 12.2**

**SUBSTRAND: HEC 12.2.5 FOOD PRESERVATION**

**CLO: HEC 12.2.5.1 Examine and communicate the methods, skills and knowledge on the principles of commercial food preservation.**

**LESSON: 91**

Bottling

* Bottling is done using the similar method as canning. Two methods are used in bottling.
* These are water bath bottling or canning and pressure bottling or canning.

A. Water-bath canning:

* This method sometimes referred to as hot water canning, uses a large kettle of boiling water. Filled jars are submerged in the water and heated to an internal temperature of 212 degrees for a specific period of time.
* This method is for processing high-acid foods, such as fruit, items made from fruit, pickles, pickled food, and tomatoes.

B. Pressure canning:

* Pressure canning uses a large kettle that produces steam in a locked compartment.
* The filled jars in the kettle reach an internal temperature of 240 degrees under a specific pressure (stated in pounds) that’s measured with a dial gauge or weighted gauge on the pressure-canner cover.
* A pressure canner is for processing vegetables and other low-acid foods, such as meat, poultry, and fish.

Freezing

* Freezing foods is the preparing, packaging, and freezing foods at their peak of freshness.
* You can freeze most fresh vegetables and fruits, meats and fish, breads and cakes, and clear soups and casseroles.
* The keys to freezing food are to make sure it’s absolutely fresh [quality maintained], that you freeze it as quickly as possible, and that you keep it at a proper frozen temperature (0 degrees).
* Damage occurs when your food comes in contact with the dry air of a freezer. Although freezer- damaged food won’t hurt you, it does make the food taste bad.
* Freezer burn is a condition that occurs when frozen food has been damaged by dehydration and oxidation due to air reaching the food. It is generally caused by food not being properly wrapped.

**FOOD PRESERVATION**

**LESSON: 92**

How to reduce freezer burns:

* Reduce exposure to air: Wrap food tightly.
* Avoid fluctuating temperatures: Keep the freezer closed as much as possible. Know what you want to remove before opening the door.
* Don’t overfill your freezer: An overly full freezer reduces air circulation and speeds freezer damage.

1. Dehydration

* Drying is the oldest method known for preserving food.
* When you dry food, you expose the food to a temperature that’s high enough to remove the moisture but low enough that it doesn’t cook.
* Good air circulation assists in evenly drying the food. An electric dehydrator is the best and most efficient unit for drying, or dehydrating, food.
* You can also dry food in your oven or by using the heat of the sun, but the process will take longer and produce inferior results to food dried in a dehydrator.

1. Cold Storage – food storage at low temperature

* Storage at low temperatures prolongs the shelf life of many foods. In general, low temperatures reduce the growth rates of microorganisms and slow many of the physical and chemical reactions that occur in foods.
* For example: Fish once fish is frozen, it must be stored at a constant temperature of −23 °C (−10 °F) or below in order to maintain a long shelf life and ensure quality. Because the water in fish contains many dissolved substances, it does not uniformly freeze at the freezing point of pure water.

1. Irradiation

* Ionizing radiation can kill micro – organisms, so it can be used to preserve food.
* When food is irradiated, energy passes through and kills harmful bacteria. The energy is similar to ultraviolet light. It does not make the food radioactive. Two levels of radiation are use:

1. Low dose – will stop vegetables like potatoes from sprouting; prevents insect damage to cereals, pulses, spices, etc.; destroy parasites(like tapeworms in pigs); delays the ripening of fruits (e.g. bananas and mangoes); and allows longer storage of foods such as shellfish and strawberries.
2. Medium dose – will kill most spoilage and harmful bacteria, molds and yeast and will enhance the storage of some foods.

* There is a concern that some nutrients may be lost during irradiation; although the food may look fresh, chemical and enzyme changes may continue, so the consumer may be buying an inferior product.

4. Use of Antibiotics

* Antibiotics are used to treat infections caused by bacteria. Bacteria are microscopic organisms, some of which may cause illness.
* The word bacteria are the plural of bacterium. Such illnesses as syphilis, tuberculosis, salmonella, and some forms of meningitis are caused by bacteria.

**LESSON 93**

Types of Preservatives

A. Domestic Preservatives

1. Sugar

* Sugar is an organic form of carbohydrate and just like salt; it controls the microorganism growth by the osmosis process.
* When sugar is used as a preservative, food is stored in the form of syrup or cooked till the sugar gets crystallized.
* Sugar draws out water from the microorganisms and bacteria due to which their growth is inhibited or they get killed and for the formation of gel.
* It must be accurately measured, as too much will cause crystallization of the sugar and too little will prevent proper setting and will encourage fermentation.
* Example of product where sugar is used – Jam.

1. Salt

* Use of salt helps in dehydration of microbes by the osmosis process due to which the food spoiling bacterial growth is inhibited.
* Salt is also used to protect the food items from molds and yeast.

1. Vinegar:

* Vinegar is acidic in nature and is produced by fermenting water and sugar solution that goes beyond the stage of alcohol.
* This preservative has an acetic acid concentration of 4 to 5 percent due to which the food spoiling microbes are inhibited. Depending upon the sugar base, different concentrations of vinegar can be prepared and used as food preservatives.

1. Oil

* Oil has an ability to stop the moisture from entering the food and thus it acts as a barrier for moisture.
* It is a natural antioxidant that stops the process of oxidation.
* Oil forms a layer on the surface of the food and as the nature of the oil is oleophilic you do not need to worry about the oxidation of food.
* In pickling oil plays a vital role as pickles have to have a shelf life of several years.

**FOOD PRESERVATION**

**LESSON: 94**

B. Commercial Preservatives (Synthetic)

* Sulphur Dioxide (Sulphites)- Sulfites are antioxidants which can destroy vitamin B1 in the body, and cause problems in patients who have asthma.
* Sodium benzoate and benzoic acid are two very common antimicrobial compounds used in the preservation of food; sodium benzoate actually produces benzoic acid when dissolved in water.
* Benzoic acid has the antimicrobial properties and is found naturally in some fruits. Sodium benzoate is the sodium salt of benzoic acid is preferred over the acid because it is 180 times more soluble in water.
* For sodium benzoate, the lower the pH, the more effective it is; it will only work if a food has a pH below 4.5. The maximum level allowed by law is 0.1% because it can cause a food product’s flavors to change if too much is used.

Advantages of preservatives

* Adds colour
* Kills micro- organisms
* Maintains foods longer shelf life

Disadvantages of preservatives

* Allergic reactions – to any compounds if your body considers it pathogenic or disease causing. Allergic reactions to food additives are usually mild -- skin irritation, intestinal upset, some breathing problems. In chemically sensitive people prone to eczema, a type of skin rash. Chemicals associated with triggering allergies or asthma includes monosodium glutamate, or MSG, sulfites, food colorings and artificial sweeteners.
* Potential links to Cancer - There are a number of food additives -- particularly aspartame, saccharin, nitrites and benzoates -- that have been linked to cancer, at least in animal studies, because they produce carcinogenic compounds when they are metabolized.

**STRAND: HEC 12.2**

**SUB STRAND HEC 12.2.6FOOD PLANNING AND PRODUCT DEVELOPMENT**

**CLO:** **HEC 12 2.6.1 Recognize an ideal BMI and demonstrate skills of selecting, planning, preparing and serving meals**

**LESSON: 95**

Measuring Body Fat

* Body mass index (BMI) is measure of body fat based on height and weight.
* The higher the BMI, the greater the risk of some diseases, including high blood pressure, coronary artery disease, stroke, osteoarthritis, some cancers, and type 2 diabetes.

BMI Numbers - what do they mean? For adults older than 20 years:

* A BMI below 18.5 is considered underweight.
* A BMI between 18.5 and 24.9 is considered a healthy weight.
* A BMI between 25 and 29.9 is considered overweight.
* A BMI of 30 and above is considered obese.

BMI Limitations

* BMI is accepted as a reliable indicator of total body fat. The limits are:

1. It may overestimate body fat in athletes and others who have a muscular build.
2. It may underestimate body fat in older persons and others who have lost muscle mass.

Factors that affect BMI

* Age: energy needs are increased during growth spurt. BMI reduces, as one gets older. After 20 years, it drops by 2 per cent per decade.
* Gender: Men have a greater muscle mass and a lower body fat percentage. Men therefore have a higher BMR.
* Genes: Some individuals are born with a fast metabolism others with a slower metabolism. Exercise: Exercise helps raise your BMR by building extra lean tissue. Lean tissue is more metabolically demanding than fat tissue.
* Weight: The heavier you are, the higher your BMI
* Body Surface– A tall thin person will have a higher BMI than a shorter, fatter person. BMI also increases in pregnant women.
* Body Fat Percentage: The more lean tissue on the body, the higher the BMI, the more fatty body tissue, the lower the BMI. Men generally have a 10-15% faster BMI than women.
* Diet: Starvation or serious abrupt calorie-reduction can dramatically reduce BMR by up to 30 percent. Restrictive low-calorie weight loss diets can cause your BMR to drop as much as 20%.

Temporary factors affecting BMI include:

* Fever: Fevers raises the BMR.
* Stress: Stress hormones also raise the BMR.
* Temperature: Both the heat and cold raise the BMR.

BMI = (WEIGHT IN KILOGRAMS)

HEIGHT IN METRE²

**REVISION QUESTIONS**

1. List and explain four types of commercial preservation

2. Explain the principles used in irradiation.

3. Discuss the role of the following in domestic preservation:

i. Salt ii. Sugar

iii. Vinegar iv. Oil

4. List down the advantages of commercial preservation.

5. Explain the role of ascorbic acid and nisin in commercial preservation.

6. List and describe the two methods of canning.

7. Explain the side effects of preservatives on our health.

8. Freezer burns are a common cause of food spoilage.

(i) Explain how freezer burns occur on food.

(ii) State **one** way of reducing freezer burns from occurring.

9. Given below is an illustration of a preserved product.



i. Identify the principle of preservation involved in the preservation method above.

ii. Explain how commercial preservatives contribute to cancer.