# FOOD PRODUCT DEVELOPMENT

## TRAINING MANUAL


**Development of Marketable Delicious Local Meals to Improve Public Health Through Competition**

**A collaboration between the IDRCs FaN Project**

**and**

**The Jamaican Home Economics Association**

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# Introduction

## Marketing Meals Competition Training Manual

This training manual is designed to provide you with information that will facilitate you developing and producing menu items that are healthy and acceptable by the general public. You will be making products that the food companies will be seeking you out to provide for them that they can get them on the market.

You will find information on the nutrients found in food and how the nutrients are combined to provide good nutrition. Because you will be cooking food, you will be reminded how to utilize the various methods of cooking to retain maximum nutrients in the end products.

The manual would not be complete without helping you to understand the process involved in developing the dishes that you will be creating for the final output.

The chapters in the manual will address the following topics in the chapters indicated.

Chapter 1: Food nutrients

Chapter 2: Combining foods for good nutrition

Chapter 3: Methods of cooking food

Chapter 4: Safe food handling practices

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# Chapter 1

## Food Nutrients

Foods are solid or liquid substances that that come from either plants or animals and that we eat or drink. They will not harm the body when eaten. Foods are made up of various materials. The three that we will mention are **colours**, **flavours**, and **nutrients**.

### Colours in Food

The colours we generally find in food are green, yellow/orange, white, red, and blue/purple. Foods with a **green** colour include green peppers, cucumber, callaloo, pak-choi, kale, and

_____, _____,

_____, _____.

**Yellow** foods include carrot, pumpkin, oranges, pineapple, sweet corn, and

_____, _____,

_____, _____.

**White** foods include onions, potatoes, cauliflower, turnips, bananas, and

_____, _____, _____,

and _____.

**Red** foods include tomatoes, watermelon, beets, and

_____, _____,

_____, and _____.

Some foods that have **blue or purple** colour are egg plant, purple grapes,

_____, _____, and

_____.

**Flavours in Food**

Foods have five basic tastes that are recognized universally. These are sweet, sour, bitter, salty, and umami (savoury). In this manual, we will use taste and flavour alternately.

Foods that are **sweet** include sugar, honey, _____,

_____, and _____.

Foods that are **sour** include lime, lemon, _____,

_____, and _____.

Foods that are **bitter** include cocoa, tea, _____,

_____, and _____.

Foods that are **salty** include salt, salt cured-foods, _____

and _____.

Foods with the **umami** or savoury flavour include tomato, onion, MSG,

_____, _____, and

_____.

**Nutrients in Food**

There are six major nutrients in food. They are compounds in foods that are essential to life and health, provide us with energy, and serve as the building blocks for growth and tissue repair, and regulate chemical processes in the body. The nutrients are carbohydrate, fat, protein, water, vitamins, and minerals. The first four are called macro-nutrients because we need them in large quantities in the body, and the last two are called micro-nutrients because we need small quantities of them in the body.

The nutrients in foods perform different functions in the body.

***Macro-nutrients***

*Carbohydrates* include sugars, starches, and fibre.

The major function of carbohydrates is to provide energy. The body converts carbohydrates mostly into glucose for immediate energy and into glycogen or fat as stored energy. The body uses glucose to provide most of the energy for the human brain (Herman, 2021). We get carbohydrates mainly from plant sources.

*Fats and oils (lipids)*

Fat is a type of nutrient. Everyone needs some fat in the diet. Fats give energy and help the body absorb fat-soluble vitamins. Fats also protect internal organs and helps the body maintain normal temperature. We can get fats from animal sources such as butter, meat, fish and from plant sources such a s avocado, nuts and nut butters, and oils.

*Proteins*

Every cell in the human body contains protein. Proteins are the building blocks of life. The basic structure of protein is a chain of amino acids. This nutrient is necessary for repairing body cells and making new ones. Proteins are also important for growth and development in children, teen-agers, and pregnant women. Proteins are found in animal sources such as meats, milk, fish, and eggs. They are also found in plant sources such as soy, beans, legumes, nut butters, and some grains such as wheat germ and quinoa.

*Water*

Water makes up about 60% of the human body. The body needs water for a number of reasons. Among them are to: carry nutrients to the cells in the body, regulate body temperature keeping the body from overheating, protect body organs and tissues from becoming worn out, help fight illnesses such as urinary tract infection.

***Micro-nutrients***

*Vitamins*

There are two main classes of vitamins; water-soluble and fat-soluble. Water-soluble vitamins, vitamin B complex and vitamin C are not generally stored in the body and so must be provided in the diet daily. Fat-soluble vitamins, A, D, E, and K can be stored for later use. The body needs vitamins to grow and develop normally; they are actually considered vital for life. The best way to get enough vitamins is to eat a balanced diet with a variety of foods. In some cases, people may need to take vitamin supplements.

*Minerals*

There are two kinds of minerals: macro-minerals and micro- or trace minerals. The body needs larger amounts of macro-minerals. These include calcium, phosphorus, magnesium, sodium, potassium, chloride, and sulphur. The body needs small amounts of the trace minerals. These include iron, manganese, copper, iodine, zinc, cobalt, fluoride and selenium. Minerals are important for the body to stay healthy. The body uses minerals for many different jobs, including keeping the bones, muscles, heart, and brain working properly. Minerals are also important for making enzymes and hormones.

Both types of minerals are present in plant and animal foods.

# Chapter 2

## Combining Foods for Good Nutrition

We get the nutrients from the foods we eat. We must however combine foods appropriately to get the best out of them. To be able to do this, experts in the Caribbean have devised a way to group our foods so that when they are combined, we get good nutrition.

The foods we eat are placed into six groups; staples, legumes, foods from animals, fruits, dark green leafy and yellow vegetables, and fats and oils. The foods are grouped according to which ones have similar nutrients. The foods in each group can be exchanged one for another within the same group.

The diagram titled, “Caribbean Food Groups” shows the names of the groups and examples of foods that are found in each group.

**Nutrients in the Food Groups**

The food groups contribute the following nutrients, among others to the diet.

***Staples***

*Cereal*: carbohydrate (starch) and sugar in some dry cereals, protein, B-complex vitamins, fibre, and high levels of sodium from instant cereals

*Starchy fruits, roots and tubers/ground provisions*: carbohydrate (starch), fibre, water, small amounts of vitamins, protein, and minerals, and low level of sodium

***Legumes***

Carbohydrate, protein, fibre, calcium and iron, B complex vitamins and fat and vitamin E in soybeans, peanuts, cashew nuts and seeds.

***Foods from animals***

Protein, fat, vitamins A, B, D, E, minerals, cholesterol, carbohydrate mainly from milk

***Fruits***

Water, fibre, carbohydrates (sugar), vitamins (especially C and carotene), minerals mainly potassium

***Dark green leafy and yellow vegetables***

Water, fibre, vitamin C, B complex vitamins, iron and calcium from vegetables such as callaloo, cbbage, pak choi, string beans, pumpkin, and carrot

***Fats and oils***

Fat, rich sources of energy, vitamin A and vitamin E

**Food Combinations**

Various combinations of food from the different groups can be developed. The combination of foods from different groups is called the “multimix principle.” The multi mix principle is a guideline for combining foods from complementary food groups to assure nutritional balance. It is based on the idea that when a mixture of foods is eaten together, they will complement and strengthen each other to ensure an adequate intake of essential nutrients.

Importantly, the multi mix principle is based on using four of the six Caribbean food groups to form the foundation on which nutritious meals can be planned. The four groups are staples, legumes, food from animals, and vegetables. The four foundational groups can be used in different combinations to form three types of multi-mixes. These are: double mix or two mix, triple mix or three mix, and quadri-mix or four mix.

**The Double/Two Mix**

The **double mix** is the simplest and most economical combination. It uses only two food groups. There are three possible combinations with this mix. They are:

1. Staple (cereal) + legume
2. Staple (cereal) + foods from animal
3. Staple (provisions/starchy vegetable/tuber) + foods from animals

Here are some examples of double mixes. Name the food groups that are combined.

Cornmeal Porridge with milk: _____

Meatless Stewed Peas with Fluffy Boiled Rice _____

Fried Fish with French Fries _____

***Special note***:

When a staple is combined with legume, the staple used is always a cereal. This is to ensure an appropriate complement to allow a high biological protein to be formed. What is deficient in one food will be supplied by the other one. Combining a starchy food such as root vegetables or tubers, namely yam, sweet potatoes, cassava with a legume would yield a low-quality protein. For this reason, a starchy food must be combined with foods from animals.

**The Triple/Three Mix**

The three mixes incorporate three food groups. The following are the possible ways of combining the groups for nutritious mixes; five in all:

1. Staple (cereal) + foods from animals + vegetable
2. Staple (starchy root) + food from animals + vegetable
3. Staple (cereal) + food from animals+ legumes
4. Staple (starchy root) + food from animal+ legumes
5. Staple (cereal) +legume + vegetables

Here are some examples of triple mixes. Name the food groups that are combined.

Boiled Bananas, Braised Liver and Callaloo_____

Corned Beef Cook-up, Fluffy White Rice and Tomato Slices _____

**The Quadri/Four Mix**

All four foundation groups are included. This mix therefore presents the highest nutrient value. There are two possible combinations.

1. Staple (cereal) + legumes + foods from animals + vegetable
2. Staple (starchy fruits, roots/tubers) + legumes + foods from animals + vegetable

Here are two examples of the four mix. Name the groups that are combined.

Bar-B-Fried Chicken, Rice and Peas, and Mixed Vegetables _____

Red Peas Soup with Beef _____

**Rules Guiding the Multi Mix Principle**

1. Staples are fundamental and must be included in all mixes.
2. Each combination should ensure a good protein source in all mixes.
3. Vegetables are added to the mix only when staples and a protein source are paired.
4. Fats and oils are not featured in the mix because it is assumed they are added during the meal preparation sparingly.

# Chapter 3

# Methods of Cooking Food

Food is cooked when heat is applied to it. Cooking is done using either moist or dry heat. Moist-heat methods are those in which the heat is conducted to the food product by water or water-based liquids such as stock and sauces, or by steam. Methods that use moist heat include poaching, simmering and boiling; braising or stewing; and steaming. Dry-heat methods are those in which the heat is conducted without moisture, that is, by hot air, hot metal, radiation, or hot fat. Dry-heat methods are divided into two categories: without fat and with fat. The methods using dry heat without fat include roasting and baking, and broiling, grilling, and griddling. Dry-heat methods with fat include sauteing, pan-frying, deep-frying. Microwave cooking is somewhat unclassified as it refers to the use of a specific tool rather than to a basic dry-heat or moist-heat cooking method. The microwave oven is used mostly for heating prepared foods and for thawing raw or cooked items. However, it can be used for primary cooking as well.

## Cooking Using Moist-heat

Let's examine the methods that use moist-heat; poaching, simmering and boiling; braising or stewing; and steaming.

### *Poaching, Simmering, and Boiling*

Poaching, simmering, and boiling all involve cooking a food in water or a seasoned or flavoured liquid. The temperature of the liquid determines the method. The temperature for poaching is 160°–180°F (71°–82°C); for simmering is 185°F to 205°F (85°C to 96°C); and for boiling is 212°F (100°C) at sea level. The boiling point of water decreases as altitude above sea level is increased. At 5,000 feet (1,500 m) above sea level, water boils at about 203°F (95°C). It takes therefore takes longer to boil foods to doneness at high altitudes

because the temperature is lower. The temperature of the liquid will not rise any higher no matter how high the burner is turned.

To poach means to cook in a liquid, usually a small amount, that is hot but not actually bubbling; to simmer means to cook in a liquid that is bubbling gently; and to boil means to cook in a liquid that is bubbling rapidly and greatly agitated.

Poaching is suitable for cooking delicate foods such as fish and eggs out of the shell; most foods cooked in a liquid are simmered, subjected to a gentle bubble; boiling is generally reserved for vegetables and starches. The high temperature of boiling toughens the proteins of meats, fish, and eggs, and the rapid bubbling breaks up delicate foods.

Blanching involves cooking an item briefly and partially in water for the purpose of setting the color and destroying harmful enzymes in vegetables, or to loosen the skins of tomatoes and similar items for easier peeling. Blanching may also be done to dissolve out blood, salt, or impurities from meats and bones. French fries may be blanched in deep fat before storing.

***Braising or Stewing***

Braising involves cooking food, usually meat covered in a small amount of liquid, after it is browned. Braising is often referred to as a combination cooking method because the product is first browned, using dry heat, before it is cooked with a liquid. The moist heat is responsible for most of the cooking process; the browning may be thought of as a preliminary

technique, the purpose of which is not so much to cook the item as to develop colour and flavour.

Braising and stewing are accomplished by the same method; browning the food first with dry heat and then cooking with moist heat. The major difference between both is that braising applies to cooking large cuts of meat while stewing applies to cooking smaller cuts of meat. Braising or stewing is a slow method of cooking by moist heat. The food may be cooked 1) on top of the stove in a saucepan with a tight-fitting lid, 2) in a covered casserole in the oven, or 3) in a slow cooker.

In braising, the food is cooked at a low temperature in a small amount of liquid that covers the product about one-third or two-thirds, e.g., pot roasts. For stewing, the liquid may cover the product as it is generally cut in small, bite-sized pieces. In both cases the cooking liquid yields a flavourful, concentrated sauce which is served with the product.

This method of cooking is suitable for a variety of foods including meat and poultry such as beef, tripe, mutton, chicken and turkey.  It is also suitable for cooking vegetables such as carrots, turnips, potatoes, green pawpaw, and other old, or very large vegetables that are coarse in texture. Peas and beans such as red peas and lentils and firm fruits such as guavas and June plums may be cooked by stewing.

***Steaming***

To steam means to cook foods by exposing them directly to steam. Steam at normal pressure is 212°F (100°C), the same as boiling water. However, it carries much more heat than boiling water and cooks foods very rapidly. Cooking times must be carefully controlled to avoid overcooking. In commercial cooking, steaming is usually done in special steam cookers. Cooking in a steam-jacketed kettle is not steaming because the steam does not actually touch the food. Steaming also refers to cooking an item tightly wrapped or in a covered pan so it cooks in the steam formed by its own moisture. This method is used in cooking items *en papillote*, meaning "wrapped in parchment paper" or foil. In Jamaica we are accustomed to cooking jerked fish in this way. "Baked" potatoes wrapped in foil are actually steamed.

A pressure steamer is a steam cooker that holds steam under pressure. The temperature of the steam then goes higher than 212°F (100°C), up to as much as to as 250°F (121°C).

Steaming is widely used for vegetables. It cooks them rapidly, without agitation, and minimizes the dissolving away of nutrients that occurs when vegetables are boiled. While steaming conserves nutrients, it does not completely eliminate leaching. Some steam condenses on the vegetables and drips off, carrying some pigments and nutrients with it. All is not lost anyway, as this liquid can be collected in drip pans below the steamer pans and saved for later use.

**Cooking Using Dry-heat Without Fat**

Let's now examine the methods that use dry heat without fat include roasting and baking, and broiling and grilling; and dry-heat methods with fat include sauteing, pan-frying, deep-frying.

***Roasting and Baking***

To roast and to bake both mean to cook foods by surrounding them with hot, dry air, usually in an oven. The term roasting usually applies to meats and poultry. The term baking usually applies to breads, pastries, vegetables, and fish. Baking is a more general term than roasting and there is little or no difference in actual technique. While the terms are often interchangeable, baking is always used for breads and pastries. Roasting requires a higher temperature (400°F and above) to create a browned, flavourful "crust" on the outside of the food being cooked, while baking occurs at lower oven temperatures (up to 375°F).

Roasting and baking are done uncovered. Meat is usually roasted on a rack. The rack prevents the meat from simmering in its own juices and fat as it allows hot air to circulate around the product. This is also a slow method of cooking which requires basting the food with its own dripping or oil. Meat kind is basted using dripping as a sauce to keep the roasted food moist or to have the outer layer crisp. Some of the foods suitable for roasting are chicken, tender joints of meat, and potatoes.

Barbequing is another form of cooking with dry heat that uses a roasting or grilling technique but which requires a wood fire. This is created by the burning of hardwood or by the using the hot coals of the wood.

*Note to ponder*: According to Foster (2014), if you are cooking food that has a solid structure, such as meat or vegetables, you are 'roasting' them regardless of the temperature of the oven, you'll roast it. If you are cooking food that does not already have a solid structure, but which

will become solid after it is cooked, like muffins, cake, bread, and casseroles, the proper method is baking. The question then is, “What about baked chicken?”

***Broiling***

To broil means to cook with radiant heat from above, so broiling is done in an overhead broiler. Broiling is a rapid, high-heat cooking method used mainly for tender meats, poultry, fish, and a few vegetable items. To broil larger, thicker items and items to be cooked well done, use lower heat and cook for a longer time. Use higher heat for thinner pieces and for items to be cooked rare. The moderation in temperature is required for the inside and outside to be cooked to the desired degree at the same time. A low-intensity broiler called a *salamander* is used for browning or melting the top of some items before service.

Broiling is usually done at very high temperatures, typically 500–550°F (260–288°C). It requires practice and experience to cook foods of different thicknesses to the right degree of doneness inside with the desired amount of surface browning.

***Grilling***

Grilling is done on an open grid over a heat source, which may be charcoal, an electric element, or a gas-heated element. Cooking temperature is regulated by moving the items to hotter or cooler places on the grill. Grilled meats should be turned to achieve desired grill marks. This is also done for broiling.

Appropriate temperatures for grilling are: 400-450°F for high, 350-400°F for medium-high, 300-350°F for medium and 250-300°F for low heat. High heat is recommended when preparing steaks, pork chops, or kabobs; medium high heat for cooking hamburgers, vegetables, and fish; and medium heat is ideal for grilling chicken, turkey, roasts, and sausages. Medium heat provides enough warmth to create a satisfying browning effect on the outside of your proteins while still bringing the insides to a proper internal temperature.

**Dry-heat Methods with Fat**

***Sauteing***

To sauté means to cook quickly in a small amount of fat. The items are usually tossed by flipping the pan while cooking. Two important principles to consider when sauteing are 1) the pan must be preheated before adding the food to be sautéed as the food must start cooking

at high heat to prevent food simmering in its own juices. 2) The pan should not be overcrowded as this lowers the temperature too much, and again cause the food to simmer in its own juices.

***Pan-frying***

To pan-fry means to cook in a moderate amount of fat in a pan over moderate heat. Pan-frying is similar to sautéing except more fat is used and the cooking time is longer. The method is used for larger pieces of food, such as chops and chicken pieces, and the items are not tossed by flipping the pan, as they often are in sautéing. Instead, the food is turned at least once for even cooking. Some larger foods may be removed from the pan and finished in the oven to prevent excessive surface browning.

***Deep-frying***

To deep-fry means to cook food submerged in hot fat. Most foods are fried at 350°–375°F (175°–190°C). This prevents excessive greasiness in fried foods. Fry in fat that has a high smoke point, that is the temperature at which the fat begins to smoke and to break down rapidly. Soybean oil, vegetable oil, and corn oil are familiar oils that have a high smoke point.

For best results in frying, do not overload the frying basket or pot. Overloading lowers the temperature of the fat quickly and reduces the quality of the product. Dry wet foods to remove excessive moisture to prevent splattering and drain fried foods on absorbent paper to prevent absorption of excess fat.

# Chapter 4

## Safe Food Handling Practices

Food handling is something that we all do every day, whether we are cooking professionals, homemakers, or workers in a food plant. Therefore, we must all ensure that the foods we eat or prepare for others to eat is of sufficient hygienic quality that we can avoid the hazard of food-borne diseases (FBDs). Food-borne diseases are one of the most frequent public health problems in daily life.

The hazards that cause FBD may occur in the different stages of the food chain (from primary production to the table). Independently from its origin, once the food reaches the consumer it may have an impact on public health and cause severe economic damage to the establishments devoted to its preparation and sale. This is true of persons in this project who will be preparing foods for the Jamaican market. If FBDs are caused by mishandling of foods and the process of preparation, there may be loss of confidence in the activity and bring the activity to an end before it has an opportunity to reach the market.

Fortunately, the measures for preventing food contamination are very simple and may be applied by anyone who handles food, by following easy rules for hygienic food handling. FBDs affect mainly the most susceptible segments of our society, namely, children, the elderly, pregnant women, and persons who are ill. All persons in Jamaica are our target population. About two-thirds of FBD epidemics have their origin in food consumption in restaurants, cafeterias, school dining rooms, and even at home.

If we always handle food with clean hands and follow the proper hygienic procedures, we can prevent our families and clients from the risk of consuming contaminated food.
We must see our contribution as food handlers as critical in food preparation and service and play our role with a high sense of responsibility.

**Food Hazards**

A food hazard is a biological, chemical, or physical agent in food, or a food condition that poses a threat to public health. Hazards may be introduced “accidentally, intentionally or criminally.” There are different types of hazards:

1. Physical hazards: these include foreign matter in food. Examples of physical hazards are glass or wood fragments and non-edible food parts, such as bone pieces or fruit stones.

2. Chemical hazards: may occur along the entire food chain. For example, through the indiscriminate or inappropriate use of chemical products, storage mistakes, poor technique in disinfecting countertops, and utensils, and other such practices.

3. Biological hazards: The main hazards are microorganisms inclusive of bacteria, yeasts, mold, viruses, and parasites. Bacteria are the microorganisms with a greater impact on food safety, because they have an excellent reproduction capacity and, in a few hours, they form groups or colonies of millions of bacteria, leading to food contamination.

On average, under ideal conditions, bacteria may double in number every 20 minutes. Because microorganisms can so easily reproduce, they seriously affect persons in a short time. Microorganisms are found everywhere:

A) In the environment, they are found:

- In the air, soil, and water.
- On contaminated utensils.
- On contaminated food.
- In sewage.
- Garbage and food residues.

B) In human beings and animals, they are found:

• On human and animal skin.

• On infected wounds.

• On hair.

• On hands and nails.

• In human and animal saliva.

• In feces.

**How Foods Become Contaminated**

Foods become contaminated when food hazards are introduced into food at any point in the food production and preparation chain. Hazards are introduced in varying ways; through primary contamination, direct contamination, and cross-contamination.

***Primary contamination***

Occurs in primary food production, for example during harvest, slaughter, milking, fishing. A typical example is the contamination of eggs by the hen's feces.

***Direct contamination***

The contaminants affect the food through the person that handles it. This type of contamination is probably the most simple and common form of food contamination.
A typical example is when a person sneezes coughs into food while preparing it.

***Cross-contamination***

This contamination is caused by the transference of a hazard present in one food to another food that is safe, usually via surfaces or utensils that have contact with both, without the requisite cleaning and disinfection. The most frequent cases of cross-contamination occur when the food handler allows a raw food to come in contact with a food that is ready to be consumed, by using the same cutting boards or kitchen utensils. Another example of this type

of contamination occurs when the same cutting board is used for cutting raw meat and then cooked meat.

**Keep Foods Safe by Limiting Microbial Growth**

Microorganisms need favourable conditions to promote their growth. unfavorable factors limit their growth.

***Factors that Favour Reproduction***:

*Nutrients*

Microorganisms extract carbon and nitrogen from substances such as proteins, fats and carbohydrates and use same for their energy supply as well as to repair and procreate.

*Water*

The free flow of water is vital to microorganisms for their cells to exchange materials and for their metabolic processes. As a general rule, microorganisms abound where there is more water/moisture. While all microorganisms require some level of water, a few can survive in low-moisture conditions by conserving all the water they find and by staying in a moisture-rich environment.

*Temperature*

Microorganisms generally thrive at higher temperatures, but that is up to a certain point. Very high and very low temperatures both obstruct the enzyme processes microorganisms depend on to survive. Microorganisms have been grouped according to their temperature of preference: psychrophiles, mesophiles and thermophiles. Psychrophiles prefer temperatures from 0 to 5 degrees Celsius; mesophiles like temperatures from 20-45 degrees Celsius; and thermophiles like it hot, thriving in temperatures around or above 55 degrees Celsius.

*Oxygen*

Microorganisms usually require gases that they absorb to produce needed nutrients. Nitrogen is one necessary element, as is oxygen. There are many microorganisms that require an

oxygen-rich environment to survive. Others flourish in low-oxygen surroundings. Still, a wide variety that may prefer more or less oxygen and that will flourish equally no matter how much oxygen is present.

*Time*

Bacterial growth happens in number as opposed to size. Under ideal conditions, many types of bacteria can double their population every 20 minutes.

***Factors that Inhibit Reproduction***

*Acidity – pH level*

Microorganisms prefer a certain pH level in the substance or environment in which they grow; they prefer to have particular acidic qualities (pH 6-1) in their surroundings. Most microorganisms, including most human pathogens, are neutrophils, that is, they prefer a neutral pH level (pH 7). While some like high pH levels (pH 8-14), if conditions are too acidic, the organism's enzymes break down.

*Sugar*

Inhibit microbial growth by dehydration, i.e., withdrawing the water in the microorganism by osmosis.

*Salt*

Inhibit microbial growth by dehydration, i.e., withdrawing the water in the microorganism by osmosis.

> *Salt or sugar*, whether in solid or aqueous form, attempts to reach equilibrium with the salt or sugar content of the food product with which it is in contact. This has the effect of drawing available water from within the food to the outside and inserting salt or sugar molecules into the food interior. The result is a reduction of the so-called product water activity ($a_w$), a measure of unbound, free water molecules in the food that is necessary for microbial survival and growth (Parish, 2006).

## Hygiene Measures to Prevent Food Contamination

### *Conditions pertaining to the personnel that handle food*

Food handlers play a crucial role in reducing the likelihood of contamination of the products that they prepare. At a personal level, the basic rules a food handler must observe are as follows:

*Maintain optimum health condition*

1. Keep free of respiratory problems, stomach illnesses, wounds, or infection.

2. It is important to stay away from work if one is ill. While difficult to do because of financial needs or an individual's personal commitment to work, this advice must be adhered to as doing otherwise ultimately does more harm than good to the consumers.

*Observe personal hygiene*

1. Wash hands properly with water and soap before handling food. The same procedure must be followed after any activity that is likely to contaminate one's hands;

2. Shower before going to work. A daily shower with plenty of water and soap should be part of one's daily routine;

3. Keep nails trimmed and clean, the face shaven (in case of a male), and the hair washed and bound under a cap or a scarf.

**Figure 1**: Appropriate hand washing procedure

*Clothing*

Clothes and jewelry can be a source of food contamination as they contain microbes and dirt collected during our daily activities. Therefore, jewelry should not be used by food handlers. The following is a list of the appropriate clothing for a food handler:

1. A cap that covers the hair entirely to prevent hairs from falling.
2. A light-colored jacket worn solely in the work area.
3. A mask that covers the nose and mouth.
4. An apron.
5. Gloves.
6. Comfortable closed toe shoes to be worn exclusively in the work area.

***Desirable habits in food preparation and service***

1. Thoroughly wash utensils and preparation surfaces before and after handling foods.

2. Thoroughly wash dishes and utensils before using them for serving food.

3. Always use soap and clean water in cleaning dishes, utensils, and pots and pans.

4. Hold plates and serving dishes by the borders, silverware by the handle, and glasses by the bottom.

***Undesirable habits in food preparation and service***

1. Cleaning or scratching nose, mouth, hair, ears, pimples, wounds, burns, while handling and preparing food.

2.Wearing rings, bracelets, earrings, watches, or other similar items when preparing and serving food.

3. Handling foods with hands instead of with utensils.

4. Using clothes as a cleaning or drying cloth.

5. Using the toilet while wearing work clothes.

6.Smoking near food.

**The Seven Principles of HACCP**

Hazard Analysis Critical Control Points (HACCP) is an internationally recognized method of identifying and managing food safety related risk and, when central to an active food safety program, can provide customers, the public, and regulatory agencies assurance that a food safety program is well managed. There are seven core principles of HACCP.

***Principle 1 - Conduct a Hazard Analysis***

The application of this principle involves listing the steps in the process and identifying where significant hazards are likely to occur. The HACCP team will focus on hazards that

can be prevented, eliminated or controlled by the HACCP plan. A justification for including or excluding the hazard is reported and possible control measures are identified.

***Principle 2 - Identify the Critical Control Points***

A critical control point (CCP) is a point, step or procedure at which control can be applied and a food safety hazard can be prevented, eliminated or reduced to acceptable levels. The HACCP team will use a CCP decision tree to help identify the critical control points in the process. A critical control point may control more than one food safety hazard or in some cases more than one CCP is needed to control a single hazard. The number of CCP's needed depends on the processing steps and the control needed to assure food safety.

***Principle 3 - Establish Critical Limits***

A critical limit (CL) is the maximum and/or minimum value to which a biological, chemical, or physical parameter must be controlled at a CCP to prevent, eliminate, or reduce to an acceptable level the occurrence of a food safety hazard. The critical limit is usually a measure such as time, temperature, water activity (Aw), pH, weight, or some other measure that is based on scientific literature and/or regulatory standards.

***Principle 4- Monitor CCP***

The HACCP team will describe monitoring procedures for the measurement of the critical limit at each critical control point. Monitoring procedures should describe how the measurement will be taken, when the measurement is taken, who is responsible for the measurement and how frequently the measurement is taken during production.

***Principle 5 - Establish Corrective Action***

Corrective actions are the procedures that are followed when a deviation in a critical limit occurs. The HACCP team will identify the steps that will be taken to prevent potentially

hazardous food from entering the food chain and the steps that are needed to correct the process. This usually includes identification of the problems and the steps taken to assure that the problem will not occur again.

***Principle 6 - Verification***

Those activities, other than monitoring, that determine the validity of the HACCP plan and that the system is operating according to the plan. The HACCP team may identify activities such as auditing of CCP's, record review, prior shipment review, instrument calibration and product testing as part of the verification activities.

***Principle 7 - Recordkeeping***

A key component of the HACCP plan is recording information that can be used to prove that the food was produced safely. The records also need to include information about the HACCP plan. Record should include information on the HACCP team, product description, flow diagrams, the hazard analysis, the CCP's identified, critical limits, monitoring system, corrective actions, recordkeeping procedures, and verification procedures.

# Chapter 5

## Developing and Modifying Recipes


Your task is to develop recipes and produce the items/products for the Jamaican market. The products you develop will meet standards of quality that will be irresistible; the Jamaican people will want to purchase and consume them as they will promote good health, be economical, and be tasty and appealing. The information presented in this chapter should provide you with the tools to do just that.

The development of a food product begins with an idea that either arises from your own thought to create something simply because you think you should, your uneasiness with things as they are and your desire to fix them, or from a call like the one to participate in this competition. If your desire to create the product arose from the first two reasons you would then have to do the market research to see if there is really a need for this product. In this instance, that research has been done and you know the need is real. So here you are at stage three of the process; creating and testing the recipe. This will be followed in this case by competing with others to see if your product stands up to scrutiny and then walk away with the prize and fulfilment of seeing your product on the market.

Let’s talk about developing the recipe or modifying one that fits the criteria you are trying to meet; prepare items from any three of these groups (snacks/desserts, breakfast meals, lunch/dinner meals, healthy fast foods, one-pot meal, beverages), develop new recipes

to produce food items for different age groups to promote healthy eating, modify local recipes to produce food items that are nutritious and appetizing, create recipes that can produce food items that can be packaged and included on the school menu, package, brand, and price the saleable food products developed.

**Recipe**

The making of any food product requires that there is a recipe. That is, a set of instructions for a particular dish or food item. This is a positive combination of sensory qualities and is a blueprint or pattern. It has a particular format, title and yield, has a list of ingredients, and a series of method statements. Use this list to ensure your recipe meets the standard. You have no doubt been using recipes and have been seeing these elements so you are familiar with the requirements.

1. Menu item name – the name of the given recipe
2. Ingredient list/quantity – exact quantities of each ingredient (with the exception of spices that may be added to taste)
3. Preparation procedures – specific directions for the order of tasks and types of tasks required to make the product (e.g., blend, fold, mix, sauté)
4. Cooking temperatures and times, including HACCP critical control points and limits to ensure the dish is cooked properly and safely
5. Total yield – number of servings, or portions that a recipe produces, and often the total weight or volume of the recipe
6. Portion size – amount or size of the individual portion
7. Service instructions, including hot/cold storage
8. Plating/garnishing if applicable

**Recipe Checklist for Competition**

While these points are good for general recipe development, you may need to go a step further in developing the recipes for this competition. Use this evaluation checklist to make sure you are hitting the mark. Remember that you are in a competition

***Purpose***

Does the recipe fulfill the purpose for which it was requested?

1. Advertising
2. Promotion
3. Packaging
4. Publicity
5. Editorial – magazines, newspapers, books, TV
6. Educational

***Design***

1. Is the recipe in line with the general concept?
2. Does it have general appeal?
3. Does it have news and flair?
4. Does it show one of the best uses of the product and help sell the product?
5. Is the recipe brief and easy to read?
6. Is it tolerant to ensure good results?
7. Will it photograph attractively?

***Ingredients***

1. Are the ingredients too expensive?
2. Are the ingredients on-hand, or commonly available at the supermarkets?
3. Are standard measures used – cups, complete cans, complete packages?
4. Are measures practical, easy to follow, or too varied?

5. Do the ingredients require too much pre-cooking preparation i.e., too much chopping, toasting?
6. Are there too many ingredients? Can any be omitted without sacrificing the quality?
7. Are ingredients listed in practical order, along with order or use? Can a measure first be used for dry ingredients, then for liquid ingredients?

***Preparation of Ingredients***

1. Does the recipe preparation require standard household/foodservice equipment?
2. Can some of the preparation be eliminated?
3. Will pieces of equipment be used that later will have to be washed for use in the recipe cooking/processing i.e., chop onions in a food processor when you make pastry later.

***Cooking and/or Processing***

1. Is the cooking method a logical one?
2. Does it require too much time?
3. Does it require special equipment?
4. Does it require difficult techniques, cooking skills, or ‘special tricks?
5. Can information be added for special service? i.e., advance or partial cooking, storage or freezing information, suggestions for other nutritional information

***Detailed Recipe Direction***

1. Are they brief, clear, complete and easy to read?
2. Are the words used understandable? i.e., ‘very gently combine’ rather than ‘fold’. Are the correct terms used? i.e., ‘fold’ rather than ‘blend’
3. Are the recipe yields and number of servings included?

4. Are there any unanswered questions in the recipe?
5. Are any idiosyncrasies explained? i.e., the batter will be thin; the mixture will look curdled.
6. Is the recipe accurate? Has it been given a second and third technique test with good results?

**Food Ingredients Matter**

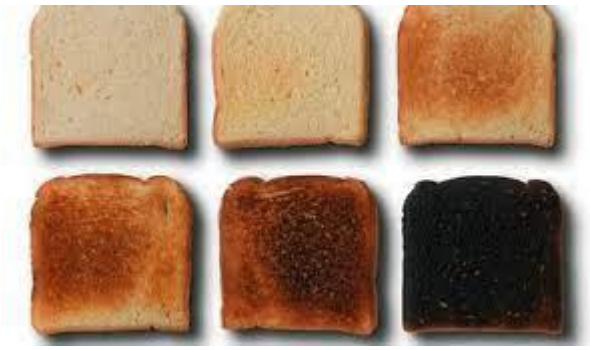
Ingredients are key in any cooking recipe. As producers of food products, for you to get the product right you must have a sense of the functions of the ingredients. Regardless of the food product you will create - baked products, meat, fish and poultry dishes, soups, sauces, preserves, jams, jellies; and the form in which you will take it to the market – frozen, partially cooked, ready-to-eat, dried and powdered, dried and chipped, a knowledge of the functions the ingredients play in cooking is essential.

We spoke in chapter one about the nutrients including carbohydrates, proteins, and fats. These nutrients have a range of different properties that make them useful in a variety of food products. Carbohydrates are present in food in the form of sugars, starch and fibre. Sugars are naturally present in foods such as milk, fruits, vegetables and honey. Sugar cane is the most common source of sugar in Jamaica. Starch is present in foods such as potatoes, flour (bread and pasta), and rice. Fibre is present in whole grains, fruits and vegetables, especially the outer covering of seeds. Proteins and fats also perform a variety of functions in foods. Sometimes the different nutrients perform similar functions. Let us explore how these nutrients affect the food products of which they are a part. We will also look at ingredients such as seasons, herbs, and spices.

***Functions of Carbohydrates***

Carbohydrates, both in the form of starch and sugar, perform different functions in food products.

*Colour change*: When foods containing starch are heated by dry heat (without the presence of water) they produce brown compounds called dextrins through a process called dextrinization. Toast is a good example of dextrinization.



*Flavour*: Sugar contributes to the chewiness, colour and sweet flavour of caramel. When sucrose (table sugar) is heated above its melting point it undergoes physical and chemical changes to produce caramel. This happens more readily without water but syrups will caramelise with rapid heating. This process is used extensively in the production of confectionery. Overheating will cause the substance to become bitter and dark. Maillard, dextrinization and caramelization reactions are all examples of non-enzymic browning reactions.

*Thickener*: When starch is mixed with water and heated, the starch granules swell and eventually rupture. Liquid is absorbed and the mixture thickens. If enough starch is used, a gel will form when the mixture cools. This is called gelatinization. Products such as sauces and custards are thickened this way.

***Functions of Proteins***

Reactions of different types of proteins result in different functions in food products.

*Structure*: Two proteins, gliadin and glutenin, found in wheat flour, form gluten when mixed with water. Gluten is strong and elastic and forms a 3D network in dough. In the production of bread, kneading helps untangle the gluten strands and align them. Gluten helps give structure to the bread and keeps in the gases that expand during cooking. The amount and type of protein present depends on the flour type and quality. Strong flour contains a maximum of 17% protein while plain flour contains 10%. The gluten in four also forms the structure of the cake in cake making. As the cake is heated, protein (gluten) in the flour coagulates and sets the framework and shape of the product.  

*Aeration*: When egg white is whisked, tiny air pockets are captured in the mixture, each surrounded by a very thin layer of egg protein. The protein coating of the air pockets links together and make a foam.  When the foam is heated, the protein coagulates, water evaporates, and a solid foam is formed. Whole eggs and yolks can also trap and hold air that expands during heating, leavening cake batters and other baked goods. Baking helps the proteins coagulate and properly set the structure.

*Thickener*: protein in egg thickens when gently heated (coagulation). Egg functions as a thickener in creme caramel, quiche, stirred custard, and creme anglaise.

*Gelation*: The gelling capacity of food proteins is an important function in food manufacturing. The gel forming ability of proteins affects their ability to retain water and bind fat. Gelation plays a major role in stabilizing emulsions and foams. The property of proteins to form a gel and retain significant amounts of sugars, flavour and other food ingredients is valuable in food processing and developing new food products.

***Functions of Fats***

Fats perform different functions in foods.

*Shortening*: Fat shortens food products, giving them their characteristic crumbly texture by coating the flour particles and preventing them from absorbing water. This reduces the gluten development which would cause the dough to become elastic.  Fats such as pure vegetable fats or lard are suitable for shortening because of their low water content.

*Plasticity*: This refers to the ability of fats to spread. This plasticity is due to the mixture of triglycerides, each with their own melting point. Because of this, fats do not melt at fixed temperatures, but over a range. It gives all fats unique characteristics.

Some products are formulated using fats containing triglycerides with lower melting points so they can spread from the fridge (e.g., soft spread) or melt on the tongue (e.g., chocolate). Other fats have higher melting points and are used for cooking.

*Aeration*: Products such as creamed cakes need air incorporated into the mixture in order to give a well-risen texture. This is achieved by creaming a fat, such as butter or baking spread, with sugar. Small bubbles of air are incorporated and form a stable foam.

*Flakiness*: Flaky and puff pastry use fat to help separate layers of gluten and starch formed in the dough. The fat melts during cooking, leaving thin layers. The water present in the pastry produces steam, which evaporates and causes the layers to rise. The fat prevents the layers from sticking together.

*Colouring*: There are distinctive colours associated with the type of fat used. Butter produces a golden colour and lard produces a pale yellow.

*Retention of moisture*: Some fats can help retain a bakery product's moisture and increase its shelf-life. The ability of fats and oils to suspend liquid contribute to the moisture content of cake batters.

They may also be used to baste food that is being cooked by dry heat. This is done to keep the meat moist.

*Glaze:* Fats, e.g., butter is poured on hot vegetables to give a glossy appearance. *Fats also add shine to cooked vegetables and sauces*

*Sensory attributes*

All fats and oils have unique flavours and odours.

Some are more suited for particular purposes than others, e.g., olive oil for salad dressing (for flavour) and lard for pastry (due to its blandness).

They can also contribute to the texture of the food, for example by increasing succulence.

**Other Functions of Ingredients**

***Adding Flavour***

Fresh and dried herbs and spices can be added to dishes for flavour, e.g.,
_____ and _____.

Herbs and spices can also be used to replace the salt in some dishes, e.g.
_____, _____, and _____.

Food processing, packaging and storing can impact the flavour of food so manufacturers may add additives such as _____ and _____ to overcome this.

***Adding Colour***

Fruit, vegetables, herbs and spices are often used in recipes to add colour. Different colours and examples of some of these are

| Colour | Examples |
|---|---|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

Food processing can negatively impact the colour of food so manufacturers may use additives to improve this. For example, canned mushy peas contain the colours E101 (yellow-orange) and E133 (brilliant blue) to provide the bright green colour expected of peas.

Other acceptable food colours are

_____

_____

***Adding Texture***

Nuts, seeds, grains, fruit and vegetables can all be added to recipes to provide texture, e.g., sesame seeds on a bread roll and _____.

The cooking method and cooking time can also impact the texture, e.g., steaming or microwaving vegetables quickly can retain their colour, flavour and firm texture, or

_____

_____

The equipment used to process the food can also impact the texture, e.g., using a food processor to blend soup for a smoother texture, or

_____

_____

***Provide Nutrients or Change the Nutritional Profile of a Dish***

All ingredients provide nutrients and/or energy, e.g., chicken (protein) and potatoes (starchy carbohydrates) in a casserole. Other examples are:

_____

Some ingredients can be changed or modified to improve the nutritional profile of a dish, e.g., wholemeal flour for added fibre,

The quantity of ingredients can also be reduced or ingredients substituted, e.g., using a smaller amount of a strong flavoured mature cheese can reduce the fat content of a dish whilst retaining the flavour, or

Generally, foods perform different functions which can be used in the production of food products because of their physical and chemical properties. These functions include:

**Binding** – liquid is added to combine or hold dry ingredients together

**Aeration** –some dishes need to be made lighter through the addition of air (whisking eggs), carbon dioxide (baking powder and yeast) and steam (water in choux pastry)

**Thickening** – protein in egg thickens when gently heated (coagulation); starch in flour thickens liquids when heat is added (gelatinisation) and starch in yam thickens soups

**Setting** – protein in egg thickens and sets when heated (coagulation), gelatine forms a gel when making jelly; the starch in cornflour thickens and sets sweet desserts such as blancmange; gluten in flour (a protein) thickens and sets in baked goods such as cakes (coagulation)

**Shortening** –in products such as shortcrust pastry, biscuits and shortbread, fat coats the flour particles and prevents moisture absorption. This inhibits gluten formation which gives them a crisp and crumby texture

**Adding colour to baked goods** – when dry heat is added to starch, browning occurs when the starch is turned to dextrin (sugar) and caramelisation then takes place (the browning of sugar), e.g., toasting bread and browning of pastry when baking

**Adding colour to cooked meats** – when cooked, the outside surface of meat changes colour due to the proteins and carbohydrates reacting with each other. This is known as the Maillard reaction

**Tenderising meat** – some acids such as lemon juice have a tenderising or softening effect on meat fibres and so are often used in marinades.

Ingredients can also be used to add flavour, texture, moisture and bulk to a dish along with improving the nutritional value.

**Recipe Modification**

It is quite possible that you will be modifying recipes to make the creation more your own. Use the information here to help you achieve success in making those changes. Let's start with the basic principles of modification.

***Basic Principles***

1. *Elimination* - if the ingredient is not essential, don't use it. In some recipes, you can eliminate an ingredient altogether or scale back the amount you use.
    - Eliminate items you generally add out of habit or for appearance, such as frosting, coconut or whipped cream toppings, which are all high in fat and calories.
    - Cut condiments which can have large amounts of salt, sugar, fat and calories, e.g., pickles, olives, butter, mayonnaise, syrup, jelly and mustard
    - Use fresh condiments such as cucumbers vs pickles, cherry tomatoes vs olives, non-fat or reduced fat spreads vs butter or mayonnaise. Instead of syrup or jelly, try fresh berries that are mashed, or thin slices of fresh apples, peaches or pears.

- Use low-sodium soy sauce in a smaller amount than a recipe calls for to decrease the amount of salt.

2. *Reduction* - if less will do, use less. You often can reduce the amount of fat, sugar and salt without sacrificing flavour in healthy recipes.
   - **Fat:** for baked goods, use half the butter, shortening or oil and replace the other half with unsweetened applesauce, mashed banana or prune puree. You can also use commercially prepared fruit-based fat replacers
   - **Sugar:** reduce the amount of sugar by one-third to one-half. Instead, add spices such as cinnamon, cloves, allspice and nutmeg, or flavorings such as vanilla or almond extract to boost sweetness.
   - **Salt:** for most main dishes, salads, soups and other foods, you can reduce the salt by half or even eliminate it. You can reduce salt by half in baked goods that don't require yeast. For foods that require yeast, you may need to experiment as some salt may be necessary for leavening to keep baked goods from being too dense or flat.
   - **Cheese:** if a recipe calls for 1 cup of shredded cheddar cheese, use 1/2 cup instead.
3. *Substitution* - if you can find a more healthful ingredient, use it. Healthy substitutions not only reduce the amount of fat, calories and salt in your recipes but also can boost the nutritional content.
   - Pasta: use whole-wheat pasta instead of enriched pasta. This will almost triple the fiber.
   - Milk: prepare a dessert with fat-free milk instead of whole milk to save more than 60 calories and 7 grams of fat per cup.

- Meat: when making casseroles, scale back on meat, poultry or fish and increase the amount of vegetables. You'll save on calories and fat while gaining more vitamins, minerals and fiber.

4. *Preparation Techniques* - Change cooking and preparation techniques… conserve, conserve, conserve. Healthy cooking techniques can capture the flavour and nutrients of your food without adding excessive amounts of fat, oil or salt.
   - Cooking method**:** healthy cooking techniques include braising, broiling, grilling, poaching, sautéing and steaming.
   - Basting liquid**:** if the directions say baste the meat or vegetables in oil or drippings, use a small amount of wine, fruit juice, vegetable juice or fat-free vegetable broth instead.
   - Non-stick cookware**:** using non-stick pans or spraying pans with non-stick spray will further reduce the amount of fat and calories added to your meals.
5. *Fortification* –add ingredients to increase nutritional value; add more fibre, more vegetables, more fruits
   - swap some of the meat or chicken for cooked or canned legumes.
   - swap some of the meat or chicken for chopped or grated vegetables.
   - add more vegetables to pasta and rice dishes and extra to soups.
   - swap half of the refined white flour for wholemeal flour.
   - swap white pasta with wholegrain pasta, white rice with brown rice or barley.
   - use chopped nuts to garnish salads, stuffed vegetables, stir fries, casseroles, crumbles and pasta.
   - add chopped or grated vegetables or fruit to pikelets, pancakes, scones and muffins.

**Reasons for Modifying Recipes**

Modifying recipes require experience. Recipes are modified for the following reasons:

1. ***To reduce or increase a recipe in size.*** This involves converting the recipe to change the yield size.

Converting standard recipes to change yield size is an important technique. To produce a different amount of the product, you must keep the proportions of ingredients the same or you will not get the same product. Figuring the amounts of ingredients in the correct proportions for a different number of servings is called converting the recipe.

**Procedure for Converting Total Yield**

i. Divide the desired yield by the recipe yield:

New yield/old yield = conversion factor

ii. Multiply each ingredient quantity by the conversion factor

Conversion factor x old quantity = new quantity

**Example**: You have a recipe for 10 portions of Broccoli Mornay requiring 5lbs broccoli and 2 ½ cups Mornay sauce. Convert to 15 portions.

15/10 = 1.5 (conversion factor)

Broccoli = 5lb x 1.5 = 7.5lbs

Mornay = 2 ½ cups x 1.5 = 3.75 cups

***2. Modifying recipes to promote healthful food choices***

*Reduce fat*

- Trim all fat from meat; use chicken instead.
- Use less meat in recipes; substitute vegetables.
- Omit fat – fry meat in non-stick pan or brown meat under grill.
- Halve the fat/oil in scones, stews and sautés.

*Reduce saturated fats*

- Use low-fat milk for baking, sauces and puddings.
- Omit egg yolk from pastry and certain desserts.
- Plain low-fat yogurt can be substituted for cream.

*Remove trans fats*

- Eat foods that are baked, steamed, or boiled
- Avoid stick margarine and vegetable shortening, instead use olive oil, grape seed oil, canola oil, soybean oil, corn oil, or sunflower oil when baking or preparing meals
- Eat more whole foods like fruits, vegetables, whole grains, beans, lean meats, fish, nuts, and lean poultry

*Reduce sugar*

- Omit or reduce sugar from plain breads and scones.
- Use artificial sweeteners to sweeten stewed fruit.
- Add raisins, dates, etc. To sweeten breads and desserts.
- Omit sweet icings and fillings.

*Reduce salt*

- Reduce salt or omit it from recipe.
- Flavour instead with herbs and spices.
- Use well-flavoured vegetables, e.g., onion, celery, peppers.
- Avoid using stock cubes and ready-made sauces.

*Increase fibre*

- Substitute brown pasta and rice for white.
- Add pulse vegetables, e.g., kidney beans to casseroles.
- Use more whole-meal flour in baking, e.g., in pastry and pizza.
- Use oatmeal for crumbles or to top savoury dishes, e.g., fish bakes.
- Avoid peeling fruits and vegetables: unpeeled apples can be stewed, then pureed; unpeeled new potato salad is delicious.

# Chapter 6

## Sensory Evaluation of the Food Products

Sensory evaluation is a scientific discipline that analyses and measures human responses to the composition of food and drink, e.g., appearance, touch, odour, texture, temperature and taste. Such an evaluation provides an ideal opportunity for individuals to evaluate and give feedback on the dishes, test products that have been created.

### Why use sensory evaluation?

Sensory evaluation can be used to:

- compare similarities/differences in a range of dishes/products;
- evaluate a range of existing dishes/food products; analyse food samples for improvements;
- gauge responses to a dish/product, e.g., acceptable v unacceptable;
- explore specific characteristics of an ingredient or dish/food product;
- check whether a final dish/food product meets its original specification;
- provide objective and subjective feedback data to enable informed decisions to be made.

### Organising Sensory Tests

***How to perform sensory evaluation***

1. Decide on the type of test you want to perform, i.e., one that is suitable for what you want to find out.

- Preference test - asks whether people like or dislike a product, e.g., hedonic scale
- Discrimination test - asks people to describe a particular attribute of a product, e.g., paired comparison test.

2. Find a clear area to hold the sensory test. Try to make sure that it is away from noise and cooking smells which may distract the people taking part in the test. This is often difficult to do so you will have to use your best alternative
3. Place as many samples in serving containers as there are people taking part in the test. Code each sample with a random number, letter or symbol.
4. Check that you have enough glasses of water for the people taking part. This is for tasters to cleanse their palette after tasting each food sample.
5. Explain clearly to the people taking part what is expected from them, i.e., they understand which test they are taking and what they have to do.
6. Ask each person to taste one sample at a time, and record their responses. Allow time between samples so that tasters can record their opinions.

**Types of Sensory Tests**

***Preference Tests***

These types of tests supply information about people's likes and dislikes of a product. They are not intended to evaluate specific characteristics, such as crunchiness or smoothness. They are subjective tests and include hedonic, paired comparison and scoring. Table 1 shows a sample of this scale.

**Table 1:** Sample of Preference Test

paired preference test

Orange Beverage

Name: Date:

Tester number: session code:

Please rinse your mouth with water before starting. Please taste the two samples in the order presented, from left to right. You may drink as much as you would like, but you must consume at least half the sample provided.

If you have any questions, please ask the server now.

**Circle the number of the sample you prefer**

(you must make a choice)

387 456

Thank you for your participation.

Please return your ballot through the window to the server

***Hedonic Rating Scales***

1. Prepare the food samples.

2. Ask each taster to taste each sample in turn and tick a box, from '1 Dislike Very Much' to '5. Like Very Much' to indicate their preference. This is a 5-point-scale. Sometime a 9-point-scale is used.

3. The taster may also wish to make remarks about the products' appearance, taste, odour and texture.

4. Analyse the results. Which sample received the highest/lowest scores? Which sample was preferred?

**Table 2.** A Sample of a Hedonic Rating Scale

**Record Sheet**
**Hedonic Rating Scale**

**Food Characteristics** - Appearance/colour, Taste/Flavour, Smell/Odour, Texture/Mouthfeel, Sweetness

**Score Value Assigned**:
Liked extremely = 9, like very much = 8, like moderately = 7, like slightly = 6, neither like nor dislike = 5, dislike slightly = 4, dislike moderately = 3, dislike very much = 2, dislike extremely = 1

| | Tester | | | | | Total Score | Average Score (total score ÷ number of testers) |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 20 | | |
| Appearance (colour, shape) | 9 | 9 | 9 | 8 | 7 | 165 | 8.3 |
| Taste/Flavour | 9 | 8 | 7 | 5 | 4 | 148 | 7.4 |
| Smell/Odour | 9 | 7 | 8 | 6 | 6 | 152 | 7.6 |
| Texture/ Mouthfeel | 4 | 7 | 7 | 5 | 6 | 124 | 6.2 |
| Sweetness | 7 | 7 | 8 | 8 | 6 | 150 | 7.5 |

# Chapter 7

## The Basics of Marketing Food Products

A little about thinking through your marketing plan. Some questions to ask yourself as you contemplate devising your products and some activities you need to engage in to guide your product development activities. It is important to begin thinking about the competition with the end in mind.

**What is your product?**

- Is my product significantly different from those currently on the market?
- Do I want to offer a new twist to an established product?
- What makes mine different from—or better than— all the others out there?
- Is it a product people would eat every day or something they would serve on special occasions?
- How would your product compete with similar products?
- What could you do better? Take cues from how others are selling your type of product.
- Is this something people want to purchase fresh, frozen, canned, or dried, ready-to-eat, partially cooked?
- Check out the ingredients, packaging, and labels of products that are similar to what you are considering.

**Who is your market?**

- Your target market is the group of people who are willing to buy your product.
- Learn about the people in the area where you want to sell your product.
- Look for age, gender, education, occupation, income level, and household type.

**Where will you sell it?**

- Major supermarkets
- Online
- At corner shops
- From food trucks

**What you will charge for it?**

- If you charge too much, no one will buy your product.
- If you charge too little, you will not be able to make a profit.
- You are more likely to find the right price if you have done a good job researching your product and your target market.

"You have to know your product and you have to know your customer." *–Pa. food entrepreneur*

**How will you convince potential customers to choose your product?**

- You will need to increase consumer awareness of your product and convince potential customers to buy it.
- Perhaps the most important way to communicate to the potential buyer is by ***effectively using your label***.
- Remember that the way your product ***is packaged*** sends a first impression of your product to the consumer. The colour, visual texture, choice of words, and overall design quality can directly influence sales.
- To select a design that will attract your market and fit in with your sales location, you must study how established food processors use their labels and packaging. Read about and look out for strategies that can be incorporated in your labels and your marketing strategy.

- How you use packaging to assist in promoting your product depends on your target market and your advertising budget since specialized labels can be quite costly.
- A simple label with just enough information to satisfy regulations may be suitable for the traditional or conservative customer looking for some everyday food at a roadside stand or local grocery store but a more elaborate and colourful design that includes detailed information about your company and your product may fit right in at an upscale specialty store that attracts affluent shoppers looking for a new food experience.
- Take risks!

**A bit more about packaging**

Packaging has been defined as the science, art, and technology of enclosing or protecting products for distribution, storage, sale, and use.

Packaging contains, protects, preserves, transports, informs, and sells

Your package should serve the following purposes

1. *Physical Protection* – from shock, vibration, compression, temperature, etc of the objects enclosed in the package.
2. *Barrier Protection* –from oxygen, water vapor, dust, etc.
3. *Information transmission* - about how to use the product, its contents, recycle, or dispose of the package or product is given on the package or label.
4. *Reducing theft* – by designing it so it cannot be re-closed or gets physically damaged with signs of opening aids in the prevention of theft.
5. *Convenience* –includes features which add convenience in distribution, handling, display, sale, opening, re-closing, use, and re-use.

6. *Marketing* – marketing, marketing…the package and labels can be used by marketers to encourage potential buyers to purchase the product.

**Samples of Packaging**

Here are some examples that may stimulate your thoughts about what you may use, depending on the product you are conceptualizing



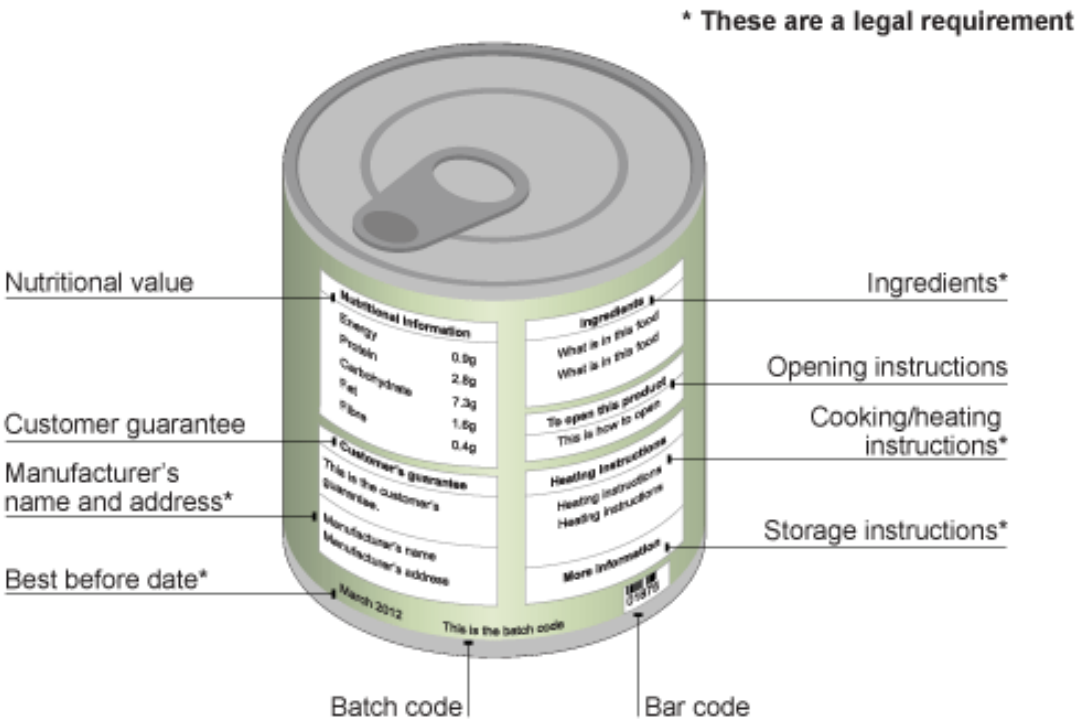


**Label Your Product**

A food label is a panel found on a package of food which contains a variety of information about the nutritional value of the food item.

Some standard information on most food labels, including

- serving size
- number of calories
- grams of fat, included nutrients
- a list of ingredients




**Ever heard about FOP…front of package labeling?

Let's explore this together. Be prepared to have a talk with the expert on the matter as part of this programme… one of the many benefits of this engagement

**Helpful Measurements and Conversions**

# METRIC CONVERSION TABLE

## VOLUME MEASUREMENT (DRY)

| | | |
|---|---|---|
| 1/8 teaspoon | = | 0.5 ml |
| ¼ teaspoon | = | 1 ml |
| ½ teaspoon | = | 2 ml |
| ¾ teaspoon | = | 4 ml |
| 1 teaspoon | = | 5 ml |
| 1 tablespoon | = | 15 ml |
| 2 tablespoons | = | 30 ml |
| ¼ cup | = | 60 ml |
| 1/3 cup | = | 75 ml |
| ½ cup | = | 125 ml |
| ¾ cup | = | 175 ml |
| 1 cup | = | 250 ml |
| 4 cups (1 quart) | = | 1 L |

## VOLUME MEASUREMENT (FLUID)

| | | |
|---|---|---|
| 1 fluid ounce (2 tablespoons) | = | 30 ml |
| 4 fluid ounces (½ cup) | = | 125 ml |
| 8 fluid ounces (1 cup) | = | 250 ml |
| 12 fluid ounces (1½ cups) | = | 375 ml |
| 16 fluid ounces (2 cups) | = | 500 ml |

**WEIGHT (MASS)**

| | | |
|---|---|---|
| ½ ounce | = | 15 g |
| 1 ounce | = | 30 g |
| 3 ounces | = | 90 g |
| 4 ounces | = | 120 g |
| 8 ounces | = | 225 g |
| 10 ounces | = | 285 g |
| 12 ounces | = | 360 g |
| 16 ounces (1 pound) | = | 450 g |

OVEN TEMPERATURES

| | | |
|---|---|---|
| $250^0$F | = | $120^0$C |
| $275^0$F | = | $140^0$C |
| $300^0$F | = | $150^0$C |
| $325^0$F | = | $150^0$C |
| $375^0$F | = | $190^0$C |
| $400^0$F | = | $200^0$C |
| $425^0$F | = | $220^0$C |
| $450^0$F | = | $230^0$C |

## Kitchen Charts - Conversions for U.S. and Metric

## U.S. CUPS TO GRAMS

**All-Purpose Flour and Confectioners' Sugar**

| | | |
|---|---|---|
| 1/8 cup | = | 15 grams |
| 1/4 cup | = | 30 grams |
| 1/3 cup | = | 40 grams |
| 3/8 cup | = | 45 grams |
| 1/2 cup | = | 60 grams |
| 5/8 cup | = | 70 grams |
| 2/3 cup | = | 75 grams |
| 3/4 cup | = | 85 grams |
| 7/8 cup | = | 100 grams |
| 1 cup | = | 110 grams |

**Brown Sugar**

| | | |
|---|---|---|
| 1/8 cup | = | 25 grams |
| 1/4 cup | = | 50 grams |
| 1/3 cup | = | 65 grams |
| 3/8 cup | = | 75 grams |
| 1/2 cup | = | 100 grams |
| 5/8 cup | = | 125 grams |
| 2/3 cup | = | 135 grams |
| 3/4 cup | = | 150 grams |
| 7/8 cup | = | 175 grams |
| 1 cup | = | 200 grams |

**Butter or Margarine**

| | | |
|---|---|---|
| 1/8 cup | = | 30 grams |
| 1/4 cup | = | 55 grams |
| 1/3 cup | = | 75 grams |
| 3/8 cup | = | 85 grams |
| 1/2 cup | = | 115 grams |
| 5/8 cup | = | 140 grams |
| 2/3 cup | = | 150 grams |
| 3/4 cup | = | 170 grams |
| 7/8 cup | = | 200 grams |
| 1 cup | = | 225 grams |

**Cake Flour**

| | | |
|---|---|---|
| 1/8 cup | = | 10 grams |
| 1/4 cup | = | 20 grams |
| 1/3 cup | = | 25 grams |
| 3/8 cup | = | 30 grams |
| 1/2 cup | = | 50 grams |
| 5/8 cup | = | 60 grams |
| 2/3 cup | = | 65 grams |
| 3/4 cup | = | 70 grams |
| 7/8 cup | = | 85 grams |
| 1 cup | = | 95 grams |

**Flaked Coconut**

| | | |
|---|---|---|
| 1/8 cup | = | 10 grams |
| 1/4 cup | = | 20 grams |
| 1/3 cup | = | 25 grams |
| 3/8 cup | = | 30 grams |
| 1/2 cup | = | 40 grams |
| 5/8 cup | = | 45 grams |
| 2/3 cup | = | 50 grams |
| 3/4 cup | = | 60 grams |
| 7/8 cup | = | 65 grams |
| 1 cup | = | 75 grams |

**Granulated Sugar**

| | | |
|---|---|---|
| 1/8 cup | = | 30 grams |
| 1/4 cup | = | 55 grams |
| 1/3 cup | = | 75 grams |
| 3/8 cup | = | 85 grams |
| 1/2 cup | = | 115 grams |
| 5/8 cup | = | 140 grams |
| 2/3 cup | = | 150 grams |
| 3/4 cup | = | 170 grams |
| 7/8 cup | = | 200 grams |
| 1 cup | = | 225 grams |

**Grated Coconut**

| | | |
|---|---|---|
| 1/8 cup | = | 10 grams |
| 1/4 cup | = | 25 grams |
| 1/3 cup | = | 35 grams |
| 3/8 cup | = | 40 grams |
| 1/2 cup | = | 50 grams |
| 5/8 cup | = | 60 grams |
| 2/3 cup | = | 65 grams |
| 3/4 cup | = | 75 grams |
| 7/8 cup | = | 85 grams |
| 1 cup | = | 100 grams |

**Slivered Almonds**

| | | |
|---|---|---|
| 1/8 cup | = | 10 grams |
| 1/4 cup | = | 20 grams |
| 1/3 cup | = | 25 grams |
| 3/8 cup | = | 30 grams |
| 1/2 cup | = | 40 grams |
| 5/8 cup | = | 50 grams |
| 2/3 cup | = | 55 grams |
| 3/4 cup | = | 60 grams |
| 7/8 cup | = | 70 grams |
| 1 cup | = | 80 grams |

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