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Homemade Food Products Processing Techniques

**“INCREASING FOOD LITERACY COMPETENCIES OF
ADULTS”**

2020-1-TR01-KA204-092828



2022



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FOODTR

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TAGEM
AR-GE & İNOVASYON



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PREFACE

“Increasing Food Literacy Competencies of Adults” Project is coordinated by Central Research Institute of Food and Feed Control from Turkey and funded by the Erasmus+ Program of the European Union in the field of Strategic Partnership for Adult Education. Project partners are the General Directorate of Agricultural Research and Policies, Bursa Provincial Directorate of Agriculture and Forestry, Bursa Metropolitan Municipality (TARIMAS) and Bursa Technical University (BTU) from Turkey. Overseas partners of the project are National Technology Center for Food and Canning (CTC) from Spain, Széchenyi István University (SZE) from Hungary and Food and Fermentation Technologies Center (TFTAK) from Estonia.

Food literacy is having the knowledge, skills and attitudes necessary to access and evaluate the information related to food and nutrition, to make appropriate choices for a healthy and balanced diet, to prevent food waste and to have positive consumption attitudes towards sustainable food systems. With the "Increasing Food Literacy Competencies of Adults" project, it is aimed to increase the food literacy skills of individuals, to ensure their access to healthy and reliable food, to understand the importance of food literacy within the society.

“Homemade Food Products Processing Techniques” will give information and recommendations to produce safe food at home directed to consumers, local farmers, homemade food entrepreneurs, parents, housewives, retired people to improve their incomes by selling this homemade food. The practical guide aims to be a useful and easily understandable tool, complementary with other products of the project for target groups and aims to deliver key recommendations for the production of safe homemade food.

1. Introduction

Food has three main functions:

- Physiological: Growth and development of the human body, provision of energy to the body and to repair and maintenance of cells.
- Social: Food is a symbol of hospitality and friendship throughout the world, it creates a relaxed and friendly atmosphere, it is used as an expression of friendship and social acceptance and it is closely linked to our culture and main celebrations (familiar, religious, national days, etc.).
- Psychological: Food not only satisfies hunger, also gives happiness and reminds our ancestors and traditions. Food is linked to emotions. People often eat more when they are tense or happy. People feel reasonably secure when they have enough food stored up.

If your olives, bread, marmalades or canned tomatoes are famous among your family or friends, a home-based food business might be a great way to earn some extra money while doing something you enjoy. But even though making marmalades or canning your tomatoes or fruits may seem more fun than work, a home-based food business is still a business where you have to avoid food risks. As with any business, you need to plan what utensils and equipments you need, to research the best recipes and preserving methods and to be sure that you comply with the legislation or rules of your country to assure food safety.



The most common and less “dangerous” homemade foods are those that preserve fruit and vegetables. This is why this output will be focussed in these food products

2. Classification of food

2.1 Basic categories of food

All the food we eat can be divided into seven basic categories:

- A) Vegetables
- B) Fruits
- C) Grains, legumes, nuts and seeds
- D) Meat and poultry
- E) Fish and seafood
- F) Dairy foods
- G) Eggs

A) Vegetables

Vegetables are some of the most important foods we need to consume regularly. Depending on which part of the plant is consumed, the food in the vegetables category is divided into a number of subcategories. There are root vegetables, bulb vegetables, stem, leafy, and podded vegetables.

Some ‘vegetables’ such as tomatoes, cucumbers, and eggplant are actually types of fruit botanically, but in the culinary world are eaten as vegetables.



Root vegetables are some of the most commonly consumed plants. In many cultures, potatoes are an important source of carbohydrates. Potatoes can be boiled, fried, sauteed, or mashed. ‘French fries’ are one of the most popular foods. Also, most restaurants serve potatoes as a side dish.

Bulbous vegetables are also important foods in nearly every type of cuisine. Chopped garlic or onions are often fried gently and form the basis of many French, Chinese, Indian, and Mediterranean dishes.

Other important vegetables included in this category are green leafy vegetables. Healthy foods such as fresh lettuce, spinach, and other greens can be mixed with tomatoes, cucumbers, olive oil, and lemon juice to create a Mediterranean salad. In Asian cuisine, bok choy, Chinese lettuce, broccoli, or kale are often stir-fried with other vegetables and meat.

Bamboo shoots are a type of stem vegetable used extensively in Asian cooking. European and North American cuisine use stem vegetables such as asparagus and celery.

Some types of root vegetables are also used to flavor food. For example, ginger and turmeric are often used in Indian, Chinese, and other ethnic dishes. The spicy roots are chopped, grated, or sliced and fried along with onions and garlic for color and flavor.

It is also important to remember that many plants have stems and leaves that are used as flavoring herbs. For example, fresh and dried oregano, thyme, and basil are the main herbs in Italian and Greek cooking. However, tarragon, bay leaves, and chives are common in French cuisine. Some green herbs such as cilantro (coriander) are popular in cuisines such as Mexican, Thai, Chinese, and Latin American.

Leaves from the *Camellia sinensis* shrub are used to make different kinds of tea such as black tea, oolong tea, jasmine tea, and green tea.

B) Fruits

Eating a variety of fruits will help you get the necessary nutrients your body needs. Foods in the fruits category are not just delicious but they are also healthy. Various types of fruit should be an important part of everyone's diet as they contain vitamins, minerals, and fiber. Even a simple apple is very rich in nutrients. Different types of fruit are common in all food cultures. We can divide the fruits into various categories such as tropical, citrus, drupes (fruit with a single hard stone), berries, pomes (such as apples), and pepos (any fleshy watery fruit of the melon or cucumber type, with numerous seeds and a firm rind).



There are also some types of fruit that we commonly think of as vegetables or savory foods. For example, avocados, olives, and tomatoes are botanically ‘fruits’ commonly used as part of a main meal, not a dessert.

One of the most common ways to eat fruit is raw. There is nothing easier than peeling a banana, orange, mango, or pineapple and enjoying the succulent, sweet tasty flesh. You can also chop up fresh fruit to create a tasty fruit salad. Variations of fruit salads are enjoyed in most cultures.

Apart from eating fresh fruit, you can also cook fruit and prepare it in many ways. Apple pie with a tasty pastry crust is a common dessert in American cuisine. Apart from scrumptious pastry desserts, a very tasty dessert in French and British cuisine is a poached pear. Or, a delicious warm German strudel with creamy Italian ice cream is a perfect combination.

Because various types of fruits are so versatile, they are commonly found in other foods. For example, chopped dates, cherries, raisins (dried grapes), and citrus peel are often used in baked goods or in muesli as a breakfast food. You can also add a few berries for decorations on desserts.

One of the best ways to get all the healthy benefits from fruits is by juicing or blending them. Putting a banana, some blueberries, or any other kind of fruit with plain yogurt and milk in a blender can create a healthy fruit smoothie.

Some exotic food cultures also use fruits along with savory dishes. For example, mango chutney and lime pickle are common condiments in Indian cuisine. Avocado (botanically a fruit) is the main ingredient of Mexican and Tex-Mex guacamole. Different types of Chinese cuisine such as Hunan and Sichuan commonly use different fruits in spicy dishes.

C) Grains, Legumes, Nuts, and Seeds

Beans and legumes are types of foods rich in fiber and plant based protein. Grains form the basic food of most cultures around the world. This food category includes grains such as wheat, oats, rye, and barley that are common in Europe and North America. In other countries, rice and corn are commonly used to accompany dishes or as flour.

Grains are so important in most food cultures that they are eaten at breakfast (porridge or cornflakes), lunch (wholemeal, white, rye, or multigrain bread sandwich), or in the evening (tortillas, noodles, or rice). Milled grains such as wheat flour are the basis for popular foods such as pastries, bread, and flatbreads. Rice porridge (pudding) is commonly consumed in Asian cuisine as a breakfast food or as a dessert in European cultures.

Legumes are a family of plants that include beans and chickpeas. These are an important basic food in most cuisines around the world. For example, chickpeas are used to create hummus which is a staple food in Lebanese, Greek, and Turkish cuisine. Fermented beans are used to make soy sauce and some Chinese dishes.



Corn is common food in many Mexican dishes and used to make taco shells. Also, stews, casseroles, and other types of food can contain beans or lentils to reduce the amount of meat consumed.



Beans from the Coffee plant are also roasted to create one of the world's most popular beverages: coffee. And remember that chocolate is the product of cocoa beans!

Foods in the nuts and seeds category are not just a great source of fiber and vitamin E, they are also very tasty. In Indian, Moroccan, and some Asian dishes, cumin, coriander, and fennel seeds are toasted and ground before being used to spice up food. In some Eastern European cuisine, caraway seeds are added to bread or even cheese. Some seeds like sesame or poppy seeds are used on bread rolls and bagels to add texture and flavor.

Apart from being a tasty snack, nuts are also a good source of oil. For example, walnut, peanuts, almonds, and coconut oils are used in cooking. Nuts are also popular ingredients in desserts where they go well with chocolate, ice cream, and cakes.

D) Meat and Poultry

Meat and poultry are important foods in many cuisines. There are very few cultures where meat and poultry are not important types of food. Some animals such as cows, pigs, chickens, and lamb are raised specifically for their meat. Others, such as game birds, wild boar, rabbits, and deer, are often hunted. For cooking, meat can be minced, cut into chops, diced, sliced, or roasted as large cuts.



In many Western countries, one of the best kind of food to eat is a rare to medium grilled steak. Even though European countries tend to eat too much red meat such as beef, hamburgers, meatballs and sausages etc.

Deep-fried chicken drumsticks or wings are also a popular Sunday lunch in Southern states in the US. Of course, turkeys or chickens roasted whole in the oven are a traditional holiday food in many countries.

Many food cultures also include cured meats in their culinary delicacies. For example, Spain has dry-cured Jamon or Serrano ham, Italy has Parma ham, and in American and British cuisine, bacon is a popular breakfast dish.

When it comes to different cuisines in the world, each region has a preference for meat. Lamb and goat meat are popular in the Mediterranean region, poultry is the meat of choice in Asia, and Latin American food culture mostly revolves around beef.

Some delicacies in French cuisine use the liver of some birds such as duck or goose to create pate known as foie gras. Other parts of the birds and animals used in cooking include the heart, kidneys, or tongue.

E) Fish and Seafood

Seafood is type of popular food around the World. Seafood is another important category of food. This food category includes fish, shellfish such as crab and lobster, and squid or octopus. Most types of fish sold in shops are caught at sea. However, fish farming is also a common way to raise salmon, carp, rainbow trout, mussels, oysters, and clams.

Most countries that have coastal regions have a distinct fish culture. For example, in Mediterranean countries, whole grilled, baked, or steamed fish is often on the menu. Also, deep-fried squid rings are popular as an appetizer and are even sold in fast-food restaurants.



In fancy restaurants, choice fillets of fish including salmon, tuna, or cod are usually on the menu. In some countries, deep-fried fish and fries (chips) are an integral part of the food culture. Fish can also be chopped for stews or made into fish cakes and fish curries.

Many Eastern European countries smoke various types of fish to preserve them. Also, caviar is a delicacy in Russian cuisine and an expensive addition to any fish-based meal.

In Asian countries, people tend to eat more fish than meat. For example, in Thai cuisine, green fish curry is a popular choice. Also, Chinese dishes include pan-fried fish or steamed fish in Cantonese cuisine.

One of the strongest fish cultures in Asia is in Japan. Slices of raw fish or slightly-salted fish are delicately cut and served with rice and nori (seaweed) rolls. Popular types of seafood or fish for sushi include tuna, salmon, halibut, clams, scallops, or sea bass.

This Japanese culture has been successfully exported all over the world. Now many countries have their own take on sushi dishes that originated in Japan.

Apart from fish, other types of seafood are also popular, especially in coastal towns. For example, Alaskan crab such as the King crab is a sought-after seafood delicacy. Also, Blue crab is popular in American and Asian cuisine. Prawns are part of Spanish cuisine and a basic ingredient of paella. Other delicacies from the sea include oysters, scallops, razor clams, and lobster.

F) Dairy Foods

Dairy foods are made from the milk of animals such as cows, sheep, goats, and even camels and buffalo. Milk is processed in particular ways to create types of food that are the central part of many cuisines around the world.

The most well-known dairy product is cow's milk. This common food can be sold full-fat, semi-skimmed, or skimmed, depending on the fat content. Cream is a by-product of milk and this can be used to make butter or whipped up to use in desserts or fill pastries.



When it comes to types of cheese, Spain, France, Switzerland and other European countries have an important cheese culture. For example, soft French cheeses such as brie or Camembert are popular favorites. Hard, aged cheese from Italy such as Parmigiano-Reggiano tastes delicious when grated over pasta dishes, and Manchego cheese from Spain has a well known taste.

Mozzarella is a type of soft fresh cheese made from Buffalo's milk. This is an important food in American and Italian cuisine as it is a favorite topping on pizzas. Feta cheese is made from sheep's milk and is synonymous with Greek cuisine.

One healthy type of dairy product is plain or natural yogurt. This is a fermented milk product that contains healthy bacteria. Natural yogurt is a popular accompaniment to many Turkish dishes, as well as being common in Moroccan and Mediterranean dishes. Milk kefir is a type of yogurt drink that is popular in Eastern European and Russian cuisine.

For many people, one of the most popular foods in the world is ice cream. This delicious frozen dessert comes in all flavors. Ice cream can contain nuts, dried fruit, fresh fruit, or chocolate. Also, non-dairy alternatives to ice cream can be made from coconut milk or almond milk. Or, you could try to eat sorbet – a type of frozen fruit juice similar to ice cream.

G) Eggs

Fried eggs or eggs tortilla on toast is a popular breakfast food in many countries, but there are many more types of cooking eggs. Some people group together eggs and dairy or eggs and meat, as both are animal products and are high in protein. However eggs are not considered a dairy product, as dairy is produced from milk whereas eggs come from birds. Also non-

fertilized eggs are not considered meat as they don't involve animal flesh used for eating. This is why eggs are a food category by themselves.



Eggs are commonly used in baking, quiches and omelets (tortilla) and they are a versatile type of food. Eggs can be eaten boiled, fried, poached, scrambled and even raw such as in mayonnaise.

The Italian pasta carbonara is a delicious pasta dish made with egg, hard cheese, cured meat, and black pepper. The Tunisian egg brik is a popular dish where a whole egg is wrapped in a triangular pastry pocket with various fillings. Croque-madame and croque-monsieur sandwiches are served in many French cafes with a poached egg on top, similar to eggs Benedict that are commonly served in American breakfast or brunch.

2.2. According to their processing

Studies show that when food has been processed the nutrient availability in the small intestine is affected. This is because the plant properties and animal cells have been altered. Issues arise when ultra-processed foods begin replacing unprocessed and minimally processed foods, which contain vital nutrients, in your diet.

Moreover, new research studies suggest a correlation between the consumption of ultra-transformed foods and an increased risk of developing cancer. On the other hand, cheese and fresh bread are both processed but considered healthy foods.

In the report "The UN Decade of Nutrition, the NOVA food classification and the trouble with ultra-processing" 2017, it is recommended the adoption of a system of grades from 1 to 4 to allow us to simply compare the degree of processing of food products.

So, the NOVA food classification divides the foods we buy into four groups, from unprocessed to ultra-processed – but it may not always be clear which is which when you are in the supermarket.

Group one: Unprocessed and minimally processed

Unprocessed foods include fruit, vegetables, nuts, seeds, grains, beans and natural animal products such as eggs, fish and milk.

Minimally processed foods may have been dried, crushed, roasted, frozen, boiled or pasteurized, but contain no added ingredients. They include frozen fruits and vegetables, frozen fish, pasteurized milk, 100% fruit juice, no-added-sugar yoghurt, spices and dried herbs.

Group two: Processed culinary ingredients

Processed culinary ingredients include oils, fats such as butter, vinegars, sugars and salt. These foods are not meant to be eaten alone, but usually with foods in group one.

Group three: Processed

Processed foods are products that are usually made using a mix of group one and two ingredients. They include smoked and cured meats, cheeses, fresh bread, bacon, salted or sugared nuts, canned fruit in syrup, beer and wine. The main purpose of the processing is to prolong the food's life or enhance its taste.

Group four: Ultra-processed

Ultra-processed foods usually contain ingredients that you wouldn't add when cooking homemade food. You may not recognise the names of these ingredients as many will be chemicals, colourings, sweeteners and preservatives. The most commonly eaten ultra-processed foods are: Industrialized bread, Pre-packaged meals, Breakfast cereals, Sausages and other reconstituted meat products, industrial confectionery, industrial chips, etc.

It can be not easy to identify food that has been ultra-processed because in some cases the same type of food could be minimally processed, processed or ultra-processed, depending on how it's been made. For example:

- Bread made from wheat flour, water, salt and yeast is processed, but if the producer adds emulsifiers or colourings then it becomes ultra-processed.

- Plain oats, corn flakes and shredded wheat are minimally processed, but when the manufacturer adds sugar, flavourings or colourings, they become ultra-processed breakfast cereals.
- Plain yogurt is minimally processed, but when the producer adds sweeteners, preservatives, stabilizers or colourings it becomes ultra-processed.

How to recognise ultra-processed food:

- A long list of ingredients, especially if it includes ingredients only used in factory-made food (and not in home-made food), may indicate that a food is ultra-processed. A product containing more than five ingredients is likely to be ultra-processed.
- Unrecognizable ingredients could be additives. Most of them are probably safe, but negative health effects have been demonstrated for a few of them.
- High fat, sugar and salt content is common in ultra-processed food.
- ‘Fresh food’ with a long shelf life may indicate the presence of preservatives. Long-life milk, which has been pasteurized at an ultra-high temperature (UHT) and doesn’t contain preservatives and so isn’t classified as ultra-processed, rather minimally processed. Check the label for preservatives such as sodium benzoate, nitrate and sulphite, BHA and BHT.
- Aggressive and intensive marketing and branding. It has never designed a high-profile marketing campaign for apples and pears.

It is really difficult to draw firm conclusions from the different studies related with the risks of the “ultra-processed” foods, partly because this category is too large, ranging from packet soups to chocolate bars. Anyway, only a moderate proportion of our diet should belong to that category.

2.3. Depending on their acidity

The pH value of a food is a direct function of the acidity of the food (more acidity, lower pH value). Acids present in foods give food their distinct sour flavor. Thus, pH may be defined as a measure of free acidity.

pH: Acidity is measured by a parameter called pH, that varies between 1 and 14, corresponding 1 to the more acidic and 14 to the most basic values. Most microorganisms multiply better in foods with a pH between 4 and 9. Some foods are more acidic than others. For example, lemon and orange are more acidic than apple or milk.

A **low-pH food** is a high-acid food and vice versa. The range of pH is commonly considered to vary from zero to 14. A pH value of 7 is neutral, because pure water has a pH value of exactly 7. Values less than 7 are considered acidic, while those greater than 7 are considered basic or alkaline.

A few foods, such as egg whites, sweet corn and some baked goods may be basic. Most foods are naturally acidic, with a pH value less than 7.0. Even so, the pH value of a particular food is so important that this value determines the type of processing needed to safely preserve it.

Water is one of the most important factors controlling the rate of deterioration of food, by either microbial or non microbial effects. Water activity (*a_w*) is used for the preservation of food, stabilization of the food supply, and developing different types of shelf-stable foods.

The food will be classified depending on the pH value of the food relative to the **pH value 4.6**, and the *a_w* is equal to or less than 0.85. The three classifications are acid foods, acidified foods, and low-acid foods. Acid foods are those that have a natural pH of 4.6 or below. Low-acid foods are those that have a natural pH above 4.6 and acidified foods are those with some added acidifying agent to obtain a pH below 4.6.

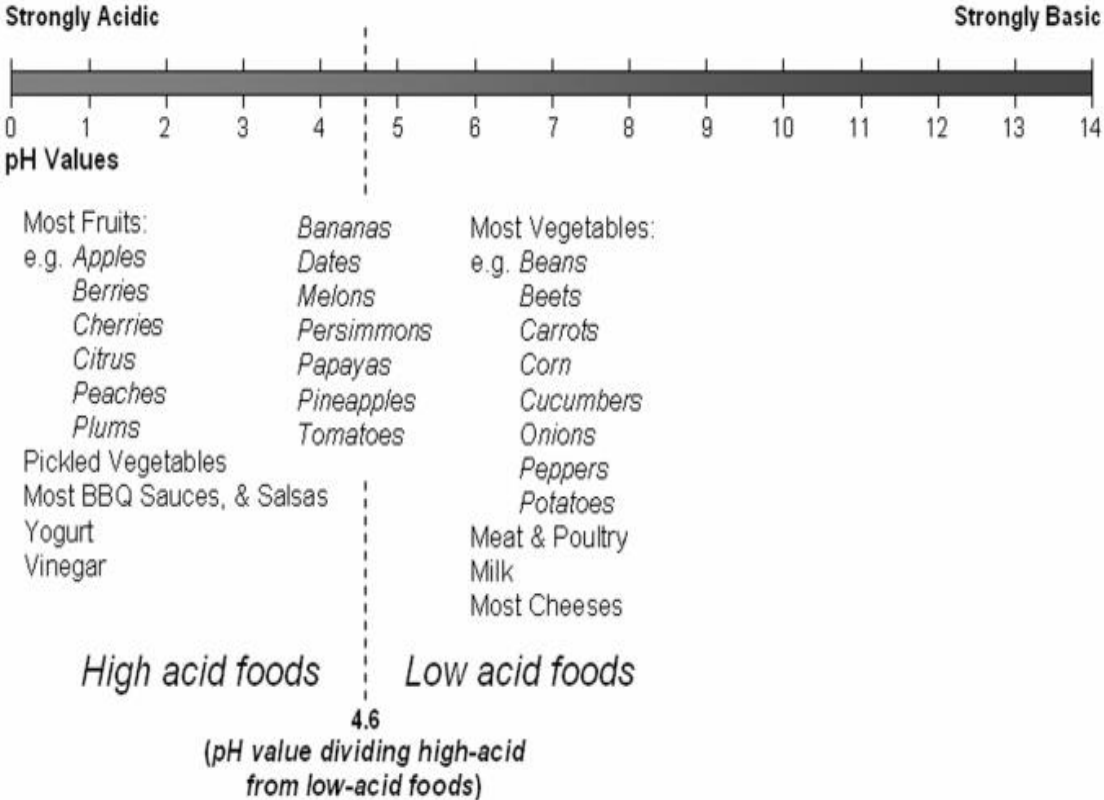


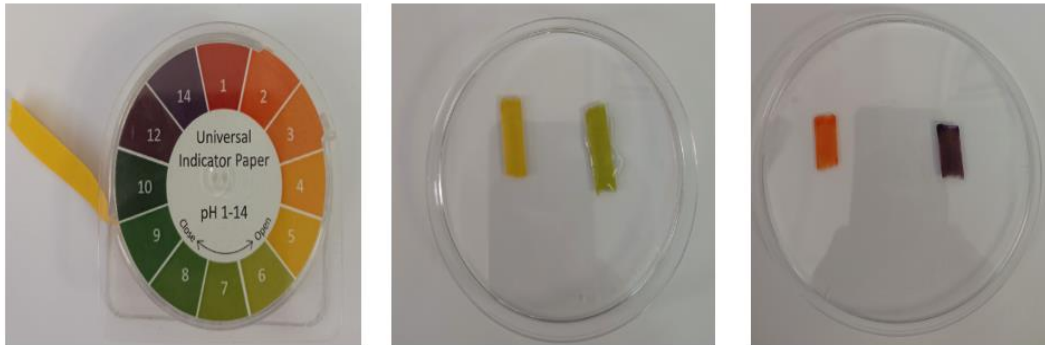
Figure 1. Approximate pH values of different foods. Source: The Importance of Food pH in Commercial Canning Operations. William McGlynn. Oklahoma State University

pH value of 4.6 is critical because of one particular bacterium, *Clostridium botulinum*, which produces a dormant form called a spore. These spores are extremely hard to kill and may survive for many years, waiting for a chance to grow. An improperly processed can of food provides an ideal environment for *Clostridium botulinum* spores, since the bacteria cannot survive in the presence of oxygen. ***Clostridium botulinum* produces an extremely potent neurotoxin among the deadliest poisons known.** Trace amounts of this toxin, which causes the food-borne illness known as botulism, are enough to kill. Fortunately, **the spores of *Clostridium botulinum* will not grow if the pH of a food is 4.6 or less.** For low-acid foods with a pH value greater than 4.6, these spores must be killed by heating during the canning process. Because these spores are very heat resistant, canned low-acid foods must be pressure-cooked at high temperatures for long periods of time. Temperatures of 121°C or greater are commonly used and process times may range from 20 minutes to several hours. Most vegetables, meat and poultry foods fall into the low-acid food category.

On the other hand, the high-acid foods include jams and jellies, pickles and most fruits. Because there is no fear of *Clostridium botulinum* growth, these foods require much less heating than low-acid foods. To be safe, such foods need only to reach pasteurization temperatures. For foods with a pH value of 3.5 or less, 80°C is a sufficient pasteurization temperature. Those foods with a pH range between 3.5 and 4 have a recommended pasteurization temperature of 85°C.

For foods with a pH range of 4 to 4.3, the recommended pasteurization temperature rises to 91°C. Foods with a pH value of 4.3 to 4.5 have a recommended pasteurization temperature of 99°C. These pasteurization temperatures are sufficient to kill all microorganisms except for bacterial spores. Since the spores will not grow because of the low pH, the food is considered commercially sterile. A high-acid food will therefore not need the high-temperature process a low-acid food requires. A high-acid food may typically be processed in a hot water or steam bath at atmospheric pressures – no pressure-cooking is required. For this type of processing, the sealed container is heated in the bath until the internal temperature of the slowest heating point reaches the recommended pasteurization temperature for two to 10 minutes, depending on the pH value and other properties of the food. The time required to reach this temperature will vary depending on several factors.

pH values can be easily measured with the Universal Indicator Paper. It is a strip of coloured paper which changes colour to red if the solution is acidic and to blue, if the solution is basic. The strip can be placed directly onto a surface of a wet substance or few drops of the solution can be dropped onto the universal indicator paper.



Universal Indicator Paper

Left pH 4, right pH 7

Left pH 2, right pH 12

Figure 2. Universal pH indicator paper

Microorganisms, including yeasts, molds and bacteria are sensitive to the pH value of the food. Very low or very high pH values prevent microbial growth. As a practical matter, no unprocessed food has a pH value high enough to offer much preservative value.

Many foods do have pH values low enough to offer some protection against microbial growth. However, very few foods have pH values low enough to completely inhibit the growth of microorganisms. For almost all foods, some combination of microbial controls, such as heat processing, refrigerated or frozen storage, or drying must be used to help preserve the food. The most common of these is heat processing or canning. Canned foods may be defined as any food sold in a hermetically sealed (water and air-tight) container at non refrigerated temperatures.

2.4. According to different properties

Food can be classified in accordance to their chemical properties, to their function, to their mass and to their nutritive value.

Table 1. Classification of foods

By chemical nature	Carbohydrates, Protein, Fats, Vitamins, Minerals, Dietary Fiber, Water
By functions in the body	Energy giving Body building Protective
By chemical properties	Organic Inorganic
By mass	Macro Nutrients Micro Nutrients
By origin	Plant Foods Animal Foods
By nutritive value	12 categories

Cereals and millets, Pulses, Nuts and oil seeds, Vegetables, Green leafy vegetables, Non-leafy vegetables, Roots and tubers, Fruits, Milk and milk products, Animal foods (meat, fish, liver, egg, etc), Carbohydrate foods, condiments and spices.

According to the chemical nature: carbohydrates, vitamins, proteins, dietary fiber, fats, water and minerals.

According to their function in the body: **Energy giving foods** (the carbohydrates, fats and the protein are considered as calorie nutrients, so that the body can perform the necessary functions. Rice, chapati, bread, potato, sugar, oil, butter and ghee are examples of energy giving foods), **Body building foods** (Foods such as proteins, fats and carbohydrates are also called body-building foods. They are the nutrients that form body tissues. Fish, meat, chicken, eggs, pulses, nuts and milk are some body building foods) and **Protective foods** (Vitamins and minerals are the nutrients that function to regulate body processes. They protect us from various diseases. Fruits and vegetables are some examples. Therefore we must eat these regularly).

According to chemical properties: **Organic** (Nutrients that contain the element of carbon are called as organic nutrients: carbohydrates, lipids, proteins and vitamins.) and **Inorganic** (Nutrients that do not contain carbon element are called as inorganic nutrients: water and minerals).

According to its mass depending on the quantity necessary for cells and organisms are classified as: **Macronutrients** (are required in large quantities daily: proteins, carbohydrates

and fats. They are the basis of any diet) and **Micronutrients** (are needed in small quantities, usually in amounts less than milligrams: vitamins and minerals. They are involved in regulating metabolism and energy processes).

According to its origin: Depending upon the origin of food it has been classified as **animal food** sources and **plant food** sources.

According to its nutritive value: Cereals and millets, Pulses, Nuts and oil seeds, Vegetables, Green leafy vegetables, Non-leafy vegetables, Roots and tubers, Fruits, Milk and milk products, Animal foods (meat, fish, liver, egg, etc), Carbohydrate foods, condiments and spices.

2.5. Balanced diet

The science of nutrition is mainly concerned with defining the nutritional requirements for the promotion, protection and maintenance of health in all groups of the population. The knowledge of nutrition has a direct impact on the maintenance of health of an individual. The concern of today's health is the maintenance and restoration of health.

The term "Balanced Diet" refers to a diet that provides all of the nutrients the body needs, without too much of any one component. A balanced diet contains all types of food in the right proportion. It means a balanced diet contains the right amount of carbohydrate, protein, fat or oil, vitamins, mineral salts and water depending on the desired needs of the body. An unbalanced diet causes malnutrition. Malnutrition can be so mild that a person suffers no ill effects, but it can also be so severe that it causes serious illness or even death.

The substances which are present in the food and consumed in our body for its vital functions are called nutrients. According to the World Health Organization (WHO), these nutrients must come from food, and they are vital for disease prevention, growth, and good health.

There are seven major classes of nutrients: carbohydrates, fats, dietary fiber, minerals, proteins, vitamins, and water. These nutrient classes can be categorized as either macronutrients (needed in relatively large amounts) such as carbohydrates, fats, and proteins, or micronutrients (needed in smaller quantities) such as individual vitamins and minerals like calcium, zinc, and vitamin B6.

2.6. The Food Pyramid

The NAOS Strategy (Nutrition, Physical Activity and Prevention of Obesity), developed by the Spanish Agency of Food Safety and Nutrition, is a health strategy that, following the line of

policies set by international health organizations (World Health Organization, European Union), has as its goal to reverse the trend in the prevalence of obesity by promoting healthy eating and physical activity, thereby substantially reducing the high rates of morbidity and mortality attributable to noncommunicable diseases.

The Spanish NAOS Pyramid shows the different food groups, classified for recommended frequency of consumption. In the same level – what means the same frequency – they can be seen in diverse types of physical activities such as walking, cycling, swimming, playing, climbing stairs, walking dogs, etc.

It is the first Pyramid to include such recommendations frequencies, both for nutrition and for physical activity, merging them in a single picture to encourage food habits and lifestyle in line with the Mediterranean Diet. The objectives are to foster physical activity to improve health and prevent obesity.



Figure 3. Spanish NAOS Food Pyramid

3. Producing food at home: general tips

3.1. Tools, utensils and equipments

Selecting the right items to equip your kitchen can be a difficult task. It is needed to make a difference between a kitchen utensil, a kitchen tool and kitchen equipment.

All of these kitchen items are used to aid food preparation. By definition, according to Merriam-Webster, the defining characteristics are:

- **Utensil:** an implement, instrument, or vessel used in a household and especially a kitchen. A useful tool or implement.
- **Tool:** a handheld device that aids in completing a task.
- **Equipment;** the implements used in an operation or activity.

According to their definition, kitchen utensils and kitchen tools are virtually interchangeable. As described above, a utensil is defined as a tool. So, the term utensil will be used to describe both.

UTENSILS

A kitchen utensil is a small hand held tool used for food preparation. Common kitchen tasks include cutting food items to size, heating food on an open fire or on a stove, baking, grinding, mixing, blending, and measuring; different utensils are made for each task. A cooking utensil is a utensil for cooking.

The handheld implements in the kitchen like forks, spoons, knives, tongs, whisks, and turners are utensils used for eating, stirring, serving, whisking, slicing, chopping, grating, and peeling. Kitchen utensils like these aid in your ability to handle both raw and cooked ingredients.



Figure 4. The most common utensils

Now, think about vessels with handles in your kitchen like ladles, measuring cups, funnels, squeezers, and sifters. These utensils are used for measuring, serving, transferring, pressing, and sifting. Kitchen utensils like these aid in your ability to transfer both wet and dry ingredients.



Figure 5. Squeezer

Some kitchen utensils are used as multipurpose items. This gives you the versatility to purchase one type of utensil and use it for many tasks. The spatula, for example, can be used for stirring, turning, scraping, beating, and scooping foods.



Figure 6. Other utensils

Other kitchen utensils are used for a specific purpose, so you have the right tool to complete the task efficiently. A good example is an egg separator because it is explicitly designed to allow the egg white to separate cleanly from the yolk.

Devices like kitchen timers, meat thermometers, and scales take the guesswork out of cooking. These utensils allow you to cook and bake with precision. Heat treatment is essential to eliminate all microorganisms that can ruin our preserves. Pasteurization, which is achieved

simply by boiling the jars, is sufficient for preserves in the medium term of previously cooked foods such as fried tomatoes or jams, but to more safely dull all types of food it is preferable to opt for sterilization, for which it is necessary use an autoclave or pressure cooker. A pot with a thermometer or electric sterilizer is the ideal tool. Infrared (laser) thermometers are used to measure the surface temperature of food and equipment.



Infrared thermometer



Digital thermometer

Figure 7. Thermometers

It is extremely important to weigh the correct amount of product, of ingredients to preserve the product and to ensure consistency between different batches. The range of measurement and precision of a balance can vary from several kilograms to a few grams. If a cooking weight is not available, cups or tins that are found in the house should be used. They should be labeled and marked with the quantities. Remember that different materials (sugar, pectin, flour, vinegar, etc.) will not weigh the same amount. Bottles or jars of a known volume can be used to measure out ingredients. Plastic bowls are better to use than metal ones, especially for acidic fruit products. Plastic spoons are better than wooden spoons as they are easier to clean.



Figure 8. Cooking weight

The great enemy of home canning is cross contamination, so it is important to have clean all the instruments that we are going to use. Having good kitchen towels, which do not accumulate dirt, is essential to safely handle food, utensils, equipment and all containers.

Funnels are essential for good packaging. Not only does it greatly facilitate the task, it also reduces the chances of cross contamination.



Figure 9. Funnels

If cherries, plums or olives are going to be preserved, a deboner will be needed to remove the pit. To make a canned fried tomato sauce or any other kind, it is essential to have a food processor to get the right texture. Smashers must be made of stainless steel, comfortable and easy to use. It has sieving discs to prepare purees, soups and compotes with different granules.



Figure 10. Smasher

Selecting utensils for your kitchen is all about understanding what you need to support your cooking techniques. Made from diverse materials, utensils must be durable and capable of withstanding extreme temperatures as required.

EQUIPMENTS

Kitchen equipment typically refers to the larger, either manual or automatic, implements in your kitchen. These are appliances that aid in processing, cooking, baking, and freezing food.



Figure 11. Semi industrial kitchen

The most common kitchen equipment in household kitchens includes your refrigerator, freezer, oven, stovetop, and microwave. These are the big implements that you operate to keep food safe and edible.



Figure 12. Ceramic hob and oven



Figure 13. Fridge



Figure 14. Microwaves oven



Figure 15. Dishwasher

Depending on your preferred cooking techniques, kitchen equipment covers an array of electric and manual appliances. Blenders, stand mixers, food processors, ice cream makers, grinders, and deep fryers are several examples of kitchen equipment used to prepare foods.



Figure 16. Deep fryer (above) and Kitchen robot (below)

Figure 17. Blender

All vegetables, except tomatoes, should be canned in a pressure canner at 116°C-121°C.



Figure 18. Pressure canner. Never process low acid vegetables or meat in a boiling water canner. A pressure canner must be used.

Strips to measure pH are easy to use, very useful and show the instant result. The pH strips are accompanied by a color legend so that you can interpret the result. Each color is associated with a pH value. pH test strips are essential when making artisanal food products. These test paper strips determine the pH degree by changing color.



Figure 19. pH strips

A special and interesting device mainly for fruits in syrup, marmalades, etc., is the Brix refractometer. Degrees Brix (symbol °Bx) is the sugar content of an aqueous solution. One degree Brix is 1 gram of sucrose in 100 grams of solution and represents the strength of the solution as percentage by mass. If the solution contains dissolved solids other than pure sucrose, then the °Bx counts the sugars and other soluble solids too. But usually °Brix are taken as a percentage of sugar in the product.

The measurement procedure is really simple:

- ✓ Place 1-2 drops of the sample on the prism. The sample is at 20°C and should be spread over the surface of the prism.
- ✓ Close the daylight plate
- ✓ Look at the scale through the eyepiece (adjust if needed).
- ✓ Read in the scale.

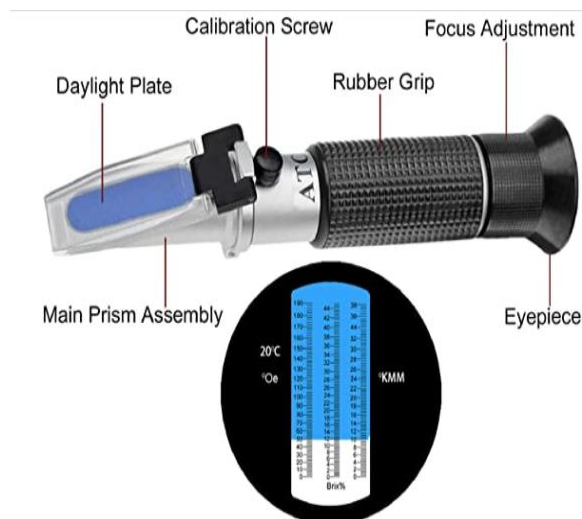


Figure 20. Refractometer

Kitchen equipment is a long-term investment for your kitchen. You have to consider the frequency and type of use, durability, power consumed for electric equipment, and storage implications when selecting kitchen equipment.

Some considerations to assure food safety:

- Stainless steel knives are the best type to use as they do not stain the flesh of fruit and vegetables. However, stainless steel knives are expensive and probably not available in all homes. Always use a sharp clean knife that is only used for cutting fruit and vegetables. Do not use a knife with a rusty blade or a knife that is also used to cut meat.
- Use a clean hard cutting surface or a board that is smooth and non-absorbent, with no splits or holes where bacteria can grow. For example, do not cut strong-smelling vegetables such as onions or garlic in the same place as fruits – the taste of onion will contaminate the fruit. Do not cut meats and fruit and vegetables at the same time (cross contamination may occur). Plastic chopping boards are best as they can be washed in hot water or boiled to sterilize. Wooden chopping boards are not good as they are difficult to clean (juice from the fruit and vegetables can get into the wood).
- Peel and chop the fruit in small batches so that they are not left for a long time before the next stage of the process. Once they are chopped, the fruit and vegetables are susceptible to bacterial contamination and spoilage. Store the chopped fruit and vegetable in a pan of clean cold water to prevent them browning and deteriorating. Salt can be added to the water to kill any insects. Citric acid (lemon juice) can be added to the water to prevent fruit such as apples from browning.
- Wash, rinse and sanitize the cutting or work surface and all the utensils and knives after cutting raw meat, fish or poultry.
- And do not forget to properly wash your hands before and after handling raw foods.

3.2. Temperature and Time Control

Many of the foods prepared at home need a temperature control to prevent the growth of bacteria that may already be in the food. Temperature can be used to control the rapid growth of harmful bacteria. The range of temperatures between 5°C and 60°C is called the Danger Zone. Bacteria grow very quickly in this temperature range. Whenever possible, it must be avoided having foods in the danger zone. For cooling or heating foods, it must be done in such a way that food passes quickly through the danger zone.

A thermometer is needed to check the temperature, especially when pasteurizing. It is useful for jam making, but not essential (alternative methods can be used to test when a jam is cooked). A controllable heat source is preferred so that heating can be adjusted.

Bacteria do not grow well at cold temperatures. This is why potentially hazardous foods are stored in the refrigerator, refrigerated display case, in ice or another approved method. Cold foods must be held at 5°C or below. Use a calibrated metal stem thermometer to check the food's temperature.

If ice is used to keep the food cold, be sure the ice comes up to the level of the food in the pan or dish. Be sure to replace the ice as it melts. If the food temperature is maintained below 5°C, then it must be discarded after three days (even less depending on the type of food).



Figure 21. Temperature control

Freezing food keeps most bacteria from multiplying, but it does not kill them. When Thawing foods, If food is allowed to enter the temperature danger zone of 5°C-60°C, bacteria will grow rapidly. There are four acceptable methods for thawing food: in a refrigerator, under cold running water, in a microwave, or as part of the cooking process.



Figure 22. Good and bad practice

Have good production planning to determine the quantity of food needed and when food should be thawed in advance. Indicate preparation such as thawing that needs to be done on the daily production record. Use one of the four safe methods when thawing frozen foods.

Any refrigeration equipment must be equipped with a thermometer that measures the internal temperature. Use a metal stem thermometer to check foods you are cooking, holding hot or cold, or cooling. It is a good idea to keep logs as a way of making sure that someone will actually be checking on the temperature regularly.

Make sure the thermometer's range includes the temperature you are looking for. You cannot use a cooking thermometer for cold or cooling foods because the range does not go down to 5°C. Test the accuracy of your thermometer by placing it in a glass of ice water for a couple of minutes. If it does not give you a reading of 0°C, it needs to be adjusted.

Most, but not all, harmful bacteria need time to grow to dangerous levels. This is why holding food at safe temperatures is important. This is also why cooling and reheating should take place as quickly as possible.

In the table below the effect of temperature on different microorganisms is shown.

Table 2. Effect of temperature in different microorganisms

Temperature	Effect
115 to 121°C	Canning temperatures for low acid vegetables, meat, and poultry in a pressure canner.
100°C	Temperature water boils at sea level. Canning temperature for acid fruits, tomatoes, pickles, and jellied products in a boiling-water canner.
82 to 121°C	Canning temperatures are used to destroy most bacteria, yeasts, and molds in acid foods. Time required to kill these decreases as temperatures increase.
60 to 74°C	Warming temperatures prevent growth, but may allow survival of some microorganisms.
4 to 60°C	DANGER ZONE: allow rapid growth of bacteria, yeast, and molds.
35°C	Maximum storage temperature for canned foods.
10 to 21°C	Best storage temperatures for canned and dried foods.
0°C	Water freezing temperature
0 to 4°C	Cold temperatures permit slow growth of some bacteria, yeasts, and molds.
-23 to 0°C	Freezing temperatures stop growth of microorganisms, but may allow some to survive.
-17 to -23°C	Best storage temperatures for frozen foods.

3.3. Most common food ingredients

A food ingredient is any substance that is added to a food to achieve a desired effect. The term “food ingredient” includes food additives, which are substances added to foods for specific technical and/or functional purposes during processing, storage or packaging.

There are two types of food additives: direct and indirect. Direct food additives are used in foods to impart specific technological or functional qualities. For example, stabilizers are used to help prevent separation of nutrients in fortified milk products, while phosphates are used as a leavening agent in baked goods. Indirect additives are not intentionally added to food, but may be present in trace amounts as a result of processing, packaging, shipping or storage. Both direct and indirect food additives are controlled by national regulatory authorities. Any food ingredient must be proven safe to be used in foods.

Food ingredients provide convenience and allow food makers to produce a wide variety of foods that are safe, appetizing, uniform, nutritious and tasty. Many of them are used in very small quantities, but contribute significantly to our vast and varied food supply—ensuring that the foods we like look, taste and feel the way we have come to expect.

Food ingredients are used for a variety of reasons:

- To support nutrition delivery
- To maintain product quality and freshness
- To prevent spoilage during transport, storage and sale
- To make foods more appealing and ensure that familiar foods have consistent qualities
- To extend shelf-life and prevent food waste
- To make some foods more affordable
- To aid in the processing and preparation of foods

Taste, texture, freshness and appearance are a few of the major contributions food ingredients and food additives make toward the properties of food. Food ingredients are classified by Codex into the functions they serve in food products. This is the list of some common food ingredient classifications and their uses:

- **Acid Regulators** help control the pH of a food to prevent it from becoming too acidic or alkaline (phosphates, citric acid, acetic acid, etc.). Phosphates are a common acidity regulator and may be used in meats, tomato ketchup, dairy products, and soft drinks.

- **Anticaking Agents** help keep solid food free-flowing. Powdered foods often clump together and change textures when they absorb moisture from the environment. The addition of anticaking agents help to prevent this from happening. Many anticaking agents are derived from mineral sources, such as calcium, magnesium, and silicon. Calcium silicate is a common anticaking agent found in table salt, and helps to absorb both oil and water to reduce salt particles from clumping together. Anticaking agents are also used in flour, sugar products, powdered milks, grated cheese, cake mixes, and egg mixes.
- **Antifoaming agents** reduce the formation of foam in liquids. They are commonly made from silicates, which are derived from silicon, oxygen, and other minerals. Antifoaming agents can be used in the manufacture of beverages to minimize foaming while mixing and bottling. Antifoaming agents are also used in oils, jams and jellies, juices, sauces, and liquid eggs. Examples of antifoaming agents are Calcium alginate, Mono- and di-glycerides or Silicon dioxide
- **Antioxidants** help prolong the shelf-life of foods by protecting against deterioration or breakdown caused by oxidation. Oxidation occurs when food reacts with oxygen and deteriorates in quality as a result. Antioxidants, like vitamin E and vitamin C, are commonly found in fruits and vegetables like blueberries, citrics, and chocolate. They may also be produced when derived from a fruit source. Citric acid is a common antioxidant derived from citrus fruits.
- **Preservatives** are added to foods to keep them safe for consumption by helping to prevent spoilage. Preservatives also help foods maintain their appearance, taste, and texture. Sugars, salts, and vinegars are examples of preservatives, which are often used to delay the growth of bacteria in foods. Preservatives are used in jellies, cured meats, oils, cereals, dressings, fruits, vegetables, and baked goods. Examples of preservatives are Acetic acid, Nisin or Phosphates. Always be sure that the used preservative is permitted by legislation.
- **Sweeteners** add sweetness to foods, and are often a low or no calorie sugar substitute for sugars. They are used in small amounts to intensify or to obtain the same level of sweetness as normal sugars, without raising blood sugar levels. Sweeteners are often used in soft drinks, canned foods, jellies and jams, baked goods, candy, and dairy products. Examples of sweeteners are Allulose, Stevia or Saccharin.
- **Thickeners** improve the density of liquid food products like soups and sauces, contributing to consistency and texture. Flour, corn starch, and gelatin are some

common thickeners used at home to improve the textures of sauces, gravies, and jams. Examples of thickeners are Carrageenan, Cellulose gum, Guar gum, Locust bean gum, Pectin or Xanthan gum

Other functions are: Carriers, Colors, Emulsifiers, Firming Agents, Flavor Enhancers, Foaming Agent, Gelling Agents, Glazing Agents, Humectants, Raising Agents, Sequestrants and Stabilizers

Some considerations for the most used ingredients in homemade food products:

Sugar is a flavoring and preservative. Jams should have a final sugar content of 65 to 68% (°Brix) to ensure that the fruit is well preserved and safe from bacterial spoilage. All fruits contain natural sugar (between 10 and 12°Brix).

Pectin forms a strong gel in the jam. Some fruits contain high levels of pectin and do not need any addition. Other fruits have low levels and need to be mixed with high-pectin fruits such as apple or banana, or with a commercial pectin

Acid. The optimum pH is below 4.6. Some fruits are acidic but others need to have acid added to reach this pH value. Lemon juice (citric acid) is usually added to the fruit to increase the acidity. Unripe fruits can be added as they are more acidic.

Vinegar is also known as acetic acid. It is one of the by-products released when bacteria ferment fruit and vegetables. Because vinegar is acidic, it can also be used to preserve fruit and vegetables, in particular when making pickles improving preservation and giving them a distinctive taste. It is often added to a fermented pickle to increase the acidity (reduce the pH) so that it is optimum for the lactic acid bacteria. This will speed up the fermentation.

Salt. Brine is the name given to a solution of salt dissolved in water. Brines are used in the preparation of canned vegetables such as pepper, artichoke and fermented pickles.

Herbs and Spices. Most common herbs include mint, basil, cilantro, thyme, rosemary, parsley, oregano, chervil, tarragon, cumin, dill, bay leaves, etc. Paprika, ginger, turmeric, vanilla bean, cinnamon, nutmeg are widely used. Herbs and spices not only add flavor, but many have health benefits.

Vegetable oil for fried tomatoes and similar products. It is also added to some types of pickles, especially the fermented pickles.

If it is possible “natural” ingredients should be used instead of synthetic ingredients. Natural ingredients can be found in nature or extracted from fruit and vegetables or other sources by simple and “green” extraction methods. Lemon juice is preferred to synthetic citric and ascorbic acids (E330 and E300 in the European list of food additives, European Commission Regulation EU No 1129/2011).

3.4. Packaging and headspace

To preserve, transport and store different food products, there are in the market a variety of food containers. Typically, food packaging includes a wide array of materials, such as plastic, metal, glass, and paper. Some containers, such as plastics, are categorized as rigid or flexible. Containers may be processed with additional treatments for preservation purposes.

At home level, the best option is to pasteurize fruit juices, sauces and pickles in their containers after packaging. This is the best method as there is no risk of contamination after the process. The time and temperature needed for pasteurization depends on the size/volume of the container and the acidity of the product. Food packaging types differ in various ways, such as weight, size, durability, and barrier properties.

Packaging materials can be rigid, flexible, or semi-flexible:

- ✓ Rigid packages include bottles, trays, cans, jars, and caps.
- ✓ Flexible packages include bags, cling wraps, bubble wraps, shrink wraps, squeezable tubes, foam trays, stand-up packets, and vacuum bags.
- ✓ Semi-flexible packages include boxes and tetra packs.

The main types of food packaging are glass containers, plastic containers and metal containers (cans). Each type of packaging has different uses and is suitable for a different product or under certain conditions. **Glass containers are the most used at home level.**

Glass Containers

Glass is well-known for being one of the most reliable and least toxic materials for packaging foods and drinks. Its advantages include inertness, strength, hygiene, resistance to tampering, design, potential decoration, transparency, chemical property, microwave ability, and heat treatability

There are two types of glass packaging most widely used for foods and drinks: narrow-neck bottles and wide-opening jars and pots. Glass bottles are commonly used for alcoholic drinks, soft drinks, and potable water. Foods packed in glass containers range from coffee, to dairy products, spices, spreads, syrups, processed vegetables and fruits, and meat and fish products. With the rise of popularity and usage of other packaging materials, such as metals and plastics, high-value products are preferred to be packed in glass containers due to their high-quality image and aroma preservation characteristics. Glass jars are probably the easiest and most cost-effective vessels for fermenting. They don't hold any odor from previous contents, and you can sterilize them again and again. Canning jars are inexpensive and easy to find in most homes.

Plastics Container

Plastics are the most common and most wide-ranging materials used for food packaging. Some of their uses are bottles, trays, bags, foils, cups, pots, pouches, and bowls. The volume of plastic allocated to food packaging amounts for around 40% of plastics. The convenience and widespread use of plastic in food packaging is owed to its low cost, ease of processability, formability, chemical resistance, lightweight, and a variety of physical properties. However, plastic suffers from permeability to gas, vapour, and light.

Acrylic containers come in a variety of heights and shapes and can include lids made of plastic or even wood. Like other designs, these can be rectangular, round, or square, and they are strong enough to withstand almost anything.

Metal Containers (cans)

Commonly used for canned food, metal vessels provide a clean surface for fermenting any foods. Stainless steel is the best choice for a metal container. Special closure equipments are needed, so metal containers are not the best option to deal with at home.

Find in the table below the advantages and disadvantages of the different types of containers:

Table 3. Comparison of different containers. *Source: Home-based Fruit and Vegetable Processing, FAO/Ministry of Agriculture, Irrigation and Livestock*

Material	Advantages	Disadvantages	Product suitability
Glass	Can be heat treated to sterilise Provides a good barrier against air, moisture, odours and micro-organisms Strong and rigid so protects the contents Can be re-used See-through so the contents can be seen	Heavy - which increases transport costs Breakable, which could be dangerous if broken glass gets into the product Expensive Not easily available in Afghanistan	<i>Pickles, chutney, jams, juice</i>
Plastic bottles	Lighter than glass Not breakable Lower cost than glass	Cannot be sterilised Cannot be re-used	<i>Pickles, chutney, jams</i>
Plastic films	Relatively low cost Good barrier protection against moisture and air Heat sealable Strong Light so do not add weight to the product	Some thinner films allow air and other gases and odours through	<i>Fruit leather, dried fruits</i>
Paper wrappers and bags	Cheap and readily available Lightweight	No protection against moisture or air Easily torn Not very attractive	<i>Fresh produce with a short shelf life</i>
Sacks (vegetable fibres)	Strong and flexible Lightweight Readily available Biodegradable	No protection against moisture or air No protection against rodents Rot easily	<i>Fresh produce</i>
Cans	Strong and unbreakable Good barrier to air, moisture and odours Good barrier to rodents and insects	Expensive to can products at the small scale	<i>Jams, fruit in syrup, canned fruit and vegetables</i>

Controlling headspace

The unfilled space above the food in a jar and below its lid is termed headspace. This space is needed for expansion of food as jars are processed, and for forming vacuums in cooled jars. The extent of expansion is determined by the air content in the food and by the processing temperature. No matter what you are canning, leaving the correct amount of space specified before processing the jar is extremely important.

The heat applied to a jar during processing causes the contents inside the jar to expand. As air escapes around the lid, headspace will decrease. If you did not leave enough headspace, the contents of the jar could seep under the lid and create a problem with the seal.

Leaving too much headspace can also be a problem. Cooling jars naturally contract and pull the lid down tight to seal the jar completely. If there is too much headspace, the processing time called for in the recipe may not have been long enough to drive out the air in the jar. More air in the jar means more oxygen is present to discolor the food and promote rancidity in fats, which can lead to an improper seal.

Headspace is needed when food begins to expand during the thermal process and for forming vacuums upon cooling. Air expands when heated to high temperatures; the higher the temperature, the greater the expansion. Foods expand less than air when heated.

A general rule for headspace is 6% of total volume, but it depends on the type of food and the type of processing. For a 500 ml container: 2.5 cm for foods like vegetables, 1.25 cm for fruits, and 0.65 cm for jams and jellies. When canning meats, poultry, and fish, it is best to have a headspace of 2.5 / 3.2 cm.

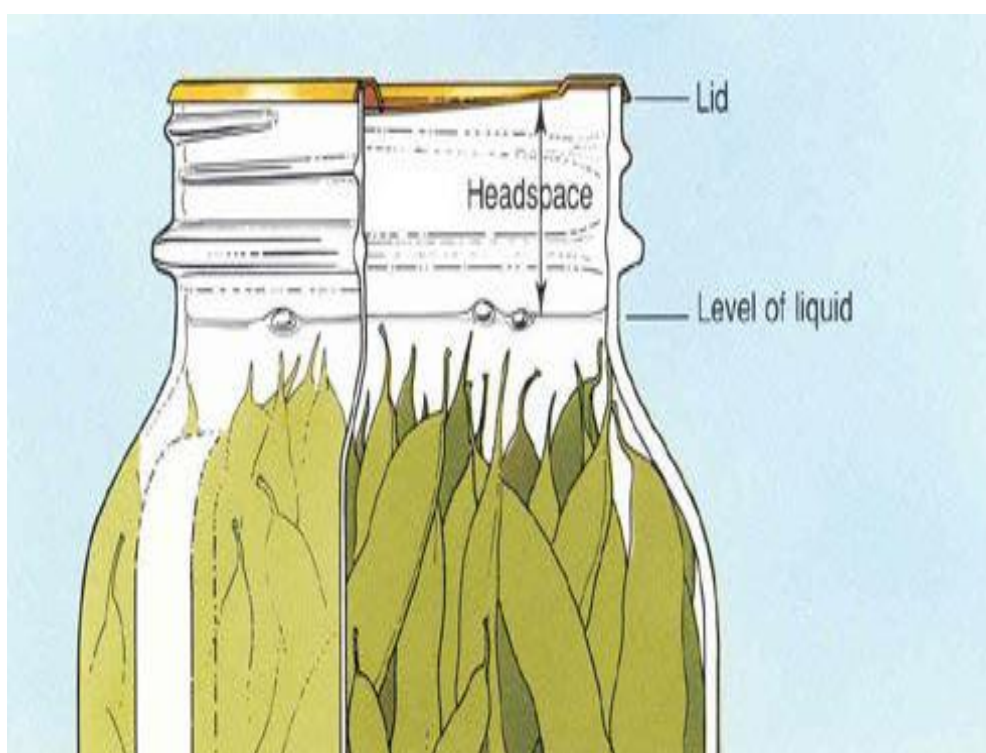


Figure 23. Headspace

3.5. Most general food processing techniques used at home

Freezing

Freezing is one of the most common and trusted food preservation techniques. A simple and quick process, freezing food slows the loss of nutritive qualities and prevents food spoilage. Once defrosted, frozen foods are similar to fresh foods in texture, flavor and color, making it the most popular method of food preservation. It's important to note that not all jars are freezer-safe. Jars with straight sides are freezer safe; shouldered jars are not.

As in all home made food first it has to be reviewed the recipe and preparation instructions. Then all the ingredients, utensils and equipments must be gathered. Choose the storage containers appropriate for the frozen food. Wash, rinse and dry containers. Use rigid containers for foods that are liquid or semi-liquid at room temperature and flexible wrap for foods that are solid at room temperature. Now, prepare the fresh product and other quality ingredients according to the recipe. Most vegetables and some fruits need some pretreatment techniques like blanching. Blanching (heating in steam or water for a specific time, then cooling quickly) sets color, slows enzyme action, and kills many spoilage microorganisms. Pack prepared food in appropriate freezer containers or wrap with freezer packaging according to the recipe instructions. For rigid containers, leave 1.3 cm headspace to allow for expansion of liquids. Label with the date and name of the product. Freeze in a single layer near the coldest part of the freezer. Stack only after food is completely frozen. Finally, store at 0°F in the freezer for the recommended length of time.

Raw and Hot packing (canning)

Many fresh foods contain from 10 percent to more than 30 percent air. How long canned food retains high quality depends on how much air is removed from food before jars are sealed.

Raw-packing is the practice of filling jars tightly with freshly prepared, but unheated food. Such foods, especially fruit, will float in the jars. The entrapped air in and around the food may cause discoloration within 2 to 3 months of storage. Raw-packing is more suitable for vegetables processed in a pressure canner.

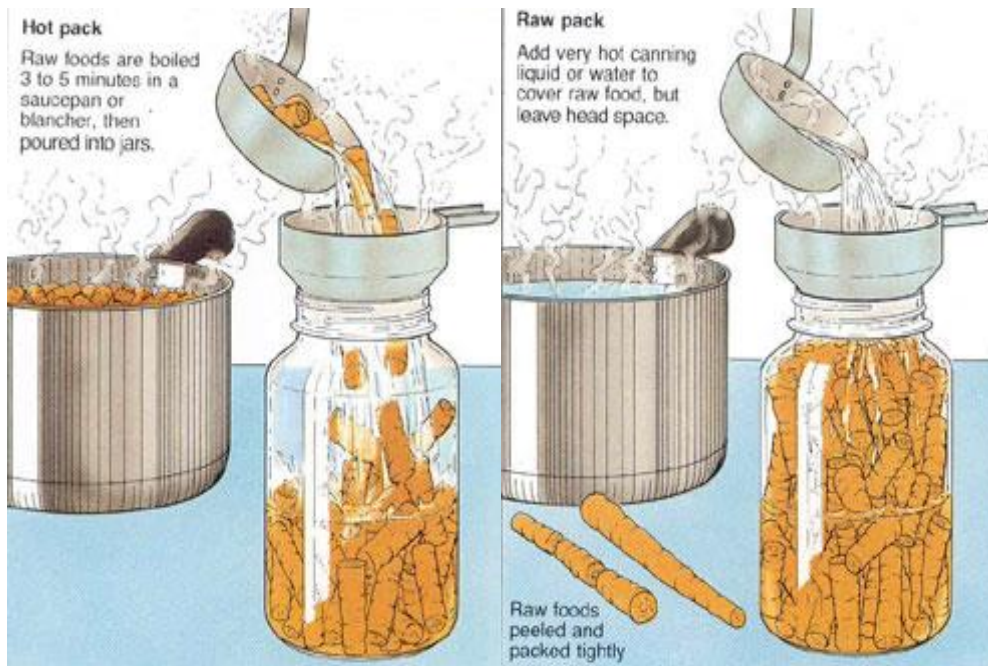


Figure 24. Preparation of hot and raw pack vegetables

Hot-packing is the practice of heating freshly prepared food to boiling, simmering it for 2 to 5 minutes, and promptly filling jars loosely with the boiled food. Whether food has been hot-packed or raw-packed, the juice, syrup, or water to be added to the foods should also be heated to boiling before adding it to the jars. This practice helps to remove air from food tissues, shrinks food, helps keep the food from floating in the jars, increases vacuum in sealed jars, and improves shelf life. Preshrinking food permits filling more food into each jar.

Hot-packing is the best way to remove air and is the preferred pack style for foods processed in a boiling-water canner. At first, the color of hot-packed foods may appear no better than that of raw-packed foods, but within a short storage period, both color and flavor of hot-packed foods will be superior.

Proper canning practices include:

- carefully selecting and washing fresh food,
- peeling and cutting them,
- hot packing (check the pH of the product to select the proper temperature and time) in good jars and self-sealing lids,
- adding acids (lemon juice or vinegar) and other ingredients,
- closing the jars,

- processing jars in a boiling-water canner (acid foods) or pressure canner (low acid foods) during the correct period of time

Fermented and Pickled Foods

A pickle is simply a food that has been preserved in a brine (salt or salty water) or an acid like vinegar or lemon juice, that changes both the taste and texture of the food. It also involves the use of heat, which serves to destroy and inhibit the growth of any microorganisms. The fastest and easiest way is quick pickling, in which vinegar along with sugar, salt, and sometimes various herbs or spices are brought to a boil and then poured over fruits or vegetables that are left to soak for a short time. And even though vinegar is a product of fermentation, pickled foods are not fermented by default, as they don't produce the same probiotic and enzymatic qualities of fermented foods.

The level of acidity in a pickled product is as important to its safety as it is to taste and texture. Do not alter vinegar, food, or water proportions in a recipe or use a vinegar with unknown acidity. Use only recipes with tested proportions of ingredients. There must be a minimum, uniform level of acid throughout the mixed product to prevent the growth of botulinum bacteria. Fruit pickles usually are prepared by heating fruit in a seasoned syrup acidified with either lemon juice or vinegar. Relishes are made from chopped fruits and vegetables that are cooked with seasonings and vinegar.

Fermented food has been preserved and transformed by “good” bacteria. Fermented foods are defined as foods or beverages produced through controlled microbial growth, and the conversion of food components through enzymatic action. In recent years, fermented foods have undergone a surge in popularity, mainly due to their proposed health benefits. Many foods have historically undergone fermentation, including meat and fish, dairy, vegetables, soybeans, other legumes, cereals and fruits. There are several variables in the fermentation process including the microorganisms, the nutritional ingredients and the environmental conditions, giving rise to thousands of different variations of fermented foods. Historically, food fermentation was performed as a method of preservation, but it is also used to enhance the organoleptic properties (e.g., taste and texture), with some foods, such as olives, being inedible without fermentation that removes bitter phenolic compounds. Examples of fermented foods are kefir, Kombucha, sauerkraut, etc.

Dehydration

Unlike canning and freezing, finding the ideal dehydration technique requires some trials before finding the proper technique. A number of factors determine the finished product, such as drying method, quality of produce, pretreatment techniques and even climate. Start with a recipe and then make adjustments as you become familiar with the process. Dehydration removes 80-95% of moisture to deactivate spoilage processes while retaining abundant nutrients.

The success of home food dehydration depends on three basic principles:

- A controlled heat warm enough to expel moisture but not hot enough to cook the food.
- Dry air to absorb the moisture released during the heating process.
- Air circulation to remove the moisture from the heating environment.

As in all home made food first it has to be reviewed the recipe and preparation instructions. Then all the ingredients, utensils and equipments (clean airtight and moisture resistant food storage containers or plastic storage containers with locking lids and vacuum seals, electric dehydrator, etc) must be gathered. Select only quality ingredients (fresh vegetables, meat, poultry or seafood). Now, prepare the fresh product and other quality ingredients according to the recipe. Most vegetables and some fruits benefit from pretreatment techniques like blanching. Dry foods in the electric dehydrator as per recipe (or sun drying, light oven, depending on the product). Pack in home canning jars, containers, or vacuum packages. Label with the date and name of the product. Store in a cool (10-20°C), dry, and dark place for the recommended time. Check periodically for moisture and mold, and if apparent, dispose of food.

Dehydrated food, especially fruits, can be a great snack. However, there may be times you will want to rehydrate the food for cooking, eating, and serving. To rehydrate, add just enough boiling water to cover the food, wait 10 minutes, and serve immediately or use in a recipe.

Baking

Baking is the final step in making yeast-leavened (bread, buns, rolls, crackers) and chemically-leavened products (cakes, cookies). Baking is a process of cooking by dry heat, especially in some kind of oven. It is one of the oldest cooking methods. Bakery products, which include bread, rolls, cookies, pies, pastries, and muffins, are usually prepared from flour or meal derived from some form of grain. In general, there are three major stages in the baking process: expansion of the dough, drying of the surface, and crust browning.

3.6. Short information about legal requirements for home-made foods in EU and non-EU countries

In all Member States of the European Union, the basic requirement to comply with food hygiene standards shall be fulfilled in accordance with Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs.

SPAIN

The Spanish Region of Murcia Law 4/2019, of April 3th, on the Local Sale of Agri-Food Products defines what are: Agricultural producers, Grouping, Primary products, Processed products, Own production, Own elaboration, Main ingredients, Agri-food products, Final consumer, Local establishment, Territorial market, Forest producer, Collector, Consumer group, Agri-food producer, Short marketing channel and Food artisans.

Within the framework of this law, two modalities are regulated under the name **of local sale: direct sales and short-channel sales (short marketing and short distribution)**.

- **Direct sale** is the sale of agri-food products of own production or of own elaboration, made directly to the final consumer by an agricultural or forestry producer or a group of them. The delivery of the products may be made on the farm itself, in establishments owned by the producer or the group, at local markets and fairs, at the consumer's own home or at the premises set up by the consumer group itself or sale "on line" (through the internet) as long as it is done without intermediaries and within the Autonomous Community of the Region of Murcia.
- **Short marketing channel sale** is understood as the sale or supply of agri-food products, of own production or elaboration, carried out by an agricultural or forestry producer or by a group, through at most a single intermediary, this being a retail establishment. In any case, the place of delivery of the products to the final consumer will be located in the territory of the Autonomous Community of the Region of Murcia.
- **Short distribution chain sales** are understood to be the sale or supply of agri-food products, of their own production or elaboration, carried out by an agricultural producer or by a group to a local establishment, located in the same region as the exploitation of which the products come from or in neighboring regions of the Autonomous Community of the Region of Murcia

HUNGARY

Regulatory Conditions for the Production and Sale of Food by Small-Scale Producers in Hungary, Food safety conditions for sale in local producer markets: The Parliament established the concept of the producer market in Act CXXXV of 2011 on Trade, amendment of Act CLXIV of 2005, the purpose of which is to enable the sale of the produced agricultural and food products by operating local markets, while complying with certain food safety requirements.

The law on food safety conditions for sale in local producer markets came into force on 1 January 2012, which aims to sell quality agricultural products of small rural subsistence (smallholders, primary producers, small-scale producers, family farms, cooperative members) on local markets and to those living near the market, supplying the inhabitants of a town or village with good quality domestic agricultural products at favorable prices.

Food production and processing must at all stages of the food chain, regardless of the size of the business or the type of food produced and the sales channel, comply in all cases with all the rules of European Community and national law.

***Who can carry out smallholder activities and how?**

- **Small-scale producer**

A natural person who directly supplies the final consumer with a small quantity of the basic product she/he produces, or with a harvested wild product harvested by her/him, or with a small quantity of food produced from the basic product she/he produces.

- **Method of reporting small producer activity**

The small producer is obliged to submit the commencement, change, suspension and termination of his / her activity in writing to the District Veterinary and Food Inspection Office of the Food Chain Safety and Animal Health Directorate of the County Government Office competent according to the location of the holding. The office will register the small producer and issue a registration number.

- **Documents required for small-scale production**

- a) proof of compliance with the notification obligation,
- b) data sheet,
- c) official veterinary certificate,

d) meat transport certificate,

e) keeping records

- **Where can food produced by a small-scale producer be sold?**

- a. on his own farm (residence),
- b. in his/her own county and in Budapest, or in a market up to 40 km as the crow flies from the place of the farm,
- c. at a trade fair, event or authorized temporary sales outlet to the final consumer,
- d. retail or catering establishments, including mass catering,
- e. on your own farm within the village guest table.

- **Persons who may be involved in sales and production**

In addition to the small producer, the sale of food from a small producer may also be carried out by persons living in a common household with him/her, spouse, officially registered partner, adult child, brother, parent or grandparent.

***Explanation of the concepts of basic product, unprocessed and processed product**

Pursuant to Article 2 (1) (b) of Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs (hereinafter: Regulation (EC) No 852/2004), primary products' means products of primary production including products of the soil, of stock farming, of hunting and fishing;

Primary products may undergo further treatment after their production, manufacture and collection, and may be unprocessed or processed products, depending on the treatment.

In the case of ***unprocessed products***, the treatment may be grinding, peeling, cutting, cleaning, freezing.

Processed products undergo treatment processes that significantly change the properties of the original product, such as heat treatment, smoking, pickling, maturing, drying, marinating, extraction).

***Conditions for small - scale food production**

Under the regulation, a small-scale producer may sell non-animal basic products, other basic animal products and meat products reared on his own farm and authorized for public consumption.

During the sale at the market and at the fair, the small-scale producer must be informed of the public health rules of the fair, market and market hall sales referred to in Section 2 of the Government Decree 55/2009. (III. 13.), 59/1999. (XI. 26.) The decree must also be complied with as regards food chain safety and food hygiene conditions, Regulation (EC) No 852/2004 of the European Parliament and of the Council on the hygiene of foodstuffs, detailed in Annex II, Chapters I and V to XII. The general requirements for the place of production and distribution of food apply.

- **Recording of quantities sold**

The small-scale producer must keep records of the quantity of products produced by him, the time of production, the quantity sold and the place and time of sale. The register or a copy thereof must be kept by the small-scale producer at the point of sale. The small-scale producer is obliged to keep the records for 2 years.

- **Labeling of small - scale products**

Section 6 of the Decree describes the manner of labeling small-scale products, if the small-scale producer sells the food produced by him in packaging to a retail or catering establishment, the criteria set out in Decree 19/2004 (II. 26.) FVM-ESzCsM-GKM on the labelling of foodstuffs shall apply.

- **Responsibility of the small-scale producer**

The small-scale producer is responsible for the safety of the food he places on the market, for ensuring and documenting traceability in accordance with Article 18 of Regulation (EC) No 178/2002 (from the production of the basic product to the sale of the finished food) and for complying with the relevant legislation.

- **Related legislation**

Decree 51/2012 (VI. 8.) VM on the food safety conditions of sales on local producer markets

55/2009. (III. 13.) Government Decree on Fairs, Markets, and Shopping Centers

52/2010. (IV. 30.) Decree of the Ministry of Agriculture and Rural Development on the conditions of production, processing and sale of food by small-scale producers

TURKEY

In Turkey the Ministry of Agriculture and Forestry determines and controls legal requirements for homemade foods. A directive named “**Explanations on Food Production to be made in Private Housing Places with Priority Settlement Purpose**” provides information for food producers.

Instructions and some important details are given below about this directive:

1- Products e.g. tomato paste, tarhana, molasses and jam produced in the home may be presented by the manufacturer to the final consumer and/or the local retailer who sells to the final consumer. In this situation;

- a) If it is sold only to the end consumer, the business is registered in the other part of the food safety information system (FSIS) without giving the registration certificate.
- b) In case of sale to a local retailer selling to the final consumer, the business is considered as retail and a registration document is issued.

2- Products such as butter, cheese, yogurt produced by raw milk producers in their homes can be offered by the producer to the final consumer and/or the local retailer who sells to the final consumer in the residence or similar places, within the scope of the "Regulation on the Regulation of Local Marginal and Limited Activities in Food Businesses"

- a) If it is sold only to the end consumer, the business is registered in the other part of the FSIS without giving the registration document.
- b) In case of supply to the local retailer who sells to the end consumer in addition to the end consumer, the business is considered as retail and a registration document is issued.

3-Butchers selling only to the end consumer or meat aisles in the markets will be considered as registered businesses under the retail definition in the Veterinary Services, Phytosanitary, Food and Feed Law. These establishments will take into account the provisions of the legislation regarding the way of sale of the products within the scope of the Turkish Food Codex.

4-Establishments producing table d'hote meals (food factories) are considered as retail businesses and will be considered within the scope of registration.

5-Pharmacies selling food supplements are required to register their business with the Ministry, as they are considered retail businesses in accordance with Law No. 5996.

6-If food transport is not carried out regularly, such as cargo companies, and the transported food is intended for personal consumption and is a transaction between the sender and the final consumer who is the receiver, these businesses do not need to be registered.

7-In the activities carried out in the electronic environment as distance sales, it is necessary to register the businesses that sell food.

8-The provisions of the Law No. 4817 on Work Permits of Foreigners should be taken into account in the registration and approval procedures of enterprises operated by foreign nationals (Anonymous, 2016).

Guidance on Turkish Food Codex Regulation on Food Labeling and Consumers Information (20/04/2021) is also associated with homemade food producers.

-The expression "homemade" cannot be used for foods produced on an industrial scale. However, the expression "homemade taste" can be used as it is left to the consumer's choice (Anonymous, 2021).

4. Most Common Home-Made Food Products

4.1 Previous concepts

The most common and less “dangerous” homemade foods are those that preserve fruit and vegetables. This is why this lesson will be focussed in these food products. Although there are many similarities between the processing of fruit and vegetables, it is important to remember the following main differences:

- Fruits are nearly all acidic and are commonly called ‘high acid foods’. The natural acidity controls the type of microorganisms that can grow in fruit products and influences the type of processing technique that should be used. The spoilage microorganisms that are likely to be found in fruit products are molds and yeasts which, if consumed, rarely cause illness. Processing of fruits generally uses preservatives such as sugar, salt, citric acid and vinegar and they can be preserved by heating in a water bath.
- Vegetables are less acidic than fruits and for that reason are classified as ‘low acid foods’. A wide range of microorganisms can grow in moist low-acid foods which may

lead to spoilage and the possibility of food poisoning if they are consumed. To prevent this, vegetables need to be heated at home in a pressure canner.

High Acid vs. Low Acid Canned Foods

- High acid (or acidified)
- pH ≤ 4.6
- depend on the **pH** of the food to prevent the growth of *Clostridium botulinum*
- **May use boiling water canner**
- Low acid
- pH > 4.6
- depend on **heat** processes under pressure to destroy the spores of *Clostridium botulinum*
- **Must use pressure canner**

Figure 25. High Acid vs. Low Acid Canned Foods



Figure 26. Knowing the pH level. Source: Ball® Mason Jars & Home Canning, www.freshpreserving.com (100°C=212°F; 115.5 °C=240°F)

The most suitable processes and products for the small-scale or homemade preservation of fruit and vegetables include **fruit in syrup, olives, jams, vegetable preserves, pickles and bakery products.**

To control the growth of mold and fungus in food products, sodium or potassium benzoate can be added to some food products. They are usually added to products that are opened and not used immediately, for example fruit jam, tomato sauces, mayonnaise, etc. It is not essential to add these preservatives to products that have been properly processed or are stored in good conditions, but they can help to extend the shelf life of certain products. Some countries do not permit this kind of additives in food products. Synthetic food colourings should be avoided. They are not required in any of the products in this book. Some food colourings are toxic and dangerous to health. They do not add any value to the product. Many consumers prefer to eat foods that do not contain colourings.

Many consumers prefer foods that do not contain artificial additives. If needed, natural ingredients should be used.

To prevent food poisoning in homemade foods there are four simple tips: clean, separate, cook and chill.

- **Clean:** Wash Hands, Utensils, and Surfaces Often
- **Separate:** Don't Cross Contaminate. Use separate cutting boards and plates for vegetables, fruits, meat, poultry, seafood, and eggs:
- **Cook** to the Right Temperature. Food is safely cooked when the internal temperature is high enough to kill germs that can make you sick:
- **Chill:** Refrigerate and Freeze Food Properly. Refrigerate perishable foods within 2 hours.

4.2. Canned olives

Raw olives, as taken from the tree, contain oleuropein, a bitter compound that must be removed prior to eating. Olives only become truly edible after curing, usually in salt brine. Of the various methods of curing, the simplest to make at home are water-curing and brine-curing (which is essentially the same process as pickling). After the olives are cured, they are placed in a pickling brine.



Green olives, which are young, immature olives, can be cured in water, which removes the bitter taste of the raw fruit. They will have a fresh, nutty flavour and firm texture. After a week or so of water curing, they are stored in a pickling brine, which adds a salty flavour. Brine curing is a similar process, but instead of simple water, the olives stay for a week in a salt and water solution. This method can be used with green olives as well as ripe (purple or black) ones.

No matter which kind of cure you select, the brining process is similar. The longer the olive is permitted to ferment in its own brine, the less bitter its flavour will become.

Before you start, be sure to have glass jars where they easily fit all the olives you want to cure, and a pot or bowl made of a nonreactive material—don't use aluminum, copper, or non-enamelled cast iron. It is not necessary to sterilize the jars.

First, select olives that haven't been bruised or spoiled (olive fly larvae in the fruits). Wash the olives thoroughly. Then cut or crack the olives, depending on how you would like them to look, to allow the brine to penetrate the fruit. Take care not to cut the pit.

Once you've decided between a water- or brine-cure, you are now ready to treat the olives. If using a water-cure process, place the prepared olives in a pan and cover with cold water; let stay for about a week, changing the water twice a day. Once the bitterness is gone, you are ready to place the olives in a brine.

For a brine-cure, place the prepared olives in a mixture of 1 part salt to 10 parts water, making sure they're submerged, and leave for 3 to 6 weeks, changing the brine every week and shaking the pan once a day.

Once the olives have been cured, they are ready to be put into the brine. Combine 1 part salt to 10 parts water and pour over the olives in a bowl or pot. Let's stay for 1 week. Drain the olives

and repeat the brining process for another week. Do this procedure two more times so the olives brine for about a month approximately.

Often olives are expensive. Making them at home is a simple process, and requires nothing but time, olives, water, vinegar, salt and some aromatic herbs. Jars of homemade olives make a nice product to be sold, and they keep very well for many months so you can enjoy tasty olives all year-round.

Recipe: green olives

Ingredients		Amount, 1000g
Cured green olives (whole, cutted or craked)		600
Covering liquid	Water	360
	Salt	20
	Lemon Juice	20
Spices and/or aromatic herbs (optional)		As desired

Steps

1. Wash the cured olives to remove excess salt. Change water 3 or 4 times till olives are not salty.
2. Fill the jars with the olives.
3. Add hot covering liquid (80-90°C), leaving a head space of 0.5 - 1cm.
4. Close jars and pasteurize 5-10 minutes (according to volume of jars) in an open boiling water bath. It needs at least 4 cm of water above the top of the lids.
5. Cool and store at room temperature. Shelf life is around 2 years. Once opened the jar is maintained under refrigeration.

4.3 Canned fruit in syrup

Once selected the fruits you want to preserve the syrup must be done. Syrup is sugar solved in water. Adding syrup to canned fruit helps to retain its flavour, colour, and shape. It does not prevent spoilage of these foods. The following table shows the different syrups: from very light, which approximates the natural sugar content of many fruits, to very heavy syrup. For the preparation of the syrup; mix water and sugar and then bring syrup to boil.

Table 4. Preparation of syrups and uses

Preparation of syrups and uses				
Syrup Types	Final ° Brix	Water, gr	Sugar, gr	Fruit commonly packed in syrup*
Very Light	10	900	100	Approximates natural sugar level in most fruits and adds the fewest calories.
Light	20	800	200	Very sweet fruit.
Medium	30	700	300	Sweet apples, sweet cherries, berries, grapes.
Heavy	40	600	400	Apricots, sour cherries, gooseberries, nectarines, peaches, pears, plums.
Very Heavy	50	500	500	Very sour fruit.
*Many fruits that are typically canned in heavy syrup are excellent and tasteful products when canned in lighter syrups. It is recommended that lighter syrups be tried, since they contain fewer calories from added sugar.				

Recipe: canned whole cherries in syrup

Ingredients		Amount, g
Cherries		1200
Medium syrup	Water	700
	Sugar	300
Ascorbic acid if pitted		*12 gr/2 litres water

Steps

1. Eliminate stems and wash cherries.
2. Remove pits if desired.
3. If pitted, place cherries in water containing ascorbic acid* to prevent stem-end discoloration.
4. Fill jars with cherries and add hot syrup, leaving 1 centimeter headspace. Remove air bubbles and adjust headspace if needed. Close lids.

- Pasteurize in a boiling water bath for 25-30 minutes. It needs at least 4 cm of water above the top of the lids.

Recipe: canned figs in syrup

Ingredients		Amount, g
Figs		1200
Medium syrup	Water	700
	Sugar	300
Lemon juice or Citric acid		20 or 4 per kg

All home-canned figs must be acidified before canning in a boiling water canner to make them safe from the microorganism that causes botulism. Select firm, ripe, uncracked figs. The mature colour depends on the variety. Avoid overripe figs with very soft flesh.

Steps

- Wash figs thoroughly in clean water and drain
- Do not peel or remove stems.
- Cover figs with water and boil for 2 minutes and drain.
- Prepare the medium syrup
- Gently boil figs in medium syrup for 5 minutes.
- Add 20 gr lemon juice or 4 gr citric acid per 1000 gr.
- Fill hot jars with hot figs and cooking syrup, leaving 1 cm headspace.
- Remove air bubbles and adjust headspace if needed.
- Close the lids and process for 45-50 minutes in a boiling water bath. It needs at least 4 cm of water above the top of the lids.
- Cool down.

Recipe: canned whole grapes in syrup

Ingredients		Amount, g
Grapes		600
Light syrup	Water	800

	Sugar	200
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Steps

1. Stem, wash, and drain grapes.
2. Prepare light syrup.
3. Fill jars with grapes and hot syrup, leaving 2-centimetre headspace.
4. Remove air bubbles and adjust headspace if needed.
5. Close the lids and process in a boiling water bath for 15-20 minutes. It needs at least 4 cm of water above the top of the lids.
6. Cool down.

Recipe: canned halved or sliced peaches in syrup

Ingredients		Amount, g
Peaches		600
Light syrup	Water	800
	Sugar	200
Lemon juice or Citric acid		10 or 2.5 per litre
Ascorbic acid		*12 gr/2 litres water

Choose ripe, mature fruit of ideal quality for eating fresh or cooking.

Steps

1. Dip fruit in boiling water for 30 to 60 seconds until skins loosen. Then dip quickly in cold water and slip off skins. Or peel fruits by hand
2. Cut in half, remove pits and slice if desired.
3. To prevent darkening, keep peeled fruit in ascorbic acid solution*.
4. Prepare and boil a light syrup. Add lemon juice or citric acid (10 gr juice or 2.5 gr citric acid per liter)
5. Fill jars with raw fruit, and add hot syrup, leaving 1 centimeter headspace.
6. Remove air bubbles and adjust headspace if needed. Close the lids and process: 20-25 minutes in boiling water bath. It needs at least 4 cm of water above the top of the lids.
7. Cool down.

4.4. Vegetable preserves

Food spoils because it is constantly under attack by microorganisms such as bacteria, yeast, molds, etc. These agents are always present in the air, water, and soil. On the other hand, vegetables contain some chemical substances called enzymes. This helps for normal ripening and maturing. Enzyme action, unless stopped, can cause over-ripening; undesirable changes in flavour, colour, and texture; and even spoilage.

When vegetables are canned, they must be heated at a high enough temperature and for a long enough time to destroy both, spoil microorganisms and stop enzyme action. The main point to remember is that each step in the canning process is important. One step depends on another. These are the main steps:

1. Harvest

Vegetables must be harvested at the right stage of maturity.

Regardless of what vegetable is being canned, as soon as it is brought from the farm, it must be kept in the coolest available place and processed as soon as possible.

2. Wash thoroughly

Wash small amounts at a time under running water or through several changes of water. Lift vegetables from the water each time so dirt that has been washed off is not in contact with food again. Do not let vegetables soak or stand in water.

3. Choose method of packing and your container or jars

Next step is to use either the raw pack or the hot pack method. If you do raw pack, for instance, of green beans, you will discover that they are going to shrink, which may cause the look of less product in your jar and more liquid, but if the liquid is above the product it is not a problem.

a. Hot Pack Method

In the hot pack method, the vegetable is placed in boiling water and heated for a few minutes (check the time in the table “***Processing time for Canning Low Acid Vegetables***”). This destroys some of the enzyme action and some microorganisms and shrinks the vegetable. Use this same liquid to fill the jars after the vegetable is packed.

b. Raw Pack Method

The only difference in this method is that vegetables are not preheated before putting it in the canning jar. Generally, the recommended canning time should be 10 minutes more than the times for Hot Pack Method.

4. Prepare Canning Jars and canner

Wash and rinse the jars by hand or in the dishwasher just before you fill them with hot product. Keep jars warm until ready to place hot products in them. Preheat your pressure canner or the water you place in it so it will be ready for the hot jars to be placed in. This also reduces the time it takes the canner to come up to pressure if the water is heated already.

5. Preparing Vegetables and Placing in Jars

When vegetables have been preheated, remove a canning jar from the hot water and empty it. At this time, salt can be added. Fill the jar with hot food within 1 cm of the top for non-starchy vegetables and 2 cm for starchy vegetables. Starchy types include potatoes, corn and beans, while non-starchy types include broccoli, tomatoes and zucchini. Add the hot liquid in which the vegetable was cooked. The vegetable pieces should be loose enough to allow the liquid between them. A too tight pack will keep the liquid from circulating around the food while it is being processed in the pressure canner.

Slide a plastic spatula down the inside of the jar on each side, all the way to the bottom. This will allow air bubbles to come to the top. Air left in the jar takes up space and can cause food to darken. Be sure the liquid completely covers the vegetable. Leave 1 cm of headspace.

6. Use a pressure canner or a water bath

All vegetables, except tomatoes, should be canned in a pressure canner at 116°C-121° C. Tomatoes can be processed both in either a water bath canner or a pressure canner, but they have to be always hot packed.

In a water bath canner, the temperature never gets higher than 100°C. When processing high acid foods such as fruits and tomatoes, 100°C is enough to kill mold and yeast and other spoilage microorganisms. Vegetables (except tomatoes) are non-acid foods and require a higher temperature to kill dangerous microorganisms, such as *Clostridium botulinum*. *Clostridium botulinum* needs a temperature of 118°C to be neutralized, which can only be reached under pressure during a certain time.

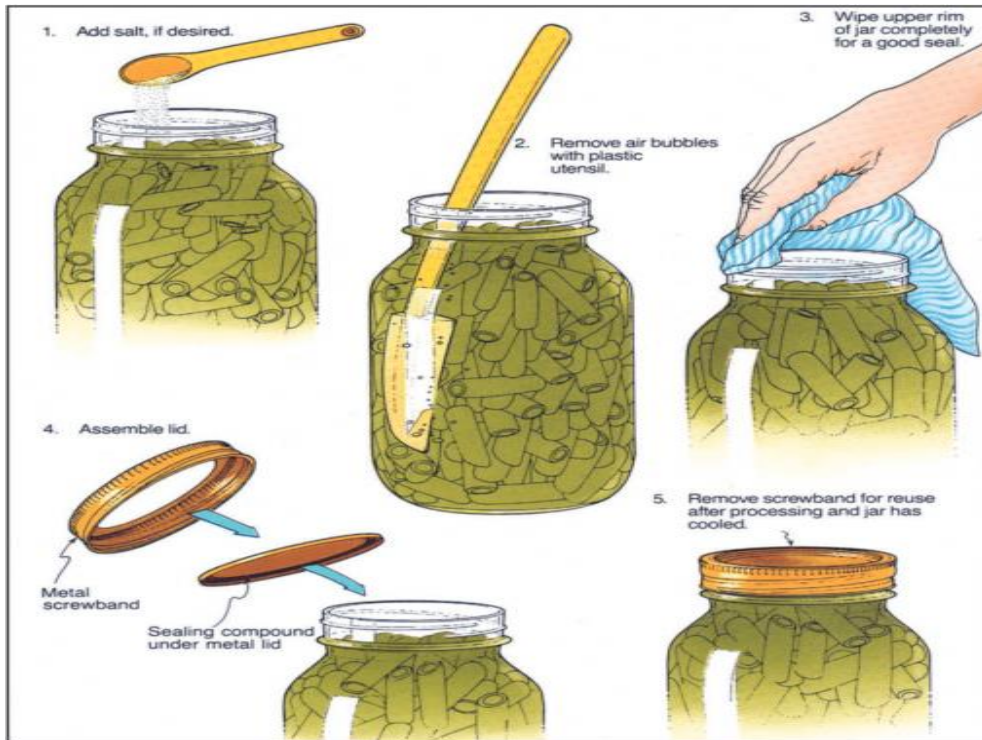


Figure 27. Properly pack the jars. Source: Complete guide to home canning, Guide 1- Principles of home canning, United States Department of Agriculture.

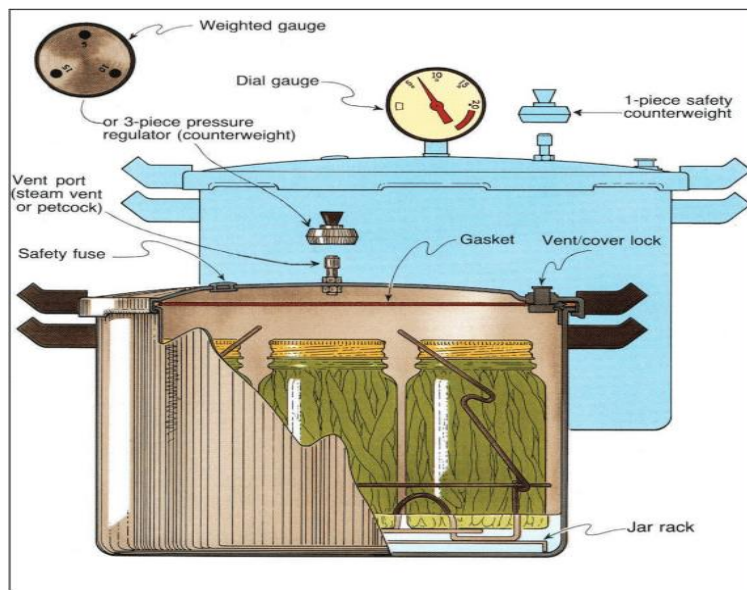


Figure 28. Use a pressure canner for all vegetables except tomatoes. Source: Complete guide to home canning, Guide 1, Principles of home canning. United States Department of Agriculture.

WARNING: As a general recommendation to assure food safety, all home-canned vegetables should be boiled for at least 10 minutes before human consumption. This destroys any toxin that may be present. Boil starchy and leafy vegetables for 20 minutes. If the food looks spoiled, foams, or has an off-odor during heating, destroy it immediately.

Table 5: Processing time for Canning Low Acid Vegetables.

Source: Complete Guide to Home Canning, Guide 1, Principles of Home Canning. United States Department of Agriculture)

Vegetables	Pre-Preparation	Pack	Processing Time (minutes) to 118°C-121°C
Asparagus (Spears or pieces)	Use tender, tight-tipped spears, 4 to 6 inches long. Wash and remove tough scales. Break off stems and wash again. Cut in pieces or leave whole.	<p>Raw pack: Fill jars with raw asparagus, pack tightly (but avoid crushing), then cover with boiling water, leaving 2 cm headspace. Remove air bubbles. Wipe jar rims. Close lids.</p> <p>Hot pack: Cover asparagus with boiling water. Boil for 2 or 3 minutes. Loosely fill jars with hot asparagus and cover with boiling water, leaving 2 cm headspace. Remove air bubbles. Wipe jar rims. Close lids.</p>	30
Beans or peas (Dry, all varieties)	Sort and wash dry seeds. Cover with cold water and let it stand for 12 to 18 hours in a cool place. Drain.	<p>Hot pack only: Cover soaked beans with fresh water and boil for 30 minutes. Fill jars with beans or peas and cooking water, leaving 2 cm headspace. Remove air bubbles. Wipe jar rims. Close lids.</p>	75
Carrots (sliced or diced)	Wash, peel and rewash. Can baby carrots whole. Slice or dice larger ones.	<p>Raw pack: Pack carrots tightly into jars to 2 cm of jar tops and cover with boiling water; leave 2 cm headspace. Remove air bubbles. Wipe jar rims. Close lids.</p> <p>Hot pack: Cover carrots with boiling water; simmer for 5 minutes. Fill jars loosely and cover with boiling water, leaving 2 cm headspace. Remove air bubbles. Wipe jar rims. Close lids.</p>	25
Mushrooms (whole or sliced)	Use only high-quality, small- to medium-sized domestic mushrooms with short stems. Do not eat wild mushrooms. Trim stems and discolored parts and soak in cold water for 10 minutes to remove dirt. Rinse in clean water. Leave small mushrooms whole; cut large ones.	<p>Hot pack only: Cover mushrooms with water in a saucepan and boil for 5 minutes. Fill jars with hot mushrooms. Add 500 milligrams of ascorbic acid powder or a 500-milligrams tablet of vitamin C to each jar to prevent discoloration. Add fresh hot water, leaving 2 cm headspace. Remove air bubbles. Wipe jar rims. Close lids.</p>	45

Peppers (Hot or sweet, including chilies, jalapeno, pimento)	Select firm yellow, green or red peppers. Wash and drain. Caution: Wear plastic gloves while handling hot peppers, or wash hands thoroughly with soap and water before touching your face. Small peppers may be left whole. Large peppers may be quartered. Remove cores and seeds.	Hot pack only: Slash 2 or 4 slits in each pepper. Blanch in boiling water or blister skins by placing peppers in a hot oven (204°C) or broiler for 6 to 8 minutes. Place blistered peppers in a pan and cover with damp cloth. Let cool for several minutes, then peel. Flatten whole peppers. Fill jars loosely with peppers and add boiling water, leaving 2 cm headspace. Remove air bubbles. Wipe jar rims. Close lids.	35
Potatoes (white)	Wash and pare. Leave whole if 1 to 2 inches in diameter or cut into 1 cm cubes. Dip potatoes into a solution of 2 grs ascorbic acid per quart of water to prevent darkening. Drain.	Hot pack only: Place potatoes in a saucepan and cover with boiling water. Boil cut potatoes for 2 minutes; whole for 10 minutes. Drain. Fill jars with hot potatoes and cover with fresh hot water, leaving 2 cm headspace. Remove air bubbles. Wipe jar rims. Close lids.	35
Greens (including spinach) Greens can be canned; however, freezing results in a better product.	Sort and wash thoroughly. Cut and remove tough stems and midribs. Remove any discoloured or damaged portions	Hot pack only: Steam greens, 1 pound at a time, for 3 to 5 minutes or until wilted. Fill jars loosely with greens; add fresh boiling water, leaving 2 cm headspace. Remove air bubbles. Wipe jar rims. Close lids.	70

Tips to Remember

- ✓ Select mature, yet tender, vegetables.
- ✓ From the garden to the canner in 2 hours.
- ✓ Wash and prepare the vegetables carefully.
- ✓ Preheat the vegetable using the hot pack method.
- ✓ Pack in standard canning jars; cover with liquid; remove air bubbles.
- ✓ Wipe jar mouth and threads; close lid.
- ✓ Adjust pressure canner lid in locked position.
- ✓ Let steam escape from the pet cock for 10 minutes, then close.
- ✓ Use recommended processing times.
- ✓ When time is up, let it cool.
- ✓ Open the canner lid away from your face to prevent steam burn.
- ✓ Take out hot jars one at a time.
- ✓ Place jars on a rack to cool.

- ✓ Next day, check lids to make sure they are sealed properly with the lids being concave (vacuum inside); clean jars and put away in storage in a clean, dark, dry area for a year to a year and a half.
- ✓ If a jar did not seal properly, place it in the refrigerator and use immediately or throw it away.

Recipe: canned peppers

Ingredients		Amount, g
Pepper		600
Covering liquid	Water	380
	Salt	10
	Lemon juice/Citric acid	25/5

Select firm yellow, green, or red peppers. Hot or sweet, including chiles or jalapeño. Do not use soft or diseased peppers.

Steps

1. Select peppers to be processed. If you choose hot peppers, wear plastic or rubber gloves and do not touch your face while handling or cutting them. Small peppers may be left whole. Large peppers may be quartered. Remove cores and seeds.
2. Slash two or four slits in each pepper, and either blanch in boiling water or blister skins placing peppers in a hot oven (200°C). After blistering skins, place peppers in a pan and cover with a damp cloth. This will make peeling the peppers easier.
3. Cool for several minutes, peel off skins.
4. Flatten whole peppers.
5. Prepare covering liquid by dissolving salt and lemon juice or citric acid in water
6. Fill hot jars loosely with peppers and add boiling covering liquid, leaving 2 cm headspace.
7. Remove air bubbles and adjust headspace if needed.
8. Close the lids and process for 35-40 minutes in a boiling water bath. It needs at least 4 cm of water above the top of the lids.
9. Cool down.

Recipe: canned whole or halved tomatoes (packed in water)

Ingredients		Amount, g
Tomatoes		600
Covering liquid	Water	1000
	Salt	10
	Lemon juice/Citric acid	10/2

Steps

1. Wash tomatoes. Dip in boiling water for 30 to 60 seconds or until skins split; then dip in cold water. Slip off skins and remove cores.
2. Leave whole or halves.
3. Prepare covering liquid by dissolving salt and lemon juice or citric acid in water
4. Heat covering liquid to boiling. Fill jars with raw tomatoes. Cover tomatoes in the jars with boiling covering liquid, leaving 1 centimeter headspace.
5. Close the lids and process for 35-40 minutes in a boiling water bath. It needs at least 4 cm of water above the top of the lids.
6. Cool down.

4.5. Fruit Jams

Jams are made by a combination of food processes: boiling to reduce water content and to kill microorganisms, combined with the addition of sugar and acid to prevent the growth of yeasts and fungus after the jam has been made. If they are properly made and stored in a cool place away from direct sunlight, jams have a shelf life of several months.

Sugar is added to fruits as a preservative. Sugar binds with the water in the fruit or vegetable and makes it unavailable for the bacteria.

Pectin is routinely used in jams, because when it's cooked at a high temperature with acid and sugar, it creates a gelatinous texture. Fruits that produce high levels of their own pectin (as orange, lemon and apple) usually need very little added pectin to make a jam.

Making jam requires the correct amounts of fruit, sugar, acid and pectin to make a good product with a long shelf life.

General ingredients for a fruit jam

Table 6. Ingredients and purpose for a fruit jam.

INGREDIENT NEEDED	PURPOSE
Sugar	Is a preservative. The <i>jam</i> should have a final sugar content of 65 to 68% to ensure that the fruit is well preserved and safe from bacterial spoilage. All fruits contain natural sugar (between 10 and 12%).
Pectin	Forms a strong gel in the <i>jam</i> . Some fruits contain high levels of <i>pectin</i> and do not need any adding. Other fruits have low levels and need to be mixed with high- <i>pectin</i> fruits or commercial <i>pectin</i> must be added
Acid	Helps to form a strong gel and gives the <i>jam</i> a good flavour. The optimum <i>pH</i> value for <i>jam</i> is 3.0-3.3. Some fruits are <i>acidic</i> (as citric fruits) but others need the addition of <i>acid</i> to reach this <i>pH</i> . Lemon juice (containing citric <i>acid</i>) is usually added to the fruit to increase the <i>acidity</i> (or low <i>pH</i> value).
Fruit	Should be ripe and of good quality. Under-ripe fruit can be added as this is more acidic. Over-ripe fruit should not be used as the <i>pectin</i> content is low.

Steps

1. Wash and cut fruit.
2. Sanitize jars. Leave lids face up on a clean surface.
3. Mix in a bowl sugar, pectin and citric acid. If lemon juice is used instead of citric acid, it should be added to the fruit.
4. Cook fruit starting with the heat on medium high and stir occasionally. When warm, add the mix of sugar /pectin / citric acid. Stir constantly until the jam begins to reduce and thicken (around 20 minutes but it depends on the fruit). The **sheet or spoon test can be used to check** whether the jam is already done (see figure). Dip a cool metal spoon into the boiling mixture and lift the spoon out of the steam so the syrup runs off the side. When the mixture first starts to boil, the drops will be light and syrupy. As the syrup continues to boil, the drops will become heavier and will drop off the spoon two at a time. When the two drops form together and "sheet" off the spoon, the jelling point has been reached.
5. Carefully fill warm jars with hot jam.

6. Wipe the top of the glass jar if some of the jam spilled in order to have a good seal and close the lid. Close the jars and process them in a boiling water bath for 5 or 10 minutes. It is needed at least 4 cm of water above the top of the lids.
7. Cool down.

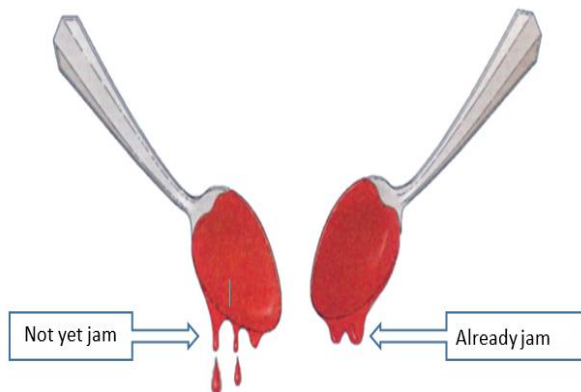


Figure 29. Sheet or spoon test

Recipe: strawberry jam

Ingredients	Amount, g
Strawberries	600
Sugar	500
Pectin	8
Lemon juice / Citric acid	20 / 2

Steps

1. Sort and wash fully ripe strawberries; remove stems and caps. Crush berries.
2. Place crushed strawberries on high heat and, stirring constantly, bring quickly to a full boil with bubbles over the entire surface.
3. Sanitize jars. Leave lids face up on a clean surface.
4. Mix in a bowl sugar, pectin and citric acid. If lemon juice is used instead of citric acid, it should be added to the fruit.
5. Add sugar and pectin and stir well, continue stirring, and heat again to a full bubbling boil.
6. Boil hard for 3 minute, stirring constantly.
7. Remove from heat, skim.
8. Fill hot jam immediately into warm jars, with 1 cm headspace.

9. Wipe rims of jars with a dampened clean paper towel; close lids.
10. Process in a boiling water bath for 5-10 minutes. It needs at least 4 cm of water above the top of the lids.
11. Cool down.



Figure 30. Strawberry jam.

Recipe: fig jam

Ingredients	Amount, g
Fig	1000
Sugar	400
Pectin	10
Lemon juice or Citric acid	45 / 2.5

Steps

1. Wash the figs carefully. Peel them, but some may be difficult, no problem if some skin is left.
2. Cut them into quarters and put them in a saucepan.
3. Sanitize jars. Leave lids face up on a clean surface.
4. Mix in a bowl sugar, pectin and citric acid. If lemon juice is used instead of citric acid, it should be added to the fruit.
5. Add the mix of sugar, pectin and acid to the fruit and put over medium-high heat. When it starts to boil, lower the heat and cook for about 20 minutes. Check the consistency with the sheet / spoon test.
6. Remove from heat, skim.
7. Fill hot jam immediately into warm jars, with 1 cm headspace.

8. Wipe rims of jars with a dampened clean paper towel; close lids.
9. Process in a boiling water bath for 5-10 minutes. It needs at least 4 cm of water above the top of the lids.
10. Cool down.



Recipe: peach jam

Ingredients	Amount. g
Peach	600
Sugar	300
Pectin	8
Lemon juice / Citric acid	20 / 2

Steps

1. Wash peaches, peel them and remove bones.
2. Cut into dices or crush (pulp), depending on the preferred final texture.
3. Sanitize jars. Leave lids face up on a clean surface.
4. Mix in a bowl sugar, pectin and citric acid. If lemon juice is used instead of citric acid, it should be added to the fruit.
5. Mix peach and lemon juice and heat at 50°C-60°C.
6. Add the mix of sugar, pectin and acid to the fruit and put over medium-high heat. When it starts to boil, lower the heat and cook for about 5 minutes for pulp or 10 minutes for dice. Check the consistency with the sheet / spoon test.
7. Remove from heat, skim.
8. Fill hot jam immediately into warm jars, with 1 cm headspace.
9. Wipe rims of jars with a dampened clean paper towel; close lids.

10. Process in a boiling water bath for 5-10 minutes. It needs at least 4 cm of water above the top of the lids.

11. Cool down.



4.6. Bakery products

Bakery products, which include bread, rolls, cookies, pies, pastries, and muffins, are usually prepared from wheat flour or flour derived from some form of grain.

Bakery products are subject to the microbiological spoilage problems affecting other foods. If moisture content is kept below 12 to 14 percent (depending on the composition), growth of yeast, bacteria, and molds is completely inhibited. Nearly all crackers and cookies fall below this level. Breads, cakes, sweet rolls, and some other bakery foods may contain as much as 38 to 40 percent water when freshly baked and are subject to attack by many fungi and a few bacteria.

To obtain maximum shelf life free of mold spoilage, high levels of sanitation must be maintained in baking and packing areas.

Recipe bread

Ingredients	Amount, g
Bakery wheat flour	500
Water at mild temperature	340
Salt	10
Yeast	4

Satisfactory white bread can be made from flour, water, salt, and yeast. Such breads have a hard crust, are relatively light in colour, with a coarse and tough crumb, and flavour that is excellent in the fresh bread.

Steps

1. Prepare the ingredients: bread flour, salt, mild water and bakery yeast.
2. Weight the yeast, the salt and mix the flour with the salt and yeast.
3. Add the mild water
4. Hand knead until the dough is elastic and smooth.
5. The dough must be now allowed to rise in a warm place for 2 hours.
6. Cut pieces of dough according to the desired breads
7. Shape the breads
8. The dough is left to stand for at least 30 minutes.
9. Now make cuts with a knife on the top of the breads
10. Oven at 200°C for 20 or 30 minutes. DO NOT OPEN THE OVEN IN THE FIRST 15 MINUTES.
11. Cool down.



Recipe: sponge cake (basic cupcakes)

Ingredients	Amount
Eggs	4 units
Dry yeast for sweets	16 gr
Natural yoghurt (125 gr)	1 unit
Lemon or orange (only use the zest)	1 unit

The yoghurt's container is the measure for the following ingredients	Vegetable oil (olive or sunflower)	1 container
	Sugar	2 containers
	Flour	3 containers

A homemade cake is tastier than the store bought one. But many people believe that making a cake at home is difficult. The best thing about this basic cake is that you can add any flavour of your choice to suit your palate. This sponge cake can also be your base for most cream cake recipes that you prepare.

Steps

1. Prepare the ingredients, utensils and equipments. Oven has to be preheated to 190°C and the baking agent mixed with the flour.
2. Beat the eggs. Beat everything well with a manual or electric stirrer.
3. Add yogurt. Beat.
4. Add sugar. Beat.
5. Add flour (with baking agent). Beat.
6. Add olive or sunflower oil. Beat
7. And lemon or orange zest
8. Beat until smooth
9. Fill in the muffins tins, lined with baking paper
10. Add a bit of sugar on the top
11. Bake in the oven for 50-55 min, or until golden brown on top and firm to the touch. Cool in the tin for 10 min before turning out onto a wire rack to cool completely. DO NOT OPEN THE OVEN IN THE FIRST 30 MINUTES.



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Adres: Adalet Mah. Hürriyet Cad. No: 128 16160
Osmangazi/Bursa

Telefon: 0224 246 47 20