**What is microbial flora of fresh food?**

**What is microbial flora:-**

In microbiology, **flora** (plural: floras or florae) refers to the collective **bacteria** and other microorganisms in an ecosystem (e.g., some part of the body of an animal host). While the term microflora is common, it is technically a misnomer since **flora** pertains to the kingdom Plantae.

Microorganisms are associate in a variety of way with all of the food we eat. They may influence the quality, availability, and quantity of our food. We might think that only spoiled foods, or foods those are not fresh, may carry microbes. But even fresh foods can contain microbes.

The magnitude of this microbial contamination reflects one or more of the following-

* The microbial population of the environment from which the food was taken.
* The condition of the raw product.
* The method of handling.
* The time and condition of storage.

**MEATS**: The carcass of a healthy animal slaughtered for meat and held in refrigerated room is likely to have only nominal surface contamination while the inner tissues are sterile. When Fresh meat cut from the chilled carcass has its surface contaminated with microorganisms of the environment or the implements (saws/knives) which can also contain microbes. Each new surface of meat, resulting from a new cut, adds more microbes to the exposed tissues. The ultimate in providing new surfaces and potential contamination of meat.

The more common species of bacteria occurring on fresh meats are pseudomonads, staphylococci, micrococci, enterococci, and coliforms. The low temperature at which fresh meats are held, favors the growth of psychrophilic (cold loving) microorganisms.

**EGGS**:- The interior of a freshly laid egg is usually free of microbes. Its subsequent microbial content is determined by the sanitary conditions under which it is held as well as the conditions of storage, such as temperature and humidity. Microbes, particularly bacteria and molds, may enter the egg through cracks in the egg-shell or penetrate the shells when the “bloom” (thin protein coat) covering the shell deteriorates. The types of microorganisms depends on those present in the environments.

**FRUITS & VEGETABLES**: Fruits and vegetables are normally susceptible to infections by bacteria, fungi, and viruses. This microbial invasion of plant tissues can occur during any stage of development of fruits and vegetables. Depending on the extent that the tissues are invaded, the likely hood of spoilage is increased. Another factor behind this invasion can be the post-harvest handling of the fruits and vegetables. Mechanical handling is likely to produce breaks in the tissues facilitating microbial invasion. The pH level of fruits is relatively acidic, and this restricts bacterial growth but doesn’t retard fungal growth. The pH range of vegetables are slightly less acidic, making them more susceptible than fruits to be attacked by bacteria.

**Microbial Spoilage of Food: - Food spoilage** is the process where a food product becomes unsuitable to ingest by the consumer. The cause of such a process is due to many outside factors as a side-effect of the type of product it is, as well as how the product is packaged and stored. Due to food spoilage, one-third of the worlds' food produced for the consumption of humans is lost every year.Bacteria and various fungi are the cause of spoilage and can create serious consequences for the consumers, but there are preventative measures that can be taken.

Reasons- Harvested foods decompose from the moment they are harvested due to attacks from [enzymes](https://en.wikipedia.org/wiki/Enzymes), oxidation and [microorganisms](https://en.wikipedia.org/wiki/Microorganism). These include  [bacteria](https://en.wikipedia.org/wiki/Bacteria), [mold](https://en.wikipedia.org/wiki/Mold), [yeast](https://en.wikipedia.org/wiki/Yeast), moisture, temperature and chemical reaction.

### **Bacteria: -** [Bacteria](https://en.wikipedia.org/wiki/Bacteria) is responsible for the spoilage of food. When bacteria breaks down the food, [acids](https://en.wikipedia.org/wiki/Acid) and other waste products are created in the process. While the bacteria itself may or may not be harmful, the waste products may be unpleasant to taste or may even be harmful to one's health

### **Fungi:-** *Fungi* has been seen as a method of food spoilage, causing only an undesirable appearance to food, however, there has been significant evidence of various fungi being a cause of death of many people Fungi are caused by acidifying, fermenting, discoloring and disintegrating processes Fungi are many different colors, including black, white, red, brown and green.

Prevention: - A number of methods of prevention can be used either totally prevent or otherwise reduce food spoilage.

* [food rotation system](https://en.wikipedia.org/wiki/Food_rotation_system)
* [Preservatives](https://en.wikipedia.org/wiki/Preservative) can expand the [shelf life](https://en.wikipedia.org/wiki/Shelf_life) of food
* One of the age old techniques for food preservation
* Other than drying, other methods include salting, curing, canning,
* Refrigeration, freezing, preservatives, irradiation, and high hydrostatic pressure [Refrigeration](https://en.wikipedia.org/wiki/Refrigeration).

**Elementary Technique of Industrial Food Preservation –Radiation:-**

It is the oldest methods of preservation are drying, refrigeration, and fermentation. Modern methods include canning, pasteurization, freezing, irradiation, and the addition of chemicals. Advances in packaging materials have played an important role in modern food preservation.

**Food preservation** involves preventing the growth of [bacteria](https://en.wikipedia.org/wiki/Bacterium), [fungi](https://en.wikipedia.org/wiki/Fungus) (such as [yeasts](https://en.wikipedia.org/wiki/Yeast)), or other [micro-organisms](https://en.wikipedia.org/wiki/Microorganism) , as well as retarding the [oxidation](https://en.wikipedia.org/wiki/Redox) of [fats](https://en.wikipedia.org/wiki/Fat) that cause [rancidity](https://en.wikipedia.org/wiki/Rancidification). Food preservation may also include processes that inhibit visual deterioration, such as the [enzymatic browning](https://en.wikipedia.org/wiki/Enzymatic_browning) reaction in apples after they are cut during food preparation.

**The best ways to preserve the food**

* Freeze. The colder a food is, the slower its rate of deterioration. ...
* Freezing herbs.
* Herbs in water can be frozen in ice cube trays. ...
* Heat.
* Boiling to make fruit preserves. ...
* Use strong concentrations. ...
* Pickling in vinegar. ...
* Fermenting alcohol. ...
* Exclude air

**Method of food preservation at Low Temperature:-**

**1**. Physical method **2**.Chemical method **3**.Biological method

**Physical method:-**

1. **Asepsis**: Maintain protective covering without mechanical damage e.g. fruits and vegetable skin, egg shell Packaging of foods – wrapping to hermetically sealed.

**Containers.**

2. Removal of microorganisms by filtration. It is limited to clear liquids

3. Centrifugation (sedimentation, clarification) to remove spores and cells

4. Washing to remove soil microbes on surface; wash water to be clean

5. Trimming: remove spoiled portion of food

6. Use of high temperature:

7. Low temperature

8. Drying

9. Irradiation

**Chemical method:-**

Chemical preservatives are considered as food additives. A food additive is a substance or substances other than the basic food stuff which is present in food as a result of any aspect of production, processing, packaging or storage. Those food additives which are specifically added to prevent microbial spoilage are referred to as chemical preservatives.

**Types:**

– Organic acids: lactic, citric, malic acids

-Propionates, methyl paraben

– Nitrites and nitrates

– Sugar and salt

– Alcohol

– Spices and other condiments

– Antibiotics

– Antioxidants

– Bacteriocins

– Antifungal agents

**Biological method:-**

* Fermentation

**Classification of food preservation methods:-**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Method** | **Procedure** | **Internal**  **Mechanism** | **External Mechanism** | **Antimicrobial**  **material** | **Typical**  **surviving**  **microbes** |
| **Physical** | Pasteurization  sterilization | aw PH | Temperature | **\_** | Thermophile  Bacteria, spores |
|  | Cold processing | aw | Temperature | **\_** | Psychrophils,  Psychrotrophs |
|  | Control of  Water content | aw | RH relative  Humidity | **\_** | Xenophiles |
|  | Irradiation | aw | Temperature  Microwave | **\_** | Spores |
| **Chemical** | Salting | aw | \_ | NaCl | Halophilic  Bacteria |
|  | Curing | aw | Temperature | Nitrites | Gr+ bacteria |
|  | Smoking | aw | Temperature | Phenols, acids | Depending on  further  preservation  method |
|  | Preservatives | PH |  | Organic acids | Bacteria tolerate  Acid |
| **Biological** | Fermentation | aw PH, Eh | Temperature | Organic acids | Depending on  ecological  factors |

**Method of food preservation by low temperature:-**

**Refrigeration: -** Temperatures typically between 45 – 32°F (7.2 – 0°C). Preferably below 38°F. Refrigeration or cold storage of food is a gentle method of food preservation Refrigeration temperature is a key factor in predicting the length of the storage period. For example, meat will last 6-10 days at 0° C, one day at 22° C and less than one day at 38° C. Household refrigerators are usually run at 4.7 -7°C.

**Chilling: -** Chilling is a processing technique in which the temperature of a food is reduced and kept at a temperature between –1°C and 8°C.

**Field of application**

**1.** -1° C to + 1°C (fresh fish, meats, sausages and ground meats, smoked meats and fish**)**

**2.** 0°C to + 5°C (pasteurized canned meat, milk and milk products, prepared salads, baked goods, Pizzas, unbaked dough and pastry)

**3.** 8°C to 12°C in the wine industry. The must is kept at this temperature between 6 and 24 hours

**Freezing:-** In food processing, method of preserving food by lowering the temperature to inhibit microorganism growth. −18 °C or lower. Fruits are frozen in a syrup or dry sugar pack to exclude air and prevent both oxidation and desiccation.

**Advantages of Freezing:-**

* Many foods can be frozen.
* Natural color, flavor, and nutritive value retained.
* Texture usually beer than other methods of food preservation.
* Foods can be frozen in less time than they can be dried or canned.
* Simple procedures. Adds convenience to food preparation.

**Disadvantages of Freezing:-**

* Texture of some foods is undesirable because of freezing process.
* Initial investment and cost of maintaining freezer is high.
* Storage space limited by capacity of freezer

**Food Preserve at High Temperature:-**

The use of high temperatures to preserve food is based on their destructive effects on microorganisms. By high temperatures are meant any and all temperatures the food preservation, there are two temperature categories is pasteurization and sterilization.

**Pasteurization** by use of heat implies either the destruction of all disease-producing organisms (for example, pasteurization of milk) or the destruction or reduction in the number of spoilage organisms in certain foods, as in the pasteurization of vinegar. The pasteurization of milk is achieved by heating as follows: 145°F (63°C) for 30 min (low temperature long time, LTLT) 161°F (72°C) for 15 sec (primary high temperature short time, HTST, method) 191°F (89°C) for 1.0 sec 194°F (90°C) for 0.5 sec 201°F (94°C) for 0.1 sec 212°F (100°C) for 0.01 sec

**Sterilization** means the destruction of all viable organisms as may be measured by an appropriate plating or enumerating technique. Canned foods are sometimes called "commercially sterile" to indicate that no viable organisms can be detected by the usual cultural methods employed or that the number of survivors is so low as to be of no significance under the conditions of canning and storage. Also, microorganisms may be present in canned foods that cannot grow in the product by reason of undesirable pH, or temperature of storage.

[Probiotics](https://www.webmd.com/diet/features/answers-to-your-questions-about-probiotics)

[Probiotics](https://www.webmd.com/diet/features/answers-to-your-questions-about-probiotics) are live bacteria and yeasts that are good for you, especially your [digestive system](https://www.webmd.com/heartburn-gerd/your-digestive-system). We usually think of these as germs that cause diseases. But your body is full to bacteria, both good and bad. Probiotics are often called "good" or "helpful" bacteria because they help keep your gut healthy.

You can find probiotics in supplements and some foods, like yogurt. Doctors often suggest them to help with digestive problems.

**How Do They Work?**

Probiotics work. Some of the ways they may keep you healthy:

* When you lose "good" bacteria in your body, for example after you take antibiotics, probiotics can help replace them.
* They can help balance your "good" and "bad" bacteria to keep your body working the way it should.

## Types of Probiotics:-

Many types of bacteria are classified as probiotics. They all have different benefits, but most come from two groups.

**Lactobacillus**. This may be the most common probiotic. It's the one you'll find in yogurt and other fermented foods. Different strains can help with [diarrhea](https://www.webmd.com/digestive-disorders/digestive-diseases-diarrhea) and may help people who can't digest lactose, the sugar in milk.

**Bifidobacterium**. You can find it in some dairy products. It may help ease the symptoms of [irritable bowel syndrome](https://www.webmd.com/ibs/default.htm) ([IBS](https://www.webmd.com/ibs/video/drossman-what-is-ibs)) and some other conditions.

**Saccharomyces boulardii**is a yeast found in probiotics. It appears to help fight diarrhea and other digestive problems. वो क्या करते हैं

## What Do They Do:-

* Irritable bowel syndrome
* [Inflammatory bowel disease](https://www.webmd.com/ibd-crohns-disease/inflammatory-bowel-syndrome) (IBD)
* Infectious diarrhea (caused by viruses, bacteria, or parasites)
* Diarrhea caused by antibiotics

## Probiotic Milk:-

## Probiotic milk is Products and Digestive Health. Probiotic products consist of specific strains of live bacteria that have potentially favorable health effects. A number of studies provide evidence that milk products with probiotics may be beneficial for digestive health and may improve various digestive problems.

## Probiotic Yogurt: - [Yogurt](https://www.healthline.com/nutrition/7-benefits-of-yogurt) is one of the best sources of probiotics, which are friendly bacteria that can improve your health.

* It is made from milk that has been fermented by friendly bacteria, mainly lactic acid bacteria and Bifidobacteria.
* Eating yogurt is associated with many health benefits, including improved [bone health](https://www.healthline.com/nutrition/build-healthy-bones). It is also beneficial for people with high blood pressure.
* In children, yogurt may help reduce the diarrhea caused by antibiotics. It can even help relieve the symptoms of irritable bowel syndrome (IBS)
* Additionally, yogurt may be suitable for people with lactose intolerance. This is because the bacteria turn some of the lactose into lactic acid, which is also why yogurt tastes sour.
* However, keep in mind that not all yogurt contains live probiotics. In some cases, the live bacteria have been killed during processing.
* For this reason, make sure to choose yogurt with active or live cultures.
* Also, make sure to always read the label on yogurt before you buy it. Even if it is labeled low-fat or fat-free, it may still be loaded with high amounts of [added sugar](https://www.healthline.com/nutrition/10-disturbing-reasons-why-sugar-is-bad)..