

FOOD PRESERVATION: A NEVER-ENDING STORY

1 Read the following text and place these food preservation methods in the suitable place.

- Canning
- Drying
- Freezing
- High Hydrostatic Pressure in combination with Temperature (HPT)
- High Pressure Processing (HPP) or Pascalisation
- Pasteurisation
- Refrigeration
- Smoking
- Ultra-high temperature processing (UHT)


When Andy Warhol painted Campbell's soup cans in 1962, he was depicting one of the most innovative ways to preserve food at that time.

When cooking spaghetti, we don't usually think of it as dried food. (1) is a crucial step in the pasta production process, where humidity, air flow and temperature are carefully controlled. Arabs, not Italians, were the first to treat pasta by desiccating it, so they could eat the product any time during their desert wanderings. The first historical records of dried pasta production date back to the 11th century in Sicily, a southern Italian region deeply influenced by Arab culture at that time.

After discovering that meat cooked with fire was much more edible and tasty, humans realised that (2) could preserve foods from perishing, due to deposits of certain substances present in the smoke. Oak and beech are the most used wood types. When burning, they generate antioxidant and antimicrobial compounds such as phenols and carboxylic acids. Recently, the high costs and timing associated with traditional smoking along

with concerns over phenols and other carcinogens have favoured the introduction of liquid smoking. This method consists of adding a cold aroma or injecting liquid smoke into the meat, thus not diminishing the bacterial load and therefore lowering the shelf life.

The (3) process goes back to 1795 when Napoleon offered a prize to anyone who could invent a way of preserving food for his army and navy. In 1809, Nicolas Appert, a French confectioner and brewer, won it after discovering that if food was heated and then sealed in glass jars, it would not spoil. Based on Appert's methods, Peter Durand, an English merchant, introduced tin cans in 1810. The reason why food didn't spoil was unknown at that time. Fifty years later Louis Pasteur demonstrated the role of microbes in food spoilage.

The food is processed and sealed in an airtight jar or can and then sterilised by heating to a temperature that destroys microorganisms and inactivates enzymes. Heating and later cooling form a vacuum seal which prevents other microorganisms from re-contaminating the food within the jar or can. 

(4) was invented by the French chemist Louis Pasteur in 1862. At the time, producers of French wine were trying to find ways to preserve their precious beverage. After discovering microbes, Pasteur wanted to find a way to kill them without changing the taste of the wine. He did find a process whereby the wine could be heated to about 60°C for 10 minutes without any adverse effects. Wine pasteurisation was only used for 10 years, until Pasteur discovered that if the wine barrels were cleaned with sulphur once a year, microbes would be kept away. Beer pasteurisation followed and, many years after Pasteur's death, the process was used to kill the pathogen microbes in food and drink such as milk, juice, and canned food. Unlike sterilisation, the food is heated to about 50-70°C for 15 to 30'' and then quickly cooled to 10°C. This prevents the remaining bacteria (such as *Lactobacillus*) from growing while maintaining taste and vitamins. This is why pasteurised milk has to be stored at 4°C.

If pasteurisation requires heating at 55-70°C for a few seconds, (5) processing requires boiling at 135°C for 2-5 seconds. Milk can then be preserved for 4-5 months at room temperature. All dangerous microorganisms are destroyed. But also vitamins.

(6) to preserve food dates back to prehistoric times, when people used snow and ice to store products. The commercialisation of frozen foods started in the 20th century in the US, using a rapid freezing method: deep freezing. This

industrial process quickly exposes food to temperatures from -30°C to -50°C, until the product core temperature reaches -18 ° C. The water contained in the food cells becomes finely crystallised, cells become "dormant" and the proliferation of microorganisms is limited. The product retains its freshness, texture, flavour and essential nutrients and vitamins. This is not the case with home freezing, where the temperature drops slowly.

(7) cannot destroy all the microorganisms present in a food, but it can stop them from reproducing. The so-called 'cold chain' is a series of activities maintaining food within a low temperature range from production to distribution. If the chain is broken and the food temperature rises above -18°C, bacterial growth starts again and the food is no longer preserved.

(8) is a technique by which packaged food products are put under very high pressure (6,000 bar or 600 MPa or 87,000 psi – pounds/square inch) applied by water for a few minutes (3 or less) at cold (4-10°C) or room temperature. This process inactivates all microorganisms (bacteria, virus, yeasts, moulds and parasites) present in the food, considerably extending shelf life and guaranteeing food safety.

While HPP maintains a food's freshness, flavour, texture and nutrients, and at the same kills the microorganisms present, (9) should represent a further improvement by combining preheating with high pressure.

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