# Heat and high pressure—new technique to process food

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Guacamole

Researchers are investigating how to improve a century old technology of processing food. Could this method result in safer food products with better characteristics and an extended shelf life?

High pressure to preserve and sterilize some foods, prolonging their shelf life: this old method of food preservation is called High Pressure Processing (HPP) or Pascalisation, from the name of the 17th century

French scientist Blaise Pascal, famous for studying the effects of pressure on fluids.

Applied to certain foods, high pressure can render inactive some microorganisms such as yeast, mould and bacteria, and some enzymes too, which contribute to deteriorating these foods when processed.

In Japan since 1990, HPP has been used to preserve some juices, jellies, and jams, whereas it is now used to preserve fish and meat, salad dressings, rice cakes, and yoghurts. In the US the technique has been used for guacamole: it did not change the taste, texture, or colour, but the product's shelf life increased from three to thirty days.

Now a new version of HPP, the so-called "High Hydrostatic Pressure in combination with Temperature" (HPT) technique, could represent a significant improvement in food processing, by adding a heating step to the high pressure processing.

The combination of a preheating stage and high pressure is expected to sterilise food products and ensure greater food safety, freshness and nutritional quality, while extending shelf life. In addition, HPT promises to be environmentally friendly thanks to its low energy costs and reduced water consumption.

HPP does not greatly affect the nutritional value, taste, texture, and appearance of a given food product. Neither does it use chemical preservatives. This is why high pressure treatment is considered a "natural" preservation method. In HPP, food products are sealed and placed into a steel compartment containing water, and pumps are used to create a pressure as high as that measured at the bottom of the ocean. The treatment works equally well for solid and liquid products.

The difference between the two methods is that in HPT, most of the

enzymes are killed when the food is heated. Enzymes are responsible for changing the colour and texture of a given product after cutting, juicing or other processing steps; just like an apple turns brown after slicing, and the so-called "cloud-loss" in freshly squeezed orange juice.

"After HPP most of the enzymes are intact, which means the colour and texture (and also flavour) are not stable during chilled shelf life. On the other hand, after HPT treatment the enzymes are mostly rendered inactive, resulting in a stable colour and texture during the ambient shelf life", explains Dennis Favier, Creative Director of the innovation company TOP bv in the Netherlands.

"Another important difference is food safety of non-acidic products, like vegetables or meat. Due to bacterial spores, non-acid food is not safe after HPP treatment. On the contrary, by applying HPT the spores are killed, which makes the products sterile and thus safe for a long period", says Favier.

"I expect this new technology will become much more widespread than HPP, due to the larger number of uses and food types it can be applied to", concludes Dennis Favier.

The final added value of HPT has yet to be proven against existing food processing techniques, but should this new method turn out to be more effective, the next steps will be scaling-up and implementation.

The HPT technique is the object of a European research project called HIPSTER, aimed at validating, implementing and marketing this new method.

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