



Thawing in Super-chilling

-- Case studies



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Case study experiment test report: Thawing in Super-chilling

Currently the most commonly used thawing methods including:

- Room Temperature Thawing: The so called Room Temperature Thawing is to place frozen food at room temperature (24°C - 25°C) environment for thawing, the advantage of Room Temperature Thawing is simple and convenient without any equipment, and the disadvantage is easily to produce a large number of drip loss and exposure to the air cause bacteria growing too much.
- Flow Water Thawing is to use cool running water (21°C) to supply energy for heat exchange with the frozen foods, the advantages of Flow Water Thawing is simple thawing equipment, the disadvantages are a lot of drip loss, the thawing level in external and internal of the food not equilibrium, water waste and pollution.
- Microwave Thawing: the principle of Microwave Thawing is to use microwave generator to produce microwave which resonates with the water molecules in the frozen food to produce heat to thaw the frozen product. The advantage of Microwave Thawing is thawing fast, the disadvantages are thawing equipment more expensive, easily to cause food partial overheating and microwave is harmful to the human body.
- Thawing in refrigeration: the most common practice method is thawing in home refrigerator, the advantages of refrigeration thawing are refrigerator popular, refrigerator provides short cold storage after thawing finished, the disadvantages are easily to suffer drip loss and temperature fluctuation ($\pm 5^{\circ}\text{C}$) impacts food tissue.
- Thawing in High-voltage electrostatic field (HVEF), which can perform thawing and preservation 2 effects, however, the equipment is more expensive.

The next novel generation of frozen food thawing method is to

thaw food just below initial freezing point (IFP) of food. King Son IFP Aging Chamber is incorporated with A7 Intelligent Food-tech Controller and designed with King Son Constancy Precision Refrigeration Technology, Constancy IFP Chilling & Super-chilling Technology and Constant Temperature and Humidity Multiple Points Monitoring and Servo Control Technology that preserves and processes food in uniformity conditions and environments, with temperature fluctuation $\pm 0.3^{\circ}\text{C}$ and humidity fluctuation $\pm 5\%$ that commercializes Super-chilling Thawing technology from lab to commercial and industrial application.

The freezing point here refers to the Initial Freezing Point of the food(IFP), and it is observed that each food in nature has a different initial freezing point and not all at zero degrees Celsius.



Experiment and Test Method

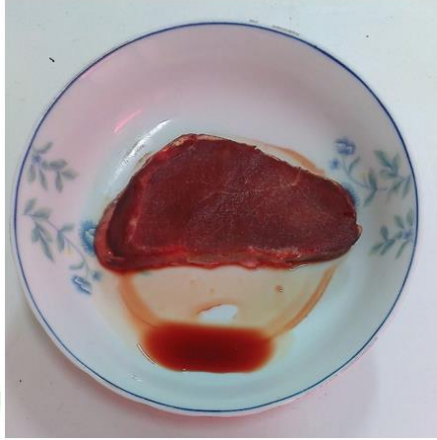
- The initial freezing point temperature of beef is between -1.7°C and -2.2°C , therefore, the thawing temperature setup in King Son IFP Aging Chamber is -2.2°C .
- Test process steps:
 - Purchased frozen beef from supermarket and separated it to 2 groups.
 - Placed frozen beef in freezer (-20°C) for one night, achieved temperature equilibrium.
 - Placed 2 groups frozen beef respectively, one group is in King Son IFP Aging Chamber for 24 hours thawing in Superchilling (-2.2°C) and another is in refrigeration compartment ($2^{\circ}\text{C}-6^{\circ}\text{C}$) of refrigerator for 24 hours thawing in refrigeration temperature.
 - Observed and recorded the weight loss and appearance change of frozen beef.

Thawing in Super-chilling test results:

Thaws frozen beef in King Son IFP Aging Chamber (-2.2°C) and refrigeration compartment ($2^{\circ}\text{C}-6^{\circ}\text{C}$) of refrigerator for 24 hours, the weight loss as below:

	Thawing in refrigeration compartment of refrigerator ($2^{\circ}\text{C}-6^{\circ}\text{C}$)	Thawing in King Son IFP Aging Chamber by Superchilling (-2.2°C)
Weight loss	12.4%	4%

Learned from above experiment results that Thaws frozen beef by Superchilling (-2.2°C) in King Son IFP Aging Chamber can minimize the weight loss of thawing. The pictures as below shown the actual thawing status of frozen beef.



The picture in upper left is the frozen beef thawed 24 hours in refrigeration compartment (2°C - 6°C) that shows a lot of drip loss, this result evidences that frozen beef thawed in the refrigeration compartment of refrigerator can cause irreversible damage to the food tissues, resulting in a significant drip loss and mouthfeel deterioration, which in turn causes food nutritional value down and high weight loss.

The picture in upper right is the frozen beef thawed 24 hours in King Son IFP Aging Chamber that shows no drip loss by Superchilling (-2.2°C), there is only a very thin ice on the surface of beef which is still pliable and yields to the thumb when pressed, evidences that the beef is ready to process after finished thawing. Most consumers consider a product to be fresh, as opposed to frozen, when it is pliable or when it is not hard to the touch.”

In order to further observe whether the thawing in Superchilling performed by King Son IFP Aging Chamber cause damages to food tissue, the Superchilling thawing beef (shown in upper right picture) is placed at room temperature for 30 minutes and the results are shown below:



Above actual photo shows that there is no drip loss happened after the Superchilling thawing beef acclimated to room temperature, this results evidences that the Superchilling Thawing process in King Son IFP Aging Chamber is hardly to produce impacts on food tissue that preserves food' s original nutrients and keep the taste same.

Summary:

Thaws frozen food by Superchilling (-2.2°C) in King Son IFP Aging Chamber can minimize the weight loss of thawing. The traditional thawing method, due to the temperature difference is too large and the temperature fluctuation too much, easily lead to the food tissue damages in the thawing process and make food taste worse, and cause a lot of drip loss and nutrient disappeared.

King Son IFP Aging Chamber is incorporated with A7 Intelligent Food-tech Controller and designed with King Son Constancy Precision Refrigeration Technology, Constancy IFP Chilling & Super-chilling Technology and Constant Temperature and Humidity

Multiple Points Monitoring and Servo Control Technology that preserves and processes food in uniformity conditions and environments, with temperature fluctuation $\pm 0.3^{\circ}\text{C}$ and humidity fluctuation $\pm 5\%$ that commercializes Super-chilling Thawing technology in mass production thawing process.

King Son IFP Aging Chamber can provide frozen food thawing in Superchilling, at above 85% constant high humidity environment that minimizes the weight loss in thawing process, it is hardly to produce impacts on food tissue and preserves food's original nutrients and keep the taste well after finished thawing.

