

Briefing notes for Novel Preservation Technologies workshop, 3rd IIR International Conference on Sustainability and the Cold Chain

Technology : Supercooling

- How does the preservation method work?

Supercooling is a preservation process which works by lowering the temperature of food below its freezing points without forming ice. At such temperatures shelf life is extended, while at the same time the quality deterioration which can result from freezing and thawing is avoided.

- Where is the technology now? Is it currently a practical solution for preservation?

The technology has been the subject of various research projects, but to date it has not been applied commercially primarily due to the difficulties in ensuring that supercooling takes place and is maintained without ice nucleation. While some products naturally supercool, cryoprotectants can also be used to reduce the chances of ice nucleation.

- Where can the technology go in the future and what is its potential for improving the cold chain?

If a technique can be developed to repeatedly and reliably produce and maintain the supercooled state, supercooling could extend the duration of cold chains with the same final quality as chilled chains. Benefits could include greater storage life and quality in the production and distribution sectors of the cold chain and for the consumer, reductions in waste, opening up more distant markets for food producers, and potentially the ability to distribute supercooled instead of frozen food.

- What are the barriers and problems that must be overcome?

Avoiding nucleation of ice at temperatures below the freezing point of food can be challenging. Diverse factors such as physical disturbance (e.g. vibration, shocks), presence of impurities, rate of cooling, final temperature and poor temperature control have all been reported to have an influence on the likelihood that ice will form. In a commercial cold chain some of these factors are difficult to control, particularly in distribution and retailing. Many cold chain stages would require modified or new equipment to be able to achieve and maintain steady supercooled temperatures.

- Where will this technology be best used in improving and developing a sustainable cold chain?

Supercooling is most likely to be applied to higher value products such as meat and fish. It is likely that supercooling would be easiest to implement during production and initial storage as refrigeration systems would be more easily adapted to supercooled temperatures. If supercooled temperature transport and retail systems were developed the technology could be applied in transport and retail, assuming nucleation can be avoided.