

Sustainable agriculture for the future

June | Junie 2023

No 122

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Freezing Methods - A sample of products available

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Freezing food products has two major advantages. Firstly, it is instrumental in making a wide variety of foods available to the consumer outside of traditional growing seasons, and coinciding with this, freezing is instrumental in preserving food stuffs for longer periods. If preformed correctly and accurately, freezing will preserve the food product (whether of plant or animal origin) without major changes in size, shape, texture, or flavour.

Systems used for freezing can be divided into two broad categories: indirect-contact and direct-contact freezers. The type of freezer used depends on several factors including the type of food being frozen and the packaging of the food product.

A SAMPLE OF THE AVAILABLE PROCESSING OPTIONS:

Frozen Blackberries

Fresh blackberries are frozen in the container (straight pack), with or without the addition of sugar. Unsweetened frozen blackberries are used in the preparation of wine and bakery fillings while the sweetened product is used as a base ingredient for making pie toppings, syrup fillings, soups, and yoghurt flavouring.

In-container freezing does not allow for rapid freezing as in the case of individually quick frozen (IQF) products. Slow freezing does not preserve the shape and individual identity of whole berries. The product has considerable drip loss upon thawing.





The firm, ripe blackberries are picked by hand and placed in flat trays for transport and/or further processing. Unripe blackberries tend to turn red on freezing. The berries have to be processed as soon as possible after harvesting or else enzyme damage and deterioration occurred.

In the past, machine harvested berries could only be used for products, where the integrity/shape of the fruit was not of prime importance. With the improved cultivars that ripen more uniformly and advanced technology of harvesters, mechanical harvesting has become a viable option for large producers/processors.

Frozen Blackcurrants

Fresh blackcurrants are frozen in the container (straight pack), with or without the addition of sugar. Unsweetened frozen blackcurrants are used in the preparation of wine, juice, jellies and bakery fillings while the sweetened product is used as a base ingredient for making pie toppings, syrup fillings and yoghurt flavouring. In-container freezing does not allow for rapid freezing as in the case of individually quick frozen (IQF) products. Slow freezing of whole currants produces a product that does not maintain its shape and individual identity. The product has considerable drip loss upon thawing.

Straight pack freezing is an ideal method

of intermediate storage of fresh produce intended for pulping to relieve the short seasonal availability.

Frozen Cherries

Both sweet and sour cherries can be frozen using the straight-pack method. Straight-pack (In-container) freezing does not allow for rapid freezing as in the case of individually quick frozen (IQF) products. Slow freezing of whole cherries produces a product that does not maintain its shape and individual identity. The product has considerable drip loss upon thawing.

Cherries may be frozen with or without the addition of sugar. Unsweetened frozen cherries are used in the preparation of wine, juice, bakery fillings and jellies. Sweetened frozen cherries are mainly used in baked products, syrups and Yoghurt flavouring.

It is advisable to harvest cherries in the early morning to eliminate or at least reduce the need for additional cooling. The time between harvesting and processing should be kept to a minimum and the harvested product requires to be handled with great care at all stages prior to processing.

Frozen Brussel Sprouts

Brussels sprouts for processing should be dark green in colour, tight budded and of small, uniform size. This is obtained by



careful cultivar selection and plant spacing. Processors generally prefer a bud size of 18 - 25 mm diameter. A sweet, nutty flavour with only a slight, bitterness is desired.

Quick freezing is desired since it causes less cellular damage and results in a crisper texture of the final product. Brussels sprouts are most often frozen by plate freezing, blast freezing or individual quick freezing (IQF) methods, depending on the scale of operation. Pre-packed Brussels sprouts can be frozen in plate and blast freezers while the IQF method is used prior to packaging. IQF produces a high-quality product because it is a very rapid freezing method that ensures that the individual sprouts remain separate and prevent the formation of iced agglomerates.

Frozen Orange Juice Concentrate

Orange juice is the most popular breakfast beverage on the market. It is mostly consumed on its own but can also be blended with other less acidic juices to serve as an acidulant and thus contribute to the preservation of the blend. Concentration to 58 - 66°Brix and

freezing are the best long term preservation options for juice. The concentrate serves as a semi-processed product that can be diluted by the final consumer into single strength orange juice or other juice blends or nectars.

The oranges are picked at full size and maturity. The Brix-acid ratio is used as the most important indicator of maturity. °Bx (°Brix) is defined as the sugar content of an aqueous solution. In other words, 1°Bx = 1 gram of sucrose in 100 grams of solution. It represents the strength of a solution as a percentage by mass.

Ice Cream

Ice cream is categorised as a *frozen dairy product*. Ice cream is a frozen or partially frozen dairy product made from the homogenised mixture containing fresh cream, butter, milk, sweetened condensed milk, and milk powder. Additional ingredients may include the following:

- sweeteners including glucose, dextrose, sucrose (14 - 16%) and invert sugar;
- stabiliser (0.2 - 0.4%) to bind water and

promote the formation of small ice crystals;

- emulsifier (0.3 – 0.5%) to form a stable fat emulsion and foam;
- water;
- permitted flavouring and colouring;
- cocoa, chocolate syrup, fruit, nuts, or other confections.

There are many frozen dessert products that resemble ice cream, but do not contain the same traditional ingredients. A classification system was developed to categorise all frozen dairy desserts. Such products are legally required to adhere to the following specifications:

- Ice cream shall contain no less than 33% total solids by weight. The milk solids-not fat (MSNF) (9 - 12%) is increased by the addition of skimmed milk solids or whey powder. At least 10% milk fat must be from milk, cream, butter, or butter oil. A 1.2 litre of ice cream shall not contain less than 0,77kg of total solids, excluding any added fruit or nuts.
- Mellorine contains vegetable oil and milk fat. Mellorine shall contain not less than 33% total solids by weight. The milk solids-not-fat (MSNF) (9 - 12%) is also increased by the addition of skimmed milk solids or whey powder.

- Sorbet is a frozen / semi-frozen product made from milk products with or without water, edible fat, sweeteners, fruit, or fruit juice and flavouring and colouring and permitted additives. The total number of organisms shall not exceed 50 000 per ml and no *Escherichia coli* (type I) or pathogenic organisms may be present.
- Milk ice may contain 2 - 7% milk fat and 12 - 15% non-fat milk solids, sugar, colouring and flavouring and permitted additives. It is frozen without any beating.
- Frozen yoghurt is an alternative frozen dairy dessert made from stirred yoghurt mixed with the ice cream mix prior to freezing.

1kg of ice cream mixture will yield 1kg of ice cream, but ice cream is sold in volume (litres) and the yield will thus largely be determined by the amount of air incorporated into the product i.e. percentage overrun.

CONCLUSION:

Freezing is a very effective form of food preservation which reduces the reactions responsible for the deterioration and spoilage of food to minimal and negligible rates and can be used on a very wide variety of food products.

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