

PRODUCTION OF ICE CREAM

Introduction

For most people, the phrase ice cream conjures up memories of warm summers, slurping melted cones, banana splits, hot fudge sundaes, or buying a 99 cone from the local shop. Ice cream is the ultimate old-fashioned treat. This dessert has a history that stretches across the globe, with different countries enjoying various versions such as kulfi in India, gelato in Italy, and mochi in Japan. It seems every country has its own spin on the delicious frozen confection that we call ice cream.

Since the turn of the century and the development of the ice cream cone, the worldwide growth in consumption has been phenomenal, with over 12 billion litres of ice cream consumed each year in the USA and China alone. The growth of low-fat, organic

Table 1: Ice cream consumption in selected countries.*

Country	Litres/capita
New Zealand	28.4
United States	20.8
Australia	18.0
Finland	14.2
Ireland	8.2

*2019 figures.

and dairy-free ice cream is changing the production landscape. Ice cream manufacturers are, in turn, seeking to maximise the nutritional benefits of the products they sell. **Table 1** outlines the ice cream consumption in selected countries (litres/capita) in comparison to Ireland.

What you need

Production requirements include:

- dry store for ingredients and packaging;
- mixing/ageing vat;
- pasteuriser/homogeniser;
- ice cream freezer – batch or continuous;*;
- packing machine/filler;
- freezer room; and,
- freezer store (packaged product).

**A batch freezer is ideal for small runs and for those starting out in production. A continuous freezer, as the name suggests, works for several hours, as long as ice cream mix is fed into the hopper.*

Ice cream production

The production of ice cream involves mixing the ingredients together, followed by pasteurisation. It is then homogenised, a process that allows the distribution of fat into as many separate small fat globules as possible. After homogenisation there is a cooling and ageing process. The mixture is

left to age for 4-24 hours and during this time all the dry ingredients are hydrated and the fat is crystallised. The product is then frozen in a continuous freezer and air incorporation takes place. When the ice cream leaves the continuous freezer at -5°C, approximately 50% of the water is frozen. The final process is hardening, which freezes out most of the water at -40°C. Ice cream is a complex product. Dairy ice

cream contains milk fat, and other components, such as proteins and carbohydrates. Sweeteners, flavourings, emulsifiers and stabilisers are added during processing to enhance flavour, texture or appearance. Ice cream is over 50% water, from milk or other ingredients. Air is incorporated into the product, resulting in finely distributed air cells protected by a layer of fat globules.

02: Production of Ice Cream



Ice cream can be made with a near endless variety of flavours.

Ingredients

Each ingredient selected for the production of ice cream has a specific function in terms of its effect on the final structure and eating quality of the product.

Fat (milk or vegetable)

Fat provides flavour, body and texture. The type and content of fat in ice cream is used to classify individual products according to certain regulations. "Dairy ice cream" must contain a minimum of 5% milk fat and should contain no other fat. "Ice cream" must contain a minimum of 5% fat; however, it can be vegetable fat. The types of vegetable fat most widely used are coconut oil, palm oil and palm kernel oil, or a combination of these.

Non-fat milk solids

Non-fat milk solids include proteins (whey and casein), lactose and minerals. The proteins contribute to the structure of the ice cream and to the incorporation of air during processing. Ice cream must contain a minimum of 2.5% milk protein. Lactose contributes to the sweetness and minerals are derived from the milk or cream used in production.

Sugar and sweeteners

Sugar is added to provide sweetness and improve texture. A combination of sugars (e.g., sucrose, glucose, fructose) is normally used to obtain the desired sweetness of the final product. Sugars control the amount of frozen water in ice cream and therefore, the softness of the final product. Sweeteners are also permitted for use in ice cream production and are often used in lower-calorie products.

Flavours and colours

Flavours and colours are added to almost all ice cream to enhance the appearance and taste of the product, but these flavours and colours can be natural in origin.

Emulsifiers and stabilisers

Emulsifiers help bind all the ingredients during the manufacturing process and improve the whipping quality during mixing. Stabilisers improve air incorporation. They have a positive influence on the body and texture of the ice cream, contributing to the creaminess and melting properties of the finished product.

Other frozen desserts

- Frozen yogurt: a low-fat or fat-free alternative to ice cream, but made with yogurt;
- sherbet: a product made with a small amount of milk fat that is sweeter than ice cream, and tends to contain citric fruit and may have a tart flavour; and,
- sorbet: a frozen fruit puree – no dairy products are used.

Equipment

Ice cream equipment can be expensive, with large variations in cost and product output. Small-scale equipment, with a production capacity of 10-30kg/hour will enable most start-up businesses to get up and running. Larger-scale equipment may be needed if you wish to sell as a wholesaler or have an existing customer base. Larger ice cream equipment will allow you to freeze multiple pans of each flavour in the same batch cycle together with faster production. The size of the equipment you require will depend not just on the amount of product you need to make, but also on the available production and storage space that is available at your premises. It would be wise to seek as much information as possible before any decision is made with regard to purchasing.

Further information

For further information please contact
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The following resources are also helpful:
🌐 www.martinfoodequip.com/ice-cream/
🌐 www.perfectfoodsolutions.ie/
🌐 www.machineryworld.com

Fact sheet produced by the Food Industry Development Department.

www.teagasc.ie/ruraldev


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