

Ice cream glossary



Acacia gum (or Arabic gum) – a vegetable based stabiliser. An exudate from incisions made in the bark of acacia trees growing usually in the warmer regions of the world. Can be used as a stabiliser for ices and sherbets. (1)

Acesulfame potassium – a high intensity sweetener also known as ACESULFAME K. Where permitted it can be used in full fat, reduced fat, low fat and non-fat ice cream. (7)

Acid – a substance capable of donating hydrogen ions. In aqueous solutions an acid has a pH less than 7, depending on concentration and type of acid. Inorganic acids are strong acids (e.g., hydrochloric, sulfuric, nitric acids) and lie in the low pH range i.e., 0 to 3. Organic acids such as acetic, citric and lactic acids are weak acids and have a slightly higher pH range, i.e., 3 to 6.

Acid flavour (in ice cream) – is caused by the development of an excessive amount of lactic acid. It can be avoided by using fresh, good quality dairy products; prompt, efficient cooling of the mix; or avoiding prolonged storage of the mix at high storage temperatures. (1)

Aeration – incorporation of air into a material; e.g., the incorporation of air into ice cream.

Agar (or agar agar) – a hydrocolloid extracted from red algae. It is recommended in combination with gums or gelatin for use as a stabiliser in sherbets and ices. Agar is difficult to disperse in the mix and tends to produce a crumbly body. It also has a high cost. Agar is a galactan, i.e., a complex of galactose units, and is not digested by man. Agar gels are firm, brittle, show syneresis and do not melt in the mouth as the gel melting temperature is above 85°C (185°F). (1) and (2)

Agglomeration of butterfat (in ice cream) – due to coalescing of solid fat globules during exposure to high shear, such as in rapid

agitation, pumping or whipping in the freezing process assisted by using certain emulsifiers. The structure formed gives structural rigidity to ice cream and makes it stiff and dry. Extremes should be avoided to minimise possibility of defects related to “churning”, “buttering out” or “mix breakdown”. See also *Fat clusters*. (9)

Aging (or ageing) – a set period of time that the refrigerated (below 5°C/41°F) ice cream mix is left to stand after cooling (with minimal agitation) before the freezing operation takes place. Aging allows fat present to solidify, and stabilisers to swell or hydrate more fully thereby increasing the viscosity of the mix. Generally two to four hours is sufficient although high fat mixes may require up to 24 hours. (1)

Air – a critical ingredient in ice cream. The amount whipped into frozen desserts is referred to as overrun. Good quality ice cream contains a uniformly dispersed number of fine air cells. The more air present in ice cream, the higher the overrun and the easier it is to scoop and bite. Excessive air makes the ice cream light and fluffy.

Air cell – air is present in ice cream as fine air cells usually coated with fat globules as agglomerates or clusters.

Albumin – a naturally occurring protein, water soluble, coagulated by heat. Found in egg white, blood serum and milk. (6)

Alcohol – usually refers to ethyl alcohol (or ethanol). Used as a solvent and found in alcoholic beverages (beer, wine, spirits). Ethyl alcohol has a marked effect on lowering the freezing point of ice cream mixes, such as when spirits are incorporated into speciality ice cream.

Algin, alginates – a vegetable hydrocolloid extracted from giant ocean kelp. Commercial product seems to consist almost entirely

of sodium alginate. Usage rates range from 0.10 to 0.20% in ice cream, depending on composition. Propylene glycol alginate gives favourable results with HTST mix processing. (1) and (2). Sodium alginate imparts a relatively short texture to ice cream as well as good melting properties and good storage stability. (11)

Alitame – an intense sweetener.

Alkali – a metallic base that is quite soluble in water; e.g., caustic soda or sodium hydroxide. The pH of their aqueous solutions is usually above 10.

Alkaline – where the pH is greater than 7.

Ammonia – a pungent, toxic gas that is used as a common refrigerant in most large ice cream factories.

Amylaceous – starchy.

Anhydrous – without water; often applied to salts without water of crystallisation, or milk fat from which all water has been removed.

Anhydrous milk fat, AMF (butter oil) – butter with the moisture and non-fat components removed to allow storage at ambient (unrefrigerated) temperatures.

Annatto – a vegetable based colouring agent giving a yellow colour with a pinkish tinge. Used for colouring butter, cheese and ice cream.

Anti-caking agents – added to powdered foodstuffs to prevent caking, e.g., calcium silicate in baking powder. (2)

Anti-foaming agents – substances that reduce foaming.

Anti-mould (or mold) agent (or antimicrobials) – substances that inhibit mould growth, e.g., sodium and calcium propionate, sorbic acid, sodium benzoate.

Antioxidants – substances that inhibit the development of “oxidised” flavour; often a troublesome defect in dairy products. Only useful if added before the objectionable fla-

avour develops, e.g., butylated hydroxy anisole (BHA), tocopherol. Usually used in fats or oils to prevent oxidative rancidity. (1)

Arabic gum – see *Acacia gum*.

Artificial cream – see *Imitation cream*.

Artificial sweeteners – chemical substances that have a sweet taste at very low concentrations. These are used as sugar substitutes in low energy foods, e.g., cyclamate, saccharin, aspartame, alitame.

Ascorbic acid – the chemical name for vitamin C found in many fruits and vegetables. Deficiency disease is scurvy.

Ash – residue left behind after all the organic matter has been burned off. Serves as a measure of the inorganic salts that were present in the original material.

Aspartame – a high intensity sweetener (peptide). Used in low calorie or no sugar added formulations. (11)

Aufait ice cream – two or more layers of ice cream with pectinised fruits or preserves spread thinly between the layers; or the fruits may be stirred gently into the ice cream as it comes from the freezer; to give a marbled appearance. (1)

Autoclave – a pressure cooker or vessel in which high temperatures can be reached by using high pressure. Sterilisation and shorter cooking times are achieved. (2)

Backpressure – the pressure that builds up in the ice cream filling line from the ice cream pump to the filling head.

Bacteria – microscopic, unicellular life, which does not contain chlorophyll; mostly 0.5 to 3 microns in size. Pathogenic bacteria can cause disease. Most foodstuffs are pasteurised to destroy these bacteria.

Balance tank – a tank into which a liquid such as ice cream mix can be pumped and drawn off at will, e.g., for bottling or can filling, or transfer to heat exchange equipment.

Balanced mix – is one in which the proportions of the constituents and ingredients will produce a fine and generally satisfactory ice cream. An ice cream in which the defects, if any, cannot be further corrected by any change in the composition or ingredients of the mix.

Batch freezer – a small freezer unit in which each batch may be measured, flavoured and coloured separately. Ammonia is the most common refrigerant. The dasher can easily be removed for cleaning and consists of 2 parts – the scraper blades and the beater. Refer also to *Continuous freezer*. (1)

Batch pasteurisation – pasteurisation by heating in a single tank or vessel. (As opposed to continuous pasteurisation through a series of heat exchangers).

Beet sugar – sucrose derived from sugar beet. In purified form, it is identical to sucrose refined from sugar cane.

Biscuit – baked snack made from flour, sugar and shortening. Referred to as a cookie in USA.

Bisque – ice cream containing particles of grapenuts, macaroons, ginger snaps, sponge cake or other bakery products and appropriate flavourings. (1)

Bitter flavour – results from the use of inferior dairy products or flavourings. May be prevented by using true extracts and avoiding use of dairy products stored for long periods at high temperatures, as certain types of bacteria produce bitter flavour under such conditions. (1)

Blast (freezer) tunnel – used for fast hardening by utilising an air blast at -34 to -46°C (i.e., -30 to -50°F). (1)

Bleaching – a process for removing the colour from an oil to obtain the more desired, light-coloured oil.

Bleeding – term applied to the settling of the sugar syrup to the bottom of the container in sherbets and ices stored in freezer cabinets. The usual causes are excessive overrun, insufficient stabiliser, too much sugar (over 32%), improper balance of sweetener types and temperatures too high in the cabinet. Using more effective stabiliser or more stabiliser; reducing sugar content and avoiding high overruns will aid in preventing this defect. Also, refers to colour bleeding. (1)

Blending – combination of ingredients into a homogeneous mixture. Mixing ingredients either in dry or liquid form.

Block milk – a high solids sweetened condensed milk with a semi-solid, paste-like

consistency. Used principally in confectionery. (11)

Bloom – (I) a mould-like appearance on frozen confections such as water ices due to sugar drying out on surface. Can be corrected by proper choice of stabiliser and/or sweetener blend. (II) In confectionery defined as a mottled discoloration of confectioners coating preceded by loss of gloss, related to fat. Common defect in chocolate.

Bloom test, bloom gelometer – instrument used for measuring the strength of jellies, and also for any test of firmness. This test is commonly used by gelatin manufacturers to grade gelatin on the basis of gel strength. (1)

Body – term used to describe the weight and substance of the product and the feature that enables it to stand up well. Refers to consistency (chewiness), firmness, or cohesive properties of ice cream. Common body defects are crumbly body, dry body, soggy body and weak body. (1)

Borden flow meter – a flow tube type viscosity instrument made by Borden Co., USA. Used to give comparative viscosities of ice cream mixes. (1)

Brine – concentrated salt solution (sodium or calcium chloride). (A) An obsolete refrigerant coolant. (1) Now used primarily in small pilot-scale equipment and novelty immersion freezing equipment (e.g., RIA, Rollo, Vitaline) (B) Some cheeses are steeped in brine as part of their maturation, e.g., mozzarella.

Brix – an expression of specific gravity giving grams of cane sugar (sucrose) in 100 g solution at 20°C , i.e., degrees Brix = percent (%) sugar by weight. (2)

Browning reaction – see *Maillard reaction*.

Bulk ice cream – ice cream packaged in large containers purchased by retailers intended for repacking and served directly to the consumer in cones or dishes. (1)

Bulking agents – food ingredients used to add bulk or body to ice cream mixes.

Butter – concentrated milk fat product prepared from pasteurised cream by churning or an equivalent process. By CFR definition, butter is made exclusively from milk or cream, or both, with or without common salt, with or without additional colouring matter;

and containing not less than 80 percent by weight of milk fat, all tolerances having been allowed for. (14)

Butterfat, milk fat – the fat of milk. It should have a specific gravity of not less than 0.905 at 40°C. (7)

Butter oil – see *Anhydrous milk fat*.

Buttermilk – (A) the liquid, rich in lecithin and other natural surfactants, obtained from the churning of cream in the making of butter. In the dry form, it can be used as part milk solids non-fat in frozen desserts. (B) Cultured grade A milk used for cooking and drinking.

Buttermilk solids – the dried form of buttermilk.

Buttery texture – caused by agglomerates of milk fat or butter fat large enough to be easily detected in the mouth. Usually due to excessive agglomeration of fat of high butter fat mixes. (1)

Other possible causes are blunt scraper blades, insufficient refrigeration capacity, incomplete homogenisation, incorrect amount of emulsifier. (8)

By-products – a general name applied to all material other than the desired product in any manufacturing process, e.g., in dairy industry:

<u>Main product</u>	<u>By-product</u>
Cheese	Whey
Butter	Buttermilk

C.P. – chemically pure.

Calorie – the unit of heat (or energy) used in nutrition, actually a kilocalorie. The amount of heat required to raise the temperature of 1 kg of water from 15°C to 16°C. (2)

Candy – sugar confectionery, sweets.

Cane sugar – (sucrose or ordinary table sugar) disaccharide extracted from the sugar cane; composed of a glucose and a fructose unit joined together. (4) See also *Sucrose*.

Caramel – (A) a brown food-grade colouring agent prepared by heating sugar or a mixture of sugars at high temperatures, usually under pressure with or without the addition of selected inorganic or organic compounds. (B) Flavouring used frequently in ice cream. (C) Confectionery. Produced by boiling together sugar, glucose syrup and sweetened condensed milk with a suitable fat. (11)

“Caramelised flavour” refers to a cooked flavour defect.

Carbohydrates – a substance containing carbon, hydrogen and oxygen, such as sugars (simple carbohydrates), starch (complex carbohydrate), dextrine. Carbohydrates liberate 4 kcal per gram (or 16 kJoule per gram) when oxidised to carbon dioxide and water. Carbohydrates, which are not digested, include cellulose, pentosans, pectins, agar and alginic acid.

Carbon dioxide – chemical formula CO₂. “Dry ice” in solid form. The gas produced during fermentation, i.e., in beer and bread dough using yeast. A colourless, tasteless, odourless gas.

Carboxymethyl cellulose (CMC), cellulose gum – usually in the modified form of sodium salt. Prepared from the pure cellulose of cotton or wood. Absorbs up to 50 times its weight of water to form a stable colloidal mass. Used as a whipping agent and as an inert food filler in slimming aids. (2) CMC is cold water soluble and imparts strong body and good heat shock resistance to ice cream. (11)

Carcinogen – a substance that produces cancer in living tissues. (6)

Cardboard off-flavour – flavour defect usually caused by dissolved metals or by absorbed odours from the air. They are particularly objectionable. (Oxidised flavour).

Carob bean gum – see *Locust bean gum*.

Carotenes – precursor to vitamin A. Carotenes and riboflavin are the major pigments in milk. A yellow-red fat-soluble pigment which gives most of the yellow colour to milk and butter.

Carrageenan – a gum extracted from red seaweed. Occurs mainly as kappa, iota and lambda types. Carrageenan is used in combination with other hydrocolloid stabilisers and aids in the prevention of wheying-off. (1) Kappa and Iota forms must be heated to over 70°C/158°F to be effective, interacts with milk proteins. Kappa types can form gels, e.g., creme caramel. Lambda is cold soluble and not gelling.

Casein – the major protein in milk comprises approximately 80% of the protein. Occurs in milk (not all) as calcium caseinate precipitated

by enzymes, alcohols, heat, various salts and acids at a pH of 4.6. Casein is a complete protein and occurs in milk as a colloidal suspension associated with calcium phosphate. Major role in stabilising air cells and contributing to the structure of ice cream.

Caseinates – salts of casein, e.g., sodium caseinate, calcium caseinate. More soluble forms of casein.

Catalase – enzyme in plants, animals and microorganisms that splits hydrogen peroxide into water and gaseous oxygen. (2)

Catalyst – a substance that alters the rate of chemical reaction, mostly of use when it accelerates the reaction. All enzymes are proteins, produced by living cells, which react as catalysts. (2)

Celiac sprue – celiac disease. A condition in which there is a reaction to gluten that causes the destruction of the villi in the small intestine, resulting in malabsorption of nutrients.

Cellulose – polysaccharide that forms the supporting cell structure in plants, does not occur in animals. Consists of a long chain of glucose units linked (1-4) by chemical beta bonds. Indigestible by man, but useful in providing bulk for intestinal functioning.

Cellulose gel – see *Microcrystalline cellulose*.

Cellulose gum – see *Carboxymethyl cellulose*.

Centigrade (Celsius) °C – the temperature scale where 0°C (32°F) and 100°C (212°F) are based on the melting point of ice and the boiling point of water, respectively. (4)

Centipoise (cP) – one hundredth (1/100) of a poise. A unit of viscosity measurement. Equivalent to 1 mPa/sec.

Cephalin – a phospholipid present in milk as part of the natural emulsifying system.

Cereal solids – in hydrolysed form can be used to increase the solids without adding much sweetness and has little effect on the freezing point.

CFR – Code of Federal Regulations.

Cheesy off-flavour – has a cheese based flavour due to using a tainted dairy product, e.g., whey solids.

Chewy body – characteristic in ice cream usually caused by high levels of stabilisation, specific types of stabiliser or a high total solids content. Resistance to bite.

Chloramines – a class of chemical sanitising agents.

Chlorine (Cl) – a gaseous element that is found in biological tissue as the chloride ion (Cl). Free Chlorine (Cl₂) is used as a sterilising agent, e.g., in drinking water. (2) Sanitises food equipment, e.g., hypochloride.

Chocolate, chocolate paste, drinking chocolate, confectioners chocolate, chocolate coating or chocolate powder – is the product prepared by mixing cocoa paste or soluble cocoa with sugar with or without the addition or subtraction of cocoa fat. (7)

Chocolate coating – prepared from cocoa fat, sugar and non-fat chocolate solids. Lecithin is usually added to prevent thickening on prolonged dipping and prevent brittleness. Coatings are usually applied to ice cream bars. (1)

Chocolate ice cream – flavoured with cocoa or chocolate. (1)

Chocolate – a high-energy food composed of sugar, cocoa butter and cocoa solids.

Cholesterol – a sterol usually associated with animal fat, insoluble in water. Milk contains about 0.015% cholesterol (120 to 150ppm). (1)

Churn, churning – process utilising high shear used in butter and ice cream manufacture. Also refers to excessive fat agglomeration in ice cream. Also refers to the item of equipment used to manufacture either butter or ice cream.

Chymosin – enzyme used in cheese-making to coagulate casein. (11)

Cis-unsaturated – an isomer in which hydrogen bonded to carbon atoms attached by a double bond is on the same side of a double bond.

Citrates – salt derived from citric acid in milk. Increases the solubility of casein and gives stability to the ice cream mix during heat-treatment and processing. (1)

Citric acid – a tribasic acid, occurs widely in nature in fruits, especially citrus fruits. (2) Added to many foodstuffs, e.g., fruit drinks, confectionery to provide tartness, sorbet and sherbet.

Cleaning in place (CIP) – forced circulation of chemical solution through assembled equipment and piping, etc. Usually done by an

automated programmed system which ensures essential cleaning operations are always carried out thoroughly and completely.

Cleaning – an operation that involves removal of contaminated material (i.e., dirt). Maintaining equipment in an hygienic condition.

Clumping or clustering – see *Agglomeration and Fat clusters*.

Clustering – when a number of things of the same kind grow closely together, e.g., clustering of fat globules.

CMC – see *Carboxymethyl cellulose*.

Coagulation – a process whereby soluble proteins become insoluble; destabilised by heat, strong acid, or alkali, metals and various other chemicals. (2)

Coalesce – to combine, e.g., two fat globules combining into one.

Coarse ice cream – see also *Icy texture*. Texture defect perceived as a roughness caused by large ice crystals. Indicates that the ice crystals are large or not uniform in size. May be controlled by using higher solids in mixes, sufficient stabiliser; lower drawing temperature at the freezer; fast hardening, avoiding temperature fluctuation and shorter storage periods.

Coatings – outer thin covering usually on novelties. (11) See *Couverture*.

Cocoa, cocoa powder or soluble cocoa – is the powdered product prepared from cocoa paste, whether or not deprived of a portion of its fat and whether or not treated with alkali or alkaline salt. (7)

Cocoa (caco) bean – is fermented and dried whole seeds from the pod of the cocoa tree. Theo Broma Caco L., native to the Amazon forests. Commercially grown worldwide in tropical rainforests within the 20° latitude of the equator.

Cocoa butter – the fat occurring in cocoa beans.

Cocoa nibs or cracked cocoa – is the roasted cocoa bean freed from its shell or husk, with or without the germ. (7)

Cocoa paste – is the product prepared by grinding cocoa nibs and is mainly composed of cocoa butter. Synonymous with – cocoa mass, caco mass, cocoa slab, cocoa neat work and cocoa. (7)

Coconut oil – vegetable-based fat used in ice cream (where permitted), and mellorines. In ice cream, hydrogenated coconut fat is used as it has the desirable properties of blandness, low colour and acceptable melting characteristics.

Cold eating – describes the excessive coldness on the palate when some frozen desserts are consumed. See also *Warm eating*.

Coliform bacteria – group of aerobic, lactose fermenters of which *Escherichia Coli* is the most important member. Many Gram-negative coliforms are not harmful but as they arise from faeces, they are useful as an indicator for the presence of faecal contamination particularly as a test for water pollution. (2)

Colloid – fine particles (the disperse phase) suspended in a second medium (the dispersion medium); can be solid, liquid or gas, e.g., fine clay in water. Colloids are classed in between true solutions and suspensions. (2)

Colour – different colours are made up of different wavelengths from the narrow visible region of the electromagnetic spectrum. The eye averages mixtures of wavelengths to give a different colour, e.g., red and green produce yellow.

Commercially dry – the moisture content of a product as sold.

Comminuted – finely divided, e.g., chopped or minced. (2)

Composition – statement of the level of major components in a product, e.g., fat, milk solids non fat, protein, etc.

Condensed milk – (unsweetened) or evaporated milk that has been condensed by the evaporation of a portion of its water content and sterilised by heat. (7) Must contain 28.0% total milk solids. The sweetened version, sweetened condensed milk, has sugar added and must contain 31% total milk solids and 9.0% milk fat. Filled condensed milk is prepared using vegetable-based fat. (7)

Confectionery – candy, sweets.

Consistency – refers to textural and rheological properties such as viscosity.

Contamination – undesirable incorporation of bacteria or foreign material into a food ingredient, equipment, utensils or packaging.

Continuous ice cream freezer – a freezer (churn) in which the ingredients (i.e., ice

cream mix and air) are fed continually in and ice cream is continually produced. They consist of horizontal and direct-expansion types, and are widely used in commercial production. (1)

Cooked flavour – caused by over-heating the mix or using over-heated dairy ingredients. This defect can be prevented by (A) carefully controlling the pasteurisation process and (B) by using ingredients free of cooked flavour. (1) A small degree can be considered as desirable.

Corn flour – purified starch from maize, in USA called corn starch. Used in custard, blanc-mange and baking powders.

Corn oil (or maize oil) – a highly polyunsaturated, odourless and almost tasteless oil obtained from the endosperm of corn kernels. (7)

Corn sweeteners – sweeteners derived from maize or corn. Consist of several types: dextrose, dried corn syrup (or corn syrup solids), liquid corn syrup (glucose syrup) and high fructose corn syrup. All these can be used in ice cream. (1)

Corn syrup – see *Glucose syrup*.

Corn syrup solids (CSS) – dried glucose syrup or glucose syrup solids.

Cottage cheese – a semi-soft cheese prepared by coagulating skim milk, concentrated skim milk, dried skim milk or a mixture of two or more thereof through the action of starter lactic acid organism cultures, protein coagulating enzymes, heat or acid or any two or more of them. (7)

Cottonseed oil – the oil derived from the seeds of various cultivated species of *Gossypium*. (7)

Counter freezer – a freezer developed in 1926 in USA used for making soft and hard ice cream. Drawing temperature is -3°C (26°F) (1) Usually placed on a counter in an ice cream parlour or outlet.

Couverture – coating or covering. Commonly used on frozen desserts such as ice cream, especially chocolate couvertures. Single novelty items are enrobed with a warm liquid couverture that sets upon cooling.

Cream – that portion of milk containing a concentration of milk fat which has risen

to the surface when at rest, or in which the greater part of the milk fat has been concentrated by mechanical separation. Must contain at least 35.0% milk fat.

Cream, half and half – contains 10.5-18% milk fat. (US definition, 14)

Cream, heavy – contains not less than 36% milk fat. (US definition, 14)

Cream, light – contains 18.0-30.0% milk fat. (US definition, 14)

Cream, light whipping – contains 30-36% milk fat. (US definition, 14)

Cream, thickened – see *Thickened cream*.

Creamy – smooth and rich in consistency, texture or flavour; cream-like.

Critical control point (CCP) – a raw material, location, practice, process or process stage at which a hazard may be controlled.

Crumbly body – ice cream which lacks cohesion and pulls or breaks apart very easily - a common defect of sherbets, ices and unstabilised ice creams where it is less serious than in ice cream. It is frequently associated with a low total solids content, insufficient stabilisation, excessive overrun, low homogenisation pressure, large air cells and imperfect homogenisation. Incomplete hydration of the proteins may also cause crumbliness. (1)

Crystal – glass-like symmetrical structure formed when super-saturated solutions of pure substances are cooled or seeded, e.g. sugar crystals.

Crystallisation – the process of forming crystals. In ice cream, ice crystals present should be small and uniform so that the final texture is smooth. (1) (Uniformity less critical than size.)

CS – centistoke. Unit of viscosity measurement.

Curdled meltdown – indicates high acidity in the mix or any other factor that might cause instability of milk protein. Corrected by using fresh dairy products, maintaining salt balance and avoiding high acid ingredients. (1)

Curdy meltdown – includes finely divided protein in watery liquid and also a dull, finely wrinkled, scum-like surface on the melted ice cream, due to protein destabilisation caused by excess acidity, mineral/salt imbalance, heat shock, use of enzymatic improvers, use of certain stabilisers, excessive homogenisation

pressures, long storage at low temperature and shrinkage of the ice cream. (1)

Custard ice cream – usually is the same as ice cream pudding. More correctly, it is a cooked mixture of milk and egg that is added to the ice cream mix and then frozen. It usually contains not less than 1.4% of egg yolk solids by weight. (10)

Custard powder – a product prepared from starch, sugar, (egg yolk solids) and flavour, for reconstitution in milk by heating to make custard sauce.

Cyclamate – sodium cyclo hexyl sulphamate. A non-nutritive intense sweetener, 30 times as sweet as sugar (sucrose) and stable under heating. Also used as the calcium salt. Useful in low calorie foods. Sucaryl is the trade name. (2) Addition to food is prohibited unless specifically permitted. (7)

D.E. (dextrose equivalent) – a term used to indicate the degree of hydrolysis of starch into glucose. It is defined as the total sugar content, expressed as dextrose, calculated as a percentage of the dry solids content. (2) Characterising term for glucose solids (corn syrup solids). The higher the DE, the more sweet and more freezing point depression.

Dashers – portion of ice cream freezer that revolves rapidly within the freezing cylinder. The important core of both batch and continuous freezers. Consists of scraper blades to remove newly formed ice crystals from the barrel surface and a beater to introduce air into the ice cream mix. It is important to have the dasher in proper alignment and the scraper blade sharp (ground to the proper angle.) (1)

Defects (in ice cream) – imperfections, flaws, faults or conditions that make ice cream sub-standard. Main defects are usually due to flavour and/or texture, body, meltdown appearance. (1)

Defrosting – removal of built up ice on refrigeration equipment especially from the coils. (1) Thawing of a frozen material.

Density (of ice cream mixes) – synonymous with specific gravity (S.G.) measured using a hydrometer or gravimetrically or by calculation from a formula. S.G. of the mix may vary from 1.0344 to 1.1232. (1)

Deodorisation – process that removes from fats the volatile flavour, odour, materials, reduces free fatty acid content and generally improves colour.

Dextrin (or dextrine) – industrial product prepared from starch by heat treatment in the dry state with or without chemicals added in small amounts. NOTE: The term dextrine is also used to designate the oligosaccharides resulting from the hydrolytic or enzymatic depolymerisation of starch. (5) (Used as bulking agents, particularly in reduced calorie/fat products.)

Dextrose – pure D-glucose (crystalline). Alternative name for glucose solids, although commercially the term "glucose" often refers to glucose syrup (a mixture of glucose, higher sugars and dextrans). (2) Molecular formula $C_6H_{12}O_6$, of which several stereoisomers exist.

White, crystalline powder; rather less soluble in water than sucrose and not as sweet (about 70% sweetness of sucrose). If all the sugar in an ice cream mix was dextrose, the frozen product would be softer at the same temperature than ice cream based only on sucrose.

Diabetes – is characterised by an excessive accumulation of glucose in the blood due to inadequate insulin production.

Diabetic – a person suffering from diabetes.

Diabetic and dietetic frozen dairy foods

– are special preparations for persons on restricted diets. (1)

Dietary – relating to diet.

Diglycerides – an emulsifier glyceride containing two fatty acid molecules to one molecule of glycerol (see monoglycerides). Rarely used alone, usually with monoglyceride.

Diocetyl sodium sulfosuccinate – ice cream emulsifier. (1)

Dipper – ice cream scoop.

Dipping – scooping. The process of dispensing the ice cream from the container using a device that measures standard portions. (1)

Disodium phosphate – mineral salt effective in protein stabilisation, helps control the churning defect of soft serve ice cream. (1)

Distilled monoglyceride – distilled monoglyceride is produced by high vacuum distillation of mono-diglycerides, which results in a prod-

uct containing a minimum of 90% monoester (monoglyceride). Distilled monoglycerides can stabilise emulsions, improve whippability and form complexes with starch.

Dosage (doseage) – level of addition or usage level of an ingredient, usually those used at low levels.

Drawing temperature – temperature at which ice cream is drawn from (or exits) the freezer. (1)

Batch freezer –3 to -4°C 24 to 26°F

Continuous freezer –5 to -6°C 21 to 22°F

Low temp. –8 to -9°C 16 to 18°F
continuous freezer

Soft serve freezer –7 to -8°C 18 to 20°F

Counter freezer –3°C 26°F

Dried glucose syrup – solid product, granular or powdered, obtained by almost complete drying of glucose syrup. (5) See *Corn syrup solids*.

Drumstick – in USA is a patented ice cream novelty. Consists of flavoured ice cream in a sugar cone. Usually with chocolate and nuts on top.

Dry ice – solid carbon dioxide (CO_2), has a temperature of -79°C (-110°F); used to refrigerate foodstuffs in transit; for carbonation of liquids and for cold traps in laboratories. (2)

Dry solids or dry substance – matter remaining after all moisture has been evaporated.

Dryness – term used to describe ice cream appearance and mouthfeel. Absence of gloss or wetness at extrusion. Dryness (and stiffness) is correlated with emulsion stability (fat clumping). (1)

Dutch process cocoa – produced by treating the beans with alkali at the time of roasting. A darker, more soluble, fuller-flavoured cocoa that leaves no bitter taste when used as flavouring in ice cream.

Dynamic extrusion – 3-dimensional extrusion of ice cream products.

EDTA – ethylene diamine tetra acetic acid. Sequestering or chelating agent.

EEF – ether extractable fat.

Egg custard – milk that has been thickened with egg, heated to a high temperature.

Egg white – main (non-yolk) part of egg contains ovomycin, albumins, globulins and glycoproteins. Chief protein of egg white is albumen.

Egg yolk – richest part of the egg containing most of the fats, lecithin, colouring agents (xanthophyll and carotenoids which gives the yellow colour) and fat soluble vitamins A, D and E. Also contains cholesterol. Egg yolk solids have emulsifier properties and improve the whipping properties of the mix. (1)

EH – equilibrium humidity.

Emulsification – the process of forming an emulsion.

Emulsifiers (emulsifying agents) – surfactants. Substances which aid the uniform dispersion of oil in water and which stabilise emulsions, e.g., lecithin, glycerol monostearate. (2) Used in ice cream to improve stiffness, dryness, whippability and stand-up properties. In ice cream, functionality associated with controlled destabilisation of the emulsion.

Emulsion – an intimate mixture of two immiscible materials, one being dispersed in the other in the form of fine droplets, e.g., oil in water such as salad dressings and milk. They will stay mixed together as long as they are stirred unless an emulsifying agent is added to stabilise the emulsion. (Butter is an emulsion of water in milk fat). (2)

Energy value – depends upon the food value of the ingredients from which a product is made.

Carbohydrates 4 kCal/g

Fat 9 kCal/g

Protein 4 kCal/g

E-numbers – a system for classification of additives to food products adopted by the European Community. An E-number shows that an additive has been toxicologically tested and approved, and complies with a stringent standard of purity.

Enzymes – catalysts produced by living cells. They are responsible for catalysing most of the reactions carried out in plants and animals. Composed of proteins and destroyed by heat and chemicals that coagulate proteins, e.g., alpha amylase, lactase; name usually ends in -ASE. (2)

Ergosterol – a sterol associated with milk fat, precursor of vitamin D. (1)

Escherichia Coli (E. Coli) – Gram-negative coliform.

Eskimo Pie – (trademark) a chocolate coated bar or rounded dome-shaped ice cream, either vanilla flavoured or with other flavours, in particular mint. (8)

Essential fatty acids (EFA) – collective name for the two unsaturated fatty acids, linoleic (18 carbon chain, two double bonds) and arachidonic (20 carbon chain, four double bonds). Also called polyunsaturates. (2)

Required for maintenance of healthy condition in mammals.

Ethyl alcohol – commonly known as alcohol. (See *Alcohol*).

Ethyl vanillin – synthetic vanilla flavour.

Evaporated milk – see *Condensed milk*.

Evaporated milk differs from condensed milk in that it has received a sterilisation heat treatment and this process imparts a noticeable cooked and caramelised colour, which is undesirable in most ice cream.

Extruded water ice – extruded water ice novelties can be defined as a sugar and water-based, fruit flavoured frozen dessert with very fine ice crystals, a smooth texture, fresh and cold-eating properties and clear colours. In order to obtain these characteristics, extruded water ice novelties are typically made with an overrun of 0% to 15%.

Extrusion – expression of ice cream into controlled shapes, usually at low temperature. Ice cream can be extruded to form shapes and flavour combinations, e.g., funny face. Special equipment such as extrusion nozzles and hardening tunnels are employed. Even highly stabilised (or very cold) water ices can be extruded. The ice cream must be frozen to a certain stiffness so that it retains its form between the time it is extruded until it enters a hardening tunnel. Extruded ice cream is drawn from the freezer at -6 to -7°C (20 to 22°F). (1)

$^{\circ}\text{F}$ – degree Fahrenheit.

Fahrenheit – temperature scale used in USA. At 32°F (0°C) ice forms and at 212°F (100°C) water boils.

FAO – Food and Agriculture Organization of the United Nations.

Farina – alternate term for starch. (2)

Farinaceous – containing or consisting of flour. (6)

Fat – term used most often for those components in food that are insoluble in water and soluble in solvents such as ethyl ether and are actual or potential esters of fatty acids. The term includes triglycerides, phospholipids, waxes and sterols, also termed lipids. In solid or semi-solid form at room temperature called fats, in liquid form called oils.

Fat clusters – formed during the whipping and freezing process in ice cream manufacture. Also called agglomerated fat and tends to reside at the air cell surface thus assisting with air incorporation and overrun stability. (1)

Fat content – the percentage by weight of triglycerides in a formulation. Usually the acid-Gerber method is used for rapid result and the Rose-Gottlieb method is used as the reference when measuring the fat content in ice cream.

Fatty acids – the fatty acids of milk fat exist in combination with glycerol as glycerides. Glycerol molecules combine with fatty acid molecules according to the reaction – 1 glycerol + 3 fatty acids = 3 H_2O + 1 fat. When the three molecules of fatty acid are the same, a simple glyceride is formed. When the three molecules of fatty acid are not similar, a mixed glyceride is formed. In milk fat the mixed glycerides predominate over the simple. (1) Examples of longer chain fatty acids include stearic, palmitic, oleic. May be saturated or unsaturated. (Triglycerides is becoming the fashionable term.)

FCC – Food Chemicals Codex. Committee body set up to formalise definitions of food additives.

FDA – Food and Drug Administration (in USA).

Feed flavour – flavour defect due to the feed consumed by dairy cattle. (1) (Not significant in ice cream).

Filter – device for separating solids or suspended particles from liquids. (4)

Filtration – the process of separating a suspended or colloidal solid from a liquid by means of a porous substance through which only the liquid passes. (6)

Finishing agents – substances used to clarify liquids by precipitating and carrying down suspended matter. Common examples, egg albumin, casein, bentonite, isinglass, gelatin. (2)

Flaky texture – occurs when air cells in ice cream are large and the amount of air (overrun) is excessive. Gives the ice cream a flake-like mouthfeel or appearance. Such a condition might be more properly noted as both fluffy and coarse. It may be corrected by decreasing the overrun, increasing the total solids or decreasing the amount of emulsifier. (1)

Flat flavour – caused by use of insufficient flavour, sugar or milk solids, and can be remedied by increasing the amount of these materials. (1)

Flavour – the taste without the sensations of body and texture. Considered to be the most important characteristic of dairy products. Delicate flavours are preferable to harsh ones. (Combined perception of taste and aroma.)

Flocculation – flocculation is an aggregation of dispersed particles, forming clusters, which behave like large droplets.

Fluffy texture (in ice cream) – is readily detected by the presence of large air cells and an open texture, and a light body. Corrected by decreasing the overrun; increasing the total solids, or decreasing the amount of emulsifier. (1)

Foam – finely divided gas bubbles in a liquid, usually floating to the surface. (6)

Foamy meltdown (of ice cream) – retention of excessive air in the melted ice cream. The foamy defect may be corrected by reducing the overrun or reducing the amount of emulsifier or egg products used. (1)

Fondant – minute sugar crystals in a saturated sugar syrup; used as the creamy filling in chocolates and cookies and for decorating cakes. Prepared by boiling sugar solution with addition of confectioner's glucose or an inverting agent and cooling rapidly while stirring. (2)

Food additive – minor functional ingredient generally recognised as safe (GRAS) such as flavourings, stabilisers, emulsifiers, sweeteners and acid materials. (1) Not normally consumed as a food in its own right.

Food colours – approved colourings are used in ice cream to add appeal. Most colours are of synthetic origin. Colouring solutions are usually prepared by dissolving the dry powdered food colours in boiling water. A preservative such as sodium benzoate should be added at 0.1% if stored in solution. (1)

Food ingredient – foodstuff incorporated into food product that could be consumed as a food in its own right.

Food intoxication – illness caused by toxins released by bacteria, not related to infection by the bacteria itself.

Food poisoning – may be due to (I) contamination with harmful bacteria; (II) toxins released by bacteria, (III) allergic reaction to certain proteins, (IV) chemical contamination. (2)

Food solids – that part of food with all the water removed. For full fat ice creams, the food solids is approximately 40%. (Typical range 38-42%.)

Food standard – a detailed description of the properties and ingredients of a food, usually as presented by a government regulatory body.

Food value – see *Energy value*.

Foreign matter – contaminants.

Formulation – quantifies the ingredients present, e.g., formulation for standard or plain ice cream mix:

Milk fat	10.00%
Milk solids non fat (MSNF)	11.50%
Sugar (sucrose)	10.50%
Glucose syrup solids	7.00%
Stabiliser/emulsifier	0.50%
Flavour	0.10%
Colour	0.10%
Water	60.39%
Total	100.00%

Frappe – an ice made from a mixture of fruit juices, frozen to a slushy consistency and served as a drink. (1) (In U.S., refers to a milk shake in some regions.)

Free fatty acids (FFA) – fatty acids not chemically associated with glycerine or not present as glycerides. Fats are esters of glycerol with three molecules of fatty acids. Under adverse storage conditions, there is some degree of hydrolysis with the liberation

of free fatty acids, hence determination of FFA is an index of quality. (2)

Freeze concentration – the concentration of ingredients that results from the removal of water in the form of ice.

Freeze-drying – a method of drying in which the material is frozen and a high vacuum applied. The cooling effect of the evaporation keeps the material frozen while the water distills off as a vapour. Freeze-dried foods reconstitute rapidly, and show minimum loss of flavour and texture. (2)

Freezer – equipment which can maintain perishable food at temperatures well below 0°C (32°F). Ice cream should be stored at temperatures below -18°C (0°F). See also batch and continuous freezer.

Freezing (of ice cream mix) – for pure water freezing begins at 0°C (or 32°F). As ice cream mix contains soluble ingredients such as sugar, glucose syrup, lactose and milk salts these have the effect of lowering the freezing point. Thus, water in the ice cream mix starts to freeze at about -3°C (27°F). In order to freeze more of the mix and form more ice crystals, the temperature must be lowered further as the unfrozen solution portion becomes more concentrated and the freezing point is depressed. When the temperature is reduced to the new freezing point, more water will freeze. (9) During this freezing process, air is also whipped into the mix forming a complex mixture of small ice crystals, minute air cells, numerous fat globules and a continuous matrix of a freeze-concentrated solution containing sugars, salts, milk proteins and stabilising gums. (9)

Freezing curve (for ice cream) – this curve shows the amount of water frozen at various temperatures. (1)

Freezing point (of ice cream) – temperature during cooling at which ice crystals begin to form.

Freezing point depression – soluble components, especially sugars, in an ice cream mix can lower or depress the freezing point to different extents. Sugars with low molecular weights will cause the greatest lowering of freezing point.

Freezing point depression factor (FPDF) – the freezing point of an ice cream mix

is first of all dependent on the amount of dissolved solids. The more solids dissolved (in the genuine solution), the lower the freezing point. The sugars produce a lowering of the freezing point and it is thus the molar concentration that determines the freezing point of the ice cream mix. In order to survey the effect of different products, it is necessary to introduce a factor that are related to the lowering of the freezing point. This factor is the freezing point depression factor (FPDF). Sucrose is chosen as the datum point with a FPDF of 1.

French/French custard ice cream – see *Frozen custard*.

Freon refrigerants – chemically-dichloro difluoro methine $C_2Cl_2F_2$. Also known commercially as F12 and K metic no. 12. It is non-toxic, odourless, non-inflammable. Main disadvantage is environmentally it causes damage to the ozone layer. (1)

Fromage frais – cultured dairy product. The term "fromage frais" ("fresh cheese") has been adopted for marketing reasons since it has a more exotic and up-market image and a more pleasing sound than quarg. (11) Covers a range of soft, spoonable products, usually thicker than yogurt. See *Quarg*.

Frostings – decorations for cakes or pies. Can be based on cream or fat (such as butter) with sugar, colour and flavour added. (1)

Frozen custard – similar to ice cream but must contain 1.4% (in U.S.A.) egg yolk solids. Also called French ice cream and French custard ice cream. (9)

Frozen desserts – encompasses a broad range of products including ice cream, frozen custard, water ices, sorbet, sherbet, frozen confection. (1)

Frozen puddings – ice cream containing a generous amount of mixed fruits, nut meats and raisins with or without liquor, spices or eggs. Examples are nesselrode and plum puddings. (1)

Frozen yogurt (yoghurt) – a frozen dessert containing similar ingredients to ice cream plus live yogurt cultures. Cultures can be added just prior to freezing or yogurt can be added. Normally, it has a titratable acidity of not more than 0.35%.

Fructose – (laevulose, levulose) a monosaccharide (6 carbon sugar), $C_6H_{12}O_6$, differing from glucose in containing a ketonic group (on carbon 2) instead of an aldehydic group (as in glucose). Combined with glucose in sucrose, yet fructose is 173% as sweet as sucrose. Fructose rotates polarised light to the left hence the name laevulose. (2) Also known as fruit sugar.

Fruit feeder – equipment used in metering fruit pieces, chocolates, nuts and food pieces into ice cream to give a fairly uniform distribution. The pieces are injected in the output line from the freezer in accurately controlled amounts by means of an auger screw or metering gear wheel.

Fruit ice cream – ice cream containing 10-15% fruit based on the weight of the mix. May contain additional fruit flavourings or colour. The fruit such as strawberry, apricot or pineapple may be fresh, frozen, canned or preserved. (1)

Fudge – caramel in which crystallisation of the sugar (graining) is deliberately induced by the addition of fondant (saturated syrup containing sugar crystals). (2)

Furcelleran – a hydrocolloid extracted from red marine algae. It is quickly soluble in hot ($80^{\circ}C/175^{\circ}F$) water or hot milk products and will thicken or gel depending on concentration and temperature. (1)

Galactose – a monosaccharide (hexose) similar to D-glucose, differing only in the position of the hydroxyl group on carbon four. It occurs mainly linked with D-glucose to form lactose (milk sugar). Galactose is 32% as sweet as sucrose. (2)

Gallon – unit of measure based on volume.
1 Imperial Gallon = 4.546 litres
(= 10 pounds water at $62^{\circ}F$)
1 U.S. Gallon = 3.785 litres
1 Imperial Gallon = 1.2 U.S. Gallons (2)

Gas liquid chromatography (GLC) – a method of separating volatile substances. (4) The volatile material is injected into a column containing a liquid absorbent supported on an inert solid. An inert gas carries the separated components to a suitable detecting device.

Gel, jel or jelly – an intricate network of large molecules in a liquid giving the liquid solid or semi solid properties. Common gelling agents include – gelatin, agar, carrageenan, alginate.

Gelatine or gelatin – a hot water soluble hydrocolloid protein (animal origin) prepared from collagen or bones by boiling with water. As a protein, it is of poor nutritive value on its own, as it lacks tryptophan. (1) An effective stabiliser. It was one of the first hydrocolloids used in ice cream.

Gelato (plural gelati) – Italian style ice cream characterised by intense flavour, low overrun, low butterfat content (relative to American ice cream) and served semi-frozen.

Genetically modified organism (GMO) – an organism in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination.

Glace – French style ice cream, characterised by relatively low butterfat content, high density, smoothness and intense flavouring.

Glacier freezing tunnel – a trademarked piece of equipment used for the high volume hardening of extruded novelties. (1)

Glacier machine – a trademarked piece of equipment popularly used for making extruded ice cream products. (1)

Glucose, D-glucose, dextrose – common name for D-glucose, grape sugar or blood sugar. Also used to describe glucose syrup. (See *Glucose syrup*.) $C_6H_{12}O_6$. A six carbon sugar (a hexose) widely distributed in plants and animals, particularly in compounds as disaccharides, e.g., sucrose and polysaccharides, e.g., starch, cellulose and glycogen, 74% sweetness of sucrose. (2)

Glucose syrup (liquid glucose) – clear viscous liquid produced from starch by acid and/or enzymatic hydrolysis. Composition will vary depending on degree of hydrolysis, starch source, catalyst and processing conditions. Graded according to the D.E. or Dextrose Equivalent. Consists of D-glucose, maltose, maltotriose and higher saccharides (dextrines). Also known as corn syrup in U.S.A., starch syrup, confectioner's glucose and liquid glucose. (2)

Gluey body – defect in ice cream caused by excessive stabilisation or use of syrups and

certain types of gum (pectin, oat gum, etc.) (1)

Gluten – proteins found in wheat.

Glycerides – esters of glycerol with fatty acids. As glycerol, possesses three hydroxyl groups. It can combine with three molecules of fatty acid to form a triglyceride or simple fat (or oil). If all three molecules of fatty acids are the same, a simple triglyceride is formed, e.g., tristearin, triolein. (2) Naturally occurring fats and oils are mixtures of various triglycerides. Mono and diglycerides are employed as emulsifying agents.

Glycerol, glycerine – a trihydric alcohol. A clear, colourless, sweet, viscous liquid, made from fats (triglycerides) by alkaline hydrolysis (saponification). Soluble in water or alcohol. Used as a solvent for flavours, as a humectant to keep foods moist and in cake batters to improve texture and slow down staling. (2)

Glycerol monooleate (GMO) – a common food emulsifier. Common name for a monoglyceride in which oleic acid is the predominant fatty acid.

Glycerol monostearate (GMS) – a common food emulsifier. Common name for a monoglyceride in which stearic acid is the predominant fatty acid (about 8%). Used to describe mixture of mono and diglycerides (40-60% mono), or a product in which mono has been concentrated to 90%.

Glyceryl mono palmitate (GMP) – emulsifier commonly used in ice cream. Not derived from animal source, i.e., vegetable based. A monoglyceride or mixture of mono and diglycerides in which palmitic acid is the predominant fatty acid.

Grainy – an alternative term to "coarse" or "icy" used to describe a rough texture in frozen desserts. Sometimes used to characterise a product containing particles that are softer than ice or lactose crystals, such as particles of destabilised protein or unhydrated NFD, whey solids or protein concentrates.

Granita (plural granite) – a type of Italian ice that is coarser in texture and often less intensely flavoured than sorbetto. It is frozen much harder than ices with little whipping or stirring during the freezing process. (1)

GRAS – an acronym used by the USA Food and Drug Administration for the phrase

Generally Recognized As Safe. Used on food ingredients or additives to characterise them as safe or unsafe. When a substance is found to be safe for its intended use in a food product (at a specified dosage) it can be labelled as GRAS. (1)

Greasy – oily or slimy. A body defect in ice cream in which destabilised fat adheres to the lips and interior surfaces of the mouth, providing a lingering perception of excessive smoothness.

Gritty or grittiness – see *Sandy*.

Guar gum – a complex carbohydrate (galactomannan) obtained from a legume grown in India and Pakistan. Guar gum is readily soluble in cold solutions and is used as a stabiliser for mixes undergoing either HTST or continuous pasteurisation. (1) Low cost general stabiliser.

Gummy body – a sticky body characteristic in frozen desserts. Caused by excessive water immobilisation. Also referred to as *pasty*, *doughy*, *gluey*. (1)

Hard frozen – the condition of ice cream at frozen storage below -18°C (0°F), at which over 90% of the water is in the form of ice.

Hardening (of fats and oils) – a chemical process involving hydrogenation, frequently used to convert liquid fat into hard or plastic fats, convert soft fat into harder fats, improve the resistance of fat or oil to deterioration. (See also *Hydrogenation*).

Hardening (of ice cream) – the process of lowering the temperature of ice cream to the point where enough water is frozen to create a hard, undippable consistency. The semi-frozen product is hardened in cold rooms maintained at -23 to -29°C (-10 to -20°F) and held at this temperature until delivered. (1)

Hardening tunnel – used for high volume freezing, especially smaller packages that can be hardened in 1 hour. The tunnels utilise an air blast at -35 to -45°C (-30 to -50°F) for fast hardening. (1) Chambers in which ice cream is hardened very rapidly by exposure to fast moving air at very low temperature.

Hardness – hardness is an inferential test, measured as the force required using, e.g., a texture analyser, to thrust a probe of known dimensions into a sample of ice cream or

water ice at a set rate to a set depth at a precise temperature.

Hazard analysis critical control point (HACCP) – a systematic approach to the identification and assessment of hazards and risks associated with the manufacture, distribution and use of a particular foodstuff and the definition of means for their control.

Heat exchanger – equipment for heating or cooling liquids rapidly by providing a large surface area and turbulence for the rapid and efficient transfer of heat. Used for continuous pasteurisation and also for subsequent cooling. (2) See *Plate heat exchanger*.

Heat shock stability – the degree to which ice cream maintains desirable properties during repeated thawing and freezing cycles.

Hexahydric alcohols – sugar alcohols made from corn sugar, e.g., sorbitol, mannitol. These have about half the sweetening value of sucrose. They affect the freezing point of ice cream and contribute to the total solids as do sugars. (1)

High cup – ice cream or related product that has a large portion of the product above the rim of the container.

High fructose corn sweetener – a sweetener consisting primarily of fructose and dextrose with a small amount of polysaccharides, derived from the hydrolysis and subsequent enzymatic conversion of corn starch. (1)

High solids ice cream – ice cream that contains more than 41% total solids.

High temperature short time (HTST) – a pasteurisation treatment that consists of heating to a temperature of at least 80°C (175°F) for at least 25 seconds.

Hold-up – the ability of ice cream to retain its shape even after partial melting of the ice crystals.

Homogenisation – the process of making homogeneous. This is done by reducing the size of fat particles or globules to a very small diameter (less than $2\ \mu\text{m}$). Homogenisation provides a more uniform ice cream with a smoother texture and improved whipping ability. (1)

Homogenisation index (of ice cream mix) – gives a measure of the homogenisation effectiveness by checking the size of the

fat globules and degree of agglomeration microscopically. (1)

Homogeniser – equipment and process which consists of a high pressure pump that forces ice cream mix under high pressure through a restricting device known as a homogenisation. In that valve the fat globules are substantially reduced in size and dispersed. Two-stage homogenisations have a second homogenising valve in which the pressure is much lower than the first. In the second stage valve clumps of small globules resulting from high pressure treatment in the first stage will be disrupted. (9)

Honey – a syrupy liquid manufactured by bees from the nectar of flowers. Average composition: water 18%, invert sugars, i.e., glucose and fructose, 74%, sucrose 2%. (2)

Hydrocolloids – see *Stabilisers*.

Hydrogenated glucose syrup – glucose syrup that has undergone a hydrogenation reaction.

Hydrogenation – the process of chemically adding hydrogen, in the presence of a catalyst, to double bonds of the fatty acid of a natural fat in most cases to make it plastic or firmer. In addition, hydrogenation retards the development of rancidity of a fat by reducing its reactivity towards oxygen. Addition of hydrogen raises the melting point of a fat, converting it generally from a relatively liquid state to a more solid state.

Hydrolysis – a cleavage reaction of an ester (a glyceride, for example) by water. The end products from the hydrolysis of an ester, if complete hydrolysis were to occur, are glycerin and free fatty acids.

Hygiene – the process of achieving and maintaining a clean and sanitary condition.

Ice confection – a frozen product usually not dairy-based. Sugar; water; flavour; colour. (7)

Ice cream bar – snack-sized ice cream novelty usually coated in chocolate, with or without a stick, possibly including nuts, biscuit fragments or a caramel, fruit or nougat strip. (1)

Ice cream brick – a bulk form of ice cream in a rectangular or brick form. The ice cream is usually in one, two or more layers, or with fancy centre. (1)

Ice cream cabinet – insulated storage units cooled by mechanical refrigeration used in retail outlets and operating usually at temperatures of between -23 to -26°C (or -10 to -15°F). (1) (Dipping cabinets warmer.)

Ice cream cake – one or more layers of ice cream hardened in cake tins, the sides and top being covered with a thin layer of whipped cream that has been flavoured and sweetened after whipping. Decorations are then applied. (3)

Ice cream cone – a popular, edible holder (cone-shaped) for scooped ice cream made from a pancake batter. First appeared at the World's Fair in St. Louis in 1904.

Ice cream freezer – see *Continuous ice cream freezer*, *Churn*.

Ice cream log – a form of ice cream with a cylindrical shape and decorated in a fancy style. (1)

Ice cream mix – liquid ice cream preparation before freezing. It consists of all ingredients of ice cream with the exception of air and some flavouring materials. (1)

Ice cream pies – generally a single layer of ice cream that has been hardened in a pie plate, sometimes with an underlying crust and appropriately decorated. (3)

Ice cream pudding – an ice cream pudding is a fruit ice cream made with an appreciable amount of egg or egg yolk.

Ice cream sandwich – a slab of ice cream pressed between cookies, wrapped and hardened. (1)

Ice cream soda – a mixture of carbonated water and scooped ice cream, usually served with some fruit syrup for flavouring. (1)

Ice cream tarts – products from vanilla brick cut into eight slices, and again cut in halves trianglewise. A small dent is made in the centre of one triangle and the depression filled with some highly coloured fruit; the second triangle is fitted over this, the sides are smoothed up and the top sprinkled lightly with bisque crumbs. (3)

Ice cream waffles – made in waffle shaped moulds using vanilla ice cream. After hardening the sides are covered with bisque crumbs. (3)

Ice cream – is a popular frozen dessert prepared from dairy foods, sugar, glucose syrup,

flavourings, including fruit, stabiliser, emulsifier, colour, and containing air. The standard of identity for ice cream varies by country. For instance, in the USA, ice cream must contain 10.0% milk fat, 20% total milk solids, at least 1.6 lb/gal of food solids, and weigh at least 4.5 lb/gallon. (14)

Ice cream, fat free/non-fat – contains less than 0.5 grams of total fat per 0.5 cup serving. (US definition, 14)

Ice cream, low fat – contains less than 3 grams of total fat per 0.5 cup serving. (US definition 14)

Ice cream, reduced fat – contains a 25% reduction in total fat from the reference ice cream. (US definition, 14)

Ice lolly – see *Water ice*.

Ices – frozen confections made from fruit juice, sugar and stabiliser with or without additional fruit acid, colour, flavouring or water, and frozen to the consistency of ice cream. Usually contains 28-30% sugar, 20-25% overrun and no dairy products. (1)

Icy texture – an extremely coarse texture caused by the presence of large ice crystals. (1)

IDF – the International Dairy Federation.

Imitation cream – a product that resembles cream in appearance but doesn't meet the standards for cream. Usually made from other fats than milk fat, and sometimes includes non-dairy sources of protein and carbohydrates.

Imitation ice cream – products which do not meet established standards for ice cream, such as those made from vegetable fat and non-fat milk constituents, or consisting entirely of non-dairy sources of fat, carbohydrate and protein. See also *Frozen confection*.

Impulse ice cream – ice cream purchased for immediate consumption.

Intense sweetener – an alternative term for artificial sweetener.

Interfacial tension – the force operating at the boundary between substances that are not soluble in each other. The addition of emulsifiers lowers the interfacial tension between oil and water allowing it to more readily form an emulsion.

Invert sugar – a mixture of glucose and fructose (50:50) produced by hydrolysis of

sucrose. It has 130% of the sweetness of sucrose. It is important in the manufacture of sugar confectionery, as the presence of 10-15% of invert sugar prevents the crystallisation of cane sugar. (2) Used also as a humectant in confectionery. Acts like dextrose in depressing the freezing point of ice cream. (1) It is sometimes used as an ice cream sweetener.

Iodine value (I.V.) – an expression of the degree of unsaturation of an fat. The value reported is the grams of iodine that reacts with 100 grams of fat under specified conditions. The I.V. represents a measure of unsaturation for most fats and oils encountered in the food industry. For this reason, it is often used as a guide in evaluating the stability of fat. Normally, the stability increases as the iodine value decreases. Hydrogenation lowers the iodine value.

Isoelectric point (IEP) – proteins and amino acids carry both negative and positive charges on their molecules and are therefore called amphoteric. At a certain degree of acidity, depending on the particular protein or amino acid, the substance becomes electronically neutral, i.e., the isoelectric point. Proteins are usually least soluble and therefore precipitated from solution at the IEP. (2)

Isoionic – the pH at which an amino acid has a net charge of zero.

Isomaltose – two molecules of glucose joined 1-6' alpha, as distinct from maltose in which the bond is 1-4' alpha. (2)

Isomers – these are compounds, usually organic, with the same molecular form but different structures, e.g., the molecular formula $\text{C}_2\text{H}_6\text{O}$ can be either ethanol $\text{CH}_3\text{-CH}_2\text{-OH}$ or dimethyl ether $\text{CH}_3\text{-O-CH}_3$.

Isotonic – two solutions are iso-osmotic (isosmotic) when they have the same total osmotic pressure. (2)

Italian ice – similar to an American-type ice in composition although it is less tart, less sweet and is normally flavoured with an extract flavouring and served in a semi-hard form. (1)

Jam – fruit preserve set to a gel by reaction between acid, pectin and added sugar.

Jelly crystals – preparation of gelatin, sugar, citric acid and flavouring, with or without

permitted colouring matter. Used to prepare jellies or gelatin-type desserts. Part or all of the sugar may be replaced by glucose and part or all of the citric acid may be replaced by tartaric acid or lactic acid.

Jelly – a colloidal suspension that has set; may be made from gelatin, pectin, agar, starch, carrageenan, etc. usually flavoured and coloured. (2)

Joule – official unit for expressing the energy value of foods. Usual term is kilojoule = 1000 Joules. This is the preferred term to use in place of calories (see *Calorie*). 4.2 calories = 1 Joule

kcal – kilocalorie = calorie = 1000 calories.

kg – kilogram = 1000 grams.

kjoule – kilojoule = kJ = 1000 Joules.

Kosher – a food that conforms to Jewish Dietary Laws.

Koumiss (or Koumyss, Coomys) – a fermented milk traditionally prepared from mare's milk.

Lactase – an enzyme that catalyses the hydrolysis of lactose (milk sugar) to glucose and galactose.

Lactic acid organisms – microorganisms where metabolism involves the conversion of lactose to lactic acid.

Lactic acid – the acid produced by the fermentation of milk sugar; responsible for the acidity of sour milk and precipitation of the casein curd in cultured dairy product manufacture. Used as an acidulant (as well as citric and tartaric acids) in sugar confectionery, soft drinks, pickles and sauces. (2)

Lactic ice – Japanese ice with minimum 3% milk solids, no minimum milk fat content (the term lactic used here does not imply a cultured milk flavour).

Lactitol – a sugar alcohol derived from lactose. It has the same freezing point depression effect as sucrose, but is only 0.3 times as sweet as sucrose with no after taste. Can be used in frozen desserts as alternatives to sucrose.

Lacto ice cream – this product is a milk sherbet made from cultured sour milk, buttermilk or fermented milk. (1)

Lactones – a class of flavour compound formed in milk fat through a non-oxidative chemical reaction. (2)

Lactose – the only carbohydrate present in milk, also referred to as milk sugar; sugar of milk, lactobiose, 4.8% of milk. A disaccharide that is hydrolysed by acid or the enzyme, lactase. It is used pharmaceutically as a tablet filler and as a medium for growth of microorganisms. Ordinary lactose is alpha-lactose (16% of sweetness of sucrose); if crystallised above 93°C, it is changed to the beta form, which is more soluble and sweeter than the alpha form. (2) The crystallisation of lactose produces a defect known as sandiness.

Laevulose (levulose) – alternative name for fructose. (2)

Latent heat – see *Sensible heat*.

Lauric acid – one of the intermediate chain saturated fatty acids, $\text{CH}_3(\text{CH}_2)_{10}\text{COOH}$. Occurs in the triglycerides of coconut oil and palmkernel oil and to a lesser extent in palm oil and butter.

Lecithin – the principal member of a group of fatty substances called phospholipins or phospholipids (also phosphatides) which is the principal emulsifier in naturally secreted milk and egg yolks. Consists of glycerol, fatty acids, phosphoric acid and choline. Helps emulsification and prevents bloom; also used as anti-spattering agent in frying fats. Obtained commercially as a by-product in the processing of soya beans, rapeseed, peanuts and corn. (2) These compounds can be useful as a "natural" emulsifier, either added in the isolated form or as one of the components of such ingredients as egg yolk solids and buttermilk solids.

Linoleic acid – an essential, unsaturated fatty acid with 18 carbon atoms and two double bonds (a diene). Occurs at low level in milk fat. (2)

Lipase – an enzyme occurring naturally in milk that catalyses the hydrolysis of fat to glycerol and fatty acids. Has a low specificity and will attack any triglyceride or long chain ester. Present in the intestinal juice and in many seeds and grains. Sometimes responsible for the development of rancidity in stored foods. (2) Unless inactivated by pasteurisation,

its activity can create a rancid flavour in dairy products.

Lipids (or lipins) – general term embracing fats and oils and waxes, as well as the complex compounds, the phosphatides and cerelvosides, i.e., all naturally occurring compounds of fatty acids. Also referred to as lipides (the term lipoid is obsolete). (2)

Lipolytic – capable of lipolysis, i.e., splitting fats forming glycerol and fatty acids. Lipases are lipolytic enzymes.

Litesse® – Litesse® is the commercial name for the polydextrose produced by Danisco. See also *Polydextrose*.

Locust bean gum (or carob bean gum) – a galactomannan extracted from seeds of the carob tree grown around the Mediterranean. It requires heating to 80°C for complete hydration. Commonly used as an ice cream stabiliser.

Low Joule food – one in which the energy value is low compared to the standard version of food. The use of this term to describe a food is usually regulated by food laws.

Low temperature extrusion – extrusion of ice cream with very low temperature, -12 to -18°C (-0.4 to 10.5°F), using a special extruder. This extruder, which is either a single or twin screw, is a heat exchanger designed for high viscosity materials, low temperature products.

Magma – mixture of sugar syrup and sugar crystals produced during sugar refining. (2)

Maillard reaction – (non-enzymic browning) the reaction between proteins or amino acids and sugars which gives a brown coloration.

Malic acid – an organic acid sometimes used as acidifier in ices and sherbets as an alternative to citric acid.

Malt, malt extract, malt barley – a mixture of starch breakdown products containing mainly maltose (malt sugar), prepared from barley or wheat. (2)

Maltodextrins – partially hydrolysed starch usually spray dried. D.E. (dextrose equivalent) range from 3 to 20. Used as fillers, bulking agents in many foods, low sweetness, bland tasting.

Maltol – starch-derived substance with a fragrant, caramel-like odour and bitter-sweet taste, used as flavour enhancer. (2)

Maltose (or malt sugar) – disaccharide derivative of corn starch composed of two molecules of D-glucose joined by 1,4 links, 33% the sweetness of sucrose.

Mannitol, mannite or manna sugar – an alcohol formed by hydrogenation of the hexose sugar, mannose, when the terminal -CHO group is reduced to -CH₂OH. Also extracted commercially from seaweed (*Laminaria*). (2)

Mannose – a hexose sugar related to glucose but of slightly different chemical configuration. (2) Mannose is found in mannitol and many polysaccharides.

Maple syrup – the heated and condensed sap of certain varieties of the maple tree. *Acer saccharinum* (USA and Canada). It is evaporated either to syrup or finally to sugar. Contains 62-65% sucrose, 1.5% invert sugar and characterising flavour compounds. Used to provide a distinctive flavour to ice cream. (2)

Marbling – a special effect in ice cream and related products where a coloured syrup or differently coloured product is distributed in it giving a marbled appearance.

Marshmallow – a soft sweet made from an aerated mixture of gelatin or egg albumin with sugar or glucose syrup. Differs from nougat in containing less glucose and more water. (2)

Mellorine – term used in US for products which are similar to ice cream in which the butterfat has been replaced by a suitable vegetable or animal fat. The vegetable fat may include coconut, cottonseed, soya bean, corn or other plant fat. Must contain at least 6.0% fat from one or more specified sources, and not less than 3.5% protein of biological value at least equivalent to that of whole milk protein. (1) Also known as imitation frozen dessert.

Meltdown – term used to describe the behaviour of ice cream while melting. Important elements include the rate at which liquid flows from the portion studied and the degree to which shape and surface features are retained as the ice melts.

Melting characteristics – describes behaviour of ice cream during meltdown. Defect descriptions may include curdiness, foamy, does not melt and whey leakage. The causes may be lack of aging of the mix, high acid ingredients, excess stabiliser and emulsifier, excessive overrun, improper homogenising temperature or pressure, poor quality ingredients.

Melting point – the temperature at which a solid, on being heated, changes into a liquid. The melting point depends on both the chemical composition and crystallographic nature of the solid.

Mesophase – opalescent or transparent liquid formed by a mixture of surfactant and water.

Mesophiles – microorganisms that grow best at temperatures between 25 and 40°C (77 and 104°F), usually will not grow at temperatures below 5°C. (2)

Metabolism – in general, the chemical processes occurring within an organism which convert nutrients into energy and by-products essential to life.

Metallic – a flavour defect caused by copper contamination and in some cases may be the result of bacterial action. (1)

Methyl cellulose – a hydrocolloid derived from cellulose fibres by reacting with methyl chloride. Soluble in cold water and forms a gel on heating. Used as a whipping agent in sorbets and sherbets.

Microcrystalline cellulose (cellulose gel) – a physically modified form of cellulose fibre useful as a bulking or bodying agent in dairy products, especially low fat foods. MCC is useful in maintaining small ice crystals in ice cream. Not soluble in water.

Milk – is the lacteal secretion of one or more healthy cows properly fed and kept, except that it must not contain colostrum or abnormal constituents. Fat and MSNF level differs from country to country, in the USA, milk must contain 3.25% milk fat and 8.25% milk solids non fat (14).

Milk fat – see also *Butterfat*. A fat source for ice cream. Gives ice cream its richness in flavour, smooth and creamy texture and provides air cell stability and body. Best source is fresh cream. (1)

Milk shake – beverage prepared by mixing together milk, ice cream and flavouring under rapid agitation. Freezer-made milk shakes are frozen direct from a sweetened mix usually containing between 3.25 and 6.0% milk fat and not less than 9-12% milk solids non fat.

Milk solids non fat (MSNF) – the term used to identify the solids of skim milk. It consists of protein, milk sugar (lactose), minerals and water soluble vitamins. High in food value, is inexpensive and enhances palatability. The lactose adds to the sweetness slightly and the minerals give a slightly salty taste rounding out the flavour. Besides contributing to the flavour, the MSNF contributes to ice cream's body and texture. (1)

Mineral salts – inorganic compounds which include citrates and phosphates. These ingredients are used in limited amounts to control protein stability. (1)

Molasses (treacle) – the uncrystallisable syrup obtained on boiling down raw cane or beat sugar. (6) It is sometimes used to impart its distinctive flavour to ice cream.

Mono and diglycerides – a mixture of monoglycerides and diglycerides forms. Most commonly used commercial ice cream emulsifier. See *Glycerol monostearate (GMS)*.

Monoglycerides – a glyceride in which one fatty acid molecule is attached to one molecule of glycerol. (6)

Monohydrate – term used to indicate that each molecule of a substance is associated with one molecule of water, e.g., dextrose monohydrate.

Mono portions – ice cream product, usually catering products, which are made for only one person.

Monosaccharide – also monosaccharose, monose. Group name of the simplest sugars, including those composed of three carbon atoms (trioses), 4 (tetroses), 5 (pentoses), e.g., xylose, 6 (hexoses), e.g., glucose, 7 (heptoses). These simple sugars cannot be hydrolysed into smaller units under reasonably mild conditions. (2) Simplest form of sugar.

Mother liquor – the residual saturated liquor which remains after the crystallisation of a portion of a liquid or solution.

Mould (mold) – (1) fungi that produces branched filaments, mycelia; reproduce by

spores, e.g., penicillium, aspergillus. Used in cheese ripening, citric acid manufacture and antibiotic manufacture. (2) Can grow in high sugar ice cream ingredients such as glucose syrup, jam, etc. Its growth can be inhibited by propionates, sorbic acid and carbon dioxide. (II) A specially shaped receptacle into which softened ice cream is placed to harden into the shape of the mould.

Mousse – a dessert composed of whipped cream of various fat levels, to which colour, flavouring and often a setting agent (e.g., gelatin) have been added. It can be served frozen or unfrozen. Sometimes condensed milk is added to improve consistency. (1)

Mouthfeel – the sensation perceived in the mouth due to the body and texture of a food.

Musty – a flavour associated with the use of mouldy ingredients.

Mycotoxin – a toxin of fungal origin. (2)

Neapolitan ice cream – two or more distinct flavours in the same package, usually layered. (1)

New York ice cream – usually plain vanilla with extra colour and may contain extra fat and eggs. (1)

Non fat dry milk (NFD) – also referred to as skim milk powder. See also *MSNF* or *Milk solids non fat*. (1)

Nougat – sweet made from a mixture of gelatin or egg albumin with sugar and glucose syrup and the whole thoroughly aerated. (2) Contains less water and air than marshmallow and so has a firmer texture.

Novelties – quiescently frozen dairy confections and frozen confection. A novelty ice cream or frozen confection is a specially shaped and usually a low-priced package containing an individual serving, the main appeal of which consist of its shape, size, colour, or convenience for eating.

Novelty (ice cream) – individual portion of quiescently frozen, moulded or extruded dairy and frozen confections, the main appeal of which consists of its shape, size, colour or convenience for eating. Examples include candy or chocolate coated ice cream with or without sticks, ice cream sandwiches, pop or

fudge; and other ice-like mixtures frozen on sticks. (1)

Nut ice cream – ice cream containing nutmeats, such as almonds, pecans, pistachio nuts or walnuts, with or without additional flavouring or colour. (1)

Nutrition – the study of foods in relation to the needs of living organisms. (2)

Odour – the property of a substance which affects the sense of smell.

Off-flavours – flavour characteristics which detract from the appeal of ice cream. These include stale, rancid, tallowy, acid, bitter, cardboard, cheesy, cooked, feed, flat, salty, storage, etc.

Oil – a mixture of triglycerides which is liquid at relatively low or room temperatures. In food processing, an oil is a natural or processed edible triglyceride which is normally

liquid under the existing climatic conditions.

Olarine – in USA (some states), the term used to describe a low fat mellorine-type product. (1)

Oleic acid – a long chain monounsaturated fatty acid with total of 18 carbon atoms per molecule. Found in most fats; high percentage in human fats and butter. By far the most abundant of the unsaturated acids. (2)

Organoleptic evaluation – the process of evaluating foods using the various senses. Also referred to as sensory evaluation. (2)

Overrun (in ice cream manufacturing) – the increase in volume of the ice cream over the volume of the mix due to the incorporation of air. The air is usually incorporated during the freezing operation. (1)

Oxidase – enzyme found in milk. Oxidises compounds by removing hydrogen and adding it to oxygen to form water. (2)

Oxidation – a chemical reaction in which oxygen is added or combined with the reacting substance. Oxidation of fats eventually results in development of rancidity, which is accompanied by objective flavours and odours.

Oxidised flavour – a strong off-flavour associated with unsaturated fatty acids. Also referred to as tallowy or cardboard. It may be avoided by using fresh dairy products,

using only stainless steel equipment to avoid the catalysing effect of iron and copper; or pasteurising at high temperatures. (1)

“Pancake” defect (in ice cream) – a taffy-like deposit composed of the serum of ice cream at the bottom of the package. Similar to the bleeding defect in ices and sherbets. When hardened these so-called pancakes are very coarse and unpalatable. Conditions favouring this defect are: storage at too high a temperature, weak body due to an improper balance of the mix constituents such as a high sugar content, low concentration of stabiliser, particularly carrageenan and low total solids content, destabilised milk protein. (1)

p.s.i. – pounds per square inch. A unit of pressure.

Palmitic acid – a saturated fatty acid. Wax-like solid. Melting point 64°C. (2), (4), (6)

Pantothenic acid – white insoluble solid, member of the vitamin B complex. (4)

Parfait – a dessert served in a tall glass with alternating layers of ice cream and crushed or syrup fruit. Usually decorated with nuts and whipped cream. (1)

Pasteurisation – the exposure of dairy products to a prescribed set of time and temperature conditions which will kill pathogenic bacteria. Partial sterilisation, especially of milk; heating to a temperature sufficiently high to kill bacteria, followed by immediate cooling. (2), (4)

Pasty body – a defect similar to gummy also described as sticky or gluey. Caused by excessive use of syrups and certain types of soft gum, pectin, oat gum. (1)

Pathogenic – causing disease. (4)

Pectinase – an enzyme that hydrolyses pectins by converting them to pectic acid; found in fruits. (6)

Pectins – occur widely as structural elements in plant tissues. The primary source of commercial pectin ingredients include citrus peel, apple pomace and pressed sugar beet pulp. (11) Pectin consists of polymers of galactose, arabinose and galacturonic acid. (4) It is used as an ingredient in the syrups and fruits used in making afaits and rippled effects in ice cream. It is also an effective stabiliser in sorbets, sherbets, water ices and frozen yogurts,

but is not usually used as a stabiliser for ice cream. (1)

Peroxide value – a chemical characteristic that reflects quality of edible oil or fat through indicating the degree of oxidation which has taken place.

Philadelphia ice cream – see *New York ice cream*.

Phosphatase – an enzyme which is inactivated by proper pasteurisation. A test for its presence is used to verify that proper pasteurisation has taken place. (1)

Phosphates – an important group of minerals which are involved in controlling the stability of protein in dairy products. Salts of phosphoric acid, H_3PO_4 , containing the tri-valent PO_4^{3-} radical. Phosphate bonds are important in energy transfer in the body. (2) (6)

Phospholipids – also phosphatides or phospholipins. Compound lipids which contain phosphoric acid groups and nitrogenous bases, e.g., lecithins, cephalins. Sometimes used as emulsifiers. (2) (4)

Plate heat exchanger (PHE) – equipment used for heating and cooling liquids in which the liquid flows between plates exposed on the opposite surface to hot or cold materials, as appropriate. Continuous indirect heating and cooling takes place in sections of plates clamped together under pressure (sometimes called a press). High energy efficiencies can be achieved through counterflow design.

Polydextrose – a polymer of dextrose which is only partially metabolised, yielding 1 cal/gram, a characteristic which makes it a desirable bulking agent in reduced calorie foods.

Polyglycerol ester – a class of compounds comprised of two or more polymerised glycerol units, esterified with one or more fatty acid units.

Polymorphism – the property of fatty acids and fats, that causes them to solidify in different crystal forms. These crystal forms display their own melting point, densities, heat of fusion, etc.

Polyols – sugar alcohols such as glycerol, sorbitol, inositol, etc. Contain more than one hydroxy group. (2)

Polysorbates – used as ice cream emulsifiers as they give very stiff, dry extrusion. The sorbitan monooleate derivative is known as polys-

orbate 80 and sorbitan tristearate is known as polysorbate 65. A common name for a group of emulsifiers which consist of various types of fatty acids esterified to sorbitol to which are attached repeating ethoxylate units. The predominant polysorbate used in ice cream is polysorbate 80 - polyethylene (20), sorbitan monooleate. It is very effective in producing dryness and stiffness in ice cream as it exits the freezer, and shape retention in the hardened product. Polysorbate 65 (polyethylene (20) sorbitan tristearate) is less frequently used, since its functionality is less than that of polysorbate 80.

Polyunsaturates – fatty acids that contain two or more cis methylene interrupted double bonds per fatty acid chain. Linoleic acid is an example of a polyunsaturated acid.

Popsicle (or ice pop) – a trademark term used to refer to a group of frozen dessert novelties usually water ices frozen quiescently without overrun. Contain sugar, stabiliser, citric acid, flavouring and water. (3)

Pre-aeration – the incorporation of air into an ice cream mix, by means of an aerator, before the mix enters the ice cream freezer. This results in a reduction in the size of the air cells and promote their even distribution in moulded ice cream.

Premium ice cream – common term for high quality ice cream. Usually characterised by high fat content and sometimes less overrun than conventional ice cream.

Press – see *Plate heat exchanger*.

Probiotic – “probiotic” is a word derived from the Greek meaning “for life”. It was first used in the modern context to describe “organisms which contribute to intestinal microbial balance” by Parker in 1974. Probiotics maintain or enhance the indigenous defense mechanisms in the animal without disturbing normal physiological or biochemical functions. The definition was later revised to “a live microbial feed supplement which beneficially affects the host animal by improving its intestinal microbial balance” (Fuller; 1989). This revised definition stressed the need for the probiotic to contain live microorganisms. The concept is not a new one. It dates from the beginning of this century when Metchinkoff was advocating the consumption of soured

milks to combat the adverse effects of the gut flora and improve the quality of life. In the ensuing years, evidence has accumulated for the effectiveness of microbial supplements in promoting the health of farm animals and thereby improving their performance (Marriott & Davidson, 1924; Fuller; 1977; Yakult, 1980; Pollman, 1986; Fuller; 1992).

Propylene glycol alginate (PGA) – a hydrocolloid which is a modified form of alginic acid extracted from kelp. It is used as a stabiliser in many frozen desserts including ice cream.

Propylene glycerol ester – a class of compounds comprised of one or two fatty acid units esterified with propylene glycol.

Proteases or proteinases – a group of enzymes capable of breaking down the structure of proteins through hydrolysis of the peptide linkages.

Proteins – essential constituents of all living cells; distinguished from fats and carbohydrates in containing nitrogen (approx. 16%). All proteins are composed of amino acids joined together by peptide linkages. (2)

Proteolysis – the hydrolysis of proteins to component amino acids or peptide units by alkali, acid or enzymes. (2)

Psychrotrophic bacteria – bacteria capable of surviving and reproducing at refrigeration temperatures.

Psychrophilic bacteria – bacteria which has optimum growth at refrigeration temperatures.

Punch – punch is an ice in which fruit juices have been reinforced with an alcoholic beverage. Often rum flavouring (non-alcoholic) is used instead of alcohol. (1) Also a liquid beverage containing a variety of fruit juices and sugar. (3)

Quarg – also known as fromage frais. Cultured dairy product obtained by fermenting milk to a pH of 4.3-4.8 with mixed mild cheese cultures. The soft-textured yogurt-like product should have a clean lactic flavour and be mildly acidic. (11)

Quiescently frozen – frozen without stirring or agitation.

Rainbow frozen desserts – products made by carefully mixing multiple coloured ice

creams as they are drawn from the freezers to give a marbled or rainbow-coloured effect when the product is hardened. (1)

Rancid, rancidity – in the dairy industry, an off-flavour formed by the hydrolytic release of short chain fatty acids from milk fat. In fats and acids, the term refers to off-flavours created by the oxidation of unsaturated fatty acids. To avoid confusion, the term should be appropriately qualified, e.g., "oxidative" rancidity or "hydrolytic" rancidity.

Recipe – a listing of the identity and amounts of ingredients used to make a particular product. See *Formulation*.

Recombined dairy products – dairy products which are prepared by reconstituting dry dairy products in water, with or without the inclusion of vegetable fat or stored dairy fat (butter oil, butter; anhydrous milk fat).

Refrigerant – the medium used indirectly to cool, freeze or store dairy products. Ammonia is the most commonly used refrigerant in dairy plants while freon and similar compounds are the refrigerants of choice in small freezing units, trucks, ice cream cabinets, etc.

Refrigeration – the process of maintaining a cold temperature in a product. The removal of heat from a substance and therefore is concerned with heat exchange (i.e., heat transfer). The excess heat in the substance being cooled (refrigerated) is transferred to a cooler substance which itself becomes heated. The dairy industry uses the term to mean cooling to temperatures below 4°C (40°F), mainly between 4 and –35°C, (40 and –30°F).

Retort – see *Autoclave*. In canning, a large autoclave for heating sealed cans by superheated steam under pressure. (4) Types of retorts are: agitating, batch, continuous, hydrostatic, etc.

Reverse osmosis – a process for concentrating milk solids which uses flow across semi-permeable membrane to separate colloidal and non-colloidal components.

Rework – surplus product, subsequently repasteurised and used as a mix ingredient.

Rhamnose or rhamose – a methyl pentose sugar. 33% sweetness of sucrose. Formed by hydrolysis of glycosides.

Rheology – the science of behaviour of liquids. Study of the deformation and flow of matter (4), e.g., elasticity, plasticity, viscosity, etc.

Riboflavin – vitamin B₂. Found in most dairy foods. Range of 0.6–3.0mg per kg. (1)

Ripples – stabilised sugar syrups, sometimes containing fruit or confectionery (e.g., chocolate, caramel, etc.), in intimate contact with the ice cream.

Rollo – a trademarked piece of equipment used for freezing stick novelties. It consists of a series of moulds immersed in a cold brine tank in a circular configuration with extension equipment for filling, inserting sticks, removal of the frozen products and packaging. The equipment is produced by Tetra Pak.

Rotary ice cream assembly (RIA) – a trademarked piece of equipment used for freezing stick novelties. It consists of a series of moulds immersed in a cold brine tank in a circular configuration with extension equipment for filling, inserting sticks, removal of the frozen products and packaging. The equipment is produced by Gram Equipment.

Saccharin (saccharine, glucide) – an intense sweetener, benzoic sulphamide, 550 times as sweet as sucrose. Soluble saccharine is the sodium salt. Used in foods as the soluble sodium salt.

Saccharometer – type of hydrometer used for determining the concentration of sugar solutions by determining the specific gravity; usually graduated to read the percentage of sugar concentration direct. (2) (4)

Saccharose – see *Sucrose*. (4)

Salmonellae – Genus of bacteria of family *Enterobacteriaceae*. Common cause of food poisoning – destroyed by adequate heating. (2)

Salt balance – the relative proportion of salts in dairy products; important in maintaining protein stability.

Salt – (I) usually refers to sodium chloride (NaCl), i.e., common salt or table salt. (2) (II) Generally refers to a compound of a metal and a non-metal or negative radical which may result from the reaction between acids and bases, e.g., sodium citrate.

Sandy – an undesirable defect in ice cream caused by lactose crystals which are detected

in the mouth giving a rough, sandy or gritty effect. The sandy defect occurs in frozen desserts when dairy ingredients high in lactose content such as whey solids are utilised at high levels.

Sanitary – having an hygienic condition.

Sanitation – refers to the general level of cleanliness in order to preserve one's health.

Sauces – similar to ripples, but added as well-defined layers, often on top or bottom, of a product.

Scoop – see *Dipping*. (1) Utensil for removing standard-sized, ball-shaped portions of ice cream from a container.

Sensible heat – is associated with merely reducing the temperature of the ice cream mix and latent heat is given out when water crystallises to ice without a reduction in temperature.

Sensory evaluation – the observation of the characteristics of a food through the direct application of the human senses and an alternative term to "organoleptic evaluation".

Serum albumin – in dairy products, refers to a component of whey protein.

Serum solids – the solids remaining after the removal of fat and water from the non fat solids in ice cream derived from dairy ingredients. (9)

Shape retention – the ability of a frozen dessert product to keep its shape under specified conditions.

Sherbet – a frozen product made from sugar, water, colour and flavouring, with or without fruit acid stabiliser and a small amount of milk solids added in the form of skim milk, whole milk, condensed milk or ice cream mix. (1)

Shrinkage – a defect in ice cream in which contents of a filled container lose volume (shrinks) leaving a space at the top and/or the sides of the container. Characterised by a reduction in volume from that occupied by the product when first packaged.

Skim milk – milk from which most or all of the milk fat has been removed. (12) In the US, contains less than 0.5% milk fat and at least 8.25% milk solids non fat. (14)

Skim milk replacers – products that can be used as a replacement of the milk solid non fat in ice cream. Skim milk replacers available in liquid condensed form and as powder.

Skim milk replacers are concentrated whey protein products that in the liquid condensed form have a total solids content of 30% and a protein content of 10%. The powdered versions have a protein content between 18% and 35%. The protein source is mainly whey proteins but some powdered skim milk replacers are mixed with 10% to 30% ordinary skim milk powder. The lactose level in skim milk replacers is kept at approximately the same level as that of skim milk powder.

Slick – see *Greasy*.

Slimy – see *Greasy*.

Smoothies – smoothie-type products originated approximately from 1990 in California. Although there is no standard of identity for smoothies, they are typically blended beverages that have high levels of fruit juices and fresh fruit, along with a small amount of yogurt or skim milk. In the US, smoothies have a fresh, healthy, natural image.

Snowy texture – see *Fluffy*. A flaky open texture often associated with high overrun and/or large air cells.

Sodium alginate – see *Alginates*. A vegetable, seaweed-derived stabiliser used in ice cream. (1)

Sodium carboxymethyl cellulose – see *Carboxymethyl cellulose*.

Sodium caseinate – the sodium salt of casein, the predominant protein in milk sometimes used to supplement the dairy ingredients of ice cream.

Sodium citrate – see *Citrates*.

Sodium hexametaphosphate – a mineral salt which when used in liquid dairy products can increase fat stability. (1)

Sodium tetrapyrophosphate – a mineral salt which when used in liquid dairy products can increase fat stability.

Soft serve – is a term used to describe a complete category of ice creams and frozen desserts. Soft serve products are frozen and dispensed direct from the freezer to the customer. The products are normally dispensed into either cups or cones.

Soggy body – (opposite to fluffy or snowy in ice cream.) Associated with a low overrun (especially if the total solids content is high). Ice cream is dense and wet in appearance, usually during melting.

Solid fat index – a number giving the proportions of solid to liquid present in a fat at a given temperature. It is a common expression for designating the result obtained from dilato-metric study.

Solids non fat (SNF) – usually refers to the solids of milk, excluding the fat, i.e., protein, lactose and salts. (2)

Solids – see *Dry substance or Dry solids or Total solids*. Matter remaining after all moisture has been evaporated.

Solvent extractable fat (SEF) – measurement of the amount (in percentage) of fat it is possible to extract from an ice cream with an organic solvent under specified conditions. The higher the SEF figure, the more destabilised fat in the ice cream.

Sorbet – a water ice with a relatively high fruit juice and sugar content, with an overrun between 50% and 90%. According to standard of identity for sorbet in Europe, sorbet should contain minimum 35% of single strength fruit juice or equivalent, except for citrus fruits where requirement is minimum 15% single strength citrus fruit juice. The high fruit juice content imparts a high flavour level. (1)

Sorbitan ester – a class of compounds, used as emulsifiers, resulting from the esterification of sorbitan with one or more fatty acids.

Sorbitol – a sugar alcohol formed by the reduction of D-glucose. It is 60% as sweet as sucrose. Sorbitol occurs naturally in plum, apricot, cherry and apple. It is readily soluble in water. Its effect on freezing point is twice that of sucrose. Insulin is not used to metabolise sorbitol.

Soufflé – a sherbet containing egg yolk or whole eggs. (1)

Sour cream – pasteurised cream that is acidified by lactic acid-producing bacteria. Sour cream contains not less than 18% milk fat. (US definition, 14)

Sour flavour (in ice cream) – see also *Acid flavour*. Caused by the presence of an excessive amount of lactic acid produced by the growth of lactic acid bacteria. (1)

Soya protein – a protein extracted from soya beans. It is often utilised in non-dairy frozen desserts. (1)

Specific gravity (SG) – the ratio of the density of a substance at the temperature under consideration to the density of water at the temperature of its maximum density (4°C). Numerically equal to the density in grams per cubic centimeter, but is stated as a pure number, while the density is stated as mass per unit volume, e.g., gm/ml. (4)

Split – frozen ice cream centre surrounded by water ice. Split ice is also called shell and core ice in some parts of the world.

Spumoni – a combination of vanilla ice cream, chocolate ice cream or mousse, cherries and tutti frutti ice cream or whipped cream combined with fruits, arranged in a spumoni cup and hardened to serve; sometimes classed a parfait. (1) Sometimes used to refer to packaged ice cream containing several flavours in distinct layers, similar to "Neapolitan".

Stabilisers – hydrocolloids that control the mobility of water in foods, by thickening or gelling. They affect the final texture of foods by increasing the viscosity. In ice cream, their major function is to control the growth of ice and sugar crystals.

Starch (or amyllum) – vegetable carbohydrate occurring in granular form in the organs of certain plants and corresponding to a polymer composed almost exclusively of alpha-D-glucose groups. (5) Starch is a white, tasteless, insoluble powder, which on hydrolysis (with acid or enzymes) initially gives dextrines, glucose syrup, and finally glucose. All starches usually are mixtures of amylose and amylopectin.

Stearate – salt or ester of stearic acid. (4)

Stearic acid – melting point 69°C (156°F). A long-chain saturated fatty acid with a total of 18 carbon atoms/molecule. Present in most animal and vegetable fats.

Sterilisation – process of killing or removing all microorganisms present in a food.

Sticky body – see *Gummy body*. Caused by excessive use of ingredients such as glucose syrup or sugar-based syrups and certain types of gum. Characterised by the product sticking to the spoon rather than dipping clean, and presenting a gummy character in the mouth.

Stiffness – the degree of rigidity exhibited by ice cream.

Storage off-flavour – stale off-flavour possibly absorbed from the surrounding air in the hardening room, may result because of chemical changes and is particularly objectionable. (1)

Sucralose – a high intensity sweetener that is 600 times sweeter than sucrose.

Sucrose – the most commonly used sweetener in ice cream. Cane sugar or beet sugar; saccharose (common or table sugar). Disaccharide of glucose and fructose. White, sweet, crystalline solids. Melting point 160–186°C (320–367°F). Found in sugar cane sugar, beet and maple tree syrup. Refined sugar is 99.9% pure. Crude brown sugar is 97% pure. (2) (4) See also *Cane sugar*.

Sugar – in general, any sweet soluble monosaccharide or disaccharide (simple carbohydrates, e.g., dextrose, lactose, maltose, fructose). Does not include artificial sweetening agents such as cyclamate, saccharin or aspartame. When unqualified usually refers to sucrose or table sugar. (2) (4)

Sulphonated alcohols – wetting agents commonly used in washing/rinsing.

Sundae – a portion of ice cream over which one or more dressings of syrups, fruits, nuts or other toppings are poured. (3)

Super premium – ice cream made from high quality ingredients, characterised by a high fat content, high total solids and a very low overrun (20–60%).

Surface tension – is a force resulting from an attraction between surface molecules of a liquid that gives surface film-like properties. The greater the attraction between the molecules, the higher the surface tension. Unit of measurement is the dyne. Emulsifiers decrease the surface tension of liquids. (1)

Surfactant, surface active agent – substance that lowers the surface tension. Aids wetting of powders, e.g., detergents, mono and diglycerides, polyethylene derivatives, lecithin, emulsifiers. (2) Materials which have a strong influence on the surface or interfacial tension of liquids and air.

Sweeteners or sweetening agents – these fall into three groups: (I) Sugars, such as sucrose (100%), fructose (173%), glucose (74%), maltose (35%) and lactose (16%). (II) Synthetic (artificial) non-nutritive sweeteners,

such as saccharin, sucralose and aspartame.

(III) Various other chemicals such as glycerine and glycine (70% as sweet as sucrose).

Syneresis – separation of a clear liquid from a colloidal system.

Tagatose – a naturally occurring multipurpose low calorie bulk sweetener derived from lactose. It has less than half the calories of sucrose, sweetness around 0.9 and a freezing point depression factor of 1.9.

Tallowy off-flavour – a term sometimes used to describe oxidised flavours.

Tartaric acid – a dibasic organic acid (dihydroxy succinic acid). A white soluble, crystalline solid. Melting point 170°C/338°F. Occurs in fruits, the chief source is grapes; used in preparing lemonade, added to jams (to increase acidity), in baking powder, and effervescent "health salts". (2) (4)

Taste – includes the most important characteristic of ice cream – flavour – as well as mouthfeel, body and texture. (1) In the pure sense, refers to sensory perception initiating in the mouth – sweet, sour, salty, bitter. Sometimes more broadly used to describe the overall sensory characteristics of a product.

Temperature – a measure of the degree of heat in a body, as measured by a thermometer. More technically it is a measure of the kinetic energy of the molecules, atoms or ions of which matter is composed. Measured using Celsius, Fahrenheit, Absolute, or Kelvin scales. (4) (6)

Texture – refers to the touch or mouthfeel, or the degree of smoothness. (1)

Thickened cream – is cream thickened to a spoonable consistency usually with gelatin or alginate (in Australia). (7)

Thickener – a material that increases the viscosity of a liquid.

Thixotropy – a rheological term defined as the increase in fluidity (or decrease of viscosity) with increased stirring (rate of shear), also referred to as "shear thinning".

Tiramisu – Italian dessert made with the Italian sweet wine Marsala and Mascapone cheese.

Tofu – a curd mass consisting of coagulated soya protein which is a food staple.

Tofutti – a registered trademark which refers in many countries to a non-dairy frozen dessert containing tofu made in the US.

Total solids – the amount of material remaining after all the moisture has been removed or driven off.

Tragacanth – a gum obtained from shrubs of the genus *Astragalus*. Used as an emulsifying agent in pharmaceutical preparations and as a thickener (also used in mayonnaise). (2) Sometimes used as a stabiliser in sherbets. (1) Rarely used in ice cream.

Trans fatty acids (TFA) – are naturally occurring at low levels in some foods, such as in meats and milk. However, most TFAs are formed during the process of partial hydrogenation used during the conversion of vegetable oils to margarine and vegetable shortenings. During this process, the naturally occurring unsaturated fatty acids are partially hydrogenated, resulting in a decrease in polyunsaturated fatty acids, increase in mono unsaturated and a slight increase in saturated fatty acids. Isomerisation of cis to trans forms can occur during this process. Unsaturated fatty acids naturally exist in cis or trans configurations. Fatty acids in the cis configuration are liquid at room temperature. However, fatty acids in the trans configuration increase the melting point of the product.

Triglycerides, triacylglycerides – see *Glycerides*.

Trans unsaturated – an isomer in which hydrogen bonded to carbon atoms attached by a double bond are on opposite sides of a double bond.

Tutti Frutti – ice cream coloured light pink (usually) and containing a mixture of prepared fruits such as cherries, pineapple, raisins and nuts. (From the Italian "all fruit").

UHT (ultra high temperature) – a form of pasteurisation using temperatures in the range of 135 to 140°C (275–285°F) for a few seconds. The product is often packaged aseptically to maximise shelf life and stored at ambient temperature. This form of pasteurisation extends the shelf life for products not packaged aseptically.

Ultrafiltration – the process of concentrating milk solids by passing a fluid dairy product

through a membrane that separates the components on the basis of their particle size.

Unclean off-flavour – a flavour defect resulting from the use of poor quality or spoiled ingredients, absorbed from an unclean environment, or from the use of ice cream mix that has undergone microbiological spoilage.

Unnatural flavour (in ice cream) – a defect found when the flavour of the product is one not associated with the flavour declared. Usually caused by the use of imitation or synthetic flavouring material. Medicinal flavour in cherry flavoured products is an example.

Unsaturation – the property a fatty acid (e.g., in fat, oil or mono-diglycerides) if the hydrocarbon chain of the fatty acid contains one or more double bonds between carbon atoms.

Vacreation – a process for the pasteurisation of ice cream mixes by heat treatment under reduced pressure (1-3 seconds, at 90°C or 194°F). Also assists in removing volatile flavours. Extensively used to pasteurise cream. (1)

Vanilla – a flavouring extracted from the fermented fruit of one or more varieties of an orchid, *Vanilla planifolia*. It is the most popular flavour for ice cream. The principal flavouring component is vanillin. The flavouring is available as pure vanilla (true), reinforced vanilla with vanillin (compound), and imitation (artificial or synthetic vanillin).

Vegetable fat – includes purified and processed edible fats from coconut, cottonseed, soya bean, corn and other plants. When making imitation ice cream vegetable fat is usually hydrogenated.

Viscosity – a measure of the resistance of a liquid to flow. In ice cream mixes, a certain viscosity is essential for whipping and retention of air. Ice cream mix ranges in viscosity from about 50 to 300 cps. (1)

Vitaline – a trademarked piece of equipment used for freezing stick novelties. It consists of a series of moulds on a continuous chain immersed in a cold brine tank in a linear configuration with extension equipment for filling, inserting sticks, coating, removal of the frozen product and packaging.

Vitamin – essential dietary factors that are required by an organism in small amounts

and whose absence results in deficiency diseases. Ice cream is a good source of vitamins such as vitamin A, thiamine (vitamin B₁), riboflavin (vitamin B₂), vitamin B₆ and niacin.

Volatility – the degree to which liquids vaporise under any given set of conditions. The greater the rate of evaporation, the greater the volatility.

Votator – scraped surface heat exchanger.

Waffle – consumed with ice cream and syrup such as maple syrup and/or butter. A flour-based batter baked between heated plates that impart a characteristic grid pattern.

Warm eating – a term to describe the sensation on the palate when a frozen dessert is consumed. Pleasant, not too cold or refreshing as experienced with cold eating. See also *Cold eating*.

Water ice – frozen desserts composed of sugar(s), fruit solids or fruit juice usually flavoured, stabilised, coloured and acidified with food acids (except for chocolate, etc.) (1)

Water soluble gums – see *Stabilisers*.

Weak body – an undesirable defect in ice cream due to a low total solids content combined with insufficient stabilisation and results in a thin mix - a mix of weak consistency. Also lacks firmness or chewiness and is accompanied by rapid melting.

Wetting agent – a substance that lowers the surface tension of a liquid, e.g., detergent. (4) Surfactant.

Whey – the portion of dairy products remaining after removal of the casein from dairy products. Composed of mostly water; lactose, whey proteins and minerals. Whey is removed in cheese making.

Whey leakage defect (in ice cream) – observed during the melting of ice cream when the mix is of poor quality or if the mix is improperly balanced or stabilised. (1)

Whey protein concentrate – an ingredient derived from whey in which the level of whey protein has been increased by the removal of lactose and minerals by a process such as ultrafiltration or reverse osmosis.

Whey protein isolate – a material consisting of one or more specific proteins recovered from whey.

Whey protein – that proportion of the milk protein system which is not coagulated by the manufacture of cheese, or casein and which therefore remains in the whey when it is separated from the curd.

Whey solids – the dried solids of whey used as a low cost source of milk solids non fat (MSNF) in ice cream. They are often used in economy ice cream. Usually whey solids are not used at levels of over 25% of the MSNF in ice cream to avoid any problems possibly caused by its high lactose content or flavour profile. Sweet whey has a pH of 5.9 to 6.3. Acid whey has a pH of 4.3-4.6. (1)

Wheying-off – the drainage of whey or serum from ice cream mix or ice cream, usually caused by instability in the protein system.

Whipped cream – cream with a fat content between 30% and 40% that is aerated by either mechanical whipping or by the release of a compressed gas.

Xanthan gum – a high molecular weight polysaccharide gum produced by a pure-culture fermentation of a carbohydrate by a bacteria called *Xanthomonas campestris*. Functions include: thickening, stabilising, emulsifying and foaming. Xanthan gum can be used as a stabiliser in ice cream.

Xylose – a five-carbon sugar (pentose). Found in plant tissues often as complex polysaccharides, i.e., xylan, pentosans, etc., 40% sweetness of sucrose. (2), (6)

Xylitol – a sugar alcohol made from xylan hemicellulose sources such as birch and other hardwoods. The hemicellulose is hydrolysed to produce D-xylose, which is then hydrogenated to produce xylitol. Xylitol is also widely found in nature, in fruits and vegetables, and indeed the human body itself produces xylitol. Xylitol is the sweetest of all polyols, with a sweetness equal to that of sucrose, and in crystalline form it has a pleasant cooling effect, which is far more pronounced than that of sorbitol. It has a freezing point depression factor of 2.25.

Yeast – unicellular microorganism of the fungi group. Useful in brewing, baking and winemaking. Also in production of fermented milk liquors like koumiss, kefir. Yeast can spoil



ice cream fruit and syrup ingredients. Most yeast is destroyed by heating to over 60°C (140°F).

Yeast flavour (in ice cream) – a defect caused by use of syrup that has begun to ferment. (1) Due to the activity of yeast, or any other ingredient in which significant yeast activity has occurred.

Yogurt (yoghurt) – a name of Turkish origin for a fermented milk of the lactic acid type. Cultures used in making yogurt usually contain *Streptococcus thermophilus* and *Lactobacillus bulgaricus* and sometimes *Lactobacillus bifidus*. (10)

Zabaglione – dessert cream mousse, consisting of egg yolks, white wine or marsala and sugar, which are whisked together in the top of a double boiler over boiling water until thick and foamy.

Zahn cup – a device for measuring liquid dairy product viscosity. It consists of a round bottom cup with an aperture of variable standardised size at the bottom. Viscosity is expressed as the time (usually in seconds) required for the liquid being tested to drain from the cup at a specified temperature. The device is available with apertures of several sizes, identified by number - Zahn No. 1, Zahn No. 2, etc.

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