

Current Comments

All About Ice Cream; Or, Confessions of an Ice Cream Addict

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"Ice cream, ice cream! My kingdom for some ice cream!"

Of course King Richard never said it that way, but had Shakespeare written the play today, he might well have. Ice cream has indeed become a staple of modern life. In fact, many people, myself included, consider themselves ice cream addicts. Though I can now go without an ice cream "fix" for several days or even weeks, eventually the craving becomes overwhelming. And since the pushers are ubiquitous, it is difficult to resist temptation without considerable self-discipline.

Though it is hard to imagine living without it, ice cream as we know it is actually a fairly recent creation. Drinks cooled with ice were known as early as the first century AD, when runners carried ice to the court of the Roman emperor Nero. Some form of ice cream was known in medieval Europe, and Marco Polo is reputed to have brought the recipe from the Orient.¹

Published recipes for the concoction appeared about 1700. Paul Dickson, avowed ice cream fanatic and writer, points out that despite these early innovations, however, ice cream really developed in America, where it probably arrived with the first colonists. Guests of the governor of Maryland were served ice cream in 1700, and ice cream was advertised for sale for the first time (in the world) in New York in 1777. George Washington was an ice cream fan, and ran up a bill of \$51—about \$200 today—for ice cream

in the summer of 1790. However, the ice cream industry began in earnest in 1851 when a Baltimore milk dealer named Jacob Fussel converted his small business into the first ice cream factory in America. Not long after, it was an industry in its own right.²

Americans have led the world in ice cream affairs ever since, both out-producing and out-consuming everyone else. Each year the US manufactures more than 1.2 billion gallons of ice cream and related products like ice milk and sherbet. This comes to 47.2 pints per person or about four average-size single cones a week. Someone seems to have refined the old adage to: "A cone a day keeps the doctor away." If only it did!

The second largest producer of ice cream is Japan. Its 126 million gallons per year is still only 1/10 of US production. Canada produces 86 million gallons and West Germany 80 million.³

In terms of per capita consumption, however, Australia is second to the US—eating about 42.7 pints per person, followed by New Zealand at 41.0 pints and Canada at 31.2. Sweden lags behind in fifth place, at a mere 17.2 pints. Sixth and seventh places belong to Ireland (17.3 pints) and Norway (16.4 pints). (Though Japan produces a lot of ice cream, it actually averages only 11.5 pints per person, or less than 1/4 of US consumption.)³

Unlike the early days when ice cream was cranked by hand in small wooden freezers, most ice cream today is a

highly-processed, factory-made product. It has actually changed very little, however, and is still a blending of cream and other milk products, sweeteners, and flavorings that is pasteurized and homogenized, then agitated and frozen. The result is a mixture of fine ice particles, air, and sweetened, thickened cold cream that is known as ice cream.

This substance, according to nutritionists, besides being a highly enjoyable food, is a nutritious one as well. According to ice cream expert Wendell Arbuckle, professor emeritus, department of dairy science, University of Maryland, one serving (1/6 quart) of average vanilla ice cream contains, among other things, about 3.9 grams of protein (six percent of the average adult male's US recommended daily allowance), 0.31 grams of calcium (3.8 percent of the RDA), 0.104 grams of phosphorus (13 percent of the RDA), 0.14 milligrams of iron (1.4 percent of the RDA), 548 international units of vitamin A (ten percent of the RDA), 0.038 milligrams of thiamin (2.7 percent of the RDA), and 0.236 milligrams of riboflavin (15 percent of the RDA). All are essential components of the human diet. Less pleasing is the fact that the same serving (about one medium ice cream cone) contains about 200 calories, or about ten percent of the RDA. All of these figures vary, of course, according to the actual ingredients of the ice cream. Ice cream made with nuts or eggs, for example, will contain more protein than plain vanilla.³

Unfortunately, ice cream also contains fairly high amounts of fats (ten percent) and sugar (15 percent). In addition to the sugar added as sweetener, ice cream also contains about 6.5 percent milk sugar, or lactose.⁴ Studies have shown that too much fat in the diet can increase the risk factor for a person to experience some form of heart disease or heart attack.

Large amounts of sugar may contribute significantly to tooth decay. Consequently, a recent pamphlet on nutrition published by the US Department of

Health, Education, and Welfare (now Health and Human Services) recommends limiting one's intake of foods high in fats and sugars.⁵ In accordance with such recommendations, Arbuckle maintains that when eaten in moderation, and in conjunction with a well-balanced diet, ice cream can be a nutritious food.³

Advances in technology have made it possible to make ice cream from a variety of food ingredients. As a result, the US Food and Drug Administration (FDA), attempting to ensure some uniformity, established an ice cream standard of identity in 1960.⁶ This standard lists the ingredients which are both allowed and required in ice cream, and specifies minimum and maximum permissible amounts. Although it has been revised several times since 1960, its power remains the same, and any product sold in the US as ice cream must conform to the standard. Accordingly, ice cream may contain various optional milk ingredients, optional caseinates (milk derived proteins used as thickeners), may be sweetened with a variety of sweeteners, and may contain "other safe and suitable non-milk derived ingredients." This means that ice cream may be made from such dairy products as cream, dried cream, plastic cream (concentrated milkfat), butter, milk, concentrated milk, evaporated milk, condensed milk, skim milk, dry milk, sweet cream buttermilk, and cheese whey; it may also contain ammonium, calcium, potassium, and sodium caseinates; plus eggs, water, sugars, emulsifiers, and stabilizers.⁶ Both stabilizers and emulsifiers are additives⁷ used in very small quantities to improve the smoothness and body of ice cream. Ice cream may be made without them, as certain milk components act as natural stabilizers and emulsifiers. Most commercial ice cream made today, however, contains both types of additives.³ James Chambers, Purdue University, explains that without added stabilizers and emulsifiers, the body and texture of ice cream would be poor.⁸ Frequently used

stabilizers include guar gum, locust bean gum, gelatin, and carrageenan; emulsifiers include lecithin, glycerides, and polysorbate 80. Ice cream may also contain a wide variety of flavorings. The law requires that all optional ingredients used in ice cream be listed on the label.

The standards ensure that a substantial part of the ice cream comes from milk products. A minimum of ten percent of the weight of the finished product must be provided by milkfat (also known as butterfat) and a minimum of ten percent milk-solids-not-fat for a total of 20 percent milk solids. (Milk-solids-not-fat are the ingredients found in milk other than water and fat; they consist mainly of protein, lactose,⁴ and minerals.) The standards also ensure that there is not an excessive amount of air in the product (known as "overrun"); a gallon must weigh at least 4.5 pounds. A quart would weigh approximately 1.1 pounds, and a liter about 1.2 pounds.

The exact ingredients and their amounts (over the minimum, or in some cases up to the maximum) are left up to the processors. What they choose to put into their ice cream mixes accounts for the vast array of ice creams, qualities, and prices in the US today. Many cheaper brands, made with a large percentage of dry milk solids and with a high proportion of air in the ice cream are light, fluffy products while more expensive brands such as *Häagen-Daz* and *Bassetts* contain high percentages of cream products with lower amounts of air.

In addition to ice cream, the standards establish legal definitions for other frozen desserts, including ice milk, sherbet, and frozen custard. These products are all made from the same basic ingredients as ice cream, but differ in the amounts they contain. As mentioned earlier, the legal milkfat requirement for ice cream is a content of ten percent or more. Ice milk has a milkfat content between two and seven percent. Sherbets contain between one and two percent milkfat. Frozen custard contains the same milkfat content as ice

cream, but has a much higher percentage of eggs.⁶

As I can well attest, ice cream varies greatly from country to country, and even city to city. Sometimes the same brand, made in different dairy plants, will differ noticeably.

Philadelphia has long been known for its ice cream. Ice cream was manufactured in Philadelphia at least as early as 1861, when *Bassetts* began making and selling ice cream. Since then, "home-made" brands such as *Bassetts*, *Abbotts*, and *Breyer's* have helped put Philadelphia on the ice cream map. There is even a kind of ice cream named for it. "Philadelphia vanilla" is a white vanilla ice cream made with black specks of natural vanilla bean showing throughout. Ice cream marketers claim that to Philadelphians, the black specks are such an important part of vanilla that they won't eat it without them. (Conversely, elsewhere in the country people prefer yellow vanilla, without specks.) When I was a boy, we often went to the automat in New York on Sunday afternoon to enjoy huckleberry pie à la mode. The ice cream was always Philadelphia vanilla. This was not surprising because automats were also started in Philadelphia.

The best ice cream is usually made in small quantities. Perhaps the best I ever ate was in an ice cream parlor in Warsaw, Poland, many years ago. I had a similar experience in Vilnius, Lithuania. These shops reach a limited clientele. Among the best commercial ice creams are the Norwegian. Unfortunately ice cream doesn't travel well. Keeping it frozen is expensive and not always practical, so much ice cream remains a local product. Arbuckle notes, however, that the development of good refrigeration techniques combined with good transportation methods in the US has made it possible to move ice cream relatively long distances without much problem.⁹

Although some brands are still made by old-fashioned methods, most ice cream today is a product of the computer age. Computers guide the ice cream

through every phase of its manufacture. In modern ice cream plants computers control the mixing of ingredients, temperatures, and even the cleaning of the mixing tanks. Ice cream begins as a collection of ingredients measured out by weight. These include the milk products, sweeteners, whey solids, emulsifiers, and stabilizers. (The flavorings are added in the final stages.) They are mixed in large tanks. After all the ingredients are well blended, pasteurization begins. In this step the mix is heated long enough to kill most bacteria. There are two main standards for pasteurization—30 minutes at a temperature of 155°F, or 25 seconds at 175°F.³ A nostalgic novelist recently complained that there has never been ice cream as good as that which was made from unpasteurized milk.

Following pasteurization, the mix is homogenized. In this process, the mix is forced through a small opening at high pressure, while at a temperature between 145° and 170°F. This ensures that the fat in the milk is permanently broken up and remains suspended in the liquid. Otherwise the fat might rise and form a layer of cream on the top of the mix during a later stage of production. After this process is completed, the mix is quickly cooled to between 32° and 40°F, then "aged" for three to 24 hours. Aging (holding the ice cream at a temperature of about 36°F) allows the fat to solidify or the gelatin, if used, to swell. The time a mix is aged is largely dependent upon the manufacturer's own preference.³

When the mix is considered sufficiently aged, the freezing process begins. Depending on the type of freezer used, this step of production can take anywhere from 24 seconds to ten minutes. Flavoring ingredients (fruit, nuts, candy) are added at this time and the mix is rapidly cooled to between 16° and 26°F while being agitated. The agitation process incorporates air into the mix, while the quick freezing promotes the formation of small ice crystals. Small crystals are preferable because

the smaller they are, the smoother the product. The amount of air added to a mix has a direct relation to the quality of the finished product. A certain amount of air must be added to ensure that the ice cream is not heavy and soggy. Above that amount, how much air is incorporated is dependent upon the quality and type of ice cream desired. A soft ice cream, for example, may contain only 15 percent air, while the bulk packaged ice cream sold to restaurants may contain as much as 50 percent air. The take-home ice cream sold in grocery stores contains about 35 to 40 percent air. As a rule, however, better quality ice creams contain less air than lower quality ones.³

When the mix is partially frozen, but not hard, it is packaged by machine, then moved on conveyor belts to cold storage rooms where it is frozen hard. The time needed for hardening (generally considered to be the time needed for the ice cream to drop to 0°F at its center) is dependent upon the temperature of the hardening room, the air flow, and the size of the packages. It can be done in as little as 30 minutes, or take a full 24 hours. From the hardening room the ice cream is shipped in refrigerated vehicles to stores and restaurants. If the process was successful, the result should be, as planned, a smooth, creamy, full-bodied product with good flavor.³

The process is not risk-free, however, and numerous things can go wrong throughout. In a recent article, James Chambers and Carlton Parmelee, Purdue University, pointed out some common problems with ice cream manufacture. If the ice cream is not frozen quickly enough, for example, large ice crystals may form, causing the ice cream to be coarse and grainy. Overheating during the pasteurization process may give the ice cream a cooked flavor; slightly off-flavor ingredients may be reflected in the ice cream's taste. Problems can occur during shipping, as well; ice cream allowed to thaw and then refreeze may become grainy;

too much agitation during shipping may "settle" the ice cream, making it flat and tough.¹⁰

Despite the potential problems, however, the ice cream industry continues to prosper. In 1979, for example, total ice cream production rose to 818 million gallons, a 0.3 percent increase over 1978's total of 815 million gallons.¹¹ Dickson claims that Americans are not only buying more ice cream, but they are also going in for expensive, high quality brands and exotic flavors.¹² *Newsweek* confirms the trend, noting that flavors such as caramel turtle fudge (*Swensen's*), kahlua (*Schraft's*), and honey vanilla (*Häagen-Daz*) are not unusual. The number of flavors available is actually staggering; the 34 year-old *Baskin-Robbins* firm alone has introduced 550 flavors.¹³ Nonetheless, vanilla (of both types) remains the number one flavor, accounting for about 50 percent of all ice cream sold. Chocolate runs a distant second, at 12 percent. Other popular flavors include nut, variegated (such as fudge swirl), strawberry, neopolitan, peach, candy (such as butter crunch), and coffee.¹⁴ I find it amusing that in America "French" ice cream is often touted as the best, like French dry cleaning, while in France, American style ice cream at Le Drugstore is the "in" thing. In England, the home of great Cornish cream, "American style" Deauville ice cream is the rage. The English are probably the most outrageous consumers of heavy cream with dessert. If you've never had clotted cream with scones, you've missed a great treat. But just imagine having ice cream topped with clotted cream! Clotted cream, incidentally, is a thick cream made by slowly heating whole milk on which the cream has been allowed to rise. You then skim off the cooled cream from the top and you have Cornish, or clotted, cream. It may also be called Devonshire cream. I should add that American sundaes are always topped with whipped cream. In Iceland I ate ice cream topped with skyr, which is equivalent to eating it with sour

cream. Skyr is sour curdled milk. Sour cream is cream fermented with lactic acid bacteria, or lactobacilli.

Ice cream producers cater to those with weight and health problems as well as the "healthy" consumer. Dietetic ice creams, which use less milkfat and sugar than regular ice creams, are available, as are ice creams for diabetics, in which the sugar content is largely replaced by artificial sweeteners. For vegetarians who shun even milk products, imitation ice cream, known as mellorine, is available in some states. In mellorine products, vegetable fats are substituted for the milkfat.³ For those who are unable to consume ice cream due to lactose intolerance,⁴ relief may be on the way. *Lact Aid*, a lactase enzyme that partially hydrolyzes the lactose in milk, has recently been introduced for use in milk. SugarLo, the New Jersey firm that produces *Lact Aid*, expects to expand *Lact Aid's* uses in a whole line of dairy products, including ice cream. Sweet acidophilus milk—milk fermented with the bacteria *Lactobacillus acidophilus*—has also found some success as a milk digestible by lactose intolerant people. The United Dairy Industry Association (UDIA) is currently conducting research on the possible uses of this milk in other dairy products.

Since ice cream is such big business, not surprisingly, ice cream manufacturing courses are offered at several universities, notably Pennsylvania State University, University of Maryland, Ohio State University, and University of Wisconsin. Penn State offered the first ice cream course in the US in 1892.³ (Dickson notes that such schools are good places to find top quality ice creams with unusual flavors, as food science students are known for their "wildcatting"—or hunting for new flavors. He claims that Ohio State has the most flamboyant wildcatters, pointing to sauerkraut sherbet as one example of their exotic creations.)¹²

Numerous organizations promote ice cream, research, and legislation. Among them are dairy associations,

such as the American Dairy Science Association, Urbana, Illinois; the National Dairy Council, Chicago, Illinois; and the UDIA, Rosemont, Illinois. Specifically geared toward ice cream are the National Association of Retail Ice Cream Manufacturers, Inc., Nashville, Tennessee, and the major ice cream association, the International Association of Ice Cream Manufacturers (IAICM), Washington, DC. The IAICM currently numbers about 1,900 members, from 23 countries. IAICM promotes all phases of ice cream production, including lobbying for favorable ice cream legislation.

Various magazines cover the ice cream industry, including *Dairy and Ice Cream Field*, *Journal of Dairy Science*, and *American Dairy Review*. All are covered in *Current Contents®/Agriculture, Biology & Environmental Sciences*.

Clearly national preferences for flavors and fat content differ. In many European countries there is a preference for "Italian" style ice cream—much lower in fat content—a sherbet-like taste that the average American would consider watered-down. But the

process of internationalization that is widest in computers and other aspects of life is also taking over the ice cream business. On my last trip to Japan the taste of the *Baskin-Robbins* ice cream sold there seemed identical to that one finds elsewhere. The Danish *Häagen-Daz* sold in Philadelphia is made in Brooklyn. In an earlier essay,⁴ I mentioned the milk shake culture that was part of my childhood. And most American children remember that almost unlimited quantities of ice cream are allowed just after a tonsillectomy. Ice cream as a reward is very much a part of our cultural tradition. Whether or not ice cream mania is a true addiction may not be a serious academic question. We all tend to think we could not "survive" with a radical change in diet but somehow we manage. Nevertheless, while there are many things one can live without, I'd rather not imagine a world without ice cream.

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