

QUALITY OF ICE CREAM AND ICE MILK

By Lester Hankin and J. Gordon Hanna

A cooperative study by The Connecticut Agricultural Experiment Station, the Food Division of the Connecticut Department of Consumer Protection, the Dairy Division of the Connecticut Department of Agriculture, and the Department of Animal Industries at the University of Connecticut.

Ice cream is a delicious, wholesome, and nutritious food made of cream, milk, skim milk, condensed milk, or other concentrated dairy products. It contains sugar or other sweeteners and flavoring, may contain stabilizer or color, and has air incorporated during freezing. Several additives also may be used; the maximum amounts are specified by regulation, and optional ingredients, flavoring, and additives must be listed on the label.

Records of frozen ices have been found in Europe back to the 16th century and a form of ice cream was recorded during the 18th century (3). In America, the introduction of ice cream is credited to Mrs. Alexander Hamilton who, it is said, in 1789 served ice cream at a dinner attended by George Washington. The upsurge in ice cream making began in 1851 when the first commercial ice cream plant was opened in Baltimore, Maryland. Four inventions were essential to the new industry: condensed milk by Gail Borden of Wolcottville, Connecticut; the cream separator; the Babcock test for fat; and mechanical refrigeration (3).

Ice cream is a popular dessert or snack for persons of all ages. In the United States the average per capita consumption is about 3.7 gallons (1, 7). In New England, however, consumption is more: 5.3 gallons. Vanilla flavor accounts for over 45% of sales followed by chocolate at about 10%. About 74% of all ice cream is purchased in supermarkets, and over 83% is purchased in half-gallon containers (1, 7). Consumption of ice milk is about 1.3 gallons per capita.

Connecticut Regulations for ice cream are administered by the Department of Consumer Protection (4) and define the ingredients that may be used and the types and amounts

of additives and flavoring permitted. The salient points of the regulations are that ice cream shall contain not less than 10% butterfat and ice milk not less than 2 nor more than 7%. Dietary frozen dessert shall contain less than 2% butterfat. Vegetable fat is not permitted in ice cream, ice milk, or dietary frozen dessert.

For ice cream the weight of milk solids not fat shall be not less than 6%. For ice milk the total milk solids shall be not less than 11% and for ice cream 20%. The total number of aerobic bacteria per gram, called the Standard Plate Count, shall not exceed 100,000 and the number of coliform bacteria shall not exceed 10 per gram. The weight per gallon for ice cream and ice milk shall be not less than 4.5 pounds and the total solids per gallon shall be not less than 1.6 pounds. If the ice cream is labeled as "French vanilla," it must contain at least 1.4% eggs.

In this Bulletin we report analyses of vanilla ice cream and ice milk sold in Connecticut. We determined compliance with State Regulations and quality and nutrient factors such as flavor, fat, protein, calories, and content of bacteria.

Methods

Seventy-nine samples of vanilla ice cream, eight of ice milk, and one dietary frozen dessert were collected from May through August 1983 by inspectors of the Connecticut Department of Consumer Protection. The samples were taken at processing plants and distribution points in Connecticut or in retail stores if the product was produced in another state. Except for the three hand-packed samples,

Table 1. Microbial, Chemical, Nutrient, and Flavor Analysis of Vanilla Ice Cream and Ice Milk.

Sample Number	Brand	Manufacturer	Weight per gal., pounds ^b	Bacteria, no/g ^b	Coliform bacteria, no/g ^b	Protein %	Fat, % ^b	Total Carbohydrate, %	Sweeteners, % ^e	Calories, no/100 g	Flavor score ^d	Sample Number
ICE CREAM												
1.	A.C. Petersen Farms, Deluxe, I ^a	A.C. Petersen Farms; West Hartford, CT	5.3	3,000	<1	2.9	12.8	21.4	16.0	209	8	1
2.	Aloha, lactose reduced (hand packed), II ^f	Aloha; New Haven, CT	—	—	—	3.9	14.9	21.9	21.9	234	8	2
3.	Aloha (hand packed), II	Aloha; New Haven, CT	—	—	—	2.7	14.8	21.0	17.2	225	8	3
4.	Ayrshire Farm, II	A.C. Petersen Farms; West Hartford, CT	4.9	600	2	3.0	12.4	21.4	15.5	207	8	4
5.	Barracini, vanilla bean, I	Embassy & Harbison's Dairy; Baltimore, MD	5.1	1,600	<1	5.6	12.0	21.7	16.7	214	9	5
6.	Bee Bee Dairys, Deluxe, I	A.C. Petersen Farms; West Hartford, CT	6.3	3,300	<1	3.7	13.1	21.5	16.6	216	7	6
7.	Baskin-Robbins, Ready-Pak, II	Baskin-Robbins; Owensboro, KY	5.0	40	<1	3.3	14.2	20.4	14.1	220	8	7
8.	Borden, II	Borden; East Syracuse, NY	5.4	260	<1	3.0	10.0	22.3	16.8	189	8	8
9.	Borden, all natural, I	Borden; Canton, OH	5.4	80	<1	3.4	10.3	24.5	19.2	203	8	9
10.	Borden, all natural, French, I	Borden; Canton, OH	5.3	70	<1	3.8	12.4	23.3	18.0	217	8	10
11.	Breyers, natural with vanilla bean, I	Kraft; Framingham, MA	4.7	9,900	<1	4.1	11.2	21.3	15.3	200	9	11
12.	Breyers, natural with vanilla bean, I	Kraft; Framingham, MA	4.8	3,300	<1	4.2	11.2	22.4	17.5	205	9	12
13.	Brigham's, I	Brigham's; Arlington, MA	6.1	260	<1	3.4	16.4	18.6	13.7	232	8.5	13
14.	Buck's Spumoni, II	Buck's Spumoni Co.; Milford, CT	4.8	2,200	540	3.7	12.9	21.6	16.2	215	5	14
15.	Buck's Spumoni, II	Buck's Spumoni Co.; Milford, CT	4.9	240	2	3.8	13.1	21.5	16.7	217	8.5	15
16.	Budget Pak, III	Ice Cream Corp. of R.I.; Woonsocket, RI	4.8	5,800,000	140	3.0	10.2	23.2	17.5	194	7	16
17.	Carvel #1624, I	Carvel; Bridgeport, CT	5.2	430	<1	4.2	11.0	20.2	13.2	194	8	17
18.	Carvel #1325, I	Carvel; Meriden, CT	7.5	680	<1	4.6	12.1	19.2	13.3	202	5	18
19.	Chas. Greenbacker & Sons, I	Chas. Greenbacker & Sons; Meriden, CT	4.5	950	<1	2.7	12.7	20.0	14.0	203	5	19
20.	Cumberland Farms, Deluxe, Old Fashioned, French, I	Cumberland Farms Dairy; Canton, MA	4.7	120	<1	3.9	12.7	21.3	16.5	212	8.5	20
21.	Cumberland Farms, Old Fashioned, I	Cumberland Farms Dairy; Canton, MA	4.8	3,300	5	3.8	12.3	22.1	16.5	212	9	21
22.	Dairylea, II	H.P. Hood; Suffield, CT	4.6	170	1	2.9	10.3	23.8	19.7	198	9	22
23.	Dari Farms, II	Dunkirk Ice Cream Co.; Dunkirk, NY	4.6	80	<1	2.8	13.1	18.9	14.9	202	7	23
24.	Dolly Madison, all natural, I	Dunkirk Ice Cream Co.; Dunkirk, NY	4.7	610	<1	4.0	10.0	25.9	20.6	208	8	24
25.	Edwards* Finast, III	Hendrie's; Milton, MA	5.4	190	<1	3.2	10.2	22.5	16.7	192	8	25
26.	Farmer John's, I	Cumberland Farms; Canton, MA	4.5	60	<1	2.9	10.3	21.7	16.8	188	6	26
27.	Friendly, II	Friendly Ice Cream Corp.; Wilbraham, MA	4.8	340	<1	3.5	11.4	22.1	18.3	203	8	27
28.	Frusen Gladje, I	Dunkirk Ice Cream Co.; Dunkirk, NY	7.2	140	<1	3.9	10.4	20.5	17.6	189	8	28
29.	Gaylord, III	Dunkirk Ice Cream Co.; Dunkirk, NY	4.8	25	<1	2.6	10.5	22.1	17.6	191	6.5	29
30.	Generic, Hood, III	H.P. Hood; Suffield, CT	4.7	110	<1	3.7	10.1	23.9	17.2	199	8.5	30
31.	Häagen-Dazs, honey vanilla, I	Woodbridge Sweets Corp.; Woodbridge, NJ	7.7	580	<1	4.6	16.3	19.3	14.8	239	8	31
32.	Hendrie's, I	Hendrie's; Milton, MA	4.8	270	<1	3.4	10.4	24.3	18.6	202	8	32
33.	Holland Hall, II	Kraft; Framingham, MA	4.7	15	<1	2.7	12.4	20.7	16.2	203	8	33
34.	Holland Hall, II	Kraft; Framingham, MA	4.7	120	<1	3.3	10.0	23.6	18.1	196	7	34
35.	Hood, II	H.P. Hood; Suffield, CT	4.7	100	<1	3.3	10.0	23.8	18.3	196	8	35
36.	Hood, Coronet, all natural, French I	H.P. Hood; Suffield, CT	4.9	200	3	3.7	10.3	23.1	18.1	198	8	36
37.	Hostess, II	Dorchester Ice Cream Corp.; Boston, MA	4.4	160	<1	2.2	12.6	20.6	16.3	202	7.5	37
38.	Hostess, II	Dorchester Ice Cream Corp.; Boston, MA	4.5	60	<1	2.6	10.3	24.1	18.2	198	8	38
39.	Howard Johnson's, I	Howard Johnson Co.; Boston, MA	5.8	470	<1	3.3	16.5	20.3	14.5	239	7.5	39
40.	Ice Cream Shop of Woodbury & Newtown, II	Ice Cream Shop #2; Newtown, CT	4.8	180	<1	3.6	14.5	20.3	15.5	223	7	40
41.	IGA, II	H.P. Hood; Suffield, CT	4.8	280	7	3.7	10.1	24.4	18.1	201	8	41
42.	J.J. Lawsen, French, I	J.J. Lawsen; East Hartford, CT	5.1	49,000	1	4.0	13.1	24.8	18.0	231	6	42
43.	Johnnies Dairy Shop, II	Johnnies Dairy Shop; Middlebury, CT	4.2	60	<1	4.4	14.2	21.0	17.1	227	7	43
44.	M & B, III	Atlantic Processing; Allentown, PA	4.8	170	10	2.9	10.4	22.9	18.1	195	7	44
45.	Marcus Dairy, I	Marcus Dairy; Danbury, CT	5.0	860	5	2.6	13.3	22.7	18.1	218	6.5	45
46.	Maygold, all natural, I	Maygold Ice Cream; Pomfret Center, CT	4.2	39,000	880	3.4	9.1	22.7	17.3	184	4	46
47.	Michael's Dairy, II	Michael's Dairy; New London, CT	5.6	40	<1	2.6	17.3	21.8	17.1	250	7	47
48.	Moser Farms, II	Moser Farms; Ellington, CT	4.6	280	<1	3.1	10.0	22.0	16.1	189	8	48
49.	Naugatuck Dairy, I	Naugatuck Dairy Ice Cream Co.; Naugatuck, CT	4.5	770	4	3.4	12.4	24.3	17.9	199	8	49
50.	Newport Creamery, I	Newport Creamery; Middletown, RI	4.6	260	<1	2.7	14.9	19.7	15.2	221	7	50
51.	No Frills, III	East Coast Ice Cream Co.; Laurel, MD	5.2	1,200	1	2.7	10.2	25.3	17.1	194	6	51
52.	Pathmark, II	Golden Quality Ice Cream Co.; Plymouth, PA	5.5	120	<1	3.1	10.5	20.8	15.2	188	7.5	52
53.	Pathmark, Premium Golden, II	Golden Quality Ice Cream Co.; Plymouth, PA	5.2	500	<1	3.2	10.7	22.8	16.6	198	8.5	53
54.	PenSupreme, all natural, I	Penn Dairies; Lancaster, PA	4.9	360	<1	3.0	11.1	27.2	21.3	219	9	54
55.	Price Chopper, II	H.P. Hood; Suffield, CT	4.7	35	<1	3.2	10.5	23.9	18.6	194	8	55
56.	Red & White, II	H.P. Hood; Suffield, CT	4.7	190	<1	2.8	10.5	23.4	17.5	198	8.5	56
57.	Royal, I	Royal Ice Cream Co.; Manchester, CT	4.8	460	3	3.8	12.8	21.9	16.1	215	8	57
58.	Schrafft's, natural, I	Penn Dairies; Lancaster, PA	6.0	450	3	3.8	15.0	20.4	15.2	229	6	58
59.	Schrafft's, natural, I	Penn Dairies; Lancaster, PA	5.6	100	<1	3.8	15.9	19.0	14.5	235	6.5	59
60.	Sealtest, Ice Cream Parlor Taste, II	Kraft; Framingham, MA	4.6	1,200	<1	3.3	10.9	24.0	17.6	205	9	60
61.	Sealtest, Ice Cream Parlor Taste, II	Kraft; Framingham, MA	4.4	300	<1	3.2	10.9	23.9	18.3	204	8	61
62.	Shady Glen, I	Shady Glen Dairy; Manchester, CT	5.1	3,900	17	3.0	12.8	23.2	17.6	217	6	62
63.	Shop Rite, II	H.P. Hood; Suffield, CT	4.7	1,400	3	2.9	10.2	24.5	19.9	199	8.5	63
64.	Shopwell, I	Penn Dairies; Lancaster, PA	5.0	190	<1	3.0	10.2	24.4	19.0	199	8.5	64
65.	Shurfine, III	H.P. Hood; Suffield, CT	4.7	80	<1	3.5	10.9	23.1	17.7	202	8.5	65
66.	Stop & Shop, 100% natural with vanilla bean, I	Hendrie's; Milton, MA	5.4	290	1	3.8	12.0	22.6	17.3	211	9	66

all were packaged by the manufacturer. Whenever possible half-gallons were collected, and 74 samples were in half-gallons, 12 in quarts, and 2 in pints.

Samples were delivered frozen to the laboratory and examined for total number of aerobic bacteria per gram (Standard Plate Count), coliform bacteria, and yeasts and molds according to Standard Methods For the Examination of Dairy Products (6). Analyses for fat, protein, ash, total solids, and egg were by methods of the Association of Official Analytical Chemists (5).

The percentage of total carbohydrate and the caloric content were calculated values. Total carbohydrate is % total solids - (% fat + % protein + % ash). Calories per 100 grams are % fat x 8.79 + [% total solids - (% fat + % ash)] x 4. One hundred grams of ice cream is about 3.5 ounces or about one slice. Percent sweetener is the % of total carbohydrate less the % lactose. Lactose was determined by high performance liquid chromatography (8). Analysis of duplicates showed for protein determination an average difference between duplicates of 0.35% with a standard deviation about the mean of 0.35%, for fat an average difference of 0.20% with a standard deviation about the mean of 0.09%, and for lactose an average difference of 0.23% with a standard deviation about the mean of 0.19%.

Flavor or taste was judged according to the standard criteria of the American Dairy Science Association (2) by at least three persons. A scoring system of I to 10 was used, 10 being the best. In Table I the Roman numerals I, II, or III appear after the brand of the product. Numeral I designates that the product contains all natural flavoring (vanilla extract or vanilla powder), II designates that mostly natural flavoring was used but some artificial flavoring was added, and numeral III indicates that all or mostly all artificial flavoring was used.

Results and Discussion

Sixty-eight brands are represented by the 88 samples in Table I. More than one type of ice cream may have been produced under the same brand. Examples are samples 8, 9, and 10, samples 35 and 36, and samples 52 and 53. We occasionally received duplicates, and results for each sample are shown in the Table. In the Table, the brand as well as the manufacturer is shown. Some samples with different brand names were made by the same processor, for example, samples 22, 30, 35, 41, 55, 56, 63, 65, 68, 69, 72, and 87.

The weight per gallon of ice cream and ice milk averaged 4.9 pounds but ranged from 4.2 to 7.5. Six samples (numbers 37, 43, 46, 61, 74, 86) failed to meet the State minimum requirement of 4.5 pounds per gallon (Table I). We do not show in the Table the weight per gallon for hand-packed samples since considerably more ice cream or ice milk can be packed by hand into a container than by a machine. All samples met the Standards for total solids, solids not fat, total milk solids, and pounds solids per gallon.

All except sample 16 met the Standard (100,000 per gram) for total number of aerobic bacteria. Seven samples had more than 10 coliform bacteria per gram (Table I), and this usually indicates post-pasteurization contamination.

The number of yeasts and molds detected was generally less than 10 per gram.

Butterfat in the ice cream samples ranged from 9.1 to 17.3% with an average of 11.9% (Table I). Only sample 46 was below the regulated minimum of 10% butterfat. Over 55% of the samples contained from 10 to 12% fat, about 27% contained from 12 to 14%, 11% contained from 14 to 16%, and about 5% contained over 16% butterfat. The fat content of the ice milks ranged from 2.2 to 6.6% with an average of 3.6%, all within the State requirement of 2 to 7%. No sample of ice cream or ice milk was adulterated with vegetable fat.

Protein content of the ice creams averaged 3.3% with a range from 2.0 to 6.0% (Table I). The amount of protein depends on the amount of casein in the milk or milk solids used. The average protein content of the ice milks was 3.5%.

The average carbohydrate content of the ice milks was 27.1% and of the ice creams 22.4%. The total carbohydrate in vanilla ice cream and ice milk includes the lactose from the dairy products as well as added sucrose, corn sweeteners (hydrolyzed corn starch containing glucose, fructose, maltose, and higher polysaccharides), as well as some stabilizers such as agar and vegetable gums.

The percentage of sweetener is the total carbohydrate less the lactose added in the solids of whole milk, skim milk, or whey. Sweeteners include sucrose and hydrolyzed corn starch usually noted on labels as corn sweeteners. Sweeteners in ice cream average 17.2% with a range from 13.2 to 21.9%. The range for ice milk was 19.2 to 26.7% with an average of 21.2%.

The average calories per 100 grams of ice cream exceeded that of ice milk by about 26%. Ice cream had an average of 207 calories (about the number in two large apples) per 100 grams and ice milk 154. The calories in ice cream and ice milk are primarily from fat. Fat provides about twice as many calories per gram as protein or carbohydrates.

Vanilla ice cream and ice milk are labeled according to the flavoring. The flavor category is shown in Table I as a Roman numeral following the brand. Vanilla ice cream or ice milk in category I would be labeled vanilla, indicating that all natural vanilla was used. In category II it would be labeled vanilla-flavored, with a subsidiary declaration such as "vanilla and artificial flavor" indicating that although mostly natural vanilla was used, some artificial flavor was added. In category III the product would be labeled artificially flavored vanilla, showing that all or mostly all flavor was artificial. Natural flavor is either vanilla extract or vanilla powder. Forty-one samples of ice cream were in category I, 27 in category II, and 11 in category III. For ice milk there were four each in categories I and II (Table I).

Taste or flavor is largely personal preference. We found the average flavor score for ice cream and ice milk was 7.6 with a range from 4 to 9 (Table I). Samples scoring between 7.5 to 9 usually were criticized as "lacking fine flavor" or "lacking flavor," not important criticisms. A score below 7.5 indicates defects such as "too sweet," "cooked flavor," or "unnatural flavor." Unnatural means the flavor does not

Table 1. Microbial, Chemical, Nutrient, and Flavor Analysis of Vanilla Ice Cream and Ice Milk (continued).

Sample Number	Brand	Manufacturer	Weight per gal., pounds ^b	Bacteria, no/g ^b	Coliform bacteria, no/g ^b	Protein %	Fat, % ^b	Total Carbohydrate, %	Sweeteners, % ^e	Calories, no/100 g	Flavor score ^d	Sample Number
ICE CREAM												
67.	Stop & Shop, I	Hendrie's; Milton, MA	4.7	420	<1	3.1	10.4	24.9	19.2	203	6	67
68.	Strassel's, all natural, French, I	H.P. Hood; Suffield, CT	4.9	1,400	10	4.1	12.6	21.6	16.3	213	7.5	68
69.	Suburban Farms, III	H.P. Hood; Suffield, CT	4.8	55	<1	2.8	10.7	24.0	18.8	201	9	69
70.	Sun Glory, III	Hendrie's; Milton, MA	4.7	310	<1	2.9	10.6	22.6	17.1	195	8	70
71.	Sweet Creams Unlimited; (hand packed), I	Sweet Creams Unlimited; New Milford, CT	—	—	—	3.4	15.4	20.8	18.1	232	6	71
72.	Sweet Life, III	H.P. Hood; Suffield, CT	4.7	1,600	4	2.7	10.6	23.1	17.5	196	8	72
73.	Tuscan Farms, Supreme, all natural, I	Tuscan Foods; Union, NJ	5.9	40	<1	3.5	10.2	25.7	20.8	206	9	73
74.	University of Connecticut, I	University of Connecticut; Storrs, CT	4.3	1,800	22	3.3	10.1	21.4	16.5	187	7	74
75.	University of Connecticut, I	University of Connecticut; Storrs, CT	4.9	15,000	4,300	3.1	11.7	21.5	16.9	201	6	75
76.	Valley Pak, III	Penn Dairies; Lancaster, PA	4.6	1,400	<1	2.9	10.6	23.4	17.9	198	8	76
77.	Waldbaum's, Old Fashioned, all natural, I	Atlantic Processing; Allentown, PA	4.5	350	<1	2.9	12.6	23.3	18.3	215	7	77
78.	Waldbaum's, Old Fashioned, all natural, I	Atlantic Processing; Allentown, PA	4.6	150	<1	2.9	12.4	24.2	18.3	217	8.5	78
79.	Wawa, vanilla bean, I	Penn Dairies; Lancaster, PA	5.0	680	1	2.9	11.8	23.3	17.8	209	9	79
ICE MILK												
80.	Cumberland Farms, Old Fashioned, I	Cumberland Farms, Dairy; Canton, MA	5.0	290	<1	3.1	4.3	24.3	19.5	147	5	80
81.	Grand Union, II	H.P. Hood; Portland, ME	4.5	200	1	3.5	3.0	27.3	21.0	150	7.5	81
82.	Hendrie's, 97% fat free, I	Hendrie's; Milton, MA	4.7	850	4	4.1	3.0	28.4	23.0	156	8	82
83.	Hood, Nuform, II	H.P. Hood; Suffield, CT	4.7	1,100	25	3.6	6.6	25.6	19.5	175	7.5	83
84.	Pathmark, Lite 'n Frosty, II	Golden Quality Ice Cream Co.; Plymouth, PA	5.2	120	6	3.4	3.4	25.2	19.2	145	8.5	84
85.	Sealtest, Light n' Lively, II	Kraft; Framingham, MA	4.6	110	<1	3.8	3.1	26.3	20.3	147	7	85
86.	Skinny Dip, I	Seymours Ice Cream; Boston, MA	4.4	380	1	2.0	3.4	26.2	20.2	142	6	86
87.	Shop Rite, I	H.P. Hood; Suffield, CT	4.4	800	1	4.1	2.2	33.2	26.7	169	7.5	87
DIETARY FROZEN DESSERT												
88.	Weight Watchers, III	Jackson Ice Cream Co.; Hutchinson, KS	5.1	390	1	4.7	1.5	20.7	13.5	114	7	88

- a) The Roman numeral designates whether the ice cream or ice milk contains only natural vanilla flavoring (I), mostly natural but some artificial flavoring (II), or all, or mostly all, artificial flavoring (III).
- b) According to State Regulations weight per gallon must be at least 4.5 pounds, bacteria per gram must not exceed 100,000, coliform bacteria must not exceed 10 per gram, ice cream must contain at least 10% butterfat, ice milk requires from 2 to 7% fat, and dietary frozen dessert must contain less than 2% fat.
- c) Weight per gallon, bacteria per gram, and coliform bacteria are not shown for hand-packed samples. Since considerably more ice cream can be packed into a container by hand than by filling machine, weights are not comparable. Bacterial counts for hand-packed samples reflect the sanitary conditions of the utensils and containers used for packaging as well as care during processing. All three hand-packed samples had satisfactory bacterial counts.

- d) Flavor score indicates the overall taste of the ice cream and ice milk based on standard criteria. A scoring system of 1 to 10 was used, 10 being the best.
- e) Sweetener is the % total carbohydrate less the % of lactose.
- f) Sample 2, which purports to be reduced in lactose, contained less than 0.3% lactose. Sample 3, the usual ice cream from the same manufacturer, contained 3.9% lactose.

suggest vanilla or there is a flavor not usually associated with vanilla ice cream. Scores below 6 reflected more serious flavor defects, such as "taste of old ingredients" or "very unnatural flavor." Consumers, of course, may disagree with this flavor analysis since standardized flavor criteria were used.

Conclusions

Seventy-nine ice cream, eight ice milks, and one dietary frozen dessert for sale in Connecticut were tested for nutrients, quality, flavor, and for compliance with State Regulations. All were vanilla or vanilla-flavored.

One sample of ice cream exceeded the total number of bacteria allowed by regulation. Six ice creams and one ice milk exceeded the standard for number of coliform bacteria, and six samples were below the required minimum of 4.5 pounds per gallon. Only one sample of ice cream did not meet the regulated minimum of 10% butterfat. All ice

milks were within the regulated 2 to 7% butterfat. The average sweetener in ice cream was 18.2% and in ice milk 21.2%. Calories per 100 grams of ice cream averaged 207 and of ice milk 154. The average flavor score, on a 1 to 10 basis, was 7.6, indicating most samples had a good flavor.

These results show ice cream and ice milk sold in Connecticut generally are of good quality.

Acknowledgments

We thank Michelle Birks, Lucia McLean, Mamie Pyles, and Alphonse Wickroski for the analyses; Donald Shields, George Norman, and Dr. Tom Hoagland for the flavor analysis; and Albert Hancock and Dominic Tartaro for collecting the samples.

References

1. Anon. 1983. Consumer trends push for premium products. Dairy Field 166:44-47.
2. Collegiate Dairy Products Evaluation-Product defects and scores. American Dairy Science Association, August 1981.
3. Frandsen, J. H. and W. S. Arbuckle. 1961. Ice Cream and Related Products. Avi Publishing Co., Westport, CT.
4. Frozen Desserts and Frozen Dessert Mix. Regulations of the Connecticut Department of Consumer Protection, adopted December 1977.
5. Official Methods of Analysis. 1980. 13th ed., W. Horwitz, ed. Association of Official Analytical Chemists, Washington, DC.
6. Standard Methods For the Examination of Dairy Products. 1978. 14th ed., E. H. Marth, ed. American Public Health Assoc., Washington, DC.
7. The Latest Scoop—Facts and figures on ice cream and related products. 1981. International Association of Ice Cream Manufacturers, Washington DC.
8. Warthensen, J. J. and P. L. Kramer. 1979. Analysis of sugars in milk and ice cream by high pressure liquid chromatography. J. Food Science 44:626-627.