

## ICE-CREAM & FROZEN DESSERTS



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## ***Module 9. Technology of dried ice cream mix and nutritive value of ice cream***

## Lesson 26

## NUTRITIVE VALUE OF ICE CREAM-CALCULATIONS AND LABELING

## 26.1 Introduction

The energy value and nutrients of ice cream depend upon the food value of the products from which it is made. Ice cream contains three or four times as much fat, carbohydrate and 12-16 % more protein than does milk. In addition, it contains other food products such as fruits, nuts, eggs, candies and sugar, which enhance its nutritive value. Like milk, ice cream is not a good source of iron and some of the trace minerals.

Ice cream is an excellent source of food energy, and fully 50% of its total solids content is sugar, including lactose, sucrose, and corn syrup solids. These constituents are almost completely assimilated and makes ice cream an especially desirable food for growing children.

## 26.2 Caloric Content of Ice Cream and Related Products

The amount of energy normally expected to be derived from milk per gram of Carbohydrates, fats and proteins is as follows: Carbohydrates 3.87 kcal; Fat 8.79 kcal; protein 4.27 kcal. Proteins and carbohydrates are of equal energy value per gram and fats are 2.25 times as rich in energy. Minerals and vitamins do not furnish appreciable amounts of energy. The lactose content of MSNF is about 52.0% and the protein content of MSNF is about 36.0%.

### 26.3 Calculating Calorific Value Provided by Ice Cream

The total calorific value of ice cream depends on

- (1) The percentage of carbohydrates including lactose, added sweeteners, and sugars that may be present in fruit or flavouring.
- (2) The percentage of protein including milk protein or any other source of protein that may be present in nuts, eggs, or stabilizer and
- (3) The percentage of fat from any source including emulsifier, egg, cocoa, or nut fat

The caloric value of 100g of vanilla ice cream containing 12.5% fat, 11% MSNF, 15% sugar and 0.3% gelatin may be calculated as follows:

Carbohydrates	=	80.19
$[15 + (11 \times 0.52)] \times 3.87$		
Fat	=	109.86
$[12.5 \times 8.79]$		
Protein	=	14.09
$[(11 \times 0.36) \times 0.30] \times 4.27$		
		<hr/> 204.14 kcal/100g

In determining the caloric value of a package or serving of ice cream, it is necessary to determine the exact weight of the product contained therein.

The milk proteins contained in ice cream are of excellent biological value, because they contain all the essential amino acids. They are important sources of tryptophan and are especially rich in lysine. They are not only known to be complete but the assimilation of ingested milk proteins is 5- 6 % more complete than for other proteins in general.

Ice cream has a high concentration of MSNF, which is 34- 36 % milk protein.

Milk fat consists mainly of triglycerides of fatty acids. It contains at least 60 fatty acids. It also contains non saponifiable fractions and other matter such as cholesterol, lecithin, and tocopherols.

**Table 26.1 Selected fatty acids and cholesterol in ice cream and other related products (per 100g)**

Products	Fatty acids			Cholesterol (mg)
	Total unsaturated (g)	Oleic (g)	Linoleic (g)	
Ice cream	7.0	4.0	Trace	45.0
Ice milk	3.0	2.0	Trace	21.6
Edible ice cream cone	1.0	1.0	Trace	0.0

26.6 Carbohydrates in Ice Cream

Lactose, milk sugar is a disaccharide, unique, found only in milk. Liberal quantities of lactose in the ice cream produce a favorable medium in the intestinal tract for the establishment of growth of *Lactobacillus acidophilus*,an organism that aids carbohydrate fermentation, which in turn results in an acid condition in the intestinal contents unfavorable to protein putrefaction. Lactose favors calcium assimilation and phosphorus utilization.

26.7 Minerals in Ice Cream

Milk and its products, including ice cream, are the richest sources of calcium, phosphorus and other minerals essential in adequate nutrition. Ice cream, which is rich in lactose, should favor assimilation of calcium, which is needed by growing children and some adults. The calcium and phosphorus content of milk and ice cream are

The calcium and phosphorus content are 0.118 and 0.093; and 0.122 and 0.105 respectively in milk and ice cream.

The daily requirement of calcium as recommended by the National Academy of Sciences (1974) is as follows

Table 26.2 Requirement of calcium

Individual	g/day
Children and adolescents	1.40
Adult	0.80
Pregnant mother	1.50
Nursing mother	2.00

## 26.8 Vitamins in Ice Cream

Like milk, ice cream is a rich source of many of the essential vitamins. Ice cream is an excellent source of vitamin A, and a good source of vitamin B (B<sub>1</sub>, B<sub>2</sub>, B<sub>6</sub>, B<sub>12</sub>) and a fairly good source of Niacin, vitamin E etc. A brief description of the better known vitamins may help to emphasize the importance of milk and ice cream in the diet.

### 26.8.1 Vitamin A

It is the principal butter fat vitamin. It is the most important in building resistance to infection in the respiratory tract, in preventing night blindness and in maintaining general good health.

### 26.8.2 Vitamin B<sub>1</sub> (Thiamine)

This vitamin is essential for growth and metabolism. A deficiency in thiamine may produce symptoms of loss of appetite and weight, general weakness, degenerative changes in the nervous system and enlargement of the heart. Ice cream contains an average of 0.48 mg/kg with a range of 0.38 – 0.65 mg/kg.

### 26.8.3 Vitamin B<sub>2</sub> (Riboflavin)

Riboflavin is a dietary essential for humans. The symptoms of riboflavin deficiency are lesions of the skin and of the eye, mouth and tongue; abnormally red lips; lesions in the corners of the mouth. Ice cream contains an average of 2.3 mg/kg with a range of 2.0 – 2.6 mg/kg.

### 26.8.4 Vitamin B<sub>6</sub>

This vitamin has an important role in amino acid metabolism. A deficiency may produce decreased growth rate, dermatitis, anemia and convulsions. Ice cream contains an average of 0.68 mg/kg with a range of 0.27 – 1.15 mg/kg.

### 26.8.5 Vitamin B<sub>12</sub> (Cyanocobalamine)

This vitamin has the most complex structure of all vitamins. It is an essential metabolite for a wide variety of organisms. A deficiency may produce pernicious anemia. Ice cream contains an average of 0.0047 mg/kg with a range of 0.0026 – 0.0078 mg/kg.

### 26.8.6 Vitamin C (Ascorbic acid)

This is the antiscorbutic factor important in the prevention of scurvy. It is not stored in the body. Ice cream contains about 10 -11 mg/kg of Vitamin C. However, fruit ice cream is a good source of this vitamin.

### 26.8.7 Vitamin D

It is the antirachitic vitamin. Its deficiency is accompanied by a decreased rate of growth and lowered calcium and inorganic phosphorus levels in the blood. These vitamin is present in trace amounts in ice cream unless milk products have been fortified with it.

### 26.8.8 Vitamin E

This is known as the anti-sterility vitamin since it helps to maintain normal health and the reproductive organs. Ice cream is a fair source. It contains an average of 3 mg/kg.

### 26.8.9 Vitamin K

This vitamin has been found necessary for coagulation of the blood. The concentration of vitamin K is very low in milk, and it may be destroyed during pasteurization and evaporation.

## 26.9 Nutritional Labeling

The correct labeling of food product is of paramount importance in order to protect both the consumer and the manufactures.

In United Kingdom the requirements for ice cream are given below and the major points that must be covered by the label include

- The correct name of the product as described in the food labeling regulations 1996. That is, “Ice cream” or ‘dairy ice cream’ and in the case of “ice cream” it is necessary for the words “Contains non-milk fat” or “Contains vegetable fat” as applicable to be included near the name “Ice cream”.

- The pack must include a list of the ingredients given in weight descending order. It is permitted to list the stabilizer, emulsifier and color using their “E” numbers. It is not sufficient to use the term “Milk non fat” because the actual source itself has to be named (eg. Liquid skim milk, skim milk powder, condensed milk or whey solids). For example, dairy ice cream made from milk, cream, skim milk powder, sugar, dextrose, stabilizer and emulsifier, flavor, and color would probably be labeled: Ingredients: Full cream milk, sugar, cream (48% milk fat), skim milk powder, dextrose, emulsifier, permitted flavor and color.
- In ice cream a “Use by Date” indication is included together with the appropriate storage conditions (eg. Keep at temperature below -18°C).
- The name and address of the manufacturer or packer, or the name and address of the seller.
- The size of the pack, either in fluid ounces, pints or gallons or in metric sizes for which there is a set of specified metric volumes.

The aspects of nutritional declaration include

- a statement of nutrition information per serving
- the serving size
- the number of servings per container
- the number of calories per serving

the amount of protein, carbohydrates and fat per serving.

Last modified: Wednesday, 19 December 2012, 03:44 PM

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