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IMITATION ICE CREAM CONTAINING HIGHLY UNSATURATED VEGETABLE OIL

Robert M. Peat, Sun Valley, Calif., assignor, by mesne assignments, to Frozen Dessert Company, Hollywood, Calif., a corporation of California
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This invention relates to ice cream composition of the type commonly known as imitation ice creams or imitation ice milks wherein the butter-fat content of the standard ice cream or ice milk products is replaced with some other edible fat or oil such as hydrogenated edible oils.

This invention also relates to new combinations or compositions of edible ingredients which result in finished products that have similarity to the type of products commonly known as imitation ice creams or imitation ice milks, but have identities of their own, separate and distinct from true or standard dairy products and from so-called "imitations" thereof because dairy products are wholly or partly excluded from these new products.

The principal object of this invention is to produce so-called imitation ice creams or ice milks, or products similar in physical appearance, but not in some component ingredient sources, to ice creams or ice milks, and wherein advantage is taken of the dietetic values of a particular group of refined, edible, non-toxic, non-cathartic, non-hydroxy, non-hydrogenated, highly unsaturated vegetable oils that possess certain characteristics of dietary value useful for control of atherosclerosis or arteriosclerosis. These characteristics include the absence of cholesterol, large percentages of unsaturated fatty acids, large percentages of the essential fatty acids, linoleic and arachidonic acids which similarly are unsaturated and have been demonstrated to exert a regulatory effect on cholesterol level in the human body. These oils are non-hydrogenated corn oil, cottonseed oil, sesame oil, soy oil, safflower oil and sunflower oil, and all of them have hardening or solidification temperatures below -20° F.

An additional object of the invention is to make available to the child or adult consumer who has demonstrated allergies to cow's milk or dairy products, a new, nutritional frozen dessert type product that has the cool, refreshing qualities and physical appearance of ice cream made from cow's milk, yet contains no fat, carbohydrate or protein obtained from the milk of the cow.

However, it was expected that refined oils of vegetable origin that remained liquid at extremely low temperatures, because of their high degree of unsaturation and lack of hardness as a result of the omission of the chemical process of hydrogenation, would thus be unsatisfactory to incorporate into the composition of imitation ice creams, ice milks or similar frozen desserts because the finished products would not have suitable consistency and physical characteristics similar to the aforementioned products. It was further expected that this particular group of liquid oils with pour points near or much lower than the temperature of the product as it is commonly drawn from the processor's freezing equipment, would separate and bleed out or "oil off" from the other constituent ingredients of the product. It was also to be expected that oils of this particular group, not being firm or solidified in the normal ice cream or imitation ice cream handling range between 0° F. and -20° F., would bleed out or seep from the finished frozen product during normal commercial handling.

I have nevertheless made the surprising and unexpected discovery that the oils of this particular group of highly unsaturated, edible, dietetic oils, with high percentages of the essential fatty acid, linoleic acid, are

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excellent replacements for butter fat in frozen desserts without the expected oil seepage or oil separation, despite their very low hardening temperatures.

More descriptively, the oils in this group are refined, non-hydrogenated, edible grade oils, obtained from the plants with the botanical names, "*Carthamus tinctorius*" (safflower); "*Helianthus annuus*" (sunflower); "*Sesamum indicum*" (sesame); "*Glycine max*" (soybean); "*Zea mays*" (corn); and "*Gossypium*" (cotton).

More specifically this invention therefore resides in the use of the aforementioned oils in imitation ice creams and ice milks and similar frozen desserts because of their high content of unsaturated fatty acids (about 75% or higher, such as 90%); their high linoleic acid contents (about 35% or higher, especially above 50%); their absence of cholesterol; and their characteristic of exerting a regulatory effect on cholesterol level in the human body.

The six oils with approximate pertinent characteristics are:

Oil	Pour Point, ¹ ° F.	Iodine Number	Sat'd Fatty Acids, per cent	Unsaturated Acids, per cent	Linoleic Acid, per cent
Corn.....	15	123	11.7	88.3	42.3
Cottonseed.....	29	110	25.6	74.4	49.7
Safflower.....	7	145	6.1	93.9	67.3
Sesame.....	25	110	13.0	87	37.7
Soybean.....	15	132	11.4	88.6	52.6
Sunflower.....	10	133	7.4	92.6	58.6

¹ Pour test as determined by A.S.T.M. D97 Method. The solidification of all these oils is below -20° F.

It will be appreciated that where fatty acids are herein mentioned they actually are present in the oils in the form of their tri-glycerides, but the terms "fatty acid" and "fatty acids" are used as more definitive for the present purpose and also because they are generally so reported in the analyses.

It has been discovered that in spite of their physical characteristics of extremely low pour points and solidification points, these oils do not bleed out nor escape from the other solidified ice cream or ice milk constituents at the freezing and handling temperatures to which standard and imitation ice creams and ice milks are exposed. This result was most surprising.

When the aforementioned selected group of oils are used with normal component ingredients of standard or imitation ice creams or ice milks such as sugars, "milk-solids-not-fat" (non-fat milk solids), water and the usual bodying agents or stabilizers and emulsifiers in the upper portions of the commonly acceptable percentage ranges for stabilizers and emulsifiers, as more fully set out below, the finished desserts are comparable to the existing ice cream type desserts.

Another discovery of equal surprise was recognized when the aforementioned selected group of oils were mixed with sugars, vegetable proteins, animal proteins other than the proteins of cow's milk, or combinations of vegetable proteins and animal proteins other than the proteins of cow's milk such as combinations of soybean protein and egg protein, water, and bodying agents or stabilizers and emulsifiers, as more fully set forth below; the finished desserts, processed in the normal methods of processing ice creams and imitation ice creams, frozen and with air or "overrun" thus incorporated, provided frozen desserts with the refreshing qualities and physical appearance of ice cream made from cow's milk, yet contained no fat, protein, or carbohydrate from cow's milk.

In producing an imitation ice cream or ice milk wherein the aforementioned group of selected oils are used as the fatty constituent, it is usually with non-fat milk