

Department of Food Science

Food Regulations

FSE 99-21

Using the Bulky Flavor Dilution

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Federal standards require that finished ice cream contains at least 20% milk solids and a minimum of 10% milkfat. These standards make allowance for the dilution of the mix due when bulky flavors are added. The processor should take into account these dilutions when formulating ice cream products using cocoa, fruit, nuts, or candy.

What is a bulky flavor?

When a flavor, such as vanilla, is added to ice cream, there is essentially no dilution of milkfat or of total milk solids. However, when a 10% white mix has a fruit added to produce, for instance, a strawberry flavor, it may have 9-10% strawberries (3 + 1), as well as, 3-4% increased sugar added to sweeten the fruit. The addition of cocoa will require the sweetener solids to be increased substantially. Regulations provide for reasonable dilution of the final milkfat and total milk solids because of the use of bulky flavors.

How does one calculate the bulky flavor dilution?

Frozen dessert regulations in 21CFR135, allow the manufacturer to reduce the milkfat and total milk solids in the final ice cream according to the amount of the bulky flavor added. The examples below are calculated to

show the dilution of milkfat, but total milk solids should be figured similarly.

A. When fruits and nuts are added, the weight of the fruits or nuts may be multiplied by a dilution factor of 1.4 to find the allowable bulky flavor dilution. In other words, for twelve pounds of 3+1 strawberries, there are 9 pounds of strawberries. Multiplying ($9 \times 1.4 = 12.6$), only 87.4% of the ice cream ($100 - 12.6 = 87.4$) of the ice cream must be 10% milkfat. Therefore the total finished product (ice cream mix + strawberries + sugar) must have at least 8.74% milkfat.

B. Assume chocolate ice cream mix is made by adding a flavoring syrup (made from 3 lbs of cocoa, 3 lbs of sugar, and 9 lbs of water). The cocoa portion can be multiplied by the 2.5 dilution factor in the regulation ($3.0 \times 2.5 = 7.5$). Then only 92.5% of the finished product ($100 - 7.5 = 92.5$) must be 10% milkfat. In this case, the total finished product (syrup + ice cream mix) must be 9.25% milkfat. When using a cocoa - liquor blend, the total chocolate solids can be used in figuring the bulky flavor dilution. Note also that in the above case, the whole amount of cocoa, sugar and added water was not available to be considered in the bulky flavor dilution. If this product was a flavor syrup added to a plain mix, it would be treated as a candy, below, and the dilution would be the total weight of the syrup. Production of a

straight chocolate mix will use similar calculations.

Are there restrictions in the use of the bulky flavor dilution?

Bulky flavor dilution factors are used for chocolate and fruit and nuts because they are incorporated with sugar solids to produce acceptable flavors. Self-contained flavors such as chocolate chips or peppermint candies only dilute the ice cream mix by the weight of the candy. In other words, five pounds of chocolate chips introduces five pounds of dilution, there being no dilution

factor. Then, 95 lbs ($100 - 5\% = 95$) must be 10% butterfat. The finished product (ice cream + candy) must be 9.5% milkfat.

A second restriction on the bulky flavor dilution is that in no case may the total milkfat be less than 8% in the finished product. However, this level is unlikely to be reached except when making complicated flavors with bulky background flavors and added candy and nuts. The dilution available for total milk solids is similar, but in no case shall it be less than 16% of the total finished product.

