United States Patent Office 2,919,195 Patented Dec. 29, 1959

2,919,195

ENRICHED FRUIT JUICES

Richard J. Block, Scarsdale, N.Y., assignor to Minute Maid Corporation, a corporation of Florida

No Drawing. Application November 19, 1956
Serial No. 622,802

7 Claims. (Cl. 99—105)

This invention relates to an acidic fruit juice enriched with protein.

The invention is particularly useful in making from orange juice an edible liquid food containing a high proportion of dispersed milk protein and will, therefore, be first illustrated by description in connection with such use.

The desirablity of a food containing orange juice enriched with proteins of high biological value such as those of milk is recognized. Heretofore, there has been no satisfactory manner, however, of dispersing the casein of milk in the citrus juices, which, at desirable taste levels, are of pH close to the isoelectric point at which casein precipitates.

My invention provides means of so compounding milk protein and orange juice as to give a stable, edible suspension of good taste that may be frozen and, after thawing, may be kept a day or so without objectionable separation of the casein from the composition.

Briefly stated, my invention comprises the herein described method and product resulting from dispersing casein and suitable other milk components in an aqueous medium, admixing egg yolk in the dispersion so as to associate the egg yolk proteins, cholesterol, and lipid fraction with the surfaces of the particles of casein, mixing the thus stabilized casein dispersion with orange or other acidic fruit juice, and adding an acid in amount, if any, required to restore approximately the original pH of the juice.

Examples of the acidic juices that I use are those of orange, tangerine, lemon, lime, grapefruit, pineapple, grape, apple, apricot, and like acidic juices, either separately or in admixture with each other.

As the source of casein and other milk protein, I use to advantage skim milk powder which is usually about 35% protein that is mostly casein, whey powder about 10% protein mostly lactalbumin, and lactalbumin. All of these are prepared in a usual manner. Thus I use to advantage whey and skim milk, either fluid or spray dried or film dried at a temperature not above about 60° C. These milk products are substantially fat-free.

In order that the egg yolk may dissolve in my processing and become absorbed on the casein, so as to coat particles of the latter, the egg yolk must be non-heat-denatured, as shown by water solubility of the egg yolk proteins. The frozen egg yolk (about 25% solids) now available commercially is satisfactory. Undenatured egg yolk powder also is useable.

I may and suitably do introduce a substantial amount of glycine, not only for its food value but also for its action in my composition in peptizing and thus promoting the dispersion of the proteins, so as to increase the intimacy of their contact with the egg yolk during the blending operations.

I use also to advantage vitamins, minerals, and other additives that are desirable as supplements to citrus juice and milk compositions. Examples of such additives that I use are vitamin A, niacin, riboflavin, thiamine, iron citrate as a mineralizing agent, and creatine as a reliever of muscle fatigue.

The miscellaneous additives are introduced in any commercial form that is soluble or permanently suspendable in water. Thus I use an aqueous solution of vitamin A solubilized with a minor proportion of polyethyleneoxide derivative of sorbitan monooleate (Tween 80). The other additives listed are introduced to advantage in powder form.

Lactalbumin is a desirable admixture. In place of it, I may use egg albumen, or mixtures therof with lactalbumin, the total proportion being as shown for lactalbumin.

Soy protein (glycinin) may be substituted on an equal weight basis for all or part of the casein. Both these proteins are normally insoluble at pH 4.5 but are protected from precipitation in my composition at such pH by the egg yolk materials.

As to proportions, it is essential that the egg yolk on the hydrous basis (50% solids) be in proportion of at least 0.3 part for 1 part of the milk products on the dry basis. I find particularly good results in stabilizing the dispersion of casein in the final mixture with acidic juice when the proportion of the egg yolk is 1 part for 1 of the milk products on the solids basis. The proportion of egg yolk should not be so large as to disturb the flavor of the juice, that is, not much above the 1:1 proportion stated.

The proportions of the milk products, whey, skim milk, and lactalbumin are ordinarily about equal in weight on the dry basis. The proportions to each other may be varied, however, the essential point being the total proportion of casein or similar protein such as soy glycinin to the egg yolk.

The glycine is used in the proportion of 5–25 parts for 500 of the final enriched juice or about 8–40 parts for 100 of total solids in the juice.

The proportion of creatine is about 0.5–5 parts for 500 parts of the final enriched juice.

Proportions that have been found particularly satisfactory in making a product having the citrus taste, the desired balance between protein and non-protein materials, and non-separation of casein are shown in the following table. In this table and elsewhere herein all proportions are expressed as parts by weight and on the dry basis except where indicated as in the case of the fruit juice. The amount of juice is stated as the unconcentrated material after the admixture of additives including my various milk products, egg yolk, and other adidtives, unless specifically recited to the contrary.

Component:	Amount for 500 ml. unconcentrated orange juice+additives
Whey, spray dried	g 10
Glycine	g 10
Egg yolk, frozen	g 20
Lactalbumin	g 10
Skim milk, spray dried (about 30% casein)	g 10
Vitamin A	units 1500
Niacin	mg 6
Riboflavin	mg 0.4
Thiamine	mg 0.3
Ferric citrate	mg 25
Creatine	g 4

The proportions in the second column of this table are calculated on the basis of a solids content of the orange juice of 11.6%, which is approximately a fourth of that of the commercial concentrated, frozen orange juice of density 41°–42° Brix.

In compounding my enriched citrus juices, I mix the first five components of the table above with 300 g. water