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NUTRITIONAL COMPOSITION AND PROCESS
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This invention relates to improvements in nutritional compositions and more particularly relates to dietary nutritional compositions useful in the administration of diets of predetermined caloric intake adapted to weight control regimens. It further relates to a novel process for the preparation of preferred forms of the present composition. This application is a continuation-in-part of my prior copending patent application Serial No. 52,058, filed August 26, 1960, now abandoned.

Numerous attempts have been made to provide a dietary nutritional product which would be useful in the control of weight and yet provide for all known nutritional requirements and maintain satiety. The present compositions are preferred for weight-reducing regimens, but are also adapted for dietary supplementation to fortify debilitated or underweight subjects.

To reduce the weight of obese persons, a limited caloric intake is nearly always essential. However, it is necessary to provide not only for the limitation of caloric intake but also for adequate nutrition to maintain health. For example, it is well known that individuals consuming a limited or narrow diet may develop vitamin deficiencies. Furthermore, if only carbohydrates are ingested for an extended period, even if in minimal amounts, protein deficiency will ensue. Lack of unsaturated fats in the diet may result in the dermatological changes or dry scaling of the skin that follows fat deprivation in experimental animals.

A dietary nutritional product for weight-reducing purposes must have a high satiety value to eliminate as much as possible the temptation to overeat.

Likewise it is necessary that a dietary product be palatable. For example, it is well known that soybean flour or meal provides a high protein food; however, products containing more than about 25% soybean flour are unpalatable.

Accordingly it is an object of the present invention to provide a dietary nutritional composition useful in weight control of humans which will satisfy all nutritional and health requirements at a low caloric intake.

It is a further object to provide a nutritional product with a proper balance of carbohydrates, fats and proteins to prevent nutritional deficiencies.

It is a still further object to provide a nutritional product which, when consumed in the prescribed amounts, will provide all minimum vitamin and mineral requirements.

A still further object is the provision of a nutritional composition that has a high satiety value.

A still further object is the provision of a nutritional product that has a nutritionally proper balance of unsaturated and saturated fats.

A still further object is the provision of a nutritional product that is palatable to humans.

A still further object is the provision of a nutritional product which is readily measured so as to provide a known caloric content of a nutritionally adequate food.

A still further object is to provide a nutritional product which has a low sodium content.

A still further object is the provision of a nutritional product which is adapted for preparation and consumption in a variety of forms.

A still further object is the provision of an economical

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and reproducible process for the production of the present compositions which is adapted to commercial use.

These and other objects of the present invention will be apparent from the following specification and appended claims.

Accordingly, in one broad form the present invention relates to a vitamin and mineral fortified dietary nutritional composition comprising milk solids containing from 52% to 81% nonfat milk solids and from 1% to 4% milk fat, from 6% to 18% soy flour and from 4% to 12% sugar. In the most preferred form the compositions comprise milk solids containing from 58% to 75% nonfat milk solids and from 1.5% to 2.5% milk fat, from 9% to 13% soy flour and from 5% to 9% sugar. Broadly the total milk solids including nonfat milk solids and milk fat is from 53% to 85% and preferably from 59% to 78%. The term sugar, as used herein, includes sugars, preferably selected from the group consisting of sucrose, fructose, maltose and dextrose, of which the most preferred is sucrose. The above proportions are on a dry weight basis.

The compositions of the invention may be further characterized as containing from 25% to 35% protein, preferably from 29% to 33% protein, from 5% to 13% fat, preferably from 8% to 10% fat, and from 40% to 60% carbohydrate, all on a dry weight basis. The fat component of these compositions is preferably divided in proportions of from 50% to 70% unsaturated fats and from 30% to 50% saturated fat.

The compositions of the present invention may also be defined in terms of milk solids content as containing from 50% to 75% nonfat milk solids, preferably from 55% to 70% nonfat milk solids, and from 3% to 10% whole milk solids, preferably from 4% to 8% whole milk solids.

The soy (soybean) flour, as indicated, is preferably one that has been pre-cooked or treated in accordance with the process of the present invention to improve the digestibility and palatability thereof, and to provide for ready dispersibility. When low fat, or defatted soy flours are employed, other sources of edible fats or oils are added to adjust the composition of the product to within the specified range of fat content.

Generally the products of the present invention may be prepared in dry form which may be subsequently mixed with water to make a liquid dispersion. The products may be flavored with a variety of well-known flavors, such as chocolate, butterscotch, vanilla or the like. It is also contemplated that the present compositions may be prepared in the liquid form; however the various components are present in the stated proportions on a dry weight basis.

It is also possible to utilize the compositions of the present invention in the preparation of puddings or pudding mixes by the addition of gelatin or gelatinizing agents to the dry components of the composition which may then be gelatinized to pudding in the conventional manner.

The total caloric content of the powder-form composition of the present invention ranges from about 700 to 1200 calories per 227 grams ($\frac{1}{2}$ pound) and preferably from about 800 to 1000 calories on the same basis. The liquid composition contains from about 175 to 300 calories in each 8 fluid ounce portion.

The sodium content of the present compositions preferably is from about 0.3% to about 0.5% on a dry weight basis.

The products of this invention are vitamin and mineral fortified to the extent that $\frac{1}{2}$ pound of the dried material provides adequate vitamins and minerals to satisfy the daily minimum requirements recommended by the Food and Nutrition Board of the National Research