NUTRITIONAL POWDER MANUFACTURING PROCESS USING MICRONIZATION, AND POWDER COMPOSITION

TECHNICAL FIELD

[0001] The present invention relates to powdered nutritional compositions and processes of making powdered nutritional compositions using micronization. The processes provide powder compositions exhibiting easy reconstitution, resulting in stable emulsions.

BACKGROUND

[0002] Powdered nutritional compositions which have historically been produced using spray drying or alternate drying technologies can be reconstituted with water to form liquid nutritional compositions. Wet oil-in-water or water-in-oil emulsions are formed and then spray or otherwise dried to produce the powdered products. However, such methods require expensive equipment, are energy intensive, and leave large economic and environmental footprints. While dry blending of various ingredients has been proposed in the past to avoid spray drying the emulsion compositions, dry blended products have typically exhibited inferior and varying solubilities, leading to unstable reconstituted liquid emulsions, sedimentation problems, and/or poor mouthfeel.

[0003] The current invention provides for powdered nutritional compositions which, upon reconstitution with water, provide stable emulsions with improved mouthfeel as compared with emulsions produced by prior dry blend technologies.

SUMMARY

[0004] In one ~~embodiment~~example, the ~~invention~~ disclosure is generally directed to processes for preparing a powdered nutritional composition, comprising dry blending powders comprising protein, fat, and carbohydrate to form a mixture. The mixture is micronized to provide a micronized powder in which 99% of the powder particles have a size less than about 50 microns, and the micronized powder is agglomerated to form agglomerates.

[0005] The disclosure~~invention~~ is also directed to powdered nutritional compositions produced by processes employing dry blending, micronizing, and agglomerating steps and to powdered

nutritional compositions comprising protein, carbohydrate, and fat, and wherein 99% of the particles have a size less than about 50 micrometers (μm).

[0005a] The disclosure is also directed to powdered nutritional composition, comprising agglomerates of particles comprising protein, fat, and carbohydrate, wherein 99% of the particles have a size less than 50 micrometers.

[0006] The processes of the ~~invention~~ disclosure are advantageous in avoiding the cost and time associated with spray drying liquid emulsion compositions. The powdered nutritional compositions of the invention are advantageous in exhibiting good emulsification properties and mouthfeel upon reconstitution with water. Additional aspects and advantages of the disclosure~~invention~~ will be apparent in view of the description below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The embodiments set forth in the drawings are illustrative of certain aspects of the invention and exemplary in nature and not intended to limit the invention defined by the claims, wherein:

[0008] **FIG. 1** illustrates the particle size, cumulative distribution, and density distribution of a first conventional dry blended powdered nutritional composition;

[0009] **FIG. 2** illustrates the particle size, cumulative distribution, and density distribution of a powdered nutritional composition similar to the composition of **FIG. 1**, but produced of a process of the current invention, including by dry blending and micronizing steps. More specifically, the ingredients were dry blended and passed through a mill to obtain a micronized power;

[0010] **FIG. 3** illustrates the particle size, cumulative distribution, and density distribution of a second powdered nutritional composition spray dried from a wet emulsion according to a conventional process;

[0011] **FIG. 4** illustrates the particle size, cumulative distribution, and density distribution of a powdered nutritional composition similar to the composition of **FIG. 3**, but produced by dry blending according to a conventional dry blending process.

[0012] **FIG. 5** illustrates the particle size, cumulative distribution, and density distribution of a powdered nutritional composition similar to the composition of **FIG. 3**, but produced according to a process of the current invention, including dry blending and micronizing.