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(54) Title: GRAIN PRODUCTS HAVING A POTENT NATURAL SWEETENER

(57) Abstract: Grain products are disclosed comprising at least a grain base and a coating enrobing at least a portion of the base, having a sweetening amount of a potent natural sweetener present in the base and the coating.

GRAIN PRODUCTS HAVING A POTENT NATURAL SWEETENER

PRIORITY CLAIM

[001] This application claims priority to U.S. Utility Application Serial No. 11/962,652, filed December 21, 2007 and entitled, *Grain Products Having a Potent Natural Sweetener* (Attorney Docket No. 056943.00043), the entire disclosure of which is hereby incorporated by reference.

TECHNICAL FIELD

[002] This invention relates to sweetened, comestible grain products with or without other ingredients, for example, grain products commonly known to consumers as cereal. In particular, this invention relates to sweetened grain products having formulations suitable to meet market demand for alternative nutritional characteristics, taste characteristics and/or mouthfeel characteristics.

BACKGROUND

[003] Sweetened grain products of various formulations have long been known. Improved and new formulations are desirable for new and different products, including sweetened grain products having alternative nutritional characteristics, for example, alternative caloric content. The development of new sweetened grain products, for example, new sweetened grain products employing alternative sweeteners, flavorants, flavor enhancing agents and the like, presents challenges. There is need for sweetened grain products which can satisfactorily meet a combination of objectives, including nutritional characteristics, flavor, shelf life and other objectives.

[004] It is therefore an object of the present invention to provide sweetened grain products. It is an object of at least certain embodiments of the invention (that is, not necessarily all embodiments of the invention) to provide grain products having

[005] desirable taste properties. It is an object of at least certain embodiments of the invention to provide grain products having improved nutrition. It is an object of at least certain embodiments of the invention to provide grain products having improved color. It is an object of at least certain embodiments of the invention to provide grain products having formulations incorporating one or more steviol glycosides, e.g., rebaudiosides, stevioside, etc., and being suitable to meet market demand for alternative nutritional characteristics or flavor profiles in grain products. It is an object of at least certain embodiments of the invention to provide grain products comprising steviol glycosides used on their own or in combination with one or more other sweeteners. These and other objects, features and advantages of the invention or of certain embodiments of the invention will be apparent to those skilled in the art from the following disclosure and description of exemplary embodiments.

SUMMARY

[006] In accordance with a first aspect, grain products comprising a sweetening amount of at least one steviol glycoside include at least a base including at least one constituent of at least one grain, a coating enrobing at least a portion of the base, a sweetening amount of at least one steviol glycoside present in the base and present in the coating. In certain exemplary embodiments, the steviol glycoside in the base and/or the steviol glycoside in the coating, is a rebaudioside such as, for example, rebaudioside A. In certain exemplary embodiments the grain is selected from corn, rice, wheat, oat and barley. In certain exemplary embodiments, the at least one grain includes one or both of corn and oat. In certain exemplary embodiments, the base is in the form of puffs, flakes, shreds, clusters, sheets or any combination thereof. In certain exemplary embodiments, the grain product is in the form of a bar, wherein the coating is provided on the bar, on clusters, puffs, etc., forming at least part of the bar, or both. In certain exemplary embodiments, the grain product contains no sucrose, fructose, glucose, invert sugar or glucose-fructose syrup, e.g., high fructose corn syrup. In certain exemplary embodiments, the grain product further includes at least one component selected from a preservative, a color additive, a flavorant, a flavor enhancer, a fat replacer, a nutrient, an emulsifier, a stabilizer, a thickener, a

binder, a texturizer, a pH control agent, an acidulant, a leavening agent, an anti-caking agent, a humectant, a dough strengthener, a dough conditioner and any combination thereof.

[007] In at least certain exemplary embodiments, the grain products disclosed here are based in part on the discovery of novel combinations of sweeteners including one or more natural potent sweeteners (e.g., Lo Han Guo, monatin, a steviol glycoside) that can be used to sweeten a grain product. In certain exemplary embodiments, the grain product coating further includes at least a natural nutritive sweetener, e.g., one or more of sucrose, fructose, glucose, invert sugar or glucose-fructose syrup, e.g., high fructose corn syrup. In certain exemplary embodiments, the grain product coating includes a sweetening component including at least an optional natural nutritive sweetener and a steviol glycoside, wherein the steviol glycoside provides approximately 25% to 100%, e.g., 50% to 99%, of the sweetness of the sweetening component. In certain exemplary embodiments, the grain product coating includes a sweetening component including at least a natural nutritive sweetener, a steviol glycoside and sucralose, wherein the steviol glycoside and sucralose provide approximately 50% to 99% of the sweetening of the sweetening component. In certain exemplary embodiments, the grain coating includes a sweetening component including at least a natural nutritive sweetener, the steviol glycoside and Acesulfame-K, wherein the steviol glycoside and Acesulfame-K provide approximately 50% to 99% of the sweetness of the sweetening component.

[008] In certain exemplary embodiments, the grain product base includes at least a natural nutritive sweetener, including, e.g., one or more of sucrose, fructose, glucose, invert sugar or glucose-fructose syrup, e.g., high fructose corn syrup. In certain exemplary embodiments, the base includes a sweetening component including at least an optional natural nutritive sweetener and a steviol glycoside, wherein the steviol glycoside provides approximately 25% to 100%, e.g., 50% to 99%, of the sweetness of the sweetening component. In certain exemplary embodiments, the base includes a sweetening component including at least a natural nutritive sweetener, a steviol glycoside and sucralose, wherein the steviol glycoside and sucralose provide

approximately 50% to 99% of the sweetness of the sweetening component. In certain exemplary embodiments, the base includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and Acesulfame-K, wherein the steviol glycoside and Acesulfame-K provide approximately 50% to 99% of the sweetening of the sweetening component.

[009] In certain exemplary embodiments, the coating and the base each includes at least a natural nutritive sweetener, e.g., of one or more of sucrose, fructose, glucose, invert sugar or glucose-fructose syrup, e.g., high fructose corn syrup. In certain exemplary embodiments, the base and the coating each includes a sweetening component including at least an optional natural nutritive sweetener and a steviol glycoside, wherein the steviol glycoside provides approximately 25% to 100%, e.g., 50% to 99%, of the sweetening of the sweetening component. In certain exemplary embodiments, the base and the coating each includes a sweetening component including at least a natural nutritive sweetener, the steviol glycoside and sucralose, wherein the steviol glycoside and sucralose provide approximately 50% to 99% of the sweetness of the sweetening component. In certain exemplary embodiments, the base and the coating each includes a sweetening component including at least a natural nutritive sweetener, a steviol glycoside and Acesulfame-K, wherein the steviol glycoside and Acesulfame-K provide approximately 50% to 99% of the sweetness of the sweetening component.

[010] In accordance with a second aspect, grain products are provided, including at least a base including at least one constituent of at least one grain, wherein the base is naturally or artificially colored and has a color brightness, and a coating enrobing at least a portion of the base and having a sweetening amount of a steviol glycoside. In certain exemplary embodiments, the coating enrobing at least a portion of the base does not substantially diminish the perceived color brightness of the base.

DETAILED DESCRIPTION OF CERTAIN EXEMPLARY EMBODIMENTS

[011] Grain products in accordance with this disclosure may have any of numerous different specific formulations or constitutions. The formulation of a grain product in accordance with this disclosure can vary to a large extent, depending upon such factors as the product's intended market segment, its desired nutritional characteristics, flavor profile and the like. For example, it will generally be an option to add further ingredients to any of the grain product formulations described below.

[012] Grain products disclosed here comprising at least one steviol glycoside can be utilized as ready-to-eat cereals and/or snacks. Grain products disclosed here can include one or more edible grains including, but not limited to, e.g., corn, rice (e.g., brown or white), wheat (e.g., spelt, einkorn, emmer, durum and the like), buckwheat, oat, barley, amaranth, fonio, quinoa, teff, millet, sorghum, triticale, flax, wild rice and the like and any combination thereof. The terms "cereal products" and "grain products" are used interchangeably herein.

[013] Grain products disclosed here can include one or more constituents of one or more grains. As used herein, the term "grain constituent" is intended to include any component of a whole grain, e.g., the whole grain kernel, the germ, the bran, the endosperm and any combination thereof. Whole grains typically refer to the germ, bran and endosperm of a grain, and may be milled, unmilled, etc. Refined grains typically refer to grain products in which the bran and most or all of the germ have been removed, leaving primarily or only the endosperm. A "grain constituent" may be, e.g., any combination of one or more components of a grain that have been ground into flour, cut into pieces of a variety of sizes or used whole.

[014] As used herein, the term "ready-to-eat cereal" refers to a grain product that may be eaten without the need for further preparation save for the optional addition of a liquid, such as, for example, milk, a milk substitute, juice or the like. As used herein, the term "snack" refers to a grain product that can be consumed from the

container, optionally without further preparation. Snack grain products include, for example, snack bars such as, for example, grain bars, breakfast bars, granola bars (e.g., crunchy and/or soft), nutrition bars, diet bars and the like. The ready-to-eat grain products and/or snack grain products described herein can be fashioned into a variety of physical forms, such as, e.g., puffs, flakes, shreds, clusters, sheets and any combination thereof.

[015] As used herein, the term "puff" is intended to refer to an expanded grain piece prepared from one or more grains and/or grain constituents. Various methods of making puffs are well known in the art and are described in, for example, U.S. Patent Nos. 4,409,250, 4,620,981, 5,176,936 and 6,319,534. Methods of making puffs are described further below. The term "puffed grain pieces" is used herein in its conventional usage to refer to low density grain pieces wherein each piece typically has a density ranging from about 0.06 to 0.16 g/cc (4.3 to 11 oz. per 124 $inch^3$) or from about 0.09 to 0.14 g/cc (5 to 10 oz. per 124 $inch^3$). Puffs in various embodiments of the grain products disclosed here can be uniform or non-uniform in size, shape, etc.

[016] As used herein, the term "flake" is intended to refer to a grain piece formed by flaking a cooked grain pellet or grain or grain constituent. Methods of making flakes are well known in the art and described in, for example, U.S. Patent Nos. 5,919,503 and 7,105,196. Methods of making flakes are described further below. Wet flakes typically range in thickness from about 350 to 900 μm (0.015 to 0.035 in.) in thickness. Flakes in various embodiments of the grain products disclosed here can be uniform or non-uniform in size, shape, etc.

[017] As used herein, the term "shred" means an elongate grain product piece, e.g., a cereal piece, in the shape of a long, narrow, thin strip. Shreds are typically manufactured by passage of a cooked grain (e.g., wheat berries for shredded wheat) between pairs of rollers, one smooth and one grooved (e.g., a shred mill). Methods of making shreds are well known in the art and are described in, for example, U.S. Patent Nos. 5,270,063, 5,464,644 and 5,972,413. Shreds can optionally be formed into a variety

of shapes such as, for example, biscuits (e.g., shredded wheat biscuits). Shreds in various embodiments of the grain products disclosed here can be uniform or non-uniform in size, shape, etc.

[018] As used herein, the term "cluster" is intended to refer an agglomerated grain piece such as, for example, granola. Methods of making clusters are well known in the art and described in, for example, U.S. Patent No. 6,837,682. Clusters in various embodiments of the grain products disclosed here can be uniform or non-uniform in size, shape, etc.

[019] As used herein, the terms "sheet" or "sheeted" are intended to refer to a grain product piece having one or more broad, thin surfaces. Methods of making sheets and sheeted grain products are well known in the art and described in, for example, U.S. Patent Nos. 5,176,936 and 6,746,707 and U.S. Patent Application No. 2003/0134010. Sheets and sheeted pieces in various embodiments of the grain products disclosed here can be uniform or non-uniform in size, shape, etc.

[020] In certain exemplary embodiments, the grain products disclosed here may include, for example, only the sweetened grain product (e.g., shredded wheat or the like). In other exemplary embodiments, the grain products disclosed here optionally include, for example, one or more components in addition to the sweetened grain product, e.g., at least one grain constituent, a coating enrobing at least a portion of the grain product, a sweetening amount of a steviol glycoside and one or more optional components. These optional components include, but are not limited to, any or all of the following: preservatives, sweeteners, color additives, flavorants, flavor enhancers, fat replacers, nutrients, emulsifiers, stabilizers, thickeners, binders, texturizers, pH control agents, acidulants, leavening agents, anti-caking agents, humectants, dough strengtheners, dough conditioners and the like. Information on each of these components is well known and can be obtained from the U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition (CFSAN).

[021] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more preservatives. Preservatives are typically used to prevent food spoilage from bacteria, molds, fungi yeast and the like; slow or prevent changes in color, flavor and/or texture, and/or delay rancidity; and/or maintain freshness of the grain products disclosed here. Suitable preservatives for at least certain exemplary embodiments of the grain products disclosed here include, for example, but are not limited to, ascorbic acid, citric acid, sodium benzoate, calcium propionate, sodium erythorbate, sodium nitrite, sodium chloride, calcium sorbate, potassium sorbate, BHA, BHT, EDTA, tocopherols (e.g., vitamin E) and the like. In certain exemplary embodiments the preservatives employed in the grain products disclosed here generally range from about 0 to about 5 weight percent of the total weight of the grain product or from about 1 to about 3 weight percent, or are present at about 1 weight percent.

[022] Various sweeteners, for example, a steviol glycoside (e.g., a rebaudioside such as rebaudioside A), can be added to a grain product base, a grain product coating or both the grain product base and the grain product coating. A grain product containing a sweetening component including at least (e.g., optionally combined with one or more additional sweeteners, e.g., sucrose) or only a steviol glycoside, can produce grain products having a favorable sweetness and/or taste profile. Certain exemplary embodiments of the grain products disclosed here comprising a steviol glycoside have a sweetness and/or taste profile that are similar to or the same as that of the same grain product sweetened with a natural nutritive sweetener such as, for example, sucrose without the inclusion of a steviol glycoside.

[023] The at least one steviol glycoside of the grain products disclosed here may be, for example, any one or more of stevioside, the rebaudiosides and related compounds suitable for sweetening. These compounds can be obtained by extraction or the like from the Stevia plant. Stevia (e.g., *Stevia rebaudiana Bertoni*) is a sweet-tasting plant, whose leaves contain a complex mixture of natural sweet diterpene glycosides. Steviol glycosides are components of Stevia that contribute sweetness. Typically, these compounds are found to include stevioside (4-13% dry weight), steviolbioside

(trace), the rebaudiosides, including rebaudioside A (2-4%), rebaudioside B (trace), rebaudioside C (1-2%), rebaudioside D (trace), and rebaudioside E (trace), and dulcoside A (0.4-0.7%). Such compounds are referred to herein as steviol glycosides.

[024] Additional sweeteners suitable for use in various embodiments of the grain products disclosed here comprising a steviol glycoside include, e.g., other natural and artificial or synthetic sweeteners. Suitable sweeteners and combinations of sweeteners are selected for the desired nutritional characteristics, taste profile for the grain product, sweetness and other organoleptic factors. Sweeteners suitable for at least certain such exemplary embodiments include, for example, one or more of sorbitol, mannitol, xylitol, glycyrrhizin, neohesperidin dihydrochalcone, D-tagatose, erythritol, meso-erythritol, malitol, maltose, lactose, fructo-oligosaccharides, Lo Han Guo, mogroside V, acesulfame, aspartame, sucralose, saccharin, xylose, arabinose, levulose, isomalt, lactitol, maltitol, trehalose, ribose, and protein sweeteners, such as, for example, thaumatin, monellin, monatin, brazzein, L-alanine and glycine, and any combination thereof.

[025] As disclosed above, the grain products disclosed here employ at least one steviol glycoside. Optionally, certain exemplary grain product embodiments also employ, e.g., nutritive, natural crystalline or liquid sweeteners, such as, for example, sucrose, fructose, glucose, glucose-fructose syrup from natural sources such as apple, chicory, honey, etc., e.g., glucose-fructose syrup, e.g., high fructose corn syrup, invert sugar, maple syrup, maple sugar, honey, brown sugar molasses, e.g., cane molasses, such as first molasses, second molasses, blackstrap molasses, and sugar beet molasses, sorghum syrup, and/or others, and mixtures of any of them. Exemplary artificial sweeteners suitable for use as an optional additional sweetener in at least certain embodiments of the grain products disclosed here include, for example, saccharin, cyclamate, aspartame, other dipeptides, acesulfame potassium, and other such potent sweeteners, and mixtures of any of them, as further discussed below. In at least certain exemplary embodiments of the grain products disclosed here, combinations of at least one steviol glycoside and one or more natural, nutritive sweeteners and/or

one or more artificial sweeteners with one or more natural non-nutritive or nutritive potent sweeteners are used to provide the sweetness and other aspects of desired taste profile and nutritive characteristics. It should also be recognized that certain such sweeteners will, either in addition or instead, act as tastents, masking agents or the like in various embodiments of the grain products disclosed here, e.g., when used in amounts below its (or their) sweetness perception threshold in the grain product in question.

[026] The various sweeteners included in the grain products disclosed here are edible consumables. By "edible consumables" is meant a food or an ingredient of a food for human or animal consumption. The sweetener or sweetening agent, as those terms are used here, can be a nutritive or non-nutritive, natural or synthetic grain product ingredient or additive (or mixtures of them) which provides sweetness to the grain product, i.e., which in the context of the whole product is perceived by a substantial portion of the consuming public as sweet by the sense of taste. The perception of flavoring agents and sweetening agents may depend to some extent on the interrelation of elements. Flavor and sweetness may also be perceived separately, i.e., flavor and sweetness perception may be both dependent upon each other and independent of each other. For example, when a large amount of a flavoring agent is used, a small amount of a sweetening agent may be readily perceptible and vice versa. Thus, the oral and olfactory interaction between a flavoring agent and a sweetening agent in any given product may involve the interrelationship of elements.

[027] As used herein, the term "taste" refers to the flavor of the grain product and includes sweetness, sourness, bitterness, saltiness and umami (e.g., savoriness or meatiness). As used herein, the term "mouthfeel" refers to a tactile sensation a grain product gives to the mouth (i.e., due to physical and chemical interactions in the mouth). Mouthfeel is evaluated from initial perception on the palate through to swallowing. Mouthfeel and taste may overlap and/or impact each other.

[028] Certain exemplary embodiments of the grain products disclosed here contain a sweetening amount of a steviol glycoside in the base and also contain a sweetening amount of at least one steviol glycoside in the coating. As used herein, the term "sweetening amount" is the amount of a steviol glycoside that yields perceptible sweetness in the product or causes the grain product to taste sweet when ingested by a human or animal. In certain exemplary embodiments a sweetening amount of a steviol glycoside such as, for example, rebaudioside A, is typically between about 0.005% and about 0.550% by weight, e.g. between about 0.033% to about 0.200% by weight, between about 0.067% to about 0.159% by weight, of the finished grain products described here. In certain exemplary embodiments, a sweetening amount of a steviol glycoside such as, for example, rebaudioside A, is between about 0.003% and about 0.020% by weight of the base, e.g., between about 0.006% and about 0.015% by weight of the base, and between about 0.030% and about 0.200% by weight of the coating, e.g., between about 0.060% and about 0.150% by weight of the coating. The amount of steviol glycoside used will depend upon the desired level of sweetness for the grain product and the amount of other optional sweetener(s) present in the sweetener product. The amount of steviol glycoside used will also depend on the particular steviol glycoside(s) used as they may differ in sweetness profile.

[029] In certain exemplary embodiments, the grain products disclosed here include a sweetening component. As used herein, the term "sweetening component" refers to a composition comprising at least one steviol glycoside and at least one other ingredient, which composition can be added to the grain product to provide sweetness. A sweetening component can be added, e.g., to both the base and the coating enrobing the base. One or more ingredients of the sweetening component can contribute sweetness to the sweetening component. In certain exemplary embodiments, the sweetening component can contribute between about 25% and 100% of the sweetness of the final grain product. In certain exemplary embodiments, one or more sweetening components can contribute about 25%, 30%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95% or 100% of the sweetness of the final grain product.

[030] In certain exemplary embodiments, a sweetening component includes a steviol glycoside, together with another sweetener. In certain exemplary embodiments, the coating includes a sweetening component comprising a natural nutritive sweetener and the steviol glycoside, wherein the steviol glycoside provides approximately 50% of sweetness of the sweetening component. In certain exemplary embodiments, the coating includes a sweetening component comprising the steviol glycoside, wherein the steviol glycoside provides approximately 100% of sweetness of the sweetening component. In certain exemplary embodiments, the coating includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and sucralose, wherein the steviol glycoside and sucralose provide approximately 50% of sweetness of the sweetening component. In certain exemplary embodiments, the coating includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and Acesulfame-K, wherein the steviol glycoside and Acesulfame-K provide approximately 50% of sweetness of the sweetening component.

[031] In certain exemplary embodiments, the base comprises a natural nutritive sweetener selected from the group consisting of one or more of sucrose, fructose, glucose, invert sugar and glucose-fructose syrup. In certain exemplary embodiments, the base includes a sweetening component comprising a natural nutritive sweetener and the steviol glycoside, wherein the steviol glycoside provides approximately 50% of sweetness of the sweetening component. In certain exemplary embodiments, the base includes a sweetening component comprising the steviol glycoside, wherein the steviol glycoside provides approximately 100% of sweetness of the sweetening component. In certain exemplary embodiments, the base includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and sucralose, wherein the steviol glycoside and sucralose provide approximately 50% of sweetness of the sweetening component. In certain exemplary embodiments, the base includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and Acesulfame-K, wherein the steviol glycoside and Acesulfame-K provide approximately 50% of sweetness of the sweetening component. In certain exemplary embodiments, the coating and the base each includes a natural nutritive

sweetener selected from the group consisting of one or more of sucrose, fructose, glucose, invert sugar and glucose-fructose syrup.

[032] In certain exemplary embodiments, the base and the coating each includes a sweetening component comprising a natural nutritive sweetener and a steviol glycoside, wherein the steviol glycoside provides approximately 50% of sweetness of the sweetening component. In certain exemplary embodiments, the base and the coating each includes a sweetening component comprising the steviol glycoside, wherein the steviol glycoside provides approximately 100% of sweetness of the sweetening component. In certain exemplary embodiments, the base and the coating each includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and sucralose, wherein the steviol glycoside and sucralose provide approximately 50% of sweetness of the sweetening component. In certain exemplary embodiments, the base and the coating each includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and Acesulfame-K, wherein the steviol glycoside and Acesulfame-K provide approximately 50% of sweetness of the sweetening component.

[033] The term "nutritive sweetener" refers generally to sweeteners which provide significant caloric content in typical usage amounts, e.g., more than about 4.0 calories per gram of sweetener. As used herein, a "non-nutritive sweetener" is one which does not provide significant caloric content in typical usage amounts, e.g., less than about 1.0 calorie per gram of sweetener. A "low-calorie" sweetener imparts sweetness to a grain product and has a caloric content of less than about 3.0 calories per gram of sweetener11.

[034] As used herein, a "potent sweetener" means a sweetener which is at least twice as sweet as sugar, that is, a sweetener which on a weight basis requires no more than half the weight of sugar to achieve an equivalent sweetness. For example, a potent sweetener may require less than one-half the weight of sugar to achieve an equivalent sweetness in a grain product sweetened to a level of 10 degrees Brix with sugar. Potent sweeteners include both nutritive and non-nutritive sweeteners. In addition,

potent sweeteners include both natural potent sweeteners and artificial potent sweeteners. Commonly accepted potency figures for certain potent sweeteners include, for example,

Cyclamate	30 times as sweet as sugar
Stevioside	100-250 times as sweet as sugar
Mogroside V	100-300 times as sweet as sugar
Rebaudioside A	150-300 times as sweet as sugar
Acesulfame-K	200 times as sweet as sugar
Aspartame	200 times as sweet as sugar
Saccharine	300 times as sweet as sugar
Neohesperidin dihydrochalcone	300 times as sweet as sugar
Sucralose	600 times as sweet as sugar
Neotame	8,000 times as sweet as sugar

[035] Artificial and/or additional natural potent sweeteners are suitable for use in at least certain exemplary embodiments of the grain products comprising a steviol glycoside (e.g., a rebaudioside) disclosed here. Such artificial potent sweeteners include peptide based sweeteners, for example, acesulfame potassium, aspartame, neotame, and alitame, and non-peptide based sweeteners, for example, sodium saccharin, calcium saccharin, acesulfame potassium, sodium cyclamate, calcium cyclamate, neohesperidin dihydrochalcone, sucralose, and mixtures of any of them. Suitable natural non-nutritive potent sweeteners are discussed further below. It will be within the ability of those skilled in the art, given the benefit of this disclosure, to select suitable additional or alternative sweeteners for use in various embodiments of the grain products comprising a steviol glycoside disclosed here.

[036] Artificial sweeteners can collectively comprise about 0.000 to 1.000% of the final grain product. In certain exemplary embodiments, artificial sweeteners can collectively comprise about 0.000 to 0.050%, about 0.000 to 0.015% or about 0.000 to 0.013% of the base of a cereal product described herein. In certain exemplary embodiments, artificial sweeteners can collectively comprise about 0.000 to 0.750%, about 0.000 to 0.500%, about 0.000 to 0.400% or about 0.000 to 0.380% of the enrobing coating of a cereal product described herein.

[037] Nutritive sweeteners can collectively comprise 0.007 to about 75%, e.g., about 0.050 to 75% of the final grain product (dry basis). In certain exemplary embodiments, nutritive sweeteners (e.g., sucrose) collectively comprise about 30 to 57% of the final grain product (dry basis) (e.g., 9 to 17 grams of sweetener (e.g., sucrose) per 30 gram serving size of grain). In other exemplary embodiments, nutritive sweeteners comprise less than 30% of the final grain product. In certain exemplary embodiments, nutritive sweeteners can collectively comprise about 0 to 75%, about 0 to 50%, about 0 to 5.0% or about 0 to 2.6% of the base of a cereal product described herein. In certain exemplary embodiments, nutritive sweeteners can collectively comprise about 20 to 75%, about 22.5 to 65% or about 25 to 57% of the enrobing coating of a cereal product described herein.

[038] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more color additives. Color additives can be used to offset color loss due to exposure to light, air, temperature extremes, moisture and/or storage conditions; correct natural variations in color; enhance colors that occur naturally; and/or provide for or enhance color of "fun" food embodiments of the grain products disclosed here. Color additives include, for example, but are not limited to, FD&C Blue No. 1, FD&C Blue No. 2, FD&C Green No. 3, FD&C Red No. 3, FD&C Red No. 40, FD&C Yellow No. 5, FD&C Yellow No. 6, Orange B, Citrus Red No. 2, annatto extract, beta-carotene, grape skin extract, carmine, cochineal extract, paprika oleoresin, caramel color, fruit juice, vegetable juice, saffron, water soluble dyes and the like.

[039] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more flavorants. Flavorants are typically used to add one or more specific natural and/or synthetic flavors to the grain products disclosed here. Flavorants can include one or more natural flavorings, artificial flavorings, spices and various combinations thereof. Exemplary flavorants include, for example, but are not limited to, vanilla, cinnamon, nutmeg, malt, chocolate, nut flavor(s), fruit flavor(s) (e.g., such as juices, extracts, purees, dried fruits and the like or mixtures thereof). Essentially any fruit flavorant can be used, with the most common being apple, peach, pear, apricot, raspberry, blueberry, strawberry, boysenberry, lemon, orange, pineapple or raisin. In certain exemplary embodiments, a strawberry flavorant is used. In certain exemplary embodiments, grain products disclosed here may optionally contain less than 10% by weight of flavorants, between about 2.000% and about 7.500% by weight of flavorants, or between about 4.000% and about 7.300% by weight of flavorants.

[040] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more flavor enhancers. Flavor enhancers are typically used to enhance flavors already present in the grain products disclosed here. Typically, flavor enhancers do not provide their own separate flavor, such as a flavorant would. Flavor enhancers can be one or more natural enhancers, artificial enhancers or combinations thereof. Flavor enhancers include, for example, but are not limited to, sodium chloride, monosodium glutamate (MSG), monopotassium glutamate, maltol, ethyl maltol, nucleotide-containing compositions derived from shiitake or other suitable mushrooms, disodium succinate, whey proteins, hydrolyzed soy protein, autolyzed yeast extract, disodium guanylate, disodium inosinate, ascorbic acid, malic acid, tartaric acid, citric acid and the like.

[041] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more fat replacers. Fat replacers are typically used to provide expected texture and/or a creamy mouthfeel in grain products (e.g., reduced-fat grain products) disclosed here. Fat replacers include, for example, but are not limited to, Olestra, cellulose gel, carrageenan, polydextrose, modified food starch,

microparticulated egg white protein, guar gum, xanthan gum, whey protein concentrate and the like.

[042] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more antioxidants. Antioxidants are typically used in grain products to stabilize free radicals before they can react and cause oxidative harm, e.g., after ingestion, in the grain products disclosed here. Antioxidants include, for example, but are not limited to, ascorbic acid, glutathione, vitamin A, vitamin C, vitamin E (e.g., tocopherols and tocotrienols), vitamin B_6, vitamin B_{12}, lipoic acid, uric acid, carotenes (e.g., beta- and retinol), ubiquinone, selenium, lycopene, folate, magnesium, carotenoids, zinc, lutein, zeaxanthin, anthocyanidins, flavanols and catechins, epicatechins, procyanidins, proanthocyanidins, flavonones, isothiocyanates (e.g., sulforaphane), phenols (e.g., caffeic acid, ferulic acid), sulfides/thiols (e.g., diallyl sulfide, allyl methyl trisulfide, dithiolthiones) and the like.

[043] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more nutrients. Nutrients are typically used to replace one or more vitamins and minerals lost during processing of a grain product disclosed here (i.e., enrichment) and/or to add one or more nutrients that may be lacking in a grain product disclosed here (i.e., fortification). One or more grain products described herein may optionally be fortified with vitamins and minerals.

[044] Embodiments of the present invention may optionally contain vitamins such as, for example, vitamins A, D, E, K, C, thiamin, riboflavin, niacin, vitamin B_6, folate, vitamin B_{12}, biotin, and/or pantothenic acid. In certain exemplary embodiments, the grain products disclosed here may optionally include one or more vitamins such as, for example, vitamin A precursors (e.g., pro-vitamin A, carotenoids and the like), including, for example, β-carotene, α-carotene, β-apo-8' carotenal, cryptoxanthin and the like. Vitamin A esters (e.g., retinyl palmitate, retinyl acetate and the like) can also be used. Vitamin D can be selected from, for example, cholecalciferol (D^3), ergocalciferol (D_2) and their biologically active metabolites and precursors such as,

for example, 1-alpha-hydroxy vitamin D, 25-hydroxy vitamin D, 1,25-dihydroxy vitamin D and the like. In exemplary embodiments, all-rac α-tocopherol and RRR-alpha-tocopherol and their esters are used as a source for vitamins. Sources of vitamin E include dl-alpha tocopherol (all-racemic) and its esters, such as, for example, dl-α-tocopheryl acetate and succinate, dl-alpha-tocopherol (RRR) and its esters, d-alpha-tocopherol and its esters, beta-tocopherol, gamma-tocopherol, and their esters, tocopheryl nicotinate and the like. Vitamin K can be selected from phylloquinone (K_1), menaquinone (K_2) and menadione and their salts and derivatives. L-ascorbic acid is exemplary as a vitamin C source, however other forms of vitamin C, for example, D-ascorbic acid, D-dehydroascorbic acid, L-isoascorbic acid, L-dehydroascorbic acid and esters of ascorbic acid (e.g., ascorbyl palmitate) may also be used. The hydrochloride and nitrate salts of thiamin and thiamin alkyl disulfides such as, for example, the prophyidisulfide, tetrahydrofurfuryl disulfide, O-benzoyl disulfide can be used. The hydrochloride and nitrate salts of thiamin are highly preferred. The sources of riboflavin are selected, for example, from crystalline riboflavin coenzyme forms of riboflavin such as, for example, flavin adenine dinucleotide, flavin adenine mononucleotide, riboflavin 5'-phosphate and their salts. Sources of niacin include nicotinic acid, nicotinamide, the coenzyme forms of niacin such as, for example, nicotinamide adenine dinucleotide and nicotinamide adenine dinucleotide phosphate. Vitamin B_6 can be selected from hydrochloride salts or 5'-phosphates of pyridoxine, pyridoxamine and pyridoxal. Folate can be in the form of folic acid, mono- or polyglutamyl folates, dihydro and tetrahydro folates, methyl and formyl folates. Sources of vitamin B_{12} are, for example, cyanocobalamin, methylcobalamin, 5'-deoxy-adenosylcobalamin and the like. Sources of biotin can be selected from D-biotin, oxybiotin, biocytin, biotinol and the like. The sources of pantothenic acid can be in the form of salts such as, for example, calcium pantothenate or as panthenol, or in the form of coenzyme A.

[045] In certain exemplary embodiments, grain products disclosed here may optionally be fortified with minerals such as, for example, calcium, phosphorus, magnesium, iron, zinc, iodine, selenium, copper, manganese, fluoride, chromium, molybdenum, sodium, potassium, and chloride The minerals can be in the form of any of the well

known salts including carbonate, oxide, hydroxide, chloride, sulfate, phosphate, pyrophosphate, gluconate, lactate, acetate, fumarate, citrate, malate, amino acids and the like for the cationic minerals and sodium, potassium, calcium, magnesium and the like for the anionic minerals. The particular salt used and the concentration used will depend upon their interaction with other food product ingredients.

[046] In certain exemplary embodiments, a grain product disclosed here can optionally include trace elements and minerals such as, for example, copper, iron, selenium, magnesium, manganese, zinc, and mixtures thereof. Conventional ingredients for vitamins and minerals can be employed to provide the desired trace elements. For example, iron can be provided by reduced iron, iron sulfite, ferric sodium pyrophosphate, and/or iron fumarate. Copper can be provided by Cu_2O, $CuCl_2$, $CuSO_4$ and mixtures thereof. Magnesium can be provided by MgO, $MgCl_2$, $MgCO_2$, $Mg(OH)_2$, magnesium acetate and mixtures thereof. Zinc can be provided by, for example Zn-citrates, Zn-gluconates, Zn-stearates, Zn-amino acid chelates, Zn-ascorbates and mixtures thereof.

[047] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more emulsifiers. Emulsifiers are typically used to allow smooth mixing of grain product ingredients and/or to prevent separation of grain product ingredients disclosed here. Emulsifiers include, for example, but are not limited to, soy lecithin, monoglycerides, diglycerides, egg yolks, polysorbates, sorbitan monostearate and the like.

[048] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more stabilizers, thickeners or texturizers. Stabilizers, thickeners, binders and texturizers are typically used to produce a uniform texture and/or to improve the mouthfeel of a grain product disclosed here. Stabilizers, thickeners, binders and texturizers include, for example, but are not limited to, gelatin, pectin, guar gum, carrageenan, xanthan gum, whey and the like.

[049] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more pH control agents or acidulants. PH control agents and acidulants are typically used to control acidity and/or alkalinity and/or prevent spoilage of the grain products described disclosed here. PH control agents and acidulants include, for example, lactic acid, citric acid, ammonium hydroxide, sodium carbonate and the like.

[050] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more leavening agents. Leavening agents are typically used to promote rising of grain products disclosed here. Leavening agents include, for example, but are not limited to, baking soda, monocalcium phosphate, calcium carbonate and the like.

[051] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more anti-caking agents. Anti-caking agents are typically used to keep powdered grain components disclosed here free-flowing and/or to prevent moisture absorption. Anti-caking agents include, for example, but are not limited to, calcium silicate, iron ammonium citrate, silicon dioxide and the like.

[052] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more humectants. Humectants are typically added to grain products disclosed here to retain moisture, e.g., of components such as, for example, shredded coconut, marshmallows, confections and the like. Humectants include, for example, but are not limited to, glycerin, sorbitol and the like.

[053] In certain exemplary embodiments, the grain products disclosed here may optionally include one or more dough strengtheners or conditioners. Dough strengtheners and conditioners are typically added to grain products disclosed here to produce a stable dough. Dough strengtheners and conditioners include, for example, but are not limited to, ammonium sulfate, azodicarbonamide, L-cysteine and the like.

[054] In certain exemplary embodiments, the amount and type of these components that may optionally be employed to produce the grain products described here depend

upon the desired color, flavor, texture, nutritional content or other benefit of the final food bars being produced. All of these optional components are commercially available from sources known by those of skill in the art.

Grain Product Base Processing

[055] As used herein, the terms "base," "spoonable base," "grain product base," and "cereal base" are used interchangeably, and refer to edible pieces of grain products such as, for example, puffs, flakes, shreds, clusters, sheets and any combination thereof. A grain product base may be suitable for consumption as is or, optionally, may require additional processing as described here (e.g., one or more of cutting, shredding, enrobing, cooking, and the like). A grain product base can comprise a wide variety of shapes, densities, sizes and compositions. A grain product base can be produced, for example, as discussed in U.S. Patent No. 5,709,902 or by any other art-recognized methods. As discussed in U.S. Patent No. 5,709,902, a grain product base can include a plurality of individual pieces of wet, unexpanded, ready-to-eat grain compositions such as, for example, wet flakes, shreds, wet sheeted dough pellets, biscuits, granola and mixtures thereof. In certain exemplary embodiments, wet, untoasted grain pellets having a moisture content of about 12% to 25% or of about 16% to 20% are used as the grain product base. In other exemplary embodiments, puffed pieces including a steviol glycoside are conventionally toasted after puffing and, in certain exemplary embodiments, thereafter coated and dried.

[056] In the conventional preparation of a grain product, a dry blend of starchy grain ingredients with or without a bran or fiber constituent is well mixed and then combined with water and other grain product ingredients (e.g., such as salt(s), sugar(s), malt or other flavors, starches and the like and combinations thereof as discussed further herein), e.g., mixing with heat to cook or gelatinize the starchy component of the grain composition. The gelatinized or cooked grain, upon further mixing, can form a cooked farinaceous dough. A variety of well known cooking methods and equipment can be used to prepare a cooked grain dough. In certain exemplary embodiments, the wetted grain blend can be processed in a short cook

time cooker extruder (e.g., a single or twin screw extruder) or in an extended cook time cooker such as a pressurized and agitated steam cooker each of which form the cooked grain dough which in turn can be fed to a grain pellet forming extruder to form grain pellets. In other exemplary embodiments, the cooking and dough forming steps are performed simultaneously in a high pressure cooker extruder equipped with a pellet-forming die head. Cooked grain dough pellets formed in this manner typically range from about 18% to 30% moisture.

[057] In certain exemplary embodiments, the cooked grain dough is formed into a dough sheet by sheeting, which sheet is then sectioned, e.g., by longitudinally cutting and transversely sheeting, to form pellets in sheet form. The pellets can then be dried in a conventional pellet dryer and optionally tempered such as in a temper bin to adjust or equilibrate the moisture content for further processing.

[058] In certain exemplary embodiments, the grain product base is a puffed grain. Pellets having a moisture content of about 10% to 14% can be puffed such as by a conventional puffing gun to form a puffed ready-to-eat grain product base, especially oat based pieces in the form of rings or other compositions in the form of spherical puffed grain pieces. The puffed base grain pieces exit the puffing gun at a moisture content of about 6%. In still other embodiments, the puffed pieces are prepared without an intermediate pellet forming step by direct expansion at the die head of a cooker extruder, e.g., a twin screw cooker extruder. In other exemplary embodiments, puffed pieces are prepared by oven puffing or microwave puffing. Such methods are well known in the art.

[059] The puffed grain can optionally be toasted in an oven of conventional design such as a fluidized bed-type oven. While the air temperature and duration for oven toasting the puffed grain product will necessarily vary according to the size and shape of the grain product and its moisture content, it has been found that an oven temperature in the range of about 335 °F to 400 °F (about 168 °C to about 204 °C) applied to a heat-set grain product for about 1 to 2 minutes is satisfactory to dry an extruded, irregular, nugget shaped grain product of about 3/16" to 5/16" (about 4.7 mm to about 7.9 mm)

in diameter to a moisture content at which the heat set grain product retains its fully expanded structure and is therefore structurally stable.

[060] In certain exemplary embodiments, the grain product base is a flaked grain. Flakes can be made using a variety of methods known in the art. In certain exemplary embodiments, dried non-circular pellets are used to form wet flakes using conventional flaking rolls. Thereafter, the wet flakes so formed are subjected to toasting to form toasted, dried grain flakes. A grain flake can be tenderized, toasted and partially expanded by rapid heating of wet flakes which converts the dense, hard, wet flakes into more palatable, porous, tender flakes. The toasting operation can also enhance the color and flavor of the finished grain product. Toasting is typically accomplished by heating the wet flakes to a temperature of between about 93.3 to 315.5 °C (200 to 600 °F) until a moisture content of approximately 2 to 5% is obtained. Toasting of the wet flakes can be practiced in conventional dryers, vacuum dryers or other commercial baking equipment.

[061] In certain exemplary embodiments, cooked whole grains are tempered and shredded in shredding rolls to form wet grain shreds. In other exemplary embodiments, the shreds can be laminated or otherwise arranged or formed into biscuits of various sizes to form the grain product base. In other exemplary embodiments, the shredded grain is formed into layers to form a shredded grain biscuit. Optionally, the shredded biscuits can be filled, e.g., with a fruit filling or a confection (e.g., a water-based icing composition).

[062] In certain exemplary embodiments, the grain product base is formed into one or more sheets (e.g., sheeted). In other exemplary embodiments, the grain product base is formed into a sheet by conventional means such as by feeding pellets into one or more sheeting rolls to form sheets to a thickness of about 200 to 400 micrometers. In other exemplary embodiments, the thin continuous sheets can be longitudinally subdivided into continuous ribbons. In other exemplary embodiments, a thin continuous sheet or ribbon laminated to form the number of layers desired in a grain product. In certain exemplary embodiments, the sheets can be fabricated from all the

same formulation of cooked grain product dough or each can be of a particular cooked grain product dough formulation. In certain exemplary embodiments, sheet pieces or ribbons are formed into a bed or mass of two or more layers being visually distinct with interstitial voids. Once the layers are formed, at least a portion of the layers be bound together to prevent total delaminating upon further processing and complete separation of the layers from each other.

[063] Within this general outline of grain processing, a wide variety of particular methods and variations can be used. In the production of a ready-to-eat grain, various general art-known procedures can be used depending upon the desired form, type or condition of the final product.

Enrobing

[064] As used herein, the term "enrobe" refers to the step of providing a coating composition (e.g., a coating composition including a sweetening component) to a grain product. In certain exemplary embodiments, the coating is uniformly applied to the surface of a grain piece to evenly coat the exterior. In other exemplary embodiments, the coating is applied to portions of the surface of a grain piece, e.g., between about 10% and about 90% of the surface of the grain piece. In other exemplary embodiments, the coating is selectively deposited on particular locations in a known manner. Enrobing may be performed before and/or after the toasting or drying step described below.

[065] In certain exemplary embodiments, a coating composition including a sweetening component is applied to a grain product piece(s) described here. The term "coating composition," as used herein, is a general collective term that includes both sweetening syrups having no solids or oil components present (e.g., sugar syrups) as well as other compositions that include an oil component, whether or not emulsified, and/or solids. Well known coating application techniques can be employed. Generally, sweetening syrups comprise 20 to 50% sucrose, 0 to 30% corn syrup, 0 to 25% oil and 9 to 75% moisture (e.g., 31 to 54% water). In certain exemplary

embodiments of the grain products disclosed here, a portion or all of the sucrose present in the sweetening syrup is replaced with a steviol glycoside (e.g., a rebaudioside).

[066] In certain exemplary embodiments, one or more coating compositions described here can be applied to grain product piece(s) using a variety of techniques known in the art, e.g., using an enrober drum or other coating vessel or equipment using a liquid coating composition. Generally, a useful technique involves tumbling. The grain piece(s) and liquid coating composition are each charged in any order to a rotating drum and tumbled for a sufficient time to enrobe the grain piece(s) with a coating. In certain exemplary embodiments, a liquid coating composition is added after the grain piece(s) have been added to the drum. In other exemplary embodiments, a liquid coating composition is spayed over the grain piece(s), which obviates a need for tumbling. In other exemplary embodiments, a dry coating process can be used to enrobe the grain piece(s) with a coating composition. In other exemplary embodiments, a coating composition can also include or be co-applied with particulates such as, for example, fruit and nut pieces and/or small grain flakes. Enrobing methods and apparatuses are well known in the art and are described in, for example, U.S. Patent Nos. 4,079,151, 4,880,645, 5,453,383, 5,516,541, 5,709,902, 5,968,572, 6,174,553 and 7,163,708.

[067] In certain exemplary embodiments, the coating composition additionally comprises about 0.1% to 15% of an optional flavor constituent and/or vitamins. The addition of a flavor constituent to the coating composition can be used to replace some or all of a sugar component (e.g., sucrose), to augment flavor development and/or to compensate for flavor losses that can occur from the toasting step(s) described here. These steps, due to their heat application, tend to drive off the volatile flavor constituents leading to flavor degradation or loss. Heat tolerant high potency sweeteners can also be used (e.g., acesulfame K). However, heat sensitive high potency sweeteners (e.g., aspartame) should not be used exclusively since the rigorous high temperatures of the subsequent drying step can cause degradation of these expensive high potency sweeteners. In certain exemplary embodiments,

optional vitamins used in this step are heat tolerant. A particularly useful combination of vitamins for topical application consist of vitamins C, A and D and mixtures thereof. In other exemplary embodiments, the coating composition can additionally comprise about 1% to 20% of a reaction flavor ingredient. Such a reaction flavor ingredient reacts due to the elevated temperature of the toasting step. The reaction can be with the other coating composition ingredients or with the grain piece itself. Exemplary reaction flavor ingredients include non-fat dry milk solids, malt and other grain syrups. Other suitable reaction flavors are commercially available from various commercial vendors.

[068] In certain exemplary embodiments, enrobed grain products disclosed here comprising at least one steviol glycoside provide the advantage of enhanced color brightness. Typically, when a grain product is enrobed, the brightness of the observed color of the surface of the grain product is diminished. This may be due, at least in part, to the effect of sugar in the coating. It has been discovered that a coating including a sweetening component comprising a sweetening amount of at least one steviol glycoside, e.g., wherein the steviol glycoside provides approximately 25% to 100% of the sweetness of the sweetening component, causes less color brightness attenuation than is observed using typical enrobing formulations known in the art. In certain exemplary embodiments, an enrobed grain product, e.g., an artificially or naturally colored product, comprising a sweetening amount of at least one steviol glycoside in the coating enrobing the grain product has a surface color brightness that is greater than that of such enrobed grain product employing sugar in place of such steviol glycoside in the coating enrobing the grain product. In certain exemplary embodiments, an enrobed grain product comprising a sweetening amount of at least one steviol glycoside in the coating enrobing the grain product has a surface brightness that is similar to the brightness observed in the grain product prior to enrobing.

[069] If a "frosted" appearance for the sugar coating is desired (as compared with a clear or glossy coating appearance), then manipulating the sugar content and crystal structure (e.g., adding crystalline sugar) can provide a frosted appearance. A frosted

appearance can also be provided by adding small amounts of titanium dioxide (TiO_2) to the coating composition. Suitable TiO_2 concentrations can range from about 0.02% to about 0.5% of the coating composition. Addition of a powdered white pigment can be added to the other frosted coating components to provide a pleasing, initial frosted appearance as well as providing a resistance to dissolution in milk.

Toasting/Drying the Grain Product Base

[070] In certain exemplary embodiments, one or more drying or toasting steps are performed to reduce the moisture of the grain product and obtain a finish moisture content level not exceeding 15% by weight. In certain exemplary embodiments, the finish moisture content is from about 1% to 6% or about 2% to 4% by weight. The one or more drying steps can be performed by a variety of heating methods (e.g., toasting, baking, microwaving and the like) and/or dehydrating methods known in the art.

[071] In certain exemplary embodiments, the external surface of the grain piece, during at least a portion of the drying step, reaches a temperature of $\geq$ 250 °F ($\geq$ 121 °C). The drying step can be performed by toasting, baking or other steps involving moisture reduction. For an enrobed grain piece, it is important for the formation of an optional sugar crust feature that the temperature gradient be such that the higher temperature is external to the grain product base. For such applications, high intensity microwave heating techniques which create a reverse or internal gradient would not be suitable since the desired external crust layer would not be formed.

[072] If desired, a pre-drying step can be performed prior to a high temperature or toasting step. The pre-drying step can include an initial drying step with forced hot air having a temperature of about 350 °F to 475 °F (about 177 °C to 246 °C) to an intermediate moisture of about 6% to 10%, and a final drying step with forced hot air having a temperature of about 275 °F to 375 °F (about 135 °C to 191 °C) to a moisture content of 1% to 6%. The elevated temperature or toasting step can be continued until the

grain pieces obtain a finish moisture content of about 1% to 6% or from about 2% to 4%.

[073] If desired, the dried pieces can be enrobed with one or more additional components such as, for example, a sweetening component, one or more heat sensitive vitamins or the like. The grain pieces can then be packaged and distributed in conventional manner.

Bar Formation

[074] In certain exemplary embodiments, one or more grain products described here are provided in a bar form. Methods of forming bars are well known in the art. In certain exemplary embodiments, a multiplicity of optionally enrobed, dried grain product pieces, optionally in combination with one or more additional ingredients (such as, e.g., nuts, dried fruit, chocolate pieces, marshmallows, etc.), are premixed to provide a uniform dry mixture. The resulting dry mixture is mixed with a binder system in sufficient amounts and manner to extensively distribute binder over the multiplicity of dried grain product pieces and optional additional ingredients. The resulting bar composition can be pressed and cut into bar shapes. The resulting bars can be packaged in a conventional or otherwise suitable manner for such products.

[075] In certain exemplary embodiments, compression can be performed by spreading the mixture onto a leveled surface and applying compression from above. Any convenient suitable means can be used in this respect, such as, e.g., mold(s), pressure plate(s), compression roller(s), conveyor belt(s), etc. The compression treatment will increase the density of the mixture. For example, the compression may increase the density of the mixture by about 25 to 150 percent. In certain exemplary embodiments, the compression increases the density of the mixture from about 0.2 to about 0.4 g/cc before compression to about 0.45 to about 0.65 g/cc after compression.

[076] A bar may be formed in any suitable shape, size and thickness. It can have a regular or irregular geometric shape. Regular geometric shapes include, but are not limited

to, rectangular, square, circular, or oval cross-sections. In certain exemplary embodiments, a bar may contain a filling layer, a topping layer, or a coating or any combination of these. Although not limited thereto, the grain product bars may be cut into sizes having a weight of about 20 grams to about 100 grams.

[077] The following example is a specific embodiment of the present invention, but is not intended to limit it. The contents of all references, patents and published patent applications cited throughout this application are hereby incorporated by reference in their entirety for all purposes.

EXAMPLE I

Enrobed, Puffed Grain Product

[078] It is well known to food technologists that replacing sucrose with a sucrose substitute results in a detectable taste difference. It has been discovered that some or all of a sweetening amount of sucrose in a grain product can be replaced with rebaudioside A, alone or in combination with a potent sweetener, to make a grain product that tastes sugar sweetened. The grain products disclosed here are based in part on the discovery of novel combinations of rebaudioside A and, optionally, other sweeteners (e.g., potent sweeteners) that can be used to sweeten a grain product that is typically sweetened with sucrose, to substantially preserve or closely replicate the taste, including sweetness, of the grain product.

[079] The following tables disclose enrobed, puffed grain product formulations in which a portion or all of the sugar (e.g., sucrose) was replaced with rebaudioside A, alone or in combination with one or more potent or non-potent sweeteners.

[080] **Table 1.** Total Rebaudioside A in Enrobed, Puffed Grain Product Samples

Component	100% Reb A	50% Reb A
% Reb A in Base (dry weight basis)	0.0175	0.0085
% Reb A in Syrup (wet basis)	0.5132	0.1452
Dry Mix Moisture %	7.5000	7.5000
Syrup Initial Moisture %	55.4172	31.5752
Finished Moisture %	2.5000	2.5000
Mix % Base	81.6536	67.5768
Mix % Syrup	18.3464	32.4232
Adjusted % Reb A in Base*	0.0184	0.0090
Adjusted % Reb A in Syrup*	0.7848	0.1874
Final % Reb A in Base	0.0150	0.0061
Final % Reb A in Syrup	0.1440	0.0608
Final % Reb A in Total Finished Product	0.1590	0.0668

*adjusted for moisture differential

[081] **Table 2.** Formulation For Enrobed, Puffed Grain Product

Ingredient	Amount (% by weight)
Flour	95.000 – 98.000
Sugar	0.000 – 2.600
Rebaudioside A	0.002 – 0.020
Artificial Sweetener	0.000 – 0.015
Salt and Minor Ingredients	2.000 – 2.500

[082] **Table 3.** Formulation For Enrobing Syrup

Ingredient	Amount (% by weight)
Sugar	20.000 – 75.000
Rebaudioside A	0.100 – 0.550
Artificial Sweetener	0.000 – 0.400
Water	20.000 – 55.000
Flavor and Minor Ingredients	2.000 – 7.500
Oil	5.000 – 15.000

[083] Rebaudioside A sweetened, enrobed, puffed grain products that replaced up to 50% of the sucrose present in the original enrobed, puffed grain product formulation was judged as tasting substantially the same as the control enrobed, puffed grain product containing control amounts of sucrose and no rebaudioside A.

[084] Given the benefit of the above disclosure and description of exemplary embodiments, it will be apparent to those skilled in the art that numerous alternative and different embodiments are possible in keeping with the general principles of the invention disclosed here. Those skilled in this art will recognize that all such various modifications and alternative embodiments are within the true scope and spirit of the invention. The appended claims are intended to cover all such modifications and alternative embodiments. It should be understood that the use of a singular indefinite or definite article (e.g., "a," "an," "the," etc.) in this disclosure and in the following claims follows the traditional approach in patents of meaning "at least one" unless in a particular instance it is clear from context that the term is intended in that particular instance to mean specifically one and only one. Likewise, the term "comprising" is open ended, not excluding additional items, features, components, etc.

What is claimed is:

1. A grain product comprising:

a base including at least one constituent of at least one grain;

a coating enrobing at least a portion of the base;

a sweetening amount of at least one steviol glycoside present in the base; and

a sweetening amount of at least one steviol glycoside present in the coating.

2. The grain product of claim 1, wherein the steviol glycoside in both the base and the coating consists essentially of rebaudioside A.

3. The grain product of claim 1, wherein the coating further comprises a natural nutritive sweetener selected from the group consisting of one or more of sucrose, fructose, glucose, invert sugar and glucose-fructose syrup.

4. The grain product of claim 1, wherein the coating includes a sweetening component comprising a natural nutritive sweetener and the steviol glycoside, wherein the steviol glycoside provides approximately 25% to 100% of sweetness of the sweetening component.

5. The grain product of claim 1, wherein the coating includes a sweetening component comprising the steviol glycoside, wherein the steviol glycoside provides approximately 50% of sweetness of the sweetening component.

6. The grain product of claim 1, wherein the coating includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and sucralose, wherein the steviol glycoside and sucralose provide approximately 50% of sweetness of the sweetening component.

7. The grain product of claim 1, wherein the coating includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and Acesulfame-K, wherein the steviol glycoside and Acesulfame-K provide approximately 50% of sweetness of the sweetening component.

8. The grain product of claim 1, wherein the base comprises a natural nutritive sweetener selected from the group consisting of one or more of sucrose, fructose, glucose, invert sugar and glucose-fructose syrup.

9. The grain product of claim 1, wherein the base includes a sweetening component comprising a natural nutritive sweetener and the steviol glycoside, wherein the steviol glycoside provides approximately 25% to 100% of sweetness of the sweetening component.

10. The grain product of claim 1, wherein the base includes a sweetening component comprising the steviol glycoside, wherein the steviol glycoside provides approximately 50% of sweetness of the sweetening component.

11. The grain product of claim 1, wherein the base includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and sucralose, wherein the steviol glycoside and sucralose provide approximately 50% of sweetness of the sweetening component.

12. The grain product of claim 1, wherein the base includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and Acesulfame-K, wherein the steviol glycoside and Acesulfame-K provide approximately 50% of sweetness of the sweetening component.

13. The grain product of claim 1, wherein the coating and the base each includes a natural nutritive sweetener selected from the group consisting of one or more of sucrose, fructose, glucose, invert sugar and glucose-fructose syrup.

14. The grain product of claim 1, wherein the base and the coating each includes a sweetening component comprising a natural nutritive sweetener and the steviol glycoside, wherein the steviol glycoside provides approximately 25% to 100% of sweetness of the sweetening component.

15. The grain product of claim 1, wherein the base and the coating each includes a sweetening component comprising the steviol glycoside, wherein the steviol glycoside provides approximately 50% of sweetness of the sweetening component.

16. The grain product of claim 1, wherein the base and the coating each includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and sucralose, wherein the steviol glycoside and sucralose provide approximately 50% of sweetness of the sweetening component.

17. The grain product of claim 1, wherein the base and the coating each includes a sweetening component comprising a natural nutritive sweetener, the steviol glycoside and Acesulfame-K, wherein the steviol glycoside and Acesulfame-K provide approximately 50% of sweetness of the sweetening component.

18. The grain product of claim 1, wherein the at least one grain is selected from corn, rice, wheat, oat and barley.

19. The grain product of claim 18, wherein the at least one grain is one or both of corn and oat.

20. The grain product of claim 1, wherein the base is in the form of puffs, flakes, shreds, clusters, sheets or any combination thereof.

21. The grain product of claim 1, wherein the grain product contains no sucrose, fructose, glucose, invert sugar or glucose-fructose syrup.

22. The grain product of claim 1, further comprising a component selected from a preservative, a color additive, a flavorant, a flavor enhancer, a fat replacer, a nutrient, an emulsifier, a stabilizer, a thickener, a binder, a texturizer, a pH control agent, an acidulant, a leavening agent, an anti-caking agent, a humectant, a dough strengthener and a dough conditioner.

23. A bar comprising the grain product of claim 1.

24. A grain product comprising:

a base including at least one constituent of at least one grain, wherein the base is artificially colored and has a color brightness; and

a coating enrobing at least a portion of the base and having a sweetening amount of a steviol glycoside.

25. The grain product of claim 24, wherein the coating enrobing at least a portion of the base does not substantially diminish the perceived color brightness of the base.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/084672

A. CLASSIFICATION OF SUBJECT MATTER
INV. A23L1/10 A23L1/164 A23L1/18 A23L1/182

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, FSTA, BIOSIS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/116821 A1 (PRAKASH INDRA [US] ET AL) 24 May 2007 (2007-05-24) examples A1-A4	1-25
A	WO 2006/027796 A (PHARMED MEDICARE PTY LTD [IN]; RATNAM RAKESH [IN]; AURORA SUNEET [IN];) 16 March 2006 (2006-03-16) claims 1,4	1-25
A	US 2003/049357 A1 (PHIPPS L MYLES [US]) 13 March 2003 (2003-03-13) example 1	24,25

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 March 2009	17/03/2009

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2008/084672

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US 2003049357 A1	13-03-2003	NONE	