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(54) **Title:** MULTIGRAIN SNACK

(57) **Abstract:** The invention provides a multigrain snack exhibiting organoleptic properties of typical spicy snacks while containing health-promoting components of typical breakfast cereals meals. The snack can be a part of a low fat and healthy diet for common and safe consumption by any person, including a child.



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MULTIGRAIN SNACK

Field of the Invention

The present invention relates to the field of food manufacture and to the field of healthy diet. Particularly, the invention provides snacks for common and safe consumption by any person, including a child, in accordance with the principles of healthy nutrition.

Background of the Invention

Obesity is a major health problem in developed countries. The health problems associated with overweight include diabetes, cardiovascular diseases, arthritis, sleep disorders, and some forms of cancer. The overweight-related conditions cause half a million deaths in the USA alone, while contributing to economic losses of hundreds of billions dollars.

The weight control means include special physical activities, complex diets, drugs, and even surgeries, but prophylaxis is clearly the best choice. The average U.S. diet contains 37% of total calories as fat. The American Heart Association recommends that the proportion be reduced to 30%. This should be achieved by reducing the number of servings containing high percentage of fats and increasing the number of servings containing cereal and rice; the fat rich servings, less recommended for regular consumption, are graphically placed at the top of the food pyramid, whereas the recommended high number of cereals servings are placed at the bottom of said pyramid – called health food pyramid [The Merck Manual of Diagnosis and Therapy, 17th Ed., page 13, 1999]. Lowering daily caloric intake is usually painful; a preferred way would be to reduce the energetic content in the food items, and particularly in popular items. Even a minor reduction in the fat contents of popular food items would have a substantial effect in the overall dietary structure, and would be beneficial for general public health.

A substantial part of the human nutrition is constituted by cereals and their derivatives, wherein rice, maize and wheat provide about two thirds of world's food energy intake. In view of the increasing awareness of the risks associated with the consumption of saturated fats and cholesterol, and in view of the increasing demand for non-animal nutrition sources, the potential of the cereal product remains as high as ever. However, the cereal products include a broad range of items differing in the method by which the grain is processed during the food production, as well as in the ingredients with which the grain or its derivative is mixed; some products, such as breakfast cereals, are considered to be beneficial to human health, whereas many others, such as pieces having a high fat content and being processed at high temperatures are considered to be detrimental, particularly when consumed by children or in high quantities. There are many types of popular small food pieces, salty or sweet, ready for consumption, usually taken between main meals; they comprise, for example, potatoes or flour, they are often processed at high temperatures and include ingredients conferring or imitating special flavors, such as, for example, flavors typical for fried meat products like barbecue or onion flavor. Examples of such snack pieces are deep fried potato or corn chips. The consumption of such products keeps increasing, both in adults and children, and may represent an important part of the daily caloric intake. It is therefore an object of this invention to provide a snack which would not be harmful even if consumed regularly by children or adults in high quantities.

It is another object of this invention to provide a snack based on healthy nutrition and intended for routine consumption of any person, including persons with health problems and children.

It is a still other object of this invention to provide a snack which would have a lowered caloric content when compared with other products of similar organoleptic properties.

It is further an object of the invention to provide a snack which would exhibit a taste, flavor and texture of popular snacks, but would have a significantly lower fat content.

- 5 It is also an object of the invention to provide a process for manufacturing snacks for common daily consumption by any person, including people with compromised health, overweight people, and children, the snacks complying with the principles of healthy nutrition.
- 10 It is also another object of the invention to provide a snack which would, according to the principal of healthy nutrition, belong near the bottom of the healthy food pyramid.

Other objects and advantages of present invention will appear as description
15 proceeds.

Summary of the Invention

The present invention provides a multigrain cereal snack product comprising a flake and a coating, wherein said flake comprises at least three kinds of
20 cereals, and wherein said coating essentially covers the whole surface of said flake and confers to the snack product savor flavor. Said cereals kinds are selected from the group consisting at least of rice, corn, wheat, and oats. The multigrain snack of the invention preferably comprises less than 5 % water and less than 5% fat. Where “%” is mentioned, “weight%” is intended. The
25 multigrain cereal snack of the invention comprises flakes which are mechanically enough stable to keep their shape during packaging, storage, and transport of the product. Said coating comprises a spicy or savory flavor and/or taste selected from flavor and/or taste of onion, barbecue, meat, mixed meat, beef, lamb, game, fowl, chicken, fish, shrimp, ham, bacon, grill, smoke,
30 sesame, cinnamon, pepper, salt and vinegar, sea salt and pepper, caramel salt, tomato, potato, potato chips, green chili, hot chili, sweet chili, olive,

rosemary, oregano, cumin, mixed spice, mixed herbs, ranch salad dressing, mixed vegetable flavor, pizza, falafel, peanut, peanut butter, curry, wasabi, dairy, cheese, parmesan, butter, sour cream, or nacho. The coating preferably comprises at least one health-promoting component, for example selected from prebiotic saccharides. In a preferred embodiment, the multigrain snack of the invention, comprises carbohydrates at an amount of at least 75%, for example 80-85%. The multigrain snack of the invention preferably comprises energy at an amount of less than 480 kcal/100g, for example less than 450 kcal/100g, such as less than 400 kcal/100g. The multigrain snack of the invention comprises usually sodium at an amount of less than 450 mg/100g sodium, such as less than 400 mg/100g or less than 350 mg/100g. In a preferred embodiment of the invention, the multigrain snack comprises less than 400 kcal/100 g and less than 400 mg sodium /100g. The multigrain snack of the invention comprises essentially no sodium monoglutamate. The multigrain snack of the invention preferably comprises no milk components, and is cholesterol free.

The invention relates to a method for manufacturing a multigrain snack product comprising the steps of i) providing ingredients derived from at least three cereals kinds, sugar, kitchen salt, and edible emulsifiers, mixing them with water, and optionally with other additives adjusting the molding behavior of the mixture, and the organoleptic properties of the product; ii) extruding and flaking the mixture obtained in step i); toasting the flakes obtained in step ii); coating the tasted flakes with a coating aqueous mixture comprising oligofructans and seasonings conferring to the flakes a desired flavor; drying; and packaging and storing. The ingredients in said step i) are usually selected from rice, wheat, barley, oats, rye, whole wheat, wheat flour, barley malt extract, mono- and di-glycerides of edible fatty acids.

The invention provides a multigrain snack product constituted by extruded multi-cereal flakes, coated with a savory layer, comprising less than 4 % water and less than 3% fat, which flakes exhibit organoleptic properties of

typical spicy snacks while containing health-promoting components of typical breakfast cereals meals.

Detailed Description of the Invention

5 It has now been found that the typical cereals can provide a snack of the same organoleptic properties as the typical popular snacks of savory flavor usually based on flour and plant oil. Such savory snacks are crispy or crunchy and popularly have flavor of barbecue or onion, or other spicy taste and flavor, including taste or flavor of meat, mixed meat, grill, beef, lamb,
10 game, fowl, chicken, fish, shrimp, ham, bacon, smoke, pepper, sesame, cinnamon, tomato, potato, green chili, mixed spice, mixed herbs, ranch salad dressing, mixed vegetable flavor, dairy, cheese, parmesan, butter, nacho, and others. Such popular snacks are consumed between two meals or with a beverage like soft drinks or beer or wine or others, often they are consumed
15 several times a day or even continually and they may substantially contribute to a danger of overweight. The snacks are very popular with children. The present invention now provides snacks of the same appearance and texture as the existing high-energy snacks, with a possibility to offer any flavor from the broad spectrum of popular flavors, but with much lower fat
20 content and with lower energetic content, and further without admixtures and ingredients considered to be undesired or harmful. Some ingredients, even though broadly employed in the food products, turn out to be potentially harmful, particularly if consumed in high quantities, or if consumed by sensitive individuals; MSG belongs among such ingredients, and the
25 multigrain snack of the invention is MSG free despite its savory or spicy flavor.

Breakfast cereals, often served with milk or yogurt, belong among recommended, healthy items. It would be advantageous, in accordance with
30 the modern principles of healthy nutrition, to consume them more often than only in the morning. On the other hand, the consumption of the popular

savory-flavored high-caloric, fat-rich snacks should be reduced and consumed more rarely, according to the same principles. The instant invention will facilitate such increasing in the consumption of the healthy cereals while simultaneously decreasing the consumption of the unhealthy fat-rich snacks; this will be achieved by masking “good” cereals under a coating of “bad” snacks. Healthy cereals from the bottom of the pyramid will imitate popular snacks from its top. The nutritious grain item, usually served as a sweet morning meal, is thus converted to a product looking as a salty spicy snack, while keeping its beneficiary properties. This is achieved by employing several novel steps in processing the multigrain items, including providing a seasoning mixture comprising a desired snack flavor without including MSG and other spicy components of typical savory products, and coating the multi-cereal base with said seasoning mixture and drying, whereby mechanically stabilizing the cereals aggregates and conferring to them consistency of crunchy snack pieces. The product of the invention differs from existing breakfast cereal products by stronger structure and by stronger savory aroma, and from existing spicy snacks it differs by containing the healthy multigrain mixture without accompanying excessive oil, MSG and other spicy ingredients. In one embodiment of the invention, the multigrain snack of the invention lacks undesired products of high-temperature processing steps like high temperature baking, roasting, and deep frying, which adds still more to the healthy character of the item. Combining popularity of the snacks with healthiness of the cereals addresses the serious problems associated with increased consumption of so called “junk food” and with overweight in children and adults.

The multigrain cereal snack of the invention has all the advantages of the healthy breakfast meal, including the fibers contained in the breakfast cereals, while avoiding undesired items, such as excessive fat or allergenic components; for example, in some embodiments, the multigrain snack of the invention exhibits flavor of peanuts but does not comprise any peanut-derived components.

The multigrain snack of the invention usually contains more than two cereal kinds. The snack usually contains at least components derived from said cereal kinds. Preferably, components from at least three cereal kinds are included. The cereal kinds may comprise rice, wheat, barley, oats, and
5 others. The multigrain snack of the invention preferably comprises less than 5% water and less than 5% fat, preferably less than 4% water and 4% fat. The snack may comprise less than 3.7% water, for example about 3.5%; the snack may comprise less than 3.5% fat, such as less than 3.0%, or less than 2.5%, or less than 2.0%, for example less than 1.8% or about 1.7%. The snack
10 of the invention preferably comprises at least 75% carbohydrates, of which sweet sugars constitute at most 10%, for example at most 8%. The energetic content of the snack of the invention is usually less than 450 kcal/100g, preferably less than 400 kcal/100g. The sodium content of the snack according to the invention is less than 450 mg/100g, preferably less than 400
15 mg/g. The snack of the invention preferably does not comprise monosodium glutamate. The snack preferably does not contain milk components, and is essentially cholesterol free. In one embodiment of the invention, the multigrain snack is milk free, cholesterol free, and MSG free. In other embodiments of the invention, the multigrain snack may be free of yeast,
20 dried vegetables, or soy components.

The method of manufacturing the product of the invention usually comprises steps of mixing ingredients, extrusion, flaking, toasting, coating, and drying. The number of ingredients mixed for said step of extrusion may be relatively
25 small, for example seven. Said coating which covers the extruded core comprises seasonings. In a preferred embodiment of the invention, the coating comprises seasonings, health-promoting component(s), and the structure affecting components. The coating mixture is specially designed and can be modified in accordance with the required flavor of the multigrain
30 snack. The coating mixture preferably comprises at least one health-promoting component, such as micronutrients, metals, vitamins, or prebiotics. In a preferred embodiment, the health-promoting component

comprises a prebiotic component, such as a saccharide, oligosaccharide or polysaccharide which is not digested by human gastrointestinal enzymes but stimulates the growth or activity of health-promoting bacteria. In one preferred embodiment, the coating of the multigrain snack comprises an oligofructan.

In a preferred embodiment of the invention, the coating lacks oil and comprises oligofructans and wheat starch, beside the seasonings. In one embodiment, the coating components include water and the coating mixture is sprinkled or sprayed on the product cereals extruded core in an amount of 3 to 10 wt% of the extruded core, when considering dry weights, usually about 5 to 6 wt%. The coating mixture may contain, for example, 66 wt% water, 7 wt% oligofructose, 24 wt% flavorings, 2 wt% wheat starch, and 1 wt% salt, and may be sprinkled on the extruded core at an amount of about 20 wt% (wet weight). In another embodiment, a final product of the multigrain snack of the invention may comprise 1.6 wt% fructans, 0.4 wt% starch, 3 wt% flavorings, and 0.2 wt% kitchen salt.

The invention will be further described and illustrated in the following examples.

Examples

Example 1

Manufacturing multigrain snack

The food product and process in accordance with one embodiment of the invention may have the features as exemplified below.

Type of the product: onion-flavored snack in the shape of 2-cm sized coins (irregular circles) of a naturally golden color.

Ingredients: 50% rice, 18% whole wheat, 17% rice flour, 4.2% sucrose, 0.5% barley malt extract, 0.7% salt, 0.05% emulsifiers (mono- and di-glycerides of edible fatty acids).

- 5 Manufacturing process: steps of extrusion, flaking, toasting, coating with a flavoring mixture (6% seasonings, 3.8% oligofructans, in water), drying, packaging and storage.

Chemical characteristics:

10	Moisture	3.5%
	Proteins	7.6%
	Fat	1.7%
	Saturated fats	0.4%
	Carbohydrates	83%
15	of which starch	76%
	of which sugars	7%
	Fiber	3%
	Ash	3.3%
	Sodium	0.3%
20	Energy	384 kcal/100 g

Sensorial characteristics:

	Aspect	irregular flake
	Color	light brown
25	Odor and taste	typical of onion-flavored snacks

Microbiological characteristics:

	Total count plate	≤ 5000 ufc/g
	Molds	≤ 5000 ufc/g
30	Yeasts	≤ 5000 ufc/g
	Fecal coliforms	absent in 1 g
	<i>Salmonella</i>	absent in 25 g

Further product characteristics:

No artificial colors
No preservatives
No G.M.O. involved
No cholesterol
Store below 25°C

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Example 2**Manufacturing multigrain snack**

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The food product and process in accordance with one embodiment of the invention may have the following features.

A higher pressure and a higher temperature are employed to make the product, both assist the cereal starch to transform its structure. Rice is cooked in autoclaves for about 40 minutes, the temperature rising to 130°C. The cooked rice undergoes a “tempering process” in which the temperature decreases for about 2 hours. The ingredients for multigrain snack are placed to an extruder, including the rice, whole wheat, rice flour, barley malt extract, and salt. The pressure in the extruder is created by (a) heating the extruder elements, which generates steam inside the extruder machine, and (b) mechanical action of twin screw extruder. Pellets are obtained, having an irregular shape of about 1 cm across. The pellets are flaked in a specific machine provided with two rollers, followed by toasting and coating in a drum, the coating material comprising water, oligofructan, and seasoning, coated on the surface of the flakes having about 4% moisture. The coated flakes are dried in a dryer to remove excess water at about 80-100°C for about 15 minutes, followed by “swelling” in a toasting machine at 240°C. The final flakes are controlled for size, absence of metallic particles, and are packed.

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Example 3**Comparing the multigrain snack with a typical onion-flavored snack**

The snack as described in Example 1 above, was compared with typical
5 onion-flavored snacks as available on the market, and some of the results are
in Table 1.

The comparison shows that the snack according to the invention has all the
organoleptic features typical for popular savory-flavored snacks which are
10 considered to be near the top of the healthy food pyramid and are not
recommended for regular consumption, the features including the texture,
feeling in mouth, crunchiness, appearance, odor and taste.

Whereas the snack looks like the typical snack, it has nutrition features
15 typical for the breakfast cereals which are considered to be near the bottom
of the healthy food pyramid and are highly recommended for frequent
consumption to all people including ill people and convalescents, people with
overweight, and children. The consumers will consume the snacks of the
invention with the same pleasure as they consume the existing typical spicy
20 and highly caloric, fat-rich snacks. Thus, in many situations, the snack
according to the invention will advantageously replace the typical flour and
oil snacks with the multigrain snack of the invention while providing
recommended components with much less oil and less calories.

25 Table 1: Comparison of a snack according to one embodiment of the
invention with typical snacks existing on the market

Feature	Invention snack	Existing snack
Hardness	Strong, crunchy	Strong, crunchy
Odor	Pleasant onion	Pleasant onion

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Number of cereals kinds	3	1
Number of ingredients	7	8-9
Fat%	1.7	20 – 35
Carbohydrates%	83	44 – 66
Sodium mg/100g	300	450 – 750
Energy kcal/100 g	384	480 – 560
Rice or oats or barley #	+	-
MSG	-	+
Plant oil	±	+
Yeast or dried vegetables or soy	±	+

The sign + denotes presence of a component, the sign – denotes absence, and the sign ± denotes usual low concentration or absence.

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While this invention has been described in terms of some specific examples, many modifications and variations are possible. It is therefore understood that within the scope of the appended claims, the invention may be realized
10 otherwise than as specifically described.

CLAIMS

1. A multigrain snack product comprising a flake and a coating, wherein said flake comprises at least three kinds of cereals, and wherein said coating essentially covers the whole surface of said flake and confers to the snack product savor flavor.
2. The multigrain snack of claim 1, wherein said cereals kinds are selected from the group consisting at least of rice, corn, wheat, and oats.
3. The multigrain snack of claim 1, comprising less than 5 % water and less than 5% fat.
4. The multigrain snack of claim 1, wherein said flakes are enough stable to keep their shape during packaging, storage, and transport of the product.
5. The multigrain snack of claim 1, wherein said coating comprises a spicy or savory flavor and/or taste selected from flavor and/or taste of barbecue, meat, mixed meat, beef, lamb, game, fowl, chicken, fish, shrimp, ham, bacon, grill, smoke, onion, sesame, cinnamon, pepper, salt and vinegar, sea salt and pepper, caramel salt, tomato, potato, potato chips, green chili, hot chili, sweet chili, olive, rosemary, oregano, cumin, mixed spice, mixed herbs, ranch salad dressing, mixed vegetable flavor, pizza, falafel, peanut, peanut butter, curry, wasabi, dairy, cheese, parmesan, butter, sour cream, or nacho.
6. The multigrain snack of claim 1, wherein said coating comprises at least one health-promoting component.
7. The multigrain snack of claim 1, wherein said coating comprises at least one health-promoting component selected from prebiotic saccharides.

8. The multigrain snack of claim 1, comprising carbohydrates at an amount of at least 75%.
9. The multigrain snack of claim 1, comprising energy at an amount of less than 480 kcal/100g.
10. The multigrain snack of claim 1, comprising sodium at an amount of less than 450 mg/100g.
11. The multigrain snack of claim 1, comprising less than 400 kcal/100 g and less than 400 mg sodium /100g.
12. The multigrain snack of claim 1, comprising essentially no sodium monoglutamate.
13. The multigrain snack of claim 1, comprising essentially no milk components.
14. The multigrain snack of claim 1, constituted by extruded multi-cereal flakes, coated with a savory layer, comprising less than 4 % water and less than 3% fat, which flakes exhibit organoleptic properties of typical spicy snacks while containing health-promoting components of typical breakfast cereals meals.
15. A method for manufacturing a multigrain snack product comprising the steps of
 - i) providing ingredients derived from at least three cereals kinds, sugar, kitchen salt, and edible emulsifiers, mixing them with water and optionally with other additives adjusting the molding behavior of the mixture, and the organoleptic properties of the product;
 - ii) extruding and flaking the mixture obtained in step i);
 - iii) toasting the flakes obtained in step ii);

- iv) coating the tasted flakes with a coating aqueous mixture comprising oligofructans and seasonings conferring to the flakes a desired flavor;
- v) drying; and
- vi) packaging and storing.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER IPC (2016.01) A23L 25/00, A23L 27/00 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) IPC (2016.01) A23L 25/00, A23L 27/00 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 practicable, search terms used) Databases consulted: THOMSON INNOVATION Search terms used: Multigrain, coat, flavor, taste		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009162498 A1 THE QUAKER OATS COMPANY 25 Jun 2009 (2009/06/25) [0001] , [0009] , [0012] , [0026] , [0032] , [0039] , [0061] , [0065]	1-4,6,7,9-15
Y	[0001] , [0009] , [0012] , [0026] , [0032] , [0039] , [0065]	5,8
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Y	[0017]	8
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
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Name and mailing address of the ISA: Israel Patent Office Technology Park, Bldg.5, Malcha, Jerusalem, 9695101, Israel Facsimile No. 972-2-5651616		Authorized officer BERKOWITZ Tzipora Telephone No. 972-2-5651656

INTERNATIONAL SEARCH REPORT

Information on patent family members

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