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(73) Patenthaver: **Alchemy Foodtech Pte. Ltd., 53 Li Hwan Terrace , Golden Hill Estate, Singapore 556981, Singapore**

(72) Opfinder: **GOH, Zhi Min Verleen, 634 East Coast Road, Singapore 459020, Singapore**

(74) Fuldmægtig i Danmark: **Plougmann Vingtoft A/S, Strandvejen 70, 2900 Hellerup, Danmark**

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DESCRIPTION

Field of the Invention

[0001] The invention relates to an advanced food material in the form of a composition for lowering the glycemic index of a foodstuff and a composite comprising said composition and said foodstuff particularly, but not exclusively, wherein said foodstuff has a glycaemic index which is favourably lowered by the addition of said material.

Background of the Invention

[0002] There are a number of pathological conditions that result in hyperglycaemia; the most well-known being diabetes mellitus. Diabetes is essentially due to either the pancreas not producing enough insulin or the cells of the body not responding properly to the insulin produced. Diabetes mellitus can be of type 1 or type 2:

- Type 1 diabetes is an autoimmune disease resulting in destruction of the pancreatic β cells which means the subject is unable to produce sufficient levels of insulin;
- Type 2 diabetes is a more complicated condition and can result from a number of associated ailments but commonly involves resistance to the metabolic actions of insulin. For example, type 2 diabetes is associated with age, obesity and a sedentary life style all of which result in insulin resistance.

[0003] Without sufficient insulin in the bloodstream, after a carbohydrate rich meal, glucose in the bloodstream is unable to move out and into the cells. The blood glucose levels increases, and this is known as hyperglycemia. All forms of diabetes increase the risk of long-term complications. These typically develop after many years (10-20), but may be the first symptom in those who have otherwise not received a diagnosis before that time. If left untreated, hyperglycemia can cause long-term complications such as cardiovascular disease, neuropathy, diabetic nephropathy, diabetic retinopathy which can potentially lead to blindness, and serious limb infections which can potentially lead to amputation.

[0004] Globally, there are 387 million diabetics with Type 2 diabetes being responsible for up to 90% of these cases. Diabetes at least doubles a person's risk of death and by 2035 it is expected that the number of people with diabetes is expected to rise to 592 million.

[0005] Diabetes mellitus is a chronic disease, for which there is no known cure except in very specific situations. Clinical treatment goals for type 2 diabetes are primarily focused on lowering blood glucose levels to forestall diabetes related complications, and can be managed with or without administration of insulin.

[0006] One recommendation for diabetic patients to maintain their blood glucose levels is to follow a specific dietary plan, however, there is much disagreement about what represents an optimum diabetic diet. Since carbohydrate is the macronutrient which raises blood glucose levels most significantly, the greatest debate is regarding how low in carbohydrates the diet should be. This is because although lowering carbohydrate intake will lead to reduced blood glucose levels, carbohydrates are traditionally considered the main energy source in most modem diets, and a low-carbohydrate diet is likely to contain increased amounts of calories from fat and saturated fat. The most agreed upon recommendation is for the diet to be low in sugar and refined carbohydrates, while relatively high in dietary fiber, especially soluble fiber. Likewise, people with diabetes may be encouraged to reduce the intake of carbohydrates that have a high glycemic index (GI) and therefore follow a low GI diet.

[0007] A low-GI diet is one that selects foods on the basis of minimal alteration of circulating glucose levels. Glycemic index (GI) and glycemic load (GL) are measures of the effect on blood glucose level after a food containing carbohydrates is consumed. A diet based on foods with a low glycemic response has been associated with diabetes management, improved blood lipids (cholesterol), and reduced risk of heart disease.

[0008] Unfortunately a low GI diet is not easy to achieve, as many meals comprise refined carbohydrates, such as rice, noodles and white bread. For example, rice is the staple food of more than half of the world's population - more than 3.5 billion people depend on rice for more than 20% of their daily calories. In 2009, rice provided 19% of global human per capita energy and 13% of per capita protein. Asia accounts for 90% of global rice consumption, and the total rice demand there continues to rise.

[0009] As Asia becomes more affluent, the consumption of refined rice and rice products that are high in simple carbohydrates goes up. Despite the push for more wholegrain and unrefined rice and rice products in the developed Asian cities (where most diabetics in Asia are found), the preference for refined rice and refined rice products makes it challenging for diabetics to control their diet, causing hyperglycemia.

[0010] CN102038126 discloses a health food for regulating atherosclerosis, and preparation method thereof. DE10244359 discloses a preparation which has a high content of acid and/or salt thereof and contains at least one resistant starch and at least one polyphenol. Such preparations may be used alone in feed or in admixture with other feed additives in livestock rearing or as pet food.

[0011] We disclose herein a novel advanced food material in the form of a composition for lowering the glycemic index of a foodstuff, especially those of refined carbohydrates, without adversely affecting the taste, texture, appearance, cooking method and shelf life of same. Indeed, it has surprisingly been found that the material disclosed herein comprises the correct balance and amounts of components that have been found to reduce glycemic index to such a degree that a typically high GI food is rendered a low GI food upon addition of said material.

The material therefore has utility in its addition to food to reduce the GI levels of same, and also in the preparation and manufacture of low GI food stuffs, and as part of a low GI diet in the management of weight loss or diabetes.

Summary

[0012] In one aspect, there is provided a food material in the form of a composition for reducing the glycemic index of a foodstuff, the food material comprises insoluble resistant starch, soluble fibre, and at least one carbohydrate enzyme inhibitor(s), wherein said insoluble resistant starch is present in an amount selected from the range 40-80% by weight of the composition, wherein said soluble fibre is present in an amount selected from the range 10-20% by weight of the composition, wherein said at least one carbohydrate enzyme inhibitor(s) is present in an amount selected from the range 0.5% to 2.5% by weight of the composition.

[0013] In another aspect, there is provided a composite comprising the food material as disclosed herein, and at least one foodstuff.

[0014] In another aspect, there is provided use of the food material as disclosed herein in reducing the glycemic index of a foodstuff.

Detailed Description

[0015] According to a first aspect of the invention there is a provided an advanced food material in the form of a composition for lowering the glycemic index of a foodstuff comprising or consisting of insoluble resistant starch, soluble fibre, and at least one carbohydrate enzyme inhibitor(s) wherein said insoluble resistant starch is present in an amount selected from the range 40-80% by weight of the composition.

[0016] The term glycemic index is one well known by those skilled in the art and refers to a number associated with a particular type of food following consumption that indicates the food's effect on a person's blood glucose level. The glycemic index is usually applied in the context of the quantity of the food and the amount of carbohydrate in the food that is actually consumed. A related measure, the glycemic load (GL), factors this in by multiplying the glycemic index of the food in question by the carbohydrate content of the actual serving.

[0017] The glycemic index of a food is defined as the incremental area under the two-hour blood glucose response curve (AUC) following a 12-hour fast and ingestion of a food with a certain quantity of available carbohydrate (usually 50 g). The AUC of the test food is divided by the AUC of the standard (either glucose or white bread, giving two different definitions) and multiplied by 100. The average GI value is calculated from data collected in 10 human subjects. Both the standard and test food must contain an equal amount of available

carbohydrate. The result gives a relative ranking for each tested food. A value of 100 represents the standard, an equivalent amount of pure glucose. GI values can be interpreted as percentages on an absolute scale relative to glucose and are commonly interpreted as follows:

1. i) Low GI = 55% or less;
2. ii) Medium GI = 56-69%;
3. iii) High GI = 70% and above.

[0018] As is known to those skilled in the art, a low-GI food will release glucose more slowly and steadily, which leads to more suitable postprandial (after meal) blood glucose readings. A high-GI food causes a more rapid rise in blood glucose levels.

[0019] Reference herein to resistant starch refers to any starch, or starch products, that are not digested and absorbed in the stomach or small intestine and pass on to the large intestine, where it is digested by bacteria to form short chain fatty acids such as butyrate. Studies have shown that resistant starch is effective at lowering blood sugar levels after meals, and contributes to a second meal effect. Some studies have also shown that resistant starch increases insulin sensitivity.

[0020] In a preferred embodiment of the invention, said resistant starch is present in an amount selected from the group comprising or consisting of: 40%, 41%, 42%, 43%, 44%, 45%, 46%, 47%, 48%, 49%, 50%, 51%, 52%, 53%, 54%, 55%, 56%, 57%, 58%, 59%, 60%, 61%, 62%, 63%, 64%, 65%, 66%, 67%, 68%, 69%, 70%, 71%, 72%, 73%, 74%, 75%, 76%, 77%, 78%, 79% and 80%, including every 0.1% integer there between.

[0021] Reference herein to insoluble resistant starch refers to the afore starch that is essentially incompletely soluble (i.e. insoluble or essentially insoluble) in water or in aqueous solution.

[0022] As disclosed herein, the composition according to the present invention is characterized as comprising insoluble resistant starch having water/aqueous insolubility at room temperature and also after being cooked. This advantageously permits formation of the composition into solid foods that require a dough formation, such as but not limited to bread, buns, noodles, pasta and for products to be extruded into different shapes using an extruder (such as, for example, rice-shape like grains).

[0023] As will be appreciated by those skilled in the art, insoluble resistant starch occurs naturally in foods but can also added to foods by the addition of isolated or manufactured types of insoluble resistant starch. In a preferred embodiment of the invention, said insoluble resistant starch is derived from a natural source or is artificially manufactured. More preferably, said insoluble resistant starch is derived from a natural source selected from the group comprising: grains, seeds, legumes, corn, rice, oat, barley, nuts, psyllium, tapioca, potatoes,

beans, fruit and plantain, or the like.

[0024] As is further known to those skilled in the art, insoluble resistant starch is typically categorized into four types:

1. i) RS1 - physically inaccessible or indigestible insoluble resistant starch, such as that found in seeds or legumes and unprocessed whole grains;
2. ii) RS2 - insoluble starch inaccessible to enzymes due to starch conformation, as in high amylose corn starch;
3. iii) RS3 - insoluble resistant starch that is formed when starch-containing foods are cooked and cooled, such as pasta, it arises due to retrogradation, wherein collective processes of dissolved starch becoming less soluble after being heated and dissolved in water and then cooled; or
4. iv) RS4 - insoluble starch that have been chemically modified to resist digestion.

[0025] In a preferred embodiment of the invention, said insoluble resistant starch is a subtype selected from the group comprising: RS1, RS2, RS3 and RS4. More preferably still, said insoluble resistant starch is the subtype RS2 or RS3 or, less preferably, RS4.

[0026] Reference herein to soluble fibre refers to any form of fibre which is digestible within the body and which typically forms a viscous gel on contact with water. In this form, it is believed that this gel can trap certain food components and make them less available for absorption. In a preferred embodiment of the invention, said soluble fibre is present in an amount selected from the range 1-20% by weight of the composition.

[0027] More preferably still, said soluble fibre is present in an amount selected from the group comprising or consisting of: 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9%, 10%, 11%, 12%, 13%, 14%, 15%, 16%, 17%, 18%, 19% and 20%, including every 0.1% integer there between.

[0028] As is known to those skilled in the art, soluble fibre can be found in many natural food sources. Accordingly, in yet a further preferred embodiment said soluble fibre is derived from a natural source selected from the group comprising: chicory root, grains, seeds, corn, rice, oat, barley, nuts, psyllium, tapioca, beans, fruit, or the like.

[0029] The purpose of adding the soluble fibre, in addition to its nutritional function of slowing down GI absorption, is to increase the composition's ability to hold water. This feature provides a composition that forms a dough and so can be moulded and shaped into desired food particles.

[0030] Reference herein to a carbohydrate enzyme inhibitor refers to any agent that reduces or prevents the activity of an enzyme that is involved in carbohydrate digestion such as but not limited to starch enzyme inhibitors selected from the group comprising: amylase inhibitor, sucrase inhibitor, maltase inhibitor, and glucosidase inhibitor, or the like.

[0031] In a preferred embodiment of the invention, said enzyme inhibitor is present in an amount selected from the range 0.1-10% by weight of the composition. More preferably, said enzyme inhibitor is present in an amount selected from the group comprising or consisting of: 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9% and 10%, including every 0.1% integer there between.

[0032] In yet a further preferred embodiment of the invention, said composition further comprises protein wherein said protein is present in an amount selected from the range 0.1-10% by weight of the composition. More preferably still, said protein is present in an amount selected from the group comprising or consisting of: 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9% and 10%, including every 0.1% integer there between.

[0033] As will be appreciated by those skilled in the art, said protein may be derived from numerous sources such as, but not limited to, natural sources selected from the group comprising or consisting of: soy, wheat, pea, rice, and whey, or the like.

[0034] In yet a further preferred embodiment still, said composition further comprises at least one hydrocolloid wherein said hydrocolloid is present in an amount selected from the range 0.1-10% by weight of the composition. More preferably, said hydrocolloid is present in an amount selected from the group comprising or consisting of: 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9% and 10%, including every 0.1% integer there between.

[0035] Reference herein to hydrocolloid refers to a substance which forms a gel in the presence of water. Without wishing to be bound by theory, it is thought that the presence of a hydrocolloid increases the viscosity of food and thereby delays the rate of digestion of same. Hydrocolloids are well known to those skilled in the art and include, but is not limited to, xanthan gum, locust bean gum, agar, alginate, carrageenan, and guar gum.

[0036] In a further preferred embodiment of the invention, the advanced food material ideally comprises a composition wherein said insoluble resistant starch is present in amount of about 50% by weight, said soluble fibre is present in amount of about 10% by weight, said enzyme Inhibitor is present in amount of about 1%, said protein is present in amount of about 2% by weight and said hydrocolloid in present in amount of about 0.5% by weight. More ideally still, said advanced food material further comprises water to provide the remaining constitents.

[0037] In an alternative further preferred embodiment of the invention, the advanced food material ideally comprises a composition wherein said insoluble resistant starch is present in amount of about 70% by weight, said soluble fibre is present in amount of about 15% by weight, said enzyme Inhibitor is present in amount of about 0.5%, said protein is present in amount of about 2% by weight and said hydrocolloid is present in amount of about 0.5% by weight. More ideally still, said advanced food material further comprises water to provide the remaining constituent.

[0038] In yet a further preferred embodiment of the invention, said composition further

comprises at least one fortifying agent selected from the group comprising or consisting of: vitamins, minerals, fatty acids, lipids micronutrients, and co-enzymes, or the like. As will be appreciated by those skilled in the art, food fortification or enrichment is the process of adding micronutrients (essential trace elements and vitamins) to food to improve its nutritional value. Such examples of fortifying agents include, but is not limited to, vitamins, minerals, fatty acids, lipids micronutrients, and co-enzymes. However, any number of micronutrients can be added to the composition and are well known to those skilled in the art.

[0039] In even yet a further preferred embodiment of the invention, said composition further comprises at least one stabilizer.

[0040] Reference herein to stabilizer refers to any additive, typically to foodstuffs, which helps to preserve its structure. Such additives are commonly used in the field of food preparation and known to those skilled in the art.

[0041] In yet a further preferred embodiment, said composition is provided in the form of a powder.

[0042] Yet more preferably, said advanced food material is formed into a food particle selected from the group comprising: a grain, noodle, ribbon, layer, chunk, shell, flake, thread and granule.

[0043] In yet a further preferred embodiment, said advanced food material is provided as a composite with at least one other foodstuff wherein said foodstuff has a glycemic index which is lowered by the addition of said advanced food material. More preferably, the addition of said advanced food material to said composite is in a specific effective amount that brings said glycemic index of said foodstuff and/or said composite with in a range that is beneficial for a consumer.

[0044] As disclosed herein, the components of the composition are such that they have been found to lower the glycemic index of food in order to delay digestion and avoid blood glucose spikes. In this regard, preferably said GI is lowered to a level of 55 or less thereby representing what is generally acknowledged by those skilled in the art as low GI food. Thus the effective amount of said material in said composite is an amount that lowers the GI to a selected level, e.g. of 55 or less.

[0045] It has been found that the disclosed material comprises the correct balance and amounts of components such that it effectively reduces the glycemic index of a foodstuff, and advantageously increases the fibre content, but importantly does not compromise the taste or texture of the foodstuff to which it is applied or from which it is manufactured.

[0046] Throughout the description and claims of this specification, the words "comprise" and "contain" and variations of the words, for example "comprising" and "comprises", mean "including but not limited to" and do not exclude other moieties, additives, components,

integers or steps. Throughout the description and claims of this specification, the singular encompasses the plural unless the context otherwise requires. In particular, where the indefinite article is used, the specification is to be understood as contemplating plurality as well as singularity, unless the context requires otherwise.

[0047] All references, including any patent or patent application, cited in this specification are hereby incorporated by reference. No admission is made that any reference constitutes prior art. Further, no admission is made that any of the prior art constitutes part of the common general knowledge in the art.

[0048] Preferred features of each aspect of the invention may be as described in connection with any of the other aspects.

[0049] Other features of the present invention will become apparent from the following examples. Generally speaking, the invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including the accompanying claims and drawings). Thus, features, integers, characteristics, compounds or chemical moieties described in conjunction with a particular aspect, embodiment or example of the invention are to be understood to be applicable to any other aspect, embodiment or example described herein, unless incompatible therewith.

[0050] Moreover, unless stated otherwise, any feature disclosed herein may be replaced by an alternative feature serving the same or a similar purpose.

[0051] The Invention will now be described by way of example only with reference to the Figures and Examples below.

Figure-1. Composition comprising bread 'dough' of 10% flour substituted with 100% starch i.e. inulin. However, with this mixture a dough could not be formed.

Figure-2. Composition comprising insoluble resistant starch (70% by weight), soluble fibre (15% by weight), enzyme Inhibitor (0.5% by weight), protein (2% by weight) and hydrocolloid (0.5% by weight) extruded into a rice-shape. Following cooking in water, the food material retains its grain-shape after cooking and does not dissolve fully in water.

Figure-3. Comparison of the mouldability of compositions comprising various amounts of resistant starch and soluble fibre.

[0052] We have developed a food material having a composition of about 40-80% insoluble resistant starch (RS), especially RS2 and RS3, derived from a natural source selected from the group comprising: grains, seeds, legumes, corn, rice, oat, barley, nuts, psyllium, tapioca, potatoes, beans, fruit and plantain.

[0053] The food material contains soluble fibre. The basis for establishing the soluble fibre quantity was undertaken by comparing brown and white or naturally occurring low GI and its refined high GI options, soluble fibre is present in an amount of about 1-20% by weight of the composition ideally the fibre is sourced from a natural source such as: chicory root, grains, seeds, corn, rice, oat, barley, nuts, psyllium, tapioca, beans, and fruit. The purpose of adding the soluble fibre, in addition to its nutritional function of slowing down GI and increasing fibre content, is also to increase the composite's ability to hold water enabling it to form a dough; as if using only insoluble resistant starch the material will not have any water binding properties and a dough, from which food particles can be fashioned, cannot be formed (figure 1).

[0054] The food material also contains a carbohydrate enzyme inhibitor(s) such as a starch enzyme inhibitor, ideally, an amylase inhibitor, sucrase inhibitor, maltase inhibitor, or glucosidase inhibitor, and for best results the enzyme inhibitor is present in an amount of about 0.1-10% by weight of the composition.

[0055] The composition was derived through lots of trial and error experimentation and some serendipity, to achieve a non-sticky dough which can be molded. Advantageously our food material is useful for lowering the glycemic index of a foodstuff.

[0056] As a non-sticky dough, we have extruded the composition into rice-like grains and added these extruded grains to normal jasmine rice, in doing so the GI of the rice/grains (measured by an in-vitro method) was incrementally reduced as the amount of our food material was added (figure 2).

GI of Thai Jasmine Rice - 109 (high GI)

GI of Thai Jasmine Rice + 4.5% extruded grains- 60 (med GI)

GI of Thai Jasmine Rice + 6.0% extruded grains- 55 (low GI)

[0057] To further enhance the nature of the food material we have added a hydrocolloid and protein - these aid emulsification, binding and stabilise the food product. In the gut, hydrocolloid forms a viscous gel and hinders postprandial digestion. Although protein does not have an impact on glycemic impact per se, as it is not a carbohydrate, it slows down the rate of digestion of carbohydrates when eaten together. Hence, hydrocolloids and proteins also help to lower glycemic index.

[0058] In our food product we use protein present in an amount of about 0.1-10% by weight of the composition and, ideally, derived from natural sources such as: soy, wheat, pea, rice, and whey.

[0059] The hydrocolloid used in our product is present in an amount of about 0.1-10% by weight of the composition and, ideally, is derived from: xanthan gum, locust bean gum, agar,

alginate, carrageenan, and guar gum.

[0060] An embodiment of our food product comprises: insoluble resistant starch in amount of about 70% by weight, soluble fibre in amount of about 15% by weight, enzyme Inhibitor in amount of about 0.5%, protein in amount of about 2% by weight and hydrocolloid in amount of about 0.5% by weight.

[0061] Another embodiment of our food product comprises: insoluble resistant starch in amount of about 50% by weight, soluble fibre in amount of about 10% by weight, enzyme Inhibitor in amount of about 1%, protein in amount of about 2% by weight and hydrocolloid in amount of about 0.5% by weight.

[0062] We typically use water to provide the remaining constituent.

[0063] Optionally, we also add supplements to the product such as at least one fortifying agent such as vitamins, minerals, fatty acids, lipids micronutrients, and co-enzymes.

[0064] It may also be advantageous to add at least one stabilizer.

[0065] The food product can be fashioned according to a user's requirement using conventional techniques, powder forms are favoured but so too are grains, noodles, ribbons, layers, chunks, shells, flakes, threads and granules.

[0066] Selected amounts of our food product can be added to a high GI food, before, during or after cooking, to lower the GI of same, the amount of our food product used is determined according to the desired GI for the combined products and is calculated using known techniques.

REFERENCES CITED IN THE DESCRIPTION

Cited references

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

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Patentkrav

1. Fødevarematerialе i form af en sammensætning til at reducere en fødevares glykæmiske indeks, hvilket fødevarematerialе omfatter uopløselig resistent stivelse, opløselig fiber, og mindst en kulhydratenzyminhibitor(er), hvor nævnte uopløselige resistente stivelse er til stede i en mængde valgt fra området 40-80 vægtprocent af sammensætningen, hvor nævnte opløselige fiber er til stede i en mængde valgt fra området 10-20 vægtprocent af sammensætningen, og hvor nævnte mindst ene kulhydratenzyminhibitor(er) er til stede i en mængde valgt fra området 0,5 til 2,5 vægtprocent af sammensætningen.

2. Fødevarematerialet ifølge krav 1, hvor nævnte uopløselige resistente stivelse er kunstigt fremstillet eller stammer fra en naturlig kilde, eventuelt hvor nævnte uopløselige resistente stivelse stammer fra en naturlig kilde valgt fra gruppen bestående af: korn, frø, bælgplanter, majs, ris, havre, byg, nødder, loppefrø, tapioka, kartofler, bønner, frugt og madbananer, eventuelt hvor nævnte uopløselige resistent stivelse er en undertype valgt fra gruppen bestående af: RS1, RS2, RS3 og RS4, eventuelt hvor nævnte uopløselige resistente stivelse er undertypen RS2 eller RS3.

3. Fødevarematerialet ifølge krav 1 eller 2, hvor nævnte opløselige fiber stammer fra en naturlig kilde valgt fra gruppen omfattende: cikorierod, korn, frø, majs, ris, havre, byg, nødder, loppefrø, tapioka, bønner, frugt.

4. Fødevarematerialet ifølge et hvilket som helst af kravene 1-3, hvor nævnte kulhydratenzyminhibitor(er) er en stivelsesenzyminhibitor, eventuelt hvor nævnte stivelsesenzyminhibitor er valgt fra gruppen bestående af: amylaseinhibitor, sucraseinhibitor, maltaseinhibitor og glucosidaseinhibitor.

5. Fødevarematerialet ifølge et hvilket som helst af kravene 1-5, hvor nævnte sammensætning yderligere omfatter protein, hvor nævnte protein er til stede i en mængde valgt fra området 0,1-10 vægtprocent af sammensætningen, eventuelt hvor nævnte protein stammer fra naturlige kilder valgt fra gruppen bestående af: soja, hvede, ærter, ris og valle.

6. Fødevarematerialet ifølge et hvilket som helst af kravene 1-5, hvor nævnte sammensætning yderligere omfatter mindst et hydrokolloid, hvor nævnte hydrokolloid er til stede i en mængde valgt fra området 0,1-10 vægtprocent af sammensætningen, eventuelt hvor nævnte hydrokolloid er valgt fra gruppen bestående af: xanthangummi, johannesbrødkernemel, agar, alginat, carrageenan, og guar gummi.

7. Fødevarematerialet ifølge krav 6, hvor nævnte uopløselige resistente stivelse er til stede i en mængde på ca. 70 vægtprocent, nævnte opløselige fiber er til stede i en mængde på ca. 15 vægtprocent, nævnte enzyminhibitor er til stede i en mængde på ca. 0,5 vægtprocent, nævnte protein er til stede i en mængde på ca. 2 vægtprocent, og nævnte hydrokolloid er til stede i en mængde på ca. 0,5 vægtprocent.

8. Fødevarematerialet ifølge krav 6, hvor nævnte uopløselige resistente stivelse er til stede i en mængde på ca. 50 vægtprocent, nævnte opløselige fiber er til stede i en mængde på ca. 10 vægtprocent, nævnte enzyminhibitor er til stede i en mængde på ca. 1 vægtprocent, nævnte protein er til stede i en mængde på ca. 2 vægtprocent, og nævnte hydrokolloid er til stede i en mængde på ca. 0,5 vægtprocent.

9. Fødevarematerialet ifølge krav 7 eller 8, hvor vand udgør den restende bestanddel.

10. Fødevarematerialet ifølge et hvilket som helst af kravene 1-9, hvor nævnte sammensætning yderligere omfatter mindst et berigende middel valgt fra gruppen bestående af: vitaminer, mineraler, fedtsyrer, lipidmikronæringsstoffer og co-enzymer, eventuelt hvor nævnte sammensætning yderligere omfatter mindst en stabilisator.

11. Fødevarematerialet ifølge et hvilket som helst af kravene 1-10, hvor nævnte sammensætning er tilvejebragt i form af et pulver.

12. Fødevarematerialet ifølge et hvilket som helst af de foregående krav, hvor nævnte fødevarematerialet er formet til en fødevarepartikel valgt fra gruppen

bestående af: korn, nudler, strimmel, lag, klump, skal, flage, bånd og granulat.

13. Komposit omfattende fødevarematerialet ifølge et hvilket som helst af kravene 1-12, og mindst en fødevare.

14. Anvendelse af fødevarematerialet ifølge et hvilket som helst af kravene 1 til 12 til reduktion af en fødevares glykæmiske indeks.

DRAWINGS

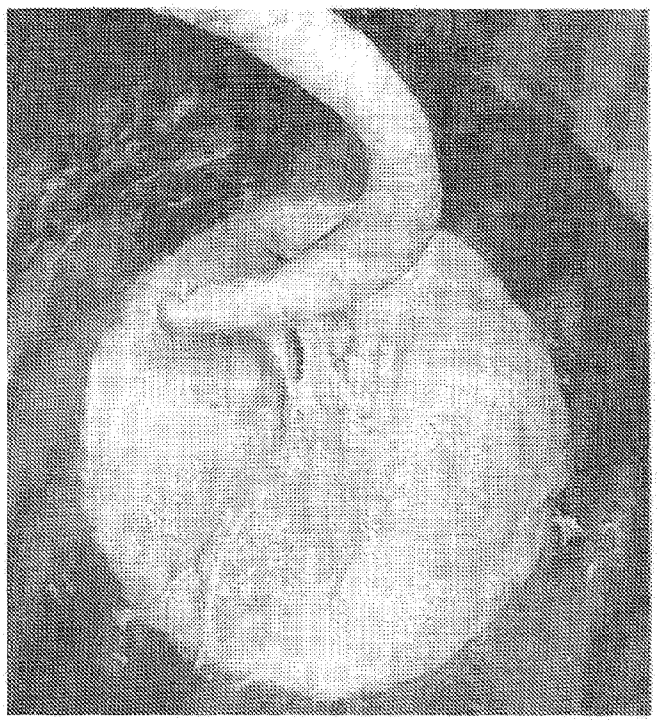


Figure-1

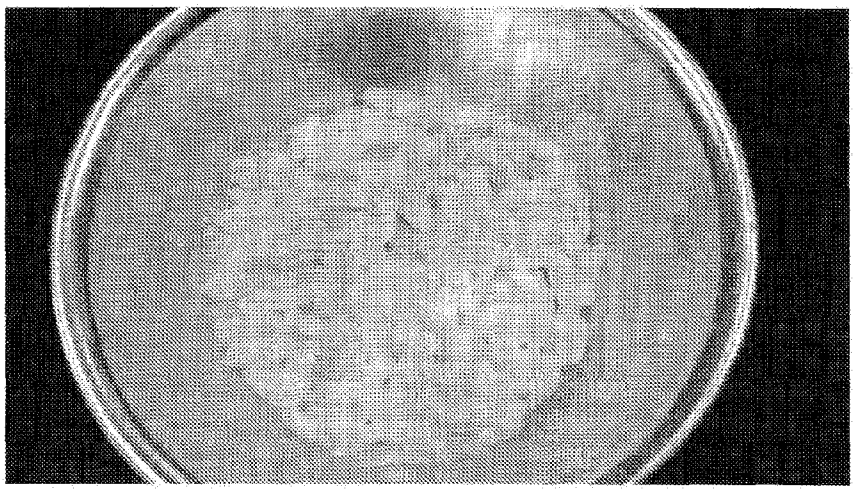


Figure-2

Sample	100% Insoluble Resistant Starch	100% Soluble Fibre	90% Insoluble Resistant Starch) + 10% Soluble Fibre	80% Insoluble Resistant Starch) + 20% Soluble Fibre
Water (ml)	25.75	25.75	25.75	25.75
Insoluble resistant starch (g)	50	0	45	40
Soluble fibre (g)	0	50	5	10
Observations	Not able to form a dough	Not able to form a dough	Not able to form a dough	Able to form a dough
Picture				
Water absorption	50.50%	no results as the material was stuck to the blades	54.50%	57%

Figure-3