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Title: DAIRY FERMENTED PRODUCT COMPRISING WHEAT BRAN

Abstract: The invention relates to a dairy fermented product comprising a significant amount of wheat bran, to a process of making such a product, and to uses thereof. The wheat bran has a specific particle size.
Dairy fermented product comprising wheat bran

The invention relates to a dairy fermented product comprising a significant amount of wheat bran, to a process of making such a product, and to uses thereof.

Wheat bran is an ingredient that can be used in food products as a source of wheat bran fibers that are recognized as providing health-related benefits. Dairy fermented products are appreciated by consumers as products that can provide health-related benefits. There is a need for dairy fermented products comprising a significant amount of wheat bran, typically for providing a significant amount of wheat bran fiber; while having good properties such as organoleptic properties, visual aspect and stability.

Document WO 201 0/066012 describes a yogurt composition comprising 8.4% of wheat bran and 3.2% of arabinobioxyan-oligosaccharides (AXOS). Such products however provide bad organoleptic properties such as astringency, bitterness and strong cereal taste. Meanwhile such products are expected to provide much whey, which is not appreciated by consumers. There is a need for improved products comprising wheat bran.

Document RU 20061 13061 describes milk-based compositions comprising 0.3-0.7% of wheat bran, wherein the wheat bran has a fiber content of 45% to 83%. Such compositions provide very low amounts of wheat bran fibers and are not efficient to provide the benefit associated to such fibers. There is a need for more concentrated compositions.

Documents WO 2006/134159 and WO 2006/134157 describe fermented dairy products comprising wheat bran with a particle size of 0.5-1.5 mm, introduced in an amount of 0.57% by weight (3% in an intermediate preparation, used as 19% of the final product). Such compositions provide very low amounts of wheat bran fibers and are not efficient to provide the benefit associated to such fibers. There is a need for more concentrated compositions.

particle size of the wheat bran is not disclosed. Such products are expected to provide much whey, which is not appreciated by consumers. There is a need for different compositions.

Document "Effect of the bran wheat on the rheological behavior of yogurt buffalo milk", Andrade, R D; Arteaga, M R; Simanca, M M., Informacion Tecnologica 21. 5 (2010): 117-124., describes buffalo yogurts comprising up to 5% of wheat bran having a particle size of about 50 μm. Such yogurts are said to have a pseudoplastic rheology. Particles of such a size are believed to provide bitterness, and are expected to provide much whey, which is not appreciated by consumers. There is a need for different compositions.

Document US 2010/00800866 describes solid baked compositions comprising wheat bran. There is a need for products having different forms.

Document US 2004-0258776 describes aleuron extracts from wheat bran and uses in food compositions such as yogurts. Amounts in products are not disclosed. The extraction process is complex; there is a need for less complex compositions and processes comprising wheat bran.

Document US 2003/01 75384 describes a method of extracting aleuron from wheat bran having a size of 400-800 μm, and uses in food compositions such as yogurts. Amounts in products are not disclosed. The extraction process is complex; there is a need for less complex compositions and processes comprising wheat bran.

Document WO 2006/002495 describes arabinoyxans extracted from wheat bran with a degree of polymerization between 5 and 50 used in dairy products such as yogurts in amounts of from 0.25 to 5 g per 125 g. The extraction process is complex, there is a need for less complex compositions and processes comprising wheat bran.

Document WO 03/055331 describes the use of wheat bran in food compositions, for example in dairy products. However there is no information about precise amounts and sizes that would be appropriate in dairy products. There is a need for improved compositions.

Document WO 2005/01 1403 describes fermenting an aqueous composition comprising wheat bran and admixing it in a dairy product. The fermentation can be complex and the final amount in the dairy product is quite low (up to 0.8% in example 10). There is a need for different products or processes.

Some dairy products comprising wheat bran, and thus wheat bran fiber, have been marketed. However these products comprise low amounts of wheat bran, and
thus low amounts of wheat bran fibers. There is a need for products comprising high amounts of wheat bran fibers, which still present good organoleptic properties, visual aspect and/or stability.

The invention addresses at least one of the above problems and/or needs with a dairy fermented product in a non-solid form comprising wheat bran dispersed therein, wherein:
- the product comprises at least 2.6 g of wheat bran, preferably at least 3.7 g, per 100 g of product, and
- the wheat bran has a particle size with a volume average diameter $D_m$ of from 200 µm to 400 µm, preferably from 250 to 350 µm.

The invention also concerns a process of making a dairy fermented product in a non-solid form, comprising the step of dispersing wheat bran powder in a dairy fermented white mass or ingredients thereof, wherein:
- at least 2.6 g of wheat bran powder, preferably at least 3.7 g, per 100 g of product are dispersed, and
- the wheat bran powder has a particle size with a volume average diameter $D_m$ of from 200 µm to 400 µm, preferably from 250 to 350 µm.

The invention also concerns an intermediate preparation useful for preparing the fermented dairy product.

The invention also concerns the use of the products as food products. The invention also concerns the use of the products by oral administration.

It has been found that the specific particle size provides improved products with a low amount of whey in the fermented dairy products, which whey is not appreciated by consumers. It has also been found that the specific particle size reduces bitterness, while avoiding the perception of particles in mouth, which is not appreciated by consumers.

Meanwhile the products, processes and/or intermediate preparations have a good processability with for example appropriate stabilities and/or viscosities.

The invention also concerns the use of the products for reducing and/or preventing gastro-intestinal discomfort. For example the invention concerns the use of the products for contributing to an acceleration of intestinal transit. The invention also concerns a method of reducing and/or preventing gastro-intestinal discomfort, by oral
administration of the products. For example the invention concerns a method for accelerating intestinal transit by oral administration of the products. The invention also concerns the products for use for reducing and/or preventing gastro-intestinal discomfort. For example the invention concerns the products for use for an acceleration of intestinal transit.

Definitions

In the present application, unless provided otherwise, amounts of compounds or compositions are amounts by weight.

In the present application particle sizes and particle sizes distribution refer to sizes and distributions evaluated by light scattering technologies, preferably with a Malvern Mastersizer 2000 laser particle size analyzer.

Unless provided otherwise, a particle size refers to a volume-average diameter $D_v$, wherein the diameter is the diameter of a sphere that would have the same volume than the particle or particles sample.

In the present application, a $D_{10}$ size represents the diameter (of a sphere having the same volume) at which 10% by volume of the particles have a lower diameter and 90% by volume the particles have a higher diameter.

In the present application, a $D_{50}$ size represents the diameter (of a sphere having the same volume) at which 50% by volume of the particles have a lower diameter and 50% by volume the particles have a higher diameter.

In the present application, a $D_{90}$ size represents the diameter (of a sphere having the same volume) at which 90% by volume of the particles have a lower diameter and 10% by volume the particles have a higher diameter.

Dairy fermented product

The product of the invention is a non-solid dairy fermented product comprising wheat bran dispersed therein. The product can be considered as a non-solid dairy fermented matrix with wheat bran dispersed therein. Herein the matrix can be understood as the product without the wheat bran. The product without the wheat bran can also be referred to as a white mass. Hereafter, for sake of simplicity, it can be referred to the dairy fermented product or dairy fermented composition or dairy fermented for the matrix for the same object.
The product is a non-solid product. Examples of non-solid products include pastes and liquids. As non-solid it is referred to pasty or fluid products that can by penetrated by a spoon. The products are typically spoonable products. Examples of products that are considered as solids include powders, baked products and dry cereals.

Dairy fermented products are known by the one skilled in the art. Compositions suitable as dairy fermented products can be referred to as white masses. The dairy fermented composition is typically a fermented milk product. Such products are made from a milk-based composition and have undergone a fermentation step. The fermentation is typically done by microorganisms comprising lactic acid bacteria and optionally yeasts, and leads to the production of fermentation products, for example lactic acid, and/or to the multiplication of the microorganisms. The designation "fermented milk" can depend on local legislation, but is typically given to a dairy product prepared from skimmed or full fat milk, or concentrated or powdered milk, having undergone a heat treatment at least equivalent to a pasteurization treatment, and inoculated with lactic acid producing microorganisms such as Lactobacilli (Lactobacillus acidophilus, Lb. casei, Lb. plantarum, Lb. reuteri, Lb. johnsonii), certain Streptococci (Streptococcus thermophilus), Bifidobacteria (Bifidobacterium bifidum, B. longum, B. breve, B. animalis) and/or Lactococi (Lactococcus lactis). The dairy fermented composition is preferably a yogurt. It is mentioned that the milk or the milk ingredient(s) is preferably animal milk or milk ingredient(s), preferably cow milk or milk ingredient(s).

The dairy fermented composition can be a set product, wherein fermentation occurs in the packaging or a stirred or drink product, wherein fermentation occurs in a tank, and is then stirred to lower the viscosity prior to pack.

Further to wheat bran, the dairy fermented composition can comprise some organoleptic modifiers, such as colorants, sugar sweeteners, further sweeteners, flavors, fruit juice or fruit preparation, provided that these ingredients are suitable for human or animal consumption. Such ingredients and preparations are known by the one skilled in the art. They are typically selected to meet the consumers’ tastes, with different varieties of products. The composition can comprise further ingredients suitable for human or animal consumption, for example ingredients and additives that are usually used in yogurts or desserts. These include for example fibers different from wheat bran fiber, minerals, vitamins, fat or fat substitutes, for example vegetal fat, preservatives, etc.
Some details about ingredients of the products and incorporation in the product are provided below.

**Wheat bran and wheat bran fiber**

The product comprises wheat bran. Wheat bran is a common ingredient, known by the one skilled in the art. Wheat bran comprises wheat bran fiber and other components. These are known as well. Wheat bran fiber is an insoluble fiber present in wheat bran. Wheat bran can typically comprise from 30% to 50% by weight of wheat bran fiber, preferably from 35% to 45%. The very composition of wheat bran can vary depending on the plant variety, the climate, and the refining. Wheat bran fiber typically comprises lignin, arabinoxylans, cellulose, and beta-glucans. It is mentioned that wheat bran is typically different from aleuron extracts.

The wheat bran is typically a powder dispersed as particles in the product. The wheat bran for the invention has a particle size with a volume average diameter \( D_M \) of from 200 \( \mu \text{m} \) to 400 \( \mu \text{m} \), preferably from 250 to 350 \( \mu \text{m} \). Wheat bran of the desired particle size can be obtained by any appropriate process and means, for example by mechanical size reduction, by example by milling and/or sieving or sifting.

The wheat bran has preferably a particle size distribution as follows:

- Volume average diameter \( D_M \) of from 200 \( \mu \text{m} \) to 400 \( \mu \text{m} \), preferably from 250 to 350 \( \mu \text{m} \),
- \( D_{10} \) of higher than 100 \( \mu \text{m} \), preferably higher than 200 \( \mu \text{m} \),
- \( D_{50} \) of from 200 \( \mu \text{m} \) to 400 \( \mu \text{m} \), preferably of from 250 \( \mu \text{m} \) to 350 \( \mu \text{m} \), and
- \( D_{90} \) of lower than 600 \( \mu \text{m} \), preferably lower than 400 \( \mu \text{m} \).

High concentrations of wheat bran allow an efficient supplementation. For example high concentrations allow quite small size servings and/or allow a reduced number of servings to reach a desired intake. The amount of wheat bran can vary depending on other features of the dairy product, for example depending on energy density of the product. The amount can vary as well depending on the amount of wheat bran fiber in the wheat bran used. The one skilled in the art knows how to adjust the amounts and features of the dairy fermented composition.

Wheat bran is present and/or provided in the product in an amount of at least 2.6 g, preferably at least 3.7 g, per 100 g of product. In some embodiments the amount is
of at least 6 g, and even of at least 7 g per 100 g. The amount is typically lower or equal to 10 g per 100 g.

Wheat bran fiber is preferably present and/or provided in the product in an amount of at least 1.17 g, preferably at least 1.66 g, of wheat bran fiber, per 100 g of product. In some embodiments the amount is of at least 2.7 g, and even of at least 3.15 g per 100 g. The amount is typically lower or equal to 4.5 g per 100 g.

Wheat bran fiber is preferably present and/or provided in the product in an amount of at least 1.17 g per 100 kcal of product, preferably at least 1.66 g per 100 kcal. In some embodiments the amount is of at least 2.7 g, and even of at least 3.15 g per 100 g. The amount is typically lower or equal to 4.50 g per 100 kcal.

Processes

The invention also concerns a process useful for making the product. One can make the product by any appropriate process allowing a dispersion of the wheat bran in the dairy fermented product.

A specifically useful process is a process of making a dairy fermented product in a non-solid form, comprising the step of dispersing wheat bran powder in a dairy fermented white mass or ingredients thereof, wherein:

- at least 2.6 g of wheat bran powder, preferably at least 3.7 g, per 100 g of product are dispersed, and
- the wheat bran powder has a particle size with a volume average diameter \(D_m\) of from 200 \(\mu\text{m}\) to 400 \(\mu\text{m}\), preferably from 250 to 350 \(\mu\text{m}\).

The process can comprise the steps of:

a) providing a dairy fermented white mass,

b) adding the wheat bran powder, preferably in an intermediate preparation comprising water, optionally taste modifiers, and the wheat bran dispersed therein.

In a preferred embodiment the wheat bran is added via an intermediate preparation typically comprising water, optionally taste modifiers, and the wheat bran dispersed therein. Such intermediate preparations are often referred to as fruit preparations, and are known by the one skilled in the art.

The intermediate preparation is preferably added in an amount by weight of from 5 parts to 50 parts, preferably from 10 parts to 30 parts, for 100 parts of product.
It is mentioned that the features, such as sizes, amounts and/or concentrations, given above about the wheat bran in the dairy fermented products apply similarly to the process.

The white mass of step a) can be prepared by any appropriate process. For example the white mass can be prepared by a comprising the steps of:
a1) providing a milk-based composition,
a2) inoculating microorganisms comprising lactic acid bacteria in the milk-based composition,
a3) allowing a lactic fermentation to obtain a white mass.

Milk-based compositions useful in the process are known by the one skilled in the art of fermented dairy products. Herein a milk-based composition encompasses milk or milk fractions, and compositions obtained by mixing several previously separated milk fractions. Some water or some additives can be added to said milk, milk fractions and mixtures. Herein milk typically refers to animal milk, for example cow milk. Some alternative animal milks can be used, such as sheep milk or goat milk.

The milk-based composition can typically comprise ingredients selected from the group consisting of milk, half skimmed milk, skimmed milk, milk powder, skimmed milk powder, milk proteins, cream, and mixtures thereof. Some water or additives can be mixed therewith.

Step a1) can comprise sub-steps further to mixing such as heat-treatments, for example pasteurization or sterilization, and/or homogenization. Such steps are known be the one skilled in the art.

Step a1) can be performed using conventional equipments such as mixing equipments, heat exchangers, and homogenizers.

In a particular embodiment, step a1) comprises the following steps:
-step a1a) mixing ingredients to provide the milk-based composition comprising erythritol,
-step a1b) pasteurizing at a temperature of at least 90°C,
-step a1c) homogenizing and cooling to a temperature of less than 50°C.

Step a1) can comprise a homogenization step. This is preferably carried out at step a1c). Such operations are well known by the one skilled in the art and can be performed with conventional equipments. The homogenization can be performed at a
pressure of at least 25 bars. In a particular embodiment, the homogenization phase is performed at a pressure of at least 100 bars. It is mentioned that the homogenization can be performed in two steps: one at a pressure of 100-200 bars, one at a pressure of 25-50 bars.

Step a1) can comprise a heat treatment, such as pasteurization, Ultra High Temperature treatment, or High Temperature treatment. This is preferably carried out at step a1 b). Such treatments are known by the one skilled in the art, and can be performed with conventional equipments. The heat treatment is typically operated at at least 90°C. Depending on the temperature the treatment time can last typically from 1s to 20 minutes.

Step a1) can comprise a step of placing the mixture to a fermentation temperature, typically comprised between 30 and 50°C, preferably of 35° to 45°C. This is typically done by cooling after a heat treatment. This can be done for example at step a1c).

Step a2)

Step a2) involves inoculating microorganisms comprising lactic acid bacteria in the milk-based composition.

Such an operation is known by the one skilled in the art. Appropriate microorganisms and lactic acid bacteria are known by the one skilled in the art. It is mentioned the microorganisms can be free of microorganisms appropriate for an alcoholic fermentation, typically used in kefir processes. The microorganisms are typically free of sake yeast.

It is mentioned that lactic acid bacteria are often referred to as ferments or cultures or starters.

Examples of lactic acid bacteria that can be used include:
- Lactobacilli, for example Lactobacillus acidophilus, Lactobacillus casei, Lactobacillus plantarum, Lactobacillus reuteri, Lactobacillus johnsonii, Lactobacillus helveticus, Lactobacillus brevis, Lactobacillus rhamnosus,
- Streptococci, for example Streptococcus thermophilus,
- Bifidobacteria, for example Bifidobacterium bifidum, Bifidobacterium longum, Bifidobacterium breve, Bifidobacterium animalis,
- Lactococci, for example Lactococcus lactis,
- mixtures or association thereof.

The lactic acid bacteria preferably comprise, preferably consist of, Lactobacillus delbrueckii subsp. bulgaricus and Streptococcus salivarius subsp. thermophilus bacteria. The lactic acid bacteria used in the invention typically comprise an association of Streptococcus thermophilus and Lactobacillus delbrueckii subsp. bulgaricus. This association is known and often referred to as a yogurt symbiosis.

In a particular embodiment the lactic acid bacteria comprise probiotic bacteria. Probiotic bacteria are known by the one skilled in the art. Examples of probiotic bacteria include some Bifidobacteria and Lactobacilli, such as Bifidobacterium brevis, Bifidobacterium animalis, Bifidobacterium animalis lactis, Bifidobacterium infantis, Bifidobacterium longum, Lactobacillus helveticus, Lactobacillus casei, Lactobacillus casei paracasei, Lactobacillus acidophilus, Lactobacillus rhamnosus, Lactobacillus plantarum, Lactobacillus reuteri, Lactobacillus delbrueckii subsp bulgaricus, Lactobacillus delbrueckii subsp lactis, Lactobacillus delbrueckii subsp delbrueckii, Lactobacillus brevis and Lactobacillus fermentum.

Step a3)

Step a3) involves allowing a lactic fermentation, preferably at a temperature of higher than 30°C. This step is also referred to as a fermentation step. Step a3) leads to a composition referred to as a sweetened white mass.

Fermentation operations are known by the one skilled in the art. Fermentation can be typically performed at a temperature between 30°C and 50°C, preferably from 35°C to 45°C. Fermentation can be stopped by cooling and/or breaking the mixture when a breaking pH is reached. The fermentation time is the time between the inoculation and the breaking and/or cooling. The fermentation time can depend on the lactic acid bacteria, on the amount thereof, and on the temperature, and can for example last from 3 hours to 30 hours, for example from 12 to 22 hours.

During fermentation, the pH of the mixture decreases with production of lactic acid by the bacteria. The pH at the end of the fermentation can be typically of 5 or less than 5, preferably of 3.5 to 4.6. In a preferred embodiment the lactic acid fermentation carried out to a pH of from 3.5 to 5 preferably from 3.9 to 4.6.

After fermentation, step a3) can comprise a further step of stirring to obtain a composition having a desired viscosity. Such a step can be performed for example with a smoothing valve, for example at a pressure of at least 1.5 bars. This step provides
some shear to composition that typically allow a viscosity drop. Such operations are known by the one skilled in the art, and can be operated with conventional appropriate equipments. This step is typically performed at cold temperature, for example at a temperature of form 1°C to 25°C. It is mentioned that this stirring step is not performed in the case of set products, wherein fermentation is performed in packaging.

Intermediate preparation

The invention also concerns intermediate preparations comprising the wheat bran with the particles sizes as described above, and the use thereof in processes of making fermented dairy products.

In a preferred embodiment the intermediate preparation comprises at least 10% by weight, preferably at least 15% of wheat bran.

Intermediate preparations such as fruit preparation can comprise, beyond wheat bran, water, fruits or fruit extracts and optionally further organoleptic modifiers, such as sugar and/or sweeteners. They also typically comprise a stabilizing system, having at least one stabilizer. The stabilizing system can comprise at least two stabilizers. Such stabilizers are known by the one skilled in the art. They typically help in avoiding phase separation of solids, for examples of fruits or fruits extracts and/or in avoiding syneresis. They typically provide some viscosity to the composition, for example a viscosity (Bostwick viscosity at 20°C) of from 1 to 20 cm/min, preferably of from 4 to 12 cm/min.

The stabilizing system or the stabilizer can for example be a starch, a pectin, a guar, a xanthan, a carrageenan, a locust bean gum, or a mixture thereof. The amount of stabilizing system is typically of from 0.5 to 5% by weight.

The sweetening composition can typically comprise organoleptic modifiers. Such ingredients are known by the one skilled in the art.

The organoleptic modifiers can be for example flavors (or "aroma"), sugars, sweetening agents, coloring agents, fruits, fruit extracts.

Examples of sweetening agents are ingredients referred to as High Intensity Sweeteners, such as sucralose, acesulfamK, aspartam, saccharine, rebaudioside A or other steviosides or stevia extracts.

Examples of flavors include for example strawberry flavor, apricot flavor, vanilla flavor, peach flavor, cream flavor, sweet boosters, flavor modifiers, flavor improvers,
sweet modifiers, sweetness enhancers, masking flavors, and mixtures thereof. Such flavors are known to the one skilled in the art.

Useful fruits or fruit extracts are known by the one skilled in the art. Fruits and fruits extracts are herein considered as being sweetening agents. Examples of fruits or fruit extract include for example:

- frozen fruit cubes, for example 10 mm fruit cubes, for example Individual Quick Frozen fruit cubes, for example strawberry, peach, apricot, mango, apple or pear fruit cubes or mixtures thereof,
- Aseptic fruit cubes, for example 10 mm fruit cubes, for example strawberry, peach, apricot, mango, apple or pear fruit cubes or mixtures thereof,
- fruit purees, for example fruit purees concentrated from 2 to 5 times, preferably 3 times, for example aseptic fruit purees, for example strawberry, peach, apricot, mango, raspberry, blueberry or apple fruit purees or mixtures thereof,
- single aseptic fruit purees, for example strawberry, raspberry, peach, apricot, blueberry or apple single aseptic fruit purees or mixture thereof,
- frozen whole fruits, for example Individual Quick Frozen whole fruits, for example blueberry, raspberry or blackberry frozen whole fruits, or mixtures thereof,
- mixtures thereof.

Other examples of organoleptic modifiers include cacao, chocolate, coffee, nuts such as almond, walnut or chestnut, or extracts thereof or flavors thereof.

The organoleptic modifiers and the amounts thereof are typically such that the composition has a brix degree of from 1 to 65 brix.

The intermediate composition can comprise water. It is mentioned that a part of the water can come from ingredients used to prepare the composition, for example from fruits or fruit extracts. The amount of water in the composition is preferably from 10 to 99%, preferably from 10 to 87%.

The intermediate composition can comprise pH modification agents such as citric acid.

The intermediate composition can comprise further ingredients. Examples of such further ingredients include some nutrients and/or vitamins. The composition can for example comprise vitamin D, vitamin B and/or vitamin E. The amounts in the composition of such further ingredients can be adjusted for meeting desired amount in the fermented dairy product.
Packaging and servings

The product of the invention is typically contained in a sealed container as a packaging. The process typically involves a step of conditioning the product in a container. The container is then typically sealed, for example with a cap or a lid. The container is preferably a 100 g to 200 g container, for example 100 g to 135 g or 135 g to 150 g or 150 g to 200 g, for example 100 g or 125 g or 150 g or 175 g. The amount of product in the container is typically a serving amount of from 100 g to 200 g, for example 100 g to 135 g or 135 g to 150 g or 150 g to 200 g, for example 100 g or 125 g or 150 g or 175 g. The container is preferably a cup.

The product can be stored, transported and/or distributed at a chilled temperature of 0°C to 10°C, preferably of 4°C to 10°C.

Use of the composition

The product is typically to be used as a food product. It is typically used by oral administration. One can typically eat or drink the composition by processing it from a container to the mouth, optionally using a spoon, a glass, or a straw.

The product can be used for contributing to an acceleration of intestinal transit. The product can be typically used with a daily dosage of at least 10 g of wheat bran fiber, optionally in a form of 1 or 2 or 3 or 4 or 5 or 6 servings, said servings being preferably of from 100 g to 200 g, preferably of from 100 g to 150 g, preferably with at least 1.5 g of wheat bran fiber per 100 kcal, preferably at least 3 g per 100 kcal. Thus the dosage can be achieved by oral administration of several servings daily, for example 1 or 2 or 3 or 4 or 5 or 6 servings. The number of serving can depend on the amount of wheat bran or wheat bran fiber in the serving, and thus on the concentration of wheat bran or wheat bran fiber in the product. This amounts and/or concentrations can be adjusted as provided above.

Further details or advantages of the invention might appear in the following non limitative examples.

Examples

Example 1 - Wheat Bran powders

Various wheat bran powders are used and/or prepared and the particle size distribution is evaluated.
Powder A (comparative): wheat bran powder "ultrafine" grade supplied by Nutrixo.
Powder B: wheat bran powder "fine" grade supplied by Nutrixo, further sifted first with a 400 μm sift to recover lower sizes, and then with a 200 μm sift to recover higher sizes.

Powder C (comparative): wheat bran powder "fine" grade supplied by Nutrixo, further sifted first with a 500 μm sift to recover lower sizes, and then with a 200 μm sift to recover higher sizes.

The particle size distribution is evaluated with a Malvern Mastersizer 2000 laser particle size analyzer with a dry sampler Sirocco 2000. Conditions and parameters are the following: wheat bran powder samples, 3 bars suction flow, vibration 75%, refractive index 1494, 0.1 absorption, obscuration analysis between 1% and 2%.

The following data are reported:
- \( D_M \): Volume-average diameter (of the sphere having the same volume)
- \( D_{10} \): Diameter (of a sphere having the same volume) at which 10% by volume of the particles have a lower diameter and 90% by volume the particles have a higher diameter.
- \( D_{50} \): Diameter (of a sphere having the same volume) at which 50% by volume of the particles have a lower diameter and 50% by volume the particles have a higher diameter.
- \( D_{90} \): Diameter (of a sphere having the same volume) at which 90% by volume of the particles have a lower diameter and 10% by volume the particles have a higher diameter.

The results are reported in table I below.

<table>
<thead>
<tr>
<th>Powder</th>
<th>( D_M )</th>
<th>( D_{10} )</th>
<th>( D_{50} )</th>
<th>( D_{90} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Comparative)</td>
<td>59.25</td>
<td>15.26</td>
<td>49.81</td>
<td>118.22</td>
</tr>
<tr>
<td>B</td>
<td>317.63</td>
<td>207.69</td>
<td>276.02</td>
<td>352.66</td>
</tr>
<tr>
<td>C (Comparative)</td>
<td>527.68</td>
<td>213.25</td>
<td>473.53</td>
<td>933.38</td>
</tr>
</tbody>
</table>
Example 2 - Intermediate Fruit preparations
Intermediate fruit preparations are prepared by mixing Powders A, B or C of Example 1 in a fruit preparation.

The fruit preparation has the following composition (total 100 parts without wheat bran powder): Water (55.86 parts), Fruits cubes (16.67 parts), wheat bran flour (20 parts), Sweetener (6.5 parts), stabilizer (0.05 parts), Flavor (0.1 20 parts), Processing aids (0.8 parts).

The compositions of the intermediate fruit preparations are reported in table II below.

Table II

<table>
<thead>
<tr>
<th>Example</th>
<th>2A (Comparative)</th>
<th>2B</th>
<th>2C (Comparative)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit preparation</td>
<td>80%</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>Powder A</td>
<td>20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powder B</td>
<td></td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Powder C</td>
<td></td>
<td></td>
<td>20%</td>
</tr>
</tbody>
</table>

These fruit preparations are stable.

Example 3 - Dairy fermented products

A white mass yogurt is prepared according to the recipe below:
- SKIM MILK POWDER (2.085%), Milk (86.600%), Cream (4.172%), Sugar (7.043%), Culture (0.1%).
- Hydration 30min. mini., Pre-heating 75°, Heating 95°, Holding 6.00 min., Homogenization 200 bars, Pre-cooling 40.00°C, Cooling 36.00°C, Fermentation 36°C, Breaking pH, Smoothing filter 0.5 mm, Cooling 20.00°C, Cold storage 10.00°C.

The white mass is then mixed with an amount of an intermediate fruit preparation of Example 2.
The following properties of the products are evaluated:
- **Viscosity (mPa.s)**: measured 17 days after its preparation (referred to as D+17). The viscosity is measured by applying a regular shearing strength increase using a rheometer with 2 co-axial cylinders. The rheometer is a RM 200 from METTLER. With these tools, the Mobile n°1 is used together with the pot n°1. The 64 s⁻¹ shearing is applied during 10 seconds on the product at 10°C.
- **Taste**: Performed as a panel test of trained experts, at 10 days after preparation
- **Stability/Whey**: Visual evaluation of presence of whey, evaluated 35 days after the preparation.

The compositions and results are reported in tables III and IV below (the amounts of powders represent the amounts in the final product).

### Table III

<table>
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<tr>
<th>Example</th>
<th>3A5</th>
<th>3B5</th>
<th>3C5</th>
<th>3A10</th>
<th>3B10</th>
<th>3C10</th>
<th>3A20</th>
<th>3B20</th>
<th>3C20</th>
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<td><strong>Intermediate Fruit preparation</strong></td>
<td>2A  5%</td>
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<td>2C  5%</td>
<td>2A  10%</td>
<td>2B  10%</td>
<td>2C  10%</td>
<td>2A  20%</td>
<td>2B  20%</td>
<td>2C  20%</td>
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<td>Powder A</td>
<td>1%</td>
<td>2%</td>
<td>4%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powder B</td>
<td>1%</td>
<td>2%</td>
<td>4%</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Powder C</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Viscosity (mPa.s)</td>
<td>820</td>
<td>777</td>
<td>817</td>
<td>958</td>
<td>912</td>
<td>647</td>
<td>952</td>
<td>1036</td>
<td>821</td>
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<td>Stability/whey</td>
<td>whey</td>
<td>low whey</td>
<td>whey</td>
<td>low whey</td>
<td>whey</td>
<td>low whey</td>
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### Table IV

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<th>3B50</th>
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<td>2A  30%</td>
<td>2B  30%</td>
<td>2C  30%</td>
<td>2A  40%</td>
<td>2B  40%</td>
<td>2C  40%</td>
<td>3A  50%</td>
<td>3B  50%</td>
<td>3C  50%</td>
</tr>
<tr>
<td>Powder A</td>
<td>6%</td>
<td>8%</td>
<td>10%</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Powder B</td>
<td>6%</td>
<td>8%</td>
<td>10%</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Powder C</td>
<td>6%</td>
<td>8%</td>
<td>10%</td>
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<tr>
<td>Viscosity (mPa.s)</td>
<td>1106</td>
<td>1152</td>
<td>720</td>
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<td>1187</td>
<td>940</td>
<td>1563</td>
<td>1757</td>
<td>919</td>
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<tr>
<td>Stability/whey</td>
<td>whey</td>
<td>low whey</td>
<td>Much whey</td>
<td>whey</td>
<td>low whey</td>
<td>Much whey</td>
<td>whey</td>
<td>low whey</td>
<td>Much whey</td>
</tr>
</tbody>
</table>
Table IV

<table>
<thead>
<tr>
<th>Example</th>
<th>3A20 (comparative)</th>
<th>3B20</th>
<th>3C20 (comparative)</th>
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<tbody>
<tr>
<td>White mass</td>
<td>80%</td>
<td>80%</td>
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<tr>
<td>Intermediate</td>
<td></td>
<td></td>
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<tr>
<td>Fruit</td>
<td>2A</td>
<td>2B</td>
<td>2C</td>
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<tr>
<td>Preparation</td>
<td>20%</td>
<td>20%</td>
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</tr>
<tr>
<td>Amount wheat bran</td>
<td>4% (powder A)</td>
<td>4% (powder B)</td>
<td>4% (powder C)</td>
</tr>
<tr>
<td>Amount of Wheat bran fiber</td>
<td>1.8%</td>
<td>1.8%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Energy (kcal per 125g)</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>Energy (kcal per 100 g)</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Viscosity D+17 (mPa.s)</td>
<td>952</td>
<td>1036</td>
<td>821</td>
</tr>
<tr>
<td>Stability/whey</td>
<td>whey</td>
<td>low whey</td>
<td>whey</td>
</tr>
<tr>
<td>Taste</td>
<td>Bitter, astringent</td>
<td>Fresh, dairy notes, low bitterness</td>
<td>Bad particles perception in mouth, too spinning in the mouth, residual bitterness</td>
</tr>
</tbody>
</table>

In a further stage the compositions are packaged and sealed in amounts of 125 g in yogurt cups.
CLAIMS

1. A dairy fermented product in a non-solid form comprising wheat bran dispersed therein, wherein:
- the product comprises at least 2.6 g of wheat bran, preferably at least 3.7 g, per 100 g of product, and
- the wheat bran has a particle size with a volume average diameter $D_m$ of from 200 $\mu\text{m}$ to 400 $\mu\text{m}$, preferably from 250 to 350 $\mu\text{m}$.

2. The product according claim 1, wherein the wheat bran has a particle size distribution as follows:
   - Volume average diameter $D_m$ of from 200 $\mu\text{m}$ to 400 $\mu\text{m}$, preferably from 250 to 350 $\mu\text{m}$,
   - $D_{10}$ of higher than 100 $\mu\text{m}$, preferably higher than 200 $\mu\text{m}$,
   - $D_{50}$ of from 200 $\mu\text{m}$ to 400 $\mu\text{m}$, preferably from 250 to 350 $\mu\text{m}$, and
   - $D_{90}$ of lower than 600 $\mu\text{m}$, preferably lower than 400 $\mu\text{m}$.

3. The product according to any of the preceding claims, comprising at least 1.17 g, preferably at least 1.66 g, of wheat bran fiber, per 100 g of product.

4. A product according to any of the preceding claims, wherein the amount of wheat bran fiber is of at least 1.17 g per 100 kcal of product, preferably at least 1.66 g per 100 kcal.

5. A product according to any of the preceding claims, wherein said product is contained in a sealed container, in a serving amount of from 100 g to 200 g, preferably 100 g or 125 g or 150 g or 175 g.

6. A process of making a dairy fermented product in a non-solid form, comprising the step of dispersing wheat bran powder in a dairy fermented white mass or ingredients thereof, wherein:
   - at least 2.6 g of wheat bran powder, preferably at least 3.7 g, per 100 g of product are dispersed, and
the wheat bran powder has a particle size with a volume average diameter $D_M$ of from 200 $\mu\text{m}$ to 400 $\mu\text{m}$, preferably from 250 to 350 $\mu\text{m}$.

7. A process according to claim 6, comprising the steps of:
   a) providing a dairy fermented white mass,
   b) adding the wheat bran powder, preferably in an intermediate preparation comprising water, optionally taste modifiers, and the wheat bran dispersed therein.

8. A process according to claim 7, wherein the intermediate preparation is added in an amount by weight of from 5 parts to 50 parts, preferably from 10 parts to 30 parts, for 100 parts of product.

9. A process according to any claims 7 to 8, wherein the intermediate preparation comprises at least 10% by weight, preferably at least 15%, of wheat bran.

10. A process according to any of claims 6 to 9, wherein the wheat bran has a particle size distribution as follows:
    - Volume average diameter $D_M$ of from 200 $\mu\text{m}$ to 400 $\mu\text{m}$, preferably from 250 to 350 $\mu\text{m}$,
    - $D_{10}$ of higher than 100 $\mu\text{m}$, preferably higher than 200 $\mu\text{m}$,
    - $D_{50}$ of from 200 $\mu\text{m}$ to 400 $\mu\text{m}$, preferably from 250 $\mu\text{m}$ to 350 $\mu\text{m}$, and
    - $D_{90}$ of lower than 600 $\mu\text{m}$, preferably lower than 400 $\mu\text{m}$.

11. A process according to any of claims 6 to 10, wherein the amount of wheat bran dispersed is such that the product comprises an amount of wheat bran fiber of at least 1.17 g, preferably at least 1.66 g, per 100 g of product.

12. A process according to any of claims 6 to 11, wherein the amount of wheat bran dispersed is such that the product comprises an amount of wheat bran fiber of at least 1.17 g per 100 kcal of product, preferably at least 1.66 g per 100 kcal.

13. A process according to any claims 6 to 12, further comprising the step of conditioning the product in a container of from 100 g to 200 g, and preferably of sealing the container.
14. The product according to any of claims 1 to 5 or obtained by a process according to any of claims 6 to 13, for use for contributing to an acceleration of intestinal transit.

15. The product for use according claim 14, with a daily dosage of at least 10 g of wheat bran fiber, optionally in a form of 1 or 2 or 3 or 4 or 5 or 6 servings, said servings being preferably of from 100 g to 150 g, preferably with at least 1.5 g of wheat bran fiber per 100 kcal, preferably at least 3 g per 100 kcal.
**INTERNATIONAL SEARCH REPORT**

**International application No**

PCT/IB2012/002871

**A. CLASSIFICATION OF SUBJECT MATTER**

INV. A23L1/1Q A23C9/12 A23L1/308

ADD.

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 A23C

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

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

EPO-Internal, WPI Data, FSTA

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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Further documents are listed in the continuation of Box C.

See patent family annex.

Date of actual completion of the international search: 2 September 2013

Date of mailing of the international search report: 16/09/2013

Authorized officer: Groh, Bjørn

Name and mailing address of the ISA:

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2440, Fax. (+31-70) 340-3016

Form PCT/ISA/210 (second sheet) [April 2005]
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