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(54) Title: NUTRITIONAL BEVERAGE PRODUCT

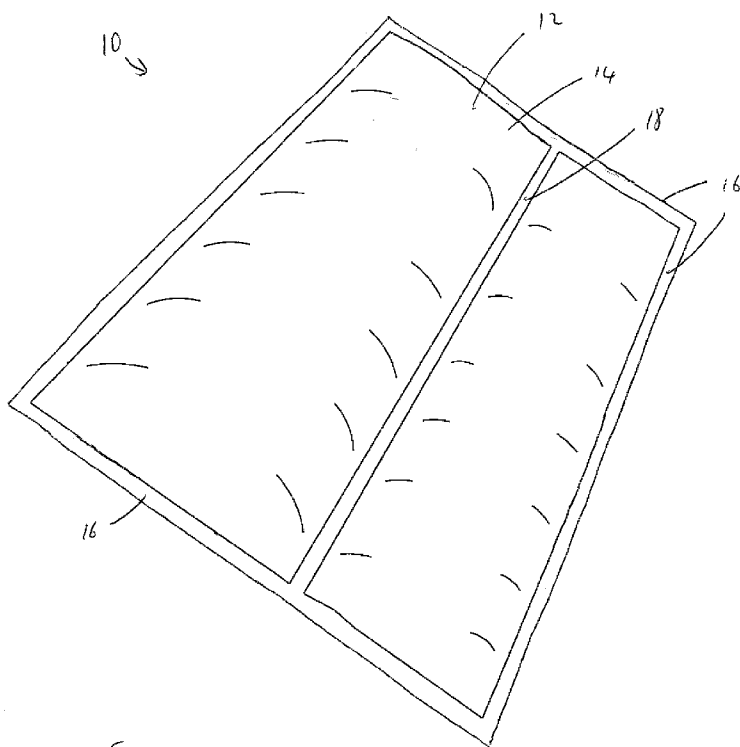


Figure 1

(57) Abstract: This invention relates to a nutritional beverage product (10) comprising: a package (12) which defines a sealed concentrate cavity (22) containing a beverage concentrate (26), and a sealed diluent cavity (20) containing a diluent (24), said package (12) comprising of thin sheets (14) of flexible material that are attached together such that the sheet material forms the walls of the concentrate cavity (22) and the diluent cavity (20); and characterised in that the flexible sheets (14) are releasably attached together in a zone that separates the concentrate cavity (22) from the diluent cavity (20), such that the sheets (14) may be separated in said zone, so that the concentrate cavity (22) and diluent cavity (20) are joined when the sheets (14) are so separated. The invention further relates to a concentrate for a beverage, said concentrate comprising: at least one probiotic producing a Gram positive lactic acid; a citrus extract; and carbohydrates; characterised in that the citrus extract includes citric acid, maleic acid, ascorbic acid, yeast extract, and/or β -glucan.

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NEUTRITIONAL BEVERAGE PRODUCT

FIELD OF THE INVENTION

This invention relates to nutritional beverage products that can be used for
5 nutritional, pharmaceutical, military, nutraceutical, sports supplementation,
alternative health, or other similar purposes. In particular, the invention
relates to nutritional beverages and packages for such beverages.

BACKGROUND TO THE INVENTION

10 Many nutritional beverages are prepared by combining two parts, typically a
concentrated substance such as a powder or liquid concentrate and a diluent
or solvent.

Many of these beverages are prepared by combining a dry powder
15 concentrate with water as diluent and need to be consumed within a relatively
short time after combining the powder and water, as the beverage does not
remain stable for extended periods, once the concentrate and water have
been combined.

20 However, in many situations, it is not convenient to prepare beverages in the
cumbersome conventional manner of pouring water and dry powder into an
open vessel, agitating the mixture (e.g. with a stirrer or spoon) to mix it and to
accelerate dissolving the powder, letting the mixture stand if required and
consuming the beverage from the open vessel.

25 Some of the disadvantages of an open vessel can be overcome by using a
closable vessel such as a capped bottle to contain the diluent, opening the
bottle to add the powder, closing the bottle, shaking it to agitate the mixture
and opening it again to drink the beverage. However, this process is
30 cumbersome and vessels of this type need to be cleaned after use.

Furthermore, nutritional beverages are often needed in situations where
potable water is in short supply or unavailable, such as disaster relief

situations, which renders the use of varieties of beverage products that require water for use impossible in these situations.

In many instances, it is imperative that the diluent and concentrate are not contaminated until the beverage is consumed and it is practically impossible to prevent contamination of these substances if they are exposed to the environment during the process when the beverage is prepared. Further, the vessels and agitators that need to be cleaned for re-use, are often not cleaned sufficiently and are very seldom sterilised and this deficiency is particularly acute in situations where potable water is scarce or unavailable.

The present invention seeks to provide packages for nutritional beverages of this type that overcomes these disadvantages. Further, the present invention seeks to ensure that a concentrate and diluent of a beverage product are conveniently and accurately combined in a predetermined ratio. Further, the present invention seeks to provide beverages that are high in nutrient content and that can be prepared by combining a concentrate with water.

SUMMARY OF THE INVENTION

According to one aspect of the present invention there is provided a nutritional beverage product comprising:
a package which defines a sealed concentrate cavity containing a beverage concentrate, and a sealed diluent cavity containing a diluent,
said package comprising of thin sheets of flexible material that are attached together such that the sheet material forms the walls of the concentrate cavity and the diluent cavity;
wherein the flexible sheets are releasably attached together in a zone that separates the concentrate cavity from the diluent cavity, such that the sheets may be separated in said zone, so that the concentrate cavity and diluent cavity are joined when the sheets are so separated.

For the purposes of this specification, the word "diluent" refers to fluids that can be combined with concentrates to dilute the concentrates. It does not exclude the possibility that the diluent may itself have inclusions.

Also, for the purposes of this specification, the word "sheets" refers to parts of sheets of material that could be separate, but that could also be joined. In particular, the term "sheets" refers to any distinguishable parts of a single sheet of material, if the single sheet has been folded, welded, or otherwise
5 treated such that parts of the sheet are distinguishable as individual "sheets".

The package may comprise of two sheets of said flexible sheet material that are attached together around outer peripheries of the concentrate and diluent
10 cavities, and that are attached together in a releasable manner in the zone between the concentrate and diluent cavities.

The sheets may be welded together along at least part of said outer peripheries and may be attached together in the releasable zone by way of a
15 burst seal.

The product may include:

at least one probiotic producing a Gram positive lactic acid;
a citrus extract; and
20 carbohydrates.

For the purposes of this specification, the word "citrus extract" refers to ProVigoro™ or a simulated citrus extract. ProVigoro™ is produced in the United Kingdom by Citrox Limited, and is available in the United Kingdom
25 under the name ProVigoro™ Food Supplement. ProVigoro™ is a combination of bioflavonoid complexes, vitamins and naturally occurring organic acids carried on a specific yeast powder, and currently find application as a nutritional food supplement. The citrus extract may also be artificially simulated from citrus plants or fruit.

30

The citrus extract may be present in a quantity such that the concentration of the citrus extract is between 950 and 1050 ppm, when combined with the diluent, preferably such that the concentration of the citrus extract is about 1000 ppm, when combined with the diluent.

The citrus extract may include citric acid, maleic acid, ascorbic acid, yeast extract, and/or β -glucan and may be ProVigoro™ or may be artificially simulated.

5

The carbohydrates may include dextrose, sucrose, malto dextrin and fructose and may further include Iso Maltulose.

10

In some preferred embodiments of the present invention, the concentrate may have a glycaemic index of less than 55. The glycaemic index may be a result from a specific ratio of dextrose, sucrose, malto dextrin and fructose.

15

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In one embodiment of the invention, the carbohydrate component may compose between about 0.4 and 0.8%(m/v) of the dextrose, between 1.8 and 2.2%(m/v) of the sucrose, between 0.4 and 0.8%(m/v) of the malto dextrin and between 2.5 and 2.9%(m/v) of the fructose. Preferably, the composition will compose between about 0.5 and 0.7%(m/v) of the dextrose, between 1.9 and 2.1%(m/v) of the sucrose, between 0.5 and 0.7%(m/v) of the malto dextrin and between 2.6 and 2.8%(m/v) of the fructose. In a preferred embodiment of the invention, the composition will compose about 0.592 %(m/v) of the dextrose, 2.032%(m/v) of the sucrose, 0.592%(m/v) of the malto dextrin and 2.714%(m/v) of the fructose.

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In another embodiment of the invention, the carbohydrate component may compose between about 0.4 and 0.8 %(m/v) of the dextrose, between 1.5 and 1.9 %(m/v) of the sucrose, between 0.3 and 0.7 %(m/v) of the malto dextrin, between 1.4 and 1.8%(m/v) of the Iso Maltulose, and between 1.4 and 1.8%(m/v) of the fructose. Preferably, the composition will compose between about 0.5 and 0.7%(m/v) of the dextrose, between 1.6 and 1.8%(m/v) of the sucrose, between 0.4 and 0.6%(m/v) of the malto dextrin, between 1.5 and 1.7%(m/v) of the Iso Maltulose, and between 1.5 and 1.7%(m/v) of the fructose. In a preferred embodiment of the invention, the composition will compose 0.560%(m/v) of the dextrose, 1.740%(m/v) of the sucrose,

0.5%(m/v) of the malto dextrin, 1.6%(m/v) of the Iso Maltulose, and 1.6% (m/v) of the fructose.

5 The concentrate may be a dry powder and may have a water activity of (a_w) of no more than 0.16.

The probiotic may be protected through capsulation, enteric coating, regulation of water activity, or through spray drying with a fat or oil base.

10 The diluent may be water or milk, preferably in pure form such as water or milk purified by radiation with ultra violet light, or water purified by reverse osmosis or filtration. In addition, the diluent may include additives such as nutrients.

15 For the purposes of this specification, the word "pure" is intended to refer to a condition generally free of contaminants and not necessarily to a condition free of inclusions such as additives. In fact the diluent may include one or more additives such as nutrients.

20 According to another aspect of the present invention there is provided a nutritional beverage including a concentrate and a diluent as described herein above with reference to the nutritional beverage product.

25 According to a further aspect of the present invention there is provided a concentrate for a nutritional beverage, said concentrate being as described herein above with reference to the nutritional beverage product.

BRIEF DESCRIPTION OF THE DRAWINGS

30 For a better understanding of the present invention and to show how the same may be carried into effect, the invention will now be described by way of non-limiting example, with reference to the accompanying drawings, in which:

Figure 1 shows a three dimensional view of a nutritional beverage product in accordance with the present invention;

Figure 2 shows a sectional view of the product of Figure 1 before use;

Figure 3 shows a sectional view of the product of Figure 1 during use, before a nutritional beverage is dispensed from the product; and

5 Figure 4 shows a three dimensional view of a different embodiment of the nutritional beverage product of Figure 1.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring to the drawings, a nutritional beverage product in accordance with the present invention is generally indicated by reference numeral 10. The product 10 can also commonly be referred to as a "pouch", "burst pack", or the like.

The beverage product 10 includes a package 12 made from two sheets 14 of thin, flexible material, e.g. of transparent plastic film. The sheets 14 are welded together around the peripheral edges of the package 12 to form strong, sealing outer seams 16. The sheets 14 are also attached together in a sealing manner along an elongate zone to form a burst seal 18, where the sheets are releasably attached to each other and can be separated from each other if sufficient force is applied.

20 A sealed diluent cavity 20 is formed between the sheets 14 and is surrounded along part of its periphery by the seams 16 and along part of its periphery by the burst seal 18. Similarly, a sealed concentrate cavity 22 is formed adjacent the diluent cavity 20 between the sheets 14 and surrounded in part by the seams 16 and in part by the burst seal 18, the sheets 14 thus form the walls of the cavities. The burst seal 18 extends between the diluent cavity 20 and the concentrate cavity 22 along a common border of these two cavities.

30 As can be seen in Figure 2, in the particular embodiment shown in the drawings, the burst seal 18 is formed by the inclusion of an elongate plastic strip 32 between the sheets 14. Unlike the seams 16 that are formed by welding or fusing the plastic material of the sheets 14, the burst seal 18 is formed by applying pressure on the sandwich formed with the strip 32 between the sheets 14. The pressure does not result in fusion of the layers in

the burst seal 18, but is sufficient to cause adhesion and thus form a seal that can be broken if sufficient forces are applied to separate at least one of the sheets 14 from the strip 32. In other embodiments of the invention (not shown), the burst seal 18 can include two or more of the seals as described above, e.g. the burst seal may be a double seal, to enhance the sealing ability of the seal and reduce the likelihood of premature failure of the seal.

In Figure 2 and 3, the sheets 14 are only shown in close proximity at the outer seams 16, for the sake of illustration, but they are actually welded together in a sealing manner. Similarly the sheets 14 are shown in close proximity in Figure 2 along the burst seal 18, for the sake of illustration, even though they are in sealing contact.

The diluent cavity 20 contains a diluent in the form of water 24 that has been purified by ultra violet radiation, but instead, the diluent may be milk and/or the diluent may be purified by other means, such as reverse osmosis, filtration or the like, depending on the intended use of the product 10 (see below). The water may also contain additives such as nutrients.

The concentrate cavity 22 contains a dry powder concentrate 26 with a water (a_w) activity of no more than 0.16. The concentrate 26 includes at least one Gram positive lactic acid producing probiotic and includes a citrus extract in the form of ProVigoro™. The quantity ProVigoro™ in the concentrate cavity 22 is such that it has a concentration of about 1000ppm, when combined with the diluent in the diluent cavity 20. ProVigoro™ includes citric acid, maleic acid, ascorbic acid, yeast extract and β -glucan. ProVigoro™ is also available or was previously available in some countries under the name Citrofresh™.

The concentrate 26 further includes carbohydrates such as dextrose, sucrose, malto dextrin, fructose, and/or iso multilose. Depending on the intended application of the beverage, it can be prepared with any desired glycaemic index (GI). In some applications, such as sport recovery beverages, or sports beverages intended for consumption during activity, the intention may be to have a GI at a predetermined level of say 60, 80 or 100. However, in most

applications of the present invention, the intention is that the GI should not exceed 55. Further, the total carbohydrate contents of the concentrate and diluent, when combined, should preferably not exceed 6%, as this is the optimal ratio for maximum energy availability during endurance activities.

5

In one preferred embodiment of the present invention, the concentrate has a glycaemic index of less than 50 and includes carbohydrates in the following combination (in mg per 100ml of water in the diluent):

	Dextrose	592
10	Sucrose	2032
	Malto dextrin 20	592
	Fructose	2714

In another preferred embodiment of the present invention, the concentrate has a glycaemic index of less than 50 and includes carbohydrates in the following combination (in mg per 100ml of water in the diluent):

	Dextrose	560
	Sucrose	1740
	Malto dextrin 20	500
20	Iso Maltulose	1600
	Fructose	1600

The diluent 24 and concentrate 26 described above are intended to prepare a nutritional beverage for use by healthy or unhealthy persons and finds particular application with persons exposed to physical exercise or labour. However, the present invention can be used to prepare a wide variety of other nutritional beverages such as beverages intended as meal replacements, for hydration, as meal supplements, for management of diarrhoea, etc. Depending on the particular nutritional beverage and its intended purpose, it can include other nutrients and/or supplements, e.g. sweeteners, soluble fibres, non-soluble fibres, pre biotic fibres, amylase resistant starch, amino acids, proteins, whey protein concentrate with 6 to 80 % purity, whey protein isolate 81% plus, egg albumin, caseinates, soy protein with 6 to 80 % purity,

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30

soy protein isolate 81 % plus, vitamins, minerals, electrolytes, anti-oxidants, herbal extracts, fats, etc.

5 What is critically important to the efficacy of the nutritional beverage is that the concentration of ProVigoro™ (or other citrus extract) must not deviate from 1000 ppm by more than a maximum of 50 ppm, when the concentrate 26 is combined with the diluent 24. The inventors have found that this composition of the concentrate causes an exceptional proliferation of the probiotics when the concentrate 26 and diluent 24 are combined.

10

In use, the product 10 can be stored for extended periods in the form illustrated in Figures 1 and 2, with the burst seal 18 separating the diluent cavity 20 and concentrate cavity 22, thus keeping the concentrate 26 dry. This allows quantities of the products 10 to be accumulated or stock-piled to be ready for use, even in cases of high demand, e.g. during natural disasters. Even where the products 10 are used routinely, e.g. to feed a labour force, the extended shelf life of the product allows it to be transported and stored conveniently.

20 When a nutritional beverage needs to be prepared, pressure is applied to the outside of the product, to place the diluent cavity 20 under pressure. The pressure causes the burst seal 18 to be released and the sheets 14 separate at the burst seal, as shown in Figure 3, so that the diluent cavity 20 and concentrate cavity 22 become joined to form a mixing cavity 28 containing the water 24 and concentrate 26 in a mixture 30. The release of the burst seal 18 could be the result of ingress of water from the diluent cavity 20 between the sheets 14 and strip 32 or a separation of the sheets 14 in the vicinity of the strip 32, caused by tension in the sheets as a result of increased pressure in the cavity 20. However, the present invention is not limited to any specific mechanism of release of the burst seal 18.

30

The mixture 30 can be agitated in the cavity 28 by applying local pressure on the outside of the product 10, by shaking the product, or the like. However, it should be borne in mind that the mixture 30 is still contained in a sealed cavity

28 within the pouch and has had no contact with the environment outside the product 10 at this stage.

5 Once the diluent 24 and concentrate 26 have been combined thoroughly, the product is left for a period of about 15 minutes, to allow for the proliferation of the probiotics in the mixture 30. After this period, the mixture 30 is ready to be consumed as a nutritional beverage. The pouch is cut or torn, preferably at a corner of the pouch and the beverage 30 is consumed directly from the cavity 28 or is poured into a suitable vessel.

10

It is also possible to use the concentrate 26 independently of the product 10, e.g. by simply keeping the concentrate in a dry, sealed condition until the beverage is required and then combining the concentrate with a diluent in any one of the known ways. However, such use of the concentrate 26 will lose the advantages of the product 10 of having a pure diluent 24 conveniently available.

15

Referring to Figure 4, in other embodiments of the present invention, the product 10 may be provided with dispensing means such as a closable spout 20 34, a dispensing valve, or the like, that is configured to be in flow communication with the mixing cavity 28, so that the beverage can conveniently be poured from the mixing cavity and/or can be re-sealed. This avoids the need to tear or cut the pouch to allow the beverage to be poured or consumed and allows temporary storage of part of the beverage in a sealed 25 pouch, for later consumption.

25

Further, the product 10 has been described herein with only two cavities in the form of the diluent cavity 20 and the concentrate cavity 22. However, in some embodiments of the invention, the product 10 may define more such cavities 30 with burst seals between adjacent cavities.

30

CLAIMS

1. A nutritional beverage product (10) comprising:
a package (12) which defines
5 a sealed concentrate cavity (22) containing a beverage concentrate
(26), and
a sealed diluent cavity (20) containing a diluent (24),
said package (12) comprising of thin sheets (14) of flexible material that are
attached together such that the sheet material forms the walls of the
10 concentrate cavity (22) and the diluent cavity (20);
characterised in that the flexible sheets (14) are releasably attached
together in a zone that separates the concentrate cavity (22) from the diluent
cavity (20), such that the sheets (14) may be separated in said zone, so that
the concentrate cavity (22) and diluent cavity (20) are joined when the sheets
15 (14) are so separated.
2. A product (10) as claimed in claim 1, **characterised in that** two sheets
(14) of the flexible sheet material are attached together around outer
peripheries of the concentrate (22) and diluent (20) cavities and are attached
20 together in a releasable manner in the zone between the concentrate (22) and
diluent (20) cavities.
3. A product (10) as claimed in claim 2, **characterised in that** the sheets
(14) are welded together along at least part of said outer peripheries.
25
4. A product (10) as claimed in any one of the preceding claims,
characterised in that the concentrate (26) includes:
at least one probiotic producing a Gram positive lactic acid;
a citrus extract; and
30 carbohydrates.
5. A product (10) as claimed in claim 4, **characterised in that** the citrus
extract is present in a quantity such that the concentration of the citrus extract
is between 950 and 1050 ppm, when combined with the diluent (24).

6. A product (10) as claimed in claim 5, **characterised in that** the citrus extract is present in a quantity such that the concentration of the citrus extract is about 1000 ppm, when combined with the diluent (24) .
- 5
7. A product (10) as claimed in any one of claims 4 to 6, **characterised in that** the citrus extract includes citric acid, maleic acid, ascorbic acid, yeast extract, and/or β -glucan
- 10
8. A product (10) as claimed in claim 7, **characterised in that** the citrus extract is ProVigoro™.
9. A product (10) as claimed in any one of claims 4 to 6, **characterised in that** the citrus extract is artificially simulated.
- 15
10. A product (10) as claimed in any one of claims 4 to 9, **characterised in that** the carbohydrates include dextrose, sucrose, malto dextrin and fructose.
11. A product (10) as claimed in claim 10, **characterised in that** the carbohydrates further include Iso Maltalose.
- 20
12. A product (10) as claimed in any one of claims 4 to 11, **characterised in that** the concentrate (26) has a glycaemic index of less than 55.
- 25
13. A product (10) as claimed in claim 12, **characterised in that** the carbohydrates include between 0.4 and 0.8%(m/v) dextrose, between 1.8 and 2.2%(m/v) sucrose, between 0.4 and 0.8%(m/v) malto dextrin and between 2.5 and 2.9%(m/v) fructose.
- 30
14. A product (10) as claimed in claim 13, **characterised in that** the carbohydrates include between 0.5 and 0.7%(m/v) dextrose, between 1.9 and 2.1%(m/v) sucrose, between 0.5 and 0.7%(m/v) malto dextrin and between 2.6 and 2.8%(m/v) fructose.

15. A product (10) as claimed in claim 14, characterised in that the carbohydrates include about 0.592 %(m/v) dextrose, about 2.032%(m/v) sucrose, about 0.592%(m/v) malto dextrin and about 2.714%(m/v) fructose.
- 5 16. A product (10) as claimed in claim 12, **characterised in that** the carbohydrates include between 0.4 and 0.8 %(m/v) dextrose, between 1.5 and 1.9 %(m/v) sucrose, between 0.3 and 0.7 %(m/v) malto dextrin, between 1.4 and 1.8%(m/v) Iso Maltulose, and between 1.4 and 1.8%(m/v) fructose.
- 10 17. A product (10) as claimed in claim 16, **characterised in that** the carbohydrates include between 0.5 and 0.7%(m/v) dextrose, between 1.6 and 1.8%(m/v) sucrose, between 0.4 and 0.6%(m/v) malto dextrin, between 1.5 and 1.7%(m/v) Iso Maltulose, and between 1.5 and 1.7%(m/v) fructose.
- 15 18. A product (10) as claimed in claim 17, **characterised in that** the carbohydrates include about 0.560%(m/v) dextrose, about 1.740%(m/v) sucrose, about 0.5%(m/v) malto dextrin, about 1.6%(m/v) Iso Maltulose, and about 1.6% (m/v) fructose.
- 20 19. A product (10) as claimed in any one of the preceding claims, **characterised in that** the concentrate (26) is a dry powder.
20. A product (10) as claimed in claim 19, characterised in that the concentrate (26) has a water activity of (a_w) of no more than 0.16
- 25 21. A product (10) as claimed in any one of the preceding claims, **characterised in that** the diluent (24) is pure water.
22. A product (10) as claimed in any one of the preceding claims, **characterised in that** the diluent (24) includes at least one additive.
- 30 23. A nutritional beverage comprising:
a concentrate including a probiotic producing a Gram positive lactic acid, a citrus extract and carbohydrates; and

a diluent;

characterised in that the ratio between the citrus extract and the diluent is such that the concentration of the citrus extract is between 950 and 1050 ppm.

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24. A beverage as claimed in claim 23, **characterised in that** the citrus extract has a concentration of about 1000 ppm.

10

25. A beverage as claimed in any claim 23 or claim 24, **characterised in that** the citrus extract includes citric acid, maleic acid, ascorbic acid, yeast extract, and/or β -glucan

15

26. A beverage as claimed in claim 25, **characterised in that** the citrus extract is ProVigoro™.

27. A beverage as claimed in any one of claims 23 to 26, **characterised in that** the citrus extract is artificially simulated.

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28. A beverage as claimed in any one of claims 23 to 27, **characterised in that** the carbohydrates include dextrose, sucrose, malto dextrin and fructose.

29. A beverage as claimed in claim 28, **characterised in that** the carbohydrates further include Iso Maltalose.

25

30. A beverage as claimed in any one of claims 23 to 29, **characterised in that** the concentrate has a glycaemic index of less than 55.

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31. A beverage as claimed in claim 30, **characterised in that** the carbohydrates include between 0.4 and 0.8%(m/v) dextrose, between 1.8 and 2.2%(m/v) sucrose, between 0.4 and 0.8%(m/v) malto dextrin and between 2.5 and 2.9%(m/v) fructose.

32. A beverage as claimed in claim 31, **characterised in that** the carbohydrates include between 0.5 and 0.7%(m/v) dextrose, between 1.9 and

2.1%(m/v) sucrose, between 0.5 and 0.7%(m/v) malto dextrin and between 2.6 and 2.8%(m/v) fructose.

33. A beverage as claimed in claim 32, characterised in that the
5 carbohydrates include about 0.592 %(m/v) dextrose, about 2.032%(m/v) sucrose, about 0.592%(m/v) malto dextrin and about 2.714%(m/v) fructose.

34. A beverage as claimed in claim 30, **characterised in that** the
10 carbohydrates include between 0.4 and 0.8 %(m/v) dextrose, between 1.5 and 1.9 %(m/v) sucrose, between 0.3 and 0.7 %(m/v) malto dextrin, between 1.4 and 1.8%(m/v) Iso Maltulose, and between 1.4 and 1.8%(m/v) fructose.

35. A beverage as claimed in claim 34, **characterised in that** the
15 carbohydrates include between 0.5 and 0.7%(m/v) dextrose, between 1.6 and 1.8%(m/v) sucrose, between 0.4 and 0.6%(m/v) malto dextrin, between 1.5 and 1.7%(m/v) Iso Maltulose, and between 1.5 and 1.7%(m/v) fructose.

36. A beverage as claimed in claim 35, **characterised in that** the
20 carbohydrates include about 0.560%(m/v) dextrose, about 1.740%(m/v) sucrose, about 0.5%(m/v) malto dextrin, about 1.6%(m/v) Iso Maltulose, and about 1.6% (m/v) fructose.

37. A concentrate for a beverage, said concentrate comprising:
25 at least one probiotic producing a Gram positive lactic acid;
a citrus extract; and
carbohydrates;
characterised in that the citrus extract includes citric acid, maleic acid, ascorbic acid, yeast extract, and/or β -glucan.

30 38. A concentrate as claimed in claim 37, **characterised in that** the citrus extract is ProVigoro™.

39. A concentrate as claimed in claim 37, **characterised in that** the citrus extract is artificially simulated.

40. A concentrate as claimed in any one of claims 37 to 39, **characterised in that** the carbohydrates include dextrose, sucrose, malto dextrin and fructose.

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41. A concentrate as claimed in claim 40, **characterised in that** the carbohydrates further include Iso Maltulose.

42. A concentrate as claimed in any one of claims 37 to 41, **characterised in that** the concentrate has a glycaemic index of less than 55.

10

43. A concentrate as claimed in claim 42, **characterised in that** the carbohydrates include between 0.4 and 0.8%(m/v) dextrose, between 1.8 and 2.2%(m/v) sucrose, between 0.4 and 0.8%(m/v) malto dextrin and between 2.5 and 2.9%(m/v) fructose.

15

44. A concentrate as claimed in claim 43, **characterised in that** the carbohydrates include between 0.5 and 0.7%(m/v) dextrose, between 1.9 and 2.1%(m/v) sucrose, between 0.5 and 0.7%(m/v) malto dextrin and between 2.6 and 2.8%(m/v) fructose.

20

45. A concentrate as claimed in claim 44, characterised in that the carbohydrates include about 0.592 %(m/v) dextrose, about 2.032%(m/v) sucrose, about 0.592%(m/v) malto dextrin and about 2.714%(m/v) fructose.

25

46. A concentrate as claimed in claim 42, **characterised in that** the carbohydrates include between 0.4 and 0.8 %(m/v) dextrose, between 1.5 and 1.9 %(m/v) sucrose, between 0.3 and 0.7 %(m/v) malto dextrin, between 1.4 and 1.8%(m/v) Iso Maltulose, and between 1.4 and 1.8%(m/v) fructose.

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47. A concentrate as claimed in claim 46, **characterised in that** the carbohydrates include between 0.5 and 0.7%(m/v) dextrose, between 1.6 and 1.8%(m/v) sucrose, between 0.4 and 0.6%(m/v) malto dextrin, between 1.5 and 1.7%(m/v) Iso Maltulose, and between 1.5 and 1.7%(m/v) fructose.

48. A concentrate as claimed in claim 47, **characterised in that** the carbohydrates include about 0.560%(m/v) dextrose, about 1.740%(m/v) sucrose, about 0.5%(m/v) malto dextrin, about 1.6%(m/v) Iso Maltulose, and
5 about 1.6% (m/v) fructose.

49. A concentrate as claimed in any one of claims 37 to 48, **characterised in that** the concentrate is a dry powder.

10 50. A concentrate as claimed in claim 49, characterised in that the concentrate has a water activity of (a_w) of no more than 0.16.

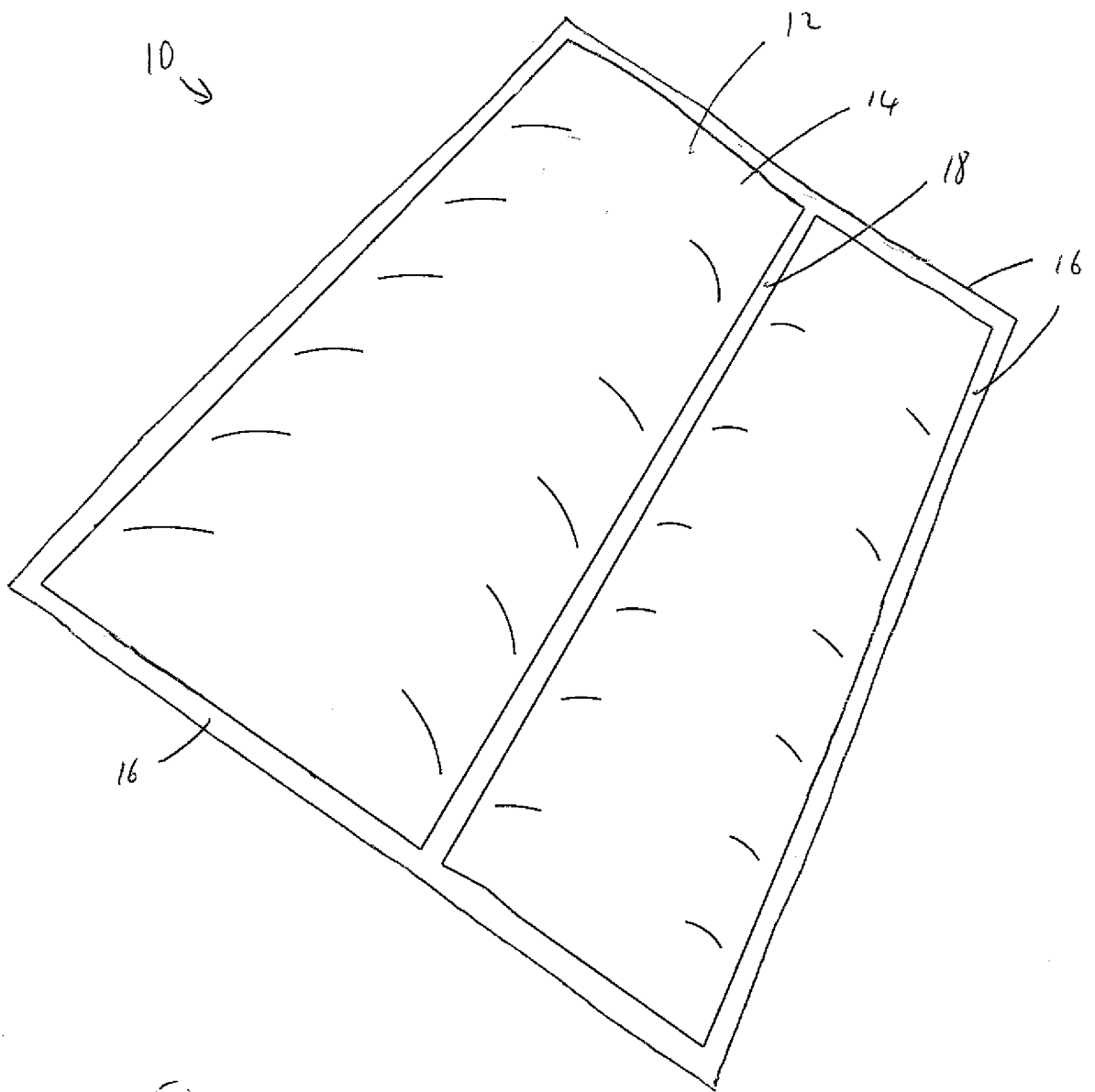


Figure 1

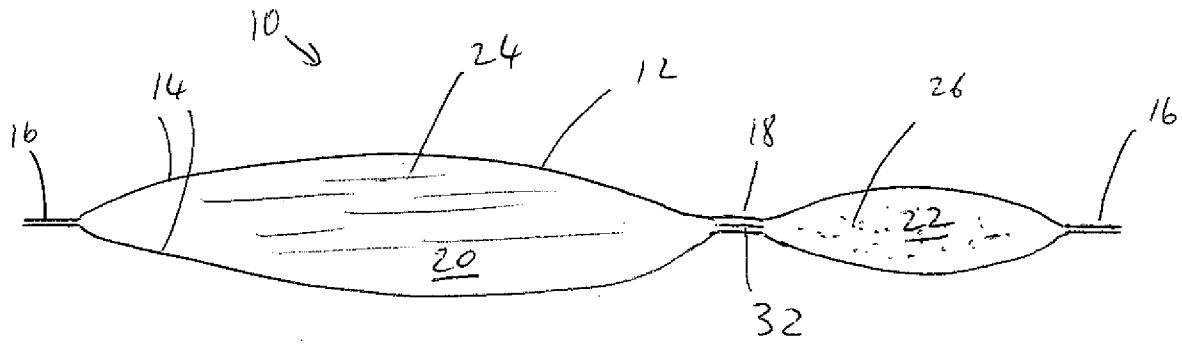


Figure 2

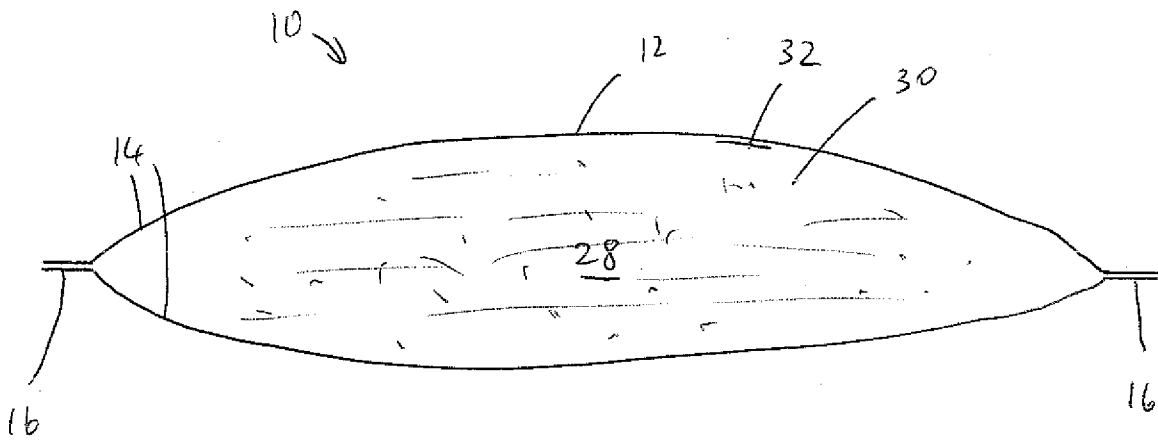


Figure 3

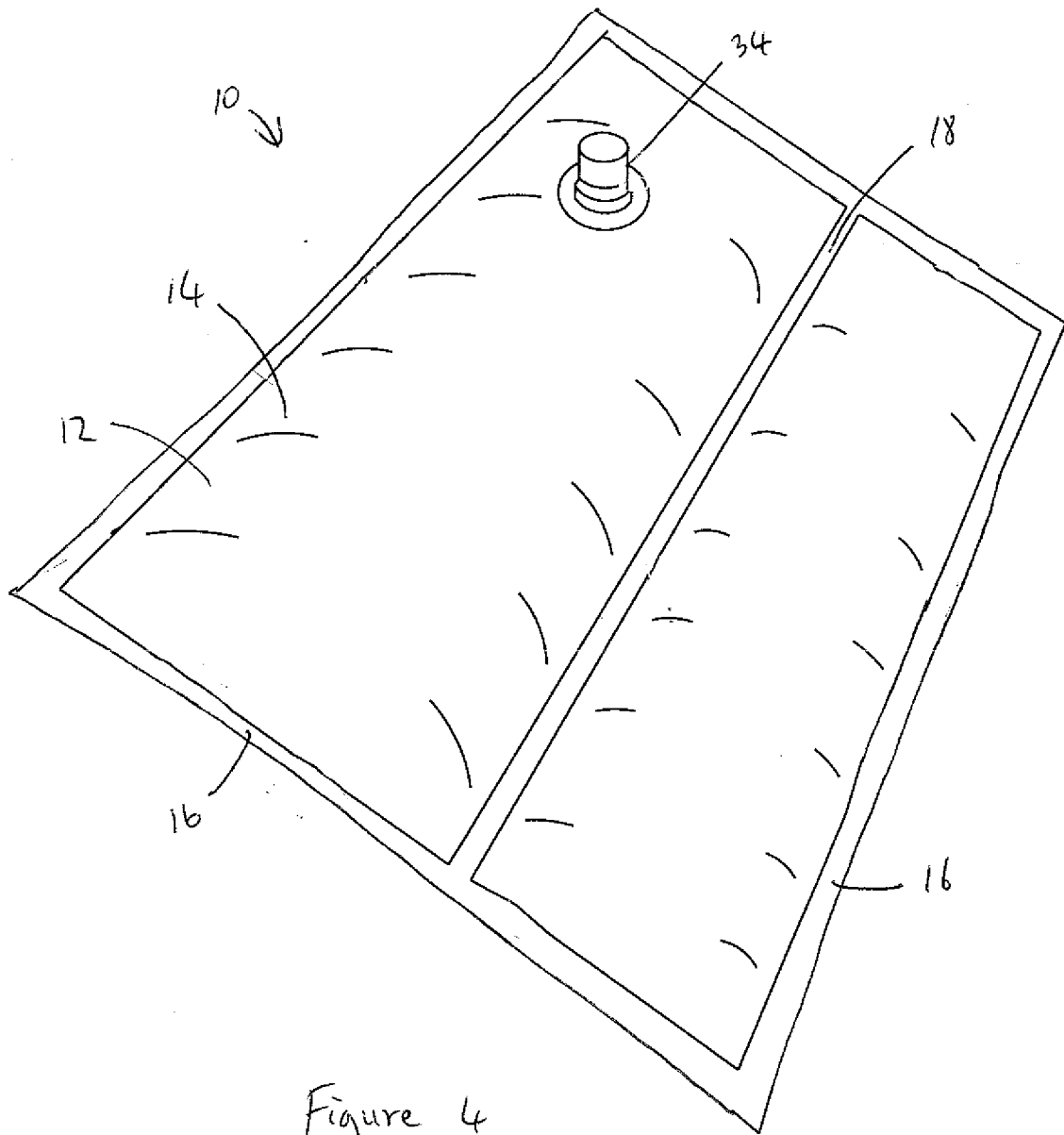


Figure 4