

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property

Organization

International Bureau

(43) International Publication Date

16 April 2020 (16.04.2020)



(10) International Publication Number

WO 2020/074858 A1

(51) International Patent Classification:

A23L 29/244 (2016.01) A23L 33/185 (2016.01)
A23J 3/16 (2006.01) A23L 33/21 (2016.01)
A23J 3/22 (2006.01) A23L 33/24 (2016.01)
A23L 29/262 (2016.01) A61K 31/733 (2006.01)
A23L 33/105 (2016.01)

Published:

— with international search report (Art. 21(3))

(21) International Application Number:

PCT/GB2019/052779

(22) International Filing Date:

02 October 2019 (02.10.2019)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

1816557.1 10 October 2018 (10.10.2018) GB

(71) Applicant: THE MEATLESS FARM LIMITED

[GB/GB]; Graphical House, 2 Wharf Street, Leeds Yorkshire LS2 7EQ (GB).

(72) Inventors: LEWIS, Frank John; 18 Brownhill Lane,

Holmbridge, Holmfirth, Huddersfield Yorkshire HD9 2QW (GB). TOFT BECH, Morten; 35 Canadellas, 07800 Ibiza (ES).

(74) Agent: TANDEM PATENTS LIMITED; Grange Farm,

Wetherby Road, Little Ribston, Wetherby Yorkshire LS22 4EP (GB).

(81) Designated States (unless otherwise indicated, for every

kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every

kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(54) Title: A FOODSTUFF

(57) Abstract: The present application describes a meat substitute composition comprising a methyl cellulose portion; a soya protein portion; and an inulin gel portion. A food product comprising the composition and a method of manufacturing a meat substitute composition are also described.



WO 2020/074858 A1

A FOODSTUFF

The present invention relates to a foodstuff and in particular to a meat substitute composition.

5

A variety of meat substitute compositions exist which use plant proteins in an attempt to resemble the fibrous qualities provided by animal muscle fibre in a meat equivalent and in turn texture. However, it would be desirable for such a meat substitute to also resemble a meat equivalent in terms of appearance and integrity before, during and after cooking, and taste and feel when being consumed.

10

It is an aim of certain embodiments of the present invention to provide a foodstuff which at least closely resembles a meat equivalent in terms of texture, appearance, integrity, taste and feel before and during cooking and consumption.

15

According to a first aspect of the present invention there is provided a meat substitute composition comprising:

- a methyl cellulose portion;
- a soya protein portion; and
- an inulin gel portion.

20

Optionally, the composition comprises around 15.5% by weight of the methyl cellulose portion.

25

Optionally, the composition comprises around 5.75% by weight of the soya protein portion.

Optionally, the composition comprises around 2.5% by weight of the inulin gel portion.

30

Optionally, the methyl cellulose portion comprises methyl cellulose and water. Aptly, the methyl cellulose portion comprises around 1% by weight of the methyl cellulose. Aptly, the methyl cellulose portion comprises around 30% by weight of the water.

Optionally, the soya protein portion comprises an isolated soya protein and an oil. Aptly, the oil is rapeseed oil. Aptly, the soya protein portion comprises water. Aptly, the soya protein portion comprises around 1% by weight of the isolated soya protein, around 5.5% by weight of the rapeseed oil, and around 5% by weight of the water.

5

Optionally, the inulin gel portion comprises inulin and water. Aptly, the inulin gel portion comprises around 1.25% by weight of inulin and around 3.75% by weight of water.

10 According to a second aspect of the present invention there is provided a food product comprising the composition according to the first aspect of the present invention.

Optionally, the food product is in a minced, burger, or sausage form.

15

According to a third aspect of the present invention there is provided a method of manufacturing a meat substitute composition, comprising:

mixing a methyl cellulose portion, a soya protein portion, and an inulin gel portion.

20

Optionally, the method comprises adding colouring and/or flavouring to the mix.

Detailed Description

25 A meat substitute composition according to certain embodiments of the present invention comprises constituents which provide one or more of the following main properties of a food product made from the meat substitute; structure, tactility, appearance, and flavour.

30 During manufacture, methyl cellulose is mixed with water to provide a methyl cellulose solution. Aptly, the solution is provided by mixing around 1% by weight of methyl cellulose with around 15% by weight of hot water heated to at least around 90 degrees to thereby disperse the methyl cellulose therein. Around 15% by weight of chilled water is added to provide a relatively thick and transparent solution. The

methyl cellulose acts as a thickener/binder and is a thermo-gelling hydrocolloid in that it gels on heating to maintain the integrity of the food product during cooking, particularly frying when the product is being agitated, and prevent the same crumbling or collapsing.

5

The composition further comprises a soya protein emulsion which is provided by mixing a soya protein isolate with rapeseed oil. Water is then added to provide a relatively thick and homogenous emulsion. An emulsifier such as soya lecithin may be used to assist with the formation and stability of the emulsion. Aptly, the emulsion
10 comprises around 1% by weight of isolated soya protein, such as Supro™ 500, and around 5.5% by weight of rapeseed oil, and around 5% by weight of water. The soya protein emulsion helps to keep the fat within the product to deliver a succulent mouthfeel during consumption. The soya protein isolate is a protein source and provides firmness to the product. The rapeseed oil provides a fatty mouthfeel during
15 consumption and aids the cooking process, particularly when frying.

The composition further comprises an inulin gel which is provided by shearing inulin into water to form a smooth white gel. Aptly, the gel comprises around 1.25% by weight of inulin, such as Orafiti™ HP, and around 3.75% by weight of water. The
20 inulin gel provides a fatty texture to the product and helps to increase succulence without the need for higher fat levels in the product.

The composition further comprises a blend of texturised soya protein, such as Response™ 4410, and texturised pea protein, such as Texta Pois™. Aptly, the
25 texturised protein blend comprises around 17.7% by weight of soya protein and around 3.3% of pea protein. The texturised soya protein provides a firmer texture with more 'bite' and the texturised pea protein provides succulence and moistness. They are blended to optimise the characteristics of both texturised proteins. Wheat protein may alternatively be provided to deliver a firm bite during consumption
30 however wheat protein is not suitable for use in a gluten free product.

The composition further comprises a blend of coconut, shea and rapeseed oil. Aptly, the coconut oil and shea oil make up around 4.5% by weight of the composition. The coconut and shea oil provide visible flecks of fat and fatty mouthfeel during

consumption and also provide a 'sizzle' during cooking to closely resemble the visual and audible experience when cooking and eating a meat equivalent product.

Rapeseed oil is added to achieve a total fat content of around 10% whilst keeping the total saturated fat equal to or below that of meat. Rapeseed was selected

5 because of low saturates and high omega-3 content, but other oils may be suitable such as sunflower oil, corn oil, olive oil, soya oil or the like.

The composition further comprises additional sources of protein. Aptly, the

10 composition comprises a soya protein, such as Supro™ 500, a rice protein, such as Hi Pro Rice™ 80, and/or a pea protein, such as Texta Pois™. Soya and pea protein

are relatively low in the sulphur-containing amino acids (cysteine and methionine)

whilst being relatively high in lysine. Rice protein is relatively high in cysteine and

methionine and low in lysine. Blending helps to deliver a more complete protein (all the indispensable amino acids at the required levels). Oat and wheat protein are

15 also relatively high in cysteine and methionine. However, the use of wheat would not be desirable for a gluten-free product. Aptly, the composition comprises around 5.3% by weight of the soya protein and around 0.5% by weight of the rice protein.

The composition further comprises around 0.5% by weight of carrot fibre which binds

20 water and enhances succulence of the product. Alternatively or additionally, the composition may comprise chicory root fibre as a water binder and succulence enhancer.

The composition further comprises colouring. Aptly, the composition comprises a

25 red colouring, such as burger shade red DEV013447A which is a plant-based colouring. Aptly, the composition further comprises a brown colouring, such as

Exberry shade brown 49420001. Aptly, the composition comprises around 0.6% by

weight of red colouring and around 0.8% by weight of brown colouring. Aptly, the

red colouring is configured to break down during the cooking process to reveal more

30 of the brown colouring to at least closely resemble the colour of a cooked meat

product. Beetroot, radish and/or tomato extract may be used to provide a red colour

to the raw product which breakdown on heating. Aptly, carrot and caramelised carrot

may be used to provide a brown colour that is visible once the red colour/s has broken down.

The composition further comprises an acidity regulator to improve colour stability, such as ascorbic acid which is also an antioxidant. Aptly, the composition comprises around 0.1% by weight of ascorbic acid.

5

The composition further comprises flavouring, such as braised beef flavouring at an amount of around 0.65% by weight.

Optionally, the composition further comprises salt for flavouring purposes.

10

The composition further comprises a pre-mix of vitamins to replicate the vitamin profile of meat. Aptly, the composition comprises niacin, zinc, iron, vitamin B6, vitamin B2, vitamin B1, and vitamin B12. Aptly, the composition comprises around 0.03% by weight of the vitamin/mineral mix.

15

The composition further comprises a yeast extract to provide flavour. Aptly, the composition comprises around 0.2% by weight of Gistex™ 11 and around 0.3% by weight of Maxavor Beef™ YE.

20

The composition further comprises water at around 18.02% by weight.

Aptly, the composition comprises the methyl cellulose solution at a minimum amount of around 15.5% by weight (0.5% methyl cellulose) and at a maximum amount of around 46.5% by weight (1.5% methyl cellulose). Aptly, the composition comprises the soya protein emulsion at a minimum amount of around 5.75% by weight and at a maximum amount of around 17.25% by weight. Aptly, the composition comprises the inulin gel at a minimum amount of around 3% by weight and at a maximum amount of around 7% by weight. Aptly, the composition comprises the texturised soya protein at a minimum amount of 10% by weight and at a maximum amount of around 25% by weight. Aptly, the composition comprises the texturised pea protein at a minimum amount of around 0% by weight and at a maximum amount of around 8% by weight. Aptly, the composition comprises the coconut/shear oil at a minimum amount of around 0% by weight and at a maximum amount of around 4.5% by weight. Aptly, the composition comprises the isolated soya protein at a minimum

30

amount of around 1.5% by weight and at a maximum amount of around 8% by weight. Aptly, the composition comprises the rice protein at a minimum amount of around 0% by weight and at a maximum amount of around 3% by weight. Aptly, the composition comprises the carrot fibre at a minimum amount of 0% by weight and at a maximum amount of around 1% by weight. Aptly, the composition comprises the red colouring at a minimum amount of around 0.4% by weight and at a maximum amount of around 0.8% by weight. Aptly, the composition comprises the brown colouring at a minimum amount of around 0.6% by weight and at a maximum amount of around 1% by weight. Aptly, the composition comprises the ascorbic acid at a minimum amount of around 0% by weight and at a maximum amount of around 0.2% by weight. Aptly, the composition comprises the flavouring at a minimum amount of around 0.4% by weight and at a maximum amount of around 1.5% by weight. Aptly, the composition comprises the yeast extract at a minimum amount of around 0% by weight and at a maximum amount of around 0.6% by weight.

Certain embodiments of the present invention therefore provide a composition for a meat substitute foodstuff which at least closely resembles a meat equivalent foodstuff in terms of texture, appearance, integrity, taste and feel before and during cooking and consumption.

Claims

1. A meat substitute composition comprising:
 - a methyl cellulose portion;
 - 5 a soya protein portion; and
 - an inulin gel portion.

2. The composition according to claim 1, comprising around 15.5% by weight of the methyl cellulose portion.

- 10 3. The composition according to claim 1 or 2, comprising around 5.75% by weight of the soya protein portion.

4. The composition according to any preceding claim, comprising around 2.5% by weight of the inulin gel portion.

- 15 5. The composition according to any preceding claim, wherein the methyl cellulose portion comprises methyl cellulose and water.

- 20 6. The composition according to claim 5, wherein the methyl cellulose portion comprises around 1% by weight of the methyl cellulose.

7. The composition according to claim 5 or 6, wherein the methyl cellulose portion comprises around 30% by weight of the water.

- 25 8. The composition according to any preceding claim, wherein the soya protein portion comprises an isolated soya protein and an oil.

9. The composition according to claim 8, wherein the oil is rapeseed oil.

- 30 10. The composition according to claim 8 or 9, wherein the soya protein portion comprises water.

11. The composition according to claim 10, wherein the soya protein portion
35 comprises around 1% by weight of the isolated soya protein, around 5.5% by weight of the rapeseed oil, and around 5% by weight of the water.

12. The composition according to any preceding claim, wherein the inulin gel portion comprises inulin and water.
- 5 13. The composition according to claim 12, wherein the inulin gel portion comprises around 1.25% by weight of inulin and around 3.75% by weight of water.
14. A food product comprising the composition according to any preceding claim.
- 10 15. The food product according to claim 14, wherein the food product is in a minced, burger, or sausage form.
16. A method of manufacturing a meat substitute composition, comprising:
mixing a methyl cellulose portion, a soya protein portion, and an inulin gel
15 portion.
17. The method according to claim 16, comprising adding colouring and/or
flavouring to the mix.

20

25

30

35

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2019/052779

A. CLASSIFICATION OF SUBJECT MATTER
 INV. A23L29/244 A23J3/16 A23J3/22 A23L29/262 A23L33/105
 A23L33/185 A23L33/21 A23L33/24 A61K31/733
 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 A61K A23J
 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|---|-----------------------|
| X | WO 02/056701 A2 (CENTRAL SOYA CO [US]) 25 July 2002 (2002-07-25) example 5 ----- | 1-17 |
| X | WO 02/065849 A1 (CENTRAL SOYA CO [US]) 29 August 2002 (2002-08-29) example 6 ----- | 1-17 |
| X | WO 2005/036971 A1 (TECHCOM GROUP LLC [US]; ANFINSEN JON R [US]; TUNGLAND BRYAN CRAIG [US]) 28 April 2005 (2005-04-28) example 5 ----- | 1-17 |

Further documents are listed in the continuation of Box C.

See patent family annex.

- * Special categories of cited documents :
- "A" document defining the general state of the art which is not considered to be of particular relevance
 - "E" earlier application or patent but published on or after the international filing date
 - "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 - "O" document referring to an oral disclosure, use, exhibition or other means
 - "P" document published prior to the international filing date but later than the priority date claimed
 - "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
 - "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 - "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
 - "&" document member of the same patent family

| | |
|---|---|
| Date of the actual completion of the international search 5 December 2019 | Date of mailing of the international search report 17/12/2019 |
|---|---|

| | |
|--|--|
| Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016 | Authorized officer Mere1-Rausch, Eva |
|--|--|

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2019/052779

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date | |
|--|------------------|-------------------------|------------------|------------|
| WO 02056701 | A2 | 25-07-2002 | AU 2002243545 B2 | 08-09-2005 |
| | | | BR 0206479 A | 23-03-2004 |
| | | | CA 2434472 A1 | 25-07-2002 |
| | | | CN 1536965 A | 13-10-2004 |
| | | | EP 1408770 A2 | 21-04-2004 |
| | | | JP 2004521621 A | 22-07-2004 |
| | | | MX PA03006223 A | 15-10-2004 |
| | | | US 2003045689 A1 | 06-03-2003 |
| | | | US 2003232121 A1 | 18-12-2003 |
| | | | WO 02056701 A2 | 25-07-2002 |
| | | | WO 02065849 | A1 |
| AU 2002255569 B2 | 19-10-2006 | | | |
| BR 0207386 A | 10-02-2004 | | | |
| CA 2438251 A1 | 29-08-2002 | | | |
| CN 1498081 A | 19-05-2004 | | | |
| EP 1370157 A1 | 17-12-2003 | | | |
| IL 157232 A | 04-07-2007 | | | |
| JP 2004518440 A | 24-06-2004 | | | |
| MX PA03007342 A | 19-04-2005 | | | |
| NZ 527459 A | 24-03-2005 | | | |
| US 2003054087 A1 | 20-03-2003 | | | |
| WO 02065849 A1 | 29-08-2002 | | | |
| ZA 200306156 B | 01-06-2004 | | | |
| WO 2005036971 | A1 | 28-04-2005 | | |
| | | | CA 2584188 A1 | 28-04-2005 |
| | | | CN 1852659 A | 25-10-2006 |
| | | | CN 102077854 A | 01-06-2011 |
| | | | EP 1681937 A1 | 26-07-2006 |
| | | | JP 5448297 B2 | 19-03-2014 |
| | | | JP 5728408 B2 | 03-06-2015 |
| | | | JP 2007508822 A | 12-04-2007 |
| | | | JP 2012130345 A | 12-07-2012 |
| | | | US 2005118326 A1 | 02-06-2005 |
| | | | US 2011038984 A1 | 17-02-2011 |
| | | | US 2012164297 A1 | 28-06-2012 |
| | | | WO 2005036971 A1 | 28-04-2005 |