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(54) Title: BASIS FOR VEGETABLE MEAT SUBSTITUTE

(57) **Abstract:** Basis for vegetable meat substitute use natural qualities of leguminous grains/seed, oilseeds or cereal for germination where the grains/seeds undergo at least a few hour soaking in water or a prepared salt solution, preferably potassium salt or other nutritive substances e.g. vitamins, mineral salts, betanin flavonoids, anthocyanins and other which are absorbed by the grains/seeds during germination process. Basis for vegetable meat substitute after it mixed with other substances such as flour of leguminous vegetables, protein extracts e.g. lupin, mushrooms, vegetables or other without meat, may become the basis for meat substitutes flavour and texture-wise, for burgers, pate, sausages, etc. as well as it is formed on typical devices for meat processing and typical bakery equipment, and the meat substitute based products may be subject to heat treatment such as cooking, baking, frying. There is no need to add gluten, lactose, soya and its derivatives nor flavourings, preservatives, flavour enhancers to the products based on the vegetable meat substitute, however it is possible to do so.

Basis for vegetable meat substitute

The subject of the invention is the basis for vegetable meat substitute.

There are well known meat substitutes which use isolated wheat protein – gluten, soya or fermented fungi derivatives such as:

Tofu – the soybean is soaked in water, then ground and the fibre and husk are separated. During the further process a coagulant (magnesium chloride) is added, which forms curd and allows to extract the “whey”. After straining, the final product stays on the sieve and different flavour additives can be added.

“Soy meat” - the process takes place in extruders with high pressure (over 10 Pa) and high temperature (about 150 deg. C) for a short period of time. It is heated and liquefied and as it exits the extruder, the sudden drop in pressure causes evaporation of water and as a result it becomes a porous, fibrous network similar to dried meat. The so processed high-protein product soaked in salted water with spices can be used in cooking as a meat alternative. Depending on the shape and size of the extrudates you can use them to prepare different types of dishes similar to schnitzel, stew, etc.

Tempeh – it is based on soaking and cooking soybeans, then cooling them down and drying and subjecting them to controlled fermentation. As a result a cake form appears covered with white, dense mycelium. Tempeh can undergo different types of heat treatment such cooking, baking, frying.

Saitan (wheat, spelt) - it is made by washing off wheat flour dough to remove wheat, leaving sticky mass containing gluten. Its texture resembles meat and when yeast extract is added, its taste resembles some types of meat.

Quorn is made by fermentation of quorn mould in nutritive solution and the protein is extracted.

The aim of the invention is to introduce a basis for vegetable meat substitute based on the pre-germinated seeds and grains of e.g. amaranth, lentils, buckwheat, peas, haricots beans, chick peas, rice, sunflower, barley or other excluding or limiting so far used gluten, soya or fermented fungus derivatives with protein content of min. 6% dry matter and full content of exogenous amino acids, micro and macro-elements.

The essential feature of the basis for the vegetable meat substitute is the use of natural grains/seeds of legume, oilseeds or cereals such as lentils, buckwheat, peas, beans, chick peas, sunflower, amaranth, rice, barley and other for germination where the grains/seeds are soaked in water for several hours or in a prepared salt solution, preferably, potassium salt or other nutritive substances e.g. vitamins, mineral salts, betanin flavonoids, anthocyanins and other which are absorbed by the grains/seeds during germination process.

The essential feature of the basis for the vegetable meat substitute is the fact that it, having it mixed with other substances such as flour of leguminous vegetables, protein extracts e.g. lupin, mushrooms, vegetables or other without meat, it may become the basis for meat

substitutes flavour and texture-wise for burgers, pâté, sausages, etc. as well as it is formed on typical devices for meat processing and typical bakery equipment.

The essential feature of the basis for the vegetable meat substitute is also that the meat substitute based products may be subject to heat treatment such as cooking, baking, frying.

Another essential feature of the basis for the vegetable meat substitute is the fact that there is no need to add gluten, lactose, soya and its derivatives nor any flavourings, preservatives, flavour enhancers to the products based on the vegetable meat substitute, however it is possible to do so.

The advantage of this solution is that the basis for the vegetable meat substitute is actual meat substitute, ie. one which contains proteins and nutritive substance equivalents without any ingredients from animal origin.

The advantage of this solution is that the used germinated grains/seeds are more sensitive to heat treatment which means that preparing a balanced dish is shorter and less energetically expensive in comparison to meat products and other so far known meat substitutes.

The advantage of this solution is that the nutritive ingredients of germinated grains/seed are more easily absorbed by the organism than the so far used meat substitutes.

The advantage of this solution is that the germinated grains/seeds are easily available in our climate which makes the transport cheaper and their cultivation is more favourable for the environment than the one in a monoculture imported soya farms.

The method of preparing different products has been shown in eleven examples:

1. Chops/cutlets

Ingredients (industrial portion)

Lentil sprouts – 375 kg
Amaranth sprouts – 225 kg
Potatoes – 210 kg
Button mushroom – 210 kg
Onions – 210 kg
Lupin protein – 150 kg
Oil – 135 kg
Oat bran – 60 kg
Mixture of spices – 12 kg
Bell peppers – 12 kg
Pepper – 2,25 kg
Salt – 15 kg

Mix lentil sprouts with other ingredients and process them in a mincing machine. Add amaranth sprouts and knead as bread dough so it settles down and has a uniform consistency. Then put it in a machine forming the final shape. Such products can be transported into heat

treatment devices e.g. baking oven. The final products shall be cooled down and packed.

2. Pâté

Ingredients:

Legumes sprouts – 30%
Raw vegetables – 20%
Oyster mushroom – 20%
Oat bran – 10 %
Lupin protein – 10%
Rape seed oil – 5%
Deactivated yeast – 4%
Herbal spices – 3%

Mix all the ingredients thoroughly and preferably cook while mixing. Add the then mixed and cooked ingredients into the mincing machine. Take the minced matter into the dispenser and pack it in single units. The packed units shall be placed in the autoclave where they undergo a final heat treatment including pasteurisation, sterilisation.

3. Burger

Amaranth sprouts – 100 kg
Lentil sprouts – 80 kg
Button mushrooms – 120 kg
Potatoes – 120 kg
Oat bran – 30 kg
Deactivated yeast – 4 kg
Lupin protein – 15 kg
Dried onion – 4 kg
Mixture of spices – 6 kg

Stew lentil sprouts and other ingredients. Add amaranth sprouts and mix all thoroughly and knead as bread dough. Divide into portions and bake in a bakery, tunnel or rotary oven at temperature 140-200 deg. C for 5-20 mins. Pack the burgers and freeze. After defrosting, the burgers shall be deep fried not longer than a few minutes.

4. Cutlets from lentil sprouts and button mushrooms

Lentil sprouts – 40 %
Brown button mushrooms – 31 %
Pea protein extract – 15 %
Oat bran – 10%

Mixture of spices – 2%
Rape seed oil – 2%

Stew lentil sprouts and other ingredients. Add pea protein and mix all thoroughly and knead as bread dough. Divide into portions and fry them in hot oil.

5. Chops/meatballs

Amaranth sprouts – 35 %
Buckwheat sprouts – 28%
Lupin protein – 12%
Oat bran – 15%
Rape seed oil – 5%
Minced flax – 3%
Mixture of herbal spices – 1,5 %
Salt – 1,5 %

Stew sprouts in a small amount of water and oil for 20 minutes. Stir all the ingredients gently while stewing. After about 10 minutes add all the other ingredients. At the end of the process the water shall be boiled down and the dough shall have a flexible consistency. After cooling down, form chops of 3-4 cm thick.

6. Buckwheat and amaranth sprouts loose

Buckwheat sprouts – 50%
Amaranth sprouts – 30%
Lupin protein – about 10%
Mixture of spices – 5%
Oil – 5%

Mix buckwheat and amaranth sprouts and fry them in hot oil, add a small amount of water and stew them for about 10 minutes, then add other ingredients. Stir all the ingredients while stewing to avoid burning. If the water vaporizes, add water. After 10 mins, add lupin protein extract and spices. Stir all thoroughly. The product is ready to serve or to put it into the dispenser. After dividing into portions, pack them in jars, tins or aluminium containers with lids for ready made meals. Place the packed products in autoclave in order to pasteurise or sterilise them.

7. Pâté – version 1

Buckwheat sprouts – 4 kg
Grass pea sprouts – 2,75 kg
Chick peas sprouts – 5,5 kg
Onion – 2 kg
Carrot – 2 kg
Parsley – 1,4 kg

Lupin protein – 1,0 kg
Rape seed oil – 1,8 l
Herbal spices – 0,3 kg
Salt, pepper to taste

Glaze onion on oil. Steam cook sprouts and other vegetable ingredients. Combine together all the above ingredients and stir. Then process it in a mincing machine. Knead all the minced ingredients with lupin protein and spices in a mixer. Divide into portions and place in metal or silicone moulds. Bake in oven at temperature 180 deg. C.

8. Lentil sprouts with betanin

Ingredients

Lentil seeds
Betanin
Water

Clean the lentil seeds and wash in clean water, then place in containers designed for soaking seeds. Pour betanin solution, preferably 2% water solution, into the container so it covers all the seeds. The seeds shall be soaked for a few up to a dozen or so hours depending on the degree of betanin saturation. While soaking, the seeds in solution shall be stirred several times using an internal agitator or motor revolutions.

9. Amaranth seeds in potassium salt

Ingredients
Amaranth seeds
Potassium salt
Water

Clean the amaranth seeds and wash in clean water and place in containers designed for soaking seeds. Dissolve potassium salt in water, preferably 2% concentration. Pour the prepared solution into the container with the amaranth seeds. The seeds shall be soaked for a few up to a dozen or so hours depending on the degree of potassium saturation. The solution can be aerated in order to add oxygen and dispose of carbon dioxide. After soaking, place the seed on the sieves for germination. Germinated seeds store in a warehouse or transport for further treatment.

10. Buckwheat sprouts with magnesium chloride

Ingredients

Buckwheat seeds
Magnesium chloride
Water

Clean the buckwheat seeds and wash them in running water and place them in containers designed for soaking seeds. Add the earlier prepared 1% solution of magnesium chloride into the container to cover all the seeds. The seeds shall be soaked for a few up to a dozen or so hours depending on the degree of magnesium chloride saturation. While soaking, the seeds in solution shall be stirred several times using an internal agitator or motor revolutions. If the soaking is longer than a few hours, change the solution for a fresh one.

11. Pâté – version 2

Bean, chick peas and lentil sprouts – 12,5 kg

Buckwheat sprouts- 4,0 kg

Button mushrooms – 3,5 kg

Dried vegetables – 0,3 kg

Carrot – 0,7 kg

Bell pepper – 0,8 kg

Dried tomatoes – 0,9 kg

Green olives – 0,9 kg

Lupin protein – 0,4 kg

Rape seed oil – 1 l

Herbal spices – 0,5 kg

Pepper – 17 g

Salt – 20 g

Stew sprouts, vegetables, mushrooms and spices adding water gradually. Then add lupin protein. Cool down and process it in a mincing machine. Knead the matter in a kneading machine, place in metal or silicone moulds and bake at temperature 180 deg. C.

Claims

1. Basis for vegetable meat substitute **characterized in that** it uses natural qualities of leguminous grains/seed, oilseeds or cereal for germination where the grains/seeds undergo at least a few hour soaking in a prepared salt solution, preferably potassium salt or other nutritive substances e.g. vitamins, mineral salts, betanin flavonoids, anthocyanins and other which are absorbed by the grains/seeds during germination process.
2. Basis for vegetable meat substitute **characterized in that** it uses natural qualities of leguminous grains/seeds, oilseeds or cereals for germination where the grains/seeds undergo dozens of hours of soaking in water.
3. Basis according to claim 1 or 2 **characterized in that** after soaking, the sprouts can be aerated with additional nutritive substances e.g. vitamins, mineral salts, flavonoids, anthocyanins, betanin or other.
4. Basis according to claim (1 or 2) and 3 **characterized in that** having it mixed with other substances such as flour of leguminous vegetables, protein extracts e.g. lupin, mushrooms, vegetables or other without meat, may become the basis for meat substitutes flavour and texture-wise, for burgers, pâté, sausages, etc. as well as it is formed on typical devices for meat processing and typical bakery equipment.
5. Basis according to claim (1 or 2) and 3 and/or 4 **characterized in that** the meat substitute based products may be subject to heat treatment such as cooking, baking, frying.
6. Basis according to claim (1 or 2) and 3 and/or 4 and/or 5 **characterized in that** there is no need to add gluten, lactose, soya and its derivatives nor flavourings, preservatives, flavour enhancers to the products based on the vegetable meat substitute, however it is possible to do so.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

A23J1/14 (2006.01) ; A23J1/12 (2006.01) ; A23J3/14 (2006.01) ; A23L7/152 (2016.01) ; A01H3/04 (2006.01) ; A23L33/15 (2016.01); A23L33/16 (2016.01)

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)

A01H3/04 (2006.01) A23J1/12 (2006.01) ; A23J1/14 (2006.01) ; A23J3/14 (2006.01) ; A23L1/172 (2006.01) ; A23L1/212 (2006.01) ; A23L1/302 (2006.01); A23L1/304 (2006.01) ; A23L7/10 (2016.01) ; A23L7/152 (2016.01) ; A23L33/15 (2016.01) ; A23L33/16(2016.01)

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)

esp@cenet ; EPOQUENET; UPRP; Science Direct; Internet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C.



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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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