

DESCRIPTION

Title of Invention: CHEESE-LIKE FOOD AND METHOD FOR MANUFACTURING SAME

Technical Field

[0001]

The present invention relates to a cheese-like food and a method for manufacturing a cheese-like food.

The present application claims priority based on Japanese Patent Application No. 2018-106840 filed on June 4, 2018, in Japan, the content of which is incorporated herein by reference.

Background Art

[0002]

A cheese that melts and stretches on elongation when heat-melted is highly demanded as topping on pizza, gratin, toast, and the like. As a form that is suitable for topping, for example, a form of strips or thin threads obtained by shredding a block of cheese is popular.

Since a natural cheese and a processed cheese produced by heat-melting and then emulsifying a natural cheese (a cheese raw material) are expensive, there is a need for a cheese-like food that melts and stretches on elongation when heat-melted even when a small amount of a cheese raw material is used. In

addition, good processability is also required for cutting and shredding.

[0003]

PTL 1 discloses a cheese-like food having a stretching property, produced by mixing a cheese raw material in a reduced amount of 20 to 50% by mass, milk protein, and a vegetable oil, adding an emulsifying salt thereto, and heating and emulsifying the mixture, followed by cooling and shredding. PTL 1 states that, when the amount of the cheese raw material is too low, a good stretching property cannot be attained.

Citation List

Patent Literature

[0004]

PTL 1: JP-A-2009-159906

Summary of Invention

Technical Problem

[0005]

However, it is required to further reduce the amount of the cheese raw material while achieving the stretching property like in a natural cheese and the processability.

An object of the present invention is to provide a cheese-like food in which a small amount of a cheese raw material is used, which shows a good stretching property when heated, and which also has a good processability, and to provide a method for manufacturing such a cheese-like food.

Solution to Problem

[0006]

The present invention has the following aspects.

[1] A cheese-like food containing less than 10% by mass of a cheese raw material, 8 to 30% by mass of a milk protein concentrate, 5 to 35% by mass of an oil or fat, and 0.2 to 2% by mass of an emulsifying salt, the cheese like food having a total content of the milk protein concentrate and the oil or fat of 35% by mass or more, a solid content of 44 to 60% by mass, and a ratio by mass of lipid/protein of 0.3 to 3.1.

[2] The cheese-like food according to [1], wherein the milk protein concentrate is one or more selected from the group consisting of an MCC, an MCI, an MPC, an MPI, a casein, and a caseinate.

[3] The cheese-like food according to [1] or [2], wherein the oil or fat contains one or more selected from the group consisting of palm oil, coconut oil, beef tallow, lard, milk fat, and an edible refined and processed oil or fat.

[4] The cheese-like food according to any one of [1] to [3], wherein the emulsifying salt contains at least one of a citrate salt or a phosphate salt.

[5] The cheese-like food according to any one of [1] to [4], wherein the cheese-like food has a hardness at 10°C of 1.5×10^4 to 40×10^4 Pa.

[6] The cheese-like food according to any one of [1] to [5],

wherein the cheese-like food has a block shape or a sheet shape.

[7] The cheese-like food according to any one of [1] to [6], wherein the cheese-like food is a cut-processed product.

[8] A method for manufacturing a cheese-like food, the method including

heat-melting all raw materials to produce a heated and molten mixture,

shaping the heated and molten mixture to produce a shaped product, and

cooling the shaped product to produce the cheese-like food,

the raw materials including

less than 10% by mass of a cheese raw material,

8 to 30% by mass of milk protein concentrate,

5 to 35% by mass of an oil or fat, and

0.2 to 2% by mass of an emulsifying salt,

the raw materials having

a total content of the milk protein concentrate and the oil or fat of 35% by mass or more,

a solid content of 44 to 60% by mass, and

a ratio by mass of lipid/protein of 0.3 to 3.1.

[9] The method for manufacturing a cheese-like food according to [8], wherein the method further includes a step of cutting the shaped product after the cooling.

Advantageous Effects of Invention

[0007]

According to the present invention, a cheese-like food in which a small amount of a cheese raw material is used, which shows a good stretching property when heated, and which also has good processability can be obtained.

Description of Embodiments

[0008]

<Measurement Method>

The protein content in the present invention is measured by the Kjeldahl method ("Shokuhin Hyouji Kijun nitsuite (Re. standard for food indication" (Shou-Shoku-Hyou No.407 on September 1, 2017) "Betten: Eiyou Seibun tou no Bunseki Houhou tou (Appendix: Analytical method, etc., for nutrient components, etc.)", page 4).

The lipid content in the present invention is measured by an acid digestion method ("Shokuhin Hyouji Kijun nitsuite (Re. standard for food indication" (Shou-Shoku-Hyou No.407 on September 1, 2017) "Betten: Eiyou Seibun tou no Bunseki Houhou tou (Appendix: Analytical method, etc. for nutrient components, etc.)", page 11).

The water content in the present invention is measured by a drying aid method ("Shokuhin Hyouji Kijun nitsuite (Re. standard for food indication" (Shou-Shoku-Hyou No.407 on September 1, 2017) "Betten: Eiyou Seibun tou no Bunseki Houhou tou (Appendix: Analytical method, etc. for nutrient components,

etc.)", page 29).

The solid content in a cheese-like food is obtained by subtracting the water content from the total mass of the cheese-like food.

[0009]

The hardness of a cheese-like food in the present invention is obtained by measuring the maximum value of the compressive stress.

Specifically, using a physical property measuring instrument, such as a creep meter, with a cylindrical plunger with 8 mm diameter and 22 mm height, the maximum value of the stress when a sample is compressed at a compression rate of 5 mm/sec to a compression ratio of 75% is taken as a measurement value of the hardness (unit: Pa). The temperature of the sample at the measurement is 10°C.

[0010]

<Cheese-like Food>

[Cheese Raw Material]

The cheese-like food of this embodiment contains no cheese raw material or, if it contains, the content is less than 10% by mass of a cheese raw material based on the total mass of the cheese-like food. A lower content of a cheese raw material is advantageous in terms of the cost, and the content is preferably 9% by mass or less and more preferably 8% by mass or less based on the total mass of the cheese-like food.

As the cheese raw material, any cheese that is classified into "natural cheese", "processed cheese", "cheese food", and "food whose main raw material is milk or the like" according to the Nyu tou Syourei (ordinance about milk and the like) and the Kousei Kyousou Kiyaku (fair competition code) can be used with no particular limitation.

Note that the milk as a raw material of natural cheese includes, in addition to milks defined in the Nyu tou Shourei (raw milk, cow milk, special cow milk, raw goat milk, raw sheep milk, pasteurized goat milk, homogenized cow milk, low-fat cow milk, fat-free cow milk, and processed milk), milks of known common animals, such as water buffalo and camel.

Examples of the kinds of the cheese raw material include Cheddar cheese, Mozzarella cheese, Samsoe cheese, Gouda cheese, Edam cheese, Emmental cheese, and Parmesan cheese.

One cheese raw material or two or more cheese raw materials may be contained in the cheese-like food.

Note that the cheese-like food in this embodiment may contain no cheese raw material, or may contain 0.5% by mass or more, preferably 1% by mass or more, and further preferably 2% by mass or more of a cheese raw material(s).

[0011]

[Milk Protein Concentrate]

The milk protein concentrate is preferably a milk protein concentrate mainly containing a casein. Specifically, the

content of the casein is preferably 80% by mass or more, more preferably 90% by mass or more, and may be 100% by mass based on the milk protein concentrate.

Specific preferred examples include one or more selected from the group consisting of an MCC (micellar casein concentrate), an MCI (micellar casein isolate), an MPC (milk protein concentrate), an MPI (milk protein isolate), a casein, and a caseinate.

The casein may be any one of acid casein, lactic casein, and rennet casein. Two or more caseins may be used in combination.

Caseinate means an alkaline salt of a casein.

The content of the milk protein concentrate is preferably 8 to 30% by mass, preferably 11 to 29% by mass, and more preferably 14 to 29% by mass based on the total mass of the cheese-like food. With the lower limit of the above range or more, a good hardness of the cheese-like food is easily attained. With the upper limit or less, a good stretching property when heated is easily attained.

[0012]

[Oil or Fat]

The oil or fat is preferably an oil or fat that is solid at a normal temperature (25°C). The oil or fat may be a vegetable oil or fat or an animal oil or fat, or may be an edible refined and processed oil or fat obtained by subjecting a

vegetable oil or fat or an animal oil or fat to a processing, such as hydrogenation or transesterification. The oil or fat preferably contains one or more selected from the group consisting of palm oil, coconut oil, beef tallow, lard, milk fat, and an edible refined and processed oil or fat therefrom.

The content of the oil or fat is 5 to 35% by mass, preferably 12 to 32% by mass, and more preferably 12 to 30% by mass based on the total mass of the cheese-like food.

[0013]

The total content of the milk protein concentrate and the oil or fat is 35% by mass or more, preferably 38% by mass or more, and more preferably 40% by mass or more based on the total mass of the cheese-like food. With the lower limit of the above range or more, a good hardness and a good stretching property are easily attained in the cheese-like food.

[0014]

In addition, the lipid/protein which represents the ratio by mass of the lipid content to the protein content in the cheese-like food is preferably 0.3 to 3.1, more preferably 0.5 to 3, and more preferably 2 to 3.

[0015]

[Emulsifying salt]

As the emulsifying salt, a citrate salt or a phosphate salt is preferably used. Another emulsifying salt may be used in combination therewith. A citrate salt and a phosphate salt

may be used in combination.

Examples of citrate salts include sodium citrate and potassium citrate.

Examples of phosphate salts include a monophosphate (sodium orthophosphate, etc.) and a diphosphate (sodium pyrophosphate, etc.).

As said another emulsifying salt, one or more of known emulsifying salts can be used.

The content of the emulsifying salt is 0.2 to 2% by mass, and more preferably 0.4 to 1.5% by mass based on the total mass of the cheese-like food. With the lower limit of the above range or more, the emulsifiability is superior, and with the upper limit or less, the flavor and the stretching property are superior.

[0016]

[Water, Additive, or the like]

The cheese-like food contains water. When the composition of the solid matter is the same, the lesser the water, i.e., the more the solid content, the harder the cheese-like food is. The more the water, i.e., the lesser the solid content, the softer the cheese-like food is. In order to attain good processability, it is preferable that the cheese-like food not be too hard and not be too soft. When the solid content of the cheese-like food is 44 to 60% by mass based on the total mass of the cheese-like food, good

processability is easily attained.

[0017]

Additive components other than the milk protein concentrate, the oil or fat, the emulsifying salt, and water may be added to the cheese-like food to the extent that the advantageous effects of the present invention are not impaired.

Examples of other additives include a starch, a seasoning material, an acidic taste adding material, a preservative, a thickening stabilizer (or gelling agent), an emulsifier other than the emulsifying salt, a pH modifier, a fragrance, and a colorant.

Examples of starches include a processed starch or an unprocessed natural starch.

Examples of seasoning materials include salt, a carbohydrate, a spice, an amino acid, and a nucleic acid.

An example of an acidic taste adding material is citric acid.

Examples of preservatives include sodium dehydroacetate, potassium sorbate, nisin, and polylysine.

Examples of thickening stabilizers (or gelling agents) include agar, gelatin, Locust bean gum, carrageenan, guar gum, and xanthan gum.

Examples of emulsifiers other than the emulsifying salt include a sucrose fatty acid ester, lecithin, and a glyceride.

Examples of pH modifiers include sodium bicarbonate and

lactic acid.

The content of the other additives in total is preferably 10% by mass or less, more preferably 9% by mass or less, and further preferably 8% by mass or less based on the total mass of the cheese-like food. The content may be zero.

[0018]

The hardness of the cheese-like food at 10°C is 1.5×10^4 to 40×10^4 Pa, preferably 2.0×10^4 to 20×10^4 Pa, and more preferably 2.5×10^4 to 15×10^4 Pa. When the hardness is within the above range, the processability is superior.

The hardness of the cheese-like food can be adjusted, for example, by the ratio by mass of lipid/protein. With the same solid content (water content), the hardness tends to increase as the ratio by mass of lipid/protein decreases.

[0019]

<Method for Manufacturing Cheese-like Food>

The cheese-like food of this embodiment can be manufactured by a method including heat-melting all raw materials including the milk protein concentrate, the oil or fat, and the emulsifying salt, and shaping the resulting heated and molten mixture, and cooling the resulting shaped product.

Specifically, first, all the raw materials are put in a cooker and are heat-melted. The heat-melting is a step of performing a heat treatment while stirring the raw materials, and also functions as a sterilization step. The heat treatment

is preferably performed using direct or indirect steam. As the cooker, a cooker having, for example, a kettle form, a cheese cooker form with a twin screw, or a thermo-cylinder form can be used.

The conditions of the heat-melting are not particularly limited. For example, with stirring at a rotation speed of 120 to 1500 rpm, the raw materials are made molten with heat, and when a prescribed condition for heat sterilization is satisfied, the melting is ended.

The temperature of heating is preferably 70°C or higher, and more preferably 80 to 90°C.

[0020]

Next, the resulting heated and molten mixture is shaped into a prescribed shape, for example, by filling in a container, and the resulting shaped product is cooled, thus obtaining a cheese-like food. The shaped product after cooling may be a final product, or a subsequent step of cutting may be provided.

Examples of cooling methods include a method in which the shaped product is dipped in cold water of 1 to 10°C to rapidly cool the shaped product, a method in which the shaped product is stored in a refrigerator to cool the shaped product, and a method in which one surface or both surfaces of the shaped product are brought into contact with a cooled metallic surface to rapidly cool the shaped product.

[0021]

The shape of the final product of the cheese-like food is not particularly limited. For example, a block-shaped cheese-like food obtained by shaping the heated and molten mixture into a block, followed by cooling may be a final product.

A sheet-shaped cheese-like food obtained by shaping the heated and molten mixture into a sheet, followed by cooling may be a final product. The thickness of the sheet is not particularly limited, and the sheet may be a laminate.

A cut-processed product obtained by further subjecting, to a cut processing, the block-shaped or sheet-shaped product which is obtained by shaping the heated and molten mixture into a block or sheet, followed by cooling may be a final product. The shape of the cut-processed product is not particularly limited, and examples of shapes include shapes of shred, dice, bar, slice, strip, and granule.

Examples

[0022]

The present invention will be described in more detail below with reference to examples, but the present invention is not to be limited to the examples.

<Raw Materials>

The raw materials shown in Tables are as follows.

· Cheese raw material (1): Cheddar cheese (natural cheese manufactured by Fonterra)

- Milk protein concentrate (1): rennet casein (manufactured by Fonterra)
- Oil or fat (1): mixed oil or fat containing coconut oil and palm oil (manufactured by Taiyo Yushi Corporation)
- Emulsifying salt (1): trisodium citrate (crystal, manufactured by Showa Kako Corporation)
- Other additive components: starch (manufactured by Nihon Starch Co., Ltd.), seasoning material (salt, manufactured by Nihonsyokuenseizo Co., Ltd.), acidic taste adding material (citric acid, manufactured by Showa Kako Corporation), thickening stabilizer (xanthan, manufactured by San-Ei Gen F. F. I., Inc.), colorant (gardenia yellow, San-Ei Gen F. F. I., Inc.)

[0023]

<Evaluation Method>

[Hardness]

A block-shaped cheese-like food (10°C) was cut into a rectangular prism with 40 mm length, 40 mm width, and 20 mm thickness. Using a creep meter (manufactured by Yamaden Co., Inc.) with a cylindrical plunger with 8 mm diameter and 22 mm height, the maximum value of the stress (unit: Pa) when the cheese-like food was compressed at a compression rate of 5 mm/sec into a thickness of 5 mm was measured.

[Processability]

The block-shaped cheese-like food was cut into strips

with about 20 mm length, about 4 mm width, and about 2 mm thickness using a cutter (High-Speed Cutter, model 350, manufactured by Takahashi Seisakusho Ltd.) to evaluate the processability.

The processability was evaluated under the following criteria.

A: The cheese can be stably cut into a uniform shape.

B: The cheese can be stably cut into almost the same shape even with a certain nonuniformity.

C: The cheese can be cut but not stably and the cutter sometimes comes to a stop.

D: The cheese cannot be cut into strips.

[0024]

[Stretching Property]

25 g of a cut-processed product obtained by cutting the block-shaped cheese-like food into strips with about 20 mm length, about 4 mm width, and about 2 mm thickness were scattered evenly on the top of a slice of bread with a cut line previously made in the center thereof. The slice of bread was heated in an electric oven toaster (1000 W) for about 3 minutes and was then taken out. Subsequently, a temperature sensor was inserted between the bread and the cheese to measure the temperature. When the temperature became 65°C, the bread on a desk was horizontally pulled from the cut line at the center of the bread 50 mm toward both the sides. At that time, the

number of the formed threads of the elongated cheese and the width of the widest one of the threads (the maximum thread width) were measured to evaluate the stretching property under the following criteria.

A: The number of formed threads is one or more and the maximum thread width is 2 mm or more.

B: The number of formed threads is one or more and the maximum thread width is less than 2 mm.

D: The number of formed threads is zero.

[0025]

(Examples 1 to 13)

Block-shaped cheese-like foods were produced with a formulation shown in Table 1. Examples 1 to 9 are Working Examples and Examples 10 to 13 are Comparative Examples. The cheese raw material (1) was previously pulverized.

First, all the raw materials shown in the table were put in a test melting and emulsifying tank (Universal High-Speed Cutter Mixer, model UMM/SK5 manufactured by Stephan, with a mixing attachment). Note that in this cooker, steam is blown for heating, and thus the amount of water corresponding to water added by the steam is previously subtracted from the amount of water to be added. The amount of added water shown in the table includes water added by the steam.

Next, while stirring at a rotation speed of 500 rpm, heat-melting was conducted until 80°C was reached. When 80°C

was reached, the steam blow was stopped, followed by stirring for 60 seconds to effect heat sterilization. Then, the steam blow and stirring were stopped, thus obtaining a molten mixture.

The obtained molten mixture was filled in a rectangular prism container with 270 mm length, 90 mm width, and 80 mm depth, and the resulting shaped product (about 75°C) was placed in a refrigerator having an inside temperature of 5°C to cool the shaped product until the product temperature reached 10°C. The thus-obtained block-shaped cheese-like food was used as a sample to perform the evaluations according to the above methods. The results are shown in the table.

[0026]

[Table 1]

	Ex.1	Ex.2	Ex.3	Ex.4	Ex.5	Ex.6	Ex.7	Ex.8	Ex.9	Ex.10	Ex.11	Ex.12	Ex.13
Formulation [% by mass]	Cheese raw material (1)	8	8	1	8	4	0	8	8	8	8	8	16
	Milk protein concentrate (1)	30	29	17	15	15	17	14	11	9	8	6	10
	Oil or fat (1)	5	12	28	29	28	29	27	31	31	32	35	27
	Emulsifying salt (1)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Starch	4	4	4	0	4	4	4	4	4	4	4	4
	Other additive components	5.5	5.5	2.5	4.5	4.5	3.5	3.5	2.5	4.5	4.5	2.5	3.5
	Added water	46	40	41	42	43	45	42	42	42	42	43	38
	Total	100	100	100	100	100	100	100	100	100	100	100	100
	Total content of milk protein concentrate and oil or fat [% by mass]	35	41	45	44	43	46	41	42	40	40	41	37
	Solid content [% by mass]	46	51	53	51	53	51	51	51	51	51	51	53
Evaluation	Lipid content [% by mass]	7.2	13.6	28.7	30.8	29.7	28.9	28.8	32.7	33.5	34.1	36.8	29.6
	Protein content [% by mass]	27.6	27.3	16.4	15.2	15.0	14.3	14.2	10.9	10.2	9.7	7.4	15.1
	Mass ratio of lipid/protein	0.3	0.5	1.8	2.0	2.0	2.0	2.0	3.0	3.3	3.5	5.0	2.0
	Hardness ($\times 10^4$ Pa)	11.2	14.1	2.3	2.8	2.3	3.1	2.5	2.2	1.8	1.8	1.2	2.0
	Processability	A	A	B	A	B	A	A	B	C	C	D	C
	Stretching property	A	A	B	A	A	A	A	A	A	A	B	D

[0027]

As shown in Table 1, Examples 1 to 9 provided cheese-like foods in which a small amount of a cheese raw material was used, which showed a good stretching property when heated, and which also had a good processability.

In Examples 10 and 11 having a large ratio by mass of lipid/protein, the cheese-like foods were slightly soft and brittle, and thus the processability was inferior.

In Example 12 having a small content of the milk protein concentrate, the cheese like food was further softer and brittler than Examples 10 and 11, and was not able to be cut with the cutter.

In Example 13 having a large content of the cheese raw material, the cheese was slightly nonuniform and was slightly sticky, and thus the processability was inferior. In addition, when the cheese-like food was heated, no thread was formed.

[0028]

(Examples 21 to 29)

Cut-processed products were produced with the same formulations as for Examples 1 to 9.

First, all the raw materials were put in the same test melting and emulsifying tank as in Examples 1 to 9. Next, the raw materials were heat-melted while stirring at a rotation speed of 900 rpm until 85°C was reached. When 85°C was reached, the steam blow was stopped, followed by stirring for 90 seconds

to effect heat sterilization. Then, the steam blow and stirring were stopped, thus obtaining a molten mixture.

The molten mixture was shaped into a sheet-shaped product (about 75°C) with 380 mm length, 260 mm width, and 2 mm thickness. The sheet-shaped product was placed in a refrigerator having an inside temperature of 5°C and thus was cooled until the product temperature reached 10°C to obtain a sheet-shaped cheese-like food.

The sheet-shaped cheese-like food was cut into strips with the cutter.

[Industrial Applicability]

[0029]

The present invention can be applied to production of a cheese-like food in which a small amount of a cheese raw material is used, which shows a good stretching property when heated, and which also has a good processability.

CLAIMS

[Claim 1]

A cheese-like food, comprising
less than 10% by mass of a cheese raw material,
8 to 30% by mass of a milk protein concentrate,
5 to 35% by mass of an oil or fat, and
0.2 to 2% by mass of an emulsifying salt,
the cheese-like food having
a total content of the milk protein concentrate and the
oil or fat of 35% by mass or more,
a solid content of 44 to 60% by mass, and
a ratio by mass of lipid/protein of 0.3 to 3.1.

[Claim 2]

The cheese-like food according to Claim 1, wherein the
milk protein concentrate is one or more selected from the group
consisting of an MCC, an MCI, an MPC, an MPI, a casein, and
a caseinate.

[Claim 3]

The cheese-like food according to Claim 1 or 2, wherein
the oil or fat contains one or more selected from the group
consisting of palm oil, coconut oil, beef tallow, lard, milk
fat, and an edible refined and processed oil or fat.

[Claim 4]

The cheese-like food according to any one of Claims 1

to 3, wherein the emulsifying salt contains at least one of a citrate salt and a phosphate salt.

[Claim 5]

The cheese-like food according to any one of Claims 1 to 4, wherein the cheese-like food has a hardness at 10°C of 1.5×10^4 to 40×10^4 Pa.

[Claim 6]

The cheese-like food according to any one of Claims 1 to 5, wherein the cheese-like food has a block shape or a sheet shape.

[Claim 7]

The cheese-like food according to any one of Claims 1 to 6, wherein the cheese-like food is a cut-processed product.

[Claim 8]

A method for manufacturing a cheese-like food, the method comprising

heat-melting all raw materials to produce a heated and molten mixture,

shaping the heated and molten mixture to produce a shaped product, and

cooling the shaped product to produce the cheese-like food,

the raw materials including

less than 10% by mass of a cheese raw material,

8 to 30% by mass of a milk protein concentrate,

5 to 35% by mass of an oil or fat, and
0.2 to 2% by mass of an emulsifying salt,
the cheese-like food having
a total content of the milk protein concentrate
and the oil or fat of 35% by mass or more,
a solid content of 44 to 60% by mass, and
a ratio by mass of lipid/protein of 0.3 to 3.1.

[Claim 9]

The method for manufacturing a cheese-like food
according to Claim 8, wherein the method further comprises a
step of cutting the shaped product after the cooling.