

agitation. Meanwhile, various methods have been disclosed for controlling the properties of a cheese-based food by adding starch to processed cheese or a cheese-based food; for example, a method for producing a food containing egg white or starch
5 and having a hardness comparable to that of processed cheese (Patent Document 1); a method for producing a cheese food containing starch octenyl succinate and having excellent melting characteristics and stretch ability (Patent Document 2); a method for producing a cheese-based food having freezing
10 resistance and frying resistance by adding a molten salt and oxidized starch to natural cheese (Patent Document 3); and a method for producing a cheese snack containing raw tapioca starch (Patent Document 4).

15 RELATED ART

[0004]

Patent Document 1: Japanese Patent No. 3391283

Patent Document 2: Japanese Patent No. 3887922

Patent Document 3: Japanese Patent No. 3108968

20 Patent Document 4: Japanese Patent No. 3373696

SUMMARY OF INVENTION

[0005]

The food disclosed in Patent Document 1 exhibits hardness
25 comparable to that of processed cheese and has a cheese content

as high as 80 wt%. The cheese food disclosed in Patent Document 2 has a cheese content of 83 wt% or more. The cheese-based food disclosed in Patent Document 3 exhibits freezing resistance and frying resistance and has a natural cheese content of 85 wt%
5 or more. Each of these cheese-based foods has high hardness and thus exhibits no stretch ability in a cooled state. In the method disclosed in Patent Document 4, raw tapioca starch is used for providing a cheese snack with a good texture and improving the preservability of the cheese snack. Although the
10 methods disclosed in Patent Documents 1 to 3 can impart stretch ability to a product such as a food, a cheese food, or cheese in a heated state, the product loses stretch ability in a cooled state due to hardening of the cheese contained in the product during cooling. Even if starch is added to a cheese-based food,
15 the cheese-based food exhibits good stretch ability only in a heated state, and becomes hard after cooling. A conventional cheese-based food suitable for confectionery or bread production is hardened during heating. Thus, a cheese-based food has not yet been provided which has good stretch ability,
20 and high heat resistance suitable for confectionery or bread production.

[0006]

An object of the present invention is to provide a cheese-based food having favorable stretch ability and high
25 heat resistance suitable for confectionery or bread production,

which has not yet been achieved by conventional techniques, and a method for producing the cheese-based food.

SOLUTION TO PROBLEM

5 [0007]

The present inventors have conducted extensive studies for solving the above-described problems. Consequently, the inventors have found that a cheese-based food containing 2.0 to 10.0 wt% processed tapioca starch and 15 to 70 wt% raw material
10 cheese and having a pH of 4.5 to 6.5, a water content of 55% or less, and a milk fat/milk protein ratio of 3.0 or more exhibits compatibility between high heat resistance suitable for confectionery or bread production and favorable stretch ability and flavor comparable to those of processed cheese, which has
15 not yet been achieved by conventional techniques. The present invention has been accomplished on the basis of this finding.

[0008]

The present invention provides the following:

Aspect (1) A cheese-based food containing 2.0 to 10.0 wt%
20 processed tapioca starch and 15 to 70 wt% raw material cheese and having a pH of 4.5 to 6.5, a water content of 55% or less, and a milk fat/milk protein ratio of 3.0 or more.

Aspect (2) The cheese-based food according to Aspect (1), which exhibits a stretch of 10 cm or more determined through the
25 following stretch ability test at 10°C and a heat resistance

of 50% or more determined through the following heating test, and satisfies the following requirement on suitability for bread production:

stretch ability test: 40 g of the cheese-based food is
5 collected in a cup, the cheese-based food is pulled up at a rate of 2.5 cm/second, and the length of an elongated string of cheese at break is measured;

heating test: the cheese-based food is placed in an oven and heated at 150°C for 12 minutes under humidification, and
10 the heat resistance is determined by the following formula on the basis of the heights of the cheese-based food measured before and after heating:

heat resistance (%) = [the height of the cheese-based food after heating (mm)/the height thereof before heating (mm)]×100;
15 and

suitability for bread production: when the cheese-based food is wrapped with bread dough and baked, the cheese-based food does not ooze out of the baked bread.

Aspect (3): A method for producing a cheese-based food,
20 including: mixing raw material cheese with processed tapioca starch to prepare a raw material mixture; adjusting the pH, water content, and milk fat/milk protein ratio of the raw material mixture so that a cheese-based food has a pH of 4.5 to 6.5, a water content of 55% or less, and a milk fat/milk
25 protein ratio of 3.0 or more; thermally emulsifying the raw

material mixture; and cooling the thermally emulsified raw material mixture.

EFFECTS OF INVENTION

5 [0009]

The present invention can provide a cheese-based food exhibiting favorable stretch ability and high heat resistance suitable for confectionery or bread production, and a method for producing the cheese-based food.

10

DESCRIPTION OF EMBODIMENT

[0010]

The cheese-based food prepared according to the present invention has high heat resistance. Even if the cheese-based food is used in confectionery or bread baked at a high temperature (e.g., 200°C or higher), the cheese-based food does not ooze out of the confectionery or bread and exhibits cheese-like stretch ability and flavor. As used herein, the term "cheese-based food" encompasses products specified in the Japanese Ministerial Ordinance on Milk and Milk Products Concerning Compositional Standards, etc. (the Japanese Ministry of Health and Welfare Ordinance No. 52, December 27, 1951), products specified in the Fair Competition Code, and products common in the art, including cheese-based foods.

25 [0011]

Any raw material cheese can be used in the present invention. Examples thereof include natural cheeses, such as cream cheese, Gouda cheese, mozzarella cheese, and cheddar cheese; processed cheeses; and cheese foods. In particular, high-fat natural cheese, such as cream cheese, is preferably used. These raw material cheeses may be used alone or in combination. The amount of the raw material cheese incorporated may be determined depending on the flavor required for a final cheese-based food. The cheese-based food of the present invention contains the raw material cheese in an amount of 15 to 70 wt%, preferably 20 to 65 wt%. A raw material cheese content below 15 wt% or exceeding 70 wt% may cause unsatisfactory stretch ability.

[0012]

The cheese-based food of the present invention may contain, as an auxiliary material, oil and fat, such as butter, soybean oil, rapeseed oil, corn oil, or palm oil.

[0013]

The processed tapioca starch used in the present invention may be tapioca starch which has been subjected to any processing treatment, such as etherification, esterification, oxidation, or cross-linking treatment. The processed tapioca starch is preferably etherified starch, such as hydroxypropyl starch, hydroxypropylated phosphate-crosslinked starch, sodium starch glycolate, carboxymethyl starch, or cationic

starch, or esterified starch, such as hydroxypropylated phosphate-crosslinked starch, starch acetate, starch phosphate, or phosphate-crosslinked starch. Particularly preferred are hydroxypropyl starch, hydroxypropylated phosphate-crosslinked starch, and oxidized starch. The cheese-based food of the present invention contains the processed tapioca starch in an amount of 2.0 to 10.0 wt%, preferably 4.0 to 7.5 wt%. A processed tapioca starch content below 2.0 wt% or exceeding 10.0 wt% may cause unsatisfactory stretch ability.

[0014]

The cheese-based food of the present invention has a pH of 4.5 or 6.5, preferably a pH of 5.0 to 6.0. A pH below 4.5 or exceeding 6.5 may cause insufficient heat resistance and poor suitability for confectionery or bread production.

[0015]

The cheese-based food of the present invention has a water content of 55% or less, preferably 50% or less. A water content exceeding 55% may cause insufficient heat resistance and poor suitability for confectionery or bread production. The water content of the cheese-based food may be adjusted by controlling the solid content thereof through incorporation of starch such as dextrin.

[0016]

The cheese-based food of the present invention has a milk

fat/milk protein ratio of 3.0 or more, because the cheese-based food contains, as a raw material, high-fat natural cheeses (e.g., cream cheese) which are used alone or in combination. A milk fat/milk protein ratio of 3.0 or more can provide the cheese-based food with suitability for confectionery or bread production, which is a feature of the present invention. The milk fat/milk protein ratio can be adjusted according to, for example, the type or amount of the raw material cheese added or the amount of oil and fat used as an auxiliary material. For example, the cheese-based food may contain cream cheese having a high milk fat content, as a raw material. In cheese having a high milk fat content, calcium is weakly bound to casein due to a low rennet content. The structure of cheese attributed to this weak binding would probably affect an improvement in heat resistance. The amount of milk fat or milk protein may be determined through any common method; for example, the Roese-Gottlieb method for milk fat, or the Kjeldahl method for milk protein.

[0017]

As used herein, the term "stretch ability" refers to a stretch of 10 cm or more determined through the following stretch ability test at 10°C:

(Evaluation of stretch ability)

stretch ability test: 40 g of a cheese-based food is collected in a cup, the cheese-based food is pulled up at a rate

of 2.5 cm/second, and the length of an elongated string of cheese at break is measured. The stretch ability of the cheese-based food is evaluated on the basis of the determined value.

[0018]

5 As used herein, the term "heat resistance" refers to a heat resistance of 50% or more determined through the following heating test.

[0019]

(Heating test)

10 A cheese-based food is placed in an oven and heated at 150°C for 12 minutes under humidification, and the heat resistance of the cheese-based food is determined by the following formula on the basis of the heights of the cheese-based food measured before and after heating:

15
$$\text{heat resistance (\%)} = [\text{the height of the cheese-based food after heating (mm)} / \text{the height thereof before heating (mm)}] \times 100.$$

[0020]

As used herein, the expression "a cheese-based food has suitability for confectionery or bread production" refers to
20 the case where when the cheese-based food is wrapped with bread dough and baked, the cheese-based food does not ooze out of the baked bread. In general, bread production requires a baking temperature higher than that of confectionery production. Thus, in the present invention, suitability for confectionery
25 or bread production is evaluated on the basis of suitability

for only bread production.

[0021]

Any auxiliary material usable for manufacturing cheese-based foods may be used in the present invention.

5 Examples of the auxiliary material include molten salts; food additives (other than molten salts) used in cheese-based foods, such as emulsifiers, stabilizers (e.g., polysaccharide thickeners and celluloses), and flavors; milk materials serving as milk protein sources; foodstuffs, such as starch, gelatin,
10 and agar; animal and vegetable oils and fats for adjustment of fat content, such as butter; and seasonings used for flavoring.

[0022]

Now will be described a method for producing the cheese-based food of the present invention. The method
15 includes a step of mixing raw material cheese with processed tapioca starch to prepare a raw material mixture; a step of adjusting the pH, water content, and milk fat/milk protein ratio of the raw material mixture so that a cheese-based food has a pH of 4.5 to 6.5, a water content of 55% or less, and a milk
20 fat/milk protein ratio of 3.0 or more; a step of thermally emulsifying the raw material mixture; and a step of cooling the thermally emulsified raw material mixture.

[0023]

In the raw material mixing step and the adjustment step,
25 raw material cheese is mixed with processed tapioca starch to

prepare a raw material mixture, the pH of the raw material mixture is adjusted to 4.5 to 6.5, the water content of the mixture is adjusted to 55% or less, and the milk fat/milk protein ratio of the mixture is adjusted to 3.0 or more. The processed
5 tapioca starch may be added alone or in combination with an auxiliary material. Thereafter, the raw material mixture having adjusted pH and water content is thermally emulsified and then cooled, to produce a cheese-based food.

[0024]

10 The pH of the cheese-based food can be adjusted to 4.5 to 6.5 with a common pH adjuster for adjustment of the pH of cheese, such as citric acid, lactic acid, or sodium bicarbonate. The water content of the cheese-based food must be adjusted to 40 to 55%. For adjustment of the water content of the
15 cheese-based food to 55% or less, the amount of water required for the raw material mixture is calculated from the water content of each raw material and the increasing amount of water during thermal emulsification, and the calculated amount of water is added to the raw material mixture. The milk fat/milk
20 protein ratio can be adjusted depending on, for example, the type or amount of the raw material cheese added or the amount of oil and fat used as an auxiliary material.

[0025]

In the present invention, any emulsifying machine for
25 cheese production may be used in the thermal emulsification step.

Examples of the machine include a high-speed shearing emulsifier, a kettle emulsifier, and a vertical high-speed shearing emulsifier. Any emulsification temperature or agitation speed may be used, because the cheese-based food can
5 be produced under typical cheese manufacturing conditions. The agitation speed is preferably 1,000 to 2,000 rpm, more preferably 1,200 to 1,800 rpm. In the subsequent cooling step, the emulsified mixture is placed into a mold having a shape according to the intended use of the cheese-based food and then
10 cooled therein. Any cooling temperature and rate can be applied. Similar to the case of common cheese-based foods, the cheese-based food of the present invention is preferably cooled rapidly to and stored at 10°C or lower.

[0026]

15 Even if the cheese-based food prepared according to the present invention is used in confectionery or bread baked at a high temperature (e.g., 200°C or higher), the cheese-based food does not ooze out of the confectionery or bread and exhibits cheese-like stretch ability and flavor.

20 [0027]

The cheese-based food produced according to the present invention can be applied to products for domestic and commercial use. Because of its excellent stretch ability in a wide temperature range, the cheese-based food can be used for pizza,
25 hamburger steak, steamed meat bun, baked confectionery (e.g.,

fondant au chocolat or cookie), steamed bean-jam bun, cheese-wrapped bun, and topping of bread or pie.

EXAMPLES

5 [0028]

The present invention will now be described in more detail by way of Examples, which should not be construed as limiting the invention thereto.

[0029]

10 [Example 1]

(Effect of raw material cheese content on properties)

Cream cheese (manufactured by Megmilk Snow Brand Co., Ltd.) was used as a raw material. Controlled amounts of oil and fat were added such that the raw material cheese content
15 of a final cheese-based food was in the range of 10 to 80 wt%. Subsequently, processed tapioca starch (Farinex TG600: hydroxypropyl starch (etherified), manufactured by Matsutani Chemical Industry Co., Ltd.) (6.0 wt%) and dextrin (9 wt%) were added to the raw material cheese. Sodium bicarbonate (0.01 wt%)
20 serving as a pH adjuster was added to the raw material mixture, into a pH of 6.0. Water was added to the mixture into a final water content of 45 to 55%. A molten salt (molten sodium phosphate) (0.1 wt%) was added to the mixture, and the mixture was then melted by being heated to 85°C and emulsified with a
25 high-shear Stephan emulsifier at 1,500 rpm. After having been

heated to 85°C, the mixture was agitated at the same rotation speed for 30 seconds. The thermally emulsified mixture was placed into a mold and cooled at 5°C for 24 hours, to produce a cheese-based food of the present invention (inventive product). The cheese-based food was evaluated for stretch ability, suitability for bread production, and heat resistance. A comparative cheese-based food was produced in the same manner as described above, except that the processed tapioca starch was replaced with the same amount of processed cornstarch (Farinex VA70C, manufactured by Matsutani Chemical Industry Co., Ltd.).

[0030]

(Stretch ability test)

(Method)

A cheese-based food (40 g) cooled at 10°C was collected in a cup. The cheese-based food was pulled up at a rate of 2.5 cm/second, and the length of an elongated string of cheese at break was measured. The stretch ability (cooled state) of the cheese-based food was evaluated on the basis of the measured value. The stretch ability (heated state) of the cheese-based food was evaluated at 85°C.

[0031]

(Evaluation criteria)

A: Stretch of 15 cm or more

B: Stretch of 10 cm or more and less than 15 cm

C: Stretch of 5 cm or more and less than 10 cm

D: No substantial stretch of less than 5 cm

[0032]

(Heating test)

5 Procedure

1) Sample rings (inner diameter: 25 mm, height: 15 mm) were appropriately disposed (two by two or two by three).

2) A cheese-based food was densely placed into each sample ring such that substantially no voids were present in the
10 cheese-based food.

3) The sample ring was placed into a stainless steel vat together with a mat and then covered with a wrapping film.

4) The cheese-based food was solidified in a freezer at -18°C. Thereafter, it was determined that the cheese-based food was
15 solidified, although not completely frozen, to such an extent to allow removal thereof from the sample ring. The solidified sample was then removed from the ring with a cylindrical sample remover having a diameter corresponding to the inner diameter of the ring.

20 5) The sample was placed on a paper filter, and the height of the sample (i.e., the height of the cheese-based food before heating) was measured.

6) The sample and the paper filter were placed into a large Petri dish, a beaker containing water was also placed into the Petri
25 dish, and the Petri dish was closed.

7) The sample was heated in an oven at 150°C for 12 minutes under humidification.

8) The sample was removed from the oven, and the height of the sample (i.e., the height of the cheese-based food after heating)

5 was measured.

9) The heat resistance (under humidification) of the sample was determined by the following formula:

heat resistance (%) = [the height of the cheese-based food after heating (mm)/the height thereof before heating (mm)]×100.

10 [0033]

(Evaluation criterion)

A heat resistance of 50% or more determined through the heating test indicated the "presence" of heat resistance.

[0034]

15 (Evaluation of suitability for bread production)

For evaluation of suitability for bread production, a cheese-based food was wrapped with bread dough and baked through a typical bread production process. Specifically, bread dough having a formulation shown in Table 1 was kneaded and fermented at 28°C for 1.5 hours. The dough was then punched (folded in thirds) and further fermented at 28°C for 30 minutes. The fermented dough was divided into pieces and rounded, and the rounded pieces were benched for 15 minutes. Thereafter, a cheese-based food (30 g) was wrapped with each dough piece, followed by shaping. The shaped dough pieces were subjected

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to secondary fermentation at 38°C for 40 minutes and then baked at 200°C for seven minutes.

[0035]

[Table 1]

5

Bread dough formulation

Raw material	Content (g)
Hard flour	80
Soft flour	20
Yeast	1.5
Sodium chloride	1.7
Egg	15
Water	47.5

[0036]

(Evaluation criteria)

A cheese-based food was evaluated for suitability for bread production based on no oozing of the cheese-based food out of baked bread products (n=5) and easy wrapping of the cheese-based food with bread dough. Evaluation criteria are as follows:

Good: no oozing of cheese-based food out of baked bread

15 Poor: oozing of cheese-based food out of baked bread

[0037]

[Table 2]

Effect of raw material cheese content on properties (milk fat/milk protein: 5.5)

Raw material cheese	Inventive product				Comparative product			
	Stretch ability (heated)	Stretch ability (cooled)	Heat resistance	Suitability for bread production	Stretch ability (heated)	Stretch ability (cooled)	Heat resistance	Suitability for bread production
80%	B	C	Presence	Good	D	D	Absence	Poor
70%	B	B	Presence	Good	D	D	Presence	Poor
60%	A	A	Presence	Good	D	D	Presence	Poor
40%	A	A	Presence	Good	D	D	Presence	Poor
20%	A	A	Presence	Good	D	D	Presence	Poor
15%	B	B	Presence	Good	D	D	Absence	Poor
10%	C	C	Absence	Poor	D	D	Absence	Poor

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[0038]

Table 2 shows the results. With reference to Table 2, cheese-based foods having a raw material cheese content of 15 to 70 wt% exhibited good stretch ability and high heat resistance. The cheese-based foods used in bread products baked at high temperatures (200°C or higher) did not ooze out of the bread products and exhibited favorable cheese-like stretch ability and flavor.

10

[0039]

15 [Example 2]

(Effect of pH on properties)

Cream cheese (manufactured by Megmilk Snow Brand Co.,

Ltd.) (10 kg) was milled and used as a raw material. Subsequently, oil and fat (1,200 g), processed tapioca starch (Farinex TG600: hydroxypropyl starch (etherified), manufactured by Matsutani Chemical Industry Co., Ltd.) (1,500
5 g, 6.0 wt%), and dextrin (3,000 g) were added to the raw material cheese. Citric acid and sodium bicarbonate serving as pH adjusters were added to the raw material mixture, into a pH of 4.0 to 7.0. Water was added to the mixture into a final water content of 45%. A molten salt (molten sodium phosphate) (100
10 g) was added to the mixture, and the mixture was then melted by being heated to 85°C and emulsified with a high-shear Stephan emulsifier at 1,500 rpm. After having been heated to 85°C, the mixture was agitated at the same rotation speed for 30 seconds. The thermally emulsified mixture was placed into a mold and
15 cooled at 5°C for 24 hours, to produce a cheese-based food of the present invention (inventive product). The cheese-based food was evaluated for stretch ability, suitability for bread production, and heat resistance. A comparative cheese-based food was produced in the same manner as described above, except
20 that the processed tapioca starch was replaced with the same amount of processed cornstarch (Farinex VA70C, manufactured by Matsutani Chemical Industry Co., Ltd.). Stretch ability was evaluated only in a heated state.

[0040]

[Table 3]

Effect of pH on properties (milk fat/milk protein: 5.5)

pH	Inventive product			Comparative product		
	Stretch ability	Heat resistance	Suitability for bread production	Stretch ability	Heat resistance	Suitability for bread production
7.0	B	Absence	Poor	D	Absence	Poor
6.5	B	Presence	Good	D	Presence	Poor
6.0	A	Presence	Good	D	Presence	Poor
5.5	A	Presence	Good	D	Presence	Poor
5.0	A	Presence	Good	D	Presence	Poor
4.5	B	Presence	Good	D	Absence	Poor
4.0	C	Absence	Poor	D	Absence	Poor

5 [0041]

Table 3 shows the results. With reference to Table 3, cheese-based foods having a pH of 4.5 to 6.5 exhibited excellent stretch ability and high heat resistance. The cheese-based foods used in bread products baked at high temperatures did not ooze out of the bread products and exhibited favorable cheese-like stretch ability and flavor. The cheese-based foods of the present invention had a milk fat/milk protein ratio of 5.5.

[0042]

15 [Example 3]

(Effect of water content on properties)

Cream cheese (manufactured by Megmilk Snow Brand Co.,

Ltd.) (10 kg) was milled and used as a raw material. Subsequently, oil and fat (1,200 g), processed tapioca starch (Farinex TG600: hydroxypropyl starch (etherified), manufactured by Matsutani Chemical Industry Co., Ltd.) (1,000
5 to 1,500 g, 6.0 wt%), and dextrin (3,000 g) were mixed with the raw material cheese. Sodium bicarbonate (15 g) serving as a pH adjuster was added to the raw material mixture, into a pH of 6.0. Water was added to the mixture into a final water content of 40.0 to 60.0%. A molten salt (molten sodium
10 phosphate) (100 g) was added to the mixture, and the mixture was then melted by being heated to 85°C and emulsified with a high-shear Stephan emulsifier at 1,500 rpm. After having been heated to 85°C, the mixture was agitated at the same rotation speed for 30 seconds. The thermally emulsified mixture was
15 placed into a mold and cooled at 5°C for 24 hours, to produce a cheese-based food of the present invention (inventive product). The cheese-based food was evaluated for stretch ability, suitability for bread production, and heat resistance. A comparative cheese-based food was produced in the same manner
20 as described above, except that the processed tapioca starch was replaced with the same amount of processed cornstarch (Farinex VA70C, manufactured by Matsutani Chemical Industry Co., Ltd.). Stretch ability was evaluated only in a heated state.

[0043]

[Table 4]

Effect of water content on properties (milk fat/milk protein:
5.5)

Water content	Inventive product			Comparative product		
	Stretch ability	Heat resistance	Suitability for bread production	Stretch ability	Heat resistance	Suitability for bread production
60.0	B	Absence	Poor	D	Absence	Poor
55.0	B	Presence	Good	D	Presence	Poor
50.0	B	Presence	Good	D	Presence	Poor
45.0	A	Presence	Good	D	Presence	Poor
40.0	A	Presence	Good	D	Presence	Poor

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[0044]

Table 4 shows the results. With reference to Table 4,
cheese-based foods having a water content of 55% or less
exhibited good stretch ability and high heat resistance. The
10 cheese-based foods used in bread products baked at high
temperatures did not ooze out of the bread products and
exhibited favorable cheese-like stretch ability and flavor.
The cheese-based foods of the present invention had a milk
fat/milk protein ratio of 5.5.

15 [0045]

[Example 4]

(Effect of processed tapioca starch content on properties)

Cream cheese (manufactured by Megmilk Snow Brand Co.,

Ltd.) (10 kg) was milled and used as a raw material. Subsequently, oil and fat (1,200 g), processed tapioca starch (Farinex TG600: hydroxypropyl starch (etherified), manufactured by Matsutani Chemical Industry Co., Ltd.) (200 to 5 2,400 g, 1.0 to 12.0 wt%), and dextrin (3,000 g) were mixed with the raw material cheese. Sodium bicarbonate (15 g) serving as a pH adjuster was added to the raw material mixture, into a pH of 6.0. Water was added to the mixture into a final water content of 45%. A molten salt (molten sodium phosphate) (100 10 g) was added to the mixture, and the mixture was then melted by being heated to 85°C and emulsified with a high-shear Stephan emulsifier at 1,500 rpm. After having been heated to 85°C, the mixture was agitated at the same rotation speed for 30 seconds. The thermally emulsified mixture was placed into a mold and 15 cooled at 5°C for 24 hours, to produce a cheese-based food of the present invention (inventive product). The cheese-based food was evaluated for stretch ability, suitability for bread production, and heat resistance. A comparative cheese-based food was produced in the same manner as described above, except 20 that the processed tapioca starch was replaced with the same amount of processed cornstarch (Farinex VA70C, manufactured by Matsutani Chemical Industry Co., Ltd.). Stretch ability was evaluated only in a heated state.

[0046]

[Table 5]

Effect of tapioca content on properties (milk fat/milk protein:
5.5)

Tapioca content	Inventive product			Comparative product		
	Stretch ability	Heat resistance	Suitability for bread production	Stretch ability	Heat resistance	Suitability for bread production
12.0 (%)	C	Absence	Poor	D	Absence	Poor
10.0 (%)	B	Presence	Good	D	Presence	Poor
7.0 (%)	A	Presence	Good	D	Presence	Poor
6.0 (%)	A	Presence	Good	D	Presence	Poor
4.0 (%)	A	Presence	Good	D	Presence	Poor
2.0 (%)	B	Presence	Good	D	Absence	Poor
1.0 (%)	C	Absence	Poor	D	Absence	Poor

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[0047]

Table 5 shows the results. With reference to Table 5,
cheese-based foods having a processed tapioca starch content
of 2.0 to 10.0 wt% exhibited favorable stretch ability, high
10 heat resistance suitable for confectionery or bread production.
In particular, cheese-based foods having a processed tapioca
starch content of 4.0 to 7.0 wt% exhibited excellent stretch
ability. The cheese-based foods retained cheese-like stretch
ability in both heated and cooled states. The cheese-based
15 foods of the present invention had a milk fat/milk protein ratio
of 5.5.

[0048]

[Example 5]

Cream cheese (manufactured by Megmilk Snow Brand Co., Ltd.) (10 kg) was milled and used as a raw material. Subsequently, oil and fat (1,200 g), processed tapioca starch (Farinex VA70TJ: hydroxypropylated phosphate-crosslinked starch (esterified), manufactured by Matsutani Chemical Industry Co., Ltd.) (1,500 g, 6.0 wt%), and dextrin (3,000 g) were mixed with the raw material cheese. Sodium bicarbonate (15 g) serving as a pH adjuster was added to the raw material mixture, into a pH of 6.0. Water was added to the mixture into a final water content of 43%. A molten salt (molten sodium phosphate) (100 g) was added to the mixture, and the mixture was then melted by being heated to 85°C and emulsified with a high-shear Stephan emulsifier at 1,800 rpm. After having been heated to 85°C, the mixture was agitated at the same rotation speed for 30 seconds. The thermally emulsified mixture was placed into a mold and cooled at 5°C for 24 hours, to produce a cheese-based food of the present invention (inventive product). The cheese-based food was evaluated for stretch ability, suitability for bread production, and heat resistance. The cheese-based food exhibited excellent stretch ability; specifically, a stretch of 15 cm or more in both heated and cooled states. The cheese-based food also exhibited excellent suitability for bread production (i.e., no oozing of the cheese-based food out of baked bread). The cheese-based food

of the present invention had a milk fat/milk protein ratio of 5.5.

[0049]

[Example 6]

5 Cream cheese (manufactured by Megmilk Snow Brand Co., Ltd.) (10 kg) was milled and used as a raw material. Subsequently, oil and fat (1,200 g), processed tapioca starch (Stabilose TA-8: oxidized starch, manufactured by Matsutani Chemical Industry Co., Ltd.) (1,500 g, 6.0 wt%), and dextrin
10 (3,000 g) were mixed with the raw material cheese. Sodium bicarbonate (15 g) serving as a pH adjuster was added to the raw material mixture, into a pH of 5.5. Water was added to the mixture into a final water content of 40%. A molten salt (molten sodium phosphate) (100 g) was added to the mixture, and the
15 mixture was then melted by being heated to 85°C and emulsified with a high-shear Stephan emulsifier at 1,200 rpm. After having been heated to 85°C, the mixture was agitated at the same rotation speed for 30 seconds. The thermally emulsified mixture was placed into a mold and cooled at 5°C for 24 hours,
20 to produce a cheese-based food of the present invention (inventive product). The cheese-based food was evaluated for stretch ability, suitability for bread production, and heat resistance. The cheese-based food exhibited excellent stretch ability; specifically, a stretch of 15 cm or more in both heated
25 and cooled states. The cheese-based food also exhibited

excellent suitability for bread production (i.e., no oozing of the cheese-based food out of baked bread). The cheese-based food of the present invention had a milk fat/milk protein ratio of 5.5.

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INDUSTRIAL APPLICABILITY

[0050]

The present invention can provide a cheese-based food exhibiting excellent stretch ability and flavor comparable to those of processed cheese not only in a heated state but also at low temperatures, which has not yet been achieved by conventional techniques, and high heat resistance suitable for confectionery or bread production, and a method for producing the cheese-based food. The cheese-based food produced according to the present invention can be applied to various products for domestic and commercial use.

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CLAIMS

[Claim 1]

A cheese-based food comprising:

2.0 to 10.0 wt% processed tapioca starch; and

15 to 70 wt% raw material cheese, the cheese-based food having a pH of 4.5 to 6.5, a water content of 45 to 55 %, and a fat/milk protein ratio of 3.0 at the least.

[Claim 2]

The cheese-based food according to claim 1, wherein the cheese-based food comprising:

4.0 to 7.0 wt% processed tapioca starch.

[Claim 3]

The cheese-based food according to claim 2, the fat/milk protein ratio is 5.5 or less.

[Claim 4]

The cheese-based food according to claim 1, which exhibits a stretch of 10 cm or more determined through the following stretch ability test at 10°C and a heat resistance of 50% or more determined through the following heating test, and satisfies the following requirement on suitability for bread production:

stretch ability test: 40 g of the cheese-based food is collected in a cup, the cheese-based food is pulled up at a rate of 2.5 cm/second, and the length of an elongated string of cheese at break is measured;

heating test: the cheese-based food is heated at 150°C for 12 minutes under humidification, and the heat resistance is determined by the following formula on the basis of the heights of the cheese-based food measured before and after heating:

heat resistance (%) = [the height of the cheese-based food after heating (mm)/the height thereof before heating (mm)]×100;
and

suitability for bread production: when the cheese-based food is wrapped with bread dough and baked, the cheese-based food does not ooze out of the baked bread.

[Claim 5]

A method for producing a cheese-based food, comprising:
mixing raw material cheese with processed tapioca starch to prepare a raw material mixture;

adjusting the pH, water content, and fat/milk protein ratio of the raw material mixture so that a cheese-based food has a pH of 4.5 to 6.5, a water content of 45 to 55 %, and a fat/milk protein ratio of 3.0 at the least;

thermally emulsifying the raw material mixture; and
cooling the thermally emulsified raw material mixture.