

DESCRIPTION

TITLE OF INVENTION: FIBROUS CHEESE AND METHOD FOR PRODUCING FIBROUS CHEESE

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TECHNICAL FIELD

[0001] The present disclosure relates to a fibrous cheese and a method for producing the fibrous cheese.

10 BACKGROUND ART

[0002] Patent Literature 1 and Patent Literature 2 disclose cheeses having a fibrous structure. Cheese pieces torn along a fiber direction in such cheeses have a unique texture and have characteristic, pleasant chewiness.

15 CITATION LIST

PATENT LITERATURE

[0003] Patent Literature 1: JPS63-71147A
Patent Literature 2: JP2017-510252A

20 SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] However, when a liquid raw material or a powder raw material other than a cheese curd are added to impart a fibrous property or other properties to a cheese, a heat reduction odor or a powder odor may be generated and may impair a flavor of the cheese.

25 [0005] An object of the present disclosure is to provide a fibrous cheese that has an excellent fibrous property without use of any additives, and a method for producing the same.

SOLUTION TO PROBLEM

[0006] A fibrous cheese of the present disclosure is a fibrous cheese obtained by kneading a
30 cheese raw material containing one or more types of cheeses, in which a proportion of a high shape-retention cheese having a heat-resistant shape-retention property of 70% or more when heated at 50°C for 30 minutes, is 40 wt% or more in the cheese raw material.

[0007] A method for producing a fibrous cheese of the present disclosure is a method for

producing a fibrous cheese including kneading a cheese raw material containing one or more types of cheeses, in which a proportion of a high shape-retention cheese having a heat-resistant shape-retention property of 70% or more when heated at 50°C for 30 minutes, is 40 wt% or more in the cheese raw material.

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ADVANTAGEOUS EFFECTS OF INVENTION

[0008] The present disclosure allows for providing a fibrous cheese that has an excellent fibrous property without use of any additives, and a method for producing the same.

10 BRIEF DESCRIPTION OF DRAWINGS

[0009] FIG. 1 is a photograph illustrating an example in which numerous fine fibers are generated in evaluation of a fibrous property of a cheese.

FIG. 2 is a photograph illustrating an example in which no fine fibers are generated in evaluation of a fibrous property of a cheese.

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DESCRIPTION OF EMBODIMENTS

[0010] Hereinafter, a fibrous cheese and a method for producing the fibrous cheese according to the present disclosure will be described.

[0011] [Fibrous Cheese]

20 (Cheese Raw Material)

A fibrous cheese of the present disclosure is obtained by kneading a cheese raw material containing one or more types of cheeses. While a fibrous cheese may be produced using milk such as raw milk as a raw material, the fibrous cheese of the present disclosure is produced using a cheese rather than milk as a raw material. Use of a cheese as a raw material for production has advantages such as capability of producing a fibrous cheese with a variety of flavors by changing a type of the cheese used, and ease of adjusting a production volume.

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[0012] In the present disclosure, the cheese contained in the cheese raw material is, for example, a natural cheese, and a type thereof is not limited. Especially, the cheese contained in the cheese raw material may be a cheese that is naturally fibrous, or may be a cheese that is not naturally fibrous. Even when a non-fibrous cheese is used as the raw material, a fibrous cheese can be obtained by going through steps of kneading, stretching, and the like described below. As the cheese raw material, a cheese having a pH of 5 to 6 is preferably used from a viewpoint of kneading suitability. The pH can be adjusted, for example, by a method of adding an acid

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directly to milk during cheese production or by adding lactic acid bacteria and adjusting the pH through lactic acid fermentation. Suitable examples of such a cheese include cheeses used as raw materials for pasta filata cheeses (mozzarella, caciocavallo, scamorza, provolone, string cheese, and the like). Semi-hard cheeses such as a Cheddar cheese and a Gouda cheese are also preferred since the pH thereof is usually within the above range. Furthermore, other types of cheeses, such as hard cheeses and fresh cheeses, can also be suitably used by adjusting the pH as necessary. The cheese used as the cheese raw material is not limited to natural cheeses that has been subjected to a salting step, and may be unsalted cheeses (cheese curd).

[0013] In the cheese raw material of the fibrous cheese of the present disclosure, a proportion of a high shape-retention cheese having a heat-resistant shape-retention property when heated at 50°C for 30 minutes (hereinafter, may be referred to simply as "heat-resistant shape-retention property") of 70% or more, is 40 wt% or more. Use of the high shape-retention cheese as the raw material allows for providing a cheese having a good fibrous property without using any additives other than cheeses. The fibrous property of the cheese in the present disclosure means that the cheese has fine fibers, and specifically means that, fine fibers are observed when the cheese is torn apart by hand.

[0014] The heat-resistant shape-retention property in the present disclosure is an index measured by the following method. From a cheese to be measured, a 10 mm cube sample is cut out and stored in an environment of 10°C until just before being heated. A petri dish for preventing dryness in which water and a paper wipe are placed is put into a large petri dish and the large petri dish is kept in a dryer set to 50°C for 45 minutes or more to keep the petri dish in a warming state. The sample stored at 10°C is put into the large petri dish in the dryer, and is immediately covered by a lid, and the sample is heated for 30 minutes in the dryer set at 50°C. After heating, the sample is removed from the dryer and cooled down at room temperature (20°C) for 10 minutes. Thereafter, maximum and minimum heights are measured using a caliper, and an average value is regarded as a height of the sample, and the heat-resistant shape-retention property is calculated according to the following formula (1).

$$\text{Heat-resistant shape-retention property (\%)} = \frac{\text{Height of sample after heating}}{\text{Height of sample before heating}} \times 100 \quad (1)$$

[0015] The heat-resistant shape-retention property of the high shape-retention cheese is preferably 75% or more, more preferably 80% or more, and still more preferably 85% or more. A high heat-resistant shape-retention property of the high shape-retention cheese results in an excellent fibrous property. The upper limit of the heat-resistant shape-retention property of the

high shape-retention cheese is not limited.

[0016] The proportion of the high shape-retention cheese in the entire cheese raw material is preferably 50 wt% or more, more preferably 60 wt% or more, still more preferably 70 wt% or more, even more preferably 80 wt% or more, further preferably 90 wt% or more, and most preferably 100 wt%. A high proportion of the high shape-retention cheese results in an excellent fibrous property.

[0017] The cheese raw material may contain only one type of cheese or may contain two or more types of cheeses. From the viewpoint of improving diversity of flavors of the resulting cheese, the cheese raw material preferably contains two or more types of cheeses. The cheese raw material containing two or more types of cheeses allows for increasing options for the cheeses to be used as the raw material, and has an advantage of contributing to stabilization of production.

[0018] When the cheese raw material contains two or more types of cheeses, all of the cheeses contained in the cheese raw material may be high shape-retention cheeses, or the cheese raw material may contain one or more types of low shape-retention cheeses having a heat-resistant shape-retention property of less than 70%. A proportion of the low shape-retention cheeses in the entire cheese raw material can be in a range of 0 wt% or more and 60 wt% or less. Within the above range, a cheese having an excellent fibrous property can be obtained even when the cheese raw material contains a low shape-retention cheese. A value of the heat-resistant shape-retention property of the low shape-retention cheeses is not limited, but a lower limit of the heat-resistant shape-retention property of the cheese typically used as the cheese raw material is, for example, approximately 40%.

[0019] The cheese raw material preferably has a degree of ripeness of 7.0% or less. When the degree of ripeness is 7.0% or less, the fibrous property of the cheese can be maintained for a long period of time. In the present specification, the "long period of time" means a period of about 30 days or more. The degree of ripeness is more preferably 6.0% or less, still more preferably 5.0% or less, and most preferably 4.0% or less. A lower limit of the degree of ripeness is not limited, but is, for example, 1.0%. In the present disclosure, the degree of ripeness refers to an index value derived from an amount of soluble proteins, which is expressed by a ratio of a soluble nitrogen content to a total nitrogen content in the cheese raw material. The total nitrogen content and the soluble nitrogen content of the cheese raw material can be measured by, for example, the Kjeldahl method, and specifically, can be measured by subjecting the cheese raw material to Kjeldahl digestion using a KJELDATHERM KTL20S (manufactured by

C.Gerhardt Japan Co.,Ltd.), and then Kjeldahl distillation and titration using a VAPODEST 500C (manufactured by C.Gerhardt Japan Co.,Ltd.).

The degree of ripeness is a value calculated based on the measured nitrogen content and soluble nitrogen content according to the following formula (2).

5 Degree of ripeness (%) = (soluble nitrogen content/total nitrogen content) × 100 (2)

When the cheese raw material contains a plurality of types of natural cheeses, a value obtained by measuring a degree of ripeness of each natural cheese, and calculating a weighted average value based on the degrees of ripeness and weight ratios of the plurality of types of natural cheeses in the cheese raw material, can be regarded as the degree of ripeness of the
10 cheese raw material.

[0020] (Additives)

According to the present disclosure, use of the cheese raw material containing the high shape-retention cheese in a certain proportion or more allows for providing a cheese having an excellent fibrous property without adding any additives during production. This achieves
15 avoiding deterioration of the flavor and texture of the cheese due to additives. However, additives may also be used in the fibrous cheese of the present disclosure for a purpose of further increasing the fibrous property of the cheese or improving other properties. As the additives to be added to the fibrous cheese of the present disclosure, additives used in production of fibrous cheeses in the related art or additives used in production of general cheeses can be used as
20 appropriate. Examples of the additives include organic acids such as acetic acid, phosphoric acid, citric acid, lactic acid, fumaric acid, succinic acid, tartaric acid, and malic acid, and dairy ingredients such as casein, casein hydrolysates, and lactose.

[0021] (Production Process)

The fibrous cheese of the present disclosure is obtained by heating, kneading,
25 stretching, and then cooling the cheese raw material. Specifically, for example, the fibrous cheese can be produced by the following steps. The cheese raw material is cut with a cutter or the like, and hot water at 70°C to 90°C is added thereto, followed by kneading. In order to promote an even temperature rise of a curd, it is preferable to cut the cheese raw material into cubes (1 cm to 2 cm cubes). An amount of the hot water should be enough to completely cover
30 the cheese raw material. An optimum temperature varies depending on the pH of the cheese raw material, but kneading at a temperature of approximately 50°C to 63°C is preferable. The kneading is completed when the cheese raw material has a plastic, smooth and uniform composition. After kneading, the cheese is stretched into a cylindrical shape, cooled in cold

water at or below 10°C, and then cut to a length of approximately 10 cm. The cut cheese is soaked in seasoned salt water (refined salt, sodium glutamate and water) to be salted, and the seasoned salt water on a surface of the cheese is wiped off to obtain the fibrous cheese.

[0022] [Method for Producing Fibrous Cheese]

5 A method for producing the fibrous cheese of the present disclosure includes a step of kneading the cheese raw material containing one or more types of cheeses. In the method for producing the fibrous cheese of the present disclosure, a proportion of the high shape-retention cheese having a heat-resistant shape-retention property of 70% or more when heated at 50°C for 30 minutes, is 40 wt% or more in the cheese raw material. Use of the high shape-retention
10 cheese as the raw material allows for providing a cheese having a good fibrous property without using any additives other than cheeses. A preferred embodiment of the cheese raw material is the same as that of the fibrous cheese described above, and therefore description thereof will be omitted.

[0023] In the method for producing the fibrous cheese of the present disclosure, the cheese
15 raw material may contain only one type of cheese, but preferably contains two or more types of cheeses. Use of the cheese raw material containing two or more types of cheeses allows for improving the diversity of flavors of the resulting cheese to contribute to stabilization of production.

[0024] In the method for producing the fibrous cheese of the present disclosure, the cheese
20 raw material preferably has a degree of ripeness of 7.0% or less. When the degree of ripeness is 7.0% or less, the fibrous property of the cheese can be maintained for a long period of time.

[EXAMPLES]

[0025] The present invention will be further described below with reference to Examples, but the present invention is not limited to these Examples. Of the examples shown below,
25 Examples 1 to 9 and 13 to 23 are Examples, and Examples 10 to 12 and 24 are Comparative Examples.

[0026] (Examples 1 to 12)

A Cheddar cheese (cheese raw material) was cut into 15 mm cubes, and the cut cheese raw material was kneaded while being heated to approximately 60°C. When the mixture
30 became suitable for stretching, the mixture was divided into pieces of a size that could be stretched by hand, and then, the pieces were stretched. After being cooled in cold water at 10°C or lower, the stretched pieces were cut to a length of approximately 9 cm and soaked in seasoned salt water (refined salt: 20.0%, sodium glutamate: 4.4%, water: 75.6%) to be salted. After being

salted, the salt water on a surface of the cheese was wiped off, and the cheese was vacuum-packaged, and then stored at 10°C. Tables 1 and 2 show the heat-resistant shape-retention property, the degree of ripeness, and the pH of the cheese raw material used in each example.

[0027] (Examples 13 to 24)

5 Two types of Cheddar cheeses (cheese raw materials) were each cut into 15 mm cubes, mixed at a predetermined weight ratio, and kneaded while being heated to approximately 60°C. When the mixture became suitable for stretching, the mixture was divided into pieces of a size that could be stretched by hand, and then, the pieces were stretched. After being cooled in cold water at 10°C or lower, the stretched pieces were cut to a length of approximately 9 cm and
10 soaked in seasoned salt water (refined salt: 20.0%, sodium glutamate: 4.4%, water: 75.6%) to be salted. After being salted, the salt water on a surface of the cheese was wiped off, and the cheese was vacuum-packaged, and then stored at 10°C. Tables 3 and 4 show the weight ratio of two types of Cheddar cheeses (Cheddar cheese 1 and Cheddar cheese 2) with respect to the total cheese raw material, the heat-resistant shape-retention property, the degree of ripeness and the
15 pH of two types of Cheddar cheeses (Cheddar cheese 1 and Cheddar cheese 2), the proportion of the high shape-retention cheese in the total cheese raw material, and the degree of ripeness of the cheese raw material calculated as a weighted average value based on the degree of ripeness of each Cheddar cheese and the weight ratio thereof in the cheese raw material.

[0028] (Heat-resistant Shape-retention Property)

20 The heat-resistant shape-retention property of the Cheddar cheeses used as the cheese raw material was measured by the following method. From the cheese to be measured, a 10 mm cube sample was cut out and stored in an environment of 10°C until just before being heated. A drying prevention petri dish in which water and a paper wipe were placed was put into a large petri dish and kept in a dryer set to 50°C for 45 minutes or more to keep the petri dish in a
25 warming state. The sample stored at 10°C was put into the large petri dish in the dryer, and was immediately covered by a lid, and the sample was heated for 30 minutes in the dryer set at 50°C. After heating, the sample was removed from the dryer and cooled down at room temperature (20°C) for 10 minutes. Thereafter, maximum and minimum heights were measured using a caliper, and an average value was regarded as a height of the sample, and the heat-resistant
30 shape-retention property was calculated according to the following formula (1).

$$\text{heat-resistant shape-retention property (\%)} = \frac{\text{height of sample after heating}}{\text{height of sample before heating}} \times 100 \quad (1)$$

[0029] (Degree of Ripeness)

The degree of ripeness of the cheese raw material (Cheddar cheeses) was calculated by the following method. A total nitrogen content and a soluble nitrogen content of the cheese raw material were measured by subjecting the cheese raw material to Kjeldahl digestion using a KJELDATHERM KTL20S (manufactured by C.Gerhardt Japan Co.,Ltd.), and then subjecting the digested product to Kjeldahl distillation and titration using a VAPODEST 500C (manufactured by C.Gerhardt Japan Co.,Ltd.). The degree of ripeness was calculated from the measured total nitrogen content and soluble nitrogen content according to the following formula (2).

$$\text{Degree of ripeness (\%)} = (\text{soluble nitrogen content} / \text{total nitrogen content}) \times 100 \quad (2)$$

For Examples 13 to 24, the degree of ripeness of each of the two types of Cheddar cheeses contained in the cheese raw material was measured, and a weighted average value calculated based on the degree of ripeness and the weight ratio in the cheese raw material of each type of cheese was regarded as the degree of ripeness of the cheese raw material.

[0030] (Fibrous Property Evaluation)

The produced fibrous cheeses were stored at 10°C for 7 days or 30 days and then evaluated for the fibrous property. The cheese was torn by hand in a certain direction, and the number of fine fibers that were produced when the cheese was torn was visually counted. The fibrous property was evaluated according to the following criteria.

A: Ten or more fine fibers were generated.

B: Two to nine fine fibers were generated.

C: One fine fiber was generated.

D: No fine fibers were generated.

For example, in the example illustrated in FIG. 1, ten or more fine fibers were generated when the cheese was torn, and therefore the cheese is evaluated as A. In the example illustrated in FIG. 2, no fine fibers were generated when the cheese was torn, and therefore the cheese is evaluated as D. In this fibrous property evaluation, fibers that were evaluated as A or B were evaluated as having an excellent fibrous property. Evaluation results for the fibrous property after 7 days and 30 days are shown in Tables 1 to 4.

[0031] [Table 1]

		Example 1	Example 2	Example 3	Example 4	Example 5	Example 6
Cheese raw material (Cheddar cheese)	Heat-resistant shape retaining property (%)	70.18	78.58	80.46	84.39	89.11	83.53
	Degree of ripeness (%)	9.85	7.89	7.23	4.5	4.55	3.72
	pH	5.54	5.59	5.53	5.18	5.34	5.9
Fibrous property evaluation	After 7 days	B	B	A	A	A	A
	After 30 days	C	C	C	B	B	A

[0032] [Table 2]

		Example 7	Example 8	Example 9	Example 10	Example 11	Example 12
Cheese raw material (Cheddar cheese)	Heat-resistant shape retaining property (%)	84.93	89.6	92.82	45.87	48.54	61.14
	Degree of ripeness (%)	3.79	2.9	3.59	8.74	9.6	10.6
	pH	5.95	5.89	5.91	5.59	5.62	5.42
Fibrous property evaluation	After 7 days	A	A	A	D	D	D
	After 30 days	A	A	A	D	D	D

[0033] [Table 3]

			Example 13	Example 14	Example 15	Example 16	Example 17	Example 18
Cheese raw material	Cheddar cheese 1	Weight ratio (%)	60	60	80	80	80	80
		Heat-resistant shape retaining property (%)	83.53	89.6	84.93	84.93	84.93	92.82
		Degree of ripeness (%)	3.72	2.9	3.79	3.79	3.79	3.59
		pH	5.9	5.89	5.95	5.95	5.95	5.91
	Cheddar cheese 2	Weight ratio (%)	40	40	20	20	20	20
		Heat-resistant shape retaining property (%)	91.3	89.11	65.8	63.5	58.05	53.08
		Degree of ripeness (%)	4.99	4.5	10.17	11.57	12.4	12.9
		pH	5.38	5.34	5.34	5.47	5.5	5.45
	Proportion (weight%) of cheese having high shape retaining property		100	100	80	80	80	80
	Degree of ripeness (weighted average)		4.23	3.54	5.07	5.35	5.51	5.45
Fibrous property evaluation	After 7 days		A	A	A	A	A	A
	After 30 days		A	B	B	B	B	B

5 [0034] [Table 4]

			Example 19	Example 20	Example 21	Example 22	Example 23	Example 24
Cheese raw material	Cheddar cheese 1	Weight ratio (%)	60	60	60	60	40	20
		Heat-resistant shape retaining property (%)	84.93	84.93	84.93	92.82	92.82	92.82
		Degree of ripeness (%)	3.79	3.79	3.79	3.59	3.59	3.59
		pH	5.91	5.95	5.95	5.91	5.91	5.91
	Cheddar cheese 2	Weight ratio (%)	40	40	40	40	60	80
		Heat-resistant shape retaining property (%)	65.8	63.5	58.05	53.08	53.08	53.08
		Degree of ripeness (%)	10.17	11.57	12.4	12.9	12.9	12.9
		pH	5.32	5.47	5.5	5.45	5.45	5.45
	Proportion (weight%) of cheese having high shape retaining property		60	60	60	60	40	20
	Degree of ripeness (weighted average)		6.34	6.90	7.23	7.31	9.18	11.04
Fibrous property evaluation	After 7 days		B	B	B	B	B	C
	After 30 days		B	B	B	B	D	D

[0035] It was confirmed that the cheeses produced using a cheese raw material containing 40 wt% or more of a high shape-retention cheese had an excellent fibrous property when measured after storage for 7 days. It was also confirmed that the cheeses produced using a cheese raw material with a degree of ripeness of 7.0% or less exhibited an excellent fibrous property even when measured after storage for 30 days, and the fibrous property can be

maintained for a long period of time.

[0036] This application is based on a Japanese Patent Application No. 2023-49481 filed on March 27, 2023, contents of which are incorporated herein by reference.

CLAIMS

[Claim 1]

5 A fibrous cheese obtained by kneading a cheese raw material containing one or more types of cheeses, wherein a proportion of a high shape-retention cheese having a heat-resistant shape-retention property of 70% or more when heated at 50°C for 30 minutes, is 40 wt% or more in the cheese raw material.

[Claim 2]

10 The fibrous cheese according to claim 1,
wherein the cheese raw material has a degree of ripeness of 7.0% or less.

[Claim 3]

15 The fibrous cheese according to claim 1 or 2,
wherein the cheese raw material contains two or more types of cheeses.

[Claim 4]

A method for producing a fibrous cheese, comprising:
kneading a cheese raw material containing one or more types of cheeses,
20 wherein a proportion of a high shape-retention cheese having a heat-resistant shape-retention property of 70% or more when heated at 50°C for 30 minutes, is 40 wt% or more in the cheese raw material.

[Claim 5]

25 The method for producing a fibrous cheese according to claim 4,
wherein the cheese raw material has a degree of ripeness of 7.0% or less.

[Claim 6]

30 The method for producing a fibrous cheese according to claim 4 or 5,
wherein the cheese raw material contains two or more types of cheeses.