

Description

Title of Invention: ROLL-IN OIL-AND-FAT COMPOSITION

Technical Field

[0001]

The present invention relates to a roll-in oil-and/or-fat composition.

Background Art

[0002]

A pie or Danish pastry prepared using a roll-in oil-and/or-fat composition is often required to exhibit good "puffiness".

Patent Document 1 is an application relating to a roll-in margarine for frozen dough, and indicates that the layered puffed food product exhibits a good puffiness.

Patent Document 2 is an application relating to a "roll-in water-in-oil emulsion composition for a layered puffed wheat flour food product having a firm and crisp chewing texture".

Patent Document 3 is an application relating to a roll-in oil-and/or-fat composition into which is blended from 45 to 95 mass% of a predetermined interesterified oil and/or fat.

Patent Document 4 is an application relating to a roll-in emulsified oil-and/or-fat composition, and indicates that a predetermined interesterified oil and/or fat is used.

Patent Document 5 discloses a predetermined interesterified oil and/or fat and a roll-in oil-and/or-fat composition into which the interesterified oil and/or fat is blended.

Patent Document 6 discloses an oil-and/or-fat composition that contains a predetermined interesterified oil and exhibits plasticity.

Citation List

Patent Documents

[0003]

Patent Document 1: WO 2017/082113

Patent Document 2: JP 2018-166414 A

Patent Document 3: WO 2019/054082

Patent Document 4: JP 2016-21941 A

Patent Document 5: WO 2017/009887

Patent Document 6: WO 2014/050488

Summary of Invention

Technical Problem

[0004]

The present invention addresses an issue of providing a roll-in oil-and/or-fat composition that exhibits good puffiness for a Danish pastry or the like while having a smooth physical property that is suitable for folding-in. The present invention also addresses an issue of simplifying the formulation of the roll-in oil-and/or-fat composition.

Solution to Problem

[0005]

The present inventors conducted intensive studies to solve the above issues. Patent Document 1 discloses an invention for limited applications of a frozen dough. The invention-specifying matters thereof are numerous, and the process of formulating the roll-in margarine is complex.

With the invention disclosed in Patent Document 2, a thickener must be added to the aqueous phase in order to realize crispness and a good food texture, and it is also necessary to select a predetermined oil and/or fat, and therefore the process of formulating the composition is complex.

In the invention of Patent Document 3, at least 45 mass% of a predetermined interesterified oil and/or fat must be blended therein, and there are significant restrictions in the process of formulating the roll-in oil-and/or-fat composition.

The interesterified oil and/or fat disclosed in Patent Document 4 has a tri-saturated (SSS) content of from 4 to 20 mass%, and thereby differs from the present invention.

The interesterified oil and/or fat disclosed in Patent Document 5 contains from 5 to 25 mass% of lauric acid, and thereby differs from the present invention.

The interesterified oil disclosed in Patent Document 6 contains from 20 to 65 mass% of a fatty acid having 14 or fewer carbon atoms, and differs from the present invention.

[0006]

As a result of further intensive studies, the present inventors discovered that a roll-in oil-and/or-fat composition containing from 5 to 26 mass% of a predetermined oil and/or fat in an oil phase exhibits good folding-in suitability and improves the puffiness of a Danish pastry or the like when the content of palmitic acid and the content of stearic acid in the oil and/or fat are within predetermined ranges, and the solid fat content (SFC) of oils and/or fats other than the oil and/or fat is set to a predetermined range, and thereby the present inventors arrived at the present invention.

[0007]

That is, the present invention relates to the following aspects.

(1) A roll-in oil-and/or-fat composition having an oil phase consisting of an oil and/or fat mixture C and an oil and/or fat A, in which

the roll-in oil-and/or-fat composition contains from 5 to 26 mass% of the oil and/or fat A in the oil phase,

the oil and/or fat A satisfies the following requirements 1 to 3, and

the oil and/or fat mixture C satisfies the following requirements 4 to 9:

1. a palmitic acid content is from 20 to 40 wt.%, and a stearic acid content is from 1 to 20 wt.%,
2. a weight ratio of stearic acid/palmitic acid is from 0.025 to 0.5,
3. a solid fat content (an SFC) at 10°C is 50% or less,
4. an SFC at 10°C is from 49% to 72%,
5. an SFC at 15°C is from 39% to 61%,
6. an SFC at 20°C is from 29% to 49%,
7. an SFC at 25°C is from 20% to 35%,
8. an SFC at 30°C is from 13% to 24%, and
9. an SFC at 35°C is from 7% to 14.5%.

(2) The roll-in oil-and/or-fat composition according to (1), in which the requirements 1 and 2 are as follows:

1. the palmitic acid content is from 27 to 35 wt.%, and the stearic acid content is from 2.5 to 10 wt.%,
2. the weight ratio of stearic acid/palmitic acid is from 0.07 to 0.3.

(3) The roll-in oil-and/or-fat composition according to (1) or (2), in which the requirement 3 is as follows:

3. the SFC at 10°C is from 6% to 20%.

(4) A method for producing a roll-in oil-and/or-fat composition having an oil phase consisting of an oil and/or fat mixture C and an oil and/or fat A,

in which

the roll-in oil-and/or-fat composition contains from 5 to 26 mass% of the oil and/or fat A in the oil phase,

the oil and/or fat A satisfies the following requirements 1 to 3, and

the oil and/or fat mixture C satisfies the following requirements 4 to 9:

1. a palmitic acid content is from 20 to 40 wt.%, and a stearic acid content is from 1 to 20 wt.%,
2. a weight ratio of stearic acid/palmitic acid is from 0.025 to 0.5,
3. a solid fat content (SFC) at 10°C is 50% or less.
4. an SFC at 10°C is from 49% to 72%,
5. an SFC at 15°C is from 39% to 61%,
6. an SFC at 20°C is from 29% to 49%,
7. an SFC at 25°C is from 20% to 35%,
8. an SFC at 30°C is from 13% to 24%, and
9. an SFC at 35°C is from 7% to 14.5%.

(5) The method for producing a roll-in oil-and/or-fat composition according to (4), in which the requirements 1 and 2 are as follows.

1. the palmitic acid content is from 27 to 35 wt.%, and the stearic acid content is from 2.5 to 10 wt.%,

2. the weight ratio of stearic acid/palmitic acid is from 0.07 to 0.3.

(6) The roll-in oil-and/or-fat composition according to (4) or (5), in which the requirement 3 is as follows:

3. The SFC at 10°C is from 6% to 20%.

(7) A method for improving puffiness in a baked layered grain flour food product, the method including:

folding a roll-in oil-and/or-fat composition into a grain flour dough for baking; and then baking,

in which

the roll-in oil-and/or-fat composition has an oil phase consisting of an oil and/or fat mixture C and an oil and/or fat A,

the roll-in oil-and/or-fat composition contains from 5 to 26 mass% of the oil and/or fat A in the oil phase,

the oil and/or fat A satisfies the following requirements 1 to 3, and

the oil and/or fat mixture C satisfies the following requirements 4 to 9:

1. a palmitic acid content is from 20 to 40 wt.%, and a stearic acid content is from 1 to 20 wt.%,

2. a weight ratio of stearic acid/palmitic acid is from 0.025 to 0.5,

3. a solid fat content (SFC) at 10°C is 50% or less,

4. an SFC at 10°C is from 49% to 72%,

5. an SFC at 15°C is from 39% to 61%,

6. an SFC at 20°C is from 29% to 49%,

7. an SFC at 25°C is from 20% to 35%,

8. an SFC at 30°C is from 13% to 24%,

9. an SFC at 35°C is from 7% to 14.5%.

(8) The method for improving puffiness in a baked layered grain flour food product according to (7), in which the requirements 1 and 2 are as follows:

1. the palmitic acid content is from 27 to 35 wt.%, and the stearic acid content is from 2.5 to 10 wt.%, and

2. the weight ratio of stearic acid/palmitic acid is from 0.07 to 0.3.

(9) The method for improving puffiness in a baked layered grain flour food product according to (7) or (8), in which the requirement 3 is as follows:

3. the SFC at 10°C is from 6% to 20%.

Advantageous Effects of Invention

[0008]

According to the present invention, a roll-in oil-and/or-fat composition that exhibits good puffiness in a Danish pastry or the like while having a smooth physical property with folding-in suitability can be provided. In addition, such a formulation can be easily configured.

Description of Embodiments

[0009]

The present invention relates to a roll-in oil-and/or-fat composition. As used herein, the term "roll-in" implies that an oil-and/or-fat composition is used by being folded into a dough made primarily from wheat flour such that a layered structure is formed by baking the dough.

In the present invention, a dough used for such an application is sometimes referred to as a grain flour dough for baking, and a product formed by baking the grain flour dough for baking is sometimes referred to as a baked layered grain flour food product.

The roll-in oil-and/or-fat composition according to the present invention is an oil-and/or-fat composition that exhibits plasticity and is emulsified as a water-in-oil type, and typical examples thereof include margarine and fat spreads.

[0010]

The oil phase of the roll-in oil-and/or-fat composition according to the present invention consists of an oil and/or fat A and a mixture of oils and/or fats other than the oil and/or fat A. Here, the mixture of oils and/or fats other than the oil and/or fat A is referred to as an oil and/or fat mixture C for convenience in the present invention.

[0011]

The roll-in oil-and/or-fat composition according to the present invention is characterized by containing, in the formulation thereof, from 5 to 26 mass% of the oil and/or fat A in the oil phase. This amount is more desirably from 10 to 26 mass%, and even more desirably from 12 to 15 mass%. When this amount is appropriate, the resulting roll-in oil-and/or-fat composition can exhibit good puffiness for a Danish pastry or the like while having a smooth physical property with folding-in suitability.

Note that in the present invention, the oil phase is a mixture of oil and/or fat raw materials constituting the roll-in oil-and/or-fat composition. Similarly, the aqueous phase is a mixture of water and water-soluble raw materials among the raw materials constituting the roll-in oil-and/or-fat composition.

[0012]

In addition, the designation "A" in the "oil and/or fat A" is added for convenience. A plurality of types of oils and fats are present in the oil and/or fat A, and thus these different types are referred to as the oils and/or fats A-1 and the like. In addition, the oils and/or fats of the oil and/or fat A may be denoted as the "oil and/or fat A", or the "oil and/or fat A-1", etc., or as an abbreviation such as "A-1".

In the examination of the comparative examples, to clarify the comparison of oils and/or fats with the oil and/or fat A, the corresponding oils and/or fats of the comparative examples may be denoted as the "oil and/or fat A" or the like. The same applies to abbreviations of the same.
[0013]

The oil and/or fat A according to the present invention satisfies the following requirements 1 to 3.

1. A palmitic acid content is from 20 to 40 wt.%, and a stearic acid content is from 1 to 20 wt.%.

The content of the palmitic acid is more desirably from 25 to 37 mass%, and even more desirably from 27 to 35 mass%. Moreover, the content of the stearic acid is more desirably from 2 to 10 mass%, and even more desirably from 2.5 to 7 mass%. When these amounts are appropriate, the resulting roll-in oil-and/or-fat composition can exhibit good puffiness for a Danish pastry or the like while having a smooth physical property with folding-in suitability.
[0014]

2. A weight ratio of stearic acid/palmitic acid is from 0.025 to 0.5.

This value is more desirably from 0.05 to 0.4, and even more desirably from 0.07 to 0.3. When this value is appropriate, the resulting roll-in oil-and/or-fat composition can exhibit good puffiness for a Danish pastry or the like while having a smooth physical property with folding-in suitability.
[0015]

3. An SFC at 10°C is 50% or less.

This value is more desirably from 4 to 35%, and even more desirably from 6 to 20%. When this value is appropriate, the resulting roll-in oil-and/or-fat composition can exhibit good puffiness for a Danish pastry or the like while having a smooth physical property with folding-in suitability.
[0016]

The oil and/or fat mixture C may be simply referred to as the "oil and/or fat C". Further, in order to indicate the type, the oil and/or fat C may be referred to as the "oil and/or fat C-1" or the like, or simply as "C-1" or the like.

In principle, the oil and/or fat mixture C can be selected from the oil phases of known roll-in oil-and/or-fat compositions. That is, in the present invention, the oil and/or fat A is blended into a known oil-and/or-fat composition to improve the puffiness of a Danish pastry or the like. In this manner, since known formulations can be used, the formulations can be easily constituted.
[0017]

In the present invention, the oil and/or fat mixture C is specified by the SFC at each temperature. The SFC is as follows.

The SFC at 10°C is from 49% to 72%.

The SFC at 15°C is from 39% to 61%.

The SFC at 20°C is from 29% to 49%.

The SFC at 25°C is from 20% to 35%.

The SFC at 30°C is from 13% to 24%.

The SFC at 35°C is from 7% to 14.5%.

[0018]

The SFC at 10°C is more desirably from 52% to 65%, and even more desirably from 55% to 60%. The SFC at 15°C is more desirably from 42% to 55%, and even more desirably from 45% to 50%. The SFC at 20°C is more desirably from 32% to 45%, and even more desirably from 33% to 38%. The SFC at 25°C is more desirably from 21% to 31%, and even more desirably from 22% to 28%. The SFC at 30°C is more desirably from 14% to 20%, and even more desirably from 14% to 18%. The SFC at 35°C is more desirably from 7.5% to 12%, and even more desirably from 8% to 10%.

When the SFC of the oil and/or fat mixture C is appropriate, the resulting roll-in oil-and/or-fat composition can exhibit good puffiness for a Danish pastry or the like while having a smooth physical property with folding-in suitability.

[0019]

The SFC is measured as follows.

*SFC Measurement Method

1. An oil and/or fat sample is melted at 80°C.
2. From 2.7 to 3.3 g of the oil and/or fat is dispensed into a measurement test tube having a length of 180 mm and a diameter of 10 mm.
3. The filled measurement test tube is then held in a water bath at 0°C for 60 minutes.
4. The test tube is then held in water baths at 20°C and 40°C for 30 minutes.
5. The SFC is measured using the "minispec pc120 SFC Analyzer" available from Bruker Corporation.

[0020]

Next, the method for preparing the oil and/or fat A will be described.

There are several methods for preparing the oil and/or fat A. First, a method of preparation through interesterification will be described.

Various oils and fats can be used as the raw material oil and/or fat for preparing the oil and/or fat A, which is an interesterified oil. Specifically, one or more oils and/or fats including soybean oil, rapeseed oil, rice oil, fish oil, cottonseed oil, corn oil, cacao butter, and palm oil, and oils and/or fats produced by subjecting one or more oils and/or fats selected from these oils and/or fats to one or more treatments selected from fractionation, hardening, and interesterification can be used.

[0021]

When the raw material oil and/or fat is to be prepared, the raw material oil and/or fat may be adjusted at the raw material oil and/or fat stage so as to satisfy requirements such as the amount of a predetermined fatty acid required in the oil and/or fat A, or the raw material oil

and/or fat may be prepared by implementing fractionation after interesterification such that all the requirements required for the oil and/or fat A are satisfied.

In the present invention, from the viewpoint of production efficiency, the oil and/or fat A is preferably prepared by fractionating the raw material oil and/or fat after the interesterification reaction such that the requirements for the oil and/or fat A are satisfied.

[0022]

The interesterification reaction of the oil and/or fat A according to the present invention may be carried out by a method using a chemical catalyst or a method using an enzyme, but from the viewpoint of production efficiency, a method using a chemical catalyst is more preferable. The interesterification reaction in the present invention refers to a random interesterification reaction.

[0023]

The oil and/or fat A according to the present invention can also be produced by combining the processes of hardening and fractionation. Specifically, a combination of isomerization hardening and solvent fractionation as described in the Examples can be exemplified.

However, from the viewpoint of efficiency, interesterification is preferably used for preparation.

Note that regardless of which method is adopted, the oil and/or fat A preferably does not contain a lauric fat in the formulation. When an oil and/or fat that does not contain a lauric fat and satisfies the requirements stipulated for the oil and/or fat A is used as the oil and/or fat A, predetermined functions can be exhibited.

[0024]

The present invention can also be regarded as a method for preparing a roll-in oil-and/or-fat composition that exhibits good puffiness for a Danish pastry or the like while having a smooth physical property suitable for folding-in. Specifically, the present invention is a production method that is characterized in that the oil phase in the formulation of the roll-in oil-and/or-fat composition consists of the oil and/or fat A and the oil and/or fat mixture C, the roll-in oil-and/or-fat composition contains from 5 to 26 mass% of the oil and/or fat A, the oil and/or fat A satisfies the following requirements 1 to 3, and the oil and/or fat mixture C satisfies the following requirements 4 to 9.

1. A palmitic acid content is from 20 to 40 wt.%, and a stearic acid content is from 1 to 20 wt.%.

2. A weight ratio of stearic acid/palmitic acid is from 0.025 to 0.5.

3. An SFC at 10°C is 50% or less.

4. An SFC at 10°C is from 49% to 72%.

5. An SFC at 15°C is from 39% to 61%.

6. An SFC at 20°C is from 29% to 49%.

7. An SFC at 25°C is from 20% to 35%.

8. An SFC at 30°C is from 13% to 24%.

9. An SFC at 35°C is from 7% to 14.5%.

[0025]

As conditions besides those from the formulation aspect, for example, a scraped-surface type heat exchanger that is used for general roll-in oil-and/or-fat compositions can be used as the production device, and the production conditions are also the same as the production conditions for general roll-in oil-and/or-fat compositions.

[0026]

The present invention can also be regarded as an invention relating to a method for improving puffiness in a baked layered grain flour food product. Specifically, the roll-in oil-and/or-fat composition according to the present invention is folded into a grain flour dough for baking and then baked.

The embodiments of the present invention will be described in more detail with reference to Examples below.

Examples

[0027]

Examination 1: Preparation of Oil and/or Fat A, Part 1

A blended oil containing 74 wt.% of a high-melting point fraction of palm oil (iodine value: 40.0), 18 wt.% of a low-melting point fraction of StOSt fat, and 8 wt.% of a high-melting point fraction of StOSt fat was subjected to random interesterification with sodium methylate, resulting in the formation of an interesterified oil and/or fat 1. The high-melting point fraction and a medium-melting point fraction were removed from the interesterified oil and/or fat 1 by acetone fractionation, resulting in an oil and/or fat A according to the present invention. The resulting interesterified oil and/or fat is referred to below as the "oil and/or fat A-1".

The low-melting point fraction of the StOSt fat and the high-melting point fraction of the StOSt fat are by-products generated in the process of producing a StOSt fat as a cocoa butter substitute fat, and specifically, these fractions are produced as a low-melting point fraction and a high-melting point fraction by using hexane to fractionate an oil and/or fat produced by interesterification of 30 wt.% of high oleic sunflower oil and 70 wt.% of stearic acid using a commercially available 1,3-specific lipase. The stearic acid content in the high-melting point fraction of the StOSt fat was 80 wt.%. The diglyceride content was 23 wt.%. The stearic acid content in the low-melting point fraction of the StOSt fat was 29.0 wt.% and the diglyceride content was 2.5 wt.%.

The analytical values of the oil and/or fat A-1 were as described in Table 1-1. Note that the fatty acids were measured in accordance with the method outlined in 2.4.1.2 Preparation of Methyl Ester of Fatty Acids (Boron Trifluoride-Methanol Method) of the Japan Oil Chemists' Society (JOCS) Standard Methods for the Analysis of Fats, Oils, and Related Materials (1996 edition).

Note that the formulation did not contain a lauric fat.

[0028]

Table 1-1 Analytical Values of Oil and/or Fat A-1

	Palmitic Acid Content (mass%)	Stearic Acid Content (mass%)	Stearic Acid/Palmitic Acid	SFC (mass%) at 10°C	Melting Point (°C)
Oil and/or fat A-1	31.5	7	0.22	9.8	24.6

[0029]

Examination 2: Preparation of Oil and/or Fat A, Part 2

1. Super palm olein (iodine value: 67) was prepared as a raw material oil and/or fat.
2. 2.1 g of a nickel catalyst (nickel content: 21%) and 0.05 g of DL-methionine were added to 20 g of the raw material oil and/or fat, and the contents were stirred at 70°C for 10 minutes, after which 680 g of the raw material oil and/or fat was further mixed.
3. The resulting oil and/or fat of step 2 was injected into an autoclave for hardening, and hardened at a temperature from 180 to 200°C for 5 hours under a hydrogen pressure of 1 kg/cm².
4. The resulting oil and/or fat of step 3 was fractionated with hexane, resulting in, as a low-melting point component, an oil and/or fat having a melting point of 25°C and an iodine value of 68, which was designated as the oil and/or fat A-2.

Note that the formulation did not contain a lauric fat.

[0030]

Table 2-1 Analytical Values of Oil and/or Fat A-2

	Palmitic Acid Content (mass%)	Stearic Acid Content (mass%)	Stearic Acid/Palmitic Acid	SFC (mass%) at 10°C	Melting Point (°C)
Oil and/or Fat A-2	20.9	3.3	0.16	47	25

[0031]

Examination 3: Preparation of Oil and/or Fat A, Part 3

A two-stage low-melting point fraction of palm oil (iodine value: 67.0) was subjected to random interesterification using sodium methylate, resulting in the formation of an oil and/or fat A-3. Note that the formulation did not contain a lauric fat.

[0032]

Table 3-1 Analytical Values of Oil and/or Fat A-3

	Palmitic Acid Content (mass%)	Stearic Acid Content (mass%)	Stearic Acid/Palmitic Acid	SFC (mass%) at 10°C	Melting Point (°C)
Oil and/or Fat A-3	32	3	0.09	31.9	34

[0033]

Examination 4: Preparation of Roll-in Oil-and/or-Fat Composition

Roll-in oil-and/or-fat compositions were prepared according to the formulations described in Table 4-1 using the oils and/or fats A-1, A-2, and A-3 and comparative oils and/or fats.

Each roll-in oil-and/or-fat composition was prepared in accordance with the "*Method for Preparing Roll-in oil-and/or-fat Composition".

A Danish pastry was prepared using the resulting roll-in oil-and/or-fat composition. At this time, the folding-in suitability and the puffiness of a Danish pastry were evaluated. The Danish pastry was prepared in accordance with the "*Danish Pastry Preparation Method". The folding-in suitability and puffiness were evaluated in accordance with the "*Methods for Evaluating Folding-in Suitability and Puffiness".

The results are listed in Table 4-4.

[0034]

Table 4-1 Formulations of Roll-in Oil-and/or-Fat Compositions

		Comparative Example 4-1	Example 4-1	Comparative Example 4-2	Example 4-2	Comparative Example 4-3	Comparative Example 4-4	Comparative Example 4-5	Comparative Example 4-6
Oil and/or Fat A or Oil and/or Fat A'	A'-1	12.0	-	-	-	-	-	-	-
	A-1	-	12.0	-	-	-	-	-	-
	A'-2	-	-	12.0	-	-	-	-	-
	A-2	-	-	-	12.0	-	-	-	-
	A'-3	-	-	-	-	12.0	-	-	-
	A'-4	-	-	-	-	-	12.0	-	-
	A'-5	-	-	-	-	-	-	12.0	-
	A'-6	-	-	-	-	-	-	-	12.0
Oil and/or Fat Mixture C	C-1	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
Aqueous Phase	Water	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
	Refined salt	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Additive	Emulsifier 1	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	Emulsifier 2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

(Unit of formulation: mass%)

Properties of Oil and/or Fat	Amount (mass%) in oil phase	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
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A or Oil and/or Fat A'	Palmitic acid (mass%)	3.9	31.5	6.9	20.8	4.6	40.8	8.6	33.4
	Stearic acid (mass%)	1.7	7	3.2	3.3	28.2	4	2.8	3.2
	Stearic Acid/Palmitic Acid	0.44	0.22	0.46	0.16	6.13	0.10	0.33	0.10
	SFC at 10°C	5% or less	9.8	50% or less	47	1.6	36.9	55.6	60.2

		Comparative Example 4-7	Example 4-3	Example 4-4	Example 4-5	Example 4-6	Comparative Example 4-8	Example 4-7	Comparative Example 4-9
Oil and/or Fat A or Oil and/or Fat A'	A'-1	-	-	-	-	-	-	-	12.0
	A-1	-	-	22.0	17.0	5.0	2.0	12.0	-
	A'-7	12.0	-	-	-	-	-	-	-
	A-3	-	12.0	-	-	-	-	-	-
Oil and/or Fat Mixture C	C-1	75.0	75.0	-	-	-	-	-	-
	C-2	-	-	65.0	-	-	-	-	-
	C-3	-	-	-	70.0	-	-	-	-
	C-4	-	-	-	-	82.0	-	-	-
	C-5	-	-	-	-	-	85.0	-	-
	C-6	-	-	-	-	-	-	75.0	-
	C-7	-	-	-	-	-	-	-	75.0
Aqueous Phase	Water	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
	Refined Salt	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Additive	Emulsifier 1	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	Emulsifier 2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

(Unit of Formulation: mass%)

Properties of Oil and/or Fat A or Oil and/or Fat A'	Amount (mass%) in Oil Phase	13.8	13.8	25.3	19.5	5.7	2.3	13.8	13.8
	Palmitic Acid (mass%)	11.7	32.0	31.5	31.5	31.5	31.5	31.5	3.9
	Stearic Acid (mass%)	8.7	3.0	7.0	7.0	7.0	7.0	7.0	1.7
	Stearic Acid/Palmitic Acid	0.74	0.09	0.22	0.22	0.22	0.22	0.22	0.44

	SFC at 10°C	2.4	31.9	9.8	9.8	9.8	9.8	9.8	5 or less
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- The oil and/or fat A'-1 was rapeseed oil.
- The oil and/or fat A'-2 was an interesterified oil and/or fat (melting point: 18.5°C) of palm kernel olein and sunflower oil.
- The oil and/or fat A'-3 was "Purified Shea Olein" (melting point: 20°C) available from Fuji Oil Co., Ltd.
- The oil and/or fat A'-4 was "Palm Olein" available from Fuji Oil Co., Ltd.
- The oil and/or fat A'-5 was "Palm Kernel Olein" (melting point: 20°C) available from Fuji Oil Co., Ltd.
- The oil and/or fat A'-6 was an interesterified oil (melting point: 32°C) of palm oil and palm kernel oil.
- The oil and/or fat A'-7 was an interesterified oil (melting point: 17°C) primarily composed of corn oil and SOS fat.
- The glycerin fatty acid ester "Emulgy P100" available from Riken Vitamin Co., Ltd. was used as the emulsifier 1.
- "SLP Paste" available from Tsuji Oil Mills Co., Ltd. was used as the emulsifier 2.
- The SFC of each oil and/or fat mixture C was as described in Table 4-2.

[0035]

Table 4-2 SFC of Each Oil and/or Fat Mixture C

	C-1	C-2	C-3	C-4	C-5	C-6	C-7
10°C	57.5	69.3	63.4	51.7	49.0	71.1	71.1
15°C	47.0	58.2	52.1	41.4	39.2	60.2	60.2
20°C	36.2	45.5	40.4	31.4	29.9	48.0	48.0
25°C	25.1	31.9	28.3	21.5	20.8	34.7	34.7
30°C	15.9	20.5	18.1	13.8	13.0	23.3	23.3
35°C	8.7	11.4	10.0	7.3	6.5	14.3	14.3

[0036]

*Method for Preparing Roll-in Oil-and/or-Fat Composition

1. An aqueous phase was prepared according to the formulation by mixing the raw materials classified as belonging to the aqueous phase. In addition, the oil and/or fat A or the oil and/or fat A', and the oil and/or fat mixture C were heated to a temperature from 60 to 70°C, melted, and mixed to prepare an oil phase. The emulsifier was further dissolved therein.

2. While the oil phase was stirred, the aqueous phase was added thereto, resulting in a prepared liquid.

3. The prepared liquid was supplied to a combinator in a conventional manner to prepare sheet-shaped margarine.

[0037]

***Danish Pastry Preparation Method**

The formulation of the Danish pastry was in accordance with "Table 4-3 Danish Pastry Formulation".

The Danish pastry was prepared in accordance with "Table 4-4 *Process Conditions". Note that the roll-in oils and/or fats prepared in Examination 4 were used as the fold-in oils and/or fats, each at an amount of 60 mass% in relation to the flour.

[0038]

***Methods for Evaluating Folding-in Suitability and Puffiness**

To evaluate the folding-in suitability, the "dough texture during shaping" and the "dough shrinkage" were evaluated according to the following criteria by a folding-in expert.

Dough Texture During Shaping

◎: The oil and/or fat spreads to the same extent as the dough, spreads to every corner of the dough, is not sticky, is not viscous, and is resilient (exhibits moderate elasticity).

○: The oil and/or fat does not spread as easily as the dough, does not spread to every corner of the dough, is slightly sticky, is slightly viscous, and is resilient (moderate elasticity) but slightly soft.

×: The oil and/or fat does not spread at a level equivalent to that of the dough, is cracked, is sticky, is viscous, lacks resilience (elasticity), and is soft.

Dough Shrinkage

◎: The weight after cutting to a 10 cm × 10 cm square is within 55 g ± 3 g, and the dough shrinkage based on the size of one side after cutting the dough is within -0.2 cm.

○: The weight after cutting to a 10 cm × 10 cm square is within 55 g ± 6 g, and the dough shrinkage based on the size of one side after cutting the dough is within -0.4 cm.

×: The weight after cutting to a 10 cm × 10 cm square is within 55 g ± 6 g, and the dough shrinkage based on the size of one side after cutting the dough is -0.4 cm or greater.

The oil-and/or-fat compositions that did not receive × in either of the above evaluations were determined to be acceptable.

[0039]

To evaluate the puffiness, the Danish pastry prepared according to the "*Danish Pastry Preparation Method" was cut along a diagonal line, and the highest point was measured with calipers. Three measurements were taken in each evaluation area, and the average was calculated.

An average highest point of 36 mm or greater was determined to be acceptable.

Those oil-and/or-fat compositions that passed both the folding-in suitability evaluation and the puffiness evaluation were determined to pass the comprehensive evaluation.

[0040]

Table 4-3 Danish Pastry Formulation

Bread flour	100
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Yeast food	0.15
Caster sugar	12
Common salt	1.6
Whole egg	5
Skimmed milk powder	3
Fresh yeast	4
Knead-in oil and/or fat	8
Water	55

(Unit of formulation: parts by weight)

· “Mesa-ju V” available from Fuji Oil Co., Ltd. was used as a knead-in oil and/or fat.

[0041]

Table 4-4 Process Conditions

Mixing time	All-in
	L4 portion, H6 portion
Kneading temperature	26°C
Floor time	60 min
Fermentation chamber temperature/humidity	28°C/80%
Divided weight	Large division
1st retard time	-6°C, 10 hours
Number of folding-in times	Three folds × two folds
2nd retard time	-6°C, 120 min
Number of folding-in times	Four folds × one time
Shaping method	See the Key Points of Production.
Proofing time	60 to 70 min
Proofing temperature/humidity	34°C/70%
Baking temperature upper burner	210°C
Lower burner	190°C
Baking time	14 min
Key Points of Production	
(1) Croissant shaping	
Final gauge thickness: 3 mm, base 100 mm × height 200 mm	
Isosceles triangle 55 g	
(2) Square shaping	
Final gauge thickness: 3 mm, 100 mm × 100 mm square shape, 55 g	

[0042]

Table 4-5 Results

		Comparative Example 4-1	Example 4-1	Comparative Example 4-2	Example 4-2	Comparative Example 4-3	Comparative Example 4-4	Comparative Example 4-5	Comparative Example 4-6
Folding-in Suitability Evaluation	Dough Texture During Shaping	×	◎	○	○	×	○	×	◎
	Dough Shrinkage	×	◎	◎	○	×	×	×	○
	Result	Unacceptable	Acceptable	Acceptable	Acceptable	Unacceptable	Unacceptable	Unacceptable	Acceptable
Puffiness Evaluation (mm)		34.3	38.3	34.2	36.3	33.5	36	30.9	35.8
Judgment of Acceptance		Unacceptable	Acceptable	Unacceptable	Acceptable	Unacceptable	Acceptable	Unacceptable	Unacceptable
Comprehensive Evaluation		Unacceptable	Acceptable	Unacceptable	Acceptable	Unacceptable	Unacceptable	Unacceptable	Unacceptable

		Comparative Example 4-7	Example 4-3	Example 4-4	Example 4-5	Example 4-6	Comparative Example 4-8	Example 4-7	Comparative Example 4-9
Folding-in Suitability Evaluation	Dough Texture During Shaping	×	◎	○	○	○	×	◎	○
	Dough Shrinkage	×	◎	○	◎	○	○	◎	○
	Result	Unacceptable	Acceptable	Acceptable	Acceptable	Acceptable	Unacceptable	Acceptable	Acceptable
Puffiness Evaluation (mm)		34.8	38.1	37	36.5	37.5	35.4	36.3	33.6
Judgment of Acceptance		Unacceptable	Acceptable	Acceptable	Acceptable	Acceptable	Unacceptable	Acceptable	Unacceptable
Comprehensive Evaluation		Unacceptable	Acceptable	Acceptable	Acceptable	Acceptable	Unacceptable	Acceptable	Unacceptable

[0043]

Discussion

The roll-in oil-and/or-fat composition according to the present invention was confirmed to have smooth physical properties suitable for folding-in, and the Danish pastry into which the roll-in oil-and/or-fat composition of the present invention was folded exhibited excellent puffiness.

Note that the formulation of the roll-in oil-and/or-fat composition according to the present invention can be easily constructed by merely adding the predetermined oil and/or fat to the formulation of the control.

CLAIMS

1. A method for improving puffiness in a baked layered grain flour food product, the method comprising:

folding a roll-in oil-and/or-fat composition into a grain flour dough for baking; and then;

baking,

wherein

the roll-in oil-and/or-fat composition comprises an oil phase consisting of an oil and/or fat mixture C and an oil and/or fat A,

the roll-in oil-and/or-fat composition contains from 5 to 26 mass% of the oil and/or fat A in the oil phase,

the oil and/or fat A satisfies the following requirements 1 to 3, and

the oil and/or fat mixture C satisfies the following requirements 4 to 9:

1. a palmitic acid content is from 20 to 40 wt.%, and
a stearic acid content is from 1 to 20 wt.%,
2. a weight ratio of stearic acid/palmitic acid is from 0.025 to 0.5,
3. a solid fat content (an SFC) at 10°C is 50% or less,
4. an SFC at 10°C is from 49% to 72%,
5. an SFC at 15°C is from 39% to 61%,
6. an SFC at 20°C is from 29% to 49%,
7. an SFC at 25°C is from 20% to 35%,
8. an SFC at 30°C is from 13% to 24%, and
9. an SFC at 35°C is from 7% to 14.5%.