

SPECIFICATION

TITLE OF INVENTION:

METHOD OF PRODUCING DOUGH FOR BAKERY FOOD

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TECHNICAL FIELD

[0001]

The present invention relates to a production method of a dough for bakery food.

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BACKGROUND ART

[0002]

In recent years, as one of consumer preferences for bakery food, bakery food having a chewy and moist texture have come to be preferred.

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In order to produce bakery food such as breads which have such a texture, there is a method of increasing the amount of water added in a bread dough. In order to increase the amount of water added, there is a method of increasing the amount of water added in a dough, but there is also a method of increasing the amount of water added in a dough

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by adding gums such as guar gum and xanthan gum, and hydrocolloids such as methyl cellulose and hydroxymethyl cellulose to a dough. As described above, a chewy and moist texture can be obtained when the amount of water added is increased, but when addition of water exceeds a certain amount, it takes time for a dough to come together, or a dough becomes sticky, which deteriorates workability. In addition,

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a deterioration in the appearance and a deterioration in the texture such as glutinousness of the obtained bakery food are caused. In

addition, gums and hydrocolloids are food additives and may impart a negative image towards consumers.

[0003]

Patent Document 1 discloses a production method of
5 high-hydration bread using tangible water for high-hydration bread as a part of a bread-producing blending water, in which the tangible water for high-hydration bread was obtained by forming konjac flour, starch, and water into a jelly-like solid by a hydration gel reaction from an alkaline coagulant and glucomannan of konjac flour, and
10 performing immersion in an acid solution to obtain the tangible water for high-hydration bread in which the pH has been adjusted from neutral to acidic range.

[0004]

Patent Document 2 discloses a production method of bread in which
15 hydroxypropyl methyl cellulose, water, and an oil and fat were added and mixed to form a gel before mixing with a cereal flour raw material.

RELATED DOCUMENT

PATENT DOCUMENT

20 [0005]

[Patent Document 1] Japanese Unexamined Patent Publication No.
2006-320207

[Patent Document 2] Japanese Unexamined Patent Publication No.
2019-126311

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SUMMARY OF THE INVENTION

TECHNICAL PROBLEM

[0006]

However, the method of Patent Document 1 has a problem that the water retention capacity is inferior because konjac flour is used, and the higher the hydration becomes, the more sticky a dough becomes and the more difficult the bread producing workability becomes. In addition, in the method of Patent Document 2, improvement of the bread producing workability was not sufficient, and the texture was also not satisfactory.

SOLUTION TO PROBLEM

10 [0007]

When the inventor of the present invention and the like conducted diligent studies, it was found that, when obtaining a dough for bakery food, by previously obtaining a mixture by mixing an ingredient (A) containing a specific starch, water, and an oil and fat composition, and thereafter adding the mixture to a powder raw material, an amount of water added can be increased, and workability is good. In addition, it was found that the obtained bakery food had good texture.

[0008]

That is, according to the present invention,
20 a production method of a dough for bakery food containing a powder raw material, water, an oil and fat composition, and an ingredient (A) satisfying the following conditions (1) to (4) is provided, the method including:

a step of mixing the ingredient (A), the water, and the oil and
25 fat composition to obtain a mixture; and

a step of adding the mixture to the powder raw material to obtain a dough for bakery food.

The ingredient (A): a powdery granular material satisfying the following conditions (1) to (4).

(1) A starch content is 75% by mass or more.

(2) 3% by mass or more and 45% by mass or less of
5 low-molecular-weight starch of starch in which an amylose content is 5% by mass or more is contained, and a peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less.

(3) A cold water swelling degree at 25°C is 5 or more and 20 or less.

10 (4) A content under a sieve with an aperture of 0.5 mm and on a sieve with an aperture of 0.038 mm is 30% by mass or more and 100% by mass or less.

[0009]

In addition, a blending amount of the mixture in the dough for
15 bakery food is preferably 3% by mass or more and 40% by mass or less.

[0010]

In addition, the dough for bakery food preferably contains 0.5% by mass or more and 20% by mass or less of the ingredient (A).

[0011]

20 In addition, a blending amount of the oil and fat composition in the mixture is preferably 1% by mass or more and 20% by mass or less.

[0012]

In addition, a blending amount of the water with respect to a
25 total of the powder raw material and the ingredient (A) in the dough for bakery food is preferably 50% by mass or more and 110% by mass or less.

[0013]

In addition, the dough for bakery food preferably contains cereal flour.

[0014]

5 In addition, a content (4) of the ingredient (A) under the sieve with the aperture of 0.5 mm and on the sieve with the aperture of 0.038 mm is preferably 65% by mass or more and 100% by mass or less.

[0015]

In addition, according to the present invention,
10 a production method of bakery food including a step of cooking the dough for bakery food obtained by the above-mentioned production method is provided.

[0016]

In addition, a method of the cooking is preferably baking or
15 frying with oil.

[0017]

In addition, according to the present invention,
an improvement of workability when producing a dough for bakery food by mixing a raw material containing a powder raw material, water,
20 an oil and fat composition, and an ingredient (A) satisfying the following conditions (1) to (4) is provided, the method including:

a step of mixing the ingredient (A), the water, and the oil and fat composition to obtain a mixture; and

a step of adding the mixture to the powder raw material to obtain
25 a dough for bakery food.

The ingredient (A): a powdery granular material satisfying the following conditions (1) to (4).

(1) A starch content is 75% by mass or more.

(2) 3% by mass or more and 45% by mass or less of
low-molecular-weight starch of starch in which an amylose content
is 5% by mass or more is contained, and a peak molecular weight of
5 the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less.

(3) A cold water swelling degree at 25°C is 5 or more and 20
or less.

(4) A content under a sieve with an aperture of 0.5 mm and on
a sieve with an aperture of 0.038 mm is 30% by mass or more and 100%
10 by mass or less.

[0018]

In addition, according to the present invention,

an improvement method of texture of bakery food is provided,
the method including, when producing bakery food by mixing a raw
15 material containing a powder raw material, water, an oil and fat
composition, and an ingredient (A) satisfying the following
conditions (1) to (4):

a step of mixing the ingredient (A), the water, and the oil and
fat composition to obtain a mixture;

20 a step of adding the mixture to the powder raw material to obtain
a dough for bakery food; and

a step of cooking the dough for bakery food.

The ingredient (A): a powdery granular material satisfying the
following conditions (1) to (4).

25 (1) A starch content is 75% by mass or more.

(2) 3% by mass or more and 45% by mass or less of
low-molecular-weight starch of starch in which an amylose content

is 5% by mass or more is contained, and a peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less.

(3) A cold water swelling degree at 25°C is 5 or more and 20 or less.

5 (4) A content under a sieve with an aperture of 0.5 mm and on a sieve with an aperture of 0.038 mm is 30% by mass or more and 100% by mass or less.

[0019]

In addition, according to the present invention,
10 a production method of a mixture is provided, the method including a step of mixing the following ingredient (A), water, and an oil and fat composition to obtain a mixture.

The ingredient (A): a powdery granular material satisfying the following conditions (1) to (4).

15 (1) A starch content is 75% by mass or more.

(2) 3% by mass or more and 45% by mass or less of low-molecular-weight starch of starch in which an amylose content is 5% by mass or more is contained, and a peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less.

20 (3) A cold water swelling degree at 25°C is 5 or more and 20 or less.

(4) A content under a sieve with an aperture of 0.5 mm and on a sieve with an aperture of 0.038 mm is 30% by mass or more and 100% by mass or less.

25 Any combination of each of these configurations, and an aspect in which the expression of the present invention is converted between methods, devices, and the like are also effective as the aspects of

the present invention.

For example, according to the present invention, processed food using the bakery food obtained by the production method in the present invention is provided.

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ADVANTAGEOUS EFFECTS OF INVENTION

[0020]

According to the present invention, it is possible to provide a production method of a dough for bakery food having good workability even when an amount of water added is increased, an improvement method of workability when producing a dough for bakery food, and an improvement method of texture of the obtained bakery food.

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DESCRIPTION OF EMBODIMENTS

15 [0021]

A production method of a dough for bakery food of the present embodiment is

a production method of a dough for bakery food containing a powder raw material, water, an oil and fat composition, and an ingredient (A) satisfying the following conditions (1) to (4), the method including:

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a step of mixing the ingredient (A), the water, and the oil and fat composition to obtain a mixture; and

a step of adding the mixture to the powder raw material to obtain a dough for bakery food.

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The ingredient (A): a powdery granular material satisfying the following conditions (1) to (4).

(1) A starch content is 75% by mass or more.

(2) 3% by mass or more and 45% by mass or less of low-molecular-weight starch of starch in which an amylose content is 5% by mass or more is contained, and a peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less.

(3) A cold water swelling degree at 25°C is 5 or more and 20 or less.

(4) A content under a sieve with an aperture of 0.5 mm and on a sieve with an aperture of 0.038 mm is 30% by mass or more and 100% by mass or less.

Hereinafter, each ingredient that is a raw material for the dough for bakery food will be described. In the present specification, a "dough for bakery food" is also appropriately simply referred to as a "dough".

[0022]

(Ingredient (A))

The ingredient (A) is a powdery granular material containing 75% by mass or more of starch. Here, the powdery granular material includes at least one of a powdery material and a granular material, and may include both the powdery material and the granular material.

In addition, the ingredient (A) contains, as the starch, in the powdery granular material, 3% by mass or more and 45% by mass or less of the low-molecular-weight starch of the starch in which the amylose content is 5% by mass or more, in which a peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less, and the cold water swelling degree of the powdery granular material at 25°C is 5 or more and 20 or less.

[0023]

The ingredient (A) in the present embodiment is specifically a food ingredient, and by using the ingredient (A), it becomes possible to increase the amount of water added while not requiring labeling
5 of food additives, for example.

[0024]

The starch content in the ingredient (A) is 75% by mass or more, preferably 80% by mass or more, and more preferably 85% by mass or more.

10 In addition, the upper limit of the starch content in the ingredient (A) is not limited and is 100% by mass or less, but it may be 99.5% by mass or less or 99% by mass or less, for example, depending on the properties and the like of the bakery food.

[0025]

15 In addition, the ingredient (A) contains, as the starch, the low-molecular-weight starch made of the starch in which an amylose content is 5% by mass or more as a raw material in a specific proportion, and the low-molecular-weight starch having a specific peak molecular weight is used. That is, the starch in the ingredient (A) contains,
20 in the ingredient (A), 3% by mass or more and 45% by mass or less of the low-molecular-weight starch made of the starch in which an amylose content is 5% by mass or more as a raw material, and the peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less.

25 [0026]

The peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and is preferably 8×10^3 or more from the viewpoint

of improving workability and texture. In addition, from the same viewpoint, the peak molecular weight of the low-molecular-weight starch is 5×10^4 or less, preferably 3×10^4 or less, and more preferably 1.5×10^4 or less. A measurement method of the peak molecular weight
5 of starch after decomposition will be described in the section of Examples.

[0027]

From the viewpoint of excellent production stability, the low-molecular-weight starch is preferably one or two or more kinds
10 selected from the group consisting of acid-treated starch, oxidation-treated starch, or enzyme-treated starch, and more preferably acid-treated starch.

[0028]

The conditions of the acid treatment are not limited, but the
15 treatment can be performed as follows, for example.

After injecting starch in which an amylose content is 5% by mass or more and water to a reaction device, acid is further injected. Alternatively, acid water in which acid is previously dissolved in water, and the raw material starch are injected to the reaction device.
20 From the viewpoint of more stably performing the acid treatment, a state in which the total amount of the starch in the reaction is uniformly dispersed in the aqueous phase, or a slurry state of the total amount of the starch in the reaction is desirable. For that purpose, the concentration of the starch slurry when performing the
25 acid treatment is adjusted to be in the range of 10% by mass or more and 50% by mass or less, preferably 20% by mass or more and 40% by mass or less, for example. When the concentration of the slurry is

too high, the viscosity of the slurry may increase, which may make it difficult to uniformly stir the slurry.

[0029]

Specific examples of the acid used for the acid treatment include
5 inorganic acids such as hydrochloric acid, sulfuric acid, and nitric acid, which can be used regardless of the type and purity.

[0030]

In the acid treatment reaction, the acid concentration during the acid treatment is preferably 0.05 normality (N) or more and 4
10 N or less, more preferably 0.1 N or more and 4 N or less, and further preferably 0.2 N or more and 3 N or less, for example. In addition, the reaction temperature is preferably 30°C or higher and 70°C or lower, more preferably 35°C or higher and 70°C or lower, and further preferably 35°C or higher and 65°C or lower. The reaction time is
15 preferably 0.5 hours or longer and 120 hours or shorter, more preferably 1 hour or longer and 72 hours or shorter, and further preferably 1 hour or longer and 48 hours or shorter.

[0031]

From the viewpoint of improving workability and texture, the
20 content of the low-molecular-weight starch in the ingredient (A) is 3% by mass or more, preferably 8% by mass or more, and more preferably 13% by mass or more with respect to the entire ingredient (A).

Meanwhile, from the same viewpoint, the content of the low-molecular-weight starch in the ingredient (A) is 45% by mass or
25 less, preferably 35% by mass or less, and more preferably 25% by mass with respect to the entire ingredient (A).

[0032]

In addition, the amylose content in the raw material starch of the low-molecular-weight starch is 5% by mass or more, preferably 12% by mass or more, more preferably 22% by mass or more, further preferably 45% by mass or more, further more preferably 55% by mass or more, and even further preferably 65% by mass or more. The upper limit of the amylose content in the raw material starch of the low-molecular-weight starch is not limited, and it is 100% by mass or less, preferably 90% by mass or less, and more preferably 80% by mass or less.

10 [0033]

As the starch in which the amylose content is 5% by mass or more, which is a raw material of the low-molecular-weight starch, it is possible to use one or two or more kinds selected from the group consisting of high amylose corn starch, corn starch, tapioca starch, sweet potato starch, potato starch, wheat starch, high amylose wheat starch, rice starch, and processed starch in which these raw materials have been chemically, physically, or enzymatically processed. From the viewpoint of improving workability and texture, it is preferable to use one or two or more kinds selected from high amylose corn starch, corn starch, and tapioca starch, and it is more preferable to use high amylose corn starch. High amylose corn starch in which the amylose content is 40% by mass or more is available. Starch in which the amylose content is 5% by mass or more is more preferably corn starch in which the amylose content is 40% by mass or more.

25 [0034]

The cold water swelling degree of the ingredient (A) at 25°C is 5 or more, preferably 5.5 or more, and more preferably 6 or more

from the viewpoint of improving workability and texture.

In addition, from the same viewpoint, the cold water swelling degree of the ingredient (A) at 25°C is 20 or less, preferably 17 or less, and more preferably 15 or less.

5 Here, the cold water swelling degree of the ingredient (A) at 25°C is measured by the following method.

(1) A sample is heated and dried at 125°C to measure the water content using a moisture analyzer (manufactured by KENSEI KOGYO Co., Ltd., model number MX-50), and the mass of dry matter is calculated
10 from the obtained water content value.

(2) In a state where 1 g of the sample in terms of the mass of dry matter is dispersed in 50 mL of water at 25°C, stirring is gently performed in a constant-temperature incubator at 25°C for 30 minutes, and thereafter centrifugation is performed at 3000 rpm for 10 minutes
15 (centrifuge: manufactured by Hitachi Koki Co., Ltd., Hitachi table-top centrifuge CT6E type; rotor: T4SS type swing rotor; adapter: 50TC × 2S adapter) to separate into a precipitated layer and a supernatant layer.

(3) The supernatant layer is removed to measure the mass of the
20 precipitated layer, which is defined as B (g).

(4) The mass when dryness of the precipitated layer is caused (105°C, constant mass) is defined as C (g).

(5) The value obtained by dividing B by C is defined as the cold water swelling degree.

25 [0035]

The content of the ingredient (A) under the sieve with an aperture of 0.5 mm and on the sieve with an aperture of 0.038 mm according

to the JIS-Z8801-1 standard is 30% by mass or more and 100% by mass or less. From the viewpoint of improving workability and texture, it is preferably 40% by mass or more and 100% by mass or less, more preferably 50% by mass or more and 100% by mass or less, and further
5 preferably 65% by mass or more and 100% by mass or less.

Here, the content on the sieve and the content under the sieve are specifically the content of the fraction on the sieve and the content of the fraction under the sieve, respectively.

[0036]

10 In the present embodiment, various starches can be used as the starch ingredient other than the low-molecular-weight starch in the ingredient (A). Specifically, the type is not limited as long as starches are starches that are generally commercially available depending on usage applications, for example, starches for foods,
15 but one or more kinds can be appropriately selected from starches such as corn starch, potato starch, tapioca starch, and wheat starch, and processed starch in which these starches have been chemically, physically, or enzymatically processed. It is preferable to contain one or two or more kinds of starches selected from the group consisting
20 of corn starch, wheat starch, potato starch, tapioca starch, and cross-linked starch thereof, and it is more preferable to contain corn starch.

[0037]

In addition, an ingredient other than starch can be blended in
25 the ingredient (A) in the present embodiment.

Specific examples of the ingredient other than starch include insoluble salts such as calcium carbonate and calcium sulfate, and

colorants. It is preferable to blend an insoluble salt, and it is more preferable that the blending amount of the insoluble salt be 0.1% by mass or more and 2% by mass or less.

[0038]

5 Next, a production method of the ingredient (A) will be described. The production method of the ingredient (A) includes the following steps, for example.

(Step of preparing low-molecular-weight starch) A step of reducing the molecular weight of raw material starch in which the amylose content is 5% by mass or more to obtain low-molecular-weight starch in which the peak molecular weight is 3×10^3 or more and 5×10^4 or less.

(Granulation step) A step of performing heat gelatinization on a raw material, which contains 3% by mass or more and 45% by mass or less of the low-molecular-weight starch and in which the total of the low-molecular-weight starch and starch other than the low-molecular-weight starch is 75% by mass or more, to perform granulation.

[0039]

20 The step of preparing the low-molecular-weight starch is a step of decomposing starch in which the amylose content is 5% by mass or more into low-molecular-weight starch. The decomposition referred to herein refers to decomposition accompanied by a reduction in the molecular weight of starch. Examples of typical decomposition
25 methods include decomposition by acid treatment, oxidation treatment, and enzyme treatment. Among these, acid treatment is preferable from the viewpoint of decomposition rate, cost, and reproducibility of

decomposition reaction.

[0040]

In addition, in the granulation step, a general method used for granulating starch can be used, but it is preferable to use a general
5 method used for heat gelatinization of starch from the viewpoint of setting a predetermined cold water swelling degree. Specifically, a method using a machine such as a drum dryer, a jet cooker, an extruder, or a spray dryer is known, but in the present embodiment, from the viewpoint of more reliably obtaining the ingredient (A) in which the
10 cold water swelling degree satisfies the above-mentioned specific condition, heat gelatinization with an extruder or a drum dryer is preferable, and an extruder is more preferable.

In the case of treatment with an extruder, usually, after adding water to a raw material containing starch to adjust the water content
15 to about 10% to 60% by mass, heat swelling is performed under the condition in which a barrel temperature is 30°C to 200°C, an outlet temperature is 80°C to 180°C, a screw rotation speed is 100 to 1000 rpm, and a heat treatment time is 5 to 60 seconds, for example.

[0041]

20 In the present embodiment, by the step of performing heat gelatinization on the above-mentioned specific raw material, for example, the ingredient (A) in which the cold water swelling degree satisfies a specific condition can be obtained. In addition, the ingredient (A) may be obtained by pulverizing and sieving the
25 granulated product obtained by the heat gelatinization as necessary to appropriately adjust the size thereof.

[0042]

(Water)

The production method of a dough for bakery food according to the present embodiment includes the step of mixing water together with the ingredient (A) and the oil and fat composition to obtain
5 a mixture. The water referred to herein also includes the water content of liquids used in place of water, such as milk, soy milk, fruit juice, and vegetable juice. In addition, an aqueous solution and the like in which a flavor such as coffee powder is dissolved can also be used. However, water does not include the water content
10 in the powder raw material and the water content in the edible oil and fat composition.

In addition, the dough for bakery food in the present embodiment may contain water in addition to that in the mixture.

[0043]

15 (Oil and fat composition)

The production method of a dough for bakery food according to the present embodiment includes the step of mixing the oil and fat composition together with the ingredient (A) and water to obtain a mixture.

20 A raw material oil and fat used in the oil and fat composition is not limited. Examples thereof include vegetable oils and fats such as rapeseed oil, soybean oil, corn oil, coconut oil, palm oil, palm kernel oil, sal butter, cacao butter, shea butter, rice oil, cottonseed oil, safflower oil, sunflower oil, olive oil, linseed oil,
25 and peanut oil; animal oils and fats such as beef fat, lard, chicken fat, milk fat, and fish oil; and synthetic oils and fats such as medium-chain fatty acids triglycerides. In addition, examples

thereof include processed oils and fats in which the above-mentioned vegetable oils and fats, animal oils and fats, and synthetic oils and fats are treated by one or two or more kinds of curing, fractionation, and transesterification.

5 [0044]

The oil and fat composition is not limited as long as it contains edible oils and fats. The content of the edible oils and fats contained in the oil and fat composition is preferably 70% by mass or more and 100% by mass or less, and more preferably 80% by mass
10 or more and 100% by mass. In addition, the oil and fat composition can contain an oil-soluble ingredient together with the edible oils and fats. Examples of the oil-soluble ingredient include tocopherols, coloring agents, fragrances, emulsifiers, and the like.

[0045]

15 In addition, as the oil and fat composition, it is possible to use one in any state of a liquid at room temperature (20°C) such as rapeseed oil, soybean oil, and olive oil, and a solid at 20°C such as butter, margarine, shortening, and fat spread, but solid is preferable. In addition, the water content in the oil and fat
20 composition is preferably 0% by mass or more and 20% by mass or less, more preferably 0.1% by mass or more and 20% by mass or less, and further preferably 10% by mass or more and 20% by mass or less.

Here, when the oil and fat composition is liquid at room temperature (20°C), this specifically means that it is an oil and
25 fat having fluidity at room temperature (20°C) and having the rising melting point of less than 15°C. The rising melting point is measured according to a method described in 2.2.4.2-1996 of the Standard

Methods for the Analysis of Fats, Oils and Related Materials.

[0046]

The blending amount of the oil and fat composition in the mixture in the present embodiment is preferably 1% by mass or more and 20%
5 by mass or less, more preferably 2% by mass or more and 18% by mass or less, further preferably 4% by mass or more and 16% by mass or less, further more preferably 6% by mass or more and 15% by mass or less, and yet more preferably 9.5% by mass or more and 15% by mass or less from the viewpoint of making the texture of the bakery food
10 preferable.

From the same viewpoint, the blending amount of the oil and fat composition in the mixture is preferably 1% by mass or more, more preferably 2% by mass or more, further preferably 4% by mass or more, further more preferably 6% by mass or more, and even further preferably
15 9.5% by mass or more, and is preferably 20% by mass or less, more preferably 18% by mass or less, further preferably 16% by mass or less, and further more preferably 15% by mass or less.

In addition, the dough for bakery food in the present embodiment may contain the oil and fat composition in addition to that in the
20 mixture.

[0047]

(Step of obtaining mixture)

The production method of a dough for bakery food in the present embodiment includes the step of mixing the ingredient (A), water,
25 and the oil and fat composition to obtain a mixture. In the step of obtaining the mixture, a method of mixing the ingredient (A), water, and the oil and fat composition may be any method, and the order of

putting them in a mixing container (for example, a mixer bowl) also may be any order. For example, the following examples may be given: the oil and fat composition is injected to a container, the ingredient (A) is added thereafter to perform mixing, and water is injected thereafter; the ingredient (A) is injected to the container, the oil and fat composition is added thereafter to perform mixing, and water is injected thereafter; the ingredient (A) is injected to the container, water is added thereafter to perform mixing, and the oil and fat composition is injected thereafter; and all of the ingredient (A), water, and the oil and fat composition are added to the container at the same time and mixed.

Regarding the order of mixing the ingredient (A), water, and the oil and fat composition to obtain the mixture, it is preferable that the oil and fat composition and the ingredient (A) come into contact with each other first from the viewpoint a good mixed state. In addition, from the same viewpoint, it is preferable to use a mixer for mixing, and it is preferable to perform mixing in each addition step.

In addition, the state of the mixture is not limited and may be any of a suspended state or an emulsified state, for example, but an emulsified state is preferable. In addition, the mixture obtained in the step of obtaining the mixture is preferably an emulsion from the viewpoint of obtaining food having preferable texture with good workability.

[0048]

The mixture obtained in the present embodiment is specifically composed of the ingredient (A), water or the above-mentioned liquid

containing the water content, and the oil and fat composition, and is preferably composed of the ingredient (A), water, and the oil and fat composition.

In addition, the mixture preferably further contains a protein.

5 The protein may be added as these ingredients themselves in the step of obtaining the mixture, or may be added in the form of a blending ingredient containing at least one of these ingredients. At this time, the mixture obtained in the step of obtaining the mixture may be in an emulsified state or may not be in an emulsified state, and
10 is preferably in an emulsified state. In addition, examples of the mixture other than the emulsified state include a dispersion, such as a suspension, which is other than an emulsion, and a phase-separated mixture.

From the viewpoint of improving workability when handling the
15 dough for bakery food, the blending ingredient containing a protein is preferably one or two or more kinds selected from the group consisting of soy milk, tofu, milk, fresh cream, skimmed milk powder, whole milk powder, casein, whey, concentrated whey, muscle protein, egg white, and whole egg, and is more preferably one or two or more
20 kinds selected from the group consisting of soy milk, milk, fresh cream, skimmed milk powder, whole milk powder, casein, egg white, and whole egg.

[0049]

From the viewpoint of improving workability when handling the
25 dough for bakery food, the amount of the protein blended in the step of obtaining the mixture is preferably 2% by mass or more, more preferably 3% by mass or more, further preferably 5% by mass or more,

and further more preferably 8% by mass or more with respect to the entire mixture.

In addition, from the viewpoint of improving workability when handling the dough for bakery food, the amount of the protein blended
5 in the step of obtaining the mixture is preferably 20% by mass or less, more preferably 15% by mass or less, and further preferably 12% by mass or less with respect to the entire mixture.

[0050]

The mass ratio of the ingredient (A) and water in the mixture
10 in the present embodiment is preferably 1:1 to 1:5, more preferably 1:2 to 1:5, further preferably 1:2.5 to 1:4.5, and further more preferably 1:2.5 to 1:4 from the viewpoint of improving workability and making the texture of the bakery food preferable.

[0051]

15 (Step of obtaining dough for bakery food)

The production method in the present embodiment includes the step of adding the mixture to the powder raw material to obtain a dough for bakery food. The powder raw material in the step of obtaining a dough for bakery food is specifically a powder raw material
20 other than the ingredient (A).

In the present embodiment, a method and a timing of blending the mixture composed of the ingredient (A), water, and the oil and fat composition in the powder raw material are not limited, and blending may be performed until a dough for bakery food is obtained.

25 [0052]

From the viewpoint of more stably reducing stickiness of the dough for bakery food and further improving the workability, the step

of obtaining the dough for bakery food preferably includes a step of previously mixing the powder raw material, and ingredients other than the powder raw material and the mixture to obtain a base dough, and a step of kneading the mixture and the base dough to obtain a
5 dough for bakery food.

From the same viewpoint, the step of obtaining the base dough preferably includes a step of mixing the powder raw material and water.

In addition, from the same viewpoint, in the step of kneading the mixture and the base dough to obtain a dough for bakery food,
10 the mixture, the base dough, and the oil and fat composition are mixed.
[0053]

Specific examples of the ingredient, which is other than the powder raw material and the mixture and is blended in the step of obtaining the base dough and the step of kneading the mixture and
15 the base dough to obtain a dough for bakery food, include water, an oil and fat composition, and the like. The water and the oil and fat composition herein are blended as separate ingredients from the water and the oil and fat composition blended in the mixture.
Specific examples of the water and the oil and fat composition include
20 the ingredients mentioned above as the water and the oil and fat composition to be blended in the mixture in the step of obtaining the mixture. The water and the oil and fat composition herein may be the same ingredients as the ingredients blended in the mixture, or may be different ingredients.

25 [0054]

The dough for bakery food obtained by the production method of a dough for bakery food in the present embodiment may be stored frozen

as a frozen dough.

[0055]

In addition, the bakery food can be obtained through a step of heating the obtained dough for bakery food. Specific examples of
5 a method of heating include baking, steaming, frying with oil, and the like. One or two kinds of cooking selected from baking and frying with oil are preferable, where baking is more preferable.

Specific examples of the baking include baking with a frying pan or hot plate, baking with an oven, convection heating, steam
10 convection heating, and the like. One or two kinds selected from hot plate baking, baking with an oven, and convection heating are preferable, convection heating and baking with an oven are more preferable, and baking with an oven is further preferable.

The cooking temperature is preferably 150°C to 260°C, and more
15 preferably 160°C to 250°C. The time is preferably 4 to 60 minutes, and more preferably 6 to 50 minutes.

[0056]

From the viewpoint of improving workability and making the texture of the bakery food preferable, the blending amount of the
20 mixture in the dough for bakery food in the present embodiment is 3% by mass or more and 40% by mass or less, preferably 4% by mass or more and 38% by mass or less, more preferably 4% by mass or more and 35% by mass or less, further preferably 4.5% by mass or more and 30% by mass or less, and further more preferably 5% by mass or more
25 and 25% by mass or less.

From the same viewpoint, the blending amount of the above-mentioned mixture in the dough for bakery food is 3% by mass

or more, preferably 4% by mass or more, more preferably 4.5% by mass or more, and further preferably 5% by mass or more, and it is 40% by mass or less, preferably 38% by mass or less, more preferably 35% by mass or less, further preferably 30% by mass or less, and further
5 more preferably 25% by mass or less.

[0057]

From the viewpoint of improving workability and making the texture of the bakery food preferable, the dough for bakery food in the present embodiment preferably contains 0.5% by mass or more and
10 20% by mass or less of the ingredient (A), more preferably contains 0.5% by mass or more and 15% by mass or less, further preferably contains 0.6% by mass or more and 10% by mass or less, and further more preferably contains 0.8% by mass or more and 8% by mass or less.

From the same viewpoint, the amount of the ingredient (A) in
15 the dough for bakery food is preferably 0.5% by mass or more, more preferably 0.6% by mass or more, and further preferably 0.8% by mass or more, and it is preferably 20% by mass or less, more preferably 15% by mass or less, further preferably 10% by mass or less, and further more preferably 8% by mass or less.

20 [0058]

From the viewpoint of improving workability and improving the texture of the bakery food, the content of the ingredient (A) in the dough for bakery food in the present embodiment is preferably 1% by mass or more and 30% by mass or less, more preferably 1% by mass or
25 more and 25% by mass or less, further preferably 1.2% by mass or more and 20% by mass or less, and further more preferably 1.5% by mass or more and 15% by mass or less with respect to the total of the powder

raw material and the ingredient (A).

From the same viewpoint, the content of the ingredient (A) in the dough for bakery food with respect to the total of the powder raw material and the ingredient (A) is preferably 1% by mass or more, more preferably 1.2% by mass or more, and further preferably 1.5% by mass or more, and it is preferably 30% by mass or less, more preferably 25% by mass or less, further preferably 20% by mass or less, and further more preferably 15% by mass or less.

[0059]

10 The blending amount of the oil and fat composition in the mixture in the present embodiment is preferably 1% by mass or more and 20% by mass or less, more preferably 2% by mass or more and 18% by mass or less, further preferably 4% by mass or more and 16% by mass or less, further more preferably 6% by mass or more and 15% by mass or less, and yet more preferably 9.5% by mass or more and 15% by mass or less.

[0060]

The blending amount of water in the dough for bakery food in the present embodiment with respect to the total of the powder raw material and the ingredient (A) is preferably 50% by mass or more and 110% by mass or less, more preferably 50% by mass or more and 105% by mass or less, further preferably 50% by mass or more and 100% by mass or less, further more preferably 55% by mass or more and 95% by mass or less, and even further preferably 55% by mass or more and 25 90% by mass or less from the viewpoint of making the texture of the bakery food preferable.

From the same viewpoint, the blending amount of water in the

dough for bakery food in the present embodiment with respect to the total of the powder raw material and the ingredient (A) is preferably 50% by mass or more, and more preferably 55% by mass or more, and it is preferably 110% by mass or less, more preferably 105% by mass or less, further preferably 100% by mass or less, further more preferably 95% by mass or less, and even further preferably 90% by mass or less.

[0061]

The amount of water added in the dough with respect to the total of the powder raw material and the ingredient (A) is 50% by mass or more, for example, and is preferably 60% by mass or more, and more preferably 70% by mass or more, and it is 120% by mass or less, for example, and is preferably 100% by mass or less, and more preferably 90% by mass or less.

15 [0062]

(Powder raw material)

The powder raw material in the present embodiment is a raw material that is blended in a powdery form in the dough for bakery food. However, the ingredient (A) is not included in the powder raw material.

Specific examples of the powder raw material for the dough for bakery food include cereal flour such as wheat flour, rice flour, rye flour, and soybean flour; proteins such as gluten and soy protein; polysaccharides such as tapioca starch, corn starch, potato starch, wheat starch, rice starch, sago starch, sweet potato starch, mung bean starch, pea starch, and processed starch in which these starches have been subjected to single or combined processes of acetylation,

etherification, cross-linking, gelatinization, oil and fat processing, and the like, resistant starch, and dextrin; saccharides such as sugar, fructose, glucose, isomerized corn syrup, invert sugar, oligosaccharides, trehalose, and sugar alcohols; powdered sweeteners
5 such as aspartame and acesulfame potassium; milk such as skimmed milk powder, whole milk powder, and cheese powder; salts; dietary fibers such as bran, cellulose, and indigestible dextrin; eggs such as egg white powder and whole egg powder; thickening polysaccharides such as guar gum and alginic acid esters; emulsifiers; flavored powders
10 such as cocoa powder and green tea powder; improvers; and leavening agents.

In addition, the dough for bakery food preferably contains cereal flour as the powder raw material, more preferably contains one or two or more kinds selected from wheat flour and rice flour,
15 and further preferably contains wheat flour. In addition, in a case where the dough for bakery food of the present embodiment contains wheat flour, it preferably includes strong flour.

[0063]

(Other ingredients)

20 In the present embodiment, the dough can contain ingredients other than the above-mentioned ingredients as raw materials. As specific examples of the ingredients other than the above-mentioned ingredients, liquid ingredients such as water, milk, soy milk, fruit juice, vegetable juice, honey, black sugar syrup, and liquid sugar;
25 eggs such as whole eggs, egg yolks, and egg whites; various flavor materials such as nuts, dried fruits, and chocolate chips; sesame; brown rice; and mixed grains such as millet and foxtail millet can

also be blended. Specifically, these ingredients are blended in the dough in a step after the step of obtaining the mixture.

[0064]

(Bakery food)

5 Specifically, the bakery food is obtained by a production method including a step of cooking the dough for bakery food in the present embodiment.

Specific examples of the bakery food obtained in the present embodiment include yeast-fermented foods such as breads, pizzas, yeast doughnuts, Chinese dumplings, naans, and Danish pastries; and
10 yeast-free foods such as steamed breads, cake doughnuts, scones, pound cakes, sponge cakes, chiffon cakes, rolled cakes, butter cakes, muffins, cupcakes, hotcakes, financiers, bouchées, waffles, madeleines, and pies. The bakery food is preferably one selected
15 from the group consisting of yeast-fermented foods and cake doughnuts, more preferably one selected from breads, pizzas, yeast doughnuts, and cake doughnuts, further preferably one selected from breads, yeast doughnuts, and cake doughnuts, and further more preferably breads.

20 [0065]

In addition, when obtaining the mixture in an emulsified state in the step of obtaining the mixture, specific examples of the bakery food include yeast-fermented foods such as breads, pizzas, yeast doughnuts, Chinese dumplings, naan, and Danish pastries; and
25 yeast-free foods such as steamed bread, cake doughnuts, scones, cakes such as pound cakes, sponge cakes, chiffon cakes, rolled cakes, butter cakes, muffins, cupcakes, hotcakes, and pancakes, baked goods such

as financiers, bouchées, waffles, and madeleines, and pies. The bakery food is preferably one selected from the group consisting of yeast-fermented foods and cakes, more preferably one selected from breads, pancakes, yeast doughnuts, and cake doughnuts, further
5 preferably one selected from breads, pancakes, and cake doughnuts, and further more preferably breads.

[0066]

(Improvement method of workability)

In the present embodiment, workability when producing the dough
10 for bakery food can be improved by a step of mixing the ingredient (A), water, and the oil and fat composition to obtain a mixture, and a step of adding the mixture to the powder raw material to obtain the dough for bakery food. Detailed contents regarding the ingredient (A), the water, the oil and fat composition, the mixture,
15 the powder raw material, and the production steps have already been described and will not be repeated.

[0067]

The improvement of workability mentioned herein specifically means that stickiness of the dough, which is seen when merely
20 increasing the amount of water added to the dough for bakery food, is reduced, and that the work becomes easier by shortening the time until the dough comes together.

In addition, in the step of obtaining the mixture, by obtaining the mixture in an emulsified state, that is, the emulsion, it is
25 possible to even further improve workability when producing the dough for bakery food.

[0068]

(Improvement method of texture)

In the present embodiment, the texture of the obtained bakery food can be improved by a step of mixing the ingredient (A), the water, and the oil and fat composition to obtain the mixture, a step of adding
5 the mixture to the powder raw material to obtain the dough for bakery food, and a step of cooking the dough for bakery food. Detailed contents regarding the ingredient (A), the water, the oil and fat composition, the mixture, the powder raw material, and the production steps have already been described and will not be repeated.

10 [0069]

The texture in the present embodiment is specifically one or two selected from elastic force and absence of remains in mouth. The elastic force mentioned herein specifically means a state of feeling elastic force and chewy in the mouth when the bakery food is chewed.
15 In addition, the absence of remains in mouth specifically means a state of quickly disappearing from the mouth and good melting sensation in the mouth instead of becoming lumpy in the mouth when chewed.

[Examples]

20 [0070]

Examples of the present invention will be described below, but the present invention is not limited thereto.

[0071]

Control examples represent a dough for bakery food with a general
25 amount of water added.

[0072]

(Raw materials)

In the following examples, the following materials were mainly used as raw materials.

(Starch)

Low-molecular-weight starch: Acid-treated high amylose corn
5 starch produced in Production Example 1 described later

Corn starch: Corn starch Y, flour-milled by J-Oil Mills, INC.

Granular materials 1 to 3: Powdery granular materials produced by a method of Production Example 2 described later

(Oil and fat composition)

10 Oil and fat composition 1: Margarine ("GRAN MASTER PRIMERAN", manufactured by J-Oil Mills, INC., water content 15.9% by mass)

Oil and fat composition 2: Margarine ("Meister GENERTA", manufactured by J-Oil Mills, INC., water content 18% by mass)

Oil and fat composition 3: Shortening ("Fashie", manufactured
15 by J-Oil Mills, INC., water content 0.1% by mass or less)

Oil and fat composition 4: Refined rapeseed oil, manufactured by J-Oil Mills, INC., water content 0.1% by mass or less

Oil and fat composition 5: Olive oil, "Ajinomoto Olive Oil Extra Virgin" manufactured by J-Oil Mills, INC., water content 0.1% by mass
20 or less

(Powder raw material)

Strong flour 1: EAGLE, manufactured by Nippon Flour Mills Co., Ltd.

Strong flour 2: CAMELLIA, manufactured by Nisshin Flour Milling
25 INC.

Bread quality improver: Eurobake LS, manufactured by Oriental Yeast Co., Ltd.

Instant dry yeast: Saf-Instant Dry Yeast RED, manufactured by Lesaffre

Skimmed milk powder: Skimmed milk powder, manufactured by Hokkaido Dairy Products Co., Ltd.

5 Sugar: White Soft Sugar, manufactured by Mitsui Sugar Co., Ltd.

Hydroxypropyl methyl cellulose (hereinafter HPMC): METOLOSE SFE-4000, manufactured by Shin-Etsu Chemical Co., Ltd.

Commercially available mix powder: Product name "Agetate mochi-mochi Doughnut Mix (Chewy Doughnut Mix Only By Frying)",
10 manufactured by Showa Sangyo Co., Ltd.

Dough improver: Max Power, manufactured by J-Oil Mills, INC.

(Other raw materials)

Baker's yeast: Oriental Yeast, manufactured by Oriental Yeast Co., Ltd.

15 Soy milk: Organic Unadjusted Soy Milk, manufactured by Tokyo Meiraku Co., Ltd.

[0073]

(Production Example 1) Production of low-molecular-weight starch

20 Acid-treated high amylose corn starch was produced as low-molecular-weight starch that was a raw material for powdery granular materials 1 to 3.

High amylose corn starch (manufactured by J-Oil Mills, INC., HS-7, amylose content 70% by mass) was suspended in water to prepare
25 a 35.6% (w/w) slurry, which was heated to 50°C. While stirring, a hydrochloric acid aqueous solution prepared to 4.25 N was added thereto in an amount of 1/9 times the mass ratio of the slurry to

start the reaction. After the reaction for 16 hours, neutralization with 3% NaOH, washing with water, dehydration, and drying were performed to obtain acid-treated high amylose corn starch.

When the peak molecular weight of the obtained acid-treated high amylose corn starch was measured by a method described later, the peak molecular weight was 1.2×10^4 .

[0074]

(Measurement method of peak molecular weight)

Measurement of the peak molecular weight was performed using an HPLC unit manufactured by TOSOH CORPORATION (pump DP-8020, RI detector RS-8021, deaerator SD-8022).

(1) A sample was pulverized to recover the fraction under a sieve with an aperture of 0.15 mm which is a sieve of JIS-Z8801-1 standard. This recovered fraction was suspended so that it was 1 mg/mL in the mobile phase, and the suspension was heated at 100°C for 3 minutes to completely dissolve it. Filtration was performed using a 0.45 μ m filtration filter (manufactured by ADVANTEC, DISMIC-25HP PTFE 0.45 μ m), and the filtrate was used as an analysis sample.

(2) The molecular weight was measured under the following analytical conditions.

Column: Two pieces of TSKgel α -M (7.8 mm ϕ , 30 cm) (manufactured by TOSOH CORPORATION)

Flow velocity: 0.5 mL/min

Mobile phase: 5 mM sodium nitrate-containing 90% (v/v) dimethyl sulfoxide solution

Column temperature: 40°C

Analytical volume: 0.2 mL

(3) The detector data was collected by software (Multistation GPC-8020 model II Data Collection Ver 5.70, manufactured by TOSOH CORPORATION) to calculate the molecular weight peak.

Pullulan (Shodex Standard P-82, manufactured by Showa Denko K.K.) with a known molecular weight was used for a calibration curve.
[0075]

(Measurement method of cold water swelling degree)

(1) A sample was heated and dried at 125°C to measure the water content using a moisture analyzer (KENSEI KOGYO Co., Ltd., model number MX-50), and the mass of dry matter was calculated from the obtained water content value.

(2) In a state where 1 g of the sample in terms of the mass of dry matter was dispersed in 50 mL of water at 25°C, stirring was gently performed in a constant-temperature incubator at 25°C for 30 minutes, and thereafter centrifugation was performed at 3000 rpm for 10 minutes (centrifuge: manufactured by Hitachi Koki Co., Ltd., Hitachi table-top centrifuge CT6E type; rotor: T4SS type swing rotor; adapter: 50TC × 2S adapter) to separate into a precipitated layer and a supernatant layer.

(3) The supernatant layer was removed to measure the mass of the precipitated layer, which was defined as B (g).

(4) The mass when dryness of the precipitated layer was caused (105°C, constant mass) was defined as C (g).

(5) The value obtained by dividing B by C was defined as the cold water swelling degree.

[0076]

(Production Example 2) Production of powdery granular materials

1 to 3

79% by mass of corn starch, 20% by mass of acid-treated high amylose corn starch obtained by the above-mentioned method, and 1% by mass of calcium carbonate were mixed in a bag until they became
5 sufficiently uniform. The mixture was treated by pressurization and heating using a twin-screw extruder (KEI-45 manufactured by KOWA KOGYO Inc.). The treatment conditions were as follows.

Raw material supply: 450 g/minute

Water added: 17% by mass

10 Barrel temperature: 50°C, 70°C, and 100°C from the raw material inlet to the outlet.

Outlet temperature: 100°C to 110°C

Screw rotation speed: 250 rpm

The heat-gelatinized product obtained by the extruder treatment
15 in this manner was dried at 110°C to adjust the water content to 10% by mass.

Next, the dried heat-gelatinized product was pulverized with a tabletop cutter pulverizer and thereafter sieved with a sieve of JIS-Z8801-1 standard. The sieved heat-gelatinized product was mixed
20 at the blending proportions described in Table 1 to prepare the powdery granular materials 1 to 3. Table 1 collectively shows values obtained by measuring the cold water swelling degree of the powdery granular materials 1 to 3 at 25°C by the above-mentioned method.

[0077]

[Table 1]

Table 1

Fraction (mass%)	Powdery granular material 1	Powdery granular material 2	Powdery granular material 3
Under 1 mm sieve and on 0.5 mm sieve	18.0		
Under 0.5 mm sieve and on 0.25 mm sieve	42.0		
Under 0.25 mm sieve and on 0.15 mm sieve	15.0	36.4	
Under 0.15 mm sieve and on 0.075 mm sieve	20.0	48.0	75.5
Under 0.075 mm sieve and on 0.038 mm sieve	3.7	11.4	17.9
Under 0.038 mm sieve	1.3	4.2	6.6
Total of fraction (mass%)	100.0	100.0	100.0
Fraction under 0.5 mm sieve and on 0.038 mm sieve (mass%)	80.7	95.8	93.4
Fraction under 0.25 mm sieve and on 0.038 mm sieve (mass%)	38.7	95.8	93.4
Fraction under 0.15 mm sieve and on 0.038 mm sieve (mass%)	23.7	59.4	93.4
Cold water swelling degree	10.5	7.3	9.5

Note) For example, "Under 0.15 mm sieve and on 0.075 mm sieve" means "under a sieve with an aperture of 0.15 mm and on a sieve with an aperture of 0.075 mm of JIS-Z8801-1 standard".

[0078]

<Examination by presence or absence of pretreatment step and difference in amount of water added>

(Examples 1-1 to 1-3, Comparative Examples 1-1 and 1-2, and Control Example 1)

A dog bread roll was produced with formulations described in Table 2.

[0079]

(Production method of dog bread roll)

15 A. Pretreatment

1. A raw material No. 2: an oil and fat composition 1 was put

in a mixer bowl and stirred with a tabletop mixer (Ken Mixer, manufactured by AICOHSHA MFG. CO., LTD.) using a beater until it became creamy.

2. A raw material No. 1: the ingredient (A) was added and mixed.

5 3. In addition, a raw material No. 3: water was added little by little and mixed to obtain a mixture in an emulsified state.

B. Main kneading

1. Raw materials No. 4 to No. 10 and a raw material No. 12 in Table 2 (raw materials No. 4, No. 6 to No. 10, and a raw material
10 No. 12 in Control Example 1) were put in a mixer bowl and mixed. The mixing condition was a Mixing 1 condition of main kneading described in Table 2. Thus, a base dough of each example was obtained.

2. In Examples 1-1 to 1-3, the mixture obtained by the pretreatment and appropriately, a raw material No. 11 were added and
15 mixed with a mixer for bread until the dough came together. In Comparative Examples 1-1 and 1-2 and Control Example 1, the raw material No. 11 was added and mixed with the mixer for bread until the dough came together. The mixing condition was a Mixing 2 condition of main kneading described in Table 2.

20 3. After mixing, the dough was taken out from the mixer and fermented at 27°C for 60 minutes.

4. The dough was divided into 45 g, rolled, caused to rest for 20 minutes, and thereafter formed into a roll shape.

5. The formed dough was fermented in a fermenter at 36°C and
25 80% relative humidity for 60 minutes.

6. After fermentation, baking was performed in an oven under the following condition and time.

Baking condition: Upper 220°C/lower 190°C

Baking time: 10 minutes

7. After the baking, the heat just after baking of the bread baked was removed at room temperature (20°C).

5 [0080]

The obtained bread was evaluated by the following evaluation method.

(Evaluation method)

The workability of the dough, and the texture (elastic force
10 and absence of remains in mouth), the appearance, and the inner side
of the bread after baking were evaluated according to the following
evaluation criteria. The workability of the dough was determined
by the evaluation of one worker, and the texture, the appearance,
and the inner side of the bread after baking were determined by the
15 average score of three specialized panelists. The evaluation
criteria are described below.

[0081]

(Workability)

5: Almost not sticky and very easy to work with

20 4: Slightly sticky but easy to work with

3: Little sticky, but not bothering when working

2: Sticky and difficult to work with

1: Very sticky and very difficult to work with

(Elastic force)

25 5: Strong elastic force was felt

4: Elastic force was felt

3: Elastic force was slightly felt

2: Little elastic force was felt

1: Almost no elastic force was felt

(Absence of remains in mouth)

5: No remains in mouth when chewed

5 4: Almost no remains in mouth when chewed

3: A little bit of remains in mouth when chewed, but not bothered
by it

2: Became a little lumpy when chewed, and slight remains in mouth

1: Became lumpy when chewed, and remains in mouth

10 (Appearance)

5: A voluminous feeling, and good baked color

4: A little voluminous feeling, and a little good baked color

3: An appropriate voluminous feeling, and an appropriate baked
color

15 2: Slightly lacking in a voluminous feeling, and a slightly
uneven baked color

1: Lacking in a voluminous feeling, and a poor baked color
(Inner side)

5: A perfectly even inner side with very fine texture

20 4: An almost even inner side with fine texture

3: A slightly even inner side with slightly fine texture

2: A slightly uneven inner side with slightly thick dough crust

1: An uneven inner side with thick dough crust

[0082]

25 The obtained evaluation results are described in Table 2.

[Table 2]

				Control Example 1	Comparative Example 1-1	Comparative Example 1-2	Example 1-1	Example 1-2	Example 1-3
	Raw material No.	Powder raw material	Pretreatment step	Not performed	Not performed	Not performed	Performed	Performed	Performed
Pretreatment	1		Ingredient (A) Powdery granular material 2				5	10	15
	2		Oil and fat composition 1				3	6	6
	3		Water				15	30	45
Main kneading	4	0	Strong flour 1	100	90	80	95	90	85
	5		Ingredient (A) Powdery granular material 2		10	20			
	6		Baker's yeast	2.2	2.2	2.2	2.2	2.2	2.2
	7	0	Bread quality improver	0.3	0.3	0.3	0.3	0.3	0.3
	8	0	Salt	2	2	2	2	2	2
	9	0	White soft sugar	6	6	6	6	6	6
	10	0	Skimmed milk powder	2	2	2	2	2	2
	11		Oil and fat composition 1	6	6	6	3		
	12		Water	69	90	110	66	60	59
	Total of dough (part by mass)				187.5	208.5	228.5	199.5	208.5
Total of water added (part by mass)				69	90	110	81	90	104.0
Mixture/total of dough (mass%)				0	0	0	11.5	22.1	29.7
Oil and fat composition in mixture/mixture (mass%)				-	-	-	13.0	13.0	9.1
Ingredient (A)/total of dough (mass%)*				-	4.8	8.8	2.5	4.8	6.7
Ingredient (A)/powder raw material + ingredient (A) (mass%)**				-	9.1	18.2	4.5	9.1	13.6
Amount of water added per powder raw material + ingredient (A) (mass%)***				62.6	81.6	99.7	73.4	81.6	94.3
Evaluation									
Workability	Mixing 1 condition of main kneading		Hook in first gear for 3 minutes Second gear for 4 minutes Third gear for 1 minutes	Dough did not come together even after mixing for 45 minutes, which made production impossible	Hook in first gear for 3 minutes Second gear for 18 minutes	Hook in first gear for 3 minutes Second gear for 4 minutes Third gear for 5 minutes	Hook in first gear for 3 minutes Second gear for 4 minutes Third gear for 5 minutes	Hook in first gear for 3 minutes Second gear for 4 minutes Third gear for 5 minutes	Hook in first gear for 3 minutes Second gear for 4 minutes Third gear for 4 minutes
			Hook in first gear for 2 minutes Second gear for 4 minutes		Hook in first gear for 5 minutes Second gear for 3 minutes	Hook in first gear for 3 minutes Second gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 2 minutes	
	Total time of mixing of main kneading(min.)		14		29	17	17	16	
	Stickiness of bread dough		5		-	2	5	4	3
Texture of bread dough after baking	Elastic force		3	-	3	5	5	4	
	Absence of remains in mouth		2	-	3	5	5	4	
Appearance of bread dough after baking				4	-	2	5	4	3
Inner side of bread dough after baking				4	-	5	5	4	

Note)

* Ingredient (A)/total of dough (mass%) means mass% of ingredient (A) with respect to total amount of dough

** Ingredient (A)/powder raw material + ingredient (A) means mass% of ingredient (A) with respect to total of powder raw material and ingredient (A)

*** Amount of water added per powder raw material + ingredient (A) (mass%) means mass% of water with respect to total of powder raw material and ingredient (A)

[0083]

From Table 2, in the doughs of the examples in which 2.5% by mass or more and 6.7% by mass or less of the ingredient (A) was contained in the dog bread roll dough and which were subjected to the pretreatment step of obtaining the mixture composed of the ingredient (A), the oil and fat composition, and water, regardless of the increase in the amount of water added per total of the powder raw material and the ingredient (A) from 62.6% by mass of the control example to 73.4% by mass, 81.6% by mass, and 94.3% by mass, the degrees of stickiness of the doughs were all 3 points or higher, which was a practically sufficient level, and the mixing time was also within a sufficiently feasible range. In addition, in the bread after baking, the breads of the examples were superior to the bread of the control example in terms of elastic force and absence of remains in mouth.

In addition, since the mixture contained 9.1% by mass or more and 13.0% by mass or less of the oil and fat composition, the workability, and the elastic force, the absence of remains in mouth, the appearance, and the inner side of the bread after baking were good.

In addition, when Example 1-2 and Comparative Example 1-1 in which the same amount of the ingredient (A) was contained in the dough were compared, in the case of not performing the pretreatment step, the dough did not come together even after mixing for 45 minutes, which made production impossible, whereas by performing the pretreatment step, the dough came together in 17 minutes, and the workability was excellent because the stickiness of the dough was less. In addition, when Comparative Example 1-2 and Examples 1-1 to 1-3 were compared, the mixing time was significantly shortened

by performing the pretreatment step. In addition, the bread after baking was also better than the bread of the comparative example in terms of the elastic force, the absence of remains in mouth, the appearance, and the inner side.

5 Therefore, by performing the pretreatment step of obtaining the mixture composed of the ingredient (A), the oil and fat composition, and water, even in the case of increasing the amount of water added, the stickiness of the bread dough was less, the mixing time could be shortened, and the workability was improved. In addition, after
10 baking, the bread having an excellent appearance and texture could be obtained.

The breads obtained in each example were all preferable in the appearance and the inner side.

[0084]

15 <Examination 2 by difference in amount of water added>
 (Examples 2-1 to 2-3, Comparative Example 2-1, and Control Example 2)

A bread roll was produced with formulations described in Table 3.

20 [0085]

(Production method of bread roll)

A. Pretreatment

1. A raw material No. 2: an oil and fat composition in Table 3 was put in a mixer bowl and stirred with a Hobart Mixer (manufactured
25 by OSHIKIRI MACHINERY LTD.) until it became creamy.

2. A raw material No. 1: the ingredient (A) was added and mixed.

3. In addition, a raw material No. 3: water was added little

by little and mixed to obtain a mixture in an emulsified state.

B. Main kneading

1. Raw materials No. 4 to No. 10 and a raw material No. 12 in Table 3 were put in a mixer bowl and mixed. The mixing condition
5 was a Mixing 1 condition of main kneading described in Table 3. Thus, a base dough of each example was obtained.

2. In Examples 2-1 to 2-3, the mixture obtained by the pretreatment and a raw material No. 11 were added and mixed with a mixer for bread until the dough came together. In the control example
10 and Comparative Example 2-1, the raw material No. 11 was added and mixed with the mixer for bread until the dough came together. The mixing condition was a Mixing 2 condition of main kneading described in Table 3.

3. After mixing, the dough was taken out from the mixer and
15 fermented at 27°C for 60 minutes.

4. The dough was divided into 45 g, rolled, caused to rest for 15 minutes, and thereafter forming was performed.

5. The formed dough was fermented in a fermenter at 38°C and 85% relative humidity for 50 minutes.

20 6. After fermentation, baking was performed in an oven under the following condition and time.

Baking condition: Upper 210°C/lower 200°C

Baking time: 8 minutes

7. After the baking, the heat just after baking of the bread
25 baked was removed at room temperature (20°C).

[0086]

The obtained bread roll was evaluated by the above-mentioned

evaluation method.

In addition, regarding the texture, the evaluation was performed on the bread on the day of production, after being stored for 1 day at room temperature, and after being stored for 2 days at room
5 temperature.

[0087]

The obtained results are described in Table 3.

[0088]

[Table 3]

Table 3

				Control Example 2	Comparative Example 2-1	Example 2-1	Example 2-2	Example 2-3
	Raw material No.	Powder raw material	Pretreatment step	Not performed	Not performed	Performed	Performed	Performed
Pretreatment	1		Ingredient (A) Powdery granular material 2			2	5	10
	2		Oil and fat composition 2			1	3	6
	3		Water			8	15	30
Main kneading	4	0	Strong flour 2	100	100	98	95	90
	5	0	Instant dry yeast	1.2	1.2	1.2	1.2	1.2
	6	0	Bread quality improver	0.3	0.3	0.3	0.3	0.3
	7	0	Salt	1.8	1.8	1.8	1.8	1.8
	8	0	White soft sugar	10	10	10	10	10
	9	0	Skimmed milk powder	2	2	2	2	2
	10		Whole egg	10	10	10	10	10
	11		Oil and fat composition 2	10	10	9	7	4
	12		Water	57	81.3	55.86	54.15	51.3
Total of dough (part by mass)				192.3	216.6	199.2	204.5	216.6
Total of water added (part by mass)				57.0	81.3	63.9	69.2	81.3
Mixture/total of dough (mass%)				0	0.0	5.5	11.2	21.2
Oil and fat composition in mixture/mixture (mass%)				-	-	9.1	13.0	13.0
Ingredient (A)/total of dough (mass%)*				-	-	1.0	2.4	4.6
Ingredient (A)/powder raw material + ingredient (A) (mass%)**				-	0.00	1.8	4.4	8.8
Amount of water added per powder raw material + ingredient (A) (mass%***				49.4	70.5	55.4	60.0	70.5
Evaluation								
Workability	Mixing 1 condition of main kneading		Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 2 minutes	Dough did not come together even after mixing for 40 minutes, which made production impossible	Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 2 minutes	
			Hook in first gear for 2 minutes Second gear for 6 minutes		Hook in first gear for 2 minutes Second gear for 6.5 minutes	Hook in first gear for 2 minutes Second gear for 6 minutes	Hook in first gear for 2 minutes Second gear for 7 minutes	
	Time of mixing of main kneading(min.)		16		16.5	16	17	
	Stickiness of bread dough		5		-	5	5	4
Texture of bread dough after baking	Production day	Elastic force	3.3	-	3.7	4.0	4.3	
		Absence of remains in mouth	1.7	-	4.0	4.3	4.3	
	After 1 day	Elastic force	2.3	-	3.3	3.7	3.7	
		Absence of remains in mouth	1.7	-	3.0	3.7	3.3	
	After 2 days	Elastic force	2.0	-	3.7	4.0	3.7	
		Absence of remains in mouth	1.7	-	3.0	3.7	3.7	
Appearance of bread dough after baking				4	-	4	4	3
Inner side of bread dough after baking				-	-	-	-	-

Note)

* Ingredient (A)/total of dough (mass%) means mass% of ingredient (A) with respect to total amount of dough

** Ingredient (A)/powder raw material + ingredient (A) means mass% of ingredient (A) with respect to total of powder raw material and ingredient (A)

*** Amount of water added per powder raw material + ingredient (A) (mass%) means mass% of water with respect to total of powder raw material and ingredient (A)

[0089]

From Table 3, also in the bread roll doughs, as compared to the

dough of the control example in which the amount of water added per total of the powder raw material and the ingredient (A) was 49.4% by mass, even in the case of the increase to 55.4% by mass, 60.0% by mass, and 70.5% by mass as in Examples 2-1 to 2-3, the degrees
5 of stickiness of the doughs were all practically sufficient levels, and the mixing time was also within a sufficiently feasible range. In addition, in the bread after baking, the breads of the examples were superior to the bread of the control example in terms of elastic force and absence of remains in mouth.

10 When the doughs of Example 2-3 and Comparative Example 2-1 in which the amount of water added per powder raw material was the same were compared, in Comparative Example 2-1, the dough did not come together even after mixing for 40 minutes, which made production impossible, but in Example 2-3, the dough came together in 17 minutes,
15 and the workability was excellent because the stickiness of the dough was less.

The breads obtained in each example were all preferable in the appearance.

[0090]

20 <Examination by difference of oil and fat composition in mixture>

(Examples 3-1 and 3-2 and Control Example 3)

Bread rolls were produced by the above-mentioned production method of bread rolls with the formulations described in Table 4.

25 The obtained bread roll was evaluated by the above-mentioned evaluation method.

[0091]

[Table 4]

Table 4

				Control Example 3	Example 3-1	Example 3-2
	Raw material No.	Powder raw material	Pretreatment step	Not performed	Performed	Performed
Pretreatment	1		Ingredient (A) Powdery granular material 2		5	5
	2-1		Oil and fat composition 3		3	
	2-2		Oil and fat composition 4			3
	3		Water		15	15
Main kneading	4	0	Strong flour 2	100	95	95
	5	0	Instant dry yeast	1.2	1.2	1.2
	6	0	Bread quality improver	0.3	0.3	0.3
	7	0	Salt	1.8	1.8	1.8
	8	0	White soft sugar	10	10	10
	9	0	Skimmed milk powder	2	2	2
	10		Whole egg	10	10	10
	11		Oil and fat composition 2	10	7	7
12		Water	57	54.2	54.2	
Total of dough (part by mass)				192.3	204.5	204.5
Total of water added (part by mass)				57.0	69.2	69.2
Mixture/total of dough (mass%)				0	11.2	11.2
Oil and fat composition in mixture/mixture (mass%)				-	13.0	13.0
Ingredient (A)/total of dough (mass%)*				-	2.4	2.4
Ingredient (A)/powder raw material + ingredient (A) (mass%)**				-	4.4	4.4
Amount of water added per powder raw material + ingredient (A) (mass%)***				49.4	60.0	60.0
Evaluation						
Workability	Mixing 1 condition of main kneading			Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 2 minutes
				Hook in first gear for 2 minutes Second gear for 6 minutes	Hook in first gear for 2 minutes Second gear for 6 minutes	Hook in first gear for 2 minutes Second gear for 8 minutes
	Mixing 2 condition of main kneading					
	Time of mixing of main kneading(min.)			16	16	18
Stickiness of bread dough			5	5	4	
Texture of bread dough after baking	Production day	Elastic force	3.3	4.0	4.0	
		Absence of remains in mouth	1.7	4.0	3.7	
	After 1 day	Elastic force	2.3	4.0	3.7	
		Absence of remains in mouth	1.7	4.0	3.3	
	After 2 days	Elastic force	2.0	3.7	3.7	
		Absence of remains in mouth	1.7	4.0	3.3	
Appearance of bread dough after baking				4	4	4
Inner side of bread dough after baking				-	-	-

Note)

* Ingredient (A)/total of dough (mass%) means mass% of ingredient (A) with respect to total amount of dough

** Ingredient (A)/powder raw material + ingredient (A) means mass% of ingredient (A) with respect to total of powder raw material and ingredient (A)

*** Amount of water added per powder raw material + ingredient (A) (mass%) means mass% of water with respect to total of powder raw material and ingredient (A)

[0092]

From Table 4, even in the case where the oil and fat composition used in the pretreatment step was shortening or refined rapeseed oil, in the doughs of the examples, the degrees of stickiness of the doughs were all practically sufficient levels even when the amount of water added was increased, and the mixing time was also within a sufficiently feasible range. The workability was good. In addition, in the bread after baking, the breads of the examples were further superior to the bread of the control example in terms of absence of remains in mouth. In addition, the texture was superior to that of the bread of the control example even after 1 day and after 2 days from production.

The breads obtained in each example were all preferable in the appearance.

15 [0093]

<Examination by presence or absence of ingredient (A) in mixture>

(Example 4-1, Comparative Example 4-1, and Control Example 4)

Bread rolls were produced by the above-mentioned production method of bread rolls according to the formulations described in Table 5. In Comparative Example 4-1, HPMC (raw material No. 3 in Table 5) was added in the pretreatment step instead of the ingredient (A). In the procedure 3. of "A. Pretreatment" in the above-mentioned "Production method of bread roll", a raw material No. 4: water described in Table 5 was added.

In addition, in the procedure 1. of "B. Main kneading" in the above-mentioned "Production method of bread roll", raw materials No.

5 to No. 11 and a raw material No. 13 in Table 5 were put in a mixer bowl.

In the procedure 2. of the above-mentioned "B. Main kneading", a raw material No. 12 described in Table 5 was added.

5 The obtained bread roll was evaluated by the above-mentioned evaluation method.

[0094]

[Table 5]

Table 5

				Control Example 4	Comparative Example 4-1	Example 4-1
	Raw material No.	Powder raw material	Pretreatment step	Not performed	Performed	Performed
Pretreatment	1		Ingredient (A) Powdery granular material 2			5
	2		Oil and fat composition 4		2	3
	3	O	HPMC		0.5	
	4		Water		5	15
Main kneading	5	O	Strong flour 2	100	100	95
	6	O	Instant dry yeast	1.2	1.2	1.2
	7	O	Bread quality improver	0.3	0.3	0.3
	8	O	Salt	1.8	1.8	1.8
	9	O	White soft sugar	10	10	10
	10	O	Skimmed milk powder	2	2	2
	11		Whole egg	10	10	10
	12		Oil and fat composition 2	10	8	7
13		Water	57	57	54.2	
Total of dough (part by mass)				192.3	197.8	204.5
Total of water added (part by mass)				57.0	62.0	69.2
Mixture/total of dough (mass%)				0	3.8	8.8
Oil and fat composition in mixture/mixture (mass%)				-	-	13.0
Ingredient (A)/total of dough (mass%)*				-	-	2.4
Ingredient (A)/powder raw material + ingredient (A) (mass%)**				-	-	4.4
Amount of water added per powder raw material + ingredient (A) (mass%***				49.4	53.5	60.0
Evaluation						
Workability	Mixing 1 condition of main kneading		Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 2 minutes	
			mixing 2 condition of main kneading		Hook in first gear for 2 minutes Second gear for 6 minutes	Hook in first gear for 2 minutes Second gear for 8 minutes for 8 minutes
	Time of mixing of main kneading(min.)		16	18	18	
	Stickiness of bread dough		5	2	4	
Texture of bread dough after baking	Production day	Elastic force	3.3	3.0	4.0	
		Absence of remains in mouth	1.7	2.7	3.7	
	After 1 day	Elastic force	2.3	3.0	3.7	
		Absence of remains in mouth	1.7	2.7	3.3	
	After 2 days	Elastic force	2.0	2.0	3.7	
		Absence of remains in mouth	1.7	2.0	3.3	
Appearance of bread dough after baking				4	4	4
Inner side of bread dough after baking				-	-	-

(Note)

* Ingredient (A)/total of dough (mass%) means mass% of ingredient (A) with respect to total amount of dough

** Ingredient (A)/powder raw material + ingredient (A) means mass% of ingredient (A) with respect to total of powder raw material and ingredient (A)

*** Amount of water added per powder raw material + ingredient (A) (mass%) means mass% of water with respect to total of powder raw material and ingredient (A)

[0095]

From Table 5, in the dough of the example, the degrees of stickiness of the doughs were all practically sufficient levels even when the amount of water added was increased, and the mixing time was also within a sufficiently feasible range. In addition, in the bread after baking, the bread of the example was further superior to the bread of the control example in terms of the absence of remains in mouth.

In addition, when compared with Comparative Example 4-1 in which HPMC was contained in the mixture, in the example, since the ingredient (A) was contained, the stickiness of the dough was less, and the workability was excellent. In addition, the bread after baking was also good in terms of the elastic force and the absence of remains in mouth. In the bread of Comparative Example 4-1, a further deterioration in the texture after 1 day to after 2 days from production was shown, but the bread of the example did not show a deterioration in the texture.

The bread obtained in the example was preferable in the appearance.

[0096]

<Examination 2 by presence or absence of pretreatment step and examination by difference in properties of ingredient (A)>

(Examples 5-1 to 5-3, Comparative Example 5-1, and Control Example 5)

Plain bread was produced with the formulations described in Table 6.

[0097]

(Production method of plain bread)

A. Pretreatment

1. A raw material No. 2: an oil and fat composition 2 in Table 6 was put in a mixer bowl and stirred with a Hobart Mixer (manufactured by OSHIKIRI MACHINERY LTD.) until it became creamy.

2. Raw materials No. 1-1 to No. 1-3: the ingredient (A) was added and mixed.

3. In addition, a raw material No. 3: water was added little by little and mixed to obtain a mixture in an emulsified state.

10 B. Main kneading

1. Raw materials No. 4 to No. 10 and a raw material No. 12 (raw material No. 5 for only Comparative Example 5-1) were put in a mixer bowl and mixed. The mixing condition was a Mixing 1 condition of main kneading described in Table 6. Thus, a base dough of each example was obtained.

2. In Examples 5-1 to 5-3, the mixture obtained by the pretreatment and a raw material No. 11 were added and mixed with a mixer for bread until the dough came together. In the control example and Comparative Example 5-1, the raw material No. 11 was added and mixed with the mixer for bread until the dough came together. The mixing condition was a Mixing 2 condition of main kneading described in Table 6.

3. After mixing, the dough was taken out from the mixer and fermented at 28°C for 60 minutes.

25 4. The dough was divided into 230 g, rolled, caused to rest for 20 minutes, and thereafter forming was performed.

5. The formed dough was fermented in a fermenter at 38°C and

85% relative humidity for 50 to 70 minutes.

6. After fermentation, baking was performed in an oven under the following condition and time.

Baking condition: Upper 210°C/lower 220°C

5 Baking time: 35 minutes

7. After the baking, the heat just after baking of the bread baked was removed at room temperature (20°C).

[0098]

10 The obtained plain bread was evaluated by the above-mentioned evaluation method.

In addition, regarding the texture, the evaluation was performed on the bread on the day of production, after being stored for 1 day at room temperature, and after being stored for 2 days at room temperature.

15 The obtained evaluation results are described in Table 6.

[0099]

[Table 6]

Table 6

				Control Example 5	Comparative Example 5-1	Example 5-1	Example 5-2	Example 5-3			
	Raw material No.	Powder raw material	Pretreatment step	Not performed	Not performed	Performed	Performed	Performed			
Pretreatment	1-1		Ingredient (A) Powdery granular material 1			5					
	1-2		Ingredient (A) Powdery granular material 2				5				
	1-3		Ingredient (A) Powdery granular material 3					5			
	2		Oil and fat composition 2			3	3	3			
	3		Water			15	15	15			
Main kneading	4	0	Strong flour 2	100	95	95	95	95			
	5		Ingredient (A) Powdery granular material 2		5						
	6	0	Instant dry yeast	1	1	1	1	1			
	7	0	Bread quality improver	0.1	0.1	0.1	0.1	0.1			
	8	0	Salt	2	2	2	2	2			
	9	0	White soft sugar	5	5	5	5	5			
	10	0	Skimmed milk powder	2	2	2	2	2			
	11		Oil and fat composition 2	6	6	3	3	3			
	12		Water	69	80.55	65.55	65.55	65.55			
Total of dough (part by mass)				185.1	196.7	196.7	196.7	196.7			
Total of water added (part by mass)				69.0	80.6	80.6	80.6	80.6			
Mixture/total of dough (mass%)				0	0.0	9.2	9.2	11.7			
Oil and fat composition in mixture/mixture (mass%)				-	-	13.0	13.0	13.0			
Ingredient (A)/total of dough (mass%)*				-	-	2.5	2.5	2.5			
Ingredient (A)/powder raw material + ingredient (A) (mass%)**				-	4.5	4.5	4.5	4.5			
Amount of water added per powder raw material + ingredient (A) (mass%)***				62.7	73.2	73.2	73.2	73.2			
Evaluation											
Workability	Mixing 1 condition of main kneading			Hook in first gear for 3 minutes Second gear for 2 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 2 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 2 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 2 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 2 minutes Third gear for 2 minutes			
				Mixing 2 condition of main kneading			Hook in first gear for 2 minutes Second gear for 8 minutes	Hook in first gear for 2 minutes Second gear for 6 minutes	Hook in first gear for 2 minutes Second gear for 6 minutes	Hook in first gear for 2 minutes Second gear for 7 minutes	Hook in first gear for 2 minutes Second gear for 7 minutes
							Time of mixing of main kneading (min.)				17
	Stickiness of bread dough			5	1	5	4	4			
Texture of bread dough after baking	Product 1 on day	Elastic force	2.7	2.3	3.7	3.7	3.7				
		Absence of remains in mouth	2.3	2.7	4.0	4.3	4.3				
	After 1 day	Elastic force	2.3	2.3	4.0	3.3	3.7				
		Absence of remains in mouth	2.0	2.7	4.0	4.0	3.7				
	After 2 days	Elastic force	1.7	2.7	3.0	3.3	3.3				
Absence of remains in mouth		1.7	3.0	3.3	3.3	3.7					
Appearance of bread dough after baking				4	4	3	3	4			
Inner side of bread dough after baking				4	4	3	3				

(Note)

* Ingredient (A)/total of dough (mass%) means mass% of ingredient (A) with respect to total amount of dough

** Ingredient (A)/powder raw material + ingredient (A) means mass% of ingredient (A) with respect to total of powder raw material and ingredient (A)

*** Amount of water added per powder raw material + ingredient (A) (mass%) means mass% of water with respect to total of powder raw material and ingredient (A)

[0100]

From Table 6, also in the plain bread doughs, as compared with the dough of the control example in which the amount of water added per total of the powder raw material and the ingredient (A) was 62.7% by mass, even in the case of the increase to 73.2% by mass as in Examples 5-1 to 5-3, the degrees of stickiness of the doughs were all practically sufficient levels, and the mixing time was also within a sufficiently feasible range. Regarding the bread after baking, the breads of the examples were superior to the bread of the control example in terms of elastic force and absence of remains in mouth.

When Comparative Example 5-1 and Examples 5-1 to 5-3 in which the same amount of the ingredient (A) is contained in the dough and the amount of water added per powder raw material is the same were compared, by performing the pretreatment step, the stickiness of the dough was less, and even in the baked bread, the bread of the example was superior to the bread of the comparative example in terms of elastic force and absence of remains in mouth.

In addition, when the content of the ingredient (A) under the sieve with the aperture of 0.5 mm and on the sieve with the aperture of 0.038 mm is 80.7% by mass or more and 95.8% by mass or less, the workability was excellent, and the texture of the bread after baking was excellent.

The breads obtained in each example were all preferable in the appearance and the inner side.

[0101]

<Production method of cake doughnut>

(Example 6-1)

A cake doughnut was produced by the following procedure

according to the formulation described in Table 7.

A. Pretreatment

1. A raw material No. 2: an oil and fat composition 4 and a raw material No. 1: the ingredient (A) which are described in Table 7 were put in a mixer bowl to perform mixing with a Hobart Mixer (manufactured by KitchenAid) in first gear for 1 minute.

2. In addition, a raw material No. 3: water was added little by little and mixed in third gear for 3 minutes to obtain a mixture in an emulsified state.

10 B. Main kneading

1. A raw material No. 4: a commercially available mixed powder to No. 7: water which are described in Table 7 were put in a mixer bowl to perform mixing in first gear for 2 minutes. Thus, a base dough of each example was obtained.

15 2. The mixture obtained by the pretreatment was added to perform mixing in third gear for 3 minutes with a Hobart mixer.

3. The dough was obtained by adjusting such that the dough mass for three doughnuts was 108 g.

20 4. The dough obtained in the above-mentioned 3. was cut with a doughnut cutter and injected in frying oil (J FryUp 201, manufactured by J-Oil Mills, INC.) heated to 190°C. When the dough floated in the frying oil, it was fried with the oil for 3 minutes and 30 seconds while being turned over.

[0102]

[Table 7]

Table 7

				Example 6-1
	Raw material No.	Powder raw material	Pretreatment step	Performed
Pretreatment	1		Ingredient (A) Powdery granular material 2	92
	2		Oil and fat composition 4	55.2
	3		Water	276
Main kneading	4	0	Commercially available mix powder	368
	5		Whole egg	78.3
	6		Oil and fat composition 4	62.6
	7		Water	187.2
Total of dough (part by mass)				1119.3
Total of water added (part by mass)				463.2
Mixture/total of dough (mass%)				37.8
Oil and fat composition in mixture/mixture (mass%)				13.0
Ingredient (A)/total of dough (mass%)*				8.2
Ingredient (A)/powder raw material + ingredient (A) (mass%)**				20.0
Amount of water added per powder raw material + ingredient (A) (mass%***)				100.7

Note)

* Ingredient (A)/total of dough (mass%) means mass% of ingredient (A) with respect to total amount of dough

** Ingredient (A)/powder raw material + ingredient (A) means mass% of ingredient (A) with respect to total of powder raw material and ingredient (A)

*** Amount of water added per powder raw material + ingredient (A) (mass%) means mass% of water with respect to total of powder raw material and ingredient (A)

[0103]

<Evaluation>

- 5 In Example 6-1, the workability at the time of producing the dough was excellent.

In addition, the obtained cake doughnut had a good texture because there were almost no remains in mouth when chewed.

[0104]

- 10 <Examination by difference in mixing of mixture>

(Examples 7-1 and 7-2 and Control Example 6)

Plain bread was created with the formulations described in Table

8.

[0105]

(Production method of plain bread)

A-1. <Pretreatment of Example 7-1>

5 1. A raw material No. 3: an oil and fat composition 5 in Table
8 was put in a mixer bowl.

2. Raw materials No. 1: the ingredient (A) and No. 2: a skimmed
milk powder were added in the above-mentioned 1. and mixed lightly.

3. A raw material No. 4: water was added and mixed under the
10 condition of the pretreatment step in Table 8 to obtain a mixture
in an emulsified state.

[0106]

A-2. <Pretreatment of Example 7-2>

1. The raw material No. 3: the oil and fat composition 5 in Table
15 8 was put in a container.

2. The raw materials No. 1: the ingredient (A) and No. 2: the
skimmed milk powder were added in the above-mentioned 1. and mixed
lightly.

3. The raw material No. 4: water was added and mixed lightly.
20 However, water was added just before injection in 2. of B. <Main
kneading> described later. The obtained mixture was not in an
emulsified state.

[0107]

B. <Main kneading>

25 1. Raw materials No. 5 to No. 12 was put in a mixer bowl and
mixed. The mixing condition was a Mixing 1 condition of main kneading
described in Table 8. Thus, base doughs of Examples 7-1 and 7-2 were

obtained. In Control Example 6, raw materials No. 5 to No. 12 excluding a raw material No. 11 were put in a mixer bowl, and mixing was performed under a Mixing 1 condition of main kneading described in Table 8 to obtain a base dough.

5 2. In Examples 7-1 and 7-2, the mixture obtained in each pretreatment was added to perform mixing with a mixer for bread until the dough came together. In Control Example 6, the raw material No. 11 was added and mixed with the mixer for bread until the dough came together. The mixing condition was a Mixing 2 condition of main
10 kneading described in Table 8.

3. After mixing, the dough was taken out from the mixer and fermented at 28°C for 60 minutes.

4. The dough was divided into 190 g × 2 pieces, rolled, and caused to rest for 20 minutes, and thereafter put in a one loaf mold to be
15 formed into a round shape.

5. The formed dough was fermented in a fermenter at 38°C and 75% relative humidity for 70 minutes.

6. After fermentation, baking was performed in an oven under the following condition and time.

20 Baking condition: Upper 190°C/lower 230°C

 Baking time: 25 minutes (with steam)

7. After the baking, the heat just after baking of the bread baked was removed at room temperature (20°C).

[0108]

25 The obtained plain bread was evaluated by the above-mentioned evaluation method.

 In addition, regarding the texture, the evaluation was performed

on the bread on the day of production, after being stored for 1 day at room temperature, and after being stored for 2 days at room temperature.

The obtained evaluation results are described in Table 8.

[0109]

[Table 8]

Table 8

				Control Example 6	Example 7-1	Example 7-2
	Raw material No.	Powder raw material	Pretreatment step	Not performed	Performed Hook in first gear for 3 minutes Second gear for 6 minutes Third gear for 3 minutes	Performed (only mixing)
Pretreatment	1		Ingredient (A) Powdery granular material 2		3	3
	2	0	Skimmed milk powder		1.2	1.2
	3		Oil and fat composition 5		12	12
	4		Water		12	12
Main kneading	5	0	Strong flour 2	100	100	100
	6		Baker's yeast	3	3	3
	7	0	Dough improver	1	1	1
	8	0	Salt	2	2	2
	9	0	White soft sugar	2	2	2
	11		Oil and fat composition 5	8	8	8
	12		Water	69	57	57
Total of dough (part by mass)				185	201.2	201.2
Total of water added (part by mass)				69.0	69.0	69.0
Mixture/total of dough (mass%)				0.0	14.0	14.0
Oil and fat composition in mixture/mixture (mass%)				0	42.6	42.6
Ingredient (A)/total of dough (mass%)*				0	1.5	1.5
Ingredient (A)/powder raw material + ingredient (A) (mass%)**				0	32.6	32.6
Amount of water added per powder raw material + ingredient (A) (mass%***				65.7	63.2	63.2
Evaluation						
Workability	Mixing 1 condition of main kneading			Hook in first gear for 3 minutes Second gear for 2 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 2 minutes Third gear for 2 minutes	Hook in first gear for 3 minutes Second gear for 2 minutes Third gear for 2 minutes
	Mixing 2 condition of main kneading			Hook in first gear for 2 minutes Second gear for 8 minutes	Hook in first gear for 2 minutes Second gear for 6 minutes	Hook in first gear for 2 minutes Second gear for 7 minutes
	Time of mixing of main kneading(min.)			17	15	16
	Stickiness of bread dough			5	5	4
Texture of bread dough after baking	Production day	Elastic force	2.0	4.0	3.0	
		Absence of remains in mouth	1.0	4.0	4.0	
	After 1 day	Elastic force	2.0	4.0	4.0	
		Absence of remains in mouth	1.0	4.0	4.0	
	After 2 days	Elastic force	1.0	3.0	3.0	
		Absence of remains in mouth	2.0	5.0	4.0	
Appearance of bread dough after baking				4	3	3
Inner side of bread dough after baking				4	3	3

Note)

* Ingredient (A)/total of dough (mass%) means mass% of ingredient (A) with respect to total amount of dough

** Ingredient (A)/powder raw material + ingredient (A) means mass% of ingredient (A) with respect to total of powder raw material and ingredient (A)

*** Amount of water added per powder raw material + ingredient (A) (mass%) means mass% of water with respect to total of powder raw material and ingredient (A)

[0110]

From Table 8, not only in the case where the mixture that was mixed until being emulsified in the pretreatment step as in Example 7-1 was added to other dough raw material and mixed, but also in the case where mixing was only lightly performed in the pretreatment step as in Example 7-2 and addition to other dough raw material and mixing were performed, in all of the breads after baking, the elastic force and the absence of remains in mouth were excellent until 1 day and 2 days after the production day as compared to the bread of the control example.

The mixing time of main kneading was 15 minutes in Example 7-1 and 16 minutes in Example 7-2, showing that the workability was excellent from the viewpoint that the dough came together in a shorter time as compared to 17 minutes in Control Example 6.

In addition, in both Example 7-1 and Example 7-2, the appearance and the inner side of all of the bread doughs after baking were practically sufficient.

[0111]

<Examination by difference in water type>

(Examples 8-1 and 8-2)

Plain bread was created with the formulations described in Table 9.

[0112]

(Production method of plain bread)

A-1. <Pretreatment of Example 8-1>

1. A raw material No. 2: an oil and fat composition 4 in Table 9 was put in a mixer bowl.

2. A raw materials No. 1: the ingredient (A) was added in the above-mentioned 1. and mixed lightly.

3. A raw material No. 3: soy milk was added and mixed under the condition of the pretreatment step in Table 9 to obtain a mixture
5 in an emulsified state.

[0113]

A-2. <Pretreatment of Example 8-2>

1. The raw material No. 2: the oil and fat composition 4 in Table 9 was put in a container.

10 2. The raw materials No. 1: the ingredient (A) was added in the above-mentioned 1. and mixed lightly.

3. The raw material No. 3: soy milk was added and mixed lightly. However, the soy milk was added just before injection in 2. of B. <Main kneading> described later. The obtained mixture was not in
15 an emulsified state.

[0114]

B. <Main kneading>

1. Raw materials No. 4 to No. 9 was put in a mixer bowl and mixed. The mixing condition was a Mixing 1 condition of main kneading
20 described in Table 9. Thus, a base dough of each example was obtained.

2. In Examples 8-1 and 8-2, the mixture obtained in each pretreatment was added to perform mixing with a mixer for bread until the dough came together. The mixing condition was a Mixing 2 condition of main kneading described in Table 9.

25 3. After mixing, the dough was taken out from the mixer and fermented at 28°C for 60 minutes.

4. The dough was divided into 190 g × 4 pieces, rolled, and caused

to rest for 20 minutes, and thereafter put in a one loaf mold to be formed into a round shape.

5. The formed dough was fermented in a fermenter at 38°C and 85% relative humidity for 70 minutes.

5 6. After fermentation, baking was performed in an oven under the following condition and time.

Baking condition: Upper 190°C/lower 230°C

Baking time: 28 minutes

7. After the baking, the heat just after baking of the bread
10 baked was removed at room temperature (20°C).

[0115]

[Table 9]

Table 9

				Example 8-1	Example 8-2
	Raw material No.	Powder raw material	Pretreatment step	Performed Hook in first gear for 3 minutes Second gear for 6 minutes Third gear for 3 minutes	Performed (only mixing)
Pretreatment	1		Ingredient (A) Powdery granular material 2	3	3
	2		Oil and fat composition 4	12	12
	3		Soy milk	12	12
Main kneading	4	0	Strong flour 2	100	100
	5		Baker's yeast	3	3
	6	0	Dough improver	1	1
	7	0	Salt	1.8	1.8
	8	0	White soft sugar	6	6
	9		Water	66	66
Total of dough (part by mass)				204.8	204.8
Total of water added (part by mass)				78.0	78.0
Mixture/total of dough (mass%)				13.2	13.2
Oil and fat composition in mixture/mixture (mass%)				44.4	44.4
Ingredient (A)/total of dough (mass%)*				1.5	1.5
Ingredient (A)/powder raw material + ingredient (A) (mass%)**				25.4	25.4
Amount of water added per powder raw material + ingredient (A) (mass%***)				69.8	69.8
Evaluation					
Workability	Mixing 1 condition of main kneading			Hook in first gear for 3 minutes Second gear for 6 minutes	Hook in first gear for 3 minutes Second gear for 6 minutes
	Mixing 2 condition of main kneading			Hook in first gear for 3 minutes Second gear for 4 minutes Third gear for 1 minute	Hook in first gear for 3 minutes Second gear for 3 minutes Third gear for 1 minute
	Time of mixing of main kneading (min.)			17	16
	Stickiness of bread dough			4	4

(Note)

* Ingredient (A)/total of dough (mass%) means mass% of ingredient (A) with respect to total amount of dough

** Ingredient (A)/powder raw material + ingredient (A) means mass% of ingredient (A) with respect to total of powder raw material and ingredient (A)

*** Amount of water added per powder raw material + ingredient (A) (mass%) means mass% of water with respect to total of powder raw material and ingredient (A)

[0116]

From Table 9, in the case where the soy milk was used as water

5 as in Example 8-1 and Example 8-2, the workability was excellent, and all of the breads after baking were preferable from the viewpoint of the elastic force, the absence of remains in mouth, the appearance, and the inner side.

When the soy milk was used as water, compared to the mixing time of main kneading of 17 minutes in the case where the mixture mixed until being emulsified in the pretreatment step was added to other dough raw material and mixed as in Example 8-1, it was 16 minutes in the case where mixing was only lightly performed in the pretreatment step and addition to other dough raw material and mixing were performed as in Example 8-2, showing that the workability was further excellent since the dough came together in a shorter time.

[0117]

This application claims the priority on the basis of Japanese Patent Application No. 2020-015836, filed January 31, 2020, the content of which is incorporated herein by reference.

CLAIMS

1. A production method of a dough for bakery food containing a powder raw material, water, an oil and fat composition, and an ingredient
5 (A) satisfying the following conditions (1) to (4), the method comprising:

a step of mixing the ingredient (A), the water, and the oil and fat composition to obtain a mixture; and

a step of adding the mixture to the powder raw material to obtain
10 a dough for bakery food,

the ingredient (A): a powdery granular material satisfying the following conditions (1) to (4),

(1) a starch content is 75% by mass or more,

(2) 3% by mass or more and 45% by mass or less of
15 low-molecular-weight starch of starch in which an amylose content is 5% by mass or more is contained, and a peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less,

(3) a cold water swelling degree at 25°C is 5 or more and 20 or less, and

20 (4) a content under a sieve with an aperture of 0.5 mm and on a sieve with an aperture of 0.038 mm is 30% by mass or more and 100% by mass or less.

2. The production method according to claim 1, wherein a blending
25 amount of the mixture in the dough for bakery food is 3% by mass or more and 40% by mass or less.

3. The production method according to claim 1 or 2, wherein the dough for bakery food contains 0.5% by mass or more and 20% by mass or less of the ingredient (A).

5 4. The production method according to any one of claims 1 to 3, wherein a blending amount of the oil and fat composition in the mixture is 1% by mass or more and 20% by mass or less.

5. The production method according to any one of claims 1 to 4, wherein
10 a blending amount of the water with respect to a total of the powder raw material and the ingredient (A) in the dough for bakery food is 50% by mass or more and 110% by mass or less.

6. The production method according to any one of claims 1 to 5, wherein
15 the dough for bakery food contains cereal flour.

7. The production method according to any one of claims 1 to 6, wherein a content of the ingredient (A) under the sieve with the aperture of 0.5 mm and on the sieve with the aperture of 0.038 mm is 65% by
20 mass or more and 100% by mass or less.

8. A production method of bakery food, the method comprising:

a step of cooking the dough for bakery food obtained by the production method according to any one of claims 1 to 7.

25

9. The production method according to claim 8, wherein a method of the cooking is baking or frying with oil.

10. An improvement method of workability when producing a dough for bakery food by mixing a raw material containing a powder raw material, water, an oil and fat composition, and an ingredient (A) satisfying
5 the following conditions (1) to (4), the method comprising:

a step of mixing the ingredient (A), the water, and the oil and fat composition to obtain a mixture; and

a step of adding the mixture to the powder raw material to obtain a dough for bakery food,

10 the ingredient (A): a powdery granular material satisfying the following conditions (1) to (4),

(1) a starch content is 75% by mass or more,

(2) 3% by mass or more and 45% by mass or less of low-molecular-weight starch of starch in which an amylose content
15 is 5% by mass or more is contained, and a peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less,

(3) a cold water swelling degree at 25°C is 5 or more and 20 or less, and

(4) a content under a sieve with an aperture of 0.5 mm and on
20 a sieve with an aperture of 0.038 mm is 30% by mass or more and 100% by mass or less.

11. An improvement method of texture of bakery food, the method comprising, when producing bakery food by mixing a raw material
25 containing a powder raw material, water, an oil and fat composition, and an ingredient (A) satisfying the following conditions (1) to (4):

a step of mixing the ingredient (A), the water, and the oil and

fat composition to obtain a mixture;

a step of adding the mixture to the powder raw material to obtain a dough for bakery food; and

a step of cooking the dough for bakery food,

5 the ingredient (A): a powdery granular material satisfying the following conditions (1) to (4),

(1) a starch content is 75% by mass or more,

(2) 3% by mass or more and 45% by mass or less of low-molecular-weight starch of starch in which an amylose content
10 is 5% by mass or more is contained, and a peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less,

(3) a cold water swelling degree at 25°C is 5 or more and 20 or less, and

(4) a content under a sieve with an aperture of 0.5 mm and on
15 a sieve with an aperture of 0.038 mm is 30% by mass or more and 100% by mass or less.

12. A production method of a mixture, the method comprising:

a step of mixing the following ingredient (A), water, and an
20 oil and fat composition to obtain a mixture,

the ingredient (A): a powdery granular material satisfying the following conditions (1) to (4),

(1) a starch content is 75% by mass or more,

(2) 3% by mass or more and 45% by mass or less of low-molecular-weight starch of starch in which an amylose content
25 is 5% by mass or more is contained, and a peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less,

(3) a cold water swelling degree at 25°C is 5 or more and 20 or less, and

(4) a content under a sieve with an aperture of 0.5 mm and on a sieve with an aperture of 0.038 mm is 30% by mass or more and 100%
5 by mass or less.