

DESCRIPTION

METHOD FOR PRODUCING BAKERY FOOD DOUGH

5 TECHNICAL FIELD

[0001] The present invention relates to a method for producing bakery food dough.

BACKGROUND ART

10 [0002] Breads and other bakery foods are staple foods in many parts of the world. They are also popular in Japan, where rice is the staple food, both as major calorie sources and luxury foods.

[0003] In general, bakery foods become hard and dry and deteriorate in quality due to several factors, including the passage of time after baking and storage temperature. These quality losses are caused by the retrogradation of starch in bakery foods.

15 In order to solve these quality problems, it is widely known to employ a technique of adding an enzyme such as a starch-degrading enzyme to bread dough before baking so as to hydrolyze the starch in the bakery food. However, while such an enzyme can maintain the moist feeling and softness of the bakery food for a longer period of time, the texture of the bakery food, such as crispness and meltability in mouth, is reduced. For example, crispness
20 upon biting off the bakery food when eating is deteriorated, and gumminess or dumpling is caused in the mouth when chewed.

[0004] Patent literature 1 discloses a texture improver for starch-containing foods which contains a starch-degrading enzyme having certain characteristics. The texture improver is used to deliberately induce slight retrogradation of the starch in the food, thereby obtaining
25 a food with good meltability in mouth while maintaining softness.

[0005] Moreover, Patent literature 2 discloses a composition containing 75 mass% or more starch, wherein said starch is low-molecular-weight starch obtained from raw starch having an amylose content of 5 mass% or more, the content of said low-molecular-weight starch in the composition is 3 mass% or more and 45 mass% or less, wherein the peak molecular
30 weight of said low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less, the degree of cold water swelling at 25°C of said composition is 7 or more and 20 or less, and the content of granular ingredient not passing through a sieve having an aperture size of 0.5 mm in said composition is 50 mass% or less. According to this conventional technique, a new ingredient having high water absorption, no stickiness, and less dumpling in good balance is

supposed to be obtained. The literature also describes that this technique can realize excellent texture and good dough handling properties, for example, when blended in various food products.

5 CITATION LIST

Patent Literature

[0006] Patent Literature 1: International Patent Application Publication WO2014/162618

Patent Literature 2: International Patent Application Publication WO2014/132534

10 SUMMARY OF INVENTION

Technical Problem

[0007] However, the technique described in Patent literature 1 still has room for improvement in terms of reducing the gumminess and improving the crispness of the enzyme-containing bakery foods.

15 Patent literature 2 neither discloses nor suggests a technique for reducing gumminess or improving meltability in mouth and crispness of a bakery food that uses an enzyme in combination.

Solution to Problem

20 [0008] The present inventors, as a result of their diligent research, have found that blending a certain ingredient into bakery food dough using an enzyme can give a bakery food with reduced gumminess, improved meltability in mouth, excellent crispness, and improved softness, thereby accomplishing the present invention.

[0009] Thus, the present invention provides a method for producing bakery food dough, a method for producing a bakery food, and a method for reducing gumminess of a bakery food
25 when eating as follows.

[1]

A method for producing bakery food dough, the method comprising a step of preparing bakery food dough containing a powder ingredient, an enzyme, and Ingredient (A)
30 that satisfies the requirements (1) to (4) below,

wherein, in the step of preparing the bakery food dough, the content of Ingredient (A) to the sum content of the powder ingredient and Ingredient (A) in the dough is between 0.8 mass% or more and 35 mass% or less:

Ingredient (A): powdery/granular ingredient that satisfies the following

requirements (1) to (4):

(1) has a starch content of 75 mass% or more;

(2) contains 3 mass% or more and 45 mass% or less low-molecular-weight starch obtained from starch having an amylose content of 5 mass% or more, where the peak
5 molecular weight of said low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less;

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

(4) the content of Ingredient (A) passing through a sieve with an aperture size of 0.5 mm but not passing through a sieve with an aperture size of 0.038 mm is 30 mass% or more and 100 mass% or less.

10 [2]

The method according to [1], wherein the powder ingredient comprises flour.

[3]

The method according to [1] or [2], wherein the dough further comprises an edible oil-and-fat composition.

15 [4]

The method according to [3], wherein the enzyme is contained in the edible oil-and-fat composition.

[5]

The method according to any one of [1] to [4], wherein the content of Ingredient
20 (A) passing through a sieve with an aperture size of 0.15 mm but not passing through a sieve with an aperture size of 0.038 mm is 10 mass% or more and 98 mass% or less.

[6]

The method according to any one of [1] to [5], wherein the content of the enzyme relative to the sum content of the powder ingredient and Ingredient (A) in the dough is 1
25 mass ppm or more and 600 mass ppm or less.

[7]

The method according to any one of [1] to [6], wherein the content of Ingredient (A) to the content of the enzyme in the dough is 20 or more and 15,000 or less in mass ratio.

[8]

The method according to any one of [1] to [7], wherein the enzyme is one or more selected from the group consisting of α -amylase and lipase.

30 [9]

A method for producing a bakery food, comprising a step of heat cooking bakery food dough obtained by the method according to any one of [1] to [8].

[10]

The method according to [9], wherein the process of heat cooking is one or more selected from baking, oil cooking and steaming.

[11]

5 The method according to [9] or [10], wherein the bakery food is one selected from the group consisting of a white pan bread, a roll bread, a sweet bread, a steamed bread, a steamed cake, and a dressed bread.

[12]

10 A method for reducing gumminess when eating a bakery food obtained by heat cooking bakery food dough containing a powder ingredient and an enzyme, the method comprising a step of adding Ingredient (A) which satisfies the requirements (1) to (4) below to the dough such that the content of Ingredient (A) is 0.8 mass% or more and 35 mass% or less relative to the sum content of the powder ingredient and Ingredient (A):

15 Ingredient (A): powdery/granular ingredient that satisfies the following requirements (1) to (4):

(1) has a starch content of 75 mass% or more;

(2) contains 3 mass% or more and 45 mass% or less low-molecular-weight starch obtained from starch having an amylose content of 5 mass% or more, where the peak molecular weight of said low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less;

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

(4) the content of Ingredient (A) passing through a sieve with an aperture size of 0.5 mm but not passing through a sieve with an aperture size of 0.038 mm is 30 mass% or more and 100 mass% or less.

[13]

25 The method according to [12], wherein the content of Ingredient (A) to the content of the enzyme in the dough is 20 or more and 15,000 or less in mass ratio.

[14]

The method according to [12] or [13], wherein the enzyme is one or more selected from the group consisting of α -amylase and lipase.

30

[0010] The present invention also provides the following method for producing bakery food dough, method for producing a bakery food, and method for reducing gumminess of a bakery food when eating the bakery food.

[1]

A method for producing bakery food dough, the method comprising a step of preparing bakery food dough containing a powder ingredient, α -amylase, and Ingredient (A) that satisfies the requirements (1) to (4) below,

wherein, in the step of preparing the bakery food dough, the content of Ingredient (A) to the sum content of the powder ingredient and Ingredient (A) in the dough is 0.8 mass% or more and 35 mass% or less:

Ingredient (A): powdery/granular ingredient that satisfies the following requirements (1) to (4):

- (1) has a starch content of 75 mass% or more;
- (2) contains 3 mass% or more and 45 mass% or less low-molecular-weight starch obtained from starch having an amylose content of 5 mass% or more, where the peak molecular weight of said low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less;
- (3) degree of cold water swelling at 25°C is 5 or more and 20 or less; and
- (4) the content of Ingredient (A) passing through a sieve with an aperture size of 0.5 mm but not passing through a sieve with an aperture size of 0.038 mm is 30 mass% or more and 100 mass% or less.

[2]

The method according to [1], wherein the powder ingredient comprises flour.

[3]

The method according to [1] or [2], wherein the dough further comprises an edible oil-and-fat composition.

[4]

The method according to [3], wherein α -amylase is contained in the edible oil-and-fat composition.

[5]

The method according to any one of [1] to [4], wherein the content of Ingredient (A) passing through a sieve with an aperture size of 0.15 mm but not passing through a sieve with an aperture size of 0.038 mm is 10 mass% or more and 98 mass% or less.

[6]

The method according to any one of [1] to [5], wherein the content of α -amylase relative to the sum content of the powder ingredient and Ingredient (A) in the dough is 1 mass ppm or more and 600 mass ppm or less.

[7]

The method according to any one of [1] to [6], wherein the content of Ingredient

(A) to the content of α -amylase in the dough is 20 or more and 15,000 or less in mass ratio.
[8]

A method for producing a bakery food, comprising a step of heat cooking bakery food dough obtained by the method according to any one of [1] to [7].

5 [9]

The method according to [8], wherein the process of heat cooking is one or more selected from baking, oil cooking and steaming.

[10]

The method according to [8] or [9], wherein the bakery food is one selected from
10 the group consisting of a white pan bread, a roll bread, a sweet bread, a steamed bread, a steamed cake, and a dressed bread.

[11]

A method for reducing gumminess when eating a bakery food obtained by heat cooking bakery food dough containing a powder ingredient and α -amylase, the method
15 comprising a step of adding Ingredient (A) which satisfies the requirements (1) to (4) below to the dough such that the content of Ingredient (A) is 0.8 mass% or more and 35 mass% or less relative to the sum content of the powder ingredient and Ingredient (A):

Ingredient (A): powdery/granular ingredient that satisfies the following requirements (1) to (4):

20

(1) has a starch content of 75 mass% or more;

(2) contains 3 mass% or more and 45 mass% or less low-molecular-weight starch obtained from starch having an amylose content of 5 mass% or more, where the peak molecular weight of said low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less;

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

25

(4) the content of Ingredient (A) passing through a sieve with an aperture size of 0.5 mm but not passing through a sieve with an aperture size of 0.038 mm is 30 mass% or more and 100 mass% or less.

[12]

The method according to [11], wherein the content of Ingredient (A) to the content
30 of α -amylase in the dough is 20 or more and 15,000 or less in mass ratio.

[0011] Any combination of these components, and any aspect using any interchangeable expression among a method, a device, etc. of the present invention are also valid as the aspects of the invention.

ADVANTAGEOUS EFFECTS OF INVENTION

[0012] According to the present invention, a bakery food with reduced gumminess, improved meltability in mouth, excellent crispness, improved softness, as well as excellent appearance and good dough handling properties can be obtained. A bakery food with such excellent texture can also be obtained after storage at room temperature or in a refrigerator and even when reheating after storage. The term "gumminess" as used herein refers to the stickiness of the food mixed with saliva in the mouth at the time of eating. Excellent crispness refers to the ability to easily bite through the food when it is bitten with the teeth.

10

DESCRIPTION OF EMBODIMENTS

[0013] Hereinafter, an embodiment of the present invention will be described by reciting specific examples of each ingredient. Each ingredient can be used alone or in combination of two or more kinds. Moreover, unless otherwise specified, bakery food dough (also simply referred to as "dough") according to the present invention refers to dough that is yet unbaked.

15

[0014] <Bakery food dough>

In this embodiment, bakery food dough contains a powder ingredient, an enzyme, and Ingredient (A) that satisfies the following requirements (1) to (4). The content of Ingredient (A) to the sum content of the powder ingredient and Ingredient (A) in the bakery food dough is 0.8 mass% or more and 35 mass% or less.

20

Ingredient (A): powdery/granular ingredient that satisfies the following requirements (1) to (4):

(1) has a starch content of 75 mass% or more;

(2) contains 3 mass% or more and 45 mass% or less low-molecular-weight starch obtained from starch having an amylose content of 5 mass% or more, where the peak molecular weight of said low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less;

25

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

(4) the content of Ingredient (A) passing through a sieve with an aperture size of 0.5 mm but not passing through a sieve with an aperture size of 0.038 mm is 30 mass% or more and 100 mass% or less.

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Hereinafter, each of the ingredients used in the bakery food dough will be described.

[0015] <Ingredient (A)>

Ingredient (A) is a powdery/granular ingredient with a starch content of 75 mass% or more. Herein, the powdery/granular ingredient contains at least one of powdery or

granular ingredients, and may contain both powdery and granular ingredients.

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

Hereinafter, Ingredient (A) will be described more specifically.

[0016] The starch content in Ingredient (A) is preferably 80 mass% or more, and more
10 preferably 85 mass% or more from the viewpoints of reducing gumminess and improving meltability in mouth, crispness, and softness.

While there is no upper limit to the starch content in Ingredient (A) and it may be 100 mass% or less, it may also be, for example, 99.5 mass% or less or 99 mass% or less, depending on the characteristics, etc. of the bakery food.

[0017] Ingredient (A) contains, as the above starch, low-molecular-weight starch made from raw starch with an amylose content of 5 mass% or more, in a specific proportion, and the low-molecular-weight starch has a specific peak molecular weight. Specifically, as the starch contained in Ingredient (A), low-molecular-weight starch made from raw starch with an amylose content of 5 mass% or more is contained in an amount 3 mass% or more and 45
20 mass% or less in Ingredient (A), and the peak molecular weight of the low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less.

[0018] The peak molecular weight of the low-molecular-weight starch should be 3×10^3 or more, and preferably 8×10^3 or more, from the viewpoints of reducing gumminess and improving meltability in mouth, crispness, and softness. From the same perspective, the peak
25 molecular weight of the low-molecular-weight starch should be 5×10^4 or less, preferably 3×10^4 or less, and more preferably 1.5×10^4 or less. The method for measuring the peak molecular weight of the degraded starch is described in the section under "EXAMPLES".

[0019] The low-molecular-weight starch is preferably one or more kinds selected from the group consisting of an acid-treated starch, an oxidized starch, and an enzyme-treated starch
30 from the viewpoint of excellent production stability, and more preferably an acid-treated starch.

[0020] While the conditions for the acid treatment are not particularly specified, it can be carried out, for example, as follows.

The aforementioned raw starch with an amylose content of 5 mass% or more and

water are fed into a reactor, to which an acid is fed afterward. Alternatively, acid water obtained in advance by dissolving an acid in water is fed into a reactor together with raw starch. From the viewpoint of performing a more stable acid treatment, it is desirable that the whole starch is homogeneously dispersed or slurried in the aqueous phase during the reaction. For this purpose, the concentration of the starch slurry used in the acid treatment should be adjusted to, for example, 10 mass% or more and 50 mass% or less, and preferably 20 mass% or more and 40 mass% or less. If the slurry concentration is too high, the slurry viscosity may increase, rendering uniform stirring of the slurry difficult.

[0021] Specifically, inorganic acids such as hydrochloric acid, sulfuric acid, and nitric acid can be used as the acid used for the aforementioned acid treatment, regardless of type, purity, etc.

[0022] In the reaction of the acid treatment, for example, the acid concentration (normality) during the acid treatment is preferably 0.05 N or more and 4 N or less, more preferably 0.1 N or more and 4 N or less, and still more preferably 0.2 N or more and 3N or less. 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 still more preferably 35°C or higher and 65°C or lower. The reaction time is preferably 0.5 hour or more and 120 hours or less, more preferably 1 hours or more and 72 hours or less, and still more preferably 1 hours or more and 48 hours or less.

[0023] The content of the low-molecular-weight starch in Ingredient (A) should be 3 mass% or more, preferably 8 mass% or more, and still more preferably 13 mass% or more relative to the total amount of Ingredient (A) from the viewpoints of reducing gumminess and improving meltability in mouth, crispness, and softness.

On the other hand, from the same perspective, the content of the low-molecular-weight starch contained in Ingredient (A) should be 45 mass% or less, preferably 35 mass% or less, and still more preferably 25 mass% or less with respect to the total amount of Ingredient (A).

[0024] The amylose content in the raw starch of the low-molecular-weight starch should be 5 mass% or more, preferably 12 mass% or more, more preferably 22 mass% or more, still more preferably 45 mass% or more, yet still more preferably 55 mass% or more, and still more preferably 65 mass% or more. There is no upper limit to the amylose content in the raw starch of the low-molecular-weight starch, and it may be 100 mass% or less, preferably 90 mass% or less, and more preferably 80 mass% or less.

[0025] As the raw starch of the low-molecular-weight starch, which has an amylose content

of 5 mass% or more, one 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 chemically, physically or enzymatically processed starches thereof can be used. From the viewpoints of reducing gumminess and improving meltability in mouth, the raw starch is preferably one or more kinds selected from high-amylose corn starch, corn starch, and tapioca starch, and more preferably high-amylose corn starch. High-amylose corn starch with an amylose content of 40 mass% or more are available. More preferably, the starch with an amylose content of 5 mass% or more is corn starch with an amylose content of 40 mass% or more.

[0026] From the viewpoints of reducing gumminess and improving meltability in mouth, crispness and softness, the degree of cold water swelling of Ingredient (A) at 25°C is 5 or more, preferably 5.5 or more, and still more preferably 6 or more.

From the same perspective, the degree of cold water swelling of Ingredient (A) at 25°C is 20 or less, preferably 17 or less, and still more preferably 15 or less.

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

(1) A sample is heated and dried at 125°C to measure the moisture content thereof using a moisture meter (model number MX-50 manufactured by Kensei Kogyo Co., Ltd.) and calculate the dry matter mass from the obtained moisture value.

(2) 1 g of this sample in terms of dry matter mass is dispersed in 50 mL of 25°C water, gently stirred in a thermostatic bath at 25°C for 30 minutes, and then centrifuged at 3,000 rpm for 10 minutes (Centrifuge: Hitachi Desktop Centrifuge Model CT6E manufactured by Hitachi Koki Co. Ltd.; Rotor: T4 SS swing rotor; Adapter: 50TC x 2S adapter), thereby separating it into a precipitate layer and a supernatant layer.

(3) The supernatant layer is removed and the mass of the precipitate layer is measured. Let the result be B (g).

(4) Let the mass of the dried and solidified precipitate layer (105°C, constant volume) be C (g).

(5) B divided by C gives the degree of cold water swelling.

[0027] The content of Ingredient (A) passing through a sieve with an aperture size of 0.5 mm but not passing through a sieve with an aperture size of 0.038 mm according to the JIS-Z8801-1 standard is 30 mass% or more. From the viewpoint of improving softness, it is preferably 50 mass% or more, more preferably 65 mass% or more, and still more preferably 70 mass% or more. The content passing through a sieve with an aperture size of 0.5 mm but

not passing through a sieve with an aperture size of 0.038 mm is 100 mass% or less. From the viewpoints of reducing gumminess and improving crispness, it is preferably 97 mass% or less, more preferably 92 mass% or less, and still more preferably 86 mass% or less.

[0028] Furthermore, from the viewpoint of improving softness, the content of Ingredient (A) passing through a sieve with an aperture size of 0.15 mm but not passing through a sieve with an aperture size of 0.038 mm according to the JIS-Z8801-1 standard is preferably 10 mass% or more, more preferably 20 mass% or more, and still more preferably 30 mass% or more. Moreover, from the viewpoint of reducing gumminess and improving crispness, the content passing through a sieve with an aperture size of 0.15 mm but not passing through a sieve with an aperture size of 0.038 mm is preferably 98 mass% or less, more preferably 92 mass% or less, still more preferably 70 mass% or less, yet still more preferably 65 mass% or less, and still more preferably 50 mass% or less.

[0029] According to this embodiment, various kinds of starch can be used as a starch ingredient other than the aforementioned low-molecular-weight starch in Ingredient (A). Specifically, one or more kinds of starch can be selected as appropriate for the application from starches generally available on the market, for example, any food starches such as corn starch, potato starch, tapioca starch, wheat starch, and chemically, physically, or enzymatically processed starches thereof. Preferably, it includes one or more kinds of starch selected from the group consisting of corn starch, wheat starch, potato starch, tapioca starch and cross-linked starches thereof, and more preferably it includes corn starch.

[0030] Ingredients other than starch can also be added to Ingredient (A) according to this embodiment.

Specific examples of ingredients other than starch include an insoluble salt such as calcium carbonate or calcium sulfate, and a coloring. It is preferable to contain an insoluble salt, which is preferably blended in an amount of 0.1 mass% or more and 2 mass% or less.

[0031] Next, a method for producing Ingredient (A) will be described. A method for producing Ingredient (A) may include, for example, the following steps.

<Low-molecular-weight starch preparation step> A step of subjecting raw starch with an amylose content of 5 mass% or more to a molecular weight reduction treatment to give low-molecular-weight starch with a peak molecular weight of 3×10^3 or more and 5×10^4 or less.

<Granulation step> A step of granulating a raw ingredient by heat-gelatinizing it, wherein the raw ingredient contains the low-molecular-weight starch in an amount of 3 mass% or more and 45 mass% or less and the sum content of the low-molecular-weight

starch and starch other than the low-molecular-weight starch is 75 mass% or more in the raw ingredient.

[0032] The low-molecular-weight starch preparation step is a step in which starch with an amylose content of 5 mass% or more is degraded to low-molecular-weight starch. As used
5 herein, "degrade" refers to degradation involving reduction of the molecular weight of the starch, where typical degradation methods include an acid treatment, an oxidation treatment, and an enzymatic treatment. Among these treatments, an acid treatment is preferred in terms of degradation speed, cost, and reproducibility of the degradation reaction.

[0033] While a method generally used for granulating starch can be employed for the
10 granulation step, it is preferable to use a method commonly used for heat-gelatinization of starch so as to achieve the prescribed degree of cold water swelling. Specifically, methods using devices such as a drum dryer, a jet cooker, an extruder, or a spray dryer are known, but in this embodiment, an extruder or a drum dryer is preferred and an extruder is more preferred to be used for heat-gelatinization, from the viewpoint of obtaining Ingredient (A)
15 whose degree of cold water swelling meets the specific requirement described above in a more reliable manner.

In a case where an extruder is used for the treatment, water is usually added to the starch-containing raw ingredient to adjust the moisture content to about 10 to 60 mass%, and then the ingredient is heat-gelatinated, for example, under the following conditions: barrel
20 temperature of 30 to 200°C, outlet temperature of 80 to 180°C, screw rotational speed of 100 to 1,000 rpm, and heat treatment time of 5 to 60 seconds.

[0034] In this embodiment, the step of heat-gelatinizing, for example, the raw ingredient specified above, can give Ingredient (A) whose degree of cold water swelling meets the specific requirement(s). In addition, the granules resulting from heat-gelatinization can be
25 crushed, and sieved for adjusting the grain size of Ingredient (A) as necessary.

[0035] Ingredient (A) obtained as described above is a powdery/granular ingredient containing low-molecular-weight starch, where the starch content, the degree of cold water swelling, and the peak molecular weight of the low-molecular-weight starch all meet the specific requirements and therefore the gumminess of the bakery food can be reduced and
30 meltability in mouth, crispness, and softness of the bakery food can be improved.

[0036] From the viewpoint of reducing the gumminess, the content of Ingredient (A) relative to the sum content of the powder ingredient and Ingredient (A) in the bakery food dough according to the present invention is 0.8 mass% or more, preferably 1 mass% or more, more preferably 1.5 mass% or more, still more preferably 2 mass% or more, yet still more

preferably 3 mass% or more, and still more preferably 3.5 mass% or more.

Moreover, from the viewpoints of reducing the gumminess and improving the softness, the content of Ingredient (A) relative to the sum content of the powder ingredient and Ingredient (A) is 35 mass% or less, preferably 30 mass% or less, more preferably 25
5 mass% or less, still more preferably 20 mass% or less, yet still more preferably 14 mass% or less, and still more preferably 10 mass% or less.

[0037] From the viewpoints of reducing the gumminess and improving the crispness, the content of Ingredient (A) relative to the whole bakery food dough according to the present invention is preferably 0.3 mass% or more, more preferably 1.4 mass% or more, still more
10 preferably 1.9 mass% or more, and yet still more preferably 2.4 mass% or more.

From the viewpoints of reducing the gumminess, improving the crispness, and further improving the softness, the content of Ingredient (A) relative to the whole bakery food dough according to the present invention is preferably 15 mass% or less, more preferably 12 mass% or less, and still more preferably 10 mass% or less.

15 [0038] <Powder ingredients>

Next, powder ingredients will be described. Powder ingredients refer to raw ingredients that are blended in powder form when preparing bakery food dough. Note that Ingredient (A) is not considered as a powder ingredient. If the enzyme described below (e.g., α -amylase) is in powder form, it is not considered as a powder ingredient.

20 Specific examples of the powder ingredient include flours 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 starches thereof obtained by performing one or more of acetylation, etherification, cross-linking, pregelatinization, oil-
25 and-fat modification, and the like alone or in combination, resistant starch, and dextrin; saccharides such as sugar, fructose, dextrose, an isomerized sugar, an inverted sugar, an oligosaccharide, trehalose, and a sugar alcohol; powdery sweeteners such as aspartame and acesulfame potassium; milk powder such as skim milk powder, whole milk powder, and cheese powder; salt; dietary fiber such as bran, cellulose, and indigestible dextrin; egg such
30 as egg white powder and whole egg powder; polysaccharide thickeners such as guar gum and alginate ester; flavoring powder such as cocoa powder and green tea powder; nut powder such as almond powder; expanders; quality improvers such as yeast food (but those without an enzyme such as α -amylase); and emulsifiers.

The bakery food dough preferably contains flour, more preferably contains one or

more kinds selected from of wheat flour and rice flour, and still more preferably contains wheat flour, as the powder ingredient.

[0039] <Edible oil-and-fat composition>

The bakery food dough can also contain an edible oil-and-fat composition as a raw
5 ingredient. Such an edible oil-and-fat composition is not particularly limited as long as it is commonly used in bakery foods, where specific examples include margarine, shortening, butter, etc., which are solid at 20°C; and rapeseed oil, soybean oil, olive oil, etc., which are liquid at 20°C. Preferably, it is one that is solid at 20°C. The content of the edible oil-and-fat composition in the bakery food dough is 0 mass% or more and 30 mass% or less,
10 preferably 0.5 mass% or more and 20 mass% or less, more preferably 1 mass% or more and 10 mass% or less, and still more preferably 1.5 mass% or more and 8 mass% or less.

[0040] The edible oil-and-fat composition according to this embodiment contains an edible oil and fat. Specific examples of edible oil and fat include vegetable oils such as soybean oil, rapeseed oil, palm oil, corn oil, olive oil, sesame oil, safflower oil, sunflower oil, cottonseed
15 oil, rice oil, peanut oil, palm kernel oil, and coconut oil; animal fats such as tallow and lard; synthetic oils and fats such as triglycerides of medium chain fatty acids; and processed oils and fats obtained by fractionation, hydrogenation, transesterification, etc. thereof.

In this embodiment, the lower limit of the content of the edible oil and fat in the edible oil-and-fat composition is preferably 50 mass% or more, more preferably 80 mass%
20 or more, and still more preferably 90 mass% or more. Furthermore, the upper limit of the content of the edible oil and fat in the edible oil-and-fat composition is, for example, 100 mass% or less.

[0041] <Enzyme>

Bakery food dough according to the present invention contains an enzyme. An
25 enzyme in this embodiment is used for the purpose of improving the texture, shelf life, etc. of a bakery food, and can be of any quality that can be used for food processing. It can be in powder or liquid form, and can be blended as an enzyme preparation or a dough conditioner ingredient, or may be blended in the edible oil-and-fat composition.

Examples of the enzyme include α -amylase, β -amylase, glucoamylase, lipase,
30 phospholipase, protease, hemicellulase, and glucose oxidase.

These enzymes can be used alone or in combination of two or more kinds.

Among these enzymes, α -amylase, lipase, or a combination thereof is preferred for use in the present invention.

[0042] < α -Amylase>

In one embodiment of the invention, the bakery food dough contains α -amylase. α -Amylase in this embodiment is used for the purpose of improving the texture, shelf life, etc. of a bakery food, and can be of any quality that can be used for food processing. It can be in powder or liquid form, and can be blended as an enzyme preparation or a dough conditioner ingredient, or blended in the edible oil-and-fat composition.

α -Amylases derived from a variety of sources, including animals, bacteria, and molds are known. While any of these can be used as long as they can be used for baking breads, mold-derived α -amylases are favorable since they are reliably effective.

α -Amylases are commercially available (e.g., Biozyme A (manufactured by Amano Enzyme Co., Ltd.), Biozyme LC (manufactured by Amano Enzyme Co., Ltd.), GRINDAMYL MAX-LIFE E5 (manufactured by Danisco Japan Ltd.), Novamyl 3 DBG, Novamyl 10000BG, and Fungamyl 2500 SG (all manufactured by Novozymes Japan Ltd.), etc.). In addition, products of α -amylase contained in edible oil-and-fat compositions are also commercially available. Such a commercial product can also be used in the present invention.

[0043] <Lipase>

In one embodiment of the invention, the bakery food dough contains lipase. Lipase in this embodiment is used for the purpose of improving the texture, shelf life, etc. of the bakery food, and can be of any quality that can be used for food processing. It can be in powder or liquid form, and can be blended as an enzyme preparation or a dough conditioner ingredient.

Lipases derived from a variety of sources, including animals, bacteria, and molds are known. While any of these can be used as long as they can be used for baking breads, mold-derived lipases are favorable since they can be reliably effective.

Lipases are commercially available (e.g., Lipopan Prime (manufactured by Novozymes Japan Ltd.)). Such a commercial product can also be used in the present invention.

[0044] The method and timing of adding the enzyme according to this embodiment is not particularly limited as long as it is added before obtaining the bakery food dough. For example, if it is in powder form, it can be added when mixing the powder ingredients, or if it is in powder or liquid form, it can be added at the same time as other water or edible oil-and-fat composition, etc. However, from the perspective of ensuring stable effect of the enzyme, the enzyme is preferably added simultaneously with the edible oil-and-fat composition, and more preferably added to the edible oil-and-fat composition in advance.

[0045] From the viewpoints of reducing the gumminess and improving the crispness, the

content of the enzyme relative to the sum content of the powder ingredients and Ingredient (A) in the whole bakery food dough according to the present invention is preferably 1 mass ppm or more, more preferably 7 mass ppm or more, still more preferably 10 mass ppm or more, and yet still more preferably 16 mass ppm or more.

5 From the viewpoints of reducing the gumminess, improving the crispness, and having favorable appearance, the content of the enzyme relative to the sum content of the powder ingredients and Ingredient (A) in the whole bakery food dough according to the present invention is preferably 600 mass ppm or less, more preferably 400 mass ppm or less, still more preferably 100 mass ppm or less, and yet still more preferably 80 mass ppm or
10 less.

Here, the amount of the enzyme to the sum content of the powder ingredients and Ingredient (A) can be determined in accordance with each manufacturer's recommendation. For example, in the case of an enzyme preparation, the amount is 0.1 mass ppm or more and 1,000 mass ppm or less.

15 [0046] From the viewpoints of reducing the gumminess and having favorable appearance, the content of Ingredient (A) relative to the content of the enzyme in the bakery food dough according to the present invention is preferably 20 or more, more preferably 100 or more, still more preferably 500 or more, and yet still more preferably 1,000 or more in mass ratio.

From the viewpoints of reducing the gumminess and improving the crispness, the
20 content of Ingredient (A) relative to the content of the enzyme in the bakery food dough according to the present invention is preferably 15,000 or less, more preferably 12,000 or less, and still more preferably 7,000 or less in mass ratio.

[0047] For example, when α -amylase is used as the enzyme, the content of α -amylase relative to the sum content of the powder ingredients and Ingredient (A) in the bakery food
25 dough according to the present invention is preferably 1 mass ppm or more, more preferably 7 mass ppm or more, still more preferably 10 mass ppm or more, and yet still more preferably 16 mass ppm or more from the viewpoints of reducing the gumminess and improving the crispness.

From the viewpoints of reducing the gumminess, improving the crispness, and
30 having favorable appearance, the content of α -amylase relative to the sum content of the powder ingredients and Ingredient (A) in the bakery food dough according to the present invention is preferably 600 mass ppm or less, more preferably 400 mass ppm or less, still more preferably 100 mass ppm or less, and yet still more preferably 60 mass ppm or less.

Here, the amount of α -amylase to the sum content of the powder ingredients and

Ingredient (A) can be determined in accordance with each manufacturer's recommendation. For example, in the case of an α -amylase formulation, the amount is 0.1 mass ppm or more and 1,000 mass ppm or less.

[0048] From the viewpoints of reducing the gumminess and having favorable appearance,
5 the content of Ingredient (A) relative to the content of α -amylase in the bakery food dough according to the present invention is preferably 20 or more, more preferably 100 or more, still more preferably 500 or more, and yet still more preferably 1,000 or more in mass ratio.

From the viewpoints of reducing the gumminess and improving the crispness, the content of Ingredient (A) relative to the content of α -amylase in the bakery food dough
10 according to the present invention is preferably 15,000 or less, more preferably 12,000 or less, and still more preferably 7,000 or less in mass ratio.

[0049] For example, when lipase is used as the enzyme, the content of lipase relative to the sum content of the powder ingredients and Ingredient (A) in the bakery food dough according to the present invention is preferably 1 mass ppm or more, more preferably 7 mass
15 ppm or more, still more preferably 10 mass ppm or more, and yet still more preferably 16 mass ppm or more from the viewpoints of reducing the gumminess and improving the crispness.

From the viewpoints of reducing the gumminess, improving the crispness, and having favorable appearance, the content of lipase relative to the sum content of the powder
20 ingredients and Ingredient (A) in the whole bakery food dough according to the present invention is preferably 600 mass ppm or less, more preferably 400 mass ppm or less, still more preferably 100 mass ppm or less, and yet still more preferably 80 mass ppm or less.

Here, the amount of lipase to the sum content of the powder ingredients and Ingredient (A) can be determined in accordance with each manufacturer's recommendation.
25 For example, in the case of a lipase formulation, the amount is 0.1 mass ppm or more and 1,000 mass ppm or less.

[0050] From the viewpoints of reducing the gumminess and having favorable appearance, the content of Ingredient (A) relative to the content of lipase in the bakery food dough according to the present invention is preferably 20 or more, more preferably 100 or more,
30 still more preferably 500 or more, and yet still more preferably 600 or more in mass ratio.

From the viewpoints of reducing the gumminess and improving the crispness, the content of Ingredient (A) relative to the content of lipase in the bakery food dough according to the present invention is preferably 15,000 or less, more preferably 12,000 or less, and still more preferably 7,000 or less in mass ratio.

[0051] From the viewpoints of reducing the gumminess and improving the crispness, U (Unit, active unit) of the enzyme per 100 parts by mass of the sum of the powder ingredients and Ingredient (A) in the bakery food dough according to the present invention is preferably 6 U or more, more preferably 7 U or more, and still more preferably 8 U or more.

5 From the viewpoints of reducing the gumminess, improving the crispness, and having favorable appearance, U of the enzyme per 100 parts by mass of the sum of the powder ingredients and Ingredient (A) in the bakery food dough according to the present invention is preferably 30 U or less, more preferably 25 U or less, still more preferably 20 U or less, and yet still more preferably 15 U or less.

10 From the viewpoints of reducing the gumminess and improving the crispness, U (Unit, active unit) of α -amylase per 100 parts by mass of the sum of the powder ingredients and Ingredient (A) in the bakery food dough according to the present invention is preferably 6 U or more, more preferably 7 U or more, and still more preferably 8 U or more.

15 From the viewpoints of reducing the gumminess, improving the crispness, and having favorable appearance, U of α -amylase per 100 parts by mass of the sum of the powder ingredients and Ingredient (A) in the bakery food dough according to the present invention is preferably 30 U or less, more preferably 25 U or less, still more preferably 20 U or less, and yet still more preferably 15 U or less.

20 Here, the values of U for the above α -amylase shall follow the official values of commercially available enzyme preparations. In order to adjust the optimal pH of α -amylase, a pH adjuster such as vinegar, fruit juice, acetic acid, phosphoric acid, lactic acid, citric acid, a salt thereof, sodium acetate, or sodium bicarbonate, may be added so long as the effect of the present invention is not impaired.

[0052] <Method for producing bakery food dough>

25 A method for producing bakery food dough according to the present invention includes a step of preparing bakery food dough containing a powder ingredient, an enzyme, and the aforementioned Ingredient (A).

In the step of preparing the bakery food dough, the timing of adding the enzyme is as described above in the section under "(Enzyme)", " α -Amylase)", or "(Lipase)".

30 The timing of adding Ingredient (A) is not particularly limited, and Ingredient (A) and all other raw ingredients may be mixed at the same time, or Ingredient (A) and the powder ingredient may be mixed together before being mixed with other raw ingredients.

The method for preparing bakery food dough may be any generally employed method, where examples thereof include a straight-dough method (straight method), a

sponge-dough method, a pate fermentee/old dough method, a sugar-added sponge-dough method, a liquid-dough method, and a no-time dough method.

Raw ingredients of the bakery food dough are usually added during the mixing process (dough kneading process) in the step of producing a bakery product. If the dough is to be kneaded more than once as in the case of the sponge-dough method (sponge-dough mixing, final mixing, etc.), Ingredient (A) and the enzyme can be blended in either or both of the mixing processes.

The prepared dough may also be frozen to be stored as frozen dough.

[0053] <Other raw ingredients>

In this embodiment, the dough may contain raw ingredients other than those mentioned above. Specific examples of such ingredients include liquid ingredients such as water, milk, soy milk, fruit juice, vegetable juice, honey, brown sugar syrup, and liquid sugar; eggs such as whole egg, egg yolk, and egg white; various flavor ingredients such as nuts, dried fruits, and chocolate chips; sesame seeds; brown rice; and millet such as proso millet and foxtail millet.

[0054] <Bakery food>

Examples of bakery foods that can be obtained by this embodiment include yeast-fermented foods such as a bread, pizza, an yeast doughnut, an yeast-containing steamed bread (including Chinese steamed bun); yeast-free foods such as a pound cake, a sponge cake, a madeleine, a financier, a chiffon cake, and a pancake; other yeast-free steamed breads such as cracked (Alpes) steamed bread; and other yeast-free steamed cakes such as a steamed cheese cake. The bakery food according to the present invention is preferably one selected from the group consisting of yeast-fermented foods and yeast-free steamed breads, more preferably one selected from yeast-fermented foods, still more preferably one selected from the group consisting of a bread, pizza, an yeast-containing steamed bread and an yeast doughnut, yet still more preferably one selected from the group consisting of a bread, pizza and an yeast-containing steamed bread, and still more preferably a bread.

Examples of the kinds of breads include white pan breads, rolls, buns, sweet breads, and dressed breads, where dressed breads are favorable.

Dressed breads, also called savory breads, are breads made with ingredients cooked separately from the normal bread-making process as fillings inside the breads, toppings on the breads, or fillings between the breads. Examples of the dressed bread include *yakisoba* bread (bread filled with Japanese stir-fried noodle), hamburger, panini bread, a pizza-style toast (i.e., sliced bread topped with ingredients such as tomato ketchup, shredded cheese,

thinly sliced salami, etc., which is baked in a toaster oven), and sandwiches with vegetables, ham, cheese, etc., where one selected from the group consisting of a pizza-style toast and sandwiches, which are often stored at a refrigerated temperature, is particularly suitable.

[0055] <Method for producing bakery food>

5 Next, a method for producing a bakery food will be described.

[0056] In this embodiment, the method for producing a bakery food includes the steps of preparing bakery food dough and heat cooking said dough.

The method for preparing bakery food dough is as described above in the section under "(Method for producing bakery food dough)".

10 [0057] The bakery food can be obtained by the step of heat cooking the bakery food dough prepared in this way. Specific examples of heat cooking include baking, steaming, oil cooking, etc. where one or two types of heat cooking selected from baking and steaming are preferred, and baking is more preferred. Specific examples of baking include baking in a frying pan or on a hot plate, baking in a deck oven, convection heating, and steam convection
15 heating, preferably one or two selected from baking on a hot plate, baking in a deck oven, and convection heating, more preferably baking on a hot plate and baking in a deck oven, and still more preferably baking in a deck oven. The temperature for heat cooking is preferably 150 to 230°C, and more preferably 160 to 220°C. The time is preferably from 3 to 60 minutes, and more preferably from 6 to 50 minutes.

20 [0058] The bakery products may be eaten immediately after heat cooking or after a storage process.

In the case where the food is to be eaten after a storage process, examples of storage include frozen storage, refrigerated storage, room temperature storage, and warm storage, preferably one or more selected from the group consisting of frozen storage, refrigerated
25 storage, and room temperature storage, and more preferably one or two selected from the group consisting of refrigerated storage and room temperature storage.

Specifically, the lower limit of the storage temperature is preferably -50°C or higher, more preferably -20°C or higher, still more preferably above 0°C, and yet still more preferably 3°C or higher.

30 The upper limit of the storage temperature is preferably 35°C or lower, more preferably 30°C or lower, still more preferably 25°C or lower, and yet still more preferably 20°C or lower.

[0059] The food product according to this embodiment may be reheated after the storage process described above before it is eaten.

Examples of the reheating method include baking, microwave heating, oil cooking, and steaming, preferably one or more selected from baking, microwave heating, and steaming, more preferably one or two selected from baking and microwave heating, and still more preferably baking.

5 Examples of the equipment used for reheating include an oven, a toaster oven, a microwave oven, a fryer, a steamer and a steam convection ovens, preferably one or more selected from an oven, a toaster oven, a microwave oven, a steamer, and a steam convection oven, more preferably one or more selected from an oven, a toaster oven, a microwave oven, and a steam convection oven, still more preferably one or more selected from an oven, a
10 toaster oven, and a microwave oven, and yet still more preferably one or more selected from a toaster oven and a microwave oven.

[0060] According to this embodiment, Ingredient (A) described above is added to bakery food dough containing powder ingredients and an enzyme, to a content of 0.8 mass% or more and 35 mass% or less relative to the sum content of the powder ingredients and
15 Ingredient (A), thereby reducing gumminess of the bakery food obtained by heat cooking the dough.

In this case, the content of Ingredient (A) relative to the content of the enzyme in the bakery food dough is preferably 20 or more, more preferably 100 or more, still more preferably 500 or more, and yet still more preferably 1,000 or more in mass ratio. At the
20 same time, the content of Ingredient (A) relative to the content of the enzyme in the bakery food dough is preferably 15,000 or less, more preferably 12,000 or less, and still more preferably 7,000 or less in mass ratio.

EXAMPLES

25 [0061] Hereinafter, examples of the present invention will be described, although the present invention should not be limited to these examples.

[0062] <Raw ingredients>

The main raw ingredients used in the following examples were as follows.

<Starch>

30 Low-molecular-weight starch: Acid-treated high-amylose corn starch produced in Production example 1 described below.

Cornstarch: Cornstarch Y, manufactured by J-OIL MILLS

Powdery/granular ingredients 1-3: Powdery/granular ingredients produced by the method described in Production example 2 described below.

< α -Amylase>

α -Amylase 1: Biozyme A (manufactured by Amano Enzyme Co., Ltd., mold-derived, powder form, 90,000 U/g)

5 α -Amylase 2: GRINDAMYL MAX-LIFE E5 (manufactured by Danisco Japan Ltd., mold-derived, powder form)

α -Amylase 3: Novamyl 10000 BG (manufactured by Novozymes Japan Ltd., bacterium-derived, powder form)

10 <Lipase>

Lipase: Lipopan Prime (manufactured by Novozymes Japan Ltd., mold-derived, powder form)

<Powder ingredients>

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

Strong flour 2: CAMELLIA manufactured by Nisshin Flour Milling Inc.

Weak flour: FLOWER manufactured by Nisshin Flour Milling Co.

<Other raw ingredients>

20 Shortening 1: Facier manufactured by J-OIL MILLS

Baker's yeast: Oriental Yeast (paste form) manufactured by Oriental Yeast Co. Ltd.

Semi-dry yeast: Saf Semi-Dry Yeast Red manufactured by Lesaffre

Skim milk powder: Yotsuba Hokkaido Skim Milk Powder manufactured by Yotsuba Milk Products Co., Ltd.

25 Dough conditioner ingredient: C Oriental Food manufactured by Oriental Yeast Co. Ltd.

Margarine: Meister GENERTA manufactured by J-OIL MILLS

[0063] <Production Example 1> Production of low-molecular-weight starch

30 Acid-treated high-amylose corn starch was produced as low-molecular-weight starch to be used as a raw ingredient for Powdery/granular ingredients 1-3.

High-amylose corn starch (manufactured by J-OIL MILLS, HS-7, amylose content of 70 mass%) was suspended in water to prepare a 35.6% (w/w) slurry, which was then heated to 50°C. To this, a hydrochloric acid solution adjusted to 4.25 N was added 1/9 times

the mass of the slurry while stirring to initiate the reaction. After 16 hours of reaction, the product was neutralized with 3% NaOH, washed, dehydrated, and dried to obtain acid-treated high-amylose corn starch.

5 The peak molecular weight of the resulting acid-treated high-amylose corn starch was measured by the method described below. The peak molecular weight was 1.2×10^4 .

[0064] <Method for measuring peak molecular weight>

A peak molecular weight was measured using an HPLC unit manufactured by Tosoh Corporation (pump DP-8020, RI detector RS-8021, degasser SD-8022).

10 (1) A sample was crushed and the fraction that passed through a JIS-Z8801-1 standard sieve with an aperture size of 0.15 mm was collected. The collected fraction was suspended in a mobile phase to 1 mg/mL and the suspension was heated at 100°C for 3 minutes to completely dissolve the fraction. A 0.45 µm filtration filter (DISMIC-25HP PTFE 0.45 µm manufactured by ADVANTEC) was used for filtration and the filtrate was used as an analysis sample.

15 (2) Molecular weight was determined under the following analytical conditions.

Columns: TSKgel α-M (7.8 mmφ, 30 cm) (manufactured by Tosoh Corporation) x 2 columns

Flow rate: 0.5 mL/min

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

Column temperature: 40°C

Analyzed amount: 0.2 mL

25 (3) Data from the detector was collected using software (Multi Station GPC-8020 model II data collecting application ver. 5.70, manufactured by Tosoh Corporation) to calculate the peak molecular weight.

Pullulans with known molecular weights (Shodex Standard P-82 manufactured by Showa Denko K.K.) were used as the calibration curves.

[0065] <Method for measuring degree of cold water swelling>

30 (1) A sample was heated and dried at 125°C to measure the moisture content thereof using a moisture meter (available from Kensei Kogyo Co., Ltd., Model number MX-50) and the mass of the dry matter was calculated from the obtained moisture value.

(2) 1 g of the sample in terms of dry matter mass was dispersed in 50 mL of 25°C water, gently stirred in a thermostatic bath at 25°C for 30 minutes, and then centrifuged at 3,000 rpm for 10 minutes (Centrifuge: Hitachi Desktop Centrifuge Model CT6E

manufactured by Hitachi Koki Co. Ltd.; Rotor: T4 SS swing rotor; Adapter: 50TC x 2S adapter), thereby separating it into a precipitate layer and a supernatant layer.

(3) The supernatant layer was removed and the mass of the precipitate layer was measured. Let the result be B (g).

5 (4) Let the mass of the dried and solidified precipitate layer (105°C, constant volume) be C (g).

(5) B divided by C gives the degree of cold water swelling.

[0066] <Production Example 2> Production of Powdery/granular ingredients 1-3

79% cornstarch, 20% acid-treated high-amylose cornstarch obtained in (Production
10 Example 1) above, and 1 mass% calcium carbonate were thoroughly mixed in a bag until they were homogeneous. The mixture was heated under pressure using a twin-shaft extruder (KEI-45 manufactured by Kowa Kogyo Inc.) The processing conditions were as follows.

Rate of supplying raw ingredients: 450 g/min

Water added: 17 mass%

15 Temperature of barrel: 50°C, 70°C and 100°C from the raw ingredient inlet toward the outlet

Temperature at outlet: 100 to 110°C

Screw rotational speed: 250 rpm

The heat-gelatinized product obtained by the extruder treatment described above
20 was dried at 110°C to adjust the moisture content to 10 mass%.

The dried heat-gelatinized product was then crushed using a desktop cutter crusher and passed through JIS-Z8801-1 standard sieves. The sieved heat-gelatinized products were mixed in the proportions shown in Table 1 to prepare Powdery/granular ingredients 1-3. The degrees of cold water swelling of Powdery/granular ingredients 1-3 at 25°C, as measured by
25 the aforementioned method, are also shown in Table 1.

[0067]

[Table 1]

Fraction (mass%)	Powdery/granular ingredient 1	Powdery/granular ingredient 2	Powdery/granular ingredient 3
Passed through 1 mm sieve but not through 0.5 mm sieve	18.0		
Passed through 0.5 mm sieve but not through 0.25 mm sieve	42.0		
Passed through 0.25 mm sieve but not through 0.15 mm sieve	15.0	36.4	
Passed through 0.15 mm sieve but not through 0.075 mm sieve	20.0	48.0	75.5
Passed through 0.075 mm sieve but not through 0.038 mm sieve	3.7	11.4	17.9
Passed through 0.038 mm sieve	1.3	4.2	6.6
Total (mass%)	100.0	100.0	100.0
Degree of cold water swelling	10.5	7.3	9.5
Passed through 0.5 mm sieve but not through 0.038 mm sieve	80.7	95.8	93.4
Passed through 0.15 mm sieve but not through 0.038 mm sieve	23.7	59.4	93.4

Notes: For example, "Passed through 1 mm sieve but not through 0.5 mm sieve" means "passing through a JIS Z8801-1 standard sieve with an aperture size of 1 mm but not through a JIS Z8801-1 standard sieve with an aperture size of 0.5 mm"

[0068] <Production Example 3> Method for producing enzyme-containing shortening

1. An enzyme solution was prepared by weighing 1.8 g of α -Amylase 1 and 0.792 g of α -Amylase 3 and dissolving them in 9.2 g of 0.9 mass% saline solution (α -Amylase 1: 5,000 U/g).

2. 1 kg of Shortening 1 was taken in a bowl and the temperature was raised to 30°C to soften it. To this, 1 g (0.1 mass%, 5,000 U) of the enzyme solution prepared in 1. above was added, and the mixture was mixed to give a homogeneous mix.

3. The resultant of 2. was left to cool to 15°C, thereby obtaining an enzyme-

containing shortening. (Concentration of α -amylase in shortening: 100 mass ppm, 5 U/g)

[0069] Methods for producing bakery foods were as follows.

[0070] <Method for producing pullman bread 1>

For Experiments 1 and 2, bakery food dough were prepared as follows in the proportions shown in Tables 2 and 3, respectively. Then, they were used to obtain bakery foods.

1. All ingredients except the shortening were placed in a mixer bowl and mixed using a bread mixer (Kanto Mixer HP-20M manufactured by Kanto Kongoki Industrial Co., Ltd.) under the following conditions.

10 Mixing conditions: Mixing and kneading using a hook, 3 minutes in 1st gear, and 4 minutes in 2nd gear.

2. After mixing as described in 1. above, the shortening was added, and the resultant was mixed under the following conditions to obtain bakery food dough.

15 Mixing conditions: Mixing and kneading using a hook, 2 minutes in 1st gear, 4 minutes in 2nd gear, and 1 minute in 3rd gear.

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

20 4. The dough was divided into 220 g portions, rolled and allowed to rest for 20 minutes before being placed in a pan and molded (ratio of the pan volume to the dough weight: 3.9).

5. The molded dough were fermented for 60 minutes in a proof at a temperature of 36°C and relative humidity of 75%.

6. After fermentation, they were baked in an oven under the following conditions and time.

25 Baking conditions: Top heat 210°C/Bottom heat 220°C

Baking time: 40 minutes

7. After baking, the baked breads were allowed to cool off at room temperature (20°C).

30 8. After evaluating the appearance, they were sliced into 1.8 cm pieces using a slicer, sealed in a plastic bag, and stored overnight in a refrigerator (4°C).

9. The next day, they were removed from the refrigerator and used for texture evaluation.

[0071] <Method for producing pullman bread 2>

For Experiment 3, bakery food dough were prepared as follows in the proportions

shown in Table 4. Then, they were used to obtain bakery foods.

1. All ingredients except the shortening were placed in a mixer bowl and mixed using a bread mixer (Kanto Mixer HP-20M manufactured by Kanto Kongoki Industrial Co., Ltd.) under the following conditions.

5 Mixing conditions: Mixing and kneading using a hook, 3 minutes in 1st gear, 2 minutes in 2nd gear, and 2 minutes in 3rd gear.

2. After mixing as described in 1. above, the shortening was added, and the resultant was mixed under the following conditions to obtain bread dough.

 Mixing conditions: Mixing using a hook, 2 minutes in 1st gear, and 4 minutes in
10 2nd gear.

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 230 g portions, rolled and allowed to rest for 20 minutes before being placed in a pan and molded (ratio of the pan volume to the dough
15 weight: 3.6).

5. The molded dough were fermented for 50-70 minutes in a proof at a temperature of 38°C and relative humidity of 85%.

6. After fermentation, they were baked in an oven under the following conditions and time.

20 Baking conditions: Top heat 210°C/Bottom heat 220°C

 Baking time: 35 minutes

7. After baking, the baked breads were allowed to cool off at room temperature (20°C).

8. The breads obtained in 7. above were sliced into 1.8 cm pieces, and the
25 appearance and the texture immediately after 7. were evaluated using the evaluation method described below. The remaining breads were wrapped in plastic bags and stored at room temperature for 1 or 2 days, and in a refrigerator (4°C) for 4 hours or 1 day to evaluate the texture.

[0072] <Method for producing pullman bread 3>

30 For Experiments 4 and 5, bakery food dough were prepared as follows in the proportions shown in Tables 5 and 6, respectively. Then, they were used to obtain bakery foods.

1. All ingredients were placed in a mixer bowl and mixed using a bread mixer (VM-2 manufactured by Oshikiri Machinery Ltd.) under the following conditions.

Mixing conditions: Mixing and kneading using a hook, 3 minutes in 2nd gear, and 7-9 minutes in 3rd gear.

2. After mixing, the dough was taken out from the mixer and fermented at 28°C for 60 or 90 minutes.

5 3. The dough was divided into 220 g portions, rolled and allowed to rest for 20 minutes before being placed in a pan and molded via a moulder (ratio of the pan volume to the dough weight: 4.0).

4. The molded dough were fermented for 40-60 minutes in a proof at a temperature of 38°C and relative humidity of 85%.

10 5. After fermentation, they were baked in an oven under the following conditions and time.

Baking conditions: Top heat 190°C/Bottom heat 200°C

Baking time: 40 minutes

15 6. After baking, the baked breads were allowed to cool off at room temperature (20°C).

7. The breads obtained in 6. above were sliced into 1.8 cm pieces, and the appearance was evaluated according to the evaluation method described below. The remaining breads were wrapped in plastic bags and stored at room temperature for 1 day and in a refrigerator (4°C) for 1 day to evaluate the texture.

20 [0073] <Evaluation methods>

The bakery food prepared in each example was evaluated for dough handling properties during dough preparation, appearance after baking, and texture according to the following evaluation criteria.

25 The dough handling properties during dough preparation, and appearance after baking were evaluated by one operator. Texture was evaluated by a consensus of three expert panelists for Experiments 1, 2, 4, and 5, where a score of 3 points or higher was considered acceptable. For Experiment 3, the product stored at room temperature (20°C) was judged to be acceptable when an average score of three expert panelists was higher than 2 points, and the product stored at 4°C was judged to be acceptable when an average score of two expert
30 panelists was higher than 2 points.

The term "cave-in", also called "caving" in technical terminology, used for the evaluation of appearance after baking refers to a phenomenon in which the side or top surface of a pullman bread shrinks.

[0074] <Dough handling properties during dough preparation>

5: Dough is not sticky and very easy to mix and divide
4: Dough is hardly sticky and easy to mix and divide
3: Dough is not very sticky and can be mixed and divided without problem
2: Dough is slightly sticky and slightly difficult to mix and divide
5 1: Dough is quite sticky and quite difficult to mix and divide
<Appearance after baking>
5: Shape is even and no cave-in is present
4: Shape is barely uneven or cave-in is barely present
3: Shape is slightly uneven or cave-in is slightly present
10 2: Shape is uneven or cave-in is present
1: Shape is quite uneven and/or serious cave-in is present
<Texture: softness>
5: Very soft
4: Quite soft
15 3: Slightly soft
2: Not very soft
1: Not soft, feels hard
<Texture: gumminess/meltability in mouth>
5: Feels no gumminess at all, and meltability in mouth is very good
20 4: Feels almost no gumminess, and meltability in mouth is quite good
3: Feels slightly gummy, but meltability in mouth is good
2: Feels significantly gummy and meltability in mouth is slightly poor
1: Feels gummy, becomes clumpy in mouth, and meltability in mouth is poor
<Texture: crispness>
25 5: Very crispy
4: Crispy
3: Slightly crispy
2: Not very crispy
1: Crispness is poor and difficult to chew through
30 [0075] <Experiment 1>
Bakery dough were prepared using the ingredients and proportions shown in Table
2 to obtain bakery foods.
The evaluation results are shown in Table 2.
[0076]

[Table 2]

Raw ingredients (parts by mass)		Comparative example 1	Example 1-1	Example 1-2	Example 1-3
Powder ingredients	Strong flour 1	100	100	100	100
	Ingredient (A)	0	5	10	20
	Powdery/granular ingredient 1				
	Caster sugar	4	4	4	4
	Salt	1.8	1.8	1.8	1.8
Other raw ingredients	Baker's yeast	2.2	2.2	2.2	2.2
	Shortening 1	4	4	4	4
	Enzyme-containing shortening	2	2	2	2
	Water	68	75	83	98
Total amount of dough ingredients (parts by mass)		182.0	194.0	207.0	232.0
(A)/[(A) + Powder ingredients] (mass%)*		0.0	4.5	8.6	15.9
α -Amylase/[(A) + Powder ingredients] (mass ppm)**		-	18.1	17.3	15.9
(A)/ α -Amylase content (mass ratio)***		0	2,500	5,000	10,000
Appearance evaluation (evaluated by 1 operator, acceptable at a score of higher than 2 points)					
Appearance		4	5	4	3
Sensory evaluation (evaluated based on consensus among 3 experts, acceptable at score of higher than 2 points)					
1 day after storage at 4°C	Softness	2	4	4	3
	Gumminess/meltability in mouth	2	4	4	3
	Crispness	2	4	4	3

Notes:

* (A)/[(A) + Powder ingredients] (mass %) refers to mass% of Ingredient (A) relative to the sum amount of powder ingredients and Ingredient (A).

** α -Amylase/[(A) + Powder ingredients] (mass ppm) refers to mass ppm relative to the sum amount of powder ingredients and Ingredient (A).

*** (A)/ α -Amylase content (mass ratio) refers to mass ratio of Ingredient (A) to the α -amylase content in the dough.

[0077] As can be appreciated from the results shown in Table 2, the pullman bread made by blending α -amylase and Ingredient (A) were all favorable, with reduced gumminess, good meltability in mouth, improved softness, and improved crispness.

5

When the content of Ingredient (A) relative to the sum content of the powder ingredients and Ingredient (A) was 4.5 mass% or more and 15.9 mass% or less, the texture,

such as non-gumminess, meltability in mouth, softness, and crispness, were improved compared with those of the control. They were even better when the content of Ingredient (A) was 4.5 mass% or more and 8.6 mass% or less.

[0078] <Experiment 2>

- 5 Bakery dough were prepared using the raw ingredients and proportions shown in Table 3 to obtain bakery foods.

 The evaluation results are shown in Table 3.

[0079]

[Table 3]

Raw ingredients (parts by mass)		Comparative example 2	Example 1-1	Example 2-1
Powder ingredients	Strong flour 1	100	100	100
	Ingredient (A)	0	5	5
	Powdery/granular ingredient 1			
	Caster sugar	4	4	4
	Salt	1.8	1.8	1.8
Other raw ingredients	Baker's yeast	2.2	2.2	2.2
	Shortening 1	4	4	2
	Enzyme-containing shortening	2	2	4
	Water	68	75	75
Total amount of dough ingredients (parts by mass)		182.0	194.0	194.0
(A)/[(A) + Powder ingredients] (mass%)*		0.0	4.5	4.5
α -Amylase/[(A) + Powder ingredients] (mass ppm)**		-	18.1	36.1
(A)/ α -Amylase content (mass ratio)***		0	2,500	1,250
Appearance evaluation (evaluated by 1 operator, acceptable at score of higher than 2 points)				
Appearance		4	5	4
Sensory evaluation (evaluated based on consensus among 3 experts, acceptable at score of higher than 2 points)				
1 day after storage at 4°C	Softness	2	4	3
	Gumminess/meltability in mouth	2	4	3
	Crispness	2	4	3

Notes:

* (A)/[(A) + Powder ingredients] (mass %) refers to mass% of Ingredient (A) relative to the sum amount of powder ingredients and Ingredient (A).

** α -Amylase/[(A) + Powder ingredients] (mass ppm) refers to mass ppm relative to the sum amount of powder ingredients and Ingredient (A).

*** (A)/ α -Amylase content (mass ratio) refers to mass ratio of Ingredient (A) to the α -amylase content in the dough.

[0080] Even when the α -amylase content in the dough was varied, breads containing a prescribed amount of Ingredient (A) had excellent texture after 1 day of storage at 4°C.

Considering the results shown in Tables 2 and 3 together, the softness,

gumminess/meltability in mouth and crispness after 1 day of storage at 4°C were favorable when the α -amylase content relative to the sum content of the powder ingredients and Ingredient (A) was 15.9 mass ppm or more and 36.1 mass ppm or less, and even better when the α -amylase content was 17.3 mass ppm or more and 18.1 mass ppm or less.

- 5 From the same perspective, the content of Ingredient (A) relative to the content of α -amylase was favorable when the mass ratio was 1,250 or more and 10,000 or less, and even better when the mass ratio was 2,500 or more and 5,000 or less.

[0081] <Experiment 3>

- Bakery dough were prepared using the raw ingredients and proportions shown in
10 Table 4 to obtain bakery foods.

The evaluation results are shown in Table 4.

[0082]

[Table 4]

Raw ingredients (parts by mass)		Comparative example 3	Example 3-1	Example 3-2	Example 3-3	Example 3-4	Example 3-5	Example 3-6
Powder ingredients	Strong flour 2	100	100	100	100	100	100	100
	Ingredient (A)							
	Powdery/granular ingredient 1						5	
	Ingredient (A)							
	Powdery/granular ingredient 2		5	1.5	3	5		
	Ingredient (A)							
	Powdery/granular ingredient 3							5
Other raw ingredients	Caster sugar	4	4	4	4	4	4	4
	Salt	1.8	1.8	1.8	1.8	1.8	1.8	1.8
	α -Amylase 2	0.04	0.04					
	Shortening 1	6	6	4	4	4	4	4
	Enzyme-containing shortening			2	2	2	2	2
	Semi-dry yeast	0.9	0.9	0.9	0.9	0.9	0.9	0.9
	Water	69	79	72	75	79	79	79
Total amount of dough ingredients (parts by mass)		181.7	196.7	186.2	190.7	196.7	196.7	196.7
$(A)/[(A) + \text{Powder ingredients}]$ (mass%)*		0.0	4.5	1.4	2.8	4.5	4.5	4.5
α -Amylase/ $[(A) + \text{Powder ingredients}]$ (mass ppm)**		-	360.9	18.6	18.4	18.1	18.1	18.1
$(A)/\alpha$ -Amylase content (mass ratio)***		0	125	750	1,500	2,500	2,500	2,500
Evaluation of appearance and dough handling properties (evaluated by 1 operator, acceptable at score of higher than 2 points)								

(Continued)	Comparative example 3	Example 3-1	Example 3-2	Example 3-3	Example 3-4	Example 3-5	Example 3-6
Dough handling properties	3	3	4	3	4	5	4
Appearance	3	3	5	4	4	4	4
Sensory evaluation (evaluated based on average of 3 experts, acceptable at score of higher than 2 points)							
Immediately after baking	Softness	3.7	4.7	3.7	4.3	4.0	4.0
	Gumminess/meltability in mouth	1.7	4.0	3.3	4.0	4.3	3.7
1 day after storage at 20°C	Softness	2.7	4.7	3.3	4.3	3.7	4.0
	Gumminess/meltability in mouth	1.7	3.7	3.3	4.0	4.0	3.7
2 days after storage at 20°C	Softness	2.3	3.7	3.0	3.7	3.0	3.3
	Gumminess/meltability in mouth	1.3	3.3	3.0	4.0	4.0	3.7
Sensory evaluation (evaluated based on average of 2 experts, acceptable at score of higher than 2 points)							
4 hours after storage at 4°C	Softness	3.0	5.0	4.0	4.0	3.5	4.0
	Gumminess/meltability in mouth	1.0	4.0	3.5	4.0	4.5	4.0
	Softness	2.5	4.5	2.5	4.0	3.0	4.5
	Gumminess/meltability in mouth	1.0	3.0	3.0	4.0	4.5	3.5
1 day after storage at 4°C	Panelists' comments on texture	Poor crispness, sticky, and a little dry	Crispness was better than Comparative example 3	Crispness was slightly favorable	Crispness was quite favorable	Crispness was the best	Crispness was favorable

Notes:

* (A)/[(A) + Powder ingredients] (mass %) refers to mass% of Ingredient (A) relative to the sum amount of powder ingredients and Ingredient (A).

** α -Amylase/[(A) + Powder ingredients] (mass ppm) refers to mass ppm relative to the sum amount of powder ingredients and Ingredient (A).

*** (A)/ α -Amylase content (mass ratio) refers to mass ratio of Ingredient (A) to the α -amylase content in the dough.

[0083] As can be appreciated from the results shown in Table 4, pullman breads made by blending α -amylase and Ingredient (A) were all favorable, with reduced gumminess, good meltability in mouth, improved softness, and improved crispness.

Even when α -amylase was directly blended in powder form with the powder ingredients, the breads were favorable when Ingredient (A) was contained (Example 3-1). Comparing the case in which α -amylase was directly blended in powder form and the case in which α -amylase was pre-mixed with the oil-and-fat composition (Example 3-4), the latter case was superior in terms of dough handling properties, appearance, and the gumminess and meltability in mouth after leaving it for 1 day at 20°C or 4°C.

The product was favorable with reduced gumminess, good meltability in mouth, and improved softness and crispness when the content of Ingredient (A) that had passed through a sieve with an aperture size of 0.5 mm but not through a sieve with an aperture size of 0.038 mm was 80.7 mass% or more and 95.8 mass% or less. From the viewpoint of softness, it was better when the content was 80.7 mass% or more and 93.4 mass% or less. In terms of gumminess, meltability in mouth, and crispness, it was better when the content was 93.4 mass% or more and 95.8 mass% or less.

The product was favorable with reduced gumminess, good meltability in mouth, and improved softness and crispness when the content of Ingredient (A) that had passed through a sieve with an aperture size of 0.5 mm but not through a sieve with an aperture size of 0.038 mm was 80.7 mass% or more and 95.8 mass% or less. From the viewpoint of softness, it was better when the content was 80.7 mass% or more and 93.4 mass% or less. In terms of gumminess, meltability in mouth, and crispness, it was better when the content was 93.4 mass% or more and 95.8 mass% or less.

Moreover, the product was favorable with reduced gumminess, good meltability in mouth, and improved softness and crispness when the content of Ingredient (A) that had passed through a sieve with an aperture size of 0.15 mm but not through a sieve with an aperture size of 0.038 mm was 23.7 mass% or more and 93.4 mass% or less. In terms of softness when stored at 20°C, it was better when the content was 59.4 mass% or more and 93.4 mass% or less. In terms of gumminess and meltability in mouth after 1 day of storage at 4°C, it was better when the content was between 23.7 mass% or more and 59.4 mass% or less.

[0084] Considering the results shown in Tables 2 to 4 together, texture such as non-gumminess, meltability in mouth, softness, and crispness after 1 day of storage at 4°C were improved when the content of Ingredient (A) relative to the sum content of the powder

ingredients and Ingredient (A) was 1.4 mass% or more and 15.9 mass% or less. In terms of softness, it was favorable when the content was 1.4 mass% or more and 15.9 mass% or less, and more favorable when the content was 2.8 mass% or more and 8.6 mass% or less. In terms of gumminess/meltability in mouth, it was favorable when the content was 1.4 mass% or more and 15.9 mass% or less, more favorable when the content was 2.8 mass% or more and 8.6 mass% or less, and still more favorable when the content was 4.5 mass% or more and 8.6 mass% or less.

As can be appreciated from the results shown in Tables 2 to 4, texture such as non-gumminess, meltability in mouth, softness, and crispness after 1 day of storage at 4°C were improved when the content of Ingredient (A) was 0.8 mass% or more and 8.6 mass% or less in the dough. In terms of softness after 1 day of storage at 4°C, it was favorable when the content was 0.8 mass% or more and 8.6 mass% or less, and more favorable when the content was 1.6 mass% or more and 4.8 mass% or less. In terms of gumminess/meltability in mouth after 1 day of storage at 4°C, it was favorable when the content was 0.8 mass% or more and 8.6 mass% or less, more favorable when the content was 1.6 mass% or more and 4.8 mass% or less, and still more favorable when the content was 2.5 mass% or more and 4.8 mass% or less.

[0085] <Experiment 4>

Bakery dough were prepared using the raw ingredients and proportions shown in Table 5 to obtain bakery foods.

The evaluation results are shown in Table 5.

[0086]

[Table 5]

Raw ingredients (parts by mass)		Control	Comparative example 4-1	Example 4-1
Powder ingredients	Strong flour 2	80	80	80
	Weak flour	20	20	15
	Ingredient (A)	0	0	5
	Powdery/granular ingredient 1			
	Caster sugar	6	6	6
	Salt	1.8	1.8	1.8
	Skim milk powder	2	2	2
	Dough conditioner ingredient	0.1	0.1	0.1
	Lipase		0.008	0.008
Other raw ingredients	Semi-dry yeast	1	1	1
	Shortening 1	6	6	6
	Water	65	65	72
Total amount of dough ingredients (parts by mass)		181.9	181.9	188.9
(A)/[(A) + Powder ingredients] (mass%)*		0.0	0.0	4.5
Lipase/[(A) + Powder ingredients] (mass ppm)**		-	72.8	72.8
(A)/Lipase content (mass ratio)***		-	0	625
Appearance evaluation (evaluated by 1 operator, acceptable at a score of higher than 2 points)				
Appearance		4	3	3
Sensory evaluation (evaluated based on the consensus among 3 experts, acceptable at a score of higher than 2 points)				
Storage at 4°C 1 day later	Softness	1	4	4
	Gumminess/meltability in mouth	2	2	4
	Crispness	3	3	3

Notes:

* (A)/[(A) + Powder ingredients] (mass %) refers to mass% of Ingredient (A) relative to the sum amount of powder ingredients and Ingredient (A).

** Lipase/[(A) + Powder ingredients] (mass ppm) refers to mass ppm relative to the sum amount of powder ingredients and Ingredient (A).

*** (A)/Lipase content (mass ratio) refers to mass ratio of Ingredient (A) to the lipase content in the dough.

[0087] <Experiment 5>

Bakery dough were prepared using the raw ingredients and proportions shown in Table 6 to obtain bakery foods.

The evaluation results are shown in Table 6.

[0088]

[Table 6]

Raw ingredients (parts by mass)		Control	Comparative example 5-1	Example 5-1
Powder ingredients	Strong flour 2	80	80	80
	Weak flour	20	20	15
	Ingredient (A) Powdery/granular ingredient 1	0	0	5
	Caster sugar	6	6	6
	Salt	1.8	1.8	1.8
	Skim milk powder	2	2	2
	Dough conditioner ingredient	0.1	0.1	0.1
	Lipase		0.008	0.008
Other raw ingredients	Semi-dry yeast	0.98	0.98	0.98
	Margarine	6	6	6
	Water	64	64	69
Total amount of dough ingredients (parts by mass)		180.9	180.9	185.9
(A)/[(A) + Powder ingredients] (mass%)*		0.0	0.0	4.5
Lipase/[(A) + Powder ingredients] (mass ppm)**		-	72.8	72.8
(A)/Lipase content (mass ratio)***		-	0	625
Appearance evaluation (evaluated by 1 operator, acceptable at score of higher than 2 points)				
Appearance		5	4	3
Sensory evaluation (evaluated based on consensus among 3 experts, acceptable at score of higher than 2 points)				
Storage at 20°C 1 day later	Softness	3	4	4
	Gumminess/meltability in mouth	2	1	4
	Crispness	3	2	4

Notes:

* (A)/[(A) + Powder ingredients] (mass %) refers to mass% of Ingredient (A) relative to the sum amount of powder ingredients and Ingredient (A).

** Lipase/[(A) + Powder ingredients] (mass ppm) refers to mass ppm relative to the sum amount of powder ingredients and Ingredient (A).

*** (A)/Lipase content (mass ratio) refers to mass ratio of Ingredient (A) to the lipase content in the dough.

[0089] As can be appreciated from the results shown in Tables 5 and 6, even when α -amylase was replaced by lipase, breads containing a prescribed amount of Ingredient (A) had an excellent texture after 1 day of storage at 4°C or 20°C.

CLAIMS

1. A method for producing bakery food dough, the method comprising a step of preparing bakery food dough containing a powder ingredient, an enzyme, and Ingredient (A) that satisfies the requirements (1) to (4) below,

wherein, in the step of preparing the bakery food dough, the content of Ingredient (A) to the sum content of the powder ingredient and Ingredient (A) in the dough is 0.8 mass% or more and 35 mass% or less:

Ingredient (A): powdery/granular ingredient that satisfies the following requirements (1) to (4):

(1) has a starch content of 75 mass% or more;

(2) contains 3 mass% or more and 45 mass% or less low-molecular-weight starch obtained from starch having an amylose content of 5 mass% or more, where the peak molecular weight of said low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less;

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

(4) the content of Ingredient (A) passing through a sieve with an aperture size of 0.5 mm but not passing through a sieve with an aperture size of 0.038 mm is 30 mass% or more and 100 mass% or less.

2. The method according to Claim 1, wherein the powder ingredient comprises flour.

3. The method according to Claim 1 or 2, wherein the dough further comprises an edible oil-and-fat composition.

4. The method according to Claim 3, wherein the enzyme is contained in the edible oil-and-fat composition.

5. The method according to any one of Claims 1 to 4, wherein the content of Ingredient (A) passing through a sieve with an aperture size of 0.15 mm but not passing through a sieve with an aperture size of 0.038 mm is 10 mass% or more and 98 mass% or less.

6. The method according to any one of Claims 1 to 5, wherein the content of the enzyme relative to the sum content of the powder ingredient and Ingredient (A) in the dough is 1 mass ppm or more and 600 mass ppm or less.

7. The method according to any one of Claims 1 to 6, wherein the content of Ingredient (A) to the content of the enzyme in the dough is 20 or more and 15,000 or less in mass ratio.

8. The method according to any one of Claims 1 to 7, wherein the enzyme is one or more selected from the group consisting of α -amylase and lipase.

9. A method for producing a bakery food, comprising a step of heat cooking bakery food dough obtained by the method according to any one of Claims 1 to 8.

10. The method according to Claim 9, wherein the process of heat cooking is one or more selected from baking, oil cooking and steaming.

11. The method according to Claim 9 or 10, wherein the bakery food is one selected from the group consisting of a white pan bread, a roll bread, a sweet bread, a steamed bread, a steamed cake, and a dressed bread.

12. A method for reducing gumminess when eating a bakery food obtained by heat cooking bakery food dough containing a powder ingredient and an enzyme, the method comprising a step of adding Ingredient (A) which satisfies the requirements (1) to (4) below to the dough such that the content of Ingredient (A) is 0.8 mass% or more and 35 mass% or less relative to the sum content of the powder ingredient and Ingredient (A):

Ingredient (A): powdery/granular ingredient that satisfies the following requirements (1) to (4):

(1) has a starch content of 75 mass% or more;

(2) contains 3 mass% or more and 45 mass% or less low-molecular-weight starch obtained from starch having an amylose content of 5 mass% or more, where the peak molecular weight of said low-molecular-weight starch is 3×10^3 or more and 5×10^4 or less;

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

(4) the content of Ingredient (A) passing through a sieve with an aperture size of 0.5 mm but not passing through a sieve with an aperture size of 0.038 mm is 30 mass% or more and 100 mass% or less.

13. The method according to Claim 12, wherein the content of Ingredient (A) to the

content of the enzyme in the dough is 20 or more and 15,000 or less in mass ratio.

14. The method according to Claim 12 or 13, wherein the enzyme is one or more selected from the group consisting of α -amylase and lipase.