Description

Title of Invention: CHOCOLATE TO BE HEATED

Technical Field

[0001]

Related Art

The present application claims the benefit of priority from JP 2024-053273, filed with the Japan Patent Office on March 28, 2024. The priority application is incorporated herein by reference in its entirety.

[0002]

The present invention relates to a chocolate to be heated.

Background Art

[0003]

Food products containing an oil and/or fat as a continuous phase, such as a chocolate, have rich flavors and a wide variety of tastes, and are therefore widely used in comfort foods. Such food products may, in some cases, be used in combination with food products other than chocolates. In particular, it is possible to impart a chocolate-like flavor to a bakery food product by enclosing or scattering such a food product in the bakery food product. (Patent Documents 1 and 2)

Citation List

Patent Document

[0004]

Patent Document 1: JP 2018-171014 A

Patent Document 2: JP 2016-082937 A

Summary of Invention

Technical Problem

[0005]

Patent Document 1 describes a granular oil and/or fat composition having heat resistant shape retention. Patent Document 2 describes a chocolate for bakery products, which has an appropriate hardness when combined with an unbaked dough and has a smooth and creamy chocolate texture after baking. In either of these cases, the food product maintains the shape after being heated and baked, or the food product has an oil and/or fat-based creamy chocolate texture. However, these documents do not suggest obtaining a novel texture.

The present inventors tried to provide a novel bakery product by using a chocolate material that exhibits a novel texture different from that of common chocolates.

Accordingly, an object of the present invention is to provide a chocolate to be heated that exhibits a novel texture after being heated, and to provide a composite food product containing the chocolate to be heated and a bakery dough.

Solution to Problem

[0006]

As a result of intensive studies, the present inventors have found that a chocolate to be heated that exhibits a novel texture after being heated can be obtained by adding a certain amount of starch hydrolysates and adjusting the content of dairy products and the oil content, and thus have completed the present invention.

[0007]

That is, the present invention provides:

(1) a chocolate to be heated that is to be heated in combination with a bakery dough, the chocolate satisfying all of requirements 1) to 3) below:

1) the chocolate has a content of starch hydrolysates of 5 mass% or more and 40 mass% or less;

2) the chocolate has a content of dairy products of 8 mass% or less; and

3) the chocolate has an oil content of 25 mass% or more and 50 mass% or less;

(2) a composite food product containing:

the chocolate to be heated described in (1); and

a bakery dough,

the chocolate and the bakery dough having been heated simultaneously;

(3) a method for producing a chocolate to be heated, the method including mixing a powder raw material with an oil and/or fat, and satisfying all of requirements 1) to 3) below:

1) an amount of starch hydrolysates blended is 5 mass% or more and 40 mass% or less;

2) the chocolate has a content of dairy products of 8 mass% or less; and

3) the chocolate has an oil content of 25 mass% or more and 50 mass% or less;

(4) a method for producing a composite food product, the method including enclosing a chocolate to be heated that is produced by the production method described in (3) in a bakery dough, and heating and baking the chocolate and the bakery dough; and

(5) a method for improving a texture of a heated chocolate, the method including heating a chocolate satisfying all of requirements (1) to (3) below simultaneously with a bakery dough:

(1) the chocolate has a content of starch hydrolysates of 5 mass% or more and 40 mass% or less;

(2) the chocolate has a content of dairy products of 8 mass% or less; and

(3) the chocolate has an oil content of 25 mass% or more and 50 mass% or less.

Advantageous Effects of Invention

[0008]

According to the present invention, it is possible to provide a chocolate to be heated that exhibits a novel texture after being heated. It is also possible to provide a composite food product containing the chocolate to be heated and a bakery dough.

In particular, when the chocolate to be heated is baked simultaneously with the bakery dough, a solid material having a gel-like layer can be scattered inside the bakery food product, and a composite food product such as a novel bakery food product can be provided.

Description of Embodiments

[0009]

The term “chocolate” as used herein refers to chocolates, and refers to general food products in which an oil and/or fat forms a continuous phase. The term “chocolates” as used herein is not limited to “pure chocolate”, “chocolate”, “quasi-chocolate”, and “chocolate-based foods” as defined by the Japan National Chocolate Industry Fair Trade Council, and refers to food products including oil and/or fat processed foods, which contain an oil and/or fat as an essential component and also contain ingredients such as cocoa mass, whole milk powder, dried fruit juice powder, dried vegetable powder, saccharides, starch hydrolysates, cocoa butter, cocoa butter alternatives, and hard butter. Accordingly, the term may also generally refer to foods in which edible substances are dispersed in an oil and/or fat-based matrix, including, for example, matcha-flavored foods and strawberry-flavored foods obtained by mixing powders derived from vegetables or fruits.

[0010]

The term “chocolate to be heated” as used herein refers to a chocolate that is consumed after being heated. In the present invention, examples of the heating include direct baking in an oven or the like, and high-frequency heating.

The chocolate to be heated according to an embodiment of the present invention is heated and baked in combination with a bakery dough. The method of combining the chocolate to be heated with the bakery dough is not particularly limited, and examples thereof include methods of enclosing the chocolate in the bakery dough, dispersing the chocolate in the bakery dough, placing the chocolate on the bakery dough, kneading the chocolate into the bakery dough, applying the chocolate to the bakery dough, injecting the chocolate into the bakery dough, and filling the chocolate in the bakery dough. In a particularly preferred aspect, the chocolate is enclosed or dispersed in the bakery dough. The bakery dough refers to a bread dough or a baked confectionery dough. They are doughs for food products that are obtained by baking a dough made from a cereal flour as a raw material in an oven or the like, and are not particularly limited. Examples of the bread dough include a danish dough, a croissant dough, a steamed bread dough, a doughnut dough, a scone dough, and a pie dough. Examples of the baked confectionery dough include a cookie dough, a biscuit dough, a cracker dough, a tart dough, a sable dough, a muffin dough, a pound cake dough, and a financier dough.

[0011]

In an aspect, the chocolate to be heated according to an embodiment of the present invention contains a starch hydrolysate. The starch hydrolysates are products obtained by hydrolyzing starches, and are classified according to the DE value (Dextrose Equivalent) that is an index of the degree of hydrolysis of the starches. A starch hydrolysate having a DE value of 20 or more is defined as starch syrup, and a starch hydrolysate having a DE value of less than 20 is defined as maltodextrin. Further, a starch hydrolysate having a DE value of 10 or less is sometimes finely classified as dextrin.

The term "starch hydrolysates" as used herein generally refers to all of the above-mentioned hydrolysates of starches, and includes dextrin, starch sweeteners, starch hydrolysates, maltodextrin, and the like.

The content of the starch hydrolysates in the chocolate to be heated is 5 mass% or more and 40 mass% or less. The lower limit of the content is preferably 6 mass%, more preferably 8 mass%, and still more preferably 9 mass%. The upper limit of the content is preferably 35 mass%, more preferably 30 mass%, and still more preferably 25 mass%. When the content of the starch hydrolysates is adjusted within an appropriate range, it is possible to prepare a chocolate to be heated that exhibits a novel texture. In particular, it is possible to scatter a solid material having a gel-like layer similar to a viscous syrup inside the bakery dough.

[0012]

In an aspect, the chocolate to be heated according to an embodiment of the present invention has a content of dairy products of 8 mass% or less. The content of the dairy products is preferably 7 mass% or less, or 6 mass% or less, more preferably 5 mass% or less, 4 mass% or less, or 3 mass% or less, and still more preferably 2 mass% or less, 1 mass% or less, less than 1 mass%, or 0 mass%. The dairy products refer to all raw materials derived from raw milk and typically used in chocolates, and examples thereof include whole milk powder, skim milk powder, whey powder, butter milk powder, and cream powder. For use in chocolates, the dairy products are preferably in the form of a powder having a water content of less than 10 mass%. When the content of the dairy products is appropriate, it is possible to prepare a chocolate to be heated that exhibits a novel texture.

[0013]

The chocolate to be heated according to an embodiment of the present invention is heated and baked simultaneously and in combination with a bakery dough containing water. The novel texture, which is obtained by heating and baking the chocolate to be heated according to an embodiment of the present invention simultaneously and in combination with the bakery dough containing water, is presumed to be obtained as follows. A part of the water in the bakery dough is transferred to the chocolate to be heated. The transferred water is bonded to the solids contained in the chocolate to be heated, and a gel-like layer similar to a viscous syrup is formed on the surface of the chocolate. The gel-like layer and a central part having a continuous phase of an oil and/or fat and remaining inside the gel-like layer are present in the solid material, and can impart a novel texture different from that of common chocolates.

The chocolate to be heated according to an embodiment of the present invention, after being heated together with the bakery dough, has a multilayer structure of the gel-like layer and the central part. The gel-like layer has a viscous texture similar to that of a viscous syrup, and the central part is present in the gel-like layer. The central part has the continuous phase of an oil and/or fat, has a smooth texture, and can provide a texture having a sense of unity with the gel-like layer.

[0014]

In the chocolate to be heated according to an embodiment of the present invention, the mass of the heated gel-like layer can be quantified by subtracting, from the total mass of the chocolate to be heated, the mass of the central part of the heated chocolate. The gel-like layer has a translucent starch syrup-like physical property, and a difference of the gel-like layer from the central part having the continuous phase of the oil and/or fat can be visually recognized. The percentage of the heated gel-like layer in the chocolate can be calculated by dividing the mass of the gel-like layer by the total mass of the chocolate to be heated.

[0015]

When the chocolate to be heated according to an embodiment of the present invention is enclosed in a bakery dough, and the chocolate and the bakery dough are heated and baked, a solid material having a layer with a viscous gel-like texture similar to that of a viscous syrup can be scattered inside the bakery food product after baking. Generally known a viscous syrup and gel-like food products, when being enclosed in a bakery dough and baked, are sometimes difficult to scatter inside the bakery dough because they permeate the dough during baking. In contrast, the chocolate to be heated according to an embodiment of the present invention partially turns into a gel-like solid material during heating and baking, and the solid material having the gel-like layer can remain without permeating the dough. The solid material having the gel-like layer has properties different from those of chocolate chips in commonly known composite food products such as chocolate chip cookies. Specifically, the solid material is not a material maintaining a shape like a chocolate chip, but has a gel-like layer similar to a viscous syrup and a central layer having a continuous phase of an oil and/or fat and present inside the gel-like layer, and therefore, unlike a chocolate chip, the solid material does not maintain the shape before baking distinctly. The solid material having the gel-like layer is scattered inside the bakery food product to locally give a strong flavor, and therefore, a composite food product having a novel texture and a novel flavor can be provided.

[0016]

In the present invention, the oil content in the chocolate to be heated is, in one aspect, 25 mass% or more and 50 mass% or less. The oil content is preferably 27 mass% or more and 45 mass% or less, and more preferably 29 mass% or more and 40 mass% or less. When the oil content is adjusted within an appropriate range, it is possible to prepare a chocolate to be heated that exhibits a novel texture.

The oil content in the chocolate to be heated means the content (mass%) of all the oils and/or fats contained in raw materials such as dairy products in addition to the directly blended oils and/or fats.

[0017]

The chocolate to be heated according to an embodiment of the present invention preferably has a water content of about 0.3 to 3 mass%. Most of the water is derived from a small amount of water in the raw materials, such as the cocoa raw material, sugar, and starch hydrolysates. The water content can be measured by a sea sand method.

[0018]

The oil and/or fat used in the chocolate to be heated according to an embodiment of the present invention is not particularly limited. Examples of the usable oil and/or fat include vegetable oils and/or fats such as soybean oil, sunflower seed oil, high-oleic sunflower oil, cottonseed oil, rapeseed oil, high-erucic-acid rapeseed oil, peanut oil, rice oil, rice bran oil, corn oil, olive oil, kapok oil, sesame oil, safflower oil, evening primrose oil, flaxseed oil, palm oil, palm kernel oil, coconut oil, shea fat, and sal fat; animal oils and/or fats such as milk fat, beef tallow, lard, and fish oil; algal oil; oils and/or fats derived from microbial fermentation; medium-chain triglycerides (MCTs); processed oils and/or fats obtained by subjecting these oils and/or fats to hydrogenation, fractionation, hydrogenation followed by fractionation, fractionation followed by hydrogenation, interesterification, or the like; and mixed oils and/or fats thereof.

[0019]

The chocolate to be heated according to an embodiment of the present invention, regardless of the viscosity and yield value, can be scattered inside the bakery food product as a solid material having a gel-like layer. The yield value is an index for evaluating fluidity, and refers to a limit value of stress at which the chocolate starts to flow when an external force is applied. In general, when the chocolate has a high yield value, the chocolate is less likely to flow and is likely to retain the shape. Conversely, when the chocolate to be heated according to an embodiment of the present invention is enclosed in a bakery dough, and the chocolate and the bakery dough are baked, the chocolate to be heated, regardless of the yield value, can be scattered as a solid material having a gel-like layer similar to a viscous syrup after being heated and baked.

In the present invention, the fluidity can be measured using a viscometer. The viscometer is not particularly limited as long as it measures the viscosity of a fluid having a non-Newtonian characteristic, and in general, a BM type, a BH type, a BL type or the like among B type viscometers can be used, and the viscosity can be measured.

The yield value can be obtained by measuring the shear stress when the shear rate is changed, and can be calculated from the obtained results. An instrument used in the measurement and calculation is not particularly limited, and for example, the yield value can be calculated from the shear stress measured using an instrument such as Rheolab-QC available

from Anton Paar GmbH, for example. For the calculation, a Casson approximation formula and the like can be adopted.

Specifically, the yield value can be determined as follows: the shear stress of a molten chocolate adjusted to 45°C is measured with the rotation speed being decreased from 50 revolutions/second to 2 revolutions/second over 180 seconds, and then the measurement results are quantified with use of the Casson approximation formula.

[0020]

A method for producing the chocolate to be heated according to an embodiment of the present invention can be performed in the same manner as in the production of a general chocolate. Specifically, the chocolate to be heated can be obtained by appropriately selecting powder raw materials such as saccharides, starch hydrolysates, and dairy products, and raw materials such as an emulsifier, a flavoring agent, and a coloring agent, and mixing the powder raw materials and the raw materials with an oil and/or fat; performing refining, that is, roll-refining; adding the remaining raw materials as appropriate; and performing conching or mixing, that is, mixing treatment. Alternatively, for example, a production method in which a mixing step and a refining step are performed simultaneously using a ball mill, a bead mill, or the like can also be used.

[0021]

The shape of the chocolate to be heated according to an embodiment of the present invention is not particularly limited, and examples thereof include, in the case of a solid, a granular shape, a plate shape, a spherical shape, a chunk shape, a chip shape, and a dice shape, and also include liquid and paste shapes. The mode of combining the bakery dough containing water with the chocolate to be heated can be appropriately selected according to the shape of the product design. For example, in the case of a solid, the chocolate to be heated may be enclosed in the bakery dough, dispersed in the bakery dough, or placed on the bakery dough, and in the case of a liquid or paste, a combination method can be employed, for example, the chocolate to be heated may be kneaded into the bakery dough, applied to the surface of the bakery dough that has been formed to some extent, injected into the bakery dough, or filled in the bakery dough.

[0022]

The method for heating the chocolate to be heated according to an embodiment of the present invention is not particularly limited, but as described above, it is preferable to heat and bake the chocolate to be heated simultaneously with the bakery dough. In particular, it is preferable to enclose the chocolate to be heated in a bakery dough and heat and bake the chocolate and the dough. The method of simultaneous baking with the bakery dough is not particularly limited, and a commonly known method such as direct baking in an oven can be appropriately used.

As for the baking in an oven, the conditions are usually in the range of 100 to 250°C for several seconds to several tens of minutes, and are more suitably 150 to 250°C for 5 minutes to 20 minutes.

[0023]

The chocolate to be heated according to an embodiment of the present invention, when heated simultaneously and in combination with a bakery dough, can provide a chocolate having a novel texture. In other words, it can be said that the chocolate to be heated provides a method for improving a texture of a heated chocolate.

[0024]

The raw materials used in the chocolate to be heated according to an embodiment of the present invention are not particularly limited except that they contain a starch hydrolysate. The composition of typical chocolates can also be applied as a reference. For example, a dairy product, a starch, an oil and/or fat, and other edible substances can be appropriately combined. Examples of any other additive include an emulsifier, an antioxidant, and a flavoring agent, but the type and amount are not limited, and addition of these may be omitted.

Examples

[0025]

Hereinafter, the present invention will be described in more detail by presenting examples of the present invention.

[0026]

● Study 1

According to the formulation in Table 1, powder raw materials such as sugar and a saccharide were mixed with a portion of a molten vegetable oil and/or fat in a mixer. After the dough obtained by mixing the raw materials was refined with a roll refiner, the remaining vegetable oil and/or fat, lecithin, an emulsifier, and a flavoring agent were added and mixed to prepare a chocolate of each example.

The obtained chocolate was tempered, molded into a dice shape of 10 mm × 10 mm × 10 mm, and aged at 20°C for 1 week.

In this study, the following raw materials were used.

Starch hydrolysate A: starch sweetener having a DE of 40, Pinedex #6 (available from Matsutani Chemical Industry Co., Ltd.)

Vegetable oil and/or fat (1): Melano NEW SS7 (available from Fuji Oil Co., Ltd.)

Vegetable oil and/or fat (2): Palmel 26 (available from Fuji Oil Co., Ltd.)

The other raw materials used were commercially available raw materials.

[0027]

● Simultaneous Baking Test with Bread

The molded chocolate was enclosed in a bread dough prepared according to the formulation of a bread roll dough shown in Table 2, and the chocolate and the bread dough were heated by simultaneous baking. In 50 g of the bread roll dough, 10 g of the dice-shaped chocolate was enclosed, and the baking was performed by setting the oven at a top heat of 210°C and a bottom heat of 190°C for 11 minutes.

[0028]

After being allowed to cool at 25°C for 3 hours, the bread roll enclosing the chocolate was cut, and the properties of the chocolate inside the bread roll were evaluated for the following items.

The evaluation was performed by five taste panelists skilled in the field of chocolate by a sensory evaluation of the chocolate simultaneously baked with the bread dough. As for the sensory evaluation scores, scores 1 to 5 were assigned by consensus of the panelists in accordance with the following evaluation criteria.

· State and texture of gel-like layer

Score 5: the gel-like layer has sufficiently good gloss and viscosity, and has a texture similar to that of a viscous syrup

Score 4: the gel-like layer has good gloss, and has a viscous texture

Score 3: the gel-like layer has gloss, and has a viscous texture

Score 2: although the gel-like layer has gloss, it has somewhat low viscosity, and is short of a texture similar to that of a viscous syrup

Score 1: although the gel-like layer has gloss, it has low viscosity, and lacks a texture similar to that of a viscous syrup

· Amount of gel-like layer

Score 5: the amount is sufficiently large

Score 4: the amount is large

Score 3: the amount is adequate

Score 2: the amount is inadequate

Score 1: the gel-like layer is hardly present

· Texture of central part of chocolate

Score 5: the central part is sufficiently soft and has a sense of unity with the gel-like layer

Score 4: the central part is slightly soft

Score 3: the central part is slightly hard but the hardness is acceptable

Score 2: the central part is hard

Score 1: the central part is very hard

In all of the above evaluation items, score 3 or higher was regarded as being within the acceptable range.

· Overall evaluation

From the results of the above evaluation items, the quality was comprehensively judged according to the following criteria.

Acceptable: score 3 or higher in all of the evaluation items

Unacceptable: score lower than 3 in at least one of the evaluation items

The component values and evaluation results are shown in Table 3.

[0029]

[Table 1]

	Comparative Example 1	Comparative Example 2	Example 1
Whole milk powder [parts by mass]	15.0	-	-
Sugar [parts by mass]	48.0	54.0	40.0
Lactose [parts by mass]	4.0	10.0	4.0
Starch hydrolysate A [parts by mass]	-	-	20.0
Vegetable oil and/or fat (1) [parts by mass]	25.5	28.5	28.5
Vegetable oil and/or fat (2) [parts by mass]	7.0	7.0	7.0
Lecithin [parts by mass]	0.3	0.3	0.3
Flavoring agent [parts by mass]	0.2	0.2	0.2

[0030]

[Table 2]

Strong flour [parts by mass]	100.0
Granulated sugar [parts by mass]	10.0
Salt [parts by mass]	1.5
Skim milk powder [parts by mass]	2.0
Yeast [parts by mass]	3.0
Yeast food [parts by mass]	0.1
Butter [parts by mass]	10.0
Water absorption [parts by mass]	63.0

[0031]

[Table 3]

	Comparative Example 1	Comparative Example 2	Example 1
Oil content [mass%]	36.4	35.5	35.5
Dairy product [mass%]	15.0	0	0
Starch hydrolysate [mass%]	0	0	20.0
State and texture of gel-like layer [score]	1	1	5
Amount of gel-like layer [score]	1	2	5
Texture of central part [score]	1	2	5
Overall evaluation	Unacceptable	Unacceptable	Acceptable

[0032]

In the example in which the starch hydrolysate was used, a gel-like layer and a central layer were formed, and a novel texture with good quality was obtained.

[0033]

● Study 2

According to the formulation shown in Table 4, each chocolate was prepared in the same manner as in Study 1 except that the type of the starch hydrolysate was changed or the starch hydrolysate was replaced with another raw material.

The obtained chocolate was tempered, molded into a dice shape of 10 mm × 10 mm × 10 mm, and aged at 20°C for 1 week.

The following raw materials were newly used in the study.

Soybean flour: Commercially available whole soybeans were used as a raw material, and the soybeans were dehulled and the hypocotyls were removed. The obtained half-cracked soybeans were heated with steam and dried, and then refined into a powder.

Starch hydrolysate B: maltodextrin having a DE of 16, TK-16 (available from Matsutani Chemical Industry Co., Ltd.)

Starch hydrolysate C: dextrin having a DE of 8, Pinedex #1 (available from Matsutani Chemical Industry Co., Ltd.)

Inulin: Fuji FF (available from Fuji Nihon Thai Inulin Co., Ltd.)

Starch: corn starch (commercially available product)

Starch hydrolysate D: dextrin having a DE of 4, Pinedex #100 (available from Matsutani Chemical Industry Co., Ltd.)

The obtained dice-shaped chocolate was subjected to a bread baking test in the same manner as in Study 1, and the quality was evaluated in the same manner. The results are listed in Table 5.

[0034]

[Table 4]

	Example 2	Example 3	Comparative Example 3	Comparative Example 4	Example 4
Soybean flour [parts by mass]	5.0	5.0	5.0	5.0	5.0
Sugar [parts by mass]	35.0	35.0	35.0	35.0	35.0
Lactose [parts by mass]	4.0	4.0	4.0	4.0	4.0
Starch hydrolysate B [parts by mass]	20.0	-	-	-	-
Starch hydrolysate C [parts by mass]	-	20.0	-	-	-
Starch hydrolysate D [parts by mass]	-	-	-	-	20.0
Inulin [parts by mass]	-	-	20.0	-	-
Starch [parts by mass]	-	-	-	20.0	-

Vegetable oil and/or fat (1) [parts by mass]	28.0	28.0	28.0	28.0	28.0
Vegetable oil and/or fat (2) [parts by mass]	7.5	7.5	7.5	7.5	7.5
Lecithin [parts by mass]	0.3	0.3	0.3	0.3	0.3
Flavoring agent [parts by mass]	0.2	0.2	0.2	0.2	0.2

[0035]

[Table 5]

	Example 2	Example 3	Comparative Example 3	Comparative Example 4	Example 4
Oil content [mass%]	36.8	36.8	36.8	36.8	36.8
Dairy product [mass%]	0	0	0	0	0
Starch hydrolysate [mass%]	20.0	20.0	0	0	20.0
State and texture of gel-like layer [score]	4	5	2	1	4
Amount of gel-like layer [score]	5	4	2	3	4
Texture of central part [score]	4	5	4	2	5
Overall evaluation	Acceptable	Acceptable	Unacceptable	Unacceptable	Acceptable

[0036]

In the case where a starch hydrolysate was used, a gel-like layer and a central layer were formed, and a novel texture was obtained. The starch and dietary fiber did not provide a chocolate having a comparable quality.

[0037]

● Study 3

According to the formulation shown in Table 6, each chocolate was prepared in the same manner as in Study 1 except that the amount of the starch hydrolysate was changed.

The obtained chocolate was tempered, molded into a dice shape of 10 mm × 10 mm × 10 mm, and aged at 20°C for 1 week.

The obtained dice-shaped chocolate was subjected to a bread baking test in the same manner as in Study 1, and the quality was evaluated in the same manner. The results are shown in Table 7.

[0038]

[Table 6]

	Comparative Example 5	Comparative Example 6	Example 5	Example 6	Example 7
Soybean flour [parts by mass]	-	-	-	-	5.0
Sugar [parts by mass]	64.0	61.0	58.0	54.0	31.7
Lactose [parts by mass]	-	-	-	-	11.0
Glucose [parts by mass]	-	-	-	-	10.0
Starch hydrolysate A [parts by mass]	-	3.0	6.0	10.0	-
Starch hydrolysate B [parts by mass]	-	-	-	-	10.0
Vegetable oil and/or fat (1) [parts by mass]	28.0	28.0	28.0	28.0	24.8
Vegetable oil and/or fat (2) [parts by mass]	7.5	7.5	7.5	7.5	7.0
Lecithin [parts by mass]	0.3	0.3	0.3	0.3	0.3
Flavoring agent [parts by mass]	0.2	0.2	0.2	0.2	0.2

[0039]

[Table 7]

	Comparative Example 5	Comparative Example 6	Example 5	Example 6	Example 7
Oil content [mass%]	35.5	35.5	35.5	35.5	33.1
Dairy product [mass%]	0	0	0	0	0
Starch hydrolysate [mass%]	0	3.0	6.0	10.0	10.0
State and texture of gel-like layer [score]	1	2	5	5	5
Amount of gel-like layer [score]	2	2	4	4	5
Texture of central part [score]	3	3	4	5	3
Overall evaluation	Unacceptable	Unacceptable	Acceptable	Acceptable	Acceptable

[0040]

It was shown that in the case where the chocolate contains a certain amount or more of a starch hydrolysate, a gel-like layer and a central layer are formed, and a novel texture is obtained. In addition, also when a plurality of saccharides were combined as in Example 7, a gel-like layer and a central layer were formed in the same manner, and a novel texture was obtained.

[0041]

● Study 4

According to the formulation shown in Table 8, each chocolate was prepared in the same manner as in Study 1. However, the chocolate of Example 8 was prepared by only mixing the raw materials according to the same formulation as in Example 3 without performing refining with a roll refiner.

Before the obtained chocolate was molded, the BM viscosity and yield value were measured.

The viscosity was measured at 45°C and 12 rpm using a digital viscometer TVB-10M available from Toki Sangyo Co., Ltd. and a No. 3 rotor or a No. 4 rotor.

The yield value was calculated with use of the Casson approximation formula from the shear stress at 45°C measured using Rheolab-QC available from AntonPaar and using a CC27 as a rotor.

After the viscosity was measured, the chocolate was tempered, molded into a dice shape of 10 mm × 10 mm × 10 mm, and aged at 20°C for 1 week.

The obtained dice-shaped chocolate was subjected to a bread baking test in the same manner as in Study 1, and the quality was evaluated in the same manner. The results are shown in Table 9.

[0042]

[Table 8]

	Example 7	Example 8	Example 9	Comparative Example 7
Soybean flour [parts by mass]	5.0	5.0	5.0	-
Whole milk powder [parts by mass]	-	-	-	20.5
Sugar [parts by mass]	31.7	35.0	35.0	37.8
Lactose [parts by mass]	11.0	4.0	4.0	8.9
Glucose [parts by mass]	10.0	-	-	8.9
Starch hydrolysate A [parts by mass]	-	20.0	20.0	-
Starch hydrolysate B [parts by mass]	10.0	-	-	-
Starch [parts by mass]	-	-	-	5.0
Cocoa butter [parts by mass]	-	-	-	27.1
Vegetable oil and/or fat (1) [parts by mass]	24.8	28.0	28.0	-
Vegetable oil and/or fat (2) [parts by mass]	7.0	7.5	7.5	-
Lecithin [parts by mass]	0.3	0.3	0.3	0.6
Flavoring agent [parts by mass]	0.2	0.2	0.2	0.1

[0043]

[Table 9]

	Example 7	Example 8	Example 9	Comparative Example 7
Oil content [mass%]	33.1	36.8	36.8	32.4
Dairy product [mass%]	0	0	0	20.5
Starch hydrolysate [mass%]	10.0	20.0	20.0	0
Yield value [Pa]	71.9	4.4	0.8	97.5
Apparent viscosity [mPa·s]	28700*1	6800*1	2600*2	27500*1
State and texture of gel-like layer [score]	5	4	5	-*3
Amount of gel-like layer [score]	5	5	5	1
Texture of central part [score]	3	4	5	2
Overall evaluation	Acceptable	Acceptable	Acceptable	Unacceptable

*1: BM viscometer, No. 4 rotor, measured value at 12 rpm and 45°C

*2:BM viscometer, No. 3 rotor, measured value at 12 rpm and 45°C

*3: evaluation was impossible because the amount was too small

[0044]

Regardless of the viscosity or yield value, the chocolates of the examples had a gel-like layer and a central layer, and exhibited a novel texture.

[0045]

● Study 5

According to the formulation shown in Table 10, chocolates having different amounts of whole milk powder as a dairy product were prepared in the same manner as in Study 1.

The obtained chocolate was tempered, molded into a dice shape of 10 mm × 10 mm × 10 mm, and aged at 20°C for 1 week.

The obtained dice-shaped chocolate was subjected to a bread baking test in the same manner as in Study 1, and the quality was evaluated in the same manner. The results are shown in Table 11.

[0046]

[Table 10]

	Example 10	Example 11	Comparative Example 8
Whole milk powder [parts by mass]	-	7.5	15.0
Sugar [parts by mass]	44.5	37.0	29.5
Starch hydrolysate A [parts by mass]	20.0	20.0	20.0
Vegetable oil and/or fat (1) [parts by mass]	28.0	28.0	28.0
Vegetable oil and/or fat (2) [parts by mass]	7.5	7.5	7.5
Lecithin [parts by mass]	0.3	0.3	0.3
Flavoring agent [parts by mass]	0.2	0.2	0.2

[0047]

[Table 11]

	Example 10	Example 11	Comparative Example 8
Oil content [mass%]	35.5	37.5	39.4
Dairy product [mass%]	0	7.5	15.0
Starch hydrolysate [mass%]	20.0	20.0	20.0
State and texture of gel-like layer [score]	4	4	2
Amount of gel-like layer [score]	4	3	1
Texture of central part [score]	5	3	1
Overall evaluation	Acceptable	Acceptable	Unacceptable

[0048]

In the chocolate containing 15 mass% of the dairy product, the gel-like layer was not sufficiently formed, and the texture was inadequate as a novel texture.

[0049]

● Study 6

Using the oil-based food products studied so far, studies were conducted to quantify the amount of the gel-like layer.

Method

The masses of the dice-shaped chocolate samples of Examples 2 to 4 and 8 and Comparative Examples 3 and 4, and Examples 1, 5, and 6 and Comparative Examples 5 and 6, which were obtained in the previous studies, were measured. Thereafter, four pieces of each chocolate sample was enclosed in 50 g of a bread dough prepared according to the formulation of a bread roll dough shown in Table 2, and the chocolate and the bread dough were heated by simultaneous baking. The baking was performed by setting the oven at a top heat of 210°C and a bottom heat of 190°C for 11 minutes.

The baked bread was allowed to cool at 25°C for 3 hours, the central part where the oil and/or fat formed a continuous phase was taken out, and the mass of the central part was measured.

The mass of the gel-like layer was calculated by subtracting, from the total mass of the chocolate sample measured in advance, the mass of the central part. The experiment was performed two times for each sample, and the average thereof was taken as the mass of the gel-like layer. In addition, the percentage of the gel-like layer was calculated from a value obtained by dividing the mass of the gel-like layer by the total mass of the chocolate sample.

The results are shown in Tables 12 and 13 together with the results described above, that is, the sensory evaluation results of the state and texture of the gel and the amount of the gel, as well as the overall evaluation.

[0050]

[Table 12]

	Example 2	Example 3	Comparative Example 3	Comparative Example 4	Example 4	Example 8
Mass of gel-like layer (amount of decreased chocolate) [g] (total mass - mass of central part)	3.3	3.7	1.4	1.9	3.0	3.5
Percentage of gel-like layer (percentage of decreased chocolate) [%] (mass of gel-like layer [g])/(total mass [g]) × 100	62	74	30	41	54	60
(Reference) State and texture of gel-like layer [score]	4	5	2	1	4	4
(Reference) Amount of gel-like layer [score]	5	4	2	3	4	5
(Reference) Overall evaluation	Acceptable	Acceptable	Unacceptable	Unacceptable	Acceptable	Acceptable

[0051]

[Table 13]

	Comparative Example 5	Comparative Example 6	Example 5	Example 6	Example 1
Mass of gel-like layer (amount of decreased chocolate) [g] (total mass - mass of central part)	3.1	Unmeasurable	3.4	3.8	4.2
Percentage of gel-like layer (percentage of decreased chocolate) [%] (mass of gel-like layer [g])/(total mass [g]) × 100	59	-	71	79	82
(Reference) State and texture of gel-like layer [score]	1	2	5	5	5

(Reference) Amount of gel-like layer [score]	2	2	4	4	5
(Reference) Overall evaluation	Unacceptable	Unacceptable	Acceptable	Acceptable	Acceptable

[0052]

As shown in Table 12, the percentage of the gel-like layer was different between an example in which a starch hydrolysate was used and a comparative example in which inulin or starch was used, and a viscous and favorable texture was obtained in the examples. As shown in Table 13, in an example in which the chocolate contained 5 mass% or more of a starch hydrolysate, the percentage of the gel-like layer was high, and a viscous and favorable texture was obtained. In Comparative Example 6, although a decrease in chocolate was observed, a viscous gel-like layer as in Example 5 was not obtained, and the mass of the gel-like layer was unmeasurable.

[0053]

From the above studies, it was shown that in a chocolate satisfying the following requirements, a gel-like layer and a central layer are formed, and a novel texture is obtained:

(1) the chocolate has a content of starch hydrolysates of 5 mass% or more and 40 mass% or less;

(2) the chocolate has a content of dairy products of 8 mass% or less; and

(3) the chocolate has an oil content of 25 mass% or more and 50 mass% or less.

Industrial Applicability

[0054]

According to the present invention, it is possible to provide a chocolate to be heated that exhibits a novel texture after being heated. It is also possible to provide a composite food product containing the chocolate to be heated and a bakery dough.

Claims

[Claim 1]

A chocolate to be heated that is to be heated in combination with a bakery dough, the chocolate satisfying all of requirements (1) to (3) below:

(1) the chocolate has a content of starch hydrolysates of 5 mass% or more and 40 mass% or less;

(2) the chocolate has a content of dairy products of 8 mass% or less; and

(3) the chocolate has an oil content of 25 mass% or more and 50 mass% or less.

[Claim 2]

A composite food product comprising:

the chocolate to be heated described in claim 1; and

a bakery dough,

the chocolate and the bakery dough having been heated simultaneously.

[Claim 3]

A method for producing a chocolate to be heated, the method comprising mixing a powder raw material with an oil and/or fat, and satisfying all of requirements (1) to (3) below:

(1) an amount of starch hydrolysates blended is 5 mass% or more and 40 mass% or less;

(2) the chocolate has a content of dairy products of 8 mass% or less; and

(3) the chocolate has an oil content of 25 mass% or more and 50 mass% or less.

[Claim 4]

A method for producing a composite food product, the method comprising enclosing a chocolate to be heated that is produced by the production method described in claim 3 in a bakery dough, and heating and baking the chocolate and the bakery dough.

[Claim 5]

A method for improving a texture of a heated chocolate, the method comprising heating a chocolate satisfying all of requirements (1) to (3) below simultaneously with a bakery dough:

(1) the chocolate has a content of starch hydrolysates of 5 mass% or more and 40 mass% or less;

(2) the chocolate has a content of dairy products of 8 mass% or less; and

(3) the chocolate has an oil content of 25 mass% or more and 50 mass% or less.