

DESCRIPTION

Title of Invention: FOOD TEXTURE IMPROVING AGENT

5 TECHNICAL FIELD

[0001] The present invention relates to a food texture improving agent, a method for producing a battered processed meat or seafood product using the same, and the like.

BACKGROUND ART

10 [0002] Traditionally, to improve the food texture of battered processed meat or seafood products that have been stored in a warming cabinet, meat or seafood is treated with seasonings or the like prior to heat cooking.

[0003] For example, Patent literature 1 describes an invention relating to a method for producing a meat processing fluid and a processed meat product. In this case, the meat
15 processing fluid is a liquid containing an oil/fat-treated starch, liquid oil, and a pregelatinized starch. Patent literature 1 describes that by allowing the meat processing fluid to penetrate into the meat by injection, tumbling, soaking, spraying, or application, the tender and juicy food texture of the meat is not lost even after storage in a warming cabinet.

[0004] Patent literature 1 also describes a method for improving the tenderness of heat
20 cooked meat, the method comprising: a contact step in which the meat processing fluid and meat are brought into contact; and a step (cooking step) in which the meat that has undergone the contact step is heat cooked.

CITATION LIST

25 Patent Literature

[0005] Patent literature 1: International Patent Application Publication WO2018/123257

SUMMARY OF INVENTION

Technical Problem

30 [0006] Under these circumstances, there is a need for a novel method for improving the food texture of battered processed meat or seafood products that have been stored in a warming cabinet. Thus, the present invention provides a food texture improving agent capable of improving the food texture of battered processed meat or seafood products, and the like.

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Solution to Problem

[0007] The present invention has, for example, the following aspects.

A powdered food texture improving agent used in a battered processed meat or seafood product, comprising 65 mass% or more of an oil/fat-treated starch and 10 mass% or more but 30 mass% or less of a pregelatinized starch.

A method for producing a battered processed meat or seafood product, comprising: step (1) in which the food texture improving agent is mixed with meat or seafood before adhering batter thereto; and step (2) in which the meat or seafood mixed with the food texture improving agent is heat cooked.

A method for improving the food texture of a battered processed meat or seafood product, comprising: step (1) in which the food texture improving agent is mixed with meat or seafood before adhering batter thereto; and step (2) in which the meat or seafood mixed with the food texture improving agent is heat cooked.

A battered processed meat or seafood product containing the food texture improving agent.

More specifically, the present invention comprises the following aspects.

[1] A powdered food texture improving agent used in a battered processed meat or seafood product, comprising:

65 mass% or more of an oil/fat-treated starch; and

10 mass% or more but 30 mass% or less of a pregelatinized starch.

[2] The food texture improving agent according to [1] above, further comprising starch sodium octenyl succinate.

[3] The food texture improving agent according to [1] or [2] above, wherein the oil/fat-treated starch is one or more starches selected from the group consisting of acetylated starches, distarch phosphates, and unmodified starches, which have been treated with oil/fat.

[4] The food texture improving agent according to any one of [1]-[3] above, which is used on at least part of the surface of the meat or seafood of the battered processed meat or seafood product.

[5] A method for producing a battered processed meat or seafood product, comprising: step (1) in which the food texture improving agent according to any one of [1]-[4] above is mixed with meat or seafood before adhering batter thereto; and step (2) in which the meat or seafood mixed with the food texture improving agent is heat cooked.

[6] The method for producing a battered processed meat or seafood product according to [5] above, further comprising a marinating step in which the meat or seafood is marinated

in a seasoning solution prior to step (1).

[7] The method for producing a battered processed meat or seafood product according to [5] or [6] above, wherein the amount of the food texture improving agent used is more than 0 mass% but 10 mass% or less relative to the total mass of the meat or seafood.

5 [8] The method for producing a battered processed meat or seafood product according to any one of [5]-[7] above, wherein step (2) comprises deep-frying the meat or seafood mixed with the food texture improving agent.

[9] A method for improving the food texture of a battered processed meat or seafood product, comprising:

10 step (1) in which the food texture improving agent according to any one of [1]-[4] above is mixed with meat or seafood before adhering batter thereto; and

step (2) in which the meat or seafood mixed with the food texture improving agent is heat cooked.

[10] The method for improving the food texture of a battered processed meat or seafood product according to [9] above, further comprising a marinating step in which the meat or seafood is marinated in a seasoning solution prior to step (1).

[11] The method for improving the food texture of a battered processed meat or seafood product according to [9] or [10] above, wherein the amount of the food texture improving agent used is more than 0 mass% but 10 mass% or less relative to the total mass of the meat or seafood.

[12] The method for improving the food texture of a battered processed meat or seafood product according to any one of [9]-[11] above, wherein step (2) comprises deep-frying the meat or seafood mixed with the food texture improving agent.

[13] A battered processed meat or seafood product containing the food texture improving agent according to any one of [1]-[4] above.

[14] The battered processed meat or seafood product according to [13] above, wherein the food texture improving agent is adhered to at least part of the meat or seafood.

ADVANTAGEOUS EFFECTS OF INVENTION

30 [0008] According to the present invention, the food texture of a battered processed meat or seafood product that has been stored in a warming cabinet can be improved.

DESCRIPTION OF EMBODIMENTS

[0009] Hereinafter, an embodiment for carrying out the present invention will be described in detail. Note that whenever a numerical range is indicated herein, the upper and

lower limit values can be combined as appropriate, and any numerical range obtained thereby is considered to be disclosed herein.

[0010] <Food texture improving agent>

A food texture improving agent of the present invention is used in battered
5 processed meat or seafood products. The food texture improving agent is in powder form. The food texture improving agent contains 65 mass% or more of an oil/fat-treated starch and 10 mass% or more but 30 mass% or less of a pregelatinized starch, relative to the total mass of the food texture improving agent.

[0011] [Oil/fat-treated starch]

10 The raw starch used for the oil/fat-treated starch is not particularly limited as long as it is generally used for foods and examples thereof include wheat starch, rice starch, sago starch, sweet potato starch, mung bean starch, pea starch, potato starch, tapioca starch, and corn starch (cornstarch), where pea starch, tapioca starch, and corn starch are preferred, and tapioca starch and corn starch are more preferred.

15 [0012] The raw starch is preferably one or more starches selected from the group consisting of acetylated starches such as starch acetate, distarch phosphates, and unmodified starches. The oil/fat-treated starch is preferably an oil/fat-treated form of any of these raw starches. The acetylation method and the phosphate cross-linking method can be selected and adopted from known methods as appropriate.

20 [0013] The content of acetyl groups in the acetylated starch is preferably 0.1 mass% or more but 2.5 mass% or less, and more preferably 0.3 mass% or more but 2.5 mass% or less. The content of acetyl groups can be determined by the following determination method according to the method described in the Japan's Specifications and Standards for Food Additives (Consumer Affairs Agency, Ministry of Health, Labour and Welfare), 9th Edition
25 (2018), Ingredient Specifications and Preservation Standards, "Acetylated Distarch Adipate", "Purity test (2), Acetyl groups 2.5% or less".

1. The moisture value of the acetylated starch is measured using a moisture meter (Electromagnetic Moisture Meter: Model No. MX50, manufactured by Kensei Kyogo Co., Ltd.) by heating and drying at 130°C, to calculate the mass on a dry basis from the value
30 determined.

2. To 5 g of acetylated starch on a dry basis, 50 mL of water and a few drops of 1.0% (w/v) phenolphthalein-ethanol solution are added and stirred until homogeneous.

3. 0.1 N sodium hydroxide aqueous solution is added until the solution turns red, and then 25 mL of 0.45 N sodium hydroxide aqueous solution is added and stirred vigorously
35 for 30 minutes at room temperature.

4. Titration is performed using 0.2 N hydrochloric acid until the red color of the solution disappears, and the amount of 0.2 N hydrochloric acid used is used as titration value A (mL).

5. As a blank, titration of 25 mL of 0.45 N sodium hydroxide aqueous solution is similarly performed using 0.2 N hydrochloric acid until the red color of the solution disappears, and the amount of 0.2 N hydrochloric acid used is used as titration value B (mL).

6. The content of acetyl groups (mass%) is calculated using the following formula.

Formula: Acetyl group content (mass %) = [(titration value B - titration value A) x normality of hydrochloric acid x 0.043 x 100]/mass of acetylated starch on a dry basis (g)

[0014] The distarch phosphate preferably has a breakdown value of less than 40 as calculated by measuring the viscosity according to the following method or has a degree of cross-linking which does not lead to breakdown.

<Method for measuring viscosity and method for calculating breakdown value>

“RVA” (Rapid Visco Analyzer) manufactured by Newport Scientific Pty. Ltd. is used for the viscosity measurement (RVU measurement). “RVA” is a device that can continuously measure viscosity at programmed temperature and stirring blade rotational speed. Viscosity is expressed in an RVA unit (which is indicated as “RVU”), which is approximately equal to the value of pascal-seconds (Pa.s), a unit of viscosity according to the SI unit system, divided by 0.012.

1. The product and water are mixed in a special aluminum container to prepare a slurry containing the product at a mass concentration of 6 mass% on a dry matter basis. A special paddle is placed in the above aluminum container, which is then set in RVA.

2. Viscosity is measured by stirring at 160 rpm while maintaining the temperature at 40°C for 1 minute and then heating from 40°C to 95°C at a rate of 6°C/min.

3. After maintaining the temperature at 95°C for 5 minutes, the temperature is cooled to 50°C at 6°C/min.

4. Viscosity A (cP), which is the highest viscosity when heated to 95°C, and viscosity B (cP), which is the lowest viscosity when maintained at 90°C, are read to measure each viscosity. The breakdown value is calculated by subtracting viscosity B from viscosity A.

[0015] Oil/fat used in the oil/fat-treated starch is not particularly limited as long as it is an edible oil/fat, and examples thereof include rapeseed oil, soybean oil, corn oil, sunflower oil, rice bran oil, olive oil, perilla oil, linseed oil, peanut oil, safflower oil such as high linoleic

safflower oil, cottonseed oil, palm oil, coconut oil, sesame oil, camellia oil, tea oil, mustard oil, kapok oil, kaya oil, walnut oil, and poppy oil. It is preferable to use an oil/fat with an iodine number of 100 or higher, and it is more preferable to use an oil/fat with an iodine number of 140 or higher. Specifically, examples of oils/fats with an iodine number of 140 or higher include high linoleic safflower oil and linseed oil, where high linoleic safflower oil is preferred.

[0016] The method of oil/fat treatment can be selected and adopted from known methods as appropriate. For example, an oil/fat-treated starch can be prepared by steps including addition of one or more selected from the group consisting of oils/fats and edible oil/fat-related substances to a raw starch, followed by mixing and heating operations.

Here, in the step of preparing the mixture, the mixture may contain a pH adjuster, protein, etc. The method of preparing the mixture is not particularly limited and the mixture can be prepared using a certain method. Examples of the pH adjuster contained in the mixture include sodium carbonate, potassium carbonate, succinic acid, phosphoric acid, citric acid, trisodium citrate, and sodium citrate, and examples of the protein include vegetable proteins derived from legumes such as soybean and pea, and proteins derived from milk such as whey protein.

[0017] Examples of the edible oil/fat-related substance include emulsifiers such as a monoglycerol fatty acid ester; a polyglycerol fatty acid ester; a polyglycerol ester of interesterified ricinoleic acid; an organic acid fatty acid ester; a sucrose fatty acid ester; a sorbitan fatty acid ester; a polysorbate; and a phospholipid, where a polyglycerol fatty acid ester is preferred.

[0018] For example, the amount of the edible oil/fat or edible oil/fat-related substance added for the preparation of an oil/fat-treated starch is such that the total amount of the edible oil/fat and edible oil/fat-related substance is 0.005 parts by mass or more relative to 100 parts by mass of the raw starch. In the present invention, the amount of the edible oil/fat or edible oil/fat-related substance for the preparation of an oil/fat-treated starch is such that the total amount of the edible oil/fat and edible oil/fat-related substance is preferably 0.005 parts by mass or more but 2 parts by mass or less, more preferably 0.008 parts by mass or more but 1.8 parts by mass or less, and still more preferably 0.1 parts by mass or more but 1.7 parts by mass or less, relative to 100 parts by mass of the raw starch.

[0019] When one or more selected from the group consisting of edible oils/fats and edible oil/fat-related substances are added to a raw starch and mixed to obtain a mixture and then heated, the heating temperature is not particularly limited, but usually the temperature of the mixture is preferably 50°C or above but 200°C or below, more preferably 50°C or above but

150°C or below, still more preferably 50°C or above but 100°C or below, and yet still more preferably 60°C or above but 80°C or below. The heating time is not particularly limited, but is usually 1 hour or more but 3 weeks or less, and more preferably 2 hours or more but 2 weeks or less. For example, a method in which the above mixture is heated up to 150°C and held for 2-3 hours for oil/fat treatment, a method in which the above mixture is heated up to 70°C and held for 2 weeks for oil/fat treatment, or other methods can be adopted.

[0020] The content of such an oil/fat-treated starch is preferably 65 mass% or more, more preferably 66 mass% or more, and still more preferably 67 mass% or more, relative to the total mass of the food texture improving agent. The upper limit of the content of the oil/fat-treated starch is preferably 70 mass% or less, and more preferably 67 mass% or less.

[0021] [Pregelatinized starch]

The raw starch used for the pregelatinized starch is not particularly limited as long as it is generally used for foods and examples thereof include wheat starch, rice starch, sago starch, sweet potato starch, mung bean starch, pea starch, potato starch, tapioca starch, and corn starch (cornstarch), where pea starch, tapioca starch, and corn starch are preferred, and tapioca starch and corn starch are more preferred.

[0022] The pregelatinization method can be selected and adopted from known methods as appropriate, and examples thereof include pregelatinization methods by drum drying and the like.

[0023] The content of such a pregelatinized starch is 10 mass% or more but 30 mass% or less, preferably 12 mass% or more but 29 mass% or less, and more preferably 14 mass% or more but 27 mass% or less, relative to the total mass of the food texture improving agent.

[0024] [Starch sodium octenyl succinate]

Preferably, the food texture improving agent further comprises starch sodium octenyl succinate.

Starch sodium octenyl succinate refers to a sodium salt of a modified starch obtained by esterification of a raw starch with octenyl succinic anhydride. More specifically, it is a modified starch that is imparted with surface activity by introducing an octenyl succinate group into the raw starch, and it has a structure in which the carboxyl group on one end of 2-(4-octenyl)succinic acid, which is formed by the ring-opening reaction of the anhydride, is ester-bonded to the hydroxyl groups (positions 2, 3, and 6) of the glucose residue of the starch, and the carboxyl group at the other end is a sodium salt.

The raw starch is not particularly limited, and examples thereof include potato starch, corn starch, tapioca starch, and hydrolysates thereof, where corn starch is preferred.

The method of preparation can be selected and adopted from known methods as

appropriate, and, for example, a suspension of a raw starch can be esterified with octenyl succinic anhydride under alkaline conditions to obtain starch sodium octenyl succinate with both hydrophilic and hydrophobic groups.

The content of such starch sodium octenyl succinate is preferably 0 mass% or more but 10 mass% or less, and more preferably 3 mass% or more but 7 mass% or less.

[0025] [Seasonings]

The food texture improving agent may further contain seasonings. Examples of seasonings include, but are not limited to, sugar, salt, vinegar, soy sauce, *miso* (Japanese fermented soybean paste), pepper, *mirin* (Japanese sweet rice wine), sauce, ketchup, oyster sauce, mayonnaise, mustard, glutamic acid and salts thereof, and inosinic acid and salts thereof. These seasonings may be used alone or in combination of two or more.

[0026] [Additives]

The food texture improving agent may further contain additives. Examples of the additives include, but are not particularly limited to, a starch other than those mentioned above, an emulsifier, a pH adjuster, an antioxidant, a preservative, a coloring agent, a flavoring agent, dietary fiber, a thickening agent, and a leavening agent. These additives may be used alone or in combination of two or more.

[0027] [Properties of food texture improving agent]

The food texture improving agent is in powder form. While the particle size of the powder form is not particularly limited as long as it is a size that can adhere to the surface of meat or seafood, the content under a sieve with an aperture size of 273 μm is preferably 100 mass% or more.

The lower limit of the particle size is such that the content on a sieve with an aperture size of 53 μm is preferably 50 mass% or more but 80 mass% or less, and more preferably 60 mass% or more but 75 mass% or less.

[0028] The amount of moisture in the food texture improving agent is preferably 20 mass% or less, more preferably 18 mass% or less, and, for example, 15 mass% or less, 14 mass% or less, 12 mass% or less, 11 mass% or less, and 10 mass% or less, relative to the total mass of the food texture improving agent.

The total content of the oil/fat-treated starch, pregelatinized starch, and starch sodium octenyl succinate as an optional ingredient, in the food texture improving agent is preferably 75 mass% or more, more preferably 80 mass% or more, and still more preferably 85 mass% or more. For example, it may be 90 mass% or more, 95 mass% or more, or 98 mass% or more, or it may be 100 mass% or more.

[0029] [Uses of food texture improving agent]

The food texture improving agent can be used in a battered processed meat or seafood product as will be described below to improve the food texture of the battered processed meat or seafood product. More specifically, it can improve the juiciness and tenderness of a battered processed meat or seafood product that has been stored in a warming cabinet.

[0030] In one embodiment, the food texture improving agent of the present invention is used on at least part of the surface of meat or seafood of the battered processed meat or seafood product. For example, the food texture improving agent of the present invention is used as a pre-dust powder for meat or seafood so that it adheres to at least an area of the surface of the battered meat or seafood. The food texture improving agent of the present invention adhering to at least part of the surface of the meat or seafood of the battered processed meat or seafood product can improve the juiciness and tenderness. According to a preferred embodiment, the effect of the present invention is significant during storage in a warming cabinet, and it can maintain excellent food texture even when the battered processed meat or seafood product is stored in a warming cabinet for a long period of time.

[0031] <Method for producing battered processed meat or seafood product>

According to one aspect of the present invention, a method for producing a processed meat or seafood product is provided. The above production method comprises: step (1) in which the aforementioned food texture improving agent is mixed with meat or seafood; and step (2) in which the meat or seafood mixed with the food texture improving agent is heat cooked. The above production method may further comprise a marinating step (salting step) in which the meat or seafood is marinated in a seasoning solution prior to step (1), step (3) in which the processed meat or seafood product obtained in step (2) is frozen, step (4) in which the frozen food product obtained in step (3) is reheated, and other steps.

[0032] [Marinating step (salting step)]

The marinating step (salting step) is a step of marinating meat or seafood in a seasoning solution (pickle brine) before step (1). The taste, flavor, juiciness, etc. of the processed meat or seafood product can be adjusted by marinating it in the seasoning solution (pickle brine). In this case, the aforementioned “marinating” includes “dipping”, “applying”, “tumbling”, and so-called “injecting”, where needles are inserted into meat or seafood to inject the pickle brine from the tips of the needles using a pickle injector or the like. The marinating step (salting step) causes at least a portion of the seasoning solution (pickle brine) to penetrate into the meat or seafood or to be mixed with the meat or seafood.

[0033] The marinating step may be performed statically or a physical impact may be applied using a tumbler or other device. The condition for performing marinating is also not

particularly limited, and it may be pressurization, depressurization, or a combination of pressurization and depressurization. The temperature may be changed as needed.

[0034] <Meat or seafood>

The meat or seafood is not particularly limited.

5 [0035] Examples of the meat include chicken, pork, beef, mutton, and horse meat.

[0036] Examples of the seafood include tuna, cod, bonito, salmon, shrimp, crab, squid, octopus, and scallops.

[0037] These meat or seafood may be used alone or in combination of two or more. The meat or seafood preferably comprises meat, more preferably comprises at least one selected
10 from the group consisting of chicken, pork, and beef, and still more preferably comprises chicken. The meat or seafood is preferably meat or seafood that has been marinated in a seasoning solution.

[0038] The form of the meat or seafood is not particularly limited, and it can be any of a fillet, mince, or paste, preferably a fillet.

15 [0039] <Seasoning solution (pickle brine)>

The composition of the seasoning solution (pickle brine) is not particularly limited and varies depending on the desired taste, flavor, juiciness, etc. In one embodiment, the pickle brine contains an edible oil/fat, seasonings, a solvent, and the like.

[0040] Examples of the edible oil/fat include, but are not limited to, vegetable oils/fats
20 such as rapeseed oil, corn oil, soybean oil, palm olein, sesame oil, peanut oil, safflower oil, sunflower oil, cottonseed oil, sesame oil, grape seed oil, macadamia nut oil, hazelnut oil, walnut oil, pumpkin seed oil, camellia oil, tea seed oil, olive oil, rice bran oil, wheat germ oil, palm oil, palm kernel oil, coconut oil, cocoa oil, perilla oil, and Japanese perilla oil; animal oils/fats such as tallow, lard, chicken oil, and dairy fat; and fish oils. These edible
25 oils/fats may be used alone or in combination of two or more.

[0041] Examples of seasonings include, but are not particularly limited to, sugar, salt, vinegar, soy sauce, *miso* (Japanese fermented soybean paste), pepper, *mirin* (Japanese sweet rice wine), sauce, ketchup, oyster sauce, mayonnaise, mustard, glutamic acid and salts thereof, and inosinic acid and salts thereof. These seasonings may be used alone or in
30 combination of two or more.

[0042] The above solvent is not particularly limited, and examples thereof include water and ethanol. Among these, water is preferred as the solvent.

[0043] The amount of pickle brine used is preferably 10 mass% or more but 300 mass% or less, more preferably 12 mass% or more but 100 mass% or less, still more preferably 15
35 mass% or more but 50 mass% or less, and particularly preferably 15 mass% or more but 30

mass% or less, relative to the total mass of the meat or seafood.

[0044] [Step (1)]

Step (1) is a step in which a powdery food texture improving agent is mixed with meat or seafood. Step (1) is performed before adhering batter to the meat or seafood. The term “mixing” means rubbing the food texture improving agent onto the surface of the meat or seafood so that the food texture improving agent adhere to at least part of the surface of the meat or seafood. Herein, the term “adhesion” refers to a state where the food texture improving agent sticks to the surface of the meat or seafood by capturing the moisture on the surface of the meat or seafood to such an extent that it does not readily come off by shaking or the like. For example, a state where at least an area of the surface of meat or seafood is coated with the food texture improving agent is referred to as “adhesion”. On the other hand, for example, a state where dry powder, which readily comes off by shaking or the like, remains on the surface of the meat or seafood after step (1) is not referred to as “adhesion” as used herein. Thus, for example, simply sprinkling the powder on meat or seafood is not included in the “mixing” in step (1).

[0045] The aforementioned mixing is not particularly limited, and examples thereof include a method in which the meat or seafood is brought into contact with the food texture improving agent and a physical impact is applied thereto. Note that herein, a “physical impact” refers to a physical treatment artificially applied for mixing. The method of applying a physical impact may be, for example, hand mixing or a method using a mixer. The mixer used in this case is not particularly limited, and any known mixer can be used. If the mixing in step (1) is performed following the marinating step, the equipment (e.g., tumbler) used for applying a physical impact in the marinating step may also be used as the mixer. The condition for mixing is not particularly limited, and it may be pressurization, depressurization, or a combination of pressurization and depressurization. The temperature may be changed as needed.

[0046] The amount of the food texture improving agent used is preferably more than 0 mass% but 10 mass% or less, more preferably 1 mass% or more but 6 mass% or less, still more preferably 2 mass% or more but 5 mass% or less, and yet still more preferably 3 mass% or more but 4 mass% or less, relative to the total mass of the meat or seafood. From the viewpoint of obtaining a food product with excellent juiciness and tenderness, it is preferable that the amount of the food texture improving agent used be 3 mass% or more. On the other hand, it is preferable that the amount of the food texture improving agent used be 4 mass% or less so that it is easy to work with when adhering the food texture improving agent to meat or seafood. When the meat or seafood is meat or seafood that has been marinated in a

seasoning solution, the mass of the seasoning solution is not contained in the “total mass of meat or seafood”.

[0047] [Step (2)]

5 Step (2) is a step in which the meat or seafood mixed with the food texture improving agent is heat cooked. Heat cooking is preferably deep-frying.

[0048] <Meat or seafood mixed with food texture improving agent>

10 The meat or seafood mixed with the food texture improving agent has the food texture improving agent adhered to at least part of its surface. When the marinating step is performed before step (1), at least a portion of the seasoning solution (pickle brine) has penetrated into the meat or seafood or mixed with the meat or seafood.

[0049] Step (2) involves adhering batter to the meat or seafood, which has the food texture improving agent adhered to at least part of its surface, and then heat cooking the meat or seafood. The batter is adhered to at least part of the surface of the meat or seafood. The effect of the food texture improving agent in improving the food texture can be further enhanced
15 by adhering batter to the meat or seafood, which has the food texture improving agent adhered to its surface, and heat cooking it.

[0050] <Heat cooking>

20 Heat cooking method is not particularly limited as long as it can form a batter, but deep-frying, steam cooking, or oven cooking is preferred, with deep-frying being more preferred. These heat cooking methods may be used alone or in combination of two or more.

[0051] While the temperature for heat cooking is not particularly limited as long as it is a temperature at which a batter can be formed, the temperature is preferably 65°C or above but 300°C or below, more preferably 100°C or above but 280°C or below, and still more preferably 160°C or above but 200°C or below.

25 [0052] [Step (3)]

Step (3) is a step in which the processed meat or seafood product obtained in step (2) is frozen. Step (3) causes the processed meat or seafood product to be made into a frozen food product.

[0053] <Freezing>

30 Freezing is not particularly limited and can be performed by a known method. Examples of the freezing method include air blast method, brine method, contact method, liquefied gas method, and combinations of these methods.

[0054] [Step (4)]

Step (4) is a step in which the frozen food product obtained in step (3) is reheated.

35 [0055] While the method of reheating is not particularly limited, the method and

equipment described in “Heat cooking” in step (2) may be used. These reheating methods may be used alone or in combination of two or more.

[0056] <Storage in warming cabinet>

5 A warming cabinet is a holding cabinet in which food is stored at a temperature above room temperature, e.g., 50°C or above but 80°C or below. Examples include showcase-type holding cabinets (hot showcases) used in convenience stores, etc.

Rules for storing battered processed meat or seafood products in a warming cabinet in convenience stores typically require that the products have a food texture suitable for eating after about four hours of storage.

10 [0057] <Method for improving food texture>

According to one aspect of the present invention, a method for improving food texture is provided. The method for improving food texture comprises: step (1) in which the
aforementioned food texture improving agent is mixed with meat or seafood; and step (2) in
which the meat or seafood mixed with the food texture improving agent is heat cooked. In
15 this case, the above method for improving food texture may further comprise a marinating
step (salting step) in which the meat or seafood is marinated in a seasoning solution prior to
step (1), step (3) in which the processed meat or seafood product obtained in step (2) is
frozen, and step (4) in which the frozen food product obtained in step (3) is reheated. These
steps can be performed by the methods described above.

20 [0058] The above method for improving food texture can improve the food texture of a
battered processed meat or seafood product during storage in a warming cabinet.

[0059] <Processed meat or seafood product>

According to one aspect of the present invention, a battered processed meat or
seafood product is provided. The battered processed meat or seafood product contains the
25 food texture improving agent described above. The battered processed meat or seafood
product has an improved food texture. Specifically, the battered processed meat or seafood
product has reduced sliminess on the surface and has excellent moist feeling. In addition,
according to a preferred embodiment, the above battered processed meat or seafood product
can benefit from the effect of improving juiciness and tenderness.

30 [0060] Note that at least a portion of the food texture improving agent adheres to the
surface of the meat or seafood. In addition, at least a portion of the food texture improving
agent may also penetrate into the muscle fibers of the meat or seafood.

[0061] Also, in one embodiment, the battered processed meat or seafood product
preferably has the food texture improving agent adhered to at least part of the surface of the
35 meat or seafood. Adhesion of the food texture improving agent to the surface of the meat or

seafood can provide a greater effect in improving the food texture. While such a battered processed meat or seafood product is not particularly limited, it is preferably deep-fried seasoned food, tempura batter-fried food, fried shrimp, pork cutlet, fried fish, fried shrimp, fried oysters, fried squid, *tatsuta-age* (deep-fried marinated food coated with potato starch),
5 fried chicken, chicken nuggets, or the like, and more preferably deep-fried seasoned food.

EXAMPLES

[0062] Hereinafter, the present invention will be described more specifically by way of examples, but the present invention is not limited to these examples.

10 [0063] Ingredients used in the examples will be described.

[Starch]

-Cornstarch: Cornstarch Y, manufactured by J-OIL MILLS

-Oil/fat-treated acetylated tapioca starch: K-1, manufactured by Nihon Shokuhin Kako Co., Ltd., the content of acetyl groups in the acetylated tapioca starch used as a raw
15 starch was less than 1 mass%.

-Pregelatinized high-amylose cornstarch JELCALL AH-F, manufactured by J-OIL MILLS

-Starch sodium octenyl succinate: N-Creamer 46 manufactured by Nippon NSC Ltd.

20 [Seasonings, etc.]

-Sodium glutamate: Ajinomoto, manufactured by Ajinomoto Co., Inc.

-White pepper: White pepper, manufactured by House Gaban Corporation.

-Soy sauce: Koikuchi soy sauce, manufactured by Kikkoman Corporation

-Leavening agent: F-up, Omiya Ryoshoku Kogyo Co., Ltd

25 -Thickening agent: Xanthan gum FJ, Maruzen Chemicals Co., Ltd.

-Emulsy KM500: RIKEN VITAMIN Co., Ltd.

-Wheat flour (FLOWER): Nisshin FLOWER, manufactured by Nisshin Seifun Welna Inc.

-Soy protein: New Fujipro SEH, manufactured by Fuji Oil Co., Ltd.

30 -Corn grits: manufactured by Tomizawa Shouten Co., Ltd.

-Softcoat AY: manufactured by J-OIL MILLS

-Black pepper: Black pepper, manufactured by House Gaban Corporation.

-Paprika powder: Paprika, manufactured by House Gaban Corporation.

-Red pepper: Red pepper, manufactured by House Gaban Corporation.

35 -Garlic powder: Garlic powder, manufactured by House Gaban Corporation.

[0064] [Example of preparing oil/fat-treated starch 1]

To 50 parts by mass of an unmodified corn starch (Cornstarch Y, manufactured by J-OIL MILLS) and 50 parts by mass of an unmodified tapioca starch (manufactured by Siam Starch (1966) Co, Ltd.), 0.1 parts by mass of high linoleic safflower oil (iodine number 150) and 1 part by mass of defatted soy flour (Nikka Milky S, manufactured by J-OIL MILLS) were added and homogeneously mixed in a mixer (SUPERMIXER, manufactured by Kawata MFG, Co., Ltd.) at 2,000 rpm for 3 minutes to obtain a mixture (moisture content 12.5 mass%). The mixture was heated in a tray dryer at 70°C for 14 days to obtain oil/fat-treated starch 1.

10 [0065] [Example of preparing oil/fat-treated starch 2]

99.85 parts by weight of tapioca starch acetate (“ACTBODY N-5”, manufactured by J-OIL MILLS, the content of acetyl groups is 0.30 mass% or more but 0.43 mass% or less), 0.1 parts by mass of high linoleic safflower oil, and 0.05 parts by mass of polyglycerol fatty acid ester (“RIKEMAL JV-2681”, manufactured by RIKEN VITAMIN Co., Ltd.) were homogeneously mixed in a mixer (SUPERMIXER, manufactured by Kawata MFG, Co., Ltd.) at 2,000 rpm for 3 minutes and then heated in a tray dryer at 70°C for 11 days to obtain oil/fat-treated starch 2.

[0066] [Example of preparing oil/fat-treated starch 3]

To 100 parts by mass of distarch phosphate from tapioca starch (ACTBODY TP-1, breakdown value: 31, manufactured by J-OIL MILLS), 0.1 parts by mass of high linoleic safflower oil, 0.05 parts by mass of diglycerol monooleate, and 0.4 parts by mass of 25% sodium carbonate aqueous solution (0.1 parts by mass in terms of sodium carbonate), made by adding 30 parts by mass of water to 10 parts by mass of sodium carbonate and completely dissolving the sodium carbonate, were added and homogeneously mixed in a mixer (SUPERMIXER, manufactured by Kawata MFG, Co., Ltd.) at 3,000 rpm for 3 minutes to obtain a mixture (moisture content 14.8%). The mixture was heated in a tray dryer at 70°C for 10 days to obtain oil/fat-treated starch 3.

[0067] [Example 1]

<Tumbling process>

30 Chicken breast (23-30 g), cut after removing the skin, was prepared as meat. Pickle brine having the composition shown in Table 1 below was also prepared.

[0068] [Table 1]

Table 1

Ingredients	Content (Mass%)
Caster sugar	4.0
Salt	2.0
Sodium glutamate	1.5
White pepper	0.2
Soy sauce	10.0
Ice water	82.3
Total	100

[0069] The pickle brine was added to the chicken breast at 30 mass% relative to the mass of the chicken breast, and the chicken breast was tumbled with the pickle brine by mixing them at 4°C for 60 minutes using a tumbler (manufactured by VAKONA, model type: ESK-60) in a forward/reverse rotation operation.

[0070] <Mixing step>

Cornstarch or a food texture improving agent with the composition shown in Table 2 below was added to the tumbled chicken breast at 4 mass% relative to the mass of the chicken breast, and the food texture improving agent, the cornstarch or the oil/fat-treated starch was mixed into the chicken breast by hand.

[0071] [Table 2]

Table 2-1

(Mass%)	Example 1-1	Example 1-2	Example 1-3	Example 1-4	Example 1-5
Ingredients					
Cornstarch					
Oil/fat-modified acetylated tapioca starch	70	67			
Oil/fat-treated starch 1				70	
Oil/fat-treated starch 2			88		
Oil/fat-treated starch 3					70
Pregelatinized high-amylose cornstarch	30	27.7	12	30	30
Starch sodium octenyl succinate		5.3			
Total	100	100	100	100	100

Table 2-2

(Mass%)	Comparative example 1-1	Comparative example 1-2	Comparative example 1-3	Comparative example 1-4	Comparative example 1-5
Ingredients					
Cornstarch	100				
Oil/fat-modified acetylated tapioca starch		100			
Oil/fat-treated starch 1			100		
Oil/fat-treated starch 2					
Oil/fat-treated starch 3				100	
Pregelatinized high- amylose cornstarch					100
Starch sodium octenyl succinate					
Total	100	100	100	100	100

[0072] <Battering step>

The chicken breast mixed with the food texture improving agent was coated with batter at 20 mass% relative to the mass of the chicken breast, and then coated with breading at 20 mass% relative to the mass of the chicken breast. The batter and breading were formulated as shown in Table 3 below.

[0073] [Table 3]

Table 3

Composition of batter	
Ingredients	Content (Mass%)
Wheat flour	34.0
Cornstarch	4.0
Salt	0.2
Leavening agent	0.4
Thickening agent	0.1
Emulsy KM500	0.1
Water	61.0
Total	100
Composition of breadding	
Ingredients	Content (Mass%)
Wheat flour (FLOWER)	84.1
Soy protein	3.0
Corn grits	2.5
Softcoat AY	2.5
Sodium glutamate	1.5
Black pepper	0.5
Paprika powder	1.0
Red pepper	1.0
Garlic powder	2.0
Salt	2.0
Leavening agent (F-up)	0.3
Total	100

[0074] <Heat cooking step>

5 Chicken breast coated with batter was deep-fried in rapeseed oil (Sarasara Canola Oil, manufactured by J-OIL MILLS) heated to 170°C for 2 minutes, 6 pieces per batch.

[0075] Next, the heat cooked chicken breast was left to stand at room temperature for 2 minutes, then deep-fried again in rapeseed oil heated to 170°C for 1 minute to obtain deep-fried seasoned chicken breast.

[0076] <Freezing Process>

10 The deep-fried seasoned chicken breast was frozen at -50°C to obtain frozen deep-fried seasoned chicken breast.

[0077] <Deep-frying step (reheating step)>

One day after freezing, the frozen deep-fried seasoned chicken breast was deep-fried in rapeseed oil heated to 170°C for 4.5 minutes to obtain deep-fried seasoned chicken breast.

5 [0078] <Storage in warming cabinet>

The deep-fried seasoned chicken breast was stored in a warming cabinet set at 65°C for 6 hours.

[0079] <Evaluation method>

10 For evaluation, three expert panelists ate the deep-fried seasoned chicken breasts immediately after the deep-frying step, and the deep-fried seasoned chicken breast stored in the warming cabinet for 4 and 6 hours, and after discussion, decided on a score according to the evaluation criteria. For both juiciness and tenderness, scores of “3” or higher were considered acceptable. The evaluation results obtained are shown in Table 4.

[0080] <Evaluation criteria>

15 Juiciness

6: Juicy, retaining a lot of meat juices

5: Juicy, retaining meat juices

4: Not much meat juice was left but juiciness remained strong

3: Juiciness remained slightly

20 2: Slightly dry

1: Dryness is noticeable

Tenderness

6: Very tender

25 5: Tender

4: A little tender

3: Slight tenderness is felt

2: Slightly tough

1: Tough

30

[0081] [Table 4]

Table 4-1

	Example 1-1	Example 1-2	Example 1-3	Example 1-4	Example 1-5
Results of juiciness evaluation					
Immediately after deep-frying	6	6	6	6	6
After 4 hours of storage in warming cabinet	4	5	3	3	3
After 6 hours of storage in warming cabinet	3	4	3	-	-
Results of tenderness evaluation					
Immediately after deep-frying	6	6	6	6	6
After 4 hours of storage in warming cabinet	4	5	3	4	3
After 6 hours of storage in warming cabinet	3	4	3	-	-

Table 4-2

	Comparative example 1-1	Comparative example 1-2	Comparative example 1-3	Comparative example 1-4	Comparative example 1-5
Results of juiciness evaluation					
Immediately after deep-frying	5	6	6	6	6
After 4 hours of storage in warming cabinet	1	2	1	1	2
After 6 hours of storage in warming cabinet	1	2	-	-	2
Results of tenderness evaluation					
Immediately after deep-frying	4	6	6	6	6
After 4 hours of storage in warming cabinet	1	3	2	2	3
After 6 hours of storage in warming cabinet	1	2	-	-	2

[0082] As shown in Table 4, all of the deep-fried seasoned chicken breasts of the examples in which the surfaces of the chicken breasts were coated with the oil/fat-treated starch and the pregelatinized starch had an excellent food texture in terms of juiciness and tenderness after 4 or 6 hours of storage in the warming cabinet (see Examples 1-1 to 1-5). On the other hand, the deep-fried seasoned chicken breasts of the comparative examples had an excellent food texture immediately after deep-frying, but lost their juiciness after 4 hours of storage in the warming cabinet and also lost their tenderness after 6 hours of storage in

the warming cabinet (see Comparative examples 1-1 to 1-5).

The results indicate that the use of the food texture improving agent of the present invention can improve the food texture of the deep-fried seasoned fried chicken breasts that have been stored in the warming cabinet.

5 [0083] Moreover, the deep-fried seasoned chicken breast of Example 1-2, which had an excellent food texture after storage in the warming cabinet, was further stored in the warming cabinet for up to 8 hours for sensory evaluation, and the results were “3” for juiciness and “3” for tenderness.

10 The results indicate that the use of the food texture improving agent containing starch sodium octenyl succinate in addition to the oil/fat-treated starch and the pregelatinized starch can further improve the food texture after storage in the warming cabinet.

[0084] The food texture improving agent, the method for producing a battered processed meat or seafood product, the method for improving the food texture, and the battered processed meat or seafood product of the present invention are not limited to the embodiment
15 and examples described above, and may be modified in various ways within the scope that does not impair the features and effects of the present invention.

CLAIMS

[Claim 1] A powdered food texture improving agent used in a battered processed meat or seafood product, comprising:

- 5 65 mass% or more of an oil/fat-treated starch; and
 10 mass% or more but 30 mass% or less of a pregelatinized starch.

[Claim 2] The food texture improving agent according to claim 1, further comprising starch sodium octenyl succinate.

10

[Claim 3] The food texture improving agent according to claim 1 or 2, wherein the oil/fat-treated starch is one or more starches selected from the group consisting of acetylated starches, distarch phosphates, and unmodified starches, which have been treated with oil/fat.

15 [Claim 4] The food texture improving agent according to claim 1, which is used on at least part of the surface of the meat or seafood of the battered processed meat or seafood product.

[Claim 5] A method for producing a battered processed meat or seafood product, comprising:

- 20 step (1) in which the food texture improving agent according to any one of claims 1 to 4 is mixed with meat or seafood before adhering batter thereto; and
 step (2) in which the meat or seafood mixed with the food texture improving agent is heat cooked.

25

[Claim 6] The method for producing a battered processed meat or seafood product according to claim 5, further comprising a marinating step in which the meat or seafood is marinated in a seasoning solution prior to step (1).

30 [Claim 7] The method for producing a battered processed meat or seafood product according to claim 5, wherein the amount of the food texture improving agent used is more than 0 mass% but 10 mass% or less relative to the total mass of the meat or seafood.

[Claim 8] The method for producing a battered processed meat or seafood product according to claim 5, wherein step (2) comprises deep-frying the meat or seafood mixed with

35

the food texture improving agent.

[Claim 9] A method for improving the food texture of a battered processed meat or seafood product, comprising:

5 step (1) in which the food texture improving agent according to any one of claims 1-4 is mixed with meat or seafood before adhering batter thereto; and

step (2) in which the meat or seafood mixed with the food texture improving agent is heat cooked.

10 [Claim 10] The method for improving the food texture of a battered processed meat or seafood product according to claim 9, further comprising a marinating step in which the meat or seafood is marinated in a seasoning solution prior to step (1).

[Claim 11] The method for improving the food texture of a battered processed meat
15 or seafood product according to claim 9, wherein the amount of the food texture improving agent used is more than 0 mass% but 10 mass% or less relative to the total mass of the meat or seafood.

[Claim 12] The method for improving the food texture of a battered processed meat
20 or seafood product according to claim 9, wherein step (2) comprises deep-frying the meat or seafood mixed with the food texture improving agent.

[Claim 13] A battered processed meat or seafood product containing the food texture improving agent according to any one of claims 1 to 4.

25 [Claim 14] The battered processed meat or seafood product according to claim 13, wherein the food texture improving agent is adhered to at least part of the meat or seafood.