

DESCRIPTION

TEXTURE-IMPROVING COMPOSITION FOR MEAT-LIKE FOOD PRODUCT

TECHNICAL FIELD

[0001]

The present invention relates to a texture-improving composition for a meat-like food product.

BACKGROUND ART

[0002]

Due to concerns over the supply of meat ingredients, there is a growing need for meat-like food products that do not use meat ingredients and that contain more vegetable ingredients such as soy-derived ingredients and pea-derived ingredients.

Meat-like food products made with vegetable ingredients tend to have a more uniform texture than those made with meat, and there is a need to realize a texture with an excellent loosening property. For example, Patent literature 1 describes a method for improving texture by using jellies or the like. However, it has not been able to realize a meat-like loosening property.

CITATION LIST

Patent Literature

[0003]

Patent Literature 1: Japanese Unexamined Patent Application Publication No. 2016-54719

SUMMARY OF INVENTION

Technical Problem

[0004]

The objective of the present invention is to provide a meat-like food product that has an excellent loosening property.

Solution to Problem

[0005]

The present inventors, as a result of their diligent research, have found that it is possible to produce a meat-like food product with an excellent loosening property by using a composition that has an oil phase with a specific percentage of solid fat content at 20°C as a continuous phase or a composition that has an oil phase as a continuous phase and a specific Brookfield viscosity at 20°C as an ingredient to produce a meat-like food product having a vegetable protein ingredient as the main ingredient.

[0006]

A texture-improving composition for a meat-like food product, a method for producing a meat-like processed product, a method for producing a meat-like food product, and a meat-like food product of the present invention are [1] to [11] below.

[1] A texture-improving composition for a meat-like food product, comprising an oil phase as a continuous phase, wherein the solid fat content of the oil phase at 20°C is 1% or more and 70% or less.

[2] A texture-improving composition for a meat-like food product, comprising an oil phase as a continuous phase, wherein the solid fat content of the oil phase at 20°C is 1% or more and 25% or less.

[3] A texture-improving composition for a meat-like food product, comprising an oil phase as a continuous phase, wherein the Brookfield viscosity of said composition when measured at 20°C and 30 rpm is 100 cps or more and 20,000 cps or less (100 mPa·s or more and 20,000 mPa·s or less).

[4] A method for producing a meat-like processed product comprising a mixed composition production step in which a vegetable protein ingredient and the texture-improving composition for a meat-like food product according to any one of [1] to [3] are brought into contact and mixed with each other to obtain a mixed composition.

[5] The method for producing a meat-like processed product according to [4], wherein an increase in the mass of the vegetable protein ingredient is 41% or less by mass when the vegetable protein ingredient is brought into contact with the texture-improving composition for a meat-like food product at 20°C for 10 minutes.

[6] The method for producing a meat-like processed product according to either one of [4] and [5], wherein in the mixed composition production step, the temperature of the texture-improving composition for a meat-like food product is below the slipping point of the oil phase when the vegetable protein ingredient is brought into contact with the texture-improving composition for a meat-like food product.

[7] A method for producing a meat-like food product, comprising a step of heat cooking

a meat-like processed product obtained by the method for producing a meat-like processed product according to any one of [4] to [6].

[8] A meat-like food product comprising a vegetable protein ingredient and an oil and fat,

the meat-like food product containing no fish or animal meat or containing fish or animal meat in an amount of 30% or less by mass relative to 100% by mass of the meat-like food product as a whole, and

having a region where the shear force is 20 N/mm·sec or less when the meat-like food product is at any temperature between 50°C and 55°C (inclusive).

[9] A meat-like food product comprising a vegetable protein ingredient and an oil and fat,

the meat-like food product containing no fish or animal meat or containing fish or animal meat in an amount of 30% or less by mass relative to 100% by mass of the meat-like food product as a whole, and

having a drip rate of 1% or more and 5% or less by mass relative to 100% by mass of the meat-like food product as a whole.

[10] The meat-like food product according to either one of [8] and [9], which is obtained by heating a meat-like processed product containing a composition that has an oil phase with a solid fat content of 1% to 70% (i.e., 1% or more and 70% or less) at 20°C as a continuous phase.

[11] The meat-like food product according to any one of [8] to [10], which is obtained by heating a meat-like processed product containing a composition that has an oil phase as a continuous phase and a Brookfield viscosity of 100 cps or more and 20,000 cps or less (100 mPa·s or more and 20,000 mPa·s or less) at 20°C.

ADVANTAGEOUS EFFECTS OF INVENTION

[0007]

The present invention can provide a meat-like food product with an excellent loosening property.

DESCRIPTION OF EMBODIMENTS

[0008]

Hereinafter, an embodiment of the present invention will be described.

[0009]

<Texture-improving composition for meat-like food product>

A texture-improving composition for a meat-like food product of the present invention can be used to improve the texture of a meat-like food product made primarily with a vegetable protein ingredient with no or little meat.

[0010]

The texture-improving composition for a meat-like food product of the present invention has, as its active ingredient, a composition which has an oil phase as a continuous phase. In the texture-improving composition for a meat-like food product, the composition having an oil phase as a continuous phase contains an edible oil and fat. Other than the composition having an oil phase as a continuous phase, any ingredient may be contained as long as the effect of improving the loosening property of the meat-like food product is not lost. For example, water, an emulsifier such as lecithin, an antioxidant, an amino acid, etc. may be contained.

[0011]

The edible oil and fat used in the composition having an oil phase as a continuous phase is not particularly limited as long as it does not deteriorate the loosening property of the meat-like food product. For example, one or more kinds selected from below can be used in a mixture: vegetable oils and fats such as soybean oil, rapeseed oil, corn oil, olive oil, sesame oil, safflower oil, sunflower oil, cottonseed oil, rice oil, peanut oil, palm oil, palm kernel oil, and coconut oil; animal fats such as tallow, lard, milk fat, and chicken fat; and processed oils and fats obtained by subjecting the above to fractionation, hydrogenation, transesterification, etc.

[0012]

In the texture-improving composition for a meat-like food product, the content of edible oils and fats is preferably 85% or more by mass, more preferably 90% or more by mass, still more preferably 95% or more by mass, and may even be 100% by mass relative to 100% by mass of the texture-improving composition for a meat-like food product as a whole.

[0013]

In one aspect of the present invention, from the viewpoint of obtaining the effect of improving the loosening property by use of the specific composition, the content of fish or animal meat in a "meat-like food product" is preferably 30% or less by mass, more preferably 20% or less by mass, and still more preferably 10% or less by mass relative to 100% by mass of the meat-like food product as a whole, and yet still more preferably no fish or animal meat

is contained.

[0014]

In one aspect of the invention, the texture-improving composition for a meat-like food product is preferably solid or semi-solid. In this case, the solid fat content (hereinafter referred to as SFC) of the texture-improving composition for a meat-like food product is preferably 1% or more, more preferably 5% or more, and still more preferably 7% or more, at 20°C. At the same time, it is preferably 70% or less, more preferably 60% or less, more preferably 50% or less, still more preferably 40% or less, still more preferably 30% or less, still more preferably 25% or less, and yet still more preferably 23.5% or less, at 20°C.

Whenever upper and lower limit values of a numerical range appear herein, the upper and lower limit values can be combined as appropriate, and any numerical combination within such numerical range is considered to be disclosed herein.

[0015]

In one aspect of the present invention, the solid fat content (hereinafter referred to as SFC) of the texture-improving composition for a meat-like food product is preferably 1% or more, more preferably 5% or more, and still more preferably 7% or more, at 10°C. At the same time, it is preferably 90% or less, more preferably 70% or less, still more preferably 60% or less, still more preferably 45% or less, and yet still more preferably 41.6% or less, at 10°C.

[0016]

SFC is measured in accordance with AOCS Official Method Cd 16b-93.

[0017]

A texture-improving composition for a meat-like food product in one aspect of the invention can be prepared by selecting an edible oil and fat having solid fat content in the previously mentioned range or by mixing two or more kinds of edible oils and fats having different solid fat contents. More specifically, the composition can be prepared by adding one or more kinds of edible oils and fats with high solid fat contents (e.g., vegetable oils and fats such as palm oil, palm kernel oil, etc. or processed oils and fats such as transesterified oil, hydrogenated oil and fat, extremely hydrogenated oil, etc.) to an edible oil and fat with a low solid fat content (e.g., soybean oil, rapeseed oil, or corn oil). Those skilled in the art can adjust the solid fat content of the texture-improving composition for a meat-like food product to lie in a desired range by selecting and mixing edible oils and fats with different solid fat contents as appropriate.

[0018]

A texture-improving composition for a meat-like food product in one aspect of the invention can be prepared by adding an emulsifier containing 70% or more by mass saturated fatty acids in the constituent fatty acids to a composition having an oil phase as a continuous phase.

[0019]

In one aspect of the invention, a texture-improving composition for a meat-like food product may be a viscous liquid. If the texture-improving composition for a meat-like food product is a viscous liquid composition, the viscosity is preferably 100 cps or more (100 mPa·s or more), more preferably 500 cps or more (500 mPa·s or more), still more preferably 1,000 cps or more (1,000 mPa·s or more), still more preferably 3,000 cps or more (3,000 mPa·s or more), and yet still more preferably 4,000 cps or more (4,000 mPa·s or more), when the viscosity is measured after 10 times of rotation at 30 rpm using a Brookfield viscometer (manufactured by Toki Sangyo Co., Ltd., BM type rotors, Nos. 2-4) with the composition held in a 20°C water bath for 30 minutes with stirring. At the same time, the viscosity is preferably 20,000 cps or less (20,000 mPa·s or less), and more preferably 18,000 cps or less (18,000 mPa·s or less).

Herein, the viscosity measured by the above method is also referred to as a "Brookfield viscosity."

[0020]

A texture-improving composition for a meat-like food product can be prepared, for example, by mixing an emulsifier with a composition having a liquid oil phase as a continuous phase. As the emulsifier, a known emulsifier capable of thickening a composition having an oil phase as a continuous phase can be used. For example, one or more kinds selected from the group consisting of polyglycerol fatty acid esters, monoglycerol fatty acid esters, organic acid monoglycerides, sorbitan fatty acid esters, sucrose fatty acid esters, propylene glycol fatty acid esters, lecithins, and polyglycerol esters of interesterified ricinoleic acid can be used.

[0021]

<Method for producing meat-like processed product>

A method for producing a meat-like processed product comprises a mixed composition production step in which a vegetable protein ingredient and the previously described texture-improving composition for a meat-like food product are brought into contact and mixed with each other to obtain a mixed composition. Herein, a "meat-like processed product" refers to a product containing a vegetable protein ingredient and the

previously described texture-improving composition for a meat-like food product, and it is a raw product of a meat-like food product.

[0022]

The vegetable protein ingredient used in the method for producing a meat-like processed product according to the present invention is, for example, a meat substitute with a protein content of 40% or more by mass in terms of dry mass, and is an ingredient containing one or more kinds selected from the group consisting of bean proteins including soy protein, lentil protein, chickpea protein, and pea protein, and wheat protein. Examples of the soy protein ingredients include protein ingredients made from soybeans, such as soy protein isolates, defatted soybeans, soy protein concentrates, and soymilk powder.

[0023]

The vegetable protein ingredient may also be used in powder form, textured form, or in combination of these. It is preferable to use a grainy vegetable protein ingredient so that it can easily loosen in the mouth when the meat-like food product is chewed and juiciness can be imparted to the meat-like food product. For example, it is preferable to use a grainy soy protein. It is preferable to use a combination of several soy proteins of different sizes to give a meaty and chewy texture.

A grainy vegetable protein ingredient refers to a textured vegetable protein ingredient, which can be obtained, for example, by treating a vegetable protein ingredient in an extrusion molding machine such as an extruder.

[0024]

In a method for producing a meat-like processed product according to the present invention, it is preferable to use a textured soy protein ingredient that has been rehydrated and then made partially fibrous by crushing the textured structure.

[0025]

The texture-improving composition for a meat-like food product used in the method for producing a meat-like processed product is preferably one which, when maintained at 20°C ($\pm 1^\circ\text{C}$) and brought into contact with the above vegetable protein ingredient for 10 minutes, results an increase in the mass of the vegetable protein ingredient of 41% or less by mass, preferably 30% or less by mass, and more preferably 0% by mass. A texture-improving composition for a meat-like food product with such a property can be used to produce a meat-like food product with an improved loosening property.

[0026]

The content of the vegetable protein ingredient (after rehydration) in the meat-like

processed product varies depending on the kind and purpose of the meat-like processed product, but it is preferably 20% or more and 80% or less by mass, more preferably 20% or more and 75% or less by mass, and still more preferably 25% or more and 70% or less by mass relative to 100% by mass of the meat-like processed product as a whole.

The content of the texture-improving composition for a meat-like food product is preferably 3 or more and 80 or less parts by mass, more preferably 5 or more and 75 or less parts by mass, and still more preferably 10 or more and 75 or less parts by mass relative to 100 parts by mass of the vegetable protein ingredient (after rehydration).

[0027]

In the method for producing a meat-like processed product according to the present invention, in addition to the main ingredients, i.e., the vegetable protein ingredient and the texture-improving composition for a meat-like food product, additives commonly added to processed products may be used to the extent that does not impair the effect of the present invention, where examples include:

- vegetables (fresh onion, etc.);
- breadcrumbs;
- proteins (dairy protein, egg white, wheat protein, etc.);
- starches (cross-linked starch, oil and fat-processed starch, etc.);
- seasonings (sugar, sodium glutamate, etc.);
- liquid seasonings (soy sauce, vinegar, oil and fat, *sake*, sweet *sake* (*mirin*), etc.);
- enzymes (transglutaminase, protease, etc.);
- spices (nutmeg, pepper, garlic powder, ginger powder, turmeric powder, etc.);
- sodium sorbate and glycine;
- pH adjusters (hydrochloric acid, lactic acid, citric acid, acetic acid, calcium hydroxide, caustic soda, sodium carbonate, sodium bicarbonate, sodium acetate, etc.);
- salts (salt, phosphate, glutamate, citrate, gluconate, carbonate, etc.);
- preservatives (sodium acetate, etc.);
- antioxidants (sodium ascorbate, etc.);
- colorants (cochineal dye, etc.);
- emulsifiers (monoglycerol fatty acid esters, polyglycerol fatty acid esters, organic acid monoglycerol fatty acid esters, sorbitan fatty acid esters, propylene glycol fatty acid esters, sucrose fatty acid esters, lecithin, etc.); and
- nutrient-fortifying agents (calcined shell calcium, eggshell calcium, calcium carbonate, etc.). Other ingredients normally used in food products, such as flavorings, may

also be contained.

[0028]

According to a method for producing a meat-like processed product in one aspect of the invention, fish or animal meat is preferably used in an amount of 30% or less by mass, more preferably 20% or less by mass, and still more preferably 10% or less by mass relative to 100% by mass of the meat-like processed product as a whole, and it is yet still more preferable not to use fish or animal meat.

[0029]

According to a method for producing a meat-like processed product in one aspect of the invention, in the "mixed composition production step," the vegetable protein ingredient is brought into contact with and mixed with the previously described texture-improving composition for a meat-like food product.

[0030]

Mixing may be conducted manually or may be conducted by using a machine such as a food processor. The vegetable protein ingredient and the previously described texture-improving composition for a meat-like food product are mixed to give a uniform consistency. Mixing time is preferably 10 seconds or longer when using a food processor. Prolonged mixing results in an excessively fine-grained vegetable protein ingredient, making it difficult to obtain a desirable texture. Therefore, the mixing time is preferably 1 minute or shorter, and more preferably 30 seconds or shorter.

[0031]

The mixing step may be performed twice or more times to form multiple mixed species, or multiple mixed species may be mixed in the mixed composition production step to form a single mixed composition. Alternatively, a mixed composition may be formed by covering one mixed species with another mixed species.

[0032]

According to a method for producing a meat-like processed product in one aspect of the invention, when a texture-improving composition for a meat-like food product is brought into contact with a vegetable protein ingredient in the mixed composition production step, the temperature of the texture-improving composition for a meat-like food product is preferably equal to or lower than the slipping point and it is preferably in a solid or semi-solid state. A semi-solid state refers to those that have a certain degree of fluidity but are extremely viscous at room temperature and thus are difficult to measure the viscosity thereof with a rotational viscometer at room temperature, or those that are not in a solid state but

that retain a shape to a degree with no fluidity at room temperature. It refers to a substance in an intermediate state between solid and liquid, being more fluid than a solid but less fluid than a liquid.

[0033]

<Method for producing meat-like food product>

A method for producing a meat-like food product according to the present invention comprises a step of heat cooking a meat-like processed product produced by the aforementioned method for producing a meat-like processed product.

[0034]

Herein, a "meat-like food product" refers to a food product made by heat cooking a meat-like processed product. The "step of heat cooking" should preferably involve one or more heat treatments selected from the group consisting of frying, grilling, simmering, boiling, and steam heating. "Meat-like food products" contain a vegetable protein ingredient and an oil and fat, and include, for example, patties, hamburger steaks, *gyoza* (a kind of Chinese dumplings), sausages, cutlets, minced meat cutlets, *Shao mai* (a kind of Chinese dumplings), meatballs, *niku-dango* (Japanese meatballs), Chinese steamed buns, *tsukune* (Japanese chicken meatballs), nuggets, and the like, which are mainly made from a vegetable protein ingredient.

[0035]

<Meat-like food product>

A "meat-like food product" of the present invention contains fish or animal meat in an amount of 30% or less by mass, preferably 20% or less by mass, and more preferably 10% or less by mass relative to 100% by mass of the meat-like food product as a whole, or does not contain fish or animal meat and is mainly made from a vegetable protein. A food product produced using the texture-improving composition for a meat-like food product has a loosening texture compared to food products without the texture-improving composition for a meat-like food product.

[0036]

A meat-like food product of the present invention can be obtained by heating the previously described meat-like processed product.

[0037]

In one aspect of the invention, a meat-like food product is produced using a solid or semi-solid texture-improving composition for a meat-like food product. In this case, the solid fat content (hereinafter referred to as SFC) of the texture-improving composition for a

meat-like food product used is preferably 1% or more, more preferably 5% or more, and still more preferably 7% or more, at 20°C. At the same time, it is preferably 70% or less, more preferably 60% or less, more preferably 40% or less, still more preferably 30% or less, still more preferably 25% or less, and yet still more preferably 23.5% or less, at 20°C.

[0038]

In one aspect of the present invention, the solid fat content (hereinafter referred to as SFC) of the texture-improving composition for a meat-like food product that is used for producing a meat-like food product is preferably 1% or more, more preferably 5% or more, and still more preferably 7% or more, at 10°C. At the same time, it is preferably 90% or less, more preferably 70% or less, still more preferably 60% or less, still more preferably 45% or less, and yet still more preferably 41.6% or less, at 10°C.

[0039]

In one aspect of the invention, a texture-improving composition for a meat-like food product used for producing a meat-like food product may be a liquid composition. If a liquid composition is used, the viscosity of the texture-improving composition for a meat-like food product is preferably 100 cps or more (100 mPa·s or more), more preferably 500 cps or more (500 mPa·s or more), still more preferably 1,000 cps or more (1,000 mPa·s or more), still more preferably 3,000 cps or more (3,000 mPa·s or more), and yet still more preferably 4,000 cps or more (4,000 mPa·s or more), when the viscosity is measured after 10 times of rotation at 30 rpm using a Brookfield viscometer (manufactured by Toki Sangyo Co., Ltd., BM type rotors, Nos. 2-4) with the composition held in a 20°C water bath for 30 minutes with stirring. At the same time, it is preferably 20,000 cps or less (20,000 mPa·s or less), and more preferably 18,000 cps or less (18,000 mPa·s or less).

[0040]

Furthermore, from the viewpoint of enhancing the loosening property, the shear force of the meat-like processed product is preferably 8 N/mm·sec or higher, and more preferably 10 N/mm·sec or higher, when it is at any temperature between 50°C and 55°C (inclusive). At the same time, it is preferably 20 N/mm·sec or less, still more preferably 16 N/mm·sec or less, and yet still more preferably 13 N/mm·sec or less.

[0041]

Herein, "shear force" refers to force required for compression shearing and is measured by the following procedure.

First, a 20 mm wide measurement sample is cut out from a meat-like food product.

A grilled meat-like food product (diameter 80 mm) is cut in the center into a 20 mm

wide piece, which is heated in a microwave oven to a temperature between 50°C and 55°C (inclusive) (500 W, about 20 seconds), and then an area at least 15 mm from the sides of the meat-like food product is subjected to compression measurement three times using a texture analyzer (TA-XT Plus, manufactured by Stable Micro Systems) equipped with a 70 mm wide Warner-Bratzler flat blade, at a clearance of 5 mm, a compression speed of 1.5 mm/sec, and room temperature ($20 \pm 2^\circ\text{C}$). The time integral (N/mm·sec) of the stress (N/mm) applied to the measurement sample during the compression time is obtained.

The above procedure is performed three times. The average of the three values obtained by time integration of the stress is assumed to be the "shear force".

[0042]

From the perspective such as enhancement of juiciness, the drip rate of a grilled meat-like food product in one aspect of the present invention is preferably 1% or more by mass, more preferably 1.5% or more by mass, and still more preferably 2% or more by mass relative to 100% by mass of the meat-like food product as a whole when the meat-like processed product is at any temperature between 50°C and 55°C (inclusive). From the viewpoint of realizing meaty juiciness, it is preferably 5% or less by mass, more preferably 3% or less by mass, and still more preferably 2.5% or less by mass.

[0043]

Herein, "drip rate" is measured by the following procedure.

First, a meat-like food product is cut to obtain four samples (6-8 g/piece). The mass of each sample is measured. Four sheets of paper (waste wipes) are prepared. Each paper is folded and its mass is measured.

Next, the four samples are placed in a microwave oven and heated at 500 W for about 30 seconds to a temperature between 50°C and 55°C (inclusive).

Then, each sample is compressed within 10 minutes after heating. Specifically, a sample is placed on a waste wipe and compressed with a texture analyzer (TA-XT Plus, manufactured by Stable Micro Systems) equipped with a 30 mm diameter round flat plunger at a clearance of 5 mm, a compression speed of 1 mm/sec, and room temperature ($20 \pm 2^\circ\text{C}$). Compression is performed until the height is reduced by 35% compared to that before compression. This procedure is conducted for each of the four samples.

Then, the mass of each of the four sheets of paper is measured. The average for the increase in the mass of the four sheets of paper relative to that before placing the samples on the paper is obtained as the "drip volume". The "drip rate" is then obtained from the following equation:

Drip rate (mass%) = (Drip volume (g) ÷ Mass of sample before compression (g)) ×
100

EXAMPLES

[0044]

Hereinafter, the present invention will be described in more detail by way of examples, although the present invention should not be limited to these examples.

[0045]

<Ingredients>

The following were used as the main raw ingredients.

(1) Soy protein ingredients

Product names: Fujinic Ace 500, Vegetex SHF, Apex 950, and New Fujipro SEH, all manufactured by Fuji Oil Co., Ltd.

Product name: Gluten Meat, manufactured by Saniku Foods Co., Ltd.

(2) Rapeseed oil

Product name: AJINOMOTO Sarasara Canola Oil, manufactured by J-OIL MILLS

(3) Emulsifier

Polyglycerol fatty acid ester (product name: CV-1L, manufactured by Sakamoto Yakuhin Kogyo Co., Ltd.)

(4) Texture-improving composition for meat-like food product

1) Product name: S Special 100LT (shortening, solid fat content of 7.5% at 20°C)

2) Product name: Euromelt 20B (shortening, solid fat content of 16.6% at 20°C)

3) Product name: Facier Type 2 (shortening, solid fat content of 23.5% at 20°C)

4) Product name: Unicoool Gold (shortening, solid fat content of 37.9% at 20°C)

5) Product name: T Special M (shortening, solid fat content of 58% at 20°C)

6) Composition obtained by mixing CV-1L with rapeseed oil in the proportions (mass ratio) listed in Table 1

1) to 5) are all manufactured by J-OIL MILLS

(5) AJI-NO-MOTO (monosodium glutamate)

Product name; AJI-NO-MOTO, manufactured by Ajinomoto Co.

(6) Egg white powder

Product name: Dried egg white W type, manufactured by Kewpie Co.

[0046]

<Measurement of solid fat content of texture-improving composition for meat-like

food product>

The content of solid fat was measured by the previously described method.

The results are shown in Table 1.

[0047]

<Measurement of slipping point of texture-improving composition for meat-like food product>

The slipping point was measured according to "2.2.4.2-1996 Melting point (Slipping point)" of the Standard Methods for the Analysis of Fats, Oils and Related Materials (Japan Oil Chemists' Society).

The results are shown in Table 1.

[0048]

<Measurement of viscosity of texture-improving composition for meat-like food product>

The viscosity of the liquid oil containing the emulsifier was measured with a Brookfield viscometer (under the following measurement conditions: rotational speed: 30 rpm, rotors: Nos. 2-4, product temperature: 20°C).

The results are shown in Table 1.

[0049]

<Rate of increase in mass of soy protein ingredient>

The rate of increase in the mass of the soy protein composition when the soy protein ingredient was brought into contact with the texture-improving composition for a meat-like food product was examined.

First, the following soy proteins used as ingredients for patties were rehydrated. The masses of the rehydrated ingredients were as follows.

Fujinic Ace 500: 2.1x (2.1 times)

Vegetex SHF: 1.8x (1.8 times)

New Fujipro SEH: 3x (3 times)

These three soy protein ingredients (after rehydration) were mixed in a mass ratio of 1: 1: 1 to obtain a mixed soy protein ingredient. Three grams of this was weighed onto a 10 x 10 cm piece of gauze. The mixed soy protein ingredient was wrapped in the gauze by pinching up the four corners of the gauze, and fastening the four corners of the gauze with a rubber band.

The mixed soy protein ingredient wrapped in the gauze were then brought into contact with the texture-improving composition for a meat-like food product listed in Table

1 in a 100-mL beaker in a 20°C water bath. After 10 minutes, the soy protein ingredient wrapped in the gauze was pulled up and left on a wire mesh for 5 minutes. The mixed soy protein ingredient was removed from the gauze bag and its mass was measured. The rate of increase in the mass of the soy protein ingredient was calculated.

The results are shown in Table 1.

[0050] [Table 1]

Properties of ingredients (i.e., rapeseed oil or texture-improving composition for meat-like food product)	Ingredient used	Experimental example 1	Experimental example 2	Experimental example 3	Experimental example 4	Experimental example 5	Experimental example 6	Experimental example 7	Experimental example 8	Experimental example 9
		100% Rapeseed oil	S Special 100LT	Euromelt 20B	Facier Type 2	Unicool Gold	T Special M	94% rapeseed oil, 6% CV-1L	97% rapeseed oil, 3% CV-1L	99% rapeseed oil, 1% CV-1L
Properties of meat-like food product	Solid fat content (%) at 20°C	0	7.5	16.6	23.5	37.9	58	-	-	-
	Solid fat content (%) at 10°C	0	8	24.2	41.6	68.4	84.5	-	-	-
	Slipping point (°C)	-	50	37	32	28	34	-	-	-
	Viscosity (cps)	95	-	-	-	-	-	1,040	5,000	17,600
	Viscosity (mPa·s)	95	-	-	-	-	-	1,040	5,000	17,600
	Rate of increase in mass (mass%) of soy protein ingredient when brought into contact with texture-improving composition	42	0	0	0	0	0	0	6	41
	Drip volume (g)	0.03	0.15	0.19	0.17	0.21	0.22	0.12	0.15	0.18
	Drip rate (mass%)	0.4	1.8	2.2	2.1	2.7	2.7	1.4	1.8	2.0
	Shear force (N/mm·sec)	21.56	12.52	10.67	11.24	11.7	15.19	12.18	8.94	10.67
	Loosening property	3.0	4.6	4.3	4.0	3.6	3.9	-	-	-
Properties of meat-like food product	Juiciness	3.0	4.1	4.4	4.0	3.8	3.9	-	-	-

[0051]

<Method of making soya patty>

Soya patties of Experimental examples 1-9 were made according to the following procedure.

1. The soy protein ingredients were soaked in water for 1 hour, and then water was wrung out and drained.

2. Among the soy protein ingredients, Vegetex SHF and Apex 950 were cut into small pieces using a food processor.

3. The ingredients were weighed in the proportions shown in Table 2 and mixed well using a food processor. As "Rapeseed oil or texture-improving agent for meat-like food product" listed in Table 2, 100% rapeseed oil was used in Experimental example 1, S Special 100LT was used in Experimental example 2, Euromelt 20B was used in Experimental example 3, Facier Type 2 was used in Experimental example 4, Unicoool Gold was used in Experimental example 5, T Special M was used in Experimental example 6, 94 mass% rapeseed oil and 6 mass% CV-1L were used in Experimental example 7, 97 mass% rapeseed oil and 3 mass% CV-1L were used in Experimental example 8, and 99 mass% rapeseed oil and 1 mass% CV-1L were used in Experimental example 9. Hereafter, the percentages of the soy protein ingredients in the tables refer to the percentages of the rehydrated soy protein ingredients.

4. Seventy-five grams (75 g) of the mixture obtained in 3. was weighed and formed into a shape of a hamburger steak using an 80-mm diameter bottomless cylindrical mould. The hamburger steak-shaped meat-like processed product removed from the bottomless cylindrical mould was grilled in a frying pan until browned on both sides, and covered with a lid and steamed to obtain the soya patties of Experimental examples 1-9.

[0052] [Table 2]

Ingredients	Proportion
Fujinic Ace 500	15.0 mass%
Vegetex SHF	15.0 mass%
Apex 950	11.0 mass%
New Fujipro SHE	4.0 mass%
Black pepper	0.2 mass%
Salt	1.1 mass%
AJI-NO-MOTO (monosodium glutamate)	4.6 mass%
Egg white powder	3.0 mass%
Granulated sugar	0.3 mass%
Nutmeg	0.3 mass%
Water	14.5 mass%
Rapeseed oil or texture-improving composition for meat-like food product	31.0 mass%

[0053]

<Drip volume and drip rate>

Drip rates were obtained by the previously described method. The results are shown in Table 1.

[Results]

A meat-like food product with a high drip rate is preferred from the viewpoint of improving the texture. Since drip rates of Experimental examples 2-6 were increased compared to that of Experimental example 1, a texture-improving composition for a meat-like food product that had a solid fat content of 7.5% or more at 20°C was found to be preferable to be used for producing a meat-like food product.

Also, from the viewpoint of improving the texture, a meat-like food product with a high drip rate is preferred. Since drip rates of Experimental examples 7 to 9 were increased compared to that of Experimental example 1, it was found preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product that had a Brookfield viscosity of 1,040 cps or higher (1,040 mPa·s or higher) when measured at 20°C and 30 rpm, more preferable to produce a meat-like food product using a texture-improving

composition for a meat-like food product that had a Brookfield viscosity of 5,000 cps or higher (5,000 mPa·s or higher), and still more preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product that had a Brookfield viscosity of 17,600 cps or higher (17,600 mPa·s or higher).

In order to increase the drip rate of the meat-like food product, it was found preferable to use a vegetable protein ingredient and a texture-improving composition for a meat-like food product in combination that resulted a mass increase of the vegetable protein ingredient of 41% or less by mass after 10 minutes of their contact, and more preferable to use a combination that results a mass increase of 0% or less.

[0054]

<Shear force>

The "shear force" was obtained by the previously described method. The results are shown in Table 1.

[Results]

The lower the shear force value, the better the loosening property of the meat-like food product and the less the force required to chew through the meat-like food product.

Comparing Experimental examples 2-6 with Experimental example 1, it was found preferable, from the viewpoint of improving the loosening property of the meat-like food product, to produce a meat-like food product using a texture-improving composition for a meat-like food product that had a solid fat content of 7.5% or more at 20°C, and more preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product that had a solid fat content of 16.6% or more. It was also found preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product for 58% or less, more preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product for 37.9% or less, and still more preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product for 23.5% or less.

Comparing Experimental examples 7 to 9 with Experimental example 1, it was found preferable, from the viewpoint of improving the loosening property of a meat-like food product, to produce a meat-like food product using a texture-improving composition for a meat-like food product that had a Brookfield viscosity of 1,040 cps or more (1,040 mPa·s or more) when measured at 20°C and 30 rpm, and more preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product that had a Brookfield viscosity of 5,000 cps or more (5,000 mPa·s or more).

[0055]

<Sensory evaluation>

The sensory evaluation method employed in this evaluation was a scoring method. The evaluators were a panel of seven trained experts. The evaluation items and scores were as follows. Here, the score is the sum of the scores divided by the number of the panelists (i.e., the average). A score was assigned based on the evaluation of Experimental example 1 which was assigned a score of "3" points.

A grilled meat-like food product (80 mm in diameter) was cut into a fan shape with a central angle of 90 degrees and heated in a microwave oven (500 W, 40 seconds). The meat-like food product was evaluated for its loosening property when eaten and for its juiciness with oil coming out when chewed. The results are shown in Table 1.

(1) Loosening property

- 5...Loosens into grains in a single chew.
- 4...Loosens into grains in 2 chews.
- 3...Loosens into grains in 3 to 5 chews.
- 2...Loosens with repeated chewing, but not into grains.
- 1...Difficult to loosen even after repeated chewing.

(2) Juiciness

- 5...Liquid ingredients overflow from the moment the teeth are inserted.
- 4...Liquid ingredients overflow during the first chewing.
- 3...Liquid ingredients overflow in 3 to 5 chews.
- 2...Liquid ingredients can be felt after multiple chewing.
- 1...Liquid ingredients cannot be felt with chewing.

[Results]

For Experimental examples 2-6, the surfaces were crispy and had roasting aroma, oil dripped when chewed, and the moderate loosening with chewing made it easier to perceive the flavor of the oil as compared to Experimental example 1.

From the viewpoint of improving the loosening property, it was found preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product that had a solid fat content of 7.5% or more at 20°C. It was also found preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product for 58% or less, more preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product for 37.9% or less, and still more

preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product for 23.5% or less.

From the viewpoint of improving the loosening property and juiciness, a drip rate of 1.8% or more and 2.2% or less by mass was found to be preferable.

Furthermore, from the viewpoint of improving the loosening property and juiciness, it was found preferable to use a texture-improving composition for a meat-like food product that resulted a mass increase of a soy protein ingredient of 41% or less, and more preferable to use a texture-improving composition for a meat-like food product that resulted a mass increase of a soy protein ingredient of 0% or less.

[0056]

<Method of making soya cutlet>

Soya cutlets of Experimental examples 1-4 were made according to the following procedure.

1. The soy protein ingredients were soaked in water for 1 hour, and then water was wrung out and drained.

2. Among the soy protein ingredients, Vegetex SHF and Apex 950 were cut into small pieces using a food processor.

3. The ingredients were weighed in the proportions shown in Table 3 and mixed well using a food processor. As "Rapeseed oil or texture-improving agent for meat-like food product" listed in Table 3, 100% rapeseed oil was used in Experimental example 1, S Special 100LT was used in Experimental example 2, Euromelt 20B was used in Experimental example 3, and Facier Type 2 was used in Experimental example 4.

4. Fifty grams (50 g) of the mixture obtained in 3. was weighed and hand-rolled into a small oval shape, and then dredged in flour, batter solution, and breader in this order so that the whole mixture was covered with them. The resulting meat-like processed product in a shape of a minced meat cutlet was fried at 170°C for 4 minutes and left for an hour to obtain soya cutlets of Experimental examples 1-4. The batter solution was prepared by mixing 60 g of whole eggs, 27 g of flour (manufactured by Nisshin Flour Milling Inc.), and 30 g of water. Breadcrumbs (manufactured by Frystar Co. Ltd.) were used as the breader.

[0057] [Table 3]

Ingredients	Proportion
Fujinic Ace 500	12.5 mass%
Vegetex SHF	12.5 mass%
Apex 950	9.2 mass%
New Fujipro SHE	3.3 mass%
Black pepper	0.1 mass%
Salt	0.9 mass%
AJI-NO-MOTO (monosodium glutamate)	0.6 mass%
Egg white powder	2.9 mass%
Granulated sugar	0.2 mass%
Nutmeg	0.3 mass%
Seasoning oil	1.7 mass%
Sauteed onions	15.0 mass%
Water	14.6 mass%
Caramel color	0.4 mass%
Rapeseed oil or texture-improving composition for meat-like food product	25.8 mass%

[0058]

<Method of making soya *gyoza*>

Soya *gyoza* of Experimental examples 1-4 were made according to the following procedure.

1. The soy protein ingredients were soaked in water for 1 hour, and then water was wrung out and drained.

2. Among the soy protein ingredients, Vegetex SHF, Apex 950, and gluten meat were cut into small pieces using a food processor.

3. The ingredients were weighed in the proportions shown in Table 4 and mixed well using a food processor. As "Rapeseed oil or texture-improving agent for meat-like food product" listed in Table 4, 100% rapeseed oil was used in Experimental example 1, S Special 100LT was used in Experimental example 2, Euromelt 20B was used in Experimental example 3, and Facier Type 2 was used in Experimental example 4.

4. Twenty grams (20 g) of the mixture obtained in 3. was weighed and wrapped in *Gyoza* skin (manufactured by Moranbong Co., Ltd.). The resulting meat-like processed product in the shape of *gyoza* was steamed in a frying pan with a lid on for 5 minutes and left for 1 hour to obtain the soya *gyoza* of Experimental examples 1-4.

[0059] [Table 4]

Ingredients	Proportion
Fujinic Ace 500	7.8 mass%
Vegetex SHF	13.5 mass%
Apex 950	5.5 mass%
Gluten meat	6.2 mass%
Beancurd skin	1.3 mass%
Pepper	0.1 mass%
Salt	0.4 mass%
Egg white powder	2.0 mass%
Granulated sugar	0.3 mass%
Garlic paste	0.5 mass%
Ginger paste	0.5 mass%
Seasoning oil	1.0 mass%
Soy sauce	3.5 mass%
Flavoring powder	0.4 mass%
Garlic chives	20.0 mass%
Cabbage	25.0 mass%
Rapeseed oil or texture-improving composition for meat-like food product	12.0 mass%

[0060]

<Method of making soya sausage>

Soya sausages of Experimental examples 1-4 were made according to the following procedure.

1. The soy protein ingredients were soaked in water for 1 hour, and then water was wrung out and drained.

2. Among the soy protein ingredients, Vegetex SHF and Apex 950 were cut into small pieces using a food processor.

3. The ingredients were weighed in the proportions shown in Table 5 and mixed well using a food processor. As "Rapeseed oil or texture-improving agent for meat-like food product" listed in Table 5, 100% rapeseed oil was used in Experimental example 1, S Special 100LT was used in Experimental example 2, Euromelt 20B was used in Experimental example 3, and Facier Type 2 was used in Experimental example 4.

4. Using a filling machine (sausage maker, manufactured by Kai Corporation), the mixture obtained in 3. was filled into a collagen casing (manufactured by Nippi, Inc.) with a diameter of 16 mm. The resulting sausage-shaped meat-like processed product was boiled in a boiling water bath for 4 minutes and left for 1 hour to obtain soya sausages of Experimental examples 1-4.

[0061] [Table 5]

Ingredients	Proportion
Fujinic Ace 500	10.0 mass%
Apex 950	19.0 mass%
New Fujipro SHE	4.0 mass%
Gluten meat	20.0 mass%
Salt	2.0 mass%
Egg white powder	6.0 mass%
Granulated sugar	0.2 mass%
Flavoring powder	0.8 mass%
Seasoning oil	13.0 mass%
Wiener spice	1.0 mass%
Pigment	1.0 mass%
Rapeseed oil or texture-improving composition for meat-like food product	23.0 mass%

[0062]

<Sensory evaluation>

Sensory evaluation was performed by the previously described method. The evaluators were a panel of five trained experts.

The soya cutlets, soya *gyoza*, and Soya sausages were each heated in a microwave oven (500 W, 40 seconds). The meat-like food product was evaluated for its loosening property when eaten and for its juiciness with oil coming out when chewed. The results are

shown in Table 6.

[Results]

[Soya cutlet]

For Experimental examples 2-4, oil dripped when chewed, and the moderate loosening with chewing made it easier to perceive the flavor of the oil as compared to Experimental example 1.

From the viewpoint of improving the loosening property, it was found preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product that had a solid fat content of 7.5% or more at 20°C. It was also found more preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product for 23.5% or less.

Furthermore, from the viewpoint of improving the loosening property and juiciness, it was found preferable to use a texture-improving composition for a meat-like food product that resulted a mass increase of a soy protein ingredient of 0% or less.

[Soya Gyoza]

For Experimental examples 2-4, the juiciness was comparable to that of Experimental example 1, and the moderate loosening with chewing made it easier to perceive the flavor of the oil as compared to Experimental example 1.

From the viewpoint of improving the loosening property, it was found preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product that had a solid fat content of 7.5% or more at 20°C. It was also found more preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product for 23.5% or less.

Furthermore, from the viewpoint of improving the loosening property and juiciness, it was found preferable to use a texture-improving composition for a meat-like food product that resulted a mass increase of a soy protein ingredient of 0% or less.

[Soya sausage]

For Experimental examples 2-4, oil dripped when chewed, and the moderate loosening with chewing made it easier to perceive the flavor of the oil as compared to Experimental example 1.

From the viewpoint of improving the loosening property, it was found preferable to produce a meat-like food product using a texture-improving composition for a meat-like

food product that had a solid fat content of 7.5% or more at 20°C. It was also found preferable to produce a meat-like food product using a texture-improving composition for a meat-like food product for 23.5% or less.

Furthermore, from the viewpoint of improving the loosening property and juiciness, it was found preferable to use a texture-improving composition for a meat-like food product that resulted a mass increase of a soy protein ingredient of 0% or less.

[0063] [Table 6]

			Experimental example 1	Experimental example 2	Experimental example 3	Experimental example 4
Properties of ingredients (i.e., rapeseed oil or texture-improving composition for meat-like food product)	Ingredient used		100% Rapeseed oil	S Special 100LT	Euromelt 20B	Facier Type 2
	Solid fat content (%) at 20°C		0	7.5	16.6	23.5
	Solid fat content (%) at 10°C		0	8.0	24.2	41.6
	Slipping point (°C)		-	50	37	32
	Viscosity (cps)		95	-	-	-
	Viscosity (mPa·s)		95	-	-	-
	Rate of increase in mass (mass%) of soy protein ingredient when brought into contact with texture-improving composition		42	0	0	0
Properties of meat-like food product	Soya cutlet	Loosening property	3.0	3.2	4.2	3.6
		Juiciness	3.0	3.6	4.4	3.6
	Soya gyoza	Loosening property	3.0	3.7	3.6	3.4
	Soya sausage	Loosening property	3.0	4.5	5.0	4.8
		Juiciness	3.0	4.0	5.0	4.3

[0064]

The texture-improving composition for a meat-like food product, the method for producing a meat-like processed product, the method for producing a meat-like food product, and the meat-like food product of the present invention are not limited to the embodiments and examples described above, and various modifications can be made to an extent that does not impair the effect of the invention.

CLAIMS

1. A texture-improving composition for a meat-like food product, comprising an oil phase as a continuous phase, wherein the solid fat content of the oil phase at 20°C is 1% or more and 70% or less.
2. A texture-improving composition for a meat-like food product, comprising an oil phase as a continuous phase, wherein the solid fat content of the oil phase at 20°C is 1% or more and 25% or less.
3. A texture-improving composition for a meat-like food product, comprising an oil phase as a continuous phase, wherein the Brookfield viscosity of said composition when measured at 20°C and 30 rpm is 100 cps or more and 20,000 cps or less (100 mPa·s or more and 20,000 mPa·s or less).
4. A method for producing a meat-like processed product comprising a mixed composition production step in which a vegetable protein ingredient and the texture-improving composition for a meat-like food product according to any one of claims 1 to 3 are brought into contact and mixed with each other to obtain a mixed composition.
5. The method for producing a meat-like processed product according to claim 4, wherein an increase in the mass of the vegetable protein ingredient is 41% or less by mass when the vegetable protein ingredient is brought into contact with the texture-improving composition for a meat-like food product at 20°C for 10 minutes.
6. The method for producing a meat-like processed product according to either one of claims 4 and 5, wherein in the mixed composition production step, the temperature of the texture-improving composition for a meat-like food product is below the slipping point of the oil phase when the vegetable protein ingredient is brought into contact with the texture-improving composition for a meat-like food product.
7. A method for producing a meat-like food product, comprising a step of heat cooking a meat-like processed product obtained by the method for producing a meat-like processed product according to any one of claims 4 to 6.

8. A meat-like food product comprising a vegetable protein ingredient and an oil and fat,
the meat-like food product containing no fish or animal meat or containing fish or animal meat in an amount of 30% or less by mass relative to 100% by mass of the meat-like food product as a whole, and
having a region where the shear force is 20 N/mm·sec or less when the meat-like food product is at any temperature between 50°C and 55°C (inclusive).
9. A meat-like food product comprising a vegetable protein ingredient and an oil and fat,
the meat-like food product containing no fish or animal meat or containing fish or animal meat in an amount of 30% or less by mass relative to 100% by mass of the meat-like food product as a whole, and
having a drip rate of 1% or more and 5% or less by mass relative to 100% by mass of the meat-like food product as a whole.
10. The meat-like food product according to either one of claims 8 and 9, which is obtained by heating a meat-like processed product containing a composition that has an oil phase with a solid fat content of 1% or more and 70% or less at 20°C as a continuous phase.
11. The meat-like food product according to any one of claims 8 to 10, which is obtained by heating a meat-like processed product containing a composition that has an oil phase as a continuous phase and a Brookfield viscosity of 100 cps or more and 20,000 cps or less (100 mPa·s or more and 20,000 mPa·s or less) at 20°C.