

DESCRIPTION

OIL AND FAT TEXTURAL ATTRIBUTE ENHANCER FOR FOOD PRODUCT, AND
METHOD FOR ENHANCING TEXTURAL ATTRIBUTES OF OIL AND FAT IN
FOOD PRODUCT

5 TECHNICAL FIELD

[0001]

The present invention relates to an oil and fat textural
attribute enhancer for a food product, a method for
manufacturing the oil and fat textural attribute enhancer, an
10 edible oil and fat composition, a food product, a method for
manufacturing the food product, and a method for enhancing the
textural attributes of oil and fat in a food product.

BACKGROUND ART

[0002]

15 In recent years, interest in low-fat and low-calorie food
products has increased due to increasing awareness of health
concerns in consumers and for the purpose of preventing
lifestyle-based diseases and metabolic syndrome. There is also
a desire to increase the tastiness contributed by oils and
20 fats even in meat, seafood, etc., that has a low oil and fat
content. The mechanism contributing to oil- and fat-derived
tastiness has not been elucidated, but because there is a
tastiness unique to oil and fat, food products containing
large amounts of oil and fat still remain popular even as
25 interest in low-fat and low-calorie food products has
increased.

[0003]

Food products in which the amount of oil and fat is reduced to achieve a low-fat and low-calorie effect, and furthermore in which the textural attributes of oil and fat are perceptible, are being developed. Techniques for enhancing the tastiness contributed by oils and fats in a food product containing little oil and fat are also being developed.

[0004]

For example, Patent Document 1 discloses a low-oil-and-fat emulsified condiment containing octanoic acid and/or decanoic acid, and indicates that an oil-and-fat-like richness in the condiment is thereby increased.

[Related Art Documents]

[Patent Documents]

[0005]

[Patent Document 1] Japanese Laid-Open Patent Application No. 2016-174541

DISCLOSURE OF THE INVENTION

[Problems the Invention is Intended to Solve]

[0006]

The technique described above is effective for imparting the textural attributes of oil and fat to a condiment, but there is still room for improvement in terms of enhancing the textural attributes of oil and fat in condiments and other food products.

[0007]

It is accordingly an object of the present invention to provide a novel oil and fat textural attribute enhancer with which it is possible to enhance the textural attributes of oil and fat in a food product, and a method for enhancing the textural attributes of oil and fat in a food product.

[Means for Solving the Problems]

[0008]

As a result of thorough investigations, the inventors discovered that incorporating a carotenoid degradation product into a food product enhances the textural attributes of oil and fat.

[0009]

Specifically, the present invention provides an oil and fat textural attribute enhancer for a food product containing, as an active ingredient, an oxidation treatment product of a palm-based oil and fat in which the total α -carotene and β -carotene content is 50 mass ppm or more and 2000 mass ppm or less, the peroxide value of the oxidation treatment product being 3 or more and 250 or less. The present invention also provides an edible oil and fat composition containing the aforementioned oil and fat textural attribute enhancer. The "oil and fat textural attributes" in the present invention refer to a strong sensation of the oil and fat/fattiness, or richness, perceived when a food product is brought into the oral cavity.

[0010]

The β -carotene content is preferably 20 mass ppm or more and 1500 mass ppm or less. The iodine value of the palm-based oil and fat is preferably 0 or more and 80 or less.

5 [0011]

The oil and fat textural attribute enhancer for a food product of the present invention preferably contains 0.001 mass% or more and 100 mass% or less of the oxidation treatment product. The oil and fat textural attribute enhancer for a
10 food product of the present invention preferably is in a powdered form.

[0012]

The present invention furthermore provides a food product containing the aforementioned oil and fat textural attribute
15 enhancer for a food product. The oil and fat content of the food product is preferably 0.1 mass% or more and 85 mass% or less. The food product is preferably one selected from the group consisting of dressings, roux, sauces, soups, and chocolate products.

20 [0013]

The present invention furthermore provides a method for enhancing the oil and fat textural attributes of a food product, the method involving adding, to the food product, an oxidation treatment product that is obtained by performing an
25 oxidation treatment on a palm-based oil and fat in which the total α -carotene and β -carotene content is 50 mass ppm or more

and 2000 mass ppm or less, the peroxide value of the oxidation treatment product being 3 or more and 250 or less. In this method, the oxidation treatment product is preferably added in an amount of 1×10^{-8} mass% or more and 10 mass% or less.

5 [0014]

The present invention furthermore provides a method for manufacturing an oil and fat textural attribute enhancer for a food product containing an oxidation treatment product as an active ingredient, the manufacturing method including a step
10 for performing an oxidation treatment on a palm-based oil and fat in which the total α -carotene and β -carotene content is 50 mass ppm or more and 2000 mass ppm or less, so that the peroxide value reaches 3 or more and 250 or less.

[0015]

15 The step for performing an oxidation treatment preferably includes heating for 0.1 hours or more and 240 hours or less at a temperature of 50°C or more and 220°C or less. The step for performing an oxidation treatment preferably also includes supplying oxygen to the palm-based oil and fat.

20 [0016]

In the step for performing an oxidation treatment, the total α -carotene and β -carotene content is preferably reduced by 20 mass ppm or more and 2000 mass ppm or less.

[0017]

25 The present invention furthermore provides a method for manufacturing a food product by adding, to the food product,

the aforementioned oil and fat textural attribute enhancer for a food product or the aforementioned edible oil and fat composition.

[0018]

5 The present invention furthermore provides an oil and fat textural attribute enhancer for a food product containing a degradation product of a carotenoid as an active ingredient. The present invention also provides an edible oil and fat composition containing the aforementioned oil and fat textural
10 attribute enhancer for a food product.

[0019]

 The carotenoid is preferably one or more selected from the group consisting of α -carotene, β -carotene, retinol, lutein, canthaxanthin, β -cryptoxanthin, bixin, norbixin,
15 astaxanthin, zeaxanthin, fucoxanthin, violaxanthin, lycopene, crocin, crocetin, and capsanthin.

[0020]

 The oil and fat textural attribute enhancer for a food product preferably includes an edible oil and fat having an
20 iodine value of 0 or more and 140 or less. The edible oil and fat is preferably one or more selected from the group consisting of medium-chain fatty acid triglycerides (also referred to as medium chain triglycerides (MCT) below), coconut oil, fully hydrogenated oils, rapeseed oil, and palm-
25 based oils and fats.

[0021]

The present invention furthermore provides a food product containing the aforementioned oil and fat textural attribute enhancer for a food product. The oil and fat content of the food product is preferably 0.1 mass% or more and 85 mass% or less. The food product is preferably one selected from the group consisting of dressings, roux, sauces, soups, and chocolate products.

[0022]

The present invention furthermore provides a method for enhancing the oil and fat textural attributes of a food product by adding a degradation product of a carotenoid to the food product.

[0023]

The present invention furthermore provides a method for manufacturing an oil and fat textural attribute enhancer for a food product containing a degradation product of a carotenoid as an active ingredient, the method including a step for adding the carotenoid to an edible oil and fat, and a step for degrading the carotenoid in the edible oil and fat.

[0024]

The step for degrading the carotenoid preferably includes heating for 0.1 hours or more and 240 hours or less at a temperature of 50°C or more and 220°C or less. The step for degrading the carotenoid preferably also includes supplying oxygen to the edible oil and fat.

[0025]

The present invention furthermore provides a method for manufacturing a food product by adding, to the food product, the aforementioned oil and fat textural attribute enhancer for a food product or the aforementioned edible oil and fat composition. In this manufacturing method, there are included a step for adding a carotenoid to an edible oil and fat, and a step for degrading the carotenoid in the edible oil and fat, the oil and fat textural attribute enhancer for a food product or the edible oil and fat composition being added to the food product so that the total of the carotenoid content after the carotenoid-degradation step and the degradation product content, in terms of the amount of carotenoid before the carotenoid-degradation step, reaches 1×10^{-15} mass% or more and 1.5 mass% or less.

[0026]

[Effect of the Invention]

The oil and fat textural attribute enhancer for a food product according to the present invention makes it possible to enhance the textural attributes of oil and fat in a food product to which the present invention is applied with a lower oil and fat content than in the prior art. In addition, the food product containing an oil and fat textural attribute enhancer for a food product according to the present invention can have enhanced textural attributes of oil and fat with a lower oil and fat content than in the prior art. This makes it

possible to realize a food product in which the amount of oil and fat is reduced to achieve a low-fat and low-calorie effect, and furthermore in which the textural attributes of oil and fat are perceptible.

5 EMBODIMENT FOR CARRYING OUT THE INVENTION

[0027]

[First embodiment]

 An oil and fat textural attribute enhancer for a food product (also referred to simply as an oil and fat textural
10 attribute enhancer below), a method for manufacturing the oil and fat textural attribute enhancer, an edible oil and fat composition, a food product, a method for manufacturing the food product, and a method for enhancing the textural
15 attributes of oil and fat in a food product according to a first embodiment of the present invention are described below.

[0028]

 The oil and fat textural attribute enhancer for a food product in the first embodiment of the present invention contains, as an active ingredient, an oxidation treatment
20 product of a palm-based oil and fat in which the total α -carotene and β -carotene content is 50 mass ppm or more and 2000 mass ppm or less.

[0029]

 The total α -carotene and β -carotene content is preferably
25 50 mass ppm or more and 1500 mass ppm or less, more preferably 80 mass ppm or more and 1000 mass ppm or less, even more

preferably 100 mass ppm or more and 800 mass ppm or less, and particularly preferably 150 mass ppm or more and 600 mass ppm or less. One palm-based oil and fat may be used alone, or two or more thereof may be blended together, provided that the total α -carotene and β -carotene content is within the range described above.

[0030]

The β -carotene content of the palm-based oil and fat is preferably 20 mass ppm or more and 1500 mass ppm or less, more preferably 20 mass ppm or more and 1000 mass ppm or less, even more preferably 20 mass ppm or more and 500 mass ppm or less, yet even more preferably 80 mass ppm or more and 500 mass ppm or less, and particularly preferably 80 mass ppm or more and 350 mass ppm or less.

[0031]

The palm-based oil and fat referred to above includes palm oil and processed oils and fats that are obtained by fractionating, hydrogenating, transesterifying, or otherwise processing palm oil as a raw material. Specific examples include palm oil, palm olein, palm stearin, palm super olein, palm double olein, palm mid-fraction, soft palm, hard stearin, and materials obtained by hardening these. Among these palm-based oils and fats, those having an iodine value ("IV") of 0 or more and 80 or less are preferred, those having an IV of 20 or more and 80 or less are more preferred, those having an IV of 40 or more and 75 or less are even more preferred, those

having an IV of 50 or more and 75 or less are yet even more preferred, and those having an IV of 50 or more and 70 or less are particularly preferred. The iodine value can be measured in conformance with "Standard methods for the analysis of fats, oils and related materials: 2.3.4 Iodine value" (Japan Oil Chemists' Society).

[0032]

The palm oil in the present embodiment is to be obtained from fruit of oil palms, and may be subjected to one or more treatments such as fractionation, degumming, deacidification, decoloration, and deodorization. There are no particular limitations as to the methods for carrying out these treatments; methods that are normally used in treatments for processing and refining oil and fat can be employed. For example, the fractionation can be carried out through solvent fractionation or low-temperature filtration.

[0033]

The peroxide value ("POV") of the oxidation treatment product described above is 3 or more and 250 or less. If the peroxide value is less than 3, the oxidation treatment product will tend not to sufficiently enhance the textural attributes of oil and fat. The peroxide value is preferably 3 or more and 220 or less, more preferably 5 or more and 220 or less, even more preferably 8 or more and 220 or less, yet even more preferably 8 or more and 180 or less, and particularly preferably 10 or more and 150 or less. One oxidation treatment

product may be used alone, or two or more thereof may be blended together. When two or more blended oxidation treatment products are used, the peroxide value of the oxidation treatment products overall is to be within the range described above. The peroxide value can be set within the range described above by adjusting the extent of oxidation during a treatment for oxidizing the palm-based oil and fat (described in detail below).

[0034]

The peroxide value of the oxidation treatment product can be measured by reacting potassium iodide with a sample and titrating free iodine from the potassium iodide through use of a hydroperoxide in the oil and fat, or by other methods. More specifically, the peroxide value can be measured in conformance with "Standard methods for the analysis of fats, oils and related materials: 2.5.2 Peroxide value" (Japan Oil Chemists' Society).

[0035]

The oil and fat textural attribute enhancer for a food product in the present embodiment preferably contains 0.001 mass% or more and 100 mass% or less of the oxidation treatment product, more preferably contains 0.005 mass% or more and 100 mass% or less thereof, even more preferably contains 0.005 mass% or more and 50 mass% or less thereof, and yet even more preferably contains 0.005 mass% or more and 10 mass% or less thereof. Using such an oxidation treatment product content

makes it possible to effectively enhance the textural attributes of oil and fat in the food product. Specifically, it is possible to perceive a strong sensation of the oil and fat/fattiness, or richness, as if there was a high oil and fat content even with a low amount of oil and fat. In addition, one or more oxidation treatment products contained as described above may be used. When two or more are used, the oxidation treatment product content of the oil and fat textural attribute enhancer for a food product is the total amount for the two or more oxidation treatment products.

[0036]

Additives that are normally added to edible oils and fats may be blended into the oil and fat textural attribute enhancer for a food product, within a range in which the desired function of the oil and fat textural attribute enhancer is not hindered. Examples of additives include: lignan, coenzyme Q, γ -oryzanol, ascorbic acid fatty acid ester, tocopherol, rosemary extract, and other antioxidants; flavoring materials, spice extracts, animal extracts, fatty acids, and other flavor-imparting agents; emulsifiers; silicone and other antifoaming agents; and colorants.

[0037]

The oil and fat textural attribute enhancer for a food product in the present embodiment is to be in the form of a condiment or another form suitable for addition to a food product. Specific examples can include a variety of forms such

as liquid forms diluted with edible oil and fat, powdered forms, solution forms in which the amount of oil and fat components blended is less than in the liquid forms, gel forms, granular forms, and solid forms. For example, examples of the solid forms include margarine, shortening, and fast spread. Examples of the solution forms include batter liquid, breader, pickle liquid, and tumpling liquid.

[0038]

For example, in the case of a liquid form diluted with an edible oil and fat, the oxidation treatment product content is preferably 0.001 mass% or more and 50 mass% or less, more preferably 0.005 mass% or more and 50 mass% or less, even more preferably 0.01 mass% or more and 50 mass% or less, and yet even more preferably 0.01 mass% or more and 20 mass% or less relative to the edible oil and fat. Examples of the edible oil and fat include: rapeseed oil, soybean oil, palm oil, palm kernel oil, corn oil, olive oil, sesame oil, safflower oil, sunflower oil, cottonseed oil, rice bran oil, peanut oil, coconut oil, cacao fat, and other vegetable oils and fats; beef tallow, lard, chicken fat, milk fat, and other animal oils and fats; and medium-chain fatty acid triglycerides. In addition, processed oils and fats such as fractionated oils (medium-boiling-point portion of palm oil, soft fractionated palm oils, hard fractionated palm oils, etc.), transesterified oils, and hydrogenated oils of these edible oils and fats can

be used. One of the edible oils and fats may be used alone, or two or more thereof may be blended together.

[0039]

In the case of a powdered form, the oil and fat textural attribute enhancer for a food product contains the oxidation treatment product described above, an edible oil and fat, a diluent, and, as needed, an emulsifier and a pH adjuster. For example, an oil and fat that is the same as the edible oil and fat used in diluting a liquid-form oil and fat textural attribute enhancer can be used as the edible oil and fat.

[0040]

A diluent that is normally used when forming oils and fats into powdered forms may be used as the diluent. Specific examples include: milk protein, soybean protein, wheat protein, whole milk powder, skimmed milk powder, whey powder, buttermilk powder, collagen, gelatin, and other proteins, as well as degradation products of these proteins; glucose, fructose, galactose, mannose, and other monosaccharides; lactose, sucrose, maltose, trehalose, and other disaccharides; corn syrup, dextrin, oligosaccharides, and other starch degradation products; starches; polysaccharide thickeners; and sugar alcohols. One of these diluents may be used alone, or two or more thereof may be used in combination.

[0041]

There is no particular limitation as to the emulsifier, provided that the emulsifier is for use in a food product.

Examples of the emulsifier include lecithin, monoglycerin fatty acid esters, glycerin organic acid fatty acid esters, polyglycerin fatty acid esters, polyglycerin condensed ricinoleic acid esters, sorbitan fatty acid esters, sucrose fatty acid esters, propylene glycol fatty acid esters, polyoxyethylene sorbitan fatty acid esters, and stearyl calcium lactate.

[0042]

There is no particular limitation as to the pH adjuster, provided that the pH adjuster is for use in a food product. Examples of the pH adjuster include adipic acid, citric acid, trisodium citrate, gluconic acid, succinic acid, lactic acid, potassium carbonate, sodium hydrogen carbonate, sodium hydrogen phosphate, dipotassium hydrogen phosphate, sodium pyrophosphate, sodium metaphosphate, and sodium polyphosphate.

[0043]

The oil and fat textural attribute enhancer for a food product that has this configuration can be formed into an edible oil and fat composition by addition to another edible oil and fat. Oil and fat that is the same as that exemplified as the edible oil and fat used in diluting a liquid-form oil and fat textural attribute enhancer described above can be used as the edible oil and fat.

[0044]

An oil and fat textural attribute enhancer in a liquid form, a powdered form, or various other forms can also be

considered to be one aspect of the edible oil and fat composition of the present embodiment. Substances in which the powdered-form oil and fat textural attribute enhancer is added to another edible oil and fat also can be cited as examples of the edible oil and fat composition of the present embodiment.

[0045]

There is no particular limitation as to the blending ratio of the oil and fat textural attribute enhancer for a food product and the edible oil and fat in the edible oil and fat composition. However, from the standpoint of preventing loss of desired functionality of the oil and fat textural attribute enhancer, the oxidation treatment product content of the edible oil and fat composition is preferably 1×10^{-8} mass% or more and less than 100 mass%, more preferably 1×10^{-7} mass% or more and less than 100 mass%, even more preferably 1×10^{-6} mass% or more and less than 100 mass%, and yet even more preferably 1×10^{-5} mass% or more and less than 100 mass%.

[0046]

The oil and fat textural attribute enhancer for a food product having the configuration described above can be manufactured as follows.

[0047]

First, a palm-based oil and fat in which the total α -carotene and β -carotene content is 50 mass ppm or more and 2000 mass ppm or less is set to use. The palm-based oil and fat is next subjected to an oxidation treatment to produce an

oxidation treatment product in which the peroxide value is 3 or more and 250 or less. An additive, an edible oil and fat, a diluent, an emulsifier, a pH adjuster, etc., are then added as needed and a desired form is achieved, whereby an oil and fat textural attribute enhancer for a food product according to the present embodiment is obtained. In the resultant oil and fat textural attribute enhancer for a food product, the total α -carotene and β -carotene content is preferably reduced by 20 mass ppm or more and 2000 mass ppm or less, more preferably reduced by 20 mass ppm or more and 1500 mass ppm or less, even more preferably reduced by 20 mass ppm or more and 1000 mass ppm or less, and yet even more preferably reduced by 20 mass ppm or more and 800 mass ppm or less, from the amount prior to the oxidation treatment.

[0048]

The treatment for oxidizing the palm-based oil and fat is preferably a heating treatment. In that case, from the standpoint of production on an industrial scale, it is preferable to accommodate the palm-based oil and fat in a suitable container, such as a tank, that is provided with heating means that heats via, e.g., thermoelectric conversion, direct-flame burners, microwaves, steam, or hot blasts of air, and heat the contents. The heating temperature is preferably 50°C or more and 220°C or less, and more preferably 60°C or more and 160°C or less. The heating time is preferably 0.1 hours or more and 240 hours or less, and more preferably one

hour or more and 200 hours or less. Employing these heating conditions makes it possible to suitably adjust the extent of oxidation and facilitates obtaining of an oxidation treatment product having a peroxide value of 3 or more and 250 or less.

5 [0049]

During the oxidation treatment, it is preferable to supply oxygen by taking up oxygen from open space in the container through use of a stirrer, or by blowing in oxygen. Air may be used as an oxygen source. This promotes oxidation
10 of the palm-based oil and fat. The amount of oxygen supplied is preferably set to 0.001-2 L/min per kilogram of palm-based oil and fat. For example, when the oxygen source is air, the amount of oxygen supplied is preferably 0.005-10 L/min, and more preferably 0.01-5 L/min, per kilogram of palm-based oil
15 and fat.

[0050]

In manufacturing of a powdered oil and fat textural attribute enhancer, a mixture containing, e.g., the oxidation treatment product produced as described above, an edible oil
20 and fat, a diluent, water, and, as needed, an emulsifier and a pH adjuster is stirred using an emulsification means to obtain an O/W emulsion, and the O/W emulsion is furthermore subjected to dry powderization. The resultant powder may be crushed, granulated, classified, or otherwise treated as necessary. A
25 homomixer, a high-pressure homogenizer, a thin-film turning high-speed mixer, a colloid mill, an attritor mill, etc., can

be used as the emulsification means. Examples of the method for dry powderization include: methods in which drying such as freeze-drying, vacuum drying, or drum drying is combined with powderization such as freeze pulverization or airflow pulverization; and methods in which drying such as spray drying or spray freezing and powderization are performed simultaneously.

[0051]

The oil and fat textural attribute enhancer for a food product manufactured in this manner can enhance the textural attributes of oil and fat in a food product by addition thereto. The oil and fat content of the food product to which the present invention is applied is preferably 0.1 mass% or more and 85 mass% or less, more preferably 0.1 mass% or more and 70 mass% or less, and even more preferably 0.1 mass% or more and 60 mass% or less. When the oil and fat textural attribute enhancer for a food product of the present embodiment is applied to a food product having the prescribed oil and fat content, it is possible to effectively enhance the textural attributes of oil and fat.

[0052]

The oil and fat textural attribute enhancer for a food product containing the oxidation treatment product of the present embodiment can enhance the textural attributes of oil and fat in a food product by being used as a cooking oil, such as loosening oil, fried-rice-cooking oil, frying oil, or

roasting oil, or being used as a seasoning oil, such as thickening oil, oil for injection, or finishing oil, during cooking, processing, manufacturing, etc., of the food product. This oil and fat textural attribute enhancer also can enhance the textural attributes of oil and fat in a food product by being combined with the food product through addition, mixing, coating, dissolution, dispersion, emulsion, etc., after the cooking, processing, manufacturing, etc., of food product.

[0053]

In the food product of the present embodiment, the amount of the oil and fat textural attribute enhancer for a food product blended into the food product is to be set to a suitable desired value in accordance with, *inter alia*, the characteristics and ease of handling of the food product, and is not particularly limited. In the food product containing the oil and fat textural attribute enhancer for a food product of the present embodiment, it is preferable to add 1×10^{-8} mass% or more and 10 mass% or less of the oxidation treatment product contained in the oil and fat textural attribute enhancer for a food product, more preferable to add 1×10^{-7} mass% or more and 10 mass% or less of the oxidation treatment product, and even more preferable to add 1×10^{-6} mass% or more and 10 mass% or less of the oxidation treatment product. Textural attributes of oil and fat are effectively obtained in the food product containing the oxidation treatment product in this concentration.

[0054]

The oil and fat textural attribute enhancer for a food product of the present embodiment is suitably applied specifically to dressings, roux, sauces, soups, chocolate products, etc. The oil and fat textural attribute enhancer for a food product of the present embodiment can also be applied to: whipped cream; sponge cakes, pancakes, madeleines, and other cakes; and cookies and other Western confectioneries. The oil and fat textural attribute enhancer for a food product of the present embodiment can furthermore be applied to bread, doughnuts, and other bakery food products. In addition, the oil and fat textural attribute enhancer for a food product of the present embodiment can also be applied to meat and seafood having a lower oil and fat content than the normal oil and fat content for food products (refer to the triacyl glycerol equivalent or fat content of the food products disclosed in "Outline of Standard Tables of Food Composition in Japan: 2015 (Seventh Revised Edition)"), e.g., having an oil and fat content of 75 mass% or less, and to processed food products of such meat and seafood. Examples of meat and seafood having a low oil and fat content, and processed products of such meat and seafood, include: non-fried food products cooked by heating using an oven, steam, etc.; ham, *yaki-niku*, grilled chicken, steak, grilled fish, and grilled shrimp; fried pork cutlet, fried beef cutlet, fried chicken cutlet, *kara-age*, *tatsuta-age*, fried chicken, fried salmon, fried horse

mackerel, fried Atka mackerel, fried chub mackerel, fried white-flesh fish such as Pacific cod, fried shrimp, and other fried food products; and dried Atka mackerel and other dried fish.

5 [0055]

"Dressing" indicates liquid condiments that are manufactured by adding table salt, sugars, spices, herbs, alcohol, etc., to vinegar or citrus fruits and oil and fat. Specific examples include mayonnaise-like condiments, French
10 dressing, Japanese-style dressing, sesame dressing, thousand island dressing, Caesar salad dressing, creamy salad dressing, cole slaw dressing, salad dressing, sandwich spreads, cheese dressing, Italian dressing, Chinese-style dressing, and tartar sauce. Dressings having an oil and fat content of 1 mass% or
15 more and 40 mass% or less are preferred as the dressing to which the oil and fat textural attribute enhancer for a food product of the present embodiment is applied.

[0056]

"Roux" indicates paste-, granular-, or block-form
20 substances in which wheat flour or another type of flour is cooked by heating using an oil and fat such as butter. Specific examples include curry roux, hash roux, white roux, demiglace roux, pasta roux, béchamel roux, velouté roux, espagnole roux, stew roux, and potage roux. Roux having an oil
25 and fat content of 5 mass% or more and 50 mass% or less are preferred as the roux to which the oil and fat textural

attribute enhancer for a food product of the present embodiment is applied.

[0057]

"Sauce" indicates liquid- or paste-form substances created during normal cooking, and sauces commercially available for any cooking such as Worcestershire sauce. Specific examples include curry sauce, hash sauce, white sauce, demiglace sauce, pasta sauce, béchamel sauce, velouté sauce, espagnole sauce, stew sauce, potage sauce,

Worcestershire sauce, medium-thick sauce, and thick sauce.

Sauces having an oil and fat content of 0.1 mass% or more and 30 mass% or less are preferred as the sauce to which the oil and fat textural attribute enhancer for a food product of the present embodiment is applied.

[0058]

"Soup" indicates high-moisture-content cuisine obtained by thoroughly boiling meat, vegetables, seafood, etc. Specific examples include: broths for hot pot, soba, udon, ramen, pasta, etc.; and consommé soup, egg soup, wakame soup, shark fin soup, potage soup, onion soup, corn soup, Chinese soup, borscht, miso soup, and clear-broth soup. Soups having an oil and fat content of 0.1 mass% or more and 5 mass% or less are preferred as the soup to which the oil and fat textural attribute enhancer for a food product of the present

embodiment is applied.

[0059]

"Chocolate product" indicates chocolate, or quasi-chocolate, chocolate confections, and quasi-chocolate confections in which the quantity or blending ratio of cacao
5 differs from that of chocolate,. Specific examples include dark chocolate, sweet chocolate, milk chocolate, white chocolate, chocolate biscuits, and chocolate candies. Chocolate products having an oil and fat content of 10 mass% or more and 80 mass% or less are preferred as the chocolate
10 product to which the oil and fat textural attribute enhancer for a food product of the present embodiment is applied.

[0060]

[Second embodiment]

An oil and fat textural attribute enhancer for a food
15 product (also referred to simply as an oil and fat textural attribute enhancer below) according to a second embodiment of the present invention has a carotenoid degradation product as an active ingredient.

[0061]

20 Examples of the carotenoid used in the present embodiment include: carotenes such as α -carotene, β -carotene, γ -carotene, δ -carotene, ϵ -carotene, lycopene, neurosporene, phytoene, and phytofluene; xanthophylls such as lutein, canthaxanthin, β -cryptoxanthin, astaxanthin, zeaxanthin, fucoxanthin,
25 violaxanthin, capsanthin, antheraxanthin, citranaxanthin, diadinoxanthin, diatoxanthin, flavoxanthin, neoxanthin,

rhodoxanthin, and rubixanthin; and apocarotenoids such as
bixin, norbixin, crocin, crocetin, abscicic acid,
apocarotenal, ionone, peridinin, retinol, retinal, and
retinoic acid. Among these carotenoids, one or more selected
5 from the group consisting of α -carotene, β -carotene, retinol,
lutein, canthaxanthin, β -cryptoxanthin, bixin, norbixin,
astaxanthin, zeaxanthin, fucoxanthin, violaxanthin, lycopene,
crocin, crocetin, and capsanthin are preferred, and α -
carotene, β -carotene, or astaxanthin is more preferred.

10 [0062]

One carotenoid degradation product may be used, or two or
more carotenoid degradation products may be used. A carotenoid
that is an edible pigment, etc., approved or acknowledged as a
food product additive can be more preferably used because the
15 safety thereof for eating is generally recognized.

[0063]

The oil and fat textural attribute enhancer for a food
product of the present embodiment preferably contains an
edible oil and fat. Examples of the edible oil and fat
20 include: soybean oil, rapeseed oil, palm oil, corn oil, olive
oil, sesame oil, safflower oil, sunflower oil, cottonseed oil,
rice bran oil, peanut oil, palm kernel oil, coconut oil, cacao
fat, and other vegetable oils and fats; beef tallow, lard,
chicken fat, milk fat, and other animal oils and fats; medium-
25 chain fatty acid triglycerides; and processed oils and fats in
which these edible oils and fats are fractionated,

hydrogenated, transesterified, etc. One edible oil and fat may be used alone, or two or more thereof may be mixed. Among these edible oils and fats, those having an iodine value of 0 or more and 140 or less are preferred. The edible oil and fat is preferably one or more selected from the group consisting of medium-chain fatty acid triglycerides, coconut oil, fully hydrogenated oils, rapeseed oil, and palm-based oils, and is particularly preferably a medium-chain fatty acid triglyceride. Examples of the fully hydrogenated oils include fully hydrogenated versions of soybean oil, rapeseed oil, palm oil, corn oil, olive oil, sesame oil, safflower oil, sunflower oil, cottonseed oil, rice bran oil, peanut oil, palm kernel oil, and coconut oil. Among these fully hydrogenated oils, fully hydrogenated palm kernel oil is particularly preferred.

[0064]

Additives that are normally added to edible oils and fats may be blended into the oil and fat textural attribute enhancer for a food product of the present embodiment, within a range in which the desired function of the oil and fat textural attribute enhancer is not hindered, in the same manner as with the oil and fat textural attribute enhancer for a food product according to the first embodiment described previously. The oil and fat textural attribute enhancer for a food product of the present embodiment can also be in a variety of forms suitable for use by addition to a condiment or other food product. The oil and fat textural attribute

enhancer for a food product of the present embodiment can also be added to another edible oil and fat to form an edible oil and fat composition, and an oil and fat textural attribute enhancer in a liquid form, a powdered form, or various other forms can also be considered to be one aspect of the edible oil and fat composition of the present embodiment.

[0065]

The oil and fat textural attribute enhancer for a food product having the configuration described above can be manufactured as follows.

[0066]

First, an edible oil and fat is set to use, and a carotenoid is added to the edible oil and fat. One type of carotenoid may be used alone, or two or more types thereof may be used in combination, in which case the carotenoids may be used in a mixed state. The carotenoid in the edible oil and fat is next degraded. An additive, an edible oil and fat, a diluent, an emulsifier, a pH adjuster, etc., are then added as needed to the carotenoid degradation treatment product and a desired form is achieved, whereby an oil and fat textural attribute enhancer for a food product according to the present embodiment is obtained.

[0067]

The carotenoid is added to the edible oil and fat so that the carotenoid content reaches 0.003 mass% or more and 5 mass%

or less, preferably 0.003 mass% or more and 4 mass% or less,
and more preferably 0.003 mass% or more and 3 mass% or less.

[0068]

There is no particular limitation as to the means for
5 degrading the carotenoid, but a heat treatment is preferred.
When doing that, it is preferable to use the same conditions
for device, temperature, and time as in the heat treatment of
the palm-based oil and fat in the first embodiment described
previously. It is also preferable to supply oxygen to the
10 edible oil and fat when degrading the carotenoid, in the same
manner as with the first embodiment.

[0069]

The oil and fat textural attribute enhancer for a food
product manufactured in this manner can enhance the textural
15 attributes of oil and fat in a food product by addition
thereto, in the same manner as the oil and fat textural
attribute enhancer for a food product according to the first
embodiment. During manufacturing of a food product of the
present embodiment, the oil and fat textural attribute
20 enhancer for a food product is preferably added to the food
product so that the total amount for the carotenoid and the
degradation product thereof, in terms of the amount of
carotenoid before degradation, reaches 1×10^{-15} mass% or more
and 1.5 mass% or less, a more preferred amount being 1×10^{-14}
25 mass% or more and 1.5 mass% or less, an even more preferred
amount being 1×10^{-13} mass% or more and 1.5 mass% or less, and a

yet even more preferred amount being 1×10^{-12} mass% or more and 1.5 mass% or less.

[0070]

The preferred oil and fat content of a food product to which the present invention is applied and the food products to which the present invention can be applied are also the same as in the first embodiment.

EXAMPLES

[0071]

The present invention is described in greater detail below by indicating examples of the present invention. However, the present invention is not limited to the examples given below.

[0072]

The raw-material oils and fats, oils and fats for dilution, base oils, and carotenoids used in the present examples and comparative examples are as follows.

(Palm-based oils and fats)

- Palm-based oil and fat 1 (iodine value: 58):
"Carotino pure olein", Carotino Group
- Palm-based oil and fat 2 (iodine value: 58): mixed oil of the palm-based oil and fat 1 and palm olein in a proportion of 1:2
- Palm-based oil and fat 3 (iodine value: 57): "EV Redpalm Oil", Rainforest Herb

- Palm-based oil and fat 4 (iodine value: 62):

"Carotino Premium", Carotino Group

- Palm olein (iodine value: 58): "Proprietary preparation", J-Oil Mills

5 (Fully hydrogenated oils)

- Fully hydrogenated palm kernel oil (iodine value: 1): "Proprietary preparation", J-Oil Mills

(Other edible oils and fats)

- Rapeseed oil (iodine value: 115): "Sarasara canola oil", J-Oil Mills; the carotenoids used in the present examples were not detected therein

- Medium-chain fatty acid triglyceride (iodine value: 0): "Coconard MT", Kao Corp.; the carotenoids used in the present examples were not detected therein

15 (β -carotene)

- " β -carotene 30% suspension liquid", DSM

(Astaxanthin)

- "Astaxanthin oil Astabio AR5", Biogenic Co., Ltd.

[0073]

20 Methods for measuring and evaluating the materials in the present examples and comparative examples are as follows.

[0074]

[Quantitative measurement of α -carotene, β -carotene, and lycopene]

The α -carotene, β -carotene, and lycopene were quantitatively measured through analysis by high-performance liquid chromatography (HPLC). Specifically, the substance to be measured was weighed to 0.5 g, diluted in a measuring flask to 10 mL by a liquid in which the ratio of acetone:tetrahydrofuran equaled 1:1, and applied for HPLC analysis, and the α -carotene content, β -carotene content, and lycopene content were quantitatively measured from standard curves. For the standard curves, α -carotene (model no. 035-17981), β -carotene (model no. 035-05531), and lycopene (model no. 125-04341) made by Wako Pure Chemical Industries, Ltd., were used as quantitative measurement preparations, and the standard curves were created from the peak areas upon apply to HPLC analysis for each prescribed concentration.

[0075]

The main device and analysis conditions for the HPLC are as follows.

(Device)

Detector: Photodiode array detector "2996 Photodiode Array Detector" (Waters)

(Conditions)

- Column: Shim-pack VP-ODS, 4.6 mmID $\times$ 250 mm, 4.6 μ m (Shimadzu Corp.)
- Column temperature: 50°C
- Injection amount: 5 μ L

- Flow rate: 1.2 mL/min
- Detection wavelength: 300-600 nm
- Mobile phase A: acetonitrile
- Mobile phase B: ethanol
- Mobile phase C: acetone
- Gradient conditions: shown in table 1.

[0076]

[Table 1]

Gradient conditions			
Minutes	A (vol%)	B (vol%)	C (vol%)
0	80	20	0
22.0	80	20	0
22.1	0	0	100
25.0	0	0	100
25.1	80	20	0
30.0	80	20	0

[0077]

[Quantitative measurement of astaxanthin, etc.]

The astaxanthin, retinol, zeaxanthin, and capsanthin were also quantitatively measured through analysis by HPLC.

Specifically, the substance to be measured was weighed to 2 g,

diluted in a measuring flask to 10 mL by acetone, and applied

for HPLC analysis, and the astaxanthin content, etc., were

quantitatively measured from standard curves. For the standard

curves, astaxanthin (model no. 600113) made by Medkoo

Biosciences, retinol (model no. R7632) made by Sigma,

zeaxanthin (model no. 0307S) made by Extrasynthese, and

capsanthin (model no. 207-364-1) made by LKL Laboratories, Inc. were used as quantitative measurement preparations, and the standard curves were created from the peak areas upon apply to HPLC analysis for each prescribed concentration.

5 [0078]

The main device and analysis conditions for the HPLC are as follows.

(Device)

Detector: Photodiode array detector "2996 Photodiode
10 Array Detector" (Waters)

(Conditions)

- Column: YMC Carotenoid, 4.6 mmID × 250 mm, 5 µm (YMC Co., Ltd.)
- Column temperature: 25°C
- 15 • Injection amount: 10 µL
- Flow rate: 1.0 mL/min
- Detection wavelength: 400-600 nm
- Mobile phase A: methanol
- Mobile phase B: tert-butylmethyl ether
- 20 • Mobile phase C: water
- Gradient conditions: shown in table 2.

[0079]

[Table 2]

Gradient conditions			
Minutes	A (vol%)	B (vol%)	C (vol%)
0	81	15	4
90.0	6	90	4
95.0	6	90	4
95.1	81	15	4
105.0	81	15	4

[0080]

5 [Measurement of peroxide value (POV)]

The peroxide value was measured in conformance with "Standard methods for the analysis of fats, oils and related materials: 2.5.2 Peroxide value" (Japan Oil Chemists' Society).

10 [0081]

[Measurement of iodine value (IV)]

The iodine value was measured in conformance with "Standard methods for the analysis of fats, oils and related materials: 2.3.4 Iodine value" (Japan Oil Chemists' Society).

15 [0082]

[Evaluation of oil and fat textural attributes]

The presence and extent of the textural attributes of oil and fat in food products to which the oxidation treatment product or the carotenoid degradation product according to the present examples was added were evaluated through sensory

evaluation by three to five expert panelists (described in detail below).

[0083]

[Production of oxidation treatment product]

5 (Example 1-1)

First, palm-based oil and fat 1 described as a raw-material oil and fat was set to use, the α -carotene content and β -carotene content thereof were quantitatively measured, and the peroxide value thereof was measured. As a result, it
10 was found that the α -carotene content was 238 mass ppm, the β -carotene content was 206 mass ppm, and the total amount for these components was 444 mass ppm. In addition, it was found that the peroxide value was 1. 240 g of the palm-based oil and fat was next introduced into a beaker, the oil and fat was
15 heated at 80°C for 182 hours during stirring in an oil bath while air was supplied in an amount of 0.2 L/min, and then the oil and fat was cooled, after which the oxidation treatment product in example 1-1 was obtained. The α -carotene content and β -carotene content of the resultant oxidation treatment
20 product were measured, whereupon it was found that the α -carotene content and β -carotene content were both 0 mass ppm, and that the α -carotene and β -carotene in the palm-based oil and fat 1 had been completely degraded. In addition, the peroxide value was measured. The peroxide value was 80.

25 [0084]

(Examples 1-2 to 1-26, comparative examples 1-1, 1-2)

In examples 1-2 to 1-26, oxidation treatment products were obtained in the same manner as in example 1-1, except that one or more of the heating temperature, the heating time, the amount of air supplied during heating, and the type of the raw-material oil and fat were changed as shown in table 3. In addition, as comparative example 1-1, the palm-based oil and fat 1 was set to use, and the α -carotene content, the β -carotene content, and the peroxide value thereof were derived without conducting an oxidation treatment. Furthermore, as comparative example 1-2, rapeseed oil was used as the raw-material oil and fat and was subjected to an oxidation treatment, and the values were measured in the same manner as in example 1-1. In example 1-6, etc., heating was performed at 120°C for five hours and then at 80°C for five hours. In addition, a plurality of lots of the palm-based oil and fat 1 were used. Instances where the α -carotene content and β -carotene content were the same were from the same lot, and instances where these values were different were from separate lots. The results obtained for examples 1-1 to 1-26 and comparative examples 1-1 and 1-2 are collectively shown in table 3.

[0085]

[Table 3]

	Raw-material oil and fat	Oxidation treatment conditions			Carotene content						Carotene reduction amount (mass ppm)	Peroxide value	
		Heating temp. (°C)	Heating time (Hours)	Oxygen supply amount (L/min)	α-carotene (mass ppm)		β-carotene (mass ppm)		Total (mass ppm)			Before oxidation treatment	After oxidation treatment
					Before oxidation treatment	After oxidation treatment	Before oxidation treatment	After oxidation treatment	Before oxidation treatment	After oxidation treatment			
Comparative example 1-1	Palm-based oil and fat 1	—	—	—	151	—	222	—	373	—	—	1	—
Example 1-1	Palm-based oil and fat 1	80	182	0.2	238	0	206	0	444	0	444	1	80
Example 1-2	Palm-based oil and fat 1	103	53	0.01	248	0	209	0	457	0	457	1	115
Example 1-3	Palm-based oil and fat 1	120	2	0.2	151	120	222	145	373	265	108	1	8
Example 1-4	Palm-based oil and fat 1	103	40	0.2	151	2	222	0	373	5	371	1	56
Example 1-5	Palm-based oil and fat 2	103	64	0.2	43	0	72	0	115	0	115	1	216
Example 1-6	Palm-based oil and fat 3	120→80	5→5	0.2	95	60	246	138	341	198	143	1	17

Example 1-7	Palm-based oil and fat 1	120→80	5→5	0.2	151	80	222	92	373	172	201	1	22
Example 1-8	Palm-based oil and fat 1	140	4	0.2	260	0	210	0	470	0	470	1	75
Example 1-9	Palm-based oil and fat 1	120	8	0.2	151	42	222	50	373	92	281	1	28
Example 1-10	Palm-based oil and fat 1	120	10	0.2	151	14	222	22	373	36	337	1	17
Example 1-11	Palm-based oil and fat 1	120	13	0.2	151	0	222	0	373	0	373	1	53
Example 1-12	Palm-based oil and fat 1	120	14	0.2	151	0	222	0	373	0	373	1	66
Example 1-13	Palm-based oil and fat 1	120	15.25	0.2	151	0	222	0	373	0	373	1	99
Example 1-14	Palm-based oil and fat 1	103	14	0.2	238	184	206	161	444	345	99	1	18
Example 1-15	Palm-based oil and fat 1	103	26	0.2	238	95	206	101	444	196	248	1	32
Example 1-16	Palm-based oil and fat 1	103	35	0.2	238	29	206	60	444	89	355	1	46
Example 1-17	Palm-based oil and fat 1	103	42	0.2	238	0	206	0	444	0	444	1	60

Example 1-18	Palm-based oil and fat 1	80	31	0.2	238	219	206	192	444	411	33	1	12
Example 1-19	Palm-based oil and fat 1	80	93	0.2	238	112	206	109	444	221	223	1	37
Example 1-20	Palm-based oil and fat 1	80	134	0.2	238	31	206	61	444	92	352	1	54
Example 1-21	Palm-based oil and fat 1	80	165	0.2	238	0	206	0	444	0	444	1	62
Example 1-22	Palm-based oil and fat 1	103	46	—	260	0	210	0	470	0	470	1	81
Example 1-23	Palm-based oil and fat 1	103	35	0.01	248	52	209	76	457	128	329	1	37
Example 1-24	Palm-based oil and fat 1	103	32	0.1	260	33	210	70	470	103	367	1	41
Example 1-25	Palm-based oil and fat 1	103	44	0.1	260	0	210	0	470	0	470	1	96
Example 1-26	Palm-based oil and fat 4	120→80	5→5	0.2	161	81	250	115	411	196	215	1	28
Comparative example 1-2	Rapeseed oil	120→80	5→5	0.2	0	0	0	0	0	0	0	0	49

[0086]

As shown in table 3, in examples 1-1 to 1-26, it was confirmed that subjecting a palm-based oil and fat containing α -carotene and β -carotene in the total amount according to the present invention to an oxidation treatment, specifically to heating, resulted in an increase in the value of the peroxide value, which had been 1 before the oxidation treatment, to within a range of 3-250, and also resulted in proceeding of oxidation. In addition, in examples 1-1 to 1-26, it was confirmed that subjecting a palm-based oil and fat containing α -carotene and β -carotene in the total amount according to the present invention to an oxidation treatment resulted in degradation of the α -carotene and β -carotene, with the total amount thereof decreasing by 30 mass ppm or more. In particular, it was understood that when the heating temperature was 100°C or more or the heating time was 100 hours or more, as in examples 1-1, 1-2, 1-5, etc., there was obtained an oxidation treatment product in which the α -carotene and β -carotene in the palm-based oil and fat had been completely degraded. Furthermore, from a comparison of example 1-2 and example 1-4, it was understood that the α -carotene and β -carotene can be degraded even in a low heating time if the amount of oxygen supplied is high. Also, from a comparison of example 1-16 and 1-23, it was understood that when the heating temperatures and the heating times are respectively equal, the

peroxide value is higher and oxidation is promoted in the instance in which the amount of oxygen supplied is higher.

[0087]

[Production of carotenoid degradation treatment product]

5 (Example 2-1)

First, a medium-chain fatty acid triglyceride (MCT; slight transparent yellow color) was set to use as an edible oil and fat (base oil), β -carotene was set to use as a carotenoid, the β -carotene was added to the base oil to
10 produce a carotenoid-added oil and fat, and the β -carotene content thereof was quantitatively measured. As a result, it was found that the β -carotene content was 30 mass ppm. 240 g of the carotenoid-added oil and fat was next introduced into a beaker, the oil and fat was heated at 80°C for 171 hours
15 during stirring in an oil bath, and the carotenoid degradation treatment product in example 2-1 was obtained. The β -carotene content of the resultant carotenoid degradation treatment product was measured, whereupon it was found that the β -carotene content was 0 mass ppm, and that the β -carotene in
20 the base oil had been completely degraded.

[0088]

(Examples 2-2 to 2-10, comparative examples 2-1, 2-2)

In examples 2-2 to 2-10, carotenoid degradation treatment products were obtained in the same manner as in example 2-1,
25 except that one or more of the type or amount of carotenoids added, the type of base oil, the heating temperature, the

heating time, and the amount of air supplied during heating were changed as shown in tables 4 and 5. In addition, as comparative example 2-1, β -carotene was added to a medium-chain fatty acid triglyceride, and the β -carotene content thereof was derived without conducting a heating treatment. Furthermore, as comparative example 2-2, rapeseed oil was used as a base oil, and the carotenoid content thereof before and after heating was measured without addition of carotenoids. In examples 2-2 to 2-5 and comparative example 2-2, the β -carotene content of the resultant carotenoid degradation treatment product was measured in the same manner as in example 2-1. In examples 2-6 to 2-10, the colors of the carotenoid-added oil and fat and the carotenoid degradation treatment product were compared. The results obtained for examples 2-1 to 2-10 and comparative examples 2-1 and 2-2 are collectively shown in table 4 or 5. The crocin content is a value calculated according to the added amount thereof.

[0089]

[Table 4]

	Edible oil and fat (base oil)	Iodine value of edible oil and fat	Carotenoid added	Carotenoid degradation conditions			Carotenoid content (mass ppm)		Carotenoid reduction amount (mass ppm)
				Heating temperature (°C)	Heating time (Hours)	Oxygen supply amount (L/min)	Before degradation	After degradation	
Comparative example 2-1	Medium-chain fatty acid triglyceride	0	β -carotene	—	—	—	53	—	0
Example 2-1	Medium-chain fatty acid triglyceride	0	β -carotene	80	171	—	30	0	30
Example 2-2	Medium-chain fatty acid triglyceride	0	β -carotene	140	3	0.2	60	0	60
Example 2-3	Medium-chain fatty acid triglyceride	0	β -carotene	120	7	0.2	28213	0	28213
Example 2-4	Medium-chain fatty acid triglyceride	0	β -carotene	120→80	5→5	0.2	53	0	53
Example 2-5	Rapeseed oil	115	β -carotene	120→80	5→5	0.2	53	0	53
Comparative example 2-2	Rapeseed oil	115	—	120→80	5→5	0.2	0	0	0

[0090]

[Table 5]

	Edible oil and fat (base oil)	Iodine value of edible oil and fat	Carotenoid added	Carotenoid degradation conditions			Pre-degradation carotenoid content (mass ppm)	Color of carotenoid-added oil and fat	Color of carotenoid degradation treatment product
				Heating temperature	Heating time	Oxygen supply amount			
				(°C)	(Hours)	(L/min)			
Example 2-6	Medium-chain fatty acid triglyceride	0	Astaxanthin	120→80	5→5	0.2	44	Red	Pink
Example 2-7	Medium-chain fatty acid triglyceride	0	Retinol	120→80	5→5	0.2	45	Dark yellow	Slightly yellow
Example 2-8	Medium-chain fatty acid triglyceride	0	Zeaxanthin	120→80	5→5	0.2	45	Orange	Slightly yellow
Example 2-9	Medium-chain fatty acid triglyceride	0	Capsanthin	120→80	5→5	0.2	45	Orange	Pale orange
Example 2-10	Medium-chain fatty acid triglyceride	0	Crocin	120→80	5→5	0.2	45	Yellow	Slightly yellow

[0091]

As shown in table 4, in examples 2-1 to 2-5, it was confirmed that heating the carotenoid-added oil and fat under prescribed conditions resulted in complete degradation of the carotenoids. From the results of example 2-1, it was understood that carotenoids can be degraded even when oxygen is not supplied during heating. Furthermore, as shown in table 5, in examples 2-6 to 2-10, it was confirmed that carotenoids with color are reduced in color or change to the color of the base oil due to degradation, and carotenoids were degraded.

[0092]

[Sensory evaluation of mayonnaise-like condiment]

The oil and fat textural attributes of mayonnaise-like condiments, to which the oil and fat textural attribute enhancers in examples 1-1 to 1-6 or examples 2-1 to 2-6 were added, were evaluated as follows.

[0093]

(Production of reference mayonnaise-like condiment)

Reference mayonnaise-like condiments having an oil fraction of 10 mass% or 80 mass% were obtained by mixing raw ingredients in the proportions listed in table 6.

[0094]

[Table 6]

Raw ingredients	Oil fraction 10 mass%	Oil fraction 80 mass%
Oil and fat (rapeseed oil)	30	240
Water	240	—
Starch ("A-13," J-Oil Mills Corp.)	15	—
Whole eggs	36	36
Table salt	3	3
Grain vinegar (Mizkan Co., Ltd.)	21	21
Total mass of blending amounts	345	300
Mass of completed article	300	300

(Units: g)

[0095]

5 Specifically, the reference mayonnaise-like condiment having an oil fraction of 10 mass% was obtained as follows. First, the starch and the water were introduced into a stainless steel flat-bottomed pot and mixed using a wooden spatula, and the mass (including the pot and the wooden

10 spatula) was measured using an electronic scale. The contents were next heated using an IH heater (model no. "KZ-PH1" (Matsushita Electric Industrial Co., Ltd.)), and the water was allowed to evaporate until the mass was reduced by 45 g to produce a paste. The heating was conducted, while the

15 temperature was set as appropriate, such that the bottom of the pot was scraped by the wooden spatula so as to prevent burning and sticking. Paste that had adhered to the wooden spatula was next returned to the pot, the produced paste was

transferred with the pot to a shallow tray filled with ice water, the pot was covered with a wrapping, and the paste was cooled. The cooled paste was then transferred to a 500-mL plastic cup, and the whole eggs were added and sufficiently
5 mixed using a rubber spatula, after which the oil and fat was added over the course of three instances, the contents were stirred for 30 seconds using a single-blade hand mixer at each instance, and a mixture was obtained. The amount of oil and fat added was 5 g in the first instance, 10 g in the second
10 instance, and 15 g in the third instance. Thereafter, the table salt was dissolved in the grain vinegar, the resultant dissolved substance was added to the mixture, the mixture and the dissolved substance were sufficiently stirred with a hand mixer to combine these components, and a reference mayonnaise-
15 like condiment having an oil fraction of 10 mass% was obtained.

[0096]

The reference mayonnaise-like condiment having an oil fraction of 80 mass% was obtained as follows. Specifically,
20 the whole eggs were first placed in a 500-mL plastic cup, the oil and fat was added over the course of eight instances, the contents were stirred using a single-blade hand mixer at each instance, and a mixture was obtained. The amount of oil and fat added was 10 g in the first and second instances, 20 g in
25 the third and fourth instances, 30 g in the fifth and sixth instances, and 60 g in the seventh and eighth instances. The

stirring time after addition of the oil and fat was 30 seconds in the first to seventh instances and one minute in the eighth instance. Thereafter, the table salt was dissolved in the grain vinegar, the resultant dissolved substance was added to the mixture, the mixture and the dissolved substance were sufficiently stirred with a hand mixer to combine these components, and a reference mayonnaise-like condiment having an oil fraction of 80 mass% was obtained.

[0097]

The resultant reference mayonnaise-like condiment having an oil fraction of 10 mass% and reference mayonnaise-like condiment having an oil fraction of 80 mass% were mixed in the proportions shown in table 7 to prepare reference mayonnaise-like condiments having the respective oil fractions.

[0098]

[Table 7]

Oil fraction of reference mayonnaise-like condiment (mass%)	10	20	30	40	50	60	70	80
Amount of reference mayonnaise-like condiment having oil fraction of 10 mass% (g)	50.0	42.9	35.7	28.6	21.4	14.3	7.1	0
Amount of reference mayonnaise-like condiment having oil fraction of 80 mass% (g)	0	7.1	14.3	21.4	28.6	35.7	42.9	50.0

[0099]

(Examples 3-1 to 3-6, 3-11 to 3-16, comparative examples 3-1, 3-2, 3-11, 3-12)

Next, 1 part by mass of the oxidation treatment products in examples 1-1 to 1-6 and 99 parts by mass of rapeseed oil were mixed to prepare a liquid-form oil and fat textural attribute enhancer. The raw ingredients were mixed in the proportions listed in table 8 in the same manner as for the reference mayonnaise-like condiment having an oil fraction of 10 mass% described above, except that some of the oil and fat applied in the first instance was substituted with the oil and fat textural attribute enhancer, and mayonnaise-like condiments of examples 3-1 to 3-6 were prepared. As comparative example 3-1 for examples 3-1 to 3-6, the palm-based oil and fat 1 in comparative example 1-1 was used instead of the oxidation treatment product to prepare a mayonnaise-like condiment. As comparative example 3-2, the oxidation treatment product of rapeseed oil in comparative example 1-2 was used instead of the aforementioned oxidation treatment product to prepare a mayonnaise-like condiment.

[0100]

[Table 8]

Mayonnaise-like condiment ingredients	Comparative example 3-1	Example 3-1	Example 3-2	Example 3-3
Oil and fat textural attribute enhancer (oxidation treatment product:rapeseed oil=1:99)	—	2	2	2
Oil and fat (palm-based oil:rapeseed oil=1:99)	2	—	—	—
Oil and fat (oxidation treatment product:rapeseed oil=1:99)	—	—	—	—
<Oxidation treatment product or palm-based oil and fat used>	Comparative example 1-1	Example 1-1	Example 1-2	Example 1-3
Oil and fat (rapeseed oil)	18	18	18	18
Water	160	160	160	160
Starch A-13 (J-Oil Mills Corp.)	10	10	10	10
Whole eggs	24	24	24	24
Table salt	2	2	2	2
Grain vinegar (Mizkan Co., Ltd.)	14	14	14	14
Total mass of blending amounts	230	230	230	230
Mass of completed article	200	200	200	200
Oil and fat content of mayonnaise-like condiment	10 mass%	10 mass%	10 mass%	10 mass%
Oil and fat textural attribute enhancer content of mayonnaise-like condiment	—	1 mass%	1 mass%	1 mass%
Oxidation treatment product content of mayonnaise-like condiment	—	1×10 ⁻² mass%	1×10 ⁻² mass%	1×10 ⁻² mass%

(Units: g, unless otherwise specified)

Mayonnaise-like condiment ingredients	Example 3-4	Example 3-5	Example 3-6	Comparative example 3-2
Oil and fat textural attribute enhancer (oxidation treatment product:rapeseed oil=1:99)	2	2	2	—
Oil and fat (palm-based oil:rapeseed oil=1:99)	—	—	—	—
Oil and fat (oxidation treatment product:rapeseed oil=1:99)	—	—	—	2
<Oxidation treatment product or palm-based oil and fat used>	Example 1-4	Example 1-5	Example 1-6	Comparative example 1-2
Oil and fat (rapeseed oil)	18	18	18	18
Water	160	160	160	160
Starch A-13 (J-Oil Mills Corp.)	10	10	10	10
Whole eggs	24	24	24	24
Table salt	2	2	2	2
Grain vinegar (Mizkan Co., Ltd.)	14	14	14	14
Total mass of blending amounts	230	230	230	230
Mass of completed article	200	200	200	200
Oil and fat content of mayonnaise-like condiment	10 mass%	10 mass%	10 mass%	10 mass%
Oil and fat textural attribute enhancer content of mayonnaise-like condiment	1 mass%	1 mass%	1 mass%	—
Oxidation treatment product content of mayonnaise-like condiment	1×10 ⁻² mass%	1×10 ⁻² mass%	1×10 ⁻² mass%	1×10 ⁻² mass%

(Units: g, unless otherwise specified)

[0101]

In addition, 1 part by mass of the carotenoid degradation treatment products in examples 2-1 to 2-6 and 99 parts by mass of rapeseed oil were mixed to prepare a liquid-form oil and fat textural attribute enhancer. The raw ingredients were mixed in the proportions listed in table 9 in the same manner as for the reference mayonnaise-like condiment having an oil fraction of 10 mass% described above, except that some of the oil and fat applied in the first instance was substituted with the oil and fat textural attribute enhancer, and mayonnaise-like condiments of examples 3-11 to 3-16 were prepared. As comparative example 3-11 for examples 3-11 to 3-16, the β -carotene-containing MCT of comparative example 2-1 was used instead of the oxidation treatment product to prepare a mayonnaise-like condiment. As comparative example 3-12, the heated rapeseed oil of comparative example 2-2 was used instead of the oxidation treatment product to prepare a mayonnaise-like condiment. The "carotenoid degradation product content" of the mayonnaise-like condiments in table 9 corresponds to the "total of the carotenoid content after a carotenoid-degradation step and the degradation product content" of the present invention, this total being in terms of the carotenoid content before the carotenoid-degradation step.

[0102]

[Table 9]

Mayonnaise-like condiment ingredients	Comparative example 3-11	Example 3-11	Example 3-12	Example 3-13
Oil and fat textural attribute enhancer (carotenoid degradation treatment product:rapeseed oil=1:99)	—	2	2	2
Oil and fat (carotenoid-containing MCT:rapeseed oil=1:99)	2	—	—	—
Oil and fat (heated rapeseed oil:rapeseed oil=1:99)	—	—	—	—
<Carotenoid degradation treatment product, MCT, or rapeseed oil used>	Comparative example 2-1	Example 2-1	Example 2-2	Example 2-3
Oil and fat (rapeseed oil)	18	18	18	18
Water	160	160	160	160
Starch A-13 (J-Oil Mills Corp.)	10	10	10	10
Whole eggs	24	24	24	24
Table salt	2	2	2	2
Grain vinegar (Mizkan Co., Ltd.)	14	14	14	14
Total mass of blending amounts	230	230	230	230
Mass of completed article	200	200	200	200
Oil and fat content of mayonnaise-like condiment	10 mass%	10 mass%	10 mass%	10 mass%
Oil and fat textural attribute enhancer content of mayonnaise-like condiment	—	1 mass%	1 mass%	1 mass%
Carotenoid degradation treatment product content of mayonnaise-like condiment	—	1×10 ⁻² mass%	1×10 ⁻² mass%	1×10 ⁻² mass%
Carotenoid degradation product content of mayonnaise-like condiment	—	3.0×10 ⁻⁷ mass%	6.0×10 ⁻⁷ mass%	2.8×10 ⁻⁴ mass%

(Units: g, unless otherwise specified)

Mayonnaise-like condiment ingredients	Example 3-14	Example 3-15	Example 3-16	Comparative example 3-12
Oil and fat textural attribute enhancer (carotenoid degradation treatment product:rapeseed oil=1:99)	2	2	2	—
Oil and fat (carotenoid-containing MCT:rapeseed oil=1:99)	—	—	—	—
Oil and fat (heated rapeseed oil:rapeseed oil=1:99)	—	—	—	2
<Carotenoid degradation treatment product, MCT, or rapeseed oil used>	Example 2-4	Example 2-5	Example 2-6	Comparative example 2-2
Oil and fat (rapeseed oil)	18	18	18	18
Water	160	160	160	160
Starch A-13 (J-Oil Mills Corp.)	10	10	10	10
Whole eggs	24	24	24	24
Table salt	2	2	2	2
Grain vinegar (Mizkan Co., Ltd.)	14	14	14	14
Total mass of blending amounts	230	230	230	230
Mass of completed article	200	200	200	200
Oil and fat content of mayonnaise-like condiment	10 mass%	10 mass%	10 mass%	10 mass%
Oil and fat textural attribute enhancer content of mayonnaise-like condiment	1 mass%	1 mass%	1 mass%	—
Carotenoid degradation treatment product content of mayonnaise-like condiment	1×10 ⁻² mass%	1×10 ⁻² mass%	1×10 ⁻² mass%	—
Carotenoid degradation product content of mayonnaise-like condiment	5.3×10 ⁻⁷ mass%	5.3×10 ⁻⁷ mass%	4.4×10 ⁻⁷ mass%	—

(Units: g, unless otherwise specified)

[0103]

The resultant mayonnaise-like condiments were evaluated regarding to which of the aforementioned reference mayonnaise-like condiments having the respective oil fractions the oil and fat textural attributes of the resultant mayonnaise-like condiments corresponded. Five expert panelists conducted a sensory evaluation and, upon consultation, determined the oil fraction of the corresponding reference mayonnaise-like condiments. The factor by which the oil and fat textural attributes were enhanced was calculated from the determined oil fraction of the reference mayonnaise-like condiments. For example, when the mayonnaise-like condiment having an oil fraction of 10 mass% that included 1×10^{-2} mass% (0.01 mass%) of the oxidation treatment product had oil and fat textural attributes equivalent to those of the reference mayonnaise-like condiment having an oil fraction of 40 mass%, the enhancement factor was computed as $(40 \text{ mass\%} - (10 \text{ mass\%} - 0.01 \text{ mass\%})) / 0.01 \text{ mass\%} = 3001$. The results for examples 3-1 to 3-6 and comparative examples 3-1 and 3-2 are shown in table 10.

[0104]

[Table 10]

	Comp. ex. 3- 1	Ex. 3-1	Ex. 3-2	Ex. 3-3	Ex. 3-4	Ex. 3-5	Ex. 3-6	Comp. ex. 3- 2
Oil fraction of corresponding reference mayonnaise- like condiment (mass%)	10	50	40	40	60	50	60	20
Enhancement factor	1	4001	3001	3001	5001	4001	5001	1001

[0105]

As shown in table 10, whereas the mayonnaise-like
condiment in comparative example 3-1 had oil and fat textural
attributes corresponding to those of the reference mayonnaise-
like condiment having an oil fraction of 10 mass%, the
mayonnaise-like condiments in examples 3-1 to 3-6, to which
the oil and fat textural attribute enhancer of the present
invention was added, obtained oil and fat textural attributes
corresponding to those of the reference mayonnaise-like
condiments having an oil fraction of 40 to 60 mass%. In
addition, the aforementioned corresponding enhancement factors
had high values of 3001-5001, and it was understood that oil
and fat textural attributes were sufficiently enhanced even
with a low oil and fat content. However, the mayonnaise-like
condiment of comparative example 3-2, into which the oxidation
treatment product of the rapeseed oil in comparative example
1-2 was blended, only obtained oil and fat textural attributes
corresponding to those of the reference mayonnaise-like
condiment having an oil fraction of 20 mass%; moreover, in
this comparative example, the enhancement factor was 1001, and
the oil and fat textural attributes were not enhanced as the
oil and fat textural attribute enhancer of the present
invention was incorporated.

[0106]

The results for examples 3-11 to 3-16 and comparative
examples 3-11 and 3-12 are shown in table 11.

[0107]

[Table 11]

	Comp. ex. 3- 11	Ex. 3-11	Ex. 3-12	Ex. 3-13	Ex. 3-14	Ex. 3-15	Ex. 3-16	Comp. ex. 3- 12
Oil fraction of corresponding reference mayonnaise- like condiment (mass%)	20	30	40	50	50	50	50	20
Enhancement factor	1001	2001	3001	4001	4001	4001	4001	1001

[0108]

5 As shown in table 11, whereas the mayonnaise-like
condiment in comparative examples 3-11 and 3-12 had oil and
fat textural attributes corresponding to those of the
reference mayonnaise-like condiment having an oil fraction of
20 mass%, the mayonnaise-like condiments in examples 3-11 to
10 3-16, to which the oil and fat textural attribute enhancer of
the present invention was added, obtained oil and fat textural
attributes corresponding to those of the reference mayonnaise-
like condiments having an oil fraction of 30 to 50 mass%. In
addition, the aforementioned corresponding enhancement factors
15 had high values of 2001-4001, and it was understood that oil
and fat textural attributes were effectively enhanced even
with a low oil and fat content.

[0109]

(Examples 4-1 to 4-6, 4-14 to 4-16, comparative examples 4-1,
20 4-11)

Furthermore, the mayonnaise-like condiments in examples 3-1 to 3-6, comparative example 3-1, examples 3-14 to 3-16, and comparative example 3-11 described above and the reference mayonnaise-like condiment having an oil fraction of 10 mass% were mixed in proportions of 1:99 to prepare mayonnaise-like condiments of examples 4-1 to 4-6, comparative example 4-1, examples 4-13 to 4-16, and comparative example 4-11. These mayonnaise-like condiments also were similarly evaluated, by expert panelists, regarding to which of the reference mayonnaises having the respective oil fractions the oil and fat textural attributes of the resultant mayonnaise-like condiments corresponded, and the factor by which the oil and fat textural attributes were enhanced was calculated. The results for examples 4-1 to 4-6 and comparative example 4-1 are shown in table 12.

[0110]

[Table 12]

	Comp. Ex. 4-1	Ex. 4- 1	Ex. 4- 2	Ex. 4- 3	Ex. 4- 4	Ex. 4- 5	Ex. 4- 6
Oil and fat content of mayonnaise-like condiment (mass%)	10						
Oil and fat textural attribute enhancer content of mayonnaise-like condiment (mass%)	—	1×10^{-2}					
Oxidation treatment product content of mayonnaise-like condiment (mass%)	—	1×10^{-4}					
Oil fraction of corresponding reference mayonnaise-like condiment (mass%)	10	30	30	30	30	30	30
Enhancement factor	1	200001	200001	200001	200001	200001	200001

[0111]

5 As shown in table 12, even when the oxidation treatment product content was 1×10^4 mass%, the mayonnaise-like condiments having an oil fraction of 10 mass% of examples 4-1 to 4-6 obtained oil and fat textural attributes corresponding to those of the reference mayonnaise-like condiment having an oil

10 fraction of 30 mass%, and according to the calculation method in the present example, the oil and fat textural attributes were enhanced by a factor of 200001 over those of the mayonnaise-like condiment having an oil fraction of 10 mass% of comparative example 4-1, to which no oxidation treatment

15 product was added.

[0112]

The results for examples 4-14 to 4-16 and comparative example 4-11 are shown in table 13.

[0113]

5 [Table 13]

	Comparative example 4-11	Example 4-14	Example 4-15	Example 4-16
Oil and fat content of mayonnaise-like condiment (mass%)	10			
Oil and fat textural attribute enhancer content of mayonnaise-like condiment (mass%)	—	100		
Carotenoid degradation treatment product content of mayonnaise-like condiment (mass%)	—	1		
Carotenoid degradation product content of mayonnaise-like condiment (mass%)	—	5.3×10^{-9} mass%	5.3×10^{-9} mass%	4.4×10^{-9} mass%
Oil fraction of corresponding reference mayonnaise-like condiment (mass%)	10	30	30	30
Enhancement factor	1	200001	200001	200001

[0114]

As shown in table 13, even when the carotenoid degradation product content is on the order of 10^{-9} mass%, the mayonnaise-like condiments having an oil fraction of 10 mass% of examples 4-14 to 4-16 obtained oil and fat textural attributes corresponding to those of the reference mayonnaise-like condiment having an oil fraction of 30 mass%, and according to the calculation method in the present example, the oil and fat textural attributes were greatly enhanced over

those of the mayonnaise-like condiment of comparative example 4-11, to which no carotenoid degradation product was added.

[0115]

[Production of powdery oil and fat textural attribute

5 enhancer; example 5-1, comparative example 5-1]

The oxidation treatment product in example 1-4 was used, the raw ingredients listed in table 14 were mixed therewith, and water was furthermore added so as to reach a total of 200 parts by mass, after which the mixture was subjected to dry
10 powderization to obtain the powdered oil and fat textural attribute enhancer of example 5-1. As comparative example 5-1 for example 5-1, the raw ingredients in the proportions listed in table 14 were used to obtain a powdered oil and fat without adding the oxidation treatment product. The proportions of the
15 raw materials listed in table 14 are the proportions in the completed articles, i.e., in the powdered oil and fat textural attribute enhancer or the powdered oil and fat.

[0116]

[Table 14]

Raw ingredients of powdered oil and fat textural attribute enhancer/powdered oil and fat		Example 5-1 (parts by mass)	Comparative example 5-1 (parts by mass)
Oil phase	Fully hydrogenated palm kernel oil	44	45
	Oxidation treatment product of example 4-1	1	—
	Sorbitan fatty acid ester (Emazole P-10V, Kao Corp.)	0.45	0.45
	Glycerin fatty acid ester (Poem P-200, Riken Vitamin Co., Ltd.)	0.45	0.45
Water phase	Lactic casein (Westland Co-operative Dairy Co., Ltd.)	4.399	4.399
	Sodium hydroxide	0.101	0.101
	Corn syrup (Fuji syrup C-75S, moisture content: 25 mass%, Kato Kagaku Co., Ltd.)	47.5	47.5
	Dipotassium hydrogen phosphate (Taihei Kagaku Sangyo KK)	1.6	1.6
	Trisodium citrate (Sanei Gen F F I Inc.)	0.5	0.5
Total		100	100
Oil and fat content of powdered oil and fat textural attribute enhancer/powdered oil and fat		45 mass%	45 mass%
Oxidation treatment product content of powdered oil and fat textural attribute enhancer/powdered oil and fat		1 mass%	—

(Units: g, unless otherwise specified)

[0117]

5 More specifically, the oil phase was prepared by mixing fully hydrogenated palm kernel oil, the oxidation treatment product of example 1-4, and a sorbitan fatty acid ester and a glycerin fatty acid ester serving as emulsifiers. The water phase was prepared by: mixing water, lactic casein, and sodium

10 hydroxide and inducing a neutralization reaction between the lactic casein and the sodium hydroxide to obtain an aqueous

solution containing casein sodium; and then mixing corn syrup (blended so as to form 47.5 mass% as the solids fraction of the raw ingredients) serving as a diluent, and dipotassium hydrogen phosphate and trisodium citrate serving as pH

5 adjusters, into the aqueous solution. The oil-phase and water-phase preparations were then stirred together to obtain a mixture, and the mixture was emulsified by a high-pressure emulsifier (trade name "LAB-2000" (APV)) with the primary pressure set at 500 bar and the secondary pressure set at 50
10 bar to obtain an O/W emulsion. The resultant O/W emulsion was subjected to dry powderization using a spray dryer (trade name "B-290" (Nihon Buchi KK)) to thereby obtain the powdered-form oil and fat textural attribute enhancer of example 5-1 having an oil and fat content of 45 mass%. The powdered oil and fat
15 of comparative example 5-1 was produced in the same manner as the powdered oil and fat textural attribute enhancer of example 5-1, except that no oxidation treatment product was added thereto.

[0118]

20 [Sensory evaluation of soup; examples 6-1, 6-11, comparative examples 6-1, 6-11]

The soups in example 6-1 and comparative example 6-1 were obtained by mixing ingredients in the proportions listed in table 15.

[0119]

[Table 15]

Soup ingredients	Example 6-1	Comparative example 6-1
Table salt	4.09	4.09
Powdered sugar	1.27	1.27
Umami seasoning (Ajinomoto®, Ajinomoto Co., Inc.)	1.27	1.27
Chicken extract (Chicken extract 50-10-N, DSP Gokyo Food & Chemical Co., Ltd.)	0.76	0.76
White pepper (Gaban Co., Ltd.)	0.08	0.08
Carrot powder (Mikasa Sangyo KK)	0.03	0.03
Onion powder (Gaban Co., Ltd.)	0.13	0.13
Garlic powder (Gaban Co., Ltd.)	0.03	0.03
Water	487.35	487.35
Powdered oil and fat textural attribute enhancer of example 5-1 (oil and fat content: 45 mass%, oxidation treatment product of example 1-4: 1 mass%)	0.35	—
Powdered oil and fat of comparative example 5-1 (oil and fat content: 45 mass%)	—	0.35
Oil and fat (rapeseed oil)	34.65	34.65
Total mass of blending amounts	530.00	530.00
Mass of completed article	500.00	500.00
Oil and fat content of soup	3.15 mass%	3.15 mass%
Oil and fat textural attribute enhancer content of soup	7×10^{-2} mass%	—
Oxidation treatment product content of soup	7×10^{-4} mass%	—

(Units: g, unless otherwise specified)

[0120]

5 More specifically, all of the ingredients other than the powdered oil and fat textural attribute enhancer/powdered oil and fat were first introduced into a stainless steel flat-bottomed pot, the contents were heated while stirred using an IH heater (model no. "KZ-PH1" (Matsushita Electric Industrial

10 Co., Ltd.)) and caused to boil, and heating was stopped once

30 g of the water had evaporated. The powdered oil and fat
textural attribute enhancer of example 5-1 or the powdered oil
and fat of comparative example 5-1 was next added, and the
contents were furthermore sufficiently stirred to obtain the
5 respective soups of example 6-1 and comparative example 6-1.
[0121]

The soups in example 6-11 and comparative example 6-11
were obtained by mixing ingredients in the proportions listed
in table 16 using the same method as for example 6-1 and
10 comparative example 6-1.

[0122]

[Table 16]

Soup ingredients	Example 6-11	Comparative example 6-11
Table salt	4.09	4.09
Powdered sugar	1.27	1.27
Umami seasoning (Ajinomoto®, Ajinomoto Co., Inc.)	1.27	1.27
Chicken extract (Chicken extract 50-10-N, DSP Gokyo Food & Chemical Co., Ltd.)	0.76	0.76
White pepper (Gaban Co., Ltd.)	0.08	0.08
Carrot powder (Mikasa Sangyo KK)	0.03	0.03
Onion powder (Gaban Co., Ltd.)	0.13	0.13
Garlic powder (Gaban Co., Ltd.)	0.03	0.03
Water	487.35	487.35
Liquid oil and fat textural attribute enhancer (carotenoid degradation product of example 2-4:rapeseed oil=1:99)	15.75	—
Oil and fat (Carotenoid-containing MCT of comparative example 2-1:rapeseed oil=1:99)	—	15.75
Total mass of blending amounts	510.75	510.75
Mass of completed article	500.00	500.00
Oil and fat content of soup	3.15 mass%	3.15 mass%
Oil and fat textural attribute enhancer content of soup	7×10^{-2} mass%	—
Carotenoid degradation treatment product content of soup	7×10^{-4} mass%	—
Carotenoid degradation product content of soup	3.7×10^{-8} mass%	—

(Units: g, unless otherwise specified)

[0123]

5 Sensory evaluation of the oil and fat textural attributes of the resultant soups of examples 6-1 and 6-11 was conducted by comparison with the corresponding soups of comparative examples 6-1 and 6-11. The evaluation was conducted by four expert panelists in the case of example 6-1, and by three

10 expert panelists in the case of example 6-11, in accordance

with the scoring criteria below. The results are shown in table 17.

[0124]

- +6: Exceedingly strong
- 5 +5: Considerably strong
- +4: Strong
- +3: Comparatively strong
- +2: Somewhat strong
- +1: Slightly strong
- 10 0: Equivalent
- 1: Somewhat weak
- 2: Weak
- 3: Exceedingly weak

[0125]

15 [Table 17]

Results of sensory evaluation	Panelist 1	Panelist 2	Panelist 3	Panelist 4
Example 6-1	+4	+4	+2	+4
Example 6-11	+3	+2	+3	

[0126]

As shown in table 17, the results showed that the soup of example 6-1, to which the powdered oil and fat textural attribute enhancer of example 5-1 was added, had more enhanced oil and fat textural attributes than the soup of comparative example 6-1, to which the powdered oil and fat was added. In addition, the results showed that the soup of example 6-11, to

which the carotenoid-degradation-product-containing liquid oil and fat textural attribute enhancer of example 2-4 was added, also had more enhanced oil and fat textural attributes than the soup of comparative example 6-11.

5 [0127]

[Sensory evaluation of curry sauce; examples 7-1 to 7-4, 7-11, comparative examples 7-1 to 7-4, 7-11]

The curry sauces of examples 7-1 to 7-4 and comparative examples 7-1 to 7-4 were obtained by mixing ingredients in the
10 proportions listed in table 18.

[0128]

[Table 18]

Curry sauce ingredients	Example 7-1	Example 7-2	Example 7-3	Example 7-4
Curry roux (Vermont curry, oil and fat content: 36 mass%, House Foods Corp.)	15.4	15.8	15.5	16.3
Water	83.6	79.2	84.1	81.7
Powdered oil and fat textural attribute enhancer of example 5-1 (oil and fat content: 45 mass%, oxidation treatment product of example 1-4: 1 mass%)	1	5	—	—
Powdered oil and fat of comparative example 5-1 (oil and fat content: 45 mass%)	—	—	—	—
Liquid oil and fat textural attribute enhancer (oxidation treatment product of example 1-4: rapeseed oil=1:99)	—	—	0.4	2
Oil and fat (palm-based oil and fat of comparative example 1-1: rapeseed oil=1:99)	—	—	—	—
Total mass of completed article	100	100	100	100
Oil and fat content of curry sauce	6.0 mass%	7.9 mass%	6.0 mass%	7.9 mass%
Oil and fat textural attribute enhancer content of curry sauce	1 mass%	5 mass%	0.4 mass%	2 mass%
Oxidation treatment product content of curry sauce	1×10 ⁻² mass%	5×10 ⁻² mass%	4×10 ⁻³ mass%	2×10 ⁻² mass%

(Units: g, unless otherwise specified)

Curry sauce ingredients	Comparative example 7-1	Comparative example 7-2	Comparative example 7-3	Comparative example 7-4
Curry roux (Vermont curry, oil and fat content: 36 mass%, House Foods Corp.)	15.4	15.8	15.5	16.3

Water	83.6	79.2	84.1	81.7
Powdered oil and fat textural attribute enhancer of example 5-1 (oil and fat content: 45 mass%, oxidation treatment product of example 1-4: 1 mass%)	—	—	—	—
Powdered oil and fat of comparative example 5-1 (oil and fat content: 45 mass%)	1	5	—	—
Liquid oil and fat textural attribute enhancer (oxidation treatment product of example 1-4: rapeseed oil=1:99)	—	—	—	—
Oil and fat (palm-based oil and fat of comparative example 1-1: rapeseed oil=1:99)	—	—	0.4	2
Total mass of completed article	100	100	100	100
Oil and fat content of curry sauce	6.0 mass%	7.9 mass%	6.0 mass%	7.9 mass%
Oil and fat textural attribute enhancer content of curry sauce	—	—	—	—
Oxidation treatment product content of curry sauce	—	—	—	—

(Units: g, unless otherwise specified)

[0129]

In addition, the curry sauces in example 7-11 and comparative example 7-11 were obtained by mixing ingredients in the proportions listed in table 19.

[0130]

[Table 19]

Curry sauce ingredients	Example 7-11	Comparative example 7-11
Curry roux (Vermont curry, oil and fat content: 36 mass%, House Foods Corp.)	16.3	16.3
Water	81.7	81.7
Liquid oil and fat textural attribute enhancer (carotenoid degradation treatment product of example 2-4:rapeseed oil=1:99)	2	—
Oil and fat (carotenoid-containing MCT of comparative example 2-1:rapeseed oil=1:99)	—	2
Total mass of completed article	100	100
Oil and fat content of curry sauce	7.9 mass%	7.9 mass%
Oil and fat textural attribute enhancer content of curry sauce	2 mass%	—
Carotenoid degradation treatment product content of curry sauce	2×10^{-2} mass%	—
Carotenoid degradation product content of curry sauce	1.1×10^{-6} mass%	—

(Units: g, unless otherwise specified)

[0131]

More specifically, a stainless steel beaker was prepared, the water was introduced into the beaker, and the water was heated to boiling by an IH heater (model no. "KZ-PH1" (Matsushita Electric Industrial Co., Ltd.)). Heating was then stopped, the curry roux was introduced in small amounts at a time, and the contents were mixed using a wooden spatula until the roux dissolved. After the curry roux was mixed, the

contents were churned for ten minutes while being re-heated. The powdered oil and fat textural attribute enhancer of example 5-1 (examples 7-1 and 7-2), the powdered oil and fat of comparative example 5-1 (comparative examples 7-1 and 7-2),
5 the liquid oil and fat textural attribute enhancer containing the oxidation treatment product of example 1-4 (examples 7-3 and 7-4), the palm-based oil and fat 1 of comparative example 1-1 (comparative examples 7-3 and 7-4), the liquid oil and fat textural attribute enhancer containing the carotenoid
10 degradation treatment product of example 2-4 (example 7-11), or the oil and fat of comparative example 2-1 (comparative example 7-11) was then added so as to reach a prescribed concentration, and the contents were furthermore sufficiently stirred to obtain a curry sauce.

15 [0132]

Sensory evaluation of the oil and fat textural attributes of each of the resultant curry sauces of examples 7-1 to 7-4 and 7-11 was conducted by comparison with the corresponding curry sauces of comparative examples 7-1 to 7-4 and 7-11. The
20 evaluation was conducted by three expert panelists in accordance with the scoring criteria described in regard to the evaluation of the soups. The results are shown in table 20.

[0133]

[Table 20]

Results of sensory evaluation	Panelist 1	Panelist 2	Panelist 3	Panelist 4
Example 7-1	+3	+2		+1
Example 7-2	+3	+2	+4	
Example 7-3	+3	+3		+2
Example 7-4	+3	+3	+4	
Example 7-11	+3	+4	+3	

[0134]

5 As shown in table 20, the curry sauces of examples 7-1 to 7-4 and 7-11, to which the oil and fat textural attribute enhancer of the present invention was added, had more enhanced oil and fat textural attributes than the curry sauces of comparative examples 7-1 to 7-4 and 7-11, to which no oil and fat textural attribute enhancer was added.

[0135]

[Sensory evaluation of chocolate; examples 8-1, 8-2, 8-11 to 8-13, comparative example 8-1]

15 First, milk chocolate ("NK chocolate high milk," Nisshin Kako KK) was finely minced using a kitchen knife, the minced chocolate was introduced into a bowl, and the contents were warmed and melted while being churned using a rubber spatula. 0.5 g of the oil and fat textural attribute enhancer of example 1-4 was next weighed out into another bowl, 49.5 g of 20 the melted chocolate was added thereto, and the contents were sufficiently mixed using a rubber spatula while being warmed

to produce chocolate in which 1 mass% of the oil and fat textural attribute enhancer was blended. Furthermore, the oil and fat textural attribute enhancer blended chocolate and the aforementioned melted milk chocolate were added into yet another bowl in the proportions shown in table 21, the contents were sufficiently mixed using a rubber spatula while being warmed, and then the mixture was channeled into aluminum cups to obtain the chocolates in examples 8-1 and 8-2. As comparative example 8-1 for examples 8-1 and 8-2, the aforementioned milk chocolate was prepared as a control chocolate.

[0136]

[Table 21]

Chocolate ingredients	Comparative example 8-1	Example 8-1	Example 8-2
Milk chocolate (NK chocolate high milk, oil and fat content: 45 mass%, Nisshin Kako KK)	25.0	24.5	20.0
Oil and fat textural attribute enhancer blended chocolate (oil and fat textural attribute enhancer of example 1-4: 1 mass%)	—	0.5	5.0
Total mass of completed article	25	25	25
Oil and fat content of chocolate	45 mass%	45 mass%	45 mass%
Oil and fat textural attribute enhancer content of chocolate	—	2×10^{-2} mass%	2×10^{-1} mass%
Oxidation treatment product content of chocolate	—	2×10^{-4} mass%	2×10^{-3} mass%

(Units: g, unless otherwise specified)

[0137]

In addition, the chocolates in examples 8-11 to 8-13, to which the oil and fat textural attribute enhancer of example 2-4 was added, were obtained by mixing ingredients in the

proportions listed in table 22 in the same manner as the chocolates in examples 8-1 and 8-2.

[0138]

[Table 22]

Chocolate ingredients	Example 8-11	Example 8-12	Example 8-13
Milk chocolate (NK chocolate high milk, oil and fat content: 45 mass%, Nisshin Kako KK)	24.5	20.0	—
Oil and fat textural attribute enhancer blended chocolate (oil and fat textural attribute enhancer of example 1-4: 1 mass%)	0.5	5.0	25.0
Total mass of completed article	25	25	25
Oil and fat content of chocolate	45 mass%	45 mass%	46 mass%
Oil and fat textural attribute enhancer content of chocolate	2×10^{-2} mass%	2×10^{-1} mass%	1 mass%
Carotenoid degradation treatment product content of chocolate	2×10^{-4} mass%	2×10^{-3} mass%	1×10^{-2} mass%
Carotenoid degradation product content of chocolate	1.1×10^{-8} mass%	1.1×10^{-7} mass%	5.3×10^{-7} mass%

5 (Units: g, unless otherwise specified)

[0139]

Sensory evaluation of the oil and fat textural attributes of the resultant chocolates of examples 8-1, 8-2, and 8-11 to 8-13 was conducted by comparison with the corresponding chocolate of comparative example 8-1. The evaluation was conducted by three expert panelists in accordance with the scoring criteria described in regard to the evaluation of the soups. The results are shown in table 23.

10

[0140]

[Table 23]

Results of sensory evaluation	Panelist 1	Panelist 2	Panelist 3
Example 8-1	+4	+4	+4
Example 8-2	+6	+6	+6
Example 8-11	+2	+2	+4
Example 8-12	+4	+3	+5
Example 8-13	+5	+4	+6

[0141]

5 As shown in table 23, the chocolates of examples 8-1, 8-
2, and 8-11 to 8-13, to which the oil and fat textural
attribute enhancer of the present invention was added, had
more enhanced oil and fat textural attributes than the
chocolates of comparative example 8-1, to which no oil and fat
10 textural attribute enhancer was added. In particular, oil and
fat textural attributes were greatly enhanced in examples 8-2
and 8-13.

CLAIMS

1. An oil and fat textural attribute enhancer for a food product containing, as an active ingredient, an oxidation treatment product of a palm-based oil and fat in which the total α -carotene and β -carotene content is 50 mass ppm or more and 2000 mass ppm or less, the peroxide value of the oxidation treatment product being 3 or more and 250 or less.

2. The oil and fat textural attribute enhancer for a food product according to claim 1, wherein the β -carotene content is 20 mass ppm or more and 1500 mass ppm or less.

3. The oil and fat textural attribute enhancer for a food product according to claim 1 or 2, wherein the iodine value of the palm-based oil and fat is 0 or more and 80 or less.

4. The oil and fat textural attribute enhancer for a food product according to any of claims 1 to 3, containing 0.001 mass% or more and 100 mass% or less of the oxidation treatment product.

5. The oil and fat textural attribute enhancer for a food product according to any of claims 1 to 4, being in a powdered form.

6. An edible oil and fat composition containing the oil and fat textural attribute enhancer for a food product according to any of claims 1 to 5.

7. A food product containing the oil and fat textural attribute enhancer for a food product according to any of claims 1 to 5.

8. The food product according to claim 7, wherein the oil and fat content is 0.1 mass% or more and 85 mass% or less.

9. The food product according to claim 7 or 8, being one selected from the group consisting of dressings, roux, sauces, soups, and chocolate products.

10. A method for enhancing the oil and fat textural attributes of a food product, the method involving adding, to the food product, an oxidation treatment product that is obtained by performing an oxidation treatment on a palm-based oil and fat in which the total α -carotene and β -carotene content is 50 mass ppm or more and 2000 mass ppm or less, the peroxide value of the oxidation treatment product being 3 or more and 250 or less.

11. The method for enhancing oil and fat textural attributes according to claim 10, wherein the oxidation treatment product is added in an amount of 1×10^{-8} mass% or more and 10 mass% or less.

12. A method for manufacturing an oil and fat textural attribute enhancer for a food product containing an oxidation treatment product as an active ingredient,

the manufacturing method including a step for performing an oxidation treatment on a palm-based oil and fat in which the total α -carotene and β -carotene content is 50 mass ppm or more and 2000 mass ppm or less, so that the peroxide value reaches 3 or more and 250 or less.

13. The manufacturing method according to claim 12,
wherein the step for performing an oxidation treatment
includes heating for 0.1 hours or more and 240 hours or less
at a temperature of 50°C or more and 220°C or less.

5 14. The manufacturing method according to claim 12 or 13,
wherein the step for performing an oxidation treatment
includes supplying oxygen to the palm-based oil and fat.

15. The manufacturing method according to any of claims
12 to 14, wherein, in the step for performing an oxidation
10 treatment, the total α -carotene and β -carotene content is
reduced by 20 mass ppm or more and 2000 mass ppm or less.

16. A method for manufacturing a food product by adding,
to the food product, the oil and fat textural attribute
enhancer for a food product according to any of claims 1 to 5
15 or the edible oil and fat composition according to claim 6.

17. An oil and fat textural attribute enhancer for a food
product containing a degradation product of a carotenoid as an
active ingredient.

18. The oil and fat textural attribute enhancer for a
20 food product according to claim 17, wherein the carotenoid is
one or more selected from the group consisting of α -carotene,
 β -carotene, retinol, lutein, canthaxanthin, β -cryptoxanthin,
bixin, norbixin, astaxanthin, zeaxanthin, fucoxanthin,
violaxanthin, lycopene, crocin, crocetin, and capsanthin.

25 19. The oil and fat textural attribute enhancer for a
food product according to claim 17 or 18, wherein an edible

oil and fat having an iodine value of 0 or more and 140 or less is included.

20. The oil and fat textural attribute enhancer for a food product according to claim 19, wherein the edible oil and fat is one or more selected from the group consisting of medium-chain fatty acid triglycerides, coconut oil, fully hydrogenated oils, rapeseed oil, and palm-based oils and fats.

21. An edible oil and fat composition containing the oil and fat textural attribute enhancer for a food product according to any of claims 17 to 20.

22. A food product containing the oil and fat textural attribute enhancer for a food product according to any of claims 17 to 20.

23. The food product according to claim 22, wherein the oil and fat content is 0.1 mass% or more and 85 mass% or less.

24. The food product according to claim 22 or 23, being one selected from the group consisting of dressings, roux, sauces, soups, and chocolate products.

25. A method for enhancing the oil and fat textural attributes of a food product by adding a degradation product of a carotenoid to the food product.

26. A method for manufacturing an oil and fat textural attribute enhancer for a food product containing a degradation product of a carotenoid as an active ingredient,

the method including a step for adding the carotenoid to an edible oil and fat, and a step for degrading the carotenoid in the edible oil and fat.

27. The manufacturing method according to claim 26,
5 wherein the step for degrading the carotenoid includes heating for 0.1 hour or more and 240 hours or less at a temperature of 50°C or more and 220°C or less.

28. The manufacturing method according to claim 26 or 27,
wherein the step for degrading the carotenoid includes
10 supplying oxygen to the edible oil and fat.

29. A method for manufacturing a food product by adding,
to the food product, the oil and fat textural attribute
enhancer for a food product according to any of claims 17 to
20 or the edible oil and fat composition according to claim
15 21.

30. The manufacturing method according to claim 29,
including a step for adding a carotenoid to an edible oil and
fat, and a step for degrading the carotenoid in the edible oil
and fat,

20 the oil and fat textural attribute enhancer for a food
product or the edible oil and fat composition being added to
the food product so that the total of the carotenoid content
after the carotenoid-degradation step and the degradation
product content, in terms of the amount of carotenoid before
25 the carotenoid-degradation step, reaches 1×10^{-15} mass% or more
and 1.5 mass% or less.