

[DESCRIPTION]

[Title of invention] SWEETNESS AND/OR MILK FLAVOR ENHANCER

[Technical Field]

[0001]

The present invention relates to a sweetness and/or milk flavor enhancer. More particularly, the present invention relates to the enhancer which can greatly increase the taste of carbohydrates or milk fats coexisting in foods and therefore enables the reduction of the amount of sweetening agent, milk flavor, and the like to be used.

[Background Art]

[0002]

Since the risk of metabolic syndrome or diabetes mellitus has increased with changes in dietary habits, a trend toward low-calorie foods is increasing. Since high-calorie components in foods are carbohydrates or milk fats in additives or foods themselves, foods using low-calorie food materials, sugarless artificial sweetening agents, low-fat processed milk, and the like have been popular. Meanwhile, the sweetness and/or milk flavor specific to naturally-derived carbohydrates or milk fats is a contributing factor to enhance the palatability of foods. Therefore, it is desirable to develop a taste enhancer that greatly increases the taste even when the content of coexisting taste components is low.

[0003]

In the advancement of physiological research on how human taste receptors recognize the taste of food materials such as sweetness, bitterness, and umami, the

development of identifying compounds or substances that stimulate taste receptors has also been advanced. The identified compounds are used as taste enhancers that enhance the effects of the taste components coexisting in foods. For example, Patent Literature 1 proposes a sweetness enhancer and a method for enhancing the sweetness of foods and drinks consisting of long-chain polyunsaturated fatty acids and/or their esters. According to the invention of Patent Literature 1, adding the enhancer to foods can enhance the sweetness of foods and drinks. Patent Literature 2 proposes milk flavor imparting agent or enhancer consisting of 12-methyltridecanal. Patent Literature 3 proposes milk flavor imparting agent or enhancer containing (Z)-6-octenal as an active ingredient. According to Patent Literatures 2 and 3, adding these agents or enhancers to foods can impart sweet creamy flavor specific to dairy products.

[Citation List]

[Patent Literature]

[0004]

[Patent Literature 1]

Japanese Unexamined Patent Publication (Kokai) No. 2009-284859

[Patent Literature 2]

Japanese Unexamined Patent Publication (Kokai) No. 2010-158210

[Patent Literature 3]

Japanese Unexamined Patent Publication (Kokai) No. 2003-000189

[Summary of Invention]

[Technical Problem]

[0005]

An object of the present invention is to provide a new sweetness and/or milk

flavor enhancer. Another object of the present invention is to provide a processed food containing the enhancer and a food cooked using this enhancer or this processed food.

[Solution to Problem]

[0006]

The inventors have intensively studied and found that certain oxidized and partially hydrogenated oils or fats can enhance the sweetness and/or milk flavor that food materials or additives have, thus completing the present invention. Namely, the present invention provides a sweetness and/or milk flavor enhancer, including an oxidized and partially hydrogenated oil or fat having peroxide value of 25 to 300 as an active ingredient. As used herein, a sweetness enhancer means a substance or composition that enhances the recognition of sweetness by taste receptors when combined with sweetness components in food materials or a sweetening agent. "Milk flavor" means milk taste or milk fat feeling specific to dairy products. Hereinafter, a sweetness and/or milk flavor enhancer is referred to as an "enhancer," and sweetness and/or milk flavor is/are abbreviated to "sweetness and the like."

[0007]

In the enhancer, the content of trans fatty acids of the oxidized and partially hydrogenated oil or fat is preferably 5 to 75% by weight.

[0008]

In the enhancer, the content of C18:2 trans isomers in all constituent fatty acids of the oxidized and partially hydrogenated oil or fat is preferably 5 to 60% by weight.

[0009]

In the enhancer, the iodine value of the oxidized and partially hydrogenated oil or fat is preferably 35 to 135.

[0010]

The enhancer preferably contains 0.003 to 10% by weight of the oxidized and partially hydrogenated oil or fat.

[0011]

The enhancer is made of, for example, a powdered oil or fat.

[0012]

The powdered oil or fat is obtained by powdering and drying an emulsion obtained by stirring a mixture containing an oxidized and partially hydrogenated oil or fat having peroxide value of 25 to 300, an edible oil or fat, an emulsifier, a powdered base material, and water.

[0013]

The fat globule diameter (median diameter) of the powder is preferably 0.2 to 2.0 μm .

[0014]

The present invention also provides an oil or fat composition containing the above mentioned enhancer.

[0015]

The present invention also provides a food that contains the enhancer or cooked using the enhancer.

[0016]

The present invention also provides a method for producing a sweetness and/or milk flavor enhancer, which includes adding an oxidized and partially hydrogenated oil or fat having peroxide value of 25 to 300 as an active ingredient.

[0017]

The present invention also provides a method for enhancing sweetness and/or

milk flavor of cooked foods, which includes cooking by adding a sweetness and/or milk flavor enhancer containing an oxidized and partially hydrogenated oil or fat having peroxide value of 25 to 300 as an active ingredient to a food material.

[0018]

To the sweetness enhancer, an oxidized and partially hydrogenated oil or fat of 0.00002 to 200 times per sugar content of a food material is preferably added.

Therefore, the present invention provides a method for enhancing the sweetness of cooked foods, which includes cooking by adding a sweetness enhancer containing an oxidized and partially hydrogenated oil or fat having peroxide value of 25 to 300 as an active ingredient to a food material so that the oxidized and partially hydrogenated oil or fat is 0.00002 to 200 times per sugar content of the food material.

[Advantageous Effects of Invention]

[0019]

Foods or processed foods to which an enhancer of the present invention is added can enhance the sweetness and/or milk flavor that food materials or additive agents such as sweetening agents have. Therefore, when an enhancer of the present invention is used for the producing, processing, or cooking of foods, the amount of additive agents such as sweetening agents added to food materials can be reduced while the sweetness and the like of foods is maintained. Also, food materials having low degree of sweetness can be effectively utilized. An enhancer of the present invention is expected to be used as, for example, an additive agent to low-calorie foods, dairy products, and the like.

[Description of Embodiments]

[0020]

One embodiment of the present invention will be described in detail below.

An enhancer of the present invention has an oxidized and partially hydrogenated oil or fat (hereinafter referred to as “oxidized and partially hydrogenated fat”) having a certain range of peroxide value (POV) as an active ingredient. The POV of an oil or fat can be measured in accordance with the method mentioned in “the Japan Oil Chemists’ Society (JOCS) Standard Methods for the Analysis of Fats, Oils and Related Materials. 2.5.2.1-1996.”

[0021]

The lower limit of the POV of an oxidized and partially hydrogenated fat is 25 meq/kg, preferably 28 meq/kg, more preferably 30 meq/kg, and still more preferably 80 meq/kg. If the POV is lower than 25 meq/kg, it may difficult to increase and enhance the sweetness and the like of food materials or additive agents when a certain amount of the enhancer is added to food materials. In contrast, the upper limit of the POV is 300 meq/kg, preferably 280 meq/kg, and more preferably 200 meq/kg. If the POV is higher than 300 meq/kg, an unpleasant odor due to an enhancer (hereinafter referred to as “deterioration odor”) may occur.

[0022]

A partially hydrogenated fat constituting an oxidized and partially hydrogenated fat usually contains several weight percents to several hundred weight percents of cis-trans isomers or regioisomers of linoleic acid or oleic acid. This is because at the time of hydrogenation reaction, double bond of unsaturated fatty acids is isomerized from cis form to trans form, producing trans fatty acids as byproduct, and regioisomer in which the position of double bond is shifted is also produced as byproduct.

[0023]

The content of trans fatty acids of an oxidized and partially hydrogenated fat is usually 5 to 75% by weight, preferably 7 to 70% by weight, and more preferably 45 to 70% by weight. The content of trans fatty acids of an enhancer to which this oxidized and partially hydrogenated fat is added in the following range is usually 0.00015 to 7.5% by weight, and preferably 0.005 to 3.3% by weight.

[0024]

The content of trans fatty acids means a total of C18:1, C18:2, and C18:3 trans isomers when a partially hydrogenated fat was analyzed by gas chromatography. The content of trans fatty acids of an oil or fat can be measured by gas chromatography in accordance with the American Oil Chemists' Society (AOCS) Official Method (Ce 1h-05).

[0025]

The content of C18:2 trans isomers in all constituent fatty acids of the above mentioned oxidized and partially hydrogenated fat is preferably 5 to 60% by weight, more preferably 8 to 50% by weight, still more preferably 15 to 45% by weight, and most preferably 30 to 45% by weight. C18:1 trans isomers mean the general name of fatty acids corresponding to all peaks that appear between the peak of a C18:0 fatty acid and the peak of a C18:1 cis isomer when samples are analyzed by gas chromatography. C18:2 trans isomers mean the general name of fatty acids corresponding to all peaks that appears between the peak of C18:1 cis isomers and the peak of C18:2 cis isomers when samples are analyzed by gas chromatography. If the content of C18:2 trans isomers is less than 5% by weight, an oxidized and partially hydrogenated fat that enhances the sweetness of food materials may not be obtained. In contrast, if the content of C18:2 trans isomers is above 60% by weight, its production may be difficult.

[0026]

The weight ratio of the content of C18:2 trans isomers to the content of C18:1 trans isomers in all constituent fatty acids of the above mentioned oxidized and partially hydrogenated fat is preferably 0.2 to 1.8. If the ratio is out of this range, an enhancer may produce a heat deterioration odor.

[0027]

The iodine value (IV) of an oxidized and partially hydrogenated fat is preferably 35 to 135, and more preferably 70 to 130. If the IV is too much lower than 35, sufficient effects may not be exerted. In contrast, if the IV is too much higher than 135, it may be difficult to increase and enhance the sweetness and the like of food materials or additive agents when a certain amount of the enhancer is added to food materials. The IV is calculated with the Wijs method in the JOCS. The IV can also be calculated with simple near-infrared reflectance spectroscopy, and very high correlation has been obtained in J.Am.Oil Chem.Soc.76(6)693-9(1999). In the present Examples, the IV was calculated with near-infrared reflectance spectroscopy.

[0028]

An oxidized and partially hydrogenated fat can be obtained by a production method including a process in which an oil or fat is partially hydrogenated until the content of C18:2 trans isomers in all constituent fatty acids is preferably 5 to 60% by weight and a process in which an oil or fat is oxidized until the peroxide value is 25 to 300 meq/kg.

[0029]

There is no particular limitation on the order of the partial hydrogenation treatment and the oxidization treatment of an oil or fat. Preferably, after an oil or fat is partially hydrogenated until the content of C18:2 trans isomers in all constituent fatty

acids is preferably 5 to 60% by weight, the partially hydrogenated fat obtained is oxidized until the peroxide value is 25 to 300 meq/kg.

[0030]

Therefore, the oxidized and partially hydrogenated fat is obtained preferably by a process in which an oil or fat is partially hydrogenated and the partially hydrogenated fat obtained is oxidized. A partially hydrogenated fat may be oxidized after being subjected to a purification process such as decolorization treatment and deodorization treatment in accordance with the conventional methods.

[0031]

A raw material oil or fat of an oxidized and partially hydrogenated fat and a partially hydrogenated fat constituting an oxidized and partially hydrogenated fat is not particularly limited as long as it is used as an edible one, but preferably an edible vegetable oil or fat. Examples of an edible vegetable oil or fat include linseed oil, soybean oil, palm oil, walnut oil, perilla oil, rapeseed oil, and corn oil.

[0032]

The content of α -linolenic acid in constituent fatty acids in a raw material oil or fat is preferably 6% by weight or more, more preferably 30% by weight or more, and still more preferably 45% by weight or more. Effects of an enhancer containing an oxidized and partially hydrogenated fat can be enhanced, and furthermore, deterioration odors of cooked products can be decreased. The upper limit of the content of α -linolenic acid in all constituent fatty acids of a raw material oil or fat is not particularly limited, but the content of a usual edible oil or fat does not exceed 70% by weight.

[0033]

An oil or fat having a high content of α -linolenic acid is linseed oil, perilla oil,

and walnut oil. Especially, linseed oil and perilla oil have 50% by weight or more of an α -linolenic acid, and thus one or two of them is/are desirably contained in a raw material oil or fat.

[0034]

A raw material oil or fat may be a combination of one or two or more of the oils or fats. A raw material oil or fat may be an oil or fat that is obtained by transesterification, fractionation, or the like of them, and, furthermore, may be a mixture of them.

[0035]

A partially hydrogenated fat can be produced by hydrogenation reaction of the conventional methods. For example, 0.01 to 0.3% by weight for oil of a nickel catalyst and the like is added to an edible vegetable oil or fat, which is a raw material oil or fat, and hydrogenation reaction is performed at temperature of 120°C to 220°C and hydrogen pressure of 0.01 to 0.3 MPa.

[0036]

Preferably, in order to obtain an enhancer having strong sweetness and the like, hydrogenation reaction is performed using a raw material oil or fat having a high content of the α -linolenic acid, for example, under the following selective condition: with a nickel catalyst (additive amount of catalyst of 0.05 to 0.3% by weight), at reaction temperature of 170°C to 210°C, and at hydrogen pressure 0.01 to 0.2 MPa. More preferably, using a nickel catalyst having low activity (for example, a catalyst that has already been used for hydrogenation reaction for one or more time, or the product name SO650 [manufactured by Sakai Chemical Industry Co., Ltd.]) as a catalyst, hydrogenation reaction is performed with an additive amount of catalyst of 0.1 to 0.3% by weight, at reaction temperature of 190°C to 210°C, and at hydrogen pressure of 0.01

to 0.1 MPa.

[0037]

In oxidization treatment, an oil or fat may be heated at temperature of usually 50°C to 200°C, preferably 100°C to 200°C, and more preferably 100°C to 180°C. Blowing air in during heating is not always necessary, but blowing a certain amount (for example, 0.2 to 1.0 L/min) of air in by stirring at certain rate (for example, 50 to 350 rpm/min) can realize efficient oxidization to a predetermined peroxide value in a short time. Oxidization in a short time can also prevent the production of a deterioration odor. The peroxide value of a (purified) partially hydrogenated fat before oxidization treatment is usually zero (0).

[0038]

A base oil for dilution of an oxidized and partially hydrogenated fat may be added to an enhancer of the present invention. There is no particular limitation on the base oil as long as it is an edible oil or fat. Examples of the base oil include vegetable oils or fats such as extremely hardened palm oil, palm kernel oil, palm oil, coconut oil, corn oil, cottonseed oil, soybean oil, rapeseed oil, rice oil, sunflower oil, and cacao butter, and animal oils or fats such as lard. Processed oils or fats such as fractionated oil (middle melting point part of palm oil, fractionated soft oil of palm oil, fractionated hard oil of palm oil, and the like) and transesterification oil of them can be used. One or two or more of these edible oils or fats can be used.

[0039]

An additive agent that is commonly used for edible oils or fats can be combined with an enhancer of the present invention. Examples of the additive agent include emulsifiers such as lecithin, diglyceride, glycerin fatty acid ester, sorbitan fatty acid ester, propylene glycol fatty acid ester, sucrose fatty acid ester, and polyglycerol

fatty acid ester; powdered base materials such as carbohydrate, protein, and peptide; stabilizers such as casein, casein sodium, and acid casein; pH adjusters such as sodium hydroxide; sweetening agents such as corn syrup, partially hydrogenated starch, glucose, fructose, maltose, sucrose, oligosaccharide, ribose, trehalose, isomaltose, erythritol, maltitol, xylitol, sorbitol, aspartame, and sucralose; flavors such as milk flavor, butter flavor, cheese flavor, yogurt flavor, coffee flavor, tea flavor, cinnamon flavor, and chamomile flavor; flavor oils such as spearmint oil, clove oil, and peppermint oil; flavoring agents made of aldehydes such as acetaldehyde, benzaldehyde, butylaldehyde, citral, neral, decanal, ethyl vanillin, vanillin, butylaldehyde, and hexanal; spices; antioxidants such as tocopherol, vitamin C palmitate, lignan, and oryzanol; antifoamers such as silicone; and biologically active substances such as coenzyme Q.

[0040]

The content of an oxidized and partially hydrogenated fat in an enhancer of the present invention is usually 0.003 to 10% by weight, preferably 0.01 to 10% by weight, more preferably 0.05 to 5% by weight.

[0041]

The oil content (a total of an oxidized and partially hydrogenated fat and a base oil) in an enhancer of the present invention is usually 5 to 100% by weight, and preferably 20 to 100% by weight.

[0042]

The form of an enhancer of the present invention can be liquid, emulsion (water-in-oil [W/O] or oil-in-water [O/W]), or solid (powder, granule, flake, block, and the like). An enhancer of the present invention is preferably made of a powdered oil or fat.

[0043]

The particle diameter of a powder or granule is usually 0.3 to 3 mm, and preferably 0.5 to 2 mm. The thickness of a flake object is usually 0.2 to 3 mm, and preferably 0.5 to 2 mm.

[0044]

The fat globule diameter (median diameter) of a powdered oil or fat may be usually 0.2 to 2.0 μm , and is preferably 0.3 to 1.8 μm .

[0045]

An enhancer of the present invention can be prepared with an appropriate method according to its form. For example, an enhancer made of a liquid or solid oil or fat is obtained by mixing an oxidized and partially hydrogenated fat with an appropriate base oil and additive agent. A liquid or solid can be prepared by selection of a base oil.

[0046]

An enhancer made of an emulsion is obtained by mixing by stirring an oxidized and partially hydrogenated fat with a mixture containing an edible oil or fat (base oil), an emulsifier, other additive agents, and water with emulsification equipment and the like. The oil content of an emulsion is usually 10 to 90% by weight.

[0047]

An enhancer made of a powder or granule oil or fat is obtained by drying and powdering an emulsion obtained by mixing and stirring an oxidized and partially hydrogenated fat with a mixture containing an edible oil or fat (base oil), an emulsifier, a powdered base material, and water. Drying and powdering includes, for example, spray drying and frost shattering of an emulsion.

[0048]

The present invention also provides a food containing an enhancer (hereinafter

referred to as processed food) or a food cooked using the enhancer (hereinafter referred to as cooked food).

[0049]

Specific examples of the above mentioned processed food include modified powders (tempura flour, deep frying flour, okonomiyaki flour, Korean pancake flour, cake mix, hotcake mix, doughnut mix, modified milk powder, whey powder, and the like), roux (curry, stew, hashed beef with rice, and the like), instant foods and drinks (instant noodles, instant soup, instant miso soup, instant coffee, instant cocoa, and the like), boil-in-the-bag foods (curry, stew, pasta sauce, soup, and the like), refrigerated/frozen foods (doughnuts, French fries, deep-fried chicken, croquettes, minced meat cutlets, pork cutlets, fried fish, fried calamari, onion rings, gratin, pizza, Chinese fried rice, pilaf, udon, ramen, nikuman, jiaozi, and the like), processed meat products (ham, bacon, sausage, hamburger steak, roast pork, seasoned meat, roast beef, steak, and the like), processed seafood products (fish sausage, boiled fish paste, seasoned cod roe, tuna mince with Welsh onion leaves, salted fish, shrimp paste, and the like), seasonings (miso, sauce, tomato sauce, seasoning sauce, mayonnaise, dressing, ponzu, flavor oil, premix for Chinese food, premix for chicken broth, bouillon, pot cooking soup, and the like), confectionery/breads (potato chips, chocolate, cookies, cake, pie, biscuits, crackers, gummi candy, chewing gum, nougat, taffy, caramel, candy, bread, Danish pastry, and the like), confectionery materials (chocolate spread, coating chocolate, dessert mix such as premix for almond jelly, premix for pudding, and premix for jelly, and the like), dairy products (milk beverage, fermented beverage, butter, cream, processed cheese, processed foods containing cheese, and the like), alternatives to dairy products (margarine, shortening, fat spread, creaming powder, coffee cream, whipped cream, and the like), frozen dessert (ice cream, jelly, pudding, and the like).

[0050]

The above mentioned processed food can be produced by the conventional methods according to food materials to be used and their forms except that an enhancer of the present invention is added.

[0051]

An enhancer is added, for example, to the inside or surface of a food material, in batter, in blender liquid, in pickling liquid, in tumbling liquid, and the like. An enhancer is also added to frying oil, rice cooking oil, and the like.

[0052]

The additive amount of an enhancer to a processed food as the content of an oxidized and partially hydrogenated fat may be usually 0.003 to 10% by weight, and is preferably 0.008 to 5% by weight, more preferably 0.008 to 3% by weight, and particularly preferably 0.008 to 1% by weight.

[0053]

The above mentioned processed food can be produced by the conventional methods without requiring materials to be used or special conditions as long as an enhancer of the present invention is added.

[0054]

Specific examples of the above mentioned cooked food include side dishes, fried foods, non-fried fried-like foods, dairy products, flavored non-alcoholic beverages, confectionery, and the like obtained by cooking the above mentioned processed food.

[0055]

The above mentioned cooked food can be cooked or produced by the conventional methods without requiring materials to be used or special conditions except that it is cooked or produced using an enhancer of the present invention.

[Examples]

[0056]

The present invention will be described in detail below by way of Examples.

The present invention is not limited to the following Examples.

[0057]

[Preparation Examples 1 to 12]

Oxidized and partially hydrogenated fats used for Examples and partially hydrogenated fats and oxidized oils or fats used for Comparative Examples were prepared.

1. Preparation of raw material oil or fat

The following three raw material oils or fats were prepared.

Linseed oil: manufactured by J-OIL MILLS, Inc., iodine value of 186.7, and the content of α -linolenic acid of 55.3%;

Soybean oil: manufactured by J-OIL MILLS, Inc., iodine value of 130, and the content of α -linolenic acid of 7.2%;

Palm oil: manufactured by J-OIL MILLS, Inc., iodine value of 52.9, and the content of α -linolenic acid of 0%

[0058]

2. Partially hydrogenation treatment

The above mentioned raw material oils or fats were partially hydrogenated to obtain the desired iodine value under the following conditions:

Catalyst: product name SO-650 (nickel content of 14% by weight, manufactured by Sakai Chemical Industry Co., Ltd.)

Additive amount of catalyst: 0.13%

Reaction temperature: 200°C

Hydrogen pressure: 0.05 MPa

Stirring rate: 700 rpm/min

[0059]

3. Oxidization and partially hydrogenation treatment

The partially hydrogenated fat obtained in item 2. was oxidized in the following procedure. First, 250 g of the partially hydrogenated fat was put in a 500 mL stainless beaker, the beaker was immersed into an oil bath at oil temperature of 110°C, the fat was heated by stirring while blowing air in, and the fat was forcedly oxidized until the desired peroxide value shown in Table 1 was obtained.

[0060]

An oxidized oil of soybean oil and an extremely hardened and hydrogenated palm oil (manufactured by J-OIL MILLS, Inc.) were also prepared.

[0061]

4. Composition analysis

An analysis of each oil or fat was performed with the following procedures.

4.1 Iodine value

The iodine value of the oil or fat obtained in items 1 to 3 was measured with a near infrared analyzer (product name of near infrared analyzer, model number Model5000, manufactured by Nireco Corporation). The results are shown in Table 1.

[0062]

4.2 Peroxide value

The above mentioned peroxide value was measured in accordance with the

methods mentioned in “the JOCS Standard Methods for the Analysis of Fats, Oils and Related Materials. 2.5.2.1-1996.” The results are shown in Table 1.

[0063]

4.3 Content of trans fatty acid

After the above mentioned oil or fat was transformed to fatty acid methyl esters with the boron trifluoride-methanol method, the composition of fatty acid was analyzed with gas chromatography (GC). The GC measurement conditions are shown below.

GC device: product name GC2010 (manufactured by Shimadzu Corporation)

Column: SP-2560 (100 m × 0.25 mm × 0.2 μm) (manufactured by Supelco Inc.)

Inlet temperature: 250°C

Carrier gas: helium (29.1 ml/min)

Split ratio: 25:1

Column temperature: 180°C for 55 min → (8°C/min) → 220°C for 5 min

Detector: flame ionization detector (260°C)

[0064]

The GC chromatogram obtained was checked against the fatty acids represented by the peak numbers 1 to 7, 13 to 27, and 30 to 33 in Fig. 5 in “Journal of oleo science Vol.50,No.5(2001),339-352,” and then the content of trans fatty acids, the content of a C18:1 trans isomer (t18:1), and the content of a C18:2 trans isomer (t18:2) were calculated from the peak area corresponding to the following peak numbers. The results are shown in Table 1.

Trans fatty acid: fatty acids represented by the peak numbers 1 to 7, 13 to 27, and 30 to 33 in Fig. 5;

C18:1 Trans isomer (t18:1): fatty acids represented by the peak numbers 1 to 7 in Fig. 5;

C18:2 Trans isomer (t18:2): fatty acids represented by the peak numbers 13 to 27 in Fig.

5;

[0065]

[Table 1]

	Name	IV	POV (meq/kg)	t18:1 content (% by weight)	t18:2 content (% by weight)	Trans fatty acid content (% by weight)
Control	Soybean oil	130	0	0	0.4	0.9
Preparation Example 1	Oxidized soybean oil	130	56	0	0.4	0.9
Preparation Example 2	Partially hydrogenated soybean oil	83	0	47	10.0	57
Preparation Example 3	Oxidized and partially hydrogenated soybean oil	82	48	47	10.0	57
Preparation Example 4	Extremely hardened and hydrogenated palm oil	0	0	0	0	0
Preparation Example 4	Partially hydrogenated linseed oil	113	0	23.0	37.0	60
Preparation Example 5	Oxidized and partially hydrogenated linseed oil	113	14	23.9	37.1	61
Preparation Example 6	Partially hydrogenated linseed oil	113	30	24.8	37.2	62
Preparation Example 7	Oxidized and partially hydrogenated linseed oil	113	120	26.6	37.4	64
Preparation Example 8	Oxidized and partially hydrogenated linseed oil	113	170	28.5	37.5	66
Preparation Example 9	Partially hydrogenated linseed oil	113	175	28.5	37.5	66
Preparation Example 10	Oxidized and partially hydrogenated linseed oil	113	280	28.1	37.9	66
Preparation Example 11	Oxidized and partially hydrogenated palm oil	46	53	6.5	0.8	7.3
Preparation Example 12	Oxidized and partially hydrogenated linseed oil	121	28	26.6	37.4	64

[0066]

In the following Examples, unless otherwise mentioned, an oxidized and partially hydrogenated linseed oil with an IV of 113 was used.

[0067]

[Examples 1 to 2] <Corn cream soup (1)>

To a commercially available corn cream soup (product name: Cup soup corn cream, manufactured by Ajinomoto Co., Inc.; the sugar content (%) when prepared in accordance with the cooking method of the product was 9.1%), 0.01% by weight of the raw material oils or fats (oils or fats with different IVs and POVs) mentioned in Table 2 were added (0.0011 times per sugar). Cooked products were tasted to evaluate the sweetness, milk flavor, and deterioration odor of the corn cream soup with the following criteria. The results of sensory evaluation of cooked products are shown in Table 2. The sugar content (%) was defined as a value measured as BRIX value with the “Pocket refractometer PAL-J” manufactured by ATAGO Co., Ltd., and was hereinafter measured under the same conditions. The value of added sugar when caster sugar and the like is combined is almost same as the value of the sugar content. The additive amount (fold) of an oxidized and partially hydrogenated oil or fat per sugar content of a food material is a value obtained by dividing the additive amount (% by weight) of the oxidized and partially hydrogenated oil or fat for the food material by the sugar content (%).

[0068]

The evaluation criteria of each taste are as follows:

<Sweetness>

4: feel very strongly compared with the control

3: feel strongly compared with the control

2: feel slightly strongly compared with the control

1: feel the same or weak compared with the control

<Milk flavor>

4: feel very strongly compared with the control

3: feel strongly compared with the control

2: feel slightly strongly compared with the control

1: feel the same or weak compared with the control

<Deterioration odor>

4: do not feel at all

3: feel barely

2: feel somewhat

1: feel strongly

[0069]

[Table 2]

	Oil or fat added	POV	Sweetness	Milk flavor	Deterioration odor
Control	Soybean oil	0	-	-	-
Comparative Example 1	Oxidized soybean oil	56	1	1	4
Comparative Example 2	Partially hydrogenated soybean oil	0	2	2	4
Example 1	Oxidized and partially hydrogenated soybean oil	48	4	3	4
Comparative Example 3	Partially hydrogenated linseed oil	0	2	2	4
Example 2	Oxidized and partially hydrogenated linseed oil	30	4	3	4

[0070]

In Table 2, the sweetness and milk flavor of a cooked food using an oxidized

soybean oil (Comparative Example 1) or a partially hydrogenated soybean oil (Comparative Example 2) were the same or were only felt slightly strongly compared with a cooked product using a soybean oil as the control. On the other hand, the sweetness and milk flavor of a cooked product using an oxidized and partially hydrogenated fat (Example 1) were remarkably increased compared with the control. When a raw material oil or fat of an oxidized and partially hydrogenated fat was changed from a soybean oil (Example 1) to a linseed oil (Example 2), the same effects were obtained. Therefore, an enhancer of the present invention is assumed to have sweetness and/or milk flavor enhancing effects regardless of the derivation of a raw material oil or fat.

[0071]

[Examples 3 to 5] (Change in POV)

In Example 2, cooked products were evaluated by being prepared with the same procedure as in Example 2 except that oxidized and partially hydrogenated linseed oils with different POV values mentioned in Table 3 were used. The results are shown in Table 3.

[0072]

[Table 3]

	Oil or fat added	POV	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	Soybean oil	0	-	-	-	
Comparative Example 4	Partially hydrogenated linseed oil	0	2	1	4	
Comparative Example 5	Partially hydrogenated linseed oil	14	2	2	4	
Example 2	Partially hydrogenated linseed oil	30	4	3	4	
Example 3	Partially	120	4	4	4	

	hydrogenated linseed oil					
Example 4	Partially hydrogenated linseed oil	175	4	4	4	
Example 5	Partially hydrogenated linseed oil	280	4	3	3	Feel astringency slightly

[0073]

Table 3 reveals that an enhancer of the present invention has effects when the POV of an oxidized and partially hydrogenated fat is in a range of 30 to 280. If the POV is 120 or more, sweetness and milk flavor strongly emerge in a food. If the POV is 280 or more, a deterioration odor is slightly produced in a food.

[0074]

[Examples 6 to 11] <Corn cream soup (2)>

In Example 4, cooked products were evaluated by being prepared with the same procedure as in Example 4 except that the additive amount of an oxidized partially hydrogenated linseed oil was changed to the amount shown in Table 4. The results are shown in Table 4.

[0075]

[Table 4]

	Oil or fat added (POV)	Additive amount (% by weight)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	Soybean oil (0)	1	-	-	-	
Example 6	Partially hydrogenated linseed oil (175)	0.005	3	2	4	
Example 4	Partially hydrogenated linseed oil (175)	0.01	4	4	4	
Example 7	Partially	0.05	4	4	4	

	hydrogenated linseed oil (175)					
Example 8	Partially hydrogenated linseed oil (175)	0.1	4	4	4	
Example 9	Partially hydrogenated linseed oil (175)	0.3	4	4	3	
Example 10	Partially hydrogenated linseed oil (175)	0.5	4	4	3	
Example 11	Partially hydrogenated linseed oil (175)	1	4	3	3	Feel astringency slightly

[0076]

Table 4 reveals that enhancing effects were observed when the content of an enhancer of the present invention (oxidized and partially hydrogenated fat) was 0.005% by weight or more. When an oxidized and partially hydrogenated oil or fat was added at 0.0005 to 0.11 times per sugar content of a food material, sweetness enhancing effects were obtained, and the effects were remarkable in the case of 0.001 or more times.

[0077]

[Examples 12 to 15] <Corn cream soup (3)>

In Example 1, cooked products were evaluated by being prepared in the same procedure as in Example 1 except that oils or fats to be added were changed to the oils or fats with different IV and amounts of trans fatty acids as shown in Table 5. The results are shown in Table 5.

[0078]

[Table 5]

	Oil or fat added	Iodine value (IV)	t18:1 amount (% by weight)	t18:2 amount (% by weight)	Trans fatty acid amount (% by weight)	POV	Sweetness	Milk flavor	Deterioration odor
Control	Soybean oil	130	0	0.5	0.9	0	-	-	-
Comparative Example 6	Extremely hardened and hydrogenated palm oil	0	0	0	0	0	1	1	4
Comparative Example 7	Oxidized and partially hydrogenated soybean oil	83	47	10.0	57	0	2	2	4
Example 12	Oxidized and partially hydrogenated soybean oil	82	47	10.0	57	48	4	3	4
Example 13	Oxidized and partially hydrogenated palm oil	46	6.5	0.8	7.3	53	3	3	4
Example 14	Oxidized and partially hydrogenated linseed oil	113	24.8	37.2	62	30	4	4	4
Example 15	Oxidized and partially hydrogenated linseed oil	121	26.6	37.4	64	28	4	4	4

[0079]

Table 5 reveals that an enhancer of the present invention has effects when the amount of trans fatty acids of an oxidized and partially hydrogenated fat is 7.3% by weight or more. The effects of the enhancer were higher when the content of trans fatty acids was 57% by weight or more, and the effects were particularly higher when the t18:2 content was 37.2% by weight or more.

[0080]

[Examples 16 to 17] <Sugar water>

To water in which sugar was dissolved so that the content was 10% by weight (sugar water), the oils or fats mentioned in Table 6 were added so that the content was 0.005% by weight (0.0005 times per sugar) to be evaluated. The results are shown in Table 6.

[0081]

[Table 6]

	Oil or fat added	POV	Sweetness	Milk flavor	Deterioration odor
Control	Soybean oil	0	-	-	-
Comparative Example 8	Oxidized soybean oil	56	1	1	4
Example 16	Oxidized and partially hydrogenated soybean oil	170	3	1	4
Comparative Example 9	Partially hydrogenated linseed oil	0	1	1	4
Example 17	Oxidized and partially hydrogenated linseed oil	170	4	1	4

[0082]

Table 6 reveals that no sweetness enhancing effects were obtained even when an oxidized soybean oil is added to sugar water. On the other hand, an oxidized and partially hydrogenated fat showed sweetness enhancing effects regardless of a raw material of a

hydrogenated fat. It also reveals that an oxidized and partially hydrogenated fat in itself has no milk flavor.

[0083]

[Examples 18 to 21] <Whipped cream using vegetable fat>

Caster sugar was added to commercially available whipped cream (product name: Sujahta Whip (using vegetable fat), manufactured by Tokyo Meiraku Co., Ltd.), and the oils or fats mentioned in Table 7 were added to whipped cream prepared by the conventional methods (added sugar, 10% by weight; specific gravity, 3.9 g/ml; product temperature, 9.3°C) to be evaluated. The results are shown in Table 7.

[0084]

[Table 7]

	Oil or fat added (POV)	Additive amount (% by weight)	Sweetness	Milk flavor	Deterioration odor
Control	Soybean oil (0)	1	-	-	-
Example 18	Oxidized and partially hydrogenated linseed oil (175)	0.01	3	3	4
Example 19	Oxidized and partially hydrogenated linseed oil (175)	0.05	3	4	4
Example 20	Oxidized and partially hydrogenated linseed oil (175)	0.1	4	4	4
Example 21	Oxidized and partially hydrogenated linseed oil (175)	1	4	4	3

[0085]

Table 7 reveals that whipped cream using vegetable fat to which 0.01% by weight or more of an enhancer of the present invention made of an oxidized and partially hydrogenated fat was added can show significant enhancing effects compared with a soybean oil as the control. The enhancer showed sweetness enhancing effects by adding an oxidized and partially hydrogenated linseed oil at least at 0.001 to 0.1 times per sugar.

[0086]

[Examples 22 to 25] <Dairy product whipped cream>

Caster sugar was added to commercially available cream (product name: specialties Hokkaido pure raw cream 35 (dairy product), manufactured by Takanashi Milk Co., Ltd.), and the oils or fats mentioned in Table 8 were added to whipped cream prepared by the conventional methods (added sugar, 20% by weight; specific gravity, 4.7 g/ml; product temperature, 6.4°C) to be evaluated. The results are shown in Table 8.

[0087]

[Table 8]

	Oil or fat added (POV)	Additive amount (% by weight)	Sweetness	Milk flavor	Deterioration odor
Control	Soybean oil (0)	1	-	-	-
Example 22	Oxidized and partially hydrogenated linseed oil (175)	0.01	3	3	4
Example 23	Oxidized and partially hydrogenated linseed oil (175)	0.05	4	4	4
Example 24	Oxidized and partially hydrogenated linseed oil (175)	0.1	4	4	4
Example 25	Oxidized and partially hydrogenated linseed oil (175)	1	4	4	3

[0088]

Table 8 reveals that whipped cream to which 0.01% by weight or more of an enhancer of the present invention made of an oxidized and partially hydrogenated fat was added can show significant enhancing effects compared with a soybean oil as the control. The enhancer showed sweetness enhancing effects by adding an oxidized and partially hydrogenated fat at least at 0.0005 to 0.05 times per sugar. Furthermore, as a result of comparison with Table 7, an enhancer of the present invention can show good enhancing effects whether a whipped raw material is a vegetable fat or a dairy product and regardless of the added sugar amount.

[0089]

[Example 26] <Miso>

Miso obtained by adding 0.2 g of an oil or fat in which 1% by weight of an oxidized and partially hydrogenated linseed oil (POV of 170) was dissolved in a rapeseed oil (added at 0.0002 times per sugar content) or by adding 0.2 g of a rapeseed oil to 20 g of commercially available miso (product name: MARUKOMEKUN-AWASE, manufactured by Marukome Co., Ltd., sugar content of 41.9%) was tasted to evaluate sweetness and saltiness. The results are shown in Table 9. The evaluation criteria of saltiness are as follows:

<Saltiness>

4: feel very strongly compared with the control

3: feel strongly compared with the control

2: feel slightly strongly compared with the control

1: feel the same or weak compared with the control

[0090]

[Table 9]

	Oil or fat added (POV)	Sweetness	Saltiness	Deterioration odor	Special remarks
Control	Rapeseed oil (0)	-	-	-	
Example 26	Partially hydrogenated linseed oil (170)	4	4	4	Felt no sharp taste of slat, and mild

[0091]

Table 9 reveals that the sweetness and saltiness of miso to which an enhancer of the present invention is added are significantly enhanced compared with those of a rapeseed oil as the control.

[0092]

[Example 27] <Tomato sauce>

The sweetness of a tomato sauce obtained by adding 0.2 g of an oil or fat in which 1% by weight of an oxidized and partially hydrogenated linseed oil (POV of 170) was dissolved in a rapeseed oil (added at 0.0006 times per sugar content) or by adding 0.2 g of a rapeseed oil to 20 g of a commercially available tomato sauce (product name: Ripe Tomato Pizza Sauce, manufactured by Kagome Co., Ltd., sugar content of 17.2%) was evaluated. The results are shown in Table 10.

[0093]

[Table 10]

	Oil or fat added (POV)	Sweetness	Deterioration odor	Special remarks
Control	Rapeseed oil (0)	-	-	
Example 27	Partially hydrogenated linseed oil (170)	4	4	Felt no sharp taste of vinegar, and mild

[0094]

Table 10 reveals that the sweetness of a tomato sauce to which an enhancer of the present invention is added is significantly enhanced compared with that of a rapeseed oil as the control. A tomato sauce to which the enhancer was added also showed effects of feeling no sharp taste of vinegar, and being mild.

[0095]

[Example 28] <Ponzu>

The sweetness of ponzu obtained by adding 0.2 g of an oil or fat in which 1% by weight of an oxidized and partially hydrogenated linseed oil (POV of 170) was dissolved in a rapeseed oil (added at 0.0004 times per sugar content) or by adding 0.2 g of a rapeseed oil to 20 g of commercially available ponzu (product name: Ajipon, manufactured by Mizkan Holdings Co., Ltd., sugar content 25.9%) was evaluated. The results are shown in Table 11.

[0096]

[Table 11]

	Oil or fat added (POV)	Sweetness	Deterioration odor	Special remarks
Control	Rapeseed oil (0)	-	-	
Example 28	Partially hydrogenated linseed oil (170)	4	4	Felt no sharp taste of vinegar, and mild

[0097]

Table 11 reveals that the sweetness of ponzu to which an enhancer of the present invention is added is significantly enhanced compared with that of a rapeseed oil as the control. Ponzu to which the enhancer was added also showed effects of feeling no sharp taste of vinegar, and being mild.

[0098]

[Example 29] <Curry roux>

The sweetness of curry (sugar content (%): 9.0%) obtained by adding 2.2 g of an oil or fat in which 1% by weight of an oxidized and partially hydrogenated linseed oil (POV of 170) was dissolved in a rapeseed oil or by adding 2.2 g of a rapeseed oil to 14 g of commercially available curry roux (product name: Golden Curry Sauce Half, manufactured by S&B Foods Inc.) to be dissolved with 200 g of boiling water was evaluated (added at 0.001 times per sugar content). The results are shown in Table 12.

[0099]

[Table 12]

	Oil or fat added (POV)	Sweetness	Deterioration odor	Special remarks
Control	Rapeseed oil (0)	-	-	
Example 29	Partially hydrogenated linseed oil (170)	4	4	Saltiness and umami were enhanced

[0100]

Table 12 reveals that the sweetness of curry roux to which an enhancer of the present invention is added is significantly enhanced compared with that of a rapeseed oil as the control.

[0101]

[Examples 30 to 31] <Doughnut>

Doughnut dough (added sugar: 17% by weight) shown in Table 13 was prepared. To 940 g of this doughnut dough, 0.7 g of an oxidized and partially hydrogenated linseed oil (POV of 170) (added at 0.004 times per sugar) or 0.7 g of a rapeseed oil was added to be mixed.

[0102]

[Table 13]

Raw material composition	Proportion (baker's %)
Butter	10
Caster sugar	35
Salt	1.6
Yolk	8
Whole egg	8
Milk	40
Soft flour	90
Hard flour	10
Baking powder	3

[0103]

A cake doughnut obtained by frying the above mentioned dough in a palm oil at 180°C for 1 minute 40 seconds was evaluated. The results are shown in Table 14.

[Table 14]

	Oil or fat added (POV)	Sweetness	Milk flavor	Deterioration odor
Control	Rapeseed oil (0)	-	-	-
Example 30	Oxidized and partially hydrogenated linseed oil (170)	4	4	4

[0104]

Table 14 reveals that the sweetness and milk flavor of a doughnut to which an enhancer of the present invention is added are significantly enhanced compared with those of a rapeseed oil as the control.

[0105]

Furthermore, a doughnut obtained by covering chocolate on one part of a fried

doughnut was evaluated. The results are shown in Table 15. The criteria of chocolate flavor are as follows:

<Chocolate flavor>

4: feel very strongly compared with the control

3: feel strongly compared with the control

2: feel slightly strongly compared with the control

1: feel the same or weak compared with the control

[0106]

[Table 15]

	Oil or fat added (POV)	Sweetness	Milk flavor	Chocolate flavor	Deterioration odor
Control	Rapeseed oil (0)	-	-	-	-
Example 31	Partially hydrogenated linseed oil (170)	4	4	4	4

[0107]

Table 15 reveals that the chocolate flavor as well as sweetness and milk flavor of a doughnut covered in chocolate to which an enhancer of the present invention is added are significantly enhanced.

[0108]

[Example 32] <Flavor oil>

By adding 0.3 g of an oxidized and partially hydrogenated linseed oil (POV of 170) or 0.3 g of a rapeseed oil to 100 g of a commercially available flavor oil (product name: SavorUp butter flavor oil, manufactured by J-OIL MILLS, Inc.), each flavor oil was obtained. To egg mixture in which 100 g of whole egg, 15 g of milk, and 0.5 g of salt

were mixed, 3% by weight each of the above mentioned flavor oil was added and mixed well to make scrambled egg dough (sugar content of 3.8%). By using 5 g of a rapeseed oil as an underlying oil, each scrambled egg was prepared by the conventional methods and tasted. The evaluation results of the flavor oil obtained are shown in Table 16.

[0109]

[Table 16]

	Oil or fat added (POV)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	Rapeseed oil (0)	-	-	-	
Example 32	Oxidized and partially hydrogenated linseed oil (170)	4	4	4	Feel hydrogenation odor

[0110]

Table 16 reveals that the sweetness and milk flavor of a flavor oil to which an enhancer of the present invention is added are significantly enhanced compared with those of a rapeseed oil as the control. It was found that milk flavor enhancing effects are obtained also for flavor.

[0111]

[Examples 33 to 36] <Butter>

A rapeseed oil at 50°C, commercially available butter (product name: Yukijirushi Hokkaido Butter, manufactured by MEGMILK SNOW BRAND Co., Ltd., sugar content of 0.2%), and an oxidized and partially hydrogenated linseed oil (POV of 170) were combined at a proportion shown in Table 17 and dissolved. The evaluation results of oils or fats after cooling to room temperature are shown in Table 17.

[0112]

[Table 17]

	Rapeseed oil	Butter	Oxidized and partially hydrogenated linseed oil (170)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	99.5	0.5	0	-	-	-	
Example 33	99.4	0.5	0.1	3	3	3	Feel hydrogenation odor
Example 34	97.4	2.5	0.1	4	4	4	Feel no hydrogenation odor
Example 35	94.9	5	0.1	4	4	4	Feel no hydrogenation odor
Example 36	90	10	0	4	4	4	Midtaste and aftertaste are weak

[0113]

Table 17 reveals that the sweetness and milk flavor of an oil or fat to which an enhancer of the present invention is added are significantly enhanced compared with the control. Furthermore, as long as an oxidized and partially hydrogenated linseed oil was added, equivalent flavors (sweetness, milk flavor, and saltiness) were obtained even when the amount of butter was decreased to 1/4. Comparison of Example 33 with the control reveals that effects are obtained even when the additive amount of an oxidized and partially hydrogenated fat per sugar content is 100 fold.

[0114]

Commercially available loaf bread (product name: Chojuku 8 Slices, manufactured by Pasco Shikishima Corporation) was cut into 1/4 pieces, 1 ml each of oils or fats mentioned in Table 17 was applied thereto, and the flavor was evaluated similarly. As a result, the same results as in Table 17 were obtained. Therefore, it was found that the sweetness and milk flavor are significantly enhanced compared with those of the control even when an oil or fat to which an enhancer of the present invention is added is applied to a slice of loaf bread. Furthermore, it was found that as long as an oxidized and partially hydrogenated linseed oil is added, equivalent flavors (sweetness, milk flavor, and saltiness) are obtained even when the amount of butter is decreased to 1/4.

[0115]

[Example 37] <Vegetable kakiage batter>

Tempura batter was obtained by dissolving 100 g of commercially available tempura flour (product name: Nisshin Tempura Flour for crispier tempura, manufactured by Nisshin Seifun Group Inc.) in 150 g of cold water. Each of 112 g of onion, 32 g of carrot, and 16 g of tepary bean was cut into a width of 5 mm and a length of 3 cm, flour was sprinkled on it, 2.5 g of an oil or fat in which 1% by weight of an oxidized and

partially hydrogenated linseed oil (POV of 170) was dissolved in a rapeseed oil or 2.5 g of a rapeseed oil was added to 250 g of a piece of vegetable kakiage on which 90 g of the above mentioned tempura batter was sprinkled, and the piece of vegetable kakiage was fried in an tempura oil by the conventional methods to prepare vegetable kakiage (sugar content of vegetables of 7.8%) to be tasted. The results are shown in Table 18.

[0116]

[Table 18]

	Oil or fat added (POV)	Sweetness	Deterioration odor	Special remarks
Control	Rapeseed oil (0)	-	-	
Example 37	Partially hydrogenated linseed oil (170)	3	4	Saltiness and umami were enhanced

[0117]

Table 18 reveals that the sweetness of vegetable kakiage in which an enhancer of the present invention is added to tempura batter is significantly enhanced compared with that of a rapeseed oil as the control.

[0118]

[Examples 38 to 40] <Margarine>

With the composition shown in Table 19, an aqueous phase was poured by stirring into an oil phase kept at approximately 60°C to perform preliminary emulsification, and then it was passed through a votator to perform cooling kneading to prepare table-type margarine. To 99 g of the table-type margarine, 1 g of a rapeseed oil or an oil part of which was replaced with an oxidized and partially hydrogenated linseed oil as mentioned

in Table 20 was added. The evaluation results of each flavor (sweetness, milk flavor, and deterioration odor) are shown in Table 20.

[0119]

[Table 19]

Oil phase combination	Oil or fat	81
	Butter flavor	0.1
	Emulsifier	0.5
Aqueous phase combination	Water	16.7
	Salt	1.2
	Skim milk powder	0.5

[0120]

[Table 20]

	Oil or fat added (POV)	Additive amount (% by weight)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	Rapeseed oil (0)	-	-	-	-	
Example 38	Oxidized and partially hydrogenated linseed oil (120)	0.025	3	3	4	
Example 39	Oxidized and partially hydrogenated linseed oil (120)	0.05	4	4	4	Hydrogenation odor is strong
Example 40	Oxidized and partially hydrogenated linseed oil (120)	0.1	4	4	3	Hydrogenation odor is very strong

[0121]

Table 20 reveals that the sweetness and milk flavor of margarine to which 0.025% by weight or more of an enhancer of the present invention is added are significantly

enhanced compared with those of a rapeseed oil as the control. Particularly, when 0.05% by weight or more of the enhancer was added, the sweetness and milk flavor were highly enhanced.

[0122]

[Examples 41 to 43] <Loaf bread>

A test oil or fat was prepared by adding oils or fats mentioned in Table 22 to an oil or fat (palm oil:palm olein (IV67) = 7:3). By usual methods, the test oil or fat was mixed with bread materials with the combination shown in Table 21 to manufacture a Pullman loaf. Flavors (sweetness, milk flavor, and deterioration odor) 1 day after baking were evaluated. The results are shown in Table 22.

[0123]

[Table 21]

Composition	Proportion (part by weight)
Hard flour (manufactured by Nisshin Seifun Group Inc.)	100
Bread improving material	0.5
Raw yeast (manufactured by Oriental Yeast Co., Ltd.)	3.0
Caster sugar (manufactured by Mitsui Sugar Co., Ltd.)	6.0
Salt (manufactured by the Salt Industry Center of Japan)	1.8
Skim milk powder (manufactured by Morinaga Milk Industry Co., Ltd.)	2.0
Water	68.0
Test oil or fat	8.0

[0124]

[Table 22]

	Oil or fat added (POV)	Additive amount in dough (% by weight)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	-	-	-	-	-	
Example 41	Oxidized and partially hydrogenated linseed oil (120)	0.042	3	3	4	
Example 42	Oxidized and partially hydrogenated linseed oil (120)	0.13	4	3	4	Hydrogenation odor is slightly strong
Example 43	Oxidized and partially hydrogenated linseed oil (120)	0.21	4	3	3	Hydrogenation odor is strong

[0125]

From the above results, by combining 0.042% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat with dough materials of a loaf, the sweetness and milk flavor of the loaf are enhanced.

[0126]

[Examples 44 to 46] <Cookie>

A test oil or fat was prepared by adding oils or fats mentioned in Table 24 to an oil or fat (palm oil:palm olein (IV67) = 7:3). The test oil or fat was combined in accordance with Table 23 to prepare cookie dough. After the dough was molded into an icebox type, a cookie was baked by usual methods. The evaluation results of flavors (sweetness, milk flavor, and deterioration odor) 1 day after baking are shown in Table 24.

[0127]

[Table 23]

Composition	Proportion (part by weight)
Hard flour	100
Powdered sugar	36.0
Salt	0.7
Egg	4.0
Butter	7.0
Test oil or fat	63.0

[0128]

[Table 24]

	Oil or fat added (POV)	Additive amount in dough (% by weight)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	-	-	-	-	-	
Example 44	Oxidized and partially hydrogenated linseed oil (120)	0.06	3	3	4	
Example 45	Oxidized and partially hydrogenated linseed oil (120)	0.15	4	3	4	Hydrogenation odor is slightly strong
Example 46	Oxidized and partially hydrogenated linseed oil (120)	0.3	4	3	3	Hydrogenation odor is strong

[0129]

From the above results, by combining 0.06% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat with dough materials of a cookie, the sweetness and milk flavor of the cookie are enhanced.

[0130]

[Examples 47 to 49] <Chocolate>

An oxidized and partially hydrogenated fat was added to part of cocoa butter (product name: Cocoa Butter 201, manufactured by Meiji Co., Ltd.) so that the amount of the fat in chocolate was as in Table 26. Chocolate material was prepared by combining the amount shown in Table 25. From the material, carre de-type chocolate bar (milk chocolate) was made by the slab tempering method (procedure: oil or fat dissolving/mixing, refining, conching, tempering, and molding) to be aged at 17°C for 10 days. The aged chocolate was evaluated. The results are shown in Table 26.

[0131]

[Table 25]

Composition	Proportion (part by weight)
Cocoa butter (part of it was replaced with an oxidized and partially hydrogenated fat)	21.3
Cocoa mass	18.5
Sugar	39.8
Whole milk powder	20
Lecithin	0.4
Vanillin	0.04

[0132]

[Table 26]

	Oil or fat added (POV)	Additive amount (% by weight)	Sweetness	Milk flavor	Deterioration odor
Control	Cocoa butter	-	-	-	-
Example 47	Oxidized and partially hydrogenated linseed oil (120)	0.05	3	3	4

Example 48	Oxidized and partially hydrogenated linseed oil (120)	0.10	3	4	4
Example 49	Oxidized and partially hydrogenated linseed oil (120)	0.20	4	4	3

[0133]

The above results reveal that by adding 0.05% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat to chocolate material, the sweetness and milk flavor of the chocolate are enhanced.

[0134]

[Example 50] <Stew>

1. Preparation of powdered oil or fat

A composition for a powdered oil or fat in which an oxidized and partially hydrogenated linseed oil (POV of 120) was combined at a proportion shown in Preparation Example 13 in Table 27 was obtained. The oil content of this composition was 45% by weight. To 50 parts by weight of this composition, 50 parts by weight of water was added, and the composition was stirred to obtain an O/W emulsion. The emulsion obtained was further dried and powdered with a spray dryer (product name: B-290, manufactured by Nihon BUCHI K.K.) to obtain a powdered oil or fat. Regarding the powdered oil or fat prepared, the oil content was 45% and the particle diameter was 1 μm . As shown in Preparation Example 14, a powdered oil or fat without an oxidized and partially hydrogenated linseed oil (POV of 120) was prepared in the same procedure as in Preparation Example 13 (oil content of 45%, particle diameter of 1 μm).

[0135]

[Table 27]

	Preparation Example 13 (part by weight)	Preparation Example 14 (part by weight)
Corn syrup	51.79	51.79
Palm kernel super hard oil	44.00	45.00
Oxidized and partially hydrogenated linseed oil (POV = 120)	1.00	-
Emulsifier	3.21	3.21
Total	100	100

[0136]

2. Evaluation of powdered oil or fat

Into a pan, 442.5 g of water was weighted and poured, and then the pan was put over a fire to be boiled. After the heat was turned off, 57.5 g of commercially available stew mix (granule type) (product name: Stew Mix <Cream>, manufactured by House Foods Corporation) was added to be mixed well. By heating over a low heat for 2 minutes, stew was prepared. A powdered oil or fat was weighted in a container so that the amount was as shown in Table 28 in advance, 100 g of the stew was added (5.6% sugar). The stew was stirred well until it was dissolved. The evaluation results of the stew obtained are shown in Table 28.

[0137]

[Table 28]

	Powdered oil or fat added	Additive amount* (g)	Sweetness	Milk flavor	Deterioration odor	Special remarks
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Control	Preparation Example 14	0.5	-	-	-	
Example 50	Preparation Example 13	1.0	2	3	4	Felt rich tasting strongly

*Additive amount for 100 g of stew

[0138]

The above results reveal that by combining 0.01% by weight of an enhancer of the present invention made of a powdered oil or fat as an oxidized and partially hydrogenated fat with stew, the sweetness and milk flavor of the stew are enhanced.

[0139]

[Examples 51 to 52] <Soup (1)>

To 11.3 g of commercially available soup (product name: Knorr (trademark) Cup Soup (corn cream), manufactured by Knorr Foods Co., Ltd., 7.8% sugar), 88.7 g of boiling water was added to be stirred well. Furthermore, powdered oils or fats with a content shown in Table 29 were added, and stirred and dissolved well. The evaluation results of the soup are shown in Table 29.

[0140]

[Table 29]

	Powdered oil or fat added	Additive amount* (g)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	Preparation Example 14	0.5	-	-	-	
Example 51	Preparation Example 13	0.5	3	3	3	Felt corn flavor strongly
Example 52	Preparation Example 13	1.0	4	4	2	Felt corn flavor slightly strongly

*Additive amount for 100 g of soup

[0141]

The above results reveal that by adding 0.005% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat to soup, the sweetness and milk flavor of the soup are enhanced.

[0142]

[Examples 53 to 54] <Soup (2)>

To 13 g of commercially available soup (product name: Knorr (trademark) Cup Soup (cold corn potage), manufactured by Knorr Foods Co., Ltd.), 87 g of milk was added to be stirred well. Furthermore, powdered oils or fats with a content shown in Table 30 were added, and stirred and dissolved well. The evaluation results of the soup are shown in Table 30.

[0143]

[Table 30]

	Powdered oil or fat added	Additive amount* (g)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	Preparation Example 14	0.5	-	-	-	
Example 53	Preparation Example 13	0.5	2	3	4	
Example 54	Preparation Example 13	1.0	3	4	4	Aftertaste of milk flavor is strong

*Additive amount for 100 g of soup

[0144]

The above results reveal that by adding 0.005% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat to soup, the sweetness and milk flavor of the soup are enhanced.

[0145]

[Examples 55 to 56] <Cocoa>

To 16.7 g of commercially available instant cocoa (product name: Milk Cocoa, manufactured by Morinaga & Co., Ltd., 14.6% sugar), 83.3 g of boiling water was added to be stirred well. Furthermore, powdered oils or fats with a content shown in Table 31 were added, and stirred well. The evaluation results of the cocoa are shown in Table 31.

[0146]

[Table 31]

	Powdered oil or fat added	Additive amount* (g)	Sweetness	Milk flavor	Deterioration odor
Control	Preparation Example 14	0.5	-	-	-
Example 55	Preparation Example 13	0.5	4	4	3
Example 56	Preparation Example 13	1.0	4	4	2

*Additive amount for 100 g of cocoa

[0147]

The above results reveal that by adding 0.005% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat to cocoa, the sweetness and milk flavor of the cocoa are enhanced.

[0148]

[Examples 57 to 58] <Hotcake>

16.7 g of whole egg and 33.3 g of milk were put in a bowl and mixed well. Then, 50.0 g of commercially available hotcake mix (product name: Hotcake Mix, manufactured by Morinaga & Co., Ltd., 34.2% sugar) was added, and furthermore, the predetermined amount of powdered oils or fats shown in Table 32 was added, the mixture was stirred to prepare hotcake batter. The evaluation results of a hotcake obtained by baking the hotcake batter on a hot plate heated at 160°C are shown in Table 32.

[0149]

[Table 32]

	Powdered oil or fat added	Additive amount (g)	Sweetness	Milk flavor	Deterioration odor
Control	Preparation Example 14	5	-	-	-
Example 57	Preparation Example 13	5	4	3	4
Example 58	Preparation Example 13	10	4	4	4

[0150]

The above results reveal that by adding 0.05% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat to hotcake batter, the sweetness and milk flavor of the hotcake are enhanced.

[0151]

[Examples 59 to 60] <Doughnut>

To a bowl, 21.7 g of whole egg, 4.4 g of sugar, 8.7 g of melted butter, 65.2 g of commercially available hotcake mix (manufactured by Morinaga & Co., Ltd.), and powdered oils or fats with a content shown in Table 33 were added, and stirred well to prepare doughnut dough. The doughnut dough was rolled out to a thickness of 10 mm with a rolling pin. The dough was formed and fried in oil at 180°C. The evaluation results of the doughnut are shown in Table 33.

[0152]

[Table 33]

	Powdered oil or fat added	Additive amount (g)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	Preparation Example 14	5	-	-	-	
Example 59	Preparation Example 13	5	2	3	4	
Example 60	Preparation Example 13	10	3	4	4	Aftertaste of sweetness was strong, and odors of oil and

						dough were decreased
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[0153]

The above results reveal that by adding 0.05% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat to doughnut dough, the sweetness and milk flavor of the doughnut are enhanced.

[0154]

[Examples 61 to 63] <Pudding>

To a pan, 11.1 g of premix for pudding (product name: PURIN L, manufactured by House Foods Corporation, 24.2% sugar), 88.9 g of milk, and powdered oils or fats with a content shown in Table 34 were added. While being mixed, the mixture was heated over a moderate heat, and over a low heat after being boiled, and was boiled for approximately 1 minute. The mixture was poured into a container, cooled in a refrigerator to make pudding. The evaluation results of the pudding are shown in Table 34.

[0155]

[Table 34]

	Powdered oil or fat added	Additive amount (g)	Sweetness	Milk flavor	Deterioration odor
Control	Preparation Example 14	1.0	-	-	-
Example 61	Preparation Example 13	0.3	2	3	4
Example 62	Preparation Example 13	1.0	3	4	4
Example 63	Preparation Example 13	3.0	4	4	4

[0156]

The above results reveal that by adding 0.003% by weight or more of an enhancer

of the present invention as an oxidized and partially hydrogenated fat to pudding, the sweetness and milk flavor of the pudding are enhanced.

[0157]

[Examples 64 to 66] <Whipped cream>

To a bowl, 15.1 g of commercially available premix for whipped cream (product name: Kantan Whipped, manufactured by MEGMILK SNOW BRAND Co., Ltd., 38.2% sugar), 28.3 g of boiling water, and the predetermined amount of powdered oils or fats shown in Table 35 were added. Furthermore, 56.6 g of milk was added to the mixture, and stirred for 1 minute 30 seconds to prepare whipped cream. The evaluation results of the whipped cream are shown in Table 35.

[0158]

[Table 35]

	Powdered oil or fat added	Additive amount (g)	Sweetness	Milk flavor	Deterioration odor
Control	Preparation Example 14	1.0	-	-	-
Example 64	Preparation Example 13	0.3	2	3	4
Example 65	Preparation Example 13	1.0	4	3	4
Example 66	Preparation Example 13	5.0	4	4	3

[0159]

The above results reveal that by adding 0.003% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat to whipped cream, the sweetness and milk flavor of the whipped cream are enhanced. After storage in a refrigerator for 24 hours, sweetness enhancing effects and milk flavor enhancing effects were maintained although they were slightly inferior.

[0160]

[Examples 67 to 68] <Almond jelly>

To a pan, 15.1 g of premix for almond jelly (product name: Chen Kenichi Almond Jelly, manufactured by Kyoritsu Foods Co. Inc., 18.3% sugar), 28.3 g of boiling water, and the predetermined amount of powdered oils or fats shown in Table 36 were added and stirred for 1 minute 30 seconds. Then, 56.6 g of milk was put in the mixture and stirred. The evaluation results of almond jelly obtained by pouring the mixture into a container and cooling it are shown in Table 36.

[0161]

[Table 36]

	Powdered oil or fat added	Additive amount (g)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	Preparation Example 14	1.0	-	-	-	
Example 67	Preparation Example 13	1.0	3	3	4	
Example 68	Preparation Example 13	5.0	4	3	4	Felt heavy slightly

[0162]

The above results reveal that by adding 0.01% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat to almond jelly, the sweetness and milk flavor of the almond jelly are enhanced.

[0163]

[Examples 69 to 70] <Coffee (1)>

Into 1.38 g of commercially available instant coffee (product name: Blendy, manufactured by Ajinomoto General Foods, Inc., 1.5% sugar) and the predetermined amount of powdered oils or fats shown in Table 37, 98.62 g of boiling water was poured and stirred well to make coffee. The evaluation results of the coffee are shown in Table 37.

[0164]

[Table 37]

	Powdered oil or fat added	Additive amount (g)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	Preparation Example 14	0.5	-	-	-	
Example 69	Preparation Example 13	0.5	3	3	2	
Example 70	Preparation Example 13	1.0	3	3	1	Felt that the flavor of coffee was slightly weak

[0165]

The above results reveal that by combining 0.005% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat with instant coffee, the sweetness and milk flavor of the coffee are enhanced.

[0166]

[Examples 71 to 72] <Coffee (2)>

Into 1.35 g of commercially available instant coffee (product name: Blendy, manufactured by Ajinomoto General Foods, Inc., 1.5% sugar), 2.03 g of a commercially available creaming powder (product name: MARIM Half, manufactured by Ajinomoto General Foods, Inc., 2.4% sugar), and the predetermined amount of powdered oils or fats shown in Table 38, 96.62 g of boiling water was poured and stirred well to make coffee. The evaluation results of the coffee are shown in Table 38.

[0167]

[Table 38]

	Powdered oil or fat added	Additive amount (g)	Sweetness	Milk flavor	Deterioration odor	Special remarks
Control	Preparation Example 14	0.5	-	-	-	
Example 71	Preparation	0.5	3	3	3	

	Example 13					
Example 72	Preparation Example 13	1.0	3	4	2	Felt that the flavor of coffee was slightly weak

[0168]

The above results reveal that by combining 0.005% by weight or more of an enhancer of the present invention as an oxidized and partially hydrogenated fat with instant coffee, the sweetness and milk flavor of the coffee are enhanced.

[0169]

[Example 73] <Creaming powder (ICP)>

1. Preparation of creaming powder (ICP)

A composition for a creaming powder in which an oxidized and partially hydrogenated linseed oil (POV of 120) was combined at a proportion shown in Preparation Example 15 in Table 39 was obtained. The oil content of this composition was 45% by weight. To 50 parts by weight of this composition, 50 parts by weight of water was added, and the composition was stirred to obtain an O/W emulsion. The emulsion obtained was further dried and powdered with a spray dryer (B-290, manufactured by Nihon BUCHI K.K.) to obtain an ICP. Regarding the prepared ICP, the oil content was 20% and the particle diameter was 0.5 μm . As shown in Preparation Example 15, an ICP without an oxidized and partially hydrogenated linseed oil (POV of 120) was prepared in the same procedure as in Preparation Example 16 (oil content of 20%, particle diameter of 0.5 μm).

[0170]

[Table 39]

	Preparation Example 15 (part by weight)	Preparation Example 16 (part by weight)
Corn syrup	71.07	71.07

Palm kernel super hard oil	19.00	20.00
Oxidized and partially hydrogenated fat (POV = 120)	1.00	-
Emulsifier	1.93	1.93
Whole milk powder	4.00	4.00
Sweetened defatted condensed milk	3.00	3.00
Total	100	100

[0171]

2. Evaluation of ICP

When the ICP of Preparation Example 15 or 16 was eaten in its natural state, the sweetness and milk flavor of the ICP of Preparation Example 15 were enhanced compared with those of the ICP of Preparation Example 16, as shown in Table 40.

[0172]

[Table 40]

	Powdered oil or fat	Sweetness	Milk flavor	Deterioration odor
Control	Preparation Example 16	-	-	-
Example 73	Preparation Example 15	4	3	4

[CLAIMS]

[Claim 1]

A sweetness and/or milk flavor enhancer, comprising an oxidized and partially
5 hydrogenated oil or fat having peroxide value of 25 to 300, trans fatty acids of 5 to 75% by
weight, C18:2 trans isomers in all constituent fatty acids of 5 to 60% by weight, and iodine
value of 35 to 135 as an active ingredient.

[Claim 2]

The sweetness and/or milk flavor enhancer according to claim 1, which contains
10 0.003 to 10% by weight of the oxidized and partially hydrogenated oil or fat.

[Claim 3]

The sweetness and/or milk flavor enhancer according to claim 1 or 2, which is
15 made of a powdered oil or fat.

[Claim 4]

The sweetness and/or milk flavor enhancer according to claim 3, which is
15 obtained by powdering and drying an emulsion obtained by stirring a mixture containing
an oxidized and partially hydrogenated oil or fat having peroxide value of 25 to 300, trans
fatty acids of 5 to 75% by weight, C18:2 trans isomers in all constituent fatty acids of 5 to
60% by weight, and iodine value of 35 to 135, an edible oil or fat, an emulsifier, a
20 powdered base material, and water.

[Claim 5]

The sweetness and/or milk flavor enhancer according to claim 4, wherein a fat
globule diameter (median diameter) of the powder is 0.2 to 2.0 μm .

[Claim 6]

25 An oil or fat composition, comprising the sweetness and/or milk flavor enhancer

according to claim 1 or 2.

[Claim 7]

A food comprising the sweetness and/or milk flavor enhancer according to any one of claims 1 to 6 or cooked using the enhancer.

5 [Claim 8]

A method for producing a sweetness and/or milk flavor enhancer, which comprises adding an oxidized and partially hydrogenated oil or fat having peroxide value of 25 to 300, trans fatty acids of 5 to 75% by weight, C18:2 trans isomers in all constituent fatty acids of 5 to 60% by weight, and iodine value of 35 to 135 as an active ingredient.

10 [Claim 9]

A method for enhancing sweetness and/or milk flavor of cooked foods, which comprises cooking by adding a sweetness and/or milk flavor enhancer containing an oxidized and partially hydrogenated oil or fat having peroxide value of 25 to 300, trans fatty acids of 5 to 75% by weight, C18:2 trans isomers in all constituent fatty acids of 5 to 60% by weight, and iodine value of 35 to 135 as an active ingredient to a food material.

[Claim 10]

A method for enhancing the sweetness of cooked foods, which comprises cooking by adding a sweetness enhancer containing an oxidized and partially hydrogenated oil or fat having peroxide value of 25 to 300, trans fatty acids of 5 to 75% by weight, C18:2 trans isomers in all constituent fatty acids of 5 to 60% by weight, and iodine value of 35 to 135 as an active ingredient to a food material so that the oxidized and partially hydrogenated oil or fat is 0.00002 to 200 times per sugar content of the food material.

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