



159159



G00002

FERMENTATION FLAVOR AGENT

Technical Field

5 The present invention relates to a fermentation flavor agent which can impart rich milk flavor and full body to foods.

Background Art

10 With enhanced genuine inclination of the market, foods having rich milk flavor are being sought. Previously, in response to such demand, a fresh cream, butter, a whole fat milk powder, and a skimmed milk powder have been used. While these products are used at a large amount, rich milk
15 flavor can be expected, this is insufficient to meet the demand of both rich milk flavor and full body. In addition, when using a flavor, there is a tendency that a natural flavor is impaired by strongly flavoring.

 JP 7-38772 B has proposed a process for preparing a
20 flavor oil, which comprises adding 1 to 20 parts by weight of a reducing sugar to 100 parts by weight of a powdered milk product and mixing the resulting mixture, heating the mixture in the presence of 1 to 15 parts by weight of water to obtain a powdered milk product subjected to sugar-heat
25 treatment, immersing the powder in fat, heating the

resultant at a temperature of not lower than 90°C and not higher than 150°C under reduced pressure of a vacuum degree of 60 mmHg (60 Torr) or lower, and removing solid matter. However, this process is flavoring of fat.

5 Further, JP 9-266756 A has proposed a method of imparting milk flavor to foods, which comprises centrifuging butter milk to remove milk fat globules, subjecting to the resultant to ultrafiltration, drying the resulting concentrated mixture to obtain a powder
10 containing colloidal dispersing components, and adding this to foods. JP 10-004862 A has proposed a fermentation flavor imparting agent comprising a fermentation product of a mixture of an oily phase and an aqueous phase, and JP 2001-292696 A has proposed an oil-in-water type emulsified
15 composition comprising 40 to 50% by weight of milk protein which has been treated in a dehydration step and a freezing denaturation step. However, these proposals are insufficient for imparting rich milk flavor and full body.

20 Disclosure of the Invention

Problem to be Solved by the Invention

An object of the present invention is to provide a fermentation flavor agent which can impart rich milk flavor and full body to foods by use it in various foods, and a
25 W/O type or O/W/O type emulsion using the fermentation

flavor agent whose external phase is an oil phase.

Means for Solving the Problem

The present inventors have studied intensively and, as a result, found that a fermentation flavor agent obtained by lactic fermentation of an oil-in-water type emulsion comprising a low melting point fraction of milk fat and butter milk has unexpectedly rich milk flavor and thick full body, and that, when the flavor agent is used in a water-in-oil type emulsion, milk flavor and thick full body equivalent to or superior over those of natural butter can be obtained. Thus, the present invention has been completed.

That is, the first aspect of the present invention is a fermentation flavor agent obtainable by lactic fermentation of an oil-in-water type emulsion comprising a low melting point fraction of milk fat and butter milk. The second aspect is the fermentation flavor agent according to the first aspect, which comprises 2 to 50% by weight of a fat ingredient, 0.5 to 15% by weight of a protein ingredient, and 45 to 90% by weight of water. The third aspect is the fermentation flavor agent according to the first or second aspect, wherein the amount of a low melting point fraction of milk fat is 3% by weight or more based on the oil-in-water type emulsion. The fourth aspect is the fermentation flavor agent according to the first or

second aspect, wherein the amount of protein derived from butter milk is 0.5% by weight or more based on the oil-in-water type emulsion. The fifth is the fermentation flavor agent according to the first aspect, wherein pH is in the range of 4.0 to 5.7/20°C. The sixth aspect is a W/O type or O/W/O type emulsion comprising the fermentation flavor agent according to any one of the first to fifth aspects, whose external phase is an oil phase. The seventh aspect is a baked food comprising the emulsion according to the sixth aspect.

Effect of the Invention

According to the present invention, it is possible to provide a fermentation flavor agent which can impart rich milk flavor and full body to foods; a W/O type or O/W/O type emulsion using the fermentation flavor agent, whose external phase of is an oily phase; and a baked food using the emulsion. At the same time, it is possible to provide a water-in-oil type emulsion (W/O-type emulsion) having milk flavor and thick full body equivalent to or superior over those of natural butter, and a baked food excellent in flavor durability.

Best Mode for Carrying Out the Invention

The fermentation flavor agent of the present invention can be obtained by lactic fermentation of an oil-in-water

type emulsion comprising a low melting point fraction of milk fat and butter milk.

The low melting point fraction of milk fat used herein is a low melting point part obtained by fractionation of fat obtained from cow milk or butter, i.e., milk fat into a high melting point part and the low melting point part. Preferably, the melting point of the fraction is in the range of 10°C to 25°C. As the fractionation method fat, any of a dry method, an emulsification and fractionation method, and a solvent fractionation method can be adopted. A dry method is preferable in view of a cost and quality, and a representative method is Tirtiaux method.

The low melting point fraction of milk fat is also referred to as an oleic fraction and, in the present invention, the amount of oleic acid as a constituent fatty acid in fat is preferably 25 to 35%, more preferably 28 to 33%.

The butter milk used herein is that produced as a by-product during the production of butter from cow milk, and includes a butter milk powder obtained by concentrating and drying this butter milk to obtain the powder, and a butter milk powder fluid obtained by dissolving or dispersing this butter milk powder in water.

Further, as the butter milk powder, a commercially available butter milk powder can be generally used.

In the present invention, the amount of a fat ingredient of the oil-in-water type emulsion is preferably 2 to 50% by weight, more preferably 5 to 40% by weight, most preferably 7 to 30% by weight. When the amount of the fat ingredient is too small, the resulting emulsion is not in a suitable emulsified state, and excessive protein denaturation occurs upon sterilization after protein aggregation due to fermentation, thereby making it difficult to obtain sufficient milk flavor and full body.

When the amount of the fat ingredient is too large, emulsification can hardly be maintained, and viscosity is increased, thereby making it difficult to conduct lactic fermentation. Examples of a raw material of fat, as fat other than the low melting point fraction of milk fat, include milk fat derived from butter, fresh cream, etc., vegetable fat such as rapeseed oil, soybean oil, sunflower seed oil, cottonseed oil, peanut oil, rice bran oil, corn oil, safflower oil, palm oil, shea butter, sal fat, cacao butter, coconut oil, palm kernel oil, etc., and animal fat such as beef tallow, lard, fish oil, whale oil, etc. They can be used alone or in combination two or more thereof, and they may be any edible fat such as processed fat obtained by subjecting them to hydrogenation, fractionation, interesterification, etc. As fat other than the low melting point fraction of milk fat, it is preferable to use

fat having a melting point of 15 to 38°C, more preferably 25 to 37°C in view of stabilization of the emulsified state of the oil-in-water type emulsion.

And, the amount of the low melting point fraction of milk fat is preferably 3% by weight or more, more preferably 4 to 20% by weight, most preferably 4 to 15% by weight based on the oil-in-water type emulsion. When the fraction is less than 3% by weight, sufficient full body can hardly obtained.

10 In the present invention, the amount of the protein ingredient of the oil-in-water type emulsion is preferably 0.5 to 15% by weight, more preferably 1.5 to 10% by weight, and most preferably 2 to 7% by weight. When the protein ingredient is less than the lower limit, a suitable emulsified state can hardly be formed and, from a viewpoint
15 of flavor, suitable milk flavor or full body can hardly be formed. When the protein ingredient exceeds the upper limit, viscosity of the oil-in-water type emulsion is high, thereby making it difficult to compound the emulsion, or
20 even when compounded, to conduct lactic fermentation.

Examples of the protein ingredient other than protein derived from butter milk include milk products such as cow milk, processed milk, fresh cream, defatted milk, skimmed milk powder, whole fat milk powder, natural cheese,
25 processed cheese, etc., caseins such as acid casein, rennet

casein, sodium caseinate, etc., milk proteins such as whey protein, and protein derived from various animals and vegetables.

And, the amount of protein derived from butter milk is preferably 0.5% by weight or more, more preferably 0.7 to 7% by weight, most preferably 0.7 to 5% by weight based on the oil-in-water type emulsion. When the protein is less than 0.5% by weight, sufficient milk flavor can hardly be obtained.

In the present invention, the amount of water in the oil-in-water type emulsion is preferably 45 to 90% by weight. When water is less than the lower limit, viscosity of the oil-in-water type emulsion is high, and compounding is difficult, or if compounding is possible, lactic fermentation is hardly conducted. On the other hand, when water exceeds the upper limit, suitable milk flavor or full body is hardly formed in view of flavor.

For producing the fermentation flavor agent of the present invention, a process to be adopted is lactic fermentation of the oil-in-water type emulsion comprising the low melting point fraction of milk fat and butter milk, followed by adjusting pH in the range of 4.0 to 5.7/20°C. Usually, the oil-in-water type emulsion is subjected to lactic fermentation via pre-emulsification, homogenization, sterilization, and then cooling steps. Lactic fermentation

is usually conducted at 15°C to 45°C with a lactic acid bacterium starter until pH becomes 4.0 to 5.7, preferably 4.6 to 5.0. As the lactic acid bacterium starter used in lactic fermentation in the present invention, a preferred
5 lactic acid bacterium starter is that producing components called to be better flavor, aroma components of fermentation milk products such as diacetyl, acetoin, butyric acid, etc. Typical examples thereof include a single culture of *Lactococcus*, a single culture of
10 *Lactobacillus*, a single culture of *Leuconostoc*, a single culture of *Streptococcus*, and a mixed culture obtained by combining two or more kinds of them. After certain flavor is brewed by lactic fermentation, pH may be adjusted with an organic acid.

15 Upon production of the above oil-in-water type emulsion, an emulsifier may be used in such an amount that flavor is not impaired. The emulsifier is not specifically limited and a conventional known emulsifier may be used. Examples thereof include lecithin, sugar fatty acid ester,
20 propylene glycol fatty acid ester, sorbitan fatty acid ester, glycerin fatty acid ester, polyglycerin fatty acid ester, various organic acid monoglycerides such as acetic acid monoglyceride, tartaric acid monoglyceride, acetic acid tartaric acid mixed monoglyceride, citric acid
25 monoglyceride, diacetyltartaric acid monoglyceride, lactic

acid monoglyceride, etc., and polyoxyethylene sorbitan fatty acid ester. They may be used alone or in a combination of two or more thereof in an amount of 0 to 1% by weight, preferably 0 to 0.5% by weight based on the oil-
5 in-water type emulsion depending on a particular situation.

In addition to the above emulsifier, known additives such as a calcium salt, a phosphate salt, viscosity increasing polysaccharides, flavors, etc., can be added.

The production process of the W/O type or O/W/O type
10 emulsion whose external phase is an oil phase of the present invention is not specifically limited, and the fermentation flavor agent of the present invention can be used by mixing it together with an oily phase and an aqueous phase according to a conventional method.

15 Sometimes, an entire aqueous phase may be the fermentation flavor agent. Specifically, the emulsion can be produced by pre-emulsifying an oil phase, an aqueous phase and/or the fermentation flavor agent, and rapidly cooling and kneading the product with Perfecter, Votator, or Kombinator.

20 The oil phase is prepared by adding oil-soluble ingredients such as a pigment, an antioxidant, and a flavor to melted fat if necessary, and dissolving/dispersing this. The aqueous phase is prepared by adding water-soluble milk ingredients and, if necessary, table salt, sugars,
25 inorganic salts, etc., to water or warm water, and

dissolving/dispersing the mixture.

And, a fat raw material used in these emulsions is not specifically limited as far as it is edible fat, and examples thereof include vegetable fat such as rapeseed oil, soybean oil, sunflower seed oil, cottonseed oil, peanut oil, rice bran oil, corn oil, safflower oil, olive oil, kapok oil, sesame oil, evening primrose oil, palm oil, shea butter, sal fat, cacao butter, coconut oil, palm kernel oil, etc., and animal fat such as milk fat, beef tallow, lard, fish oil, whale oil, etc. They can be used alone or in a combination two or more thereof. Their processed products such as hydrogenated, fractionated and interesterified products can also be suitably used.

The fermentation flavor agent obtained as described above can be used in various foods, and is particularly useful for imparting a flavor to a W/O type or O/W/O type emulsion whose external phase is an oil phase, i.e., margarine, etc. The amount of the fermentation flavor agent to be used in the W/O type or O/W/O type emulsion whose external phase of is an oil phase is not specifically limited, but is preferably 5 to 60% by weight, more preferably 7 to 40% by weight based on the total emulsion. When the amount is too small, rich milk flavor or full body is insufficient and, when is too large, emulsification stability of these emulsions is deteriorated in some cases.

The baked food of the present invention can be obtained by using the W/O type or O/W/O type emulsion whose external phase is an oil phase, in which the fermentation flavor agent is used. The baked food can be obtained by
5 using these emulsions same as conventional margarine. Examples of the baked food include pastries, baked confectioneries, and breads. Examples of pastries include danish, croissant, etc., examples of baked confectioneries include cake, cookie, biscuit, muffin, puff, pie, pizza,
10 etc., examples of breads include confectionery bread, cooked bread, special bread, etc. They can be obtained by baking under conventional conditions for these products. In the case of an oven, the baking conditions can be appropriately selected in the range of 160°C to 240°C and 5
15 minutes to 25 minutes.

Since these baked foods use the fermentation flavor agent, a flavor is better of course not only immediately after baking but also with time, and the baked food excellent in flavor durability can be obtained.

20

Examples

The following Examples will illustrate the present invention in detail, but the spirit of the present invention is not limited thereto. In Examples, both
25 percents and parts are by weight.

The protein ingredient of the fermentation flavor agent obtained by the process of the present invention was analyzed by a Kjeldahl method described in "New Food Analysis Handbook, the first edition published in November 5 20, in 2000 by KENPAKUSHA", p24-31.

(Evaluation of milk taste and full body of fermentation flavor agent)

The product was evaluated by three stages based on the following criteria.

10 Milk taste

◎ Rich milk taste, ○ Rich milk taste, △ Weak milk taste
Full body

◎ Thick full body, ○ Presence of full body, △ Weak full body

15 (Evaluation of croissant)

The product was evaluated by three stages based on the following criteria.

Juicy mouthfeel upon melting in the mouth

◎ Thick juicy feeling

20 ○ Presence of juicy feeling

△ Absence of juicy feeling

Butter feeling in flavor

◎ Strong butter feeling

○ Presence of butter feeling

25 △ Weak butter feeling

(Evaluation of butter cake)

The product was evaluated by three stages based on the following criteria.

Butter feeling in flavor

- 5. ⊙ Strong butter feeling
- Presence of butter feeling
- △ Weak butter feeling

Example 1

10 An aqueous phase was prepared by warming 78 parts of water to 30°C, and gradually adding 10 parts of a butter milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.7%, protein 33.4%, fat 7%, ash 7.5%, sugar 48.4%) thereto with stirring.

15 To the above aqueous phase was added melted 12 parts of a low melting point fraction of milk fat (manufactured by Coleman; melting point 15°C), and the mixture was pre-emulsified at 65°C for 10 minutes, sterilized at 75°C, homogenized with a homogenizer at pressure of 80 kg/cm², and then cooled to 20°C to prepare an oil-in-water type
20 emulsion.

 To 100 parts of the thus prepared oil-in-water type emulsion was added 1 part of a lactic acid bacterium balk starter (mixed culture of *Leuconostoc cremoris* and *Lactococcus lactis diacetylactis*), and the mixture was
25 fermented at 20°C for 12 hours to obtain a fermentation

flavor agent having pH of 4.7. This fermentation flavor agent was sterilized at 80°C, and cooled to 5°C to obtain a fermentation flavor agent of Example 1.

When this fermentation flavor agent was evaluated, the agent was found to have rich milk flavor and thick full body. These results are summarized in Table 1.

Example 2

According to the same formulation and manner as those of Example 1, a fermentation flavor agent of Example 2 was obtained except that 12 parts of a low melting point fraction of milk fat (manufactured by Coleman; melting point 15°C) was changed to 4 parts of a low melting point fraction of a milk fat (manufactured by Coleman; melting point 15°C) and 8 parts of hydrogenated soybean oil.

When this fermentation flavor agent was evaluated, the agent had the same degree of milk flavor as that of Example 1, and thick full body though full body was slightly inferior to that of Example 1. These results are summarized in Table 1.

Example 3

According to the same formulation and manner as those of Example 1, a fermentation flavor agent of Example 3 was obtained except that 10 parts of a butter milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.7%, protein 33.4%, fat 7%, ash 7.5%,

sugar 48.4%) was changed to 2.5 parts of the same butter milk powder and 7.5 parts of a skimmed milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.8%, protein 34.0%, fat or oil matter 1.0%, ash 7.9%, sugar 53.3%). When this fermentation flavor agent was evaluated, milk flavor was slightly inferior to that of Example 1, but milk taste was rich. Full body was the same degree as that of Example 1. These results are summarized in Table 1.

10 Example 4

According to the same formulation and manner as those of Example 1, a fermentation flavor agent of Example 4 was obtained except that 10 parts of a butter milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.7%, protein 33.4%, fat 7%, ash 7.5%, sugar 48.4%) was changed to 2.5 parts of the same butter powder and 7.5 parts of a skimmed milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.8%, protein 34.0%, fat 1.0%, ash 7.9%, sugar 53.3%), and 12 parts of a low melting point fraction of milk fat (manufactured by Coleman; melting point 15°C) was changed to 4 parts of a low melting point fraction of milk fat (manufactured by Coleman; melting point 15°C) and 8 parts of hydrated soybean oil. When this fermentation flavor agent was evaluated, milk flavor was slightly inferior to

that of Example 1, but milk taste was rich. Full body was slightly inferior to that of Example 1, but slightly thick full body was maintained. These results are summarized in Table 1.

5 Example 5

According to the same formulation and manner as those of Example 1, a fermentation flavor agent of Example 5 was obtained except that 10 parts of a butter milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.7%, protein 33.4%, fat 7%, ash 7.5%, sugar 48.4%) was changed to 2.5 parts of the same butter milk powder and 7.5 parts of a skimmed milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.8%, protein 34.0%, fat 1.0%, ash 7.9%, sugar 53.3%), 12 parts of a low melting point fraction of milk fat (manufactured by Coleman; melting point 15°C) was changed to 8 parts of a low melting point fraction of milk fat (manufactured by Coleman; melting point 15°C) and 16 parts of hydrogenated soybean oil, and 78 parts of water was changed to 66 parts of water. When this fermentation flavor agent was evaluated, milk flavor was slightly inferior to that of Example 1, but milk taste was rich. Full body was the same extent as that of Example 1, and thick full body was maintained. These results are summarized in Table 1.

Example 6

According to the same formulation and manner as those of Example 1, a fermentation flavor agent of Example 6 was obtained except that 10 parts of a butter milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.7%, protein 33.4%, fat 7%, ash 7.5%, sugar 48.4%) was changed to 5 parts of the same butter milk powder and 15 parts of a skimmed milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.8%, protein 34.0%, fat 1.0%, ash 7.9%, sugar 53.3%), 12 parts of a low melting point fraction of milk fat (manufactured by Coleman; melting point 15°C) was changed to 4 part of a low melting point fraction of milk fat (manufactured by Coleman; malting point 15°C) and 8 parts of hydrogenated soybean oil, and 78 parts of water was changed to 68 parts of water. When this fermentation flavor agent was evaluated, milk flavor was slightly inferior to that of Example 1, but milk taste was rich. Full body was slightly inferior to that of Example 1, but slightly thick full body was maintained. These results are summarized in Table 1.

Table 1

Examples	1	2	3	4	5	6
Formulation of oil-in-water type emulsion						
Low melting point fraction of milk fat	12	4	12	4	8	4
Hydrogenated soybean oil	-	8	-	8	16	8
Butter milk powder	10	10	2.5	2.5	2.5	5
Skimmed milk powder	-	-	7.5	7.5	7.5	15
Water	78	78	78	78	66	68
Total fat (% by weight)	12.7	12.7	12.2	12.2	24.2	12.5
Low melting point fraction of milk fat (% by weight)	12	4	12	4	8	4
Total protein (% by weight)	3.3	3.3	3.4	3.4	3.4	6.7
Protein derived from butter milk powder (% by weight)	3.3	3.3	0.8	0.8	0.8	1.6
Emulsified state of fermentation flavor agent	Better	Better	Better	Better	Better	Better
Milk taste of fermentation flavor agent	⊙	⊙	○	○	○	○
Full body of fermentation flavor agent	⊙	○	⊙	○	⊙	○

Comparative Example 1

According to the same formulation and manner as those of Example 1, a fermentation flavor agent of Comparative Example 1 except that 10 parts of a butter milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.7%, protein 33.4%, fat 7%, ash 7.5%, sugar 48.4%) was changed to 10 parts of a skimmed milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.8%, protein 34.0%, fat 1.0%, ash 7.9%, sugar 53.3%). When this fermentation flavor agent was evaluated, milk flavor was weak, but full body was maintained. These results are summarized in Table 2.

Comparative Example 2

According to the same formulation and manner as those of Example 1, a fermentation flavor agent of Comparative Example 2 was obtained except that 12 parts of a low melting point fraction of milk fat (manufactured by Coleman; melting point 15°C) was changed to 12 parts of hydrogenated soybean oil.

When this fermentation flavor agent was evaluated, milk flavor was maintained, but full body was lost. These results are summarized in Table 2.

Comparative Example 3

According to the same formulation and manner as those of Example 1, a fermentation flavor agent of Comparative

Example 3 was obtained except that 10 parts of a butter milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.7%, protein 33.4%, fat 7%, ash 7.5%, sugar 48.4%) was changed to 10 parts of a skimmed milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.8%, protein 34.0%, fat 1.0%, ash 7.9%, sugar 53.3%), and 12 parts of a low melting point fraction of milk fat (manufactured by Coleman; melting point 15°C) was changed to 12 parts of hydrogenated soybean oil. When this fermentation flavor agent was evaluated, milk flavor and full body were weak. These results are summarized in Table 2.

Comparative Example 4

According to the same formulation and manner as those of Example 1 except that 12 parts of a low melting point fraction of a milk fat (manufactured by Coleman; melting point 15°C) was changed into 14 parts of a butter, and 78 parts of water was changed into 76 parts of water in Example 1, a fermentation flavor agent based on Comparative Example 4 was obtained.

When this fermentation flavor agent was assessed, milk flavor was possessed, but full body was deficient. These results are summarized in Table 2.

Comparative Example 5

According to the same formulation and manner as those

of Example 1, a fermentation flavor agent of Comparative Example 5 was obtained except that 10 parts of a butter milk powder (manufactured by Snow Brand Milk Products Co., Ltd.; components: water 3.7%, protein 33.4%, fat 7%, ash 7.5%, sugar 48.4%) was changed to 0.2 parts of the same butter milk powder, and 78 parts of water was changed to 87.8 parts of water. The emulsified state of the fermentation flavor agent was bad, and milk flavor and full body were weak. These results are summarized in Table 2.

Table 2

Comparative Examples	1	2	3	4	5
Formulation of oil-in-water emulsion					
Low melting point fraction of milk fat	12	-	-	-	12
Butter	-	-	-	14	-
Hydrogenated soybean oil	-	12	12	-	-
Butter milk powder	-	10	-	10	0.2
Skimmed milk powder	10	-	10	-	-
Water	78	78	78	76	87.8
Total fat (% by weight)	12	12.7	12	12.3	12
Low melting point fraction of milk fat (% by weight)	12	None	None	None	12
Total protein (% by weight)	3.4	3.3	3.4	3.4	0.1 or less
Protein derived from butter milk powder (% by weight)	None	3.3	None	3.3	0.1 or less
Emulsified state of fermentation flavor agent	Better	Better	Better	Better	Worse
Milk taste of fermentation flavor agent	△	◎	△	◎	△
Full body of fermentation flavor agent	◎	△	△	△	△

Example 7

An oil phase was obtained by adding 10 parts of hydrogenated soybean oil (melting point 52°C), 40 parts of hydrogenated rapeseed oil (melting point 31°C), 30 parts of palm oil, 20 parts of rapeseed oil, 0.2 parts of glycerin fatty acid ester (manufactured by Riken Vitamin Co., Ltd.; trade name Emulsi MS) and 0.1 parts of soybean lecithin (manufactured by True Lecithin Kogyo Co., Ltd.), and melting or mixing the mixture with thoroughly stirring at 60°C.

To this oil phase was added 12 parts of the fermentation flavor agent of Example 1 as an aqueous phase, the mixture was mixed and emulsified with stirring at 60°C, and rapidly cooled and kneaded with Kombinator to obtain a water-in-oil type emulsion of Example 7.

Example 8

According to the same formulation and manner as those of Example 7, a water-in-oil type emulsion of Example 8 was obtained except that 12 parts of the fermentation flavor agent of Example 1 was changed to 12 parts of the fermentation flavor agent of Example 2.

Example 9

According to the same formulation and manner as those of Example 7, a water-in-oil type emulsion of Example 9 was obtained except that 12 parts of the fermentation flavor

agent of Example 1 was changed to 12 parts of the fermentation flavor agent of Example 3.

Example 10

According to the same formulation and manner as those
5 of Example 7, a water-in-oil type emulsion of Example 10 was obtained except that 12 parts of the fermentation flavor agent of Example 1 was changed to 12 parts of the fermentation flavor agent of Example 4.

Comparative Example 6 to Comparative Example 8

10 According to the same formulation and manner as those of Example 7, a water-in-oil type emulsion of Comparative Example 6 was obtained except that 12 parts of the fermentation flavor agent of Example 1 was changed to 12 parts of the fermentation flavor agent of Comparative
15 Example 1.

According to the same manner, 12 parts of the fermentation flavor agent of Example 1, a water-in-oil type emulsion of Comparative Example 7 was obtained except that 12 parts of the fermentation flavor agent of Example 1 was
20 changed to 12 parts of the fermentation flavor agent of Comparative Example 2, and a water-in-oil type emulsion of Comparative Example 8 was obtained except that 12 parts of the fermentation flavor agent of Example 1 was changed to 12 parts of the fermentation flavor agent of Comparative
25 Example 3.

Croissants were made by using the emulsions of Example 7 to Example 10, and Comparative Example 6 to Comparative Example 8 and a commercially available sheet-like butter (manufactured by Snow Brand Milk Products Co., Ltd.), and
5 were evaluated.

Water-in-oil type emulsions of Example 7 to Example 10, and Comparative Example 6 to Comparative Example 8 were all molded in the shape of sheets. Croissants were made according to the formulation of Table 3 and baked under
10 conditions of Table 4. Their juicy mouthfeel and butter feeling in flavor were evaluated.

Table 3

	Example 11	Example 12	Example 13	Example 14	Comparative Example 9	Comparative Example 10	Comparative Example 11	Comparative Example 12
Wheat flour	100	100	100	100	100	100	100	100
Sugar	6	6	6	6	6	6	6	6
Cooking salt	2	2	2	2	2	2	2	2
Skimmed milk powder	4	4	4	4	4	4	4	4
Shortening	5	5	5	5	5	5	5	5
Yeast	5	5	5	5	5	5	5	5
Yeast food	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Water	54	54	54	54	54	54	54	54
Water-in-oil type emulsion of Example 7	50	-	-	-	-	-	-	-
Water-in-oil type emulsion of Example 8	-	50	-	-	-	-	-	-
Water-in-oil type emulsion of Example 9	-	-	50	-	-	-	-	-
Water-in-oil type emulsion of Example 10	-	-	-	50	-	-	-	-
Water-in-oil type emulsion of Comparative Example 6	-	-	-	-	50	-	-	-
Water-in-oil type emulsion of Comparative Example 7	-	-	-	-	-	50	-	-
Water-in-oil type emulsion of Comparative Example 8	-	-	-	-	-	-	50	-
Commercially available sheet-like butter	-	-	-	-	-	-	-	50

Table 4

Mixing	Low speed 5 min, medium speed 5 min
Kneading temperature	27°C
Flour	28°C, humidity 75%, 60 min
Retard	-18°C, 60 min
Folding	Folding in three, twice
Retard	-7°C, 60 min
Folding	Folding in three, once
Retard	-7°C, 45 min
Molding	Dough thickness 4 mm, 55 g
Dryer	35°C, humidity 75%, 60 min
Firing	210°C, 17 min

Example 11

In the formulation of Example 11 in Table 3,

5 ingredients other than the water-in-oil type emulsion of Example 7 were mixed, kneaded, and fermented in a container at 28°C and humidity of 75% for 60 minutes, and retarded for 60 minutes in a freezer at -18°C. The water-in-oil type emulsion of Example 7 was folded therein, followed by

10 three-folding twice with a reverse sheeter and retarding for 60 minutes in a freezer at -7°C. Three-folding of the dough was repeated once a reverse sheeter, followed by retarding for 45 minutes in a freezer at -7°C. Then, the dough was spread 4 mm in thickness with a reverse sheeter,

15 55g thereof was molded, fermented for 60 minutes in a container at 35°C and humidity of 75°C, and baked for 17 minutes in an oven at a container temperature of 210°C to obtain a croissant of Example 11. The production

conditions are summarized in Table 4. As evaluation, both juicy mouthfeel upon melting in the mouth, and butter feeling in flavor were excellent, and superior over a butter. The product was evaluated immediately after baking and one day after baking. The results are summarized in Table 5.

Examples 12 to 14, and Comparative Example 9 to Comparative Example 12

According to the formulations of Examples 12 to 14 and Comparative Example 9 to Comparative Example 12 of Table 3, and the same manner as that of Example 11, croissants were obtained. As in Example 11, juicy mouthfeel upon melting in the mouth, and butter feeling in flavor were evaluated.

As Comparative Example 12, a croissant using a commercially available butter was evaluated.

In Example 12, juicy mouthfeel was the same extent as that of the butter, but butter feeling in flavor was superior to that of the butter. The results are summarized in Table 5. The results of Examples 13 to 14, and Comparative Example 9 to Comparative Example 12 are also summarized in Table 5. In evaluation of the croissants one day after baking, the croissant using the commercially available butter of Comparative Example 12 had bad butter feeling in flavor, while the croissants of Examples 12 to 14 had no change in flavor, and were excellent in flavor

durability.

Table 5

Evaluation of flavor immediately after croissant baking

	Example 11	Example 12	Example 13	Example 14
Juicy mouthfeel upon melting in the mouth	⊙	○	⊙	○
Butter feeling in flavor	⊙	⊙	○	○

	Comparative Example 9	Comparative Example 10	Comparative Example 11	Comparative Example 12
Juicy mouthfeel upon melting in the mouth	○	△	△	○
Butter feeling in flavor	△	○	△	○

5

Evaluation of flavor one day after croissant baking

	Example 11	Example 12	Example 13	Example 14
Juicy mouthfeel upon melting in the mouth	○	△	○	△
Butter feeling in flavor	⊙	⊙	○	○

	Comparative Example 9	Comparative Example 10	Comparative Example 11	Comparative Example 12
Juicy mouthfeel upon melting in the mouth	△	△	△	△
Butter feeling in flavor	△	△	△	△

Example 15

10

Preparation of butter cake (finanshe)

According to the formulation of Example 15 in Table 6, a butter cake (finanshe) was prepared by using the water-

in-oil type emulsion of Example 7, and was evaluated. To a mixture of 100 parts of soft flour, 220 parts of white superior soft sugar, 90 parts of almond poudre, 8.75 parts of corn starch, and 3.75 parts of a baking powder was added 250 parts of an egg white fluid warmed to about 25°C with stirring by a mixer, and the water-in-oil type emulsion of Example 7 melted at about 50°C was gradually added thereto to obtain a finanshe dough. This kneaded dough was cast into a finanshe mold at about 8/10, and baked in an oven under conditions of 230°C for 15 minutes. After cooling, butter feeling in flavor was evaluated. As evaluation, butter feeling in flavor was very good, and was superior to that of a butter. The results are summarized in Table 7.

Example 16 to Example 18 and Comparative Example 13 to Comparative Example 16

According to the formulations of Example 16 to Example 18 and Comparative Example 13 to Comparative Example 16 in Table 6, and the same manner as that of Example 15, butter cakes (finanshes) were obtained. As in Example 15, butter feeling in flavor was evaluated. In Comparative Example 16, a butter cake using a commercially available butter was evaluated. Butter feeling in flavor of Example 16 was superior to that of the butter. The results are summarized in Table 7. The results of Examples 17 to 18 and Comparative Examples 13 to 16 are summarized in Table 6 and

Table 7.

Table 6

	Example 15	Example 16	Example 17	Example 18	Comparative Example 13	Comparative Example 14	Comparative Example 15	Comparative Example 16
Soft flour	100	100	100	100	100	100	100	100
White superior soft sugar	220	220	220	220	220	220	220	220
Almond poudre	90	90	90	90	90	90	90	90
Corn starch	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
Baking powder	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
Egg white solution	250	250	250	250	250	250	250	250
Water-in-oil type emulsion of Example 7	220	-	-	-	-	-	-	-
Water-in-oil type emulsion of Example 8	-	220	-	-	-	-	-	-
Water-in-oil type emulsion of Example 9	-	-	220	-	-	-	-	-
Water-in-oil type emulsion of Example 10	-	-	-	220	-	-	-	-
Water-in-oil type emulsion of Comparative Example 6	-	-	-	-	220	-	-	-
Water-in-oil type emulsion of Comparative Example 7	-	-	-	-	-	220	-	-
Water-in-oil type emulsion of Comparative Example 8	-	-	-	-	-	-	220	-
Commercially available sheet-like butter	-	-	-	-	-	-	-	220

Table 7

Evaluation of butter cake (finanshe) flavor

	Example 15	Example 16	Example 17	Example 18
Butter feeling in flavor	◎	◎	○	○

	Comparative Example 13	Comparative Example 14	Comparative Example 15	Comparative Example 16
Butter feeling in flavor	△	○	△	○

5 Industrial Applicability

The present invention relates to a fermentation flavor agent which can impart rich milk flavor and full body to foods.

CLAIMS

1. A fermentation flavor agent obtainable by lactic fermentation of an oil-in-water type emulsion comprising a low melting point fraction of milk fat and butter milk.

5 2. The fermentation flavor agent according to claim 1, which comprises 2 to 50% by weight of a fat ingredient, 0.5 to 15% by weight of a protein ingredient, and 45 to 90% by weight of water.

10 3. The fermentation flavor agent according to claim 1 or 2, wherein the amount of a low melting point fraction of milk fat is 3% by weight or more based on the oil-in-water type emulsion.

15 4. The fermentation flavor agent according to claim 1 or 2, wherein the amount of protein derived from butter milk is 0.5% by weight or more based on the oil-in-water type emulsion.

 5. The fermentation flavor agent according to claim 1, wherein pH is in the range of 4.0 to 5.7/20°C.

20 6. A W/O type or O/W/O type emulsion comprising the fermentation flavor agent according to any one of claims 1 to 5, whose external phase is an oil phase.

 7. A baked food comprising the emulsion according to claim 6.