

OIL-IN-WATER EMULSION CONTAINING LACTIC ACID FERMENTATION
EMULSION

Technical Field

5 [0001]

The present invention relates to an oil-in-water emulsion containing a lactic acid fermentation emulsion, in particular, the emulsion relates to a foamable oil-in-water emulsion.

10

Background Art

[0002]

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When it is desired to impart rich milk flavor and body taste to an oil-in-water emulsion, in particular, to a foamable oil-in-water emulsion, this has been conventionally solved by using fresh cream, butter, whole powered milk, nonfat dry milk etc., or adding milk product flavor.

20

For example, Patent Document 1 proposes a process for producing milk product flavor characterized in that a recovered aroma material, which is obtained from milk and/or a milk product as a raw material with a process of collecting aroma, is adsorbed onto an organic polymer adsorbent, and then desorbed with a desorbing solvent.

25

Such an approach using flavor has a problem that natural

flavor becomes lost when milk flavor is added strongly.

Patent Document 2 proposes a process for producing an oil-in water emulsion characterized in that a lipid protein complex in which a lipid and a protein are bound is blended
5 into the oil-in-water emulsion during producing the oil-in-water emulsion containing an edible fat and oil, an emulsifier, a milk component and/or sugars. Patent Document 3 proposes a fat and oil emulsified composition containing a lactic acid fermentation product of a complex
10 of an organic acid monoglyceride and a milk protein. Both of these two processes have some effects, but have problems that a lipid protein complex needs to be separately prepared and steps are complicated.

In addition, when a large amount of conventional milk
15 product such as fresh cream, butter, whole powdered milk, or nonfat dry milk is used, rich milk flavor and body taste are expected, but there is a limitation in a use amount from the viewpoints of resource restriction and the cost.

[0003]

20 Patent Document 1: JP 2006-325539 A

Patent Document 2: JP 05-238612 A

Patent Document 3: JP 09-238612 A

Disclosure of the Invention

25 Problems to be Solved by the Invention

[0004]

An object of the present invention is to provide an oil-in-water emulsion, in particular, a foamable oil-in-water emulsion, having sufficient milk flavor and body
5 taste while using a minimum amount of milk product such as fresh cream, butter, whole powdered milk and nonfat dry milk. Another object is to provide an oil-in-water emulsion, in particular, a foamable oil-in-water emulsion which has a more abundant milk flavor and body taste when
10 the same amount of milk product such as fresh cream, butter, whole powdered milk and nonfat dry milk is used.

Means for Solving the Problems

[0005]

15 The present inventors have intensively studied. As a result, they found out a lactic acid fermentation emulsion which can impart sufficient milk flavor and body taste to an oil-in-water emulsion having a small amount of milk component, in particular, nonfat milk solid, and further,
20 found out that an oil-in-water emulsion having a more abundant milk flavor and body taste can be obtained by using the lactic acid fermentation product when the same amount of milk product is used. And the inventors have completed the present invention based on this finding.

25 That is, a first aspect of the present invention is an

oil-in-water emulsion comprising a specific lactic acid fermentation emulsion containing fat and oil, nonfat milk solid and water, wherein the amount of fat and oil is 4.5 to 35.0 wt% and the amount of milk protein is 2.5 to 11.0 wt%. A second aspect is the oil-in-water emulsion according to the first aspect, wherein a lactic acid bacterium used in preparing the lactic acid fermentation emulsion is a combination of the *Streptococcus* family and the *Lactobacillus* family. A third aspect is the oil-in-water emulsion according to the first aspect, wherein the lactic acid fermentation emulsion has a pH of 3.5 to 5.3. A fourth aspect is the oil-in-water emulsion according to the first aspect, wherein the state of the lactic acid fermentation emulsion at 5°C is a liquid, cream-like and/or paste-like state. A fifth aspect is the oil-in-water emulsion according to the first aspect, wherein the lactic acid fermentation emulsion is contained in an amount of 0.5 to 13 wt% based on the total oil-in-water emulsion when the lactic acid fermentation emulsion is blended in the oil-in-water emulsion in advance, and the amount of lactic acid fermentation emulsion is 0.5 to 15 parts based on 100 parts of an oil-in-water emulsion A when the lactic acid fermentation emulsion and the oil-in-water emulsion A are mixed. A sixth aspect is the oil-in-water emulsion according to the first aspect, wherein the amount of fat

and oil is 15 to 50 wt% and the amount of nonfat milk solid is 0.5 to 12.0 wt%. A seventh aspect is the oil-in-water emulsion according to the sixth aspect, wherein the amount of nonfat milk solid in the oil-in-water emulsion is less than 3.5 wt%. An eighth aspect is the oil-in-water emulsion according to the sixth aspect, wherein the amount of nonfat milk solid in the oil-in-water emulsion is 3.5 to 12.0 wt%. A ninth aspect is the oil-in-water emulsion according to the first aspect, wherein 50 wt% or more of total fat and oil is lauric fat and oil. A tenth aspect is the oil-in-water emulsion according to the first aspect, wherein a pH of the oil-in-water emulsion is 6.4 to 6.8. An eleventh aspect is an oil-in-water emulsion, wherein the oil-in-water emulsion according to any one of the first to tenth aspects is a foamable oil-in-water emulsion. A twelfth aspect is the oil-in-water emulsion according to the eleventh aspect, wherein the oil-in-water emulsion is a foamable oil-in-water emulsion having an overrun of 40 to 180%.

Effects of the Invention

[0006]

It has become possible to provide an oil-in-water emulsion, in particular, a foamable oil-in-water emulsion, having sufficient milk flavor and body taste while using a

minimum amount of milk product such as fresh cream, butter, whole powdered milk, or nonfat dry milk. Further it has become possible to provide an oil-in-water emulsion, in particular, a formable oil-in-water emulsion which has a more abundant milk flavor and body taste when the same amount of milk product such as fresh cream, butter, whole powdered milk and nonfat dry milk is used.

Best Mode for Carrying Out the Invention

10 [0007]

The oil-in-water emulsion of the present invention uses a specific lactic acid fermentation emulsion which contains fat and oil, nonfat milk solid, and water, wherein the amount of fat and oil is 4.5 to 35.0 wt% and the amount of milk protein is 2.5 to 11.0 wt%.

The lactic acid fermentation emulsion of the present invention has 4.5 to 35.0 wt% of fat and oil and 2.5 to 11.0 wt% of milk protein, and includes commercially available cheeses, yogurts and sour creams as far as these ranges are satisfied.

It is preferable that the lactic acid fermentation emulsion is a liquid, cream-like and/or paste-like state at 5°C from the viewpoint of workability in that the emulsion is used in an oil-in-water emulsion. Further, from the viewpoint of flavor, it is preferable that the lactic acid

fermentation emulsion of the present invention is used.

[0008]

Examples of a fat and oil raw material used in the lactic acid fermentation emulsion of the present invention include not only milk raw materials such as natural fresh cream, cow milk, processed milk, fresh butter and fermentation butter, but also vegetable fats and oils such as rapeseed oil, soybean oil, sunflower seed oil, cotton seed 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 oil and palm kernel oil as well as animal fats and oils such as beef tallow, lard, fish oil and whale oil, and any fats and oils such as the aforementioned fats and oils alone or a mixed oil, or processed fats and oils obtained by subjecting them to hardening, fractionation, or transesterification can be used. The amount of fat and oil in the lactic acid fermentation product is 4.5 to 35.0 wt%, preferably 5.0 to 33.0 wt%, more preferably 5.0 to 32.0 wt%. In the case where the amount of fat and oil in the lactic acid fermentation emulsion is less than the lower limit, it becomes difficult to obtain milk taste when this lactic acid fermentation emulsion is used in the oil-in-water emulsion. On the other hand, in the case where the amount of fat and oil exceeds the upper limit, the emulsion is

plasticized with reduction in pH due to fermentation, this leads to fat and oil separation in some cases, and therefore, it is not preferable in terms of handling.

[0009]

5 As a milk protein raw material used in the lactic acid fermentation emulsion of the present invention, one or more kinds of cow milk, processed milk, nonfat concentrated milk, fresh cream, nonfat milk, low-heat nonfat dry milk, medium-heat nonfat dry milk, high-heat nonfat dry milk, whole
10 powdered milk, butter milk powder, whey powder, caseins such as acid casein, rennet casein, casein sodium, casein calcium and casein potassium, or milk proteins such as total milk proteins and milk whey proteins can be used. Preferably, cow milk, processed milk, nonfat concentrated
15 milk, fresh cream, nonfat milk, low heated nonfat dry milk, medium heated nonfat dry milk, high heated nonfat dry milk, whole powdered milk, butter milk powder, and whey powder are used, and further preferably, cow milk, processed milk, nonfat concentrated milk, fresh cream, nonfat milk, low
20 heated nonfat dry milk, and medium heated nonfat dry milk are used.

As the milk protein, it is preferable to use proteins having a suppressed heat denaturation degree from the viewpoint of flavor.

25 [0010]

The amount of milk protein in the lactic acid fermentation product is 2.5 to 11.0 wt%, preferably 3.0 to 7.0 wt%, more preferably 3.5 to 6.5 wt%. When the amount of milk protein is less than the lower limit, fermentation becomes insufficient and brewing of flavor is not sufficiently obtained since the buffering ability of the lactic acid fermentation emulsion is low. On the other hand, when the amount of milk protein exceeds the upper limit, aggregation of milk protein after fermentation becomes remarkable, and this leads to occurrence of roughness in the final oil-in-water emulsion.

[0011]

As a kind of lactic acid bacterium to be provided for the lactic acid fermentation emulsion of the present invention, a combination of the *Streptococcus* family and the *Lactobacillus* family is preferable. Examples of the *Streptococcus* family include *Streptococcus Lactis*, *Streptococcus diacetylactis*, *Streptococcus salivarius subsp. thermophilus*, and examples of the *Lactobacillus* family include *Lactobacillus delbruekii bulgaricus*, *Lactobacillus helveticus* and *Lactobacillus acidophilus*, and a combination of *Streptococcus salivarius subsp. thermophilus* and *Lactobacillus delbruekii bulgaricus* is most preferable.

[0012]

In the lactic acid fermentation emulsion of the

present invention, the amount of fat and oil is 4.5 to 35.0 wt%, and the amount of milk protein is 2.5 to 11.0 wt%, and the pH is preferably 3.5 to 5.3, more preferably 3.7 to 5.0, further preferably 4.0 to 4.7. When the pH is too low, a stuffy smell due to overfermentation is strong, and this adversely influences on flavor of the final lactic acid fermentation emulsion. On the other hand, when the pH is too high, brewing of flavor due to fermentation is weak, and the effect of improving flavor of the lactic acid fermentation emulsion is insufficient.

[0013]

As a process for producing the lactic acid fermentation emulsion of the present invention, an oil-in-water emulsion to be subjected to fermentation can be obtained by heating and stirring an oil phase containing the fat and oil described above and an aqueous phase containing milk protein, for example, at 65 to 80°C for 10 to 30 minutes to perform pre-emulsification and sterilization, and then homogenizing the emulsion under the condition of 7 to 10 MPa. It goes without saying that, thereupon, an emulsifier such as lecithin, fractionated lecithin fractionated with alcohol etc., partially hydrolyzed lecithin hydrolyzed with an acid or an alkali or an enzyme, sucrose fatty acid ester, propylene glycol fatty acid ester, sorbitan fatty acid ester, polyoxyethylene

sorbitan fatty acid ester, glycerin fatty acid ester, and polyglycerol fatty acid ester and, further various organic acid monoglycerides such as acetic acid monoglyceride, tartaric acid monoglyceride, acetic acid tartaric acid mixed monoglyceride, citric acid monoglyceride, diacetyl tartaric acid monoglyceride, lactic acid monoglyceride, succinic acid monoglyceride, and malic acid monoglyceride may be appropriately used.

[0014]

To the thus obtained oil-in-water emulsion is added lactic acid bacterium (e.g. the *Streptococcus* family and the *Lactobacillus* family alone or mixture thereof), and it is favorable to ferment the mixture at 35 to 45°C for 3 to 10 hours to obtain a lactic acid fermentation emulsion having a pH of 3.5 to 5.3. The thus obtained lactic acid fermentation emulsion as it is can be mixed as a raw material of the oil-in-water emulsion of the present invention at pre-emulsification, or can be mixed with an oil-in-water emulsion A.

[0015]

The oil-in-water emulsion of the present invention is characterized in that fat and oil, nonfat milk solid and water are contained and the lactic acid fermentation emulsion described above is used.

As the amount of lactic acid fermentation emulsion

used in the oil-in-water emulsion of the present invention, it is not a small amount as a flavor or a tasting material, but preferably, about 0.5 to 13 wt% based on the total oil-in-water emulsion.

5 When the lactic acid fermentation emulsion is blended in the oil-in-water emulsion in advance, the amount of lactic acid fermentation emulsion is preferably 0.5 to 13 wt%, more preferably 0.5 to 3.0 wt%, further preferably 0.5 to 2.0 wt% based on the total oil-in-water emulsion.

10 When the amount of lactic acid fermentation emulsion to be used is small, it becomes difficult to obtain the expected effect. When the amount thereof to be used is too large, sourness begins to be felt and milk taste becomes poor when adjusting this sourness.

15 [0016]

 When the lactic acid fermentation emulsion and the oil-in-water emulsion A are mixed, the lactic acid fermentation emulsion is preferably 0.5 to 15 parts, more preferably 0.5 to 3.0 parts, further preferably 0.5 to 2.0 parts based on 100 parts of the oil-in-water emulsion A.

20 When the amount of the lactic acid fermentation emulsion to be used is small, it becomes difficult to obtain the expected effect. When the amount thereof to be used is too large, sourness becomes to be felt and milk
25 taste becomes poor when adjusting this sourness.

It is preferable in workability that the lactic acid fermentation emulsion is blended in the oil-in-water emulsion in advance.

[0017]

5 Examples of fat and oil used in the oil-in-water emulsion and the oil-in-water emulsion A of the present invention include animal and vegetable fats and oils, and hardened fats and oils thereof alone, or a mixture of two or more kinds of them, or fats and oils obtained by
10 subjecting them to a variety of chemical treatments or physical treatments. Examples of the fat and oil include various animal and vegetable fats and oils such as soybean oil, cotton seed oil, corn oil, safflower oil, olive oil, palm oil, rapeseed oil, rice bran oil, sesame oil, kapok
15 oil, coconut oil, palm kernel oil, milk fat, lard, fish oil, and whale oil, and processed fats and oils such as hardened oils, fractionated oils, and transesterified oils thereof (melting point thereof is around 15 to 40°C).

[0018]

20 In the oil-in-water emulsion of the present invention, there are the cases that the lactic acid fermentation emulsion is formulated in the oil-in-water emulsion in advance, and that the lactic acid fermentation emulsion and the oil-in-water emulsion A are mixed. In any case, it is
25 preferable that 50 wt% or more in total fat and oil of the

oil-in-water emulsion is lauric fat and oil.

Examples of the lauric fat and oil include coconut oil, palm kernel oil, and fats and oils obtained by subjecting them to hardening, fractionation or transesterification.

5 It is preferable that lauric fat and oil having a slip melting point within a range from 23 to 38°C, more preferably 23 to 31°C, most preferably 26 to 30°C is contained in an amount of 50% by weight or more based on the fats and oils.

10 When a large amount of lauric fat and oil is contained, this is preferable in milk taste and light flavor, and a combination with the lactic acid fermentation emulsion of the present invention can induce more milk taste and light flavor. The case of the foamable oil-in-water emulsion is
15 further preferable from the viewpoint of shape retainability.

[0019]

The amount of fat and oil of the oil-in-water emulsion of the present invention is 15 to 50 wt%, preferably 20 to
20 48 wt%, more preferably 20 to 45 wt%. When the amount of fat and oil is small, foaming property and shape retainability tend to be deteriorated in the case of the foamable oil-in-water emulsion. When the amount of fat and oil is large, the emulsifying property of the oil-in-water
25 emulsion is deteriorated, and viscosity becomes too high.

[0020]

In the oil-in-water emulsion of the present invention, the amount of fat and oil is 15 to 50 wt%, and the amount of nonfat milk solid is 0.5 to 12.0 wt%.

5 The nonfat milk solid of the present invention refers to a component obtained by removing milk fat from the total solid of cow milk, and examples thereof include raw materials derived from milk of fresh milk, cow milk, nonfat milk, fresh cream, concentrated milk, unsweetened condensed milk, sweetened condensed milk, whole powdered milk, nonfat
10 dry milk, butter milk powder, and whey protein.

[0021]

In the oil-in-water emulsion of the present invention, even when the amount of milk component, particularly,
15 nonfat milk solid is small as less than 3.5 wt%, an oil-in-water emulsion with sufficient milk flavor and body taste imparted thereto can be obtained by using the lactic acid fermentation emulsion of the present invention. When the nonfat milk solid is used at a small amount, the amount is
20 0.5 to 3.5 wt%, preferably 1.0 to 3.5 wt%, more preferably 1.5 to 3.5 wt%. When the amount of nonfat milk solid is too small, milk taste is reduced.

[0022]

In the oil-in-water emulsion of the present invention,
25 when the normal amount of nonfat milk solid as 3.5 to 12.0

wt% is used, an oil-in-water emulsion having a more abundant milk flavor and body taste can be obtained by using the lactic acid fermentation emulsion of the present invention. The amount of nonfat milk solid is preferably
5 3.5 to 10.0 wt%, more preferably 3.5 to 8.0 wt%. When the amount of nonfat milk solid is large, the taste becomes heavy.

[0023]

In the oil-in-water emulsion of the present invention,
10 an emulsifier which is usually used upon preparation of cream can be appropriately selected and used. Examples thereof include synthetic emulsifiers such as lecithin, monoglyceride, sorbitan fatty acid ester, propylene glycol fatty acid ester, polyglycerin fatty acid ester,
15 polyoxyethylene sorbitan fatty acid ester, and sucrose fatty acid ester and, among these emulsifiers, one or two or more kinds of them can be selected and appropriately used.

[0024]

20 The oil-in-water emulsion of the present invention has a pH of 6.4 to 6.8, preferably 6.4 to 6.7, more preferably 6.4 to 6.6. When the pH is too low, sourness becomes easy to be felt. When the pH is too high, milk taste becomes poor. Various salts can be used in this range of the pH.
25 It is preferable to use, as salts, hexametaphosphate,

secondary phosphate, sodium citrate, polyphosphate, baking soda etc., alone or by mixing two or more kinds of them. In addition, sugars, stabilizers, flavors, coloring agents, preservatives etc. can be optionally used.

5 [0025]

A process for producing the oil-in-water emulsion of the present invention can be roughly classified into two cases, the case where the lactic acid fermentation emulsion is blended in the oil-in-water emulsion in advance, and the
10 case where the lactic acid fermentation emulsion and the oil-in-water emulsion A are mixed.

When the lactic acid fermentation emulsion is blended in the oil-in-water emulsion in advance, the oil-in-water emulsion can be obtained by mixing raw materials having, as
15 main raw materials, predetermined lactic acid fermentation emulsion, fat and oil, nonfat milk solid, emulsifier and water, pre-emulsifying and subjecting the emulsion to pasteurization or sterilization treatment, and homogenization treatment. From the viewpoint of the
20 storage stability of the oil-in-water emulsion, sterilization treatment is preferable. Specifically, various raw materials are pre-emulsified (emulsifying apparatus is a Homomixer) at 60 to 70°C for 20 minutes and, if necessary, homogenized (emulsifying apparatus is a
25 homogenizer) under the condition of 0 to 25 MPa. Then, the

homogenate is subjected to ultra high temperature instantaneous sterilization treatment (UHT), the resultant is homogenized again under the condition of 0 to 30 MPa, cooled, and aged for about 24 hours.

5 [0026]

When the lactic acid fermentation emulsion and the oil-in-water emulsion A are mixed, the oil-in-water emulsion A can be obtained by the same raw material and the same process of the process for producing the oil-in-water
10 emulsion described in paragraph [0025] except for the lactic acid fermentation emulsion.

A timing of mixing the lactic acid fermentation emulsion and the oil-in-water emulsion A is not limited, and can be during cooling or after cooling, after the oil-
15 in-water emulsion A is homogenized.

The oil-in-water emulsion and oil-in-water emulsion A of the present invention use almost the same raw materials except that the oil-in-water emulsion A does not contain the lactic acid fermentation emulsion.

20 [0027]

There are two systems in the sterilization that an indirect heating system and a direct heating system, and examples of an apparatus for indirect heating treatment include, but are not particularly limited to, APV plate-
25 type UHT treatment apparatus (manufactured by APV Co.,

Ltd.), CP-UHT sterilizer (manufactured by Climaty Package Co., Ltd.), Stork tubular-type sterilizer (manufactured by Stork Food & Dairy Systems B.V.), and Contherm scraped surface UHT sterilization apparatus (manufactured by TetraPak Alfa-Laval Co., Ltd.), and the like. In addition, example of a direct heating sterilization device includes, but is not limited to, a UHT sterilizer such as an ultra high temperature sterilization apparatus (manufactured by Iwai Kikai Kogyo Co., Ltd.), Uperization sterilization apparatus (manufactured by TetraPak Alfa-Laval Co., Ltd.), VTIS sterilization apparatus (manufactured by TetraPak Alfa-Laval Co., Ltd.), Lagear UHT sterilization apparatus (manufactured by Lagear Co., Ltd.), and Paralizador (manufactured by Pash and Silkevogue Co., Ltd.), and the like, and any of these apparatuses can be used.

[0028]

It is preferable that the oil-in-water emulsion of the present invention is a foamable oil-in-water emulsion.

The foamable oil-in-water emulsion of the present invention has an overrun of 40 to 180%, preferably 50 to 160%, further preferably 60 to 140%. When the overrun is too high, the taste tends to be too light and flavor becomes poor. When the overrun is too low, the taste becomes too heavy, and it becomes difficult to obtain good flavor and smooth melting in the mouth.

Examples

[0029]

The present invention will be described in more detail
5 below by way of examples of the present invention, but the
spirit of the present invention is not limited by the
following examples. In the examples, both of % and part
mean a weight basis.

[0030]

10 Method of evaluating oil-in-water emulsion

The viscosity of an oil-in-water emulsion and
Plasticization test (stability of an oil-in-water emulsion)
were evaluated.

Viscosity: Measurement of the viscosity of an oil-in-
15 water emulsion was performed with a B type viscometer
(manufactured by TOKYO KEIKI Co., Ltd.) with a No.2 rotor
at 60 rpm.

Plasticization test: 50 g of an oil-in-water emulsion
was put into a 100 ml-volume beaker, and incubated at 20°C
20 for 2 hours, and thereafter, the presence or the absence of
occurrence of plasticization at stirring for 5 minutes was
confirmed.

Method of evaluation when oil-in-water emulsion is
foamed

25 (1) Whipping time: A time until 1 kg of the oil-in

water emulsion was whipped with a Hobart mixer (MODEL N-5
 manufactured by HOBART CORPORATION) at the third gear (300
 rpm), and the emulsion reached the optimum foaming state,
 and a time during which the emulsion was mildly mixed at
 5 the second gear (130 rpm)

(2) Overrun: $[(\text{weight of oil-in-water emulsion per given volume}) - (\text{weight of foamed product after whipping per given volume})] \div (\text{weight of foamed product after whipping per given volume}) \times 100$

10 (3) Shape retainability: Fineness of a flower-shaped foamed product after storage at 15°C for 24 hours

Four-stage evaluation A; good, B; slightly good
 C; slightly bad, D; bad (not practical)

(4) Water separation: The water separation state was
 15 simultaneously evaluated with the evaluation of shape retainability

Four-stage evaluation A; Absent, B; Almost absent
 C; Present, D; Very many

Method of evaluation of taste and flavor

20 The melting in the mouth, milk taste and taste of foamed cream were evaluated.

(1) Melting in the mouth

Four-stage evaluation $\odot$; good, $\circ$; slightly good
 $\triangle$; slightly bad, $\times$; bad

25 (2) Milk taste

Four-stage evaluation ⊙; good, ○; slightly good

△; slightly bad, ×; bad

(3) Taste

Four-stage evaluation ⊙; good, ○; slightly good

5 △; slightly bad, ×; bad

[0031]

Experimental Example 1

Medium-heat nonfat dry milk (12.0 parts) manufactured
by YOTSUBA Co., Ltd. and 76.0 parts of water at 40°C were
10 mixed, then, 12.0 parts of rapeseed hardened oil was added,
the mixture was heated while stirring with a Homomixer,
pre-emulsified at 70°C for 30 minutes, then, homogenized
with a homogenizer under a pressure of 10 MPa, and rapidly
cooled to 20°C to prepare an oil-in-water emulsion. The
15 composition of this emulsion was 12.1 wt% of fat and oil,
4.1 wt% of milk protein, and 76.6 wt% of water. To 100
parts of the thus obtained emulsion was added 1 part of
lactic acid bacterium starter manufactured by Christian
Hansen A/S (mixed bacteria of *Streptococcus salivarius*
20 *subsp. Thermophilus* and *Lactobacillus delbruekii*
bulgaricus), this was subjected to fermentation at 40°C,
and at the time point at which the pH became 4.4, rapidly
cooled to 5°C to stop the fermentation. Then, this
fermentation product was immediately heat-sterilized at
25 80°C for 10 minutes, and rapidly cooled to 5°C to obtain a

"lactic acid fermentation emulsion 1" of Experimental Example 1. The pH of this "lactic acid fermentation emulsion 1" after sterilization and cooling was 4.5. Formulation and the results were summarized in Table 1.

5 [0032]

Experimental Example 2

A "lactic acid fermentation emulsion 2" of Experimental Example 2 was obtained according to the method of Experimental Example 1 except that 12.0 parts of medium-
10 heat nonfat dry milk manufactured by YOTSUBA Co., Ltd. was changed to 12.0 parts of low-heat nonfat dry milk manufactured by YOTSUBA Co., Ltd. The pH of this "lactic acid fermentation emulsion 2" after sterilization and cooling was 4.5.

15 Formulation and the results were summarized in Table 1.
[0033]

Experimental Example 3

A "lactic acid fermentation emulsion 3" of Experimental Example 3 was obtained according to the method
20 of Experimental Example 1 except that 12.0 parts of medium-heat nonfat dry milk manufactured by YOTSUBA Co., Ltd. and 76.0 parts of water were changed to 35.0 parts of nonfat concentrated milk manufactured by YOTSUBA Co., Ltd. and 53.0 parts of water. The pH of this "lactic acid
25 fermentation emulsion 3" after sterilization and cooling

was 4.5.

Formulation and the results are summarized in Table 1.

[0034]

Formulations and the results of Experimental Example 1
5 to Experimental Example 3 were summarized in Table 1.

[Table 1]

	Experimental Example 1	Experimental Example 2	Experimental Example 3
Medium-heat nonfat dry milk	12.0	0.0	0.0
Low-heat nonfat dry milk	0.0	12.0	0.0
Nonfat concentrated milk	0.0	0.0	35.0
Total milk protein	0.0	0.0	0.0
Vegetable fat and oil	12.0	12.0	12.0
Fresh cream	0.0	0.0	0.0
Water	76.0	76.0	53.0
Total	100.0	100.0	100.0
Fat and oil	12.1	12.1	12.7
Protein	4.1	4.1	4.1
Lactic acid bacterium starter	Lactic acid bacterium starter 1	Lactic acid bacterium starter 1	Lactic acid bacterium starter 1
Nonfat milk solid	11.4	11.4	10.7
Milk fat	0.1	0.1	0.1
Vegetable fat	12.0	12.0	12.0
pH	4.5	4.5	4.5
Sourness	Presence of sourness	Presence of sourness	Presence of sourness
State	Cream-like	Cream-like	Cream-like

Lactic acid bacterium starter 1	<i>Streptococcus salivarius subsp. thermophilus</i> <i>Lactobacillus delbruekii bulgaricus</i>
Lactic acid bacterium starter 2	<i>Lactococcus lactis subsp. cremoris</i> <i>Lactococcus lactis subsp. lactis</i> <i>Leuconostoc mesenteroides subsp. cremoris</i> <i>Leuconostoc pseudomesenteroides</i> <i>Leuconostoc lactis</i>
Lactic acid bacterium starter 3	<i>Lactococcus lactis subsp. cremoris</i> <i>Lactococcus lactis subsp. lactis</i> <i>Lactococcus lactis subsp. Lactis biovar diacetylactis</i> <i>Leuconostoc mesenteroides subsp. cremoris</i>

[0035]

A "lactic acid fermentation emulsion 4" of Experimental Example 4 was obtained according to the method of Experimental Example 1 except that 12 parts of rapeseed hardened oil manufactured by FUJI OIL Co., Ltd. and 76 parts of water were changed to 12.0 parts of medium-heat nonfat dry milk manufactured by YOTSUBA Co., Ltd., 24 parts of fresh cream manufactured by YOTSUBA Co., Ltd. and 64 parts of water. The pH of this "lactic acid fermentation emulsion 4" after sterilization and cooling was 4.5.

Formulation and the results were summarized in Table 2.
[0036]

Experimental Example 5

A "lactic acid fermentation emulsion 5" of Experimental Example 5 was obtained according to the method of Experimental Example 1 except that 12.0 parts of medium-heat nonfat dry milk manufactured by YOTSUBA Co., Ltd. was reduced to 9.0 parts, and 76.0 parts of water was increased to 79.0 parts. The pH of this "lactic acid fermentation emulsion 5" after sterilization and cooling was 4.5.

Formulation and the results were summarized in Table 2.
[0037]

Experimental Example 6

A "lactic acid fermentation emulsion 6" of Experimental Example 6 was obtained according to the method of Experimental Example 1 except that 3.0 parts of total

milk protein manufactured by Ingredia A/S was added to the formulation of Experimental Example 1, and 76.0 parts of water was reduced to 73.0 parts. The pH of this "lactic acid fermentation emulsion 6" after sterilization and
5 cooling was 4.8.

Formulation and the results were summarized in Table 2.
[0038]

Formulations and the results of Experimental Example 4 to Experimental Example 6 were summarized in Table 2.

[Table 2]

	Experimental Example 4	Experimental Example 5	Experimental Example 6
Medium-heat nonfat dry milk	12.0	9.0	12.0
Low-heat nonfat dry milk	0.0	0.0	0.0
Nonfat concentrated milk	0.0	0.0	0.0
Total milk protein	0.0	0.0	3.0
Vegetable fat and oil	0.0	12.0	12.0
Fresh cream	24.0	0.0	0.0
Water	64.0	79.0	73
Total	100.0	100.0	100.0
Fat and oil	11.4	12.1	12.1
Protein	4.2	3.1	6.7
Lactic acid bacterium starter	Lactic acid bacterium starter 1	Lactic acid bacterium starter 1	Lactic acid bacterium starter 1
Nonfat milk solid	12.4	8.6	14.1
Milk fat	11.4	0.0	0.0
Vegetable fat	0.0	12.0	12.0
pH	4.5	4.5	4.5
Sourness	Presence of sourness	Presence of sourness	Presence of sourness
State	Cream-like	Liquid	Paste-like

Lactic acid bacterium starter 1	<i>Streptococcus salivarius subsp. thermophilus</i> <i>Lactobacillus delbruekii bulgaricus</i>
Lactic acid bacterium starter 2	<i>Lactococcus lactis subsp. cremoris</i> <i>Lactococcus lactis subsp. lactis</i> <i>Leuconostoc mesenteroides subsp. cremoris</i> <i>Leuconostoc pseudomesenteroides</i> <i>Leuconostoc lactis</i>
Lactic acid bacterium starter 3	<i>Lactococcus lactis subsp. cremoris</i> <i>Lactococcus lactis subsp. lactis</i> <i>Lactococcus lactis subsp. Lactis biovar diacetylactis</i> <i>Leuconostoc mesenteroides subsp. cremoris</i>

[0039]

5 Experimental Example 7

A "lactic acid fermentation emulsion 7" of

Experimental Example 7 was obtained according to the method of Experimental Example 1 except that 12.0 parts of rapeseed hardened oil manufactured by FUJI OIL Co., Ltd. was reduced to 6.0 parts, and 76.0 parts of water was increased to 82.0 parts. The pH of this "lactic acid fermentation emulsion 7" after sterilization and cooling was 4.5.

Formulation and the results were summarized in Table 3.

[0040]

10 Experimental Example 8

A "lactic acid fermentation emulsion 8" of Experimental Example 8 was obtained according to the method of Experimental Example 1 except that 12.0 parts of rapeseed hardened oil manufactured by FUJI OIL Co., Ltd. was increased to 28.0 parts, and 76.0 parts of water was reduced to 60.0 parts. The pH of this "lactic acid fermentation emulsion 8" after sterilization and cooling was 5.0.

Formulation and the results were summarized in Table 3.

20 [0041]

Experimental Example 9

According the method of Experimental Example 1, an oil-in-water emulsion was prepared, subjected to fermentation, and at the time point at which the pH became 5.1, the emulsion was rapidly cooled to 5°C to stop the fermentation.

Then, this fermentation product was immediately heat-sterilized at 80°C for 10 minutes, and rapidly cooled to 5°C to obtain a "lactic acid fermentation emulsion 9" of Experimental Example 9. The pH of this "lactic acid fermentation emulsion 9" after sterilization and cooling was 5.2.

Formulation and the results were summarized in Table 3.

[0042]

Formulations and the results of Experimental Example 7 to Experimental Example 9 were summarized in Table 3.

[Table 3]

	Experimental Example 7	Experimental Example 8	Experimental Example 9
Medium-heat nonfat dry milk	12.0	12.0	12.0
Low-heat nonfat dry milk	0.0	0.0	0.0
Nonfat concentrated milk	0.0	0.0	0.0
Total milk protein	0.0	0.0	0.0
Vegetable fat and oil	6.0	28.0	12.0
Fresh cream	0.0	0.0	0.0
Water	82.0	60.0	76.0
Total	100.0	100.0	100.0
Fat and oil	6.12	28.1	12.1
Protein	4.1	4.1	4.1
Lactic acid bacterium starter	Lactic acid bacterium starter 1	Lactic acid bacterium starter 1	Lactic acid bacterium starter 1
Nonfat milk solid	11.4	11.4	11.4
Milk fat	0.0	0.0	0.0
Vegetable fat	6.0	28.0	12.0
pH	4.5	5.0	5.2
Sourness	Presence of sourness	Presence of sourness	Slight sourness
State	Liquid	Paste-like	Cream-like

Lactic acid bacterium starter 1	<i>Streptococcus salivarius subsp. thermophilus</i> <i>Lactobacillus delbruekii bulgaricus</i>
Lactic acid bacterium starter 2	<i>Lactococcus lactis subsp. cremoris</i> <i>Lactococcus lactis subsp. lactis</i> <i>Leuconostoc mesenteroides subsp. cremoris</i> <i>Leuconostoc pseudomesenteroides</i> <i>Leuconostoc lactis</i>
Lactic acid bacterium starter 3	<i>Lactococcus lactis subsp. cremoris</i> <i>Lactococcus lactis subsp. lactis</i> <i>Lactococcus lactis subsp. Lactis biovar diacetylactis</i> <i>Leuconostoc mesenteroides subsp. cremoris</i>

[0043]

5 Experimental Example 10

The method of Experimental Example 1 was carried out

except that 1 part of lactic acid bacterium starter
manufactured by Christian Hansen A/S (mixed bacteria of
Lactococcus lactis subsp. *cremoris*, *Lactococcus lactis*
subsp. *lactis*., *Leuconostoc mesenteroides* subsp. *Cremoris*,
5 *Leuconostoc pseudomesenteroides*, and *Leuconostoc lactis*)
was added, and fermentation was performed at 20°C. At the
time point at which the pH became 4.8, the emulsion was
rapidly cooled to 5°C to stop the fermentation. Then, this
fermentation product was immediately heat-sterilized at
10 80°C for 10 minutes, and rapidly cooled to 5°C to obtain a
"lactic acid fermentation emulsion 10" of Experimental
Example 10. The pH of this "lactic acid fermentation
emulsion 10" after sterilization and cooling was 5.1.

Formulation and the results were summarized in Table 4.

15 [0044]

Experimental Example 11

The method of Experimental Example 1 was carried out
except that 1 part of lactic acid bacterium starter
manufactured by Christian Hansen A/S (mixed bacteria of
20 *Lactococcus lactis* subsp. *cremoris*, *Lactococcus lactis*
subsp. *lactis*., *Lactococcus lactis* subsp. *lactis* biovar
diacetylactis., and *Leuconostoc mesenteroides* subsp.
cremoris) was added, and fermentation was performed at 20°C.
At the time point at which the pH became 4.8, the emulsion
25 was rapidly cooled to 5°C to stop the fermentation. Then,

this fermentation product was immediately heat-sterilized at 80°C for 10 minutes, and rapidly cooled to 5°C to obtain a "lactic acid fermentation emulsion 11" of Comparative Experimental Example 7. The pH of this "lactic acid
5 fermentation emulsion 11" after sterilization and cooling was 5.1.

Formulation and the results were summarized in Table 4.
[0045]

Experimental Example 12

10 A "lactic acid fermentation emulsion 12" of Experimental Example 12 was obtained according to the method of Experimental Example 1 except that 5.0 parts of total milk protein manufactured by Ingredia A/S was added to the formulation of Experimental Example 1, and 76.0
15 parts of water was reduced to 71.0 parts. The pH of this "lactic acid fermentation emulsion 12" after sterilization and cooling was 5.0.

Formulation and the results were summarized in Table 4.
[0046]

20 Formulations and the results of Experimental Example 10 to Experimental Example 12 were summarized in Table 4.

[Table 4]

	Experimental Example 10	Experimental Example 11	Experimental Example 12
Medium-heat nonfat dry milk	12.0	12.0	12.0
Low-heat nonfat dry milk	0.0	0.0	0.0
Nonfat concentrated milk	0.0	0.0	0.0
Total milk protein	0.0	0.0	5.0
Vegetable fat and oil	12.0	12.0	12.0
Fresh cream	0.0	0.0	0.0
Water	76.0	76.0	71
Total	100.0	100.0	100.0
Fat and oil	12.1	12.1	12.1
Protein	4.1	4.1	8.4
Lactic acid bacterium starter	Lactic acid bacterium starter 2	Lactic acid bacterium starter 3	Lactic acid bacterium starter 1
Nonfat milk solid	11.4	11.4	15.9
Milk fat	0.0	0.0	0.1
Vegetable fat	12.0	12.0	12.0
pH	5.1	5.1	5.0
Sourness	Presence of sourness	Presence of sourness	Presence of sourness
State	Cream-like	Cream-like	Paste-like Presence of roughness

Lactic acid bacterium starter 1	<i>Streptococcus salivarius subsp. thermophilus</i> <i>Lactobacillus delbruekii bulgaricus</i>
Lactic acid bacterium starter 2	<i>Lactococcus lactis subsp. cremoris</i> <i>Lactococcus lactis subsp. lactis</i> <i>Leuconostoc mesenteroides subsp. cremoris</i> <i>Leuconostoc pseudomesenteroides</i> <i>Leuconostoc lactis</i>
Lactic acid bacterium starter 3	<i>Lactococcus lactis subsp. cremoris</i> <i>Lactococcus lactis subsp. lactis</i> <i>Lactococcus lactis subsp. Lactis biovar diacetylactis</i> <i>Leuconostoc mesenteroides subsp. cremoris</i>

[0047]

5 Experimental Example 13

According to the method of Experimental Example 1, an oil-in-water emulsion was prepared, subjected to fermentation, and at the time point at which the pH became 5.4, the emulsion was rapidly cooled to 5°C to stop the fermentation. Then, this fermentation product was immediately heat-sterilized at 80°C for 10 minutes, and rapidly cooled to 5°C to obtain a "lactic acid fermentation emulsion 13" of Experimental Example 13. The pH of this "lactic acid fermentation emulsion 13" after sterilization and cooling was 5.5.

Formulation and the results were summarized in Table 5.

[0048]

Experimental Example 14

Commercially available cream cheese

As commercially available cream cheese, cream cheese manufactured by Tatura Milk Industries Limited was used.

The evaluation of this commercially available cream cheese is summarized in Table 5.

[0049]

Comparative Experimental Example 1

A lactic acid fermentation emulsion of Comparative Experimental Example 1 was obtained according to the method of Experimental Example 1 except that 12.0 parts of medium-heat nonfat dry milk manufactured by YOTSUBA Co., Ltd. was reduced to 7.0 parts, and 76.0 parts of water was increased

to 81.0 parts. The pH of this lactic acid fermentation emulsion after sterilization and cooling was 4.5.

Formulation and the results were summarized in Table 5.

[0050]

5 Formulations and the results of Experimental Examples 13 and 14 and Comparative Experimental Example 1 were summarized in Table 5.

[Table 5]

	Experimental Example 13	Experimental Example 14	Comparative Experimental Example 1
Medium-heat nonfat dry milk	12.0	Commercially available cream cheese	7.0
Low-heat nonfat dry milk	0.0		0.0
Nonfat concentrated milk	0.0		0.0
Total milk protein	0.0		0.0
Vegetable fat and oil	12.0		12.0
Fresh cream	0.0		0.0
Water	76.0		81.0
Total	100.0		100.0
Fat and oil	12.1	33.0	12.1
Protein	4.08	8.2	2.4
Lactic acid bacterium starter	Lactic acid bacterium starter 1	-	Lactic acid bacterium starter 1
Nonfat milk solid	11.4	11.5	6.7
Milk fat	0.0	33.0	0.0
Vegetable fat	12.0	0.0	12.0
pH	5.5	5.0	4.5
Sourness	Little sourness	Slight sourness	Presence of sourness
State	Cream-like	Solid-like	Liquid

10 [0051]

Comparative Experimental Example 2

A lactic acid fermentation emulsion of Comparative Experimental Example 2 was obtained according to the method of Experimental Example 1 except that 12.0 parts of rapeseed hardened oil manufactured by FUJI OIL Co., Ltd. was reduced to 4.0 parts, and 76.0 parts of water was increased to 84.0 parts. The pH of this lactic acid fermentation emulsion after sterilization and cooling was 4.5.

Formulation and the results were summarized in Table 6.

[0052]

Comparative Experimental Example 3

A lactic acid fermentation emulsion of Comparative Experimental Example 3 was obtained according to the method of Experimental Example 1 except that 12.0 parts of rapeseed hardened oil manufactured by FUJI OIL Co., Ltd. was increased to 35.0 parts, and 76.0 parts of water was reduced to 53.0 parts. The pH of this lactic acid fermentation emulsion after sterilization and cooling was 5.0.

Formulation and the results were summarized in Table 6.

[0053]

Comparative Experimental Example 4

As commercially available yogurt, Bulgaria Yogurt manufactured by Meiji Dairies Corporation was used. The evaluation of this yogurt is summarized in Table 6.

[0054]

Formulations and the results of Comparative Experimental Example 2 to Comparative Experimental Example 4 were summarized in Table 6.

5 [Table 6]

	Comparative Experimental Example 2	Comparative Experimental Example 3	Comparative Experimental Example 4
Medium-heat nonfat dry milk	12.0	12.0	Commercially available yogurt
Low-heat nonfat dry milk	0.0	0.0	
Nonfat concentrated milk	0.0	0.0	
Total milk protein	0.0	0.0	
Vegetable fat and oil	4.0	35.0	
Fresh cream	0.0	0.0	
Water	84.0	53.0	
Total	100.0	100.0	
Fat and oil	4.12	35.1	3.0
Protein	4.08	4.1	3.2
Lactic acid bacterium starter	Lactic acid bacterium starter 1	Lactic acid bacterium starter 1	-
Nonfat milk solid	11.4	11.4	9.0
Milk fat	0.0	0.0	3.0
Vegetable fat	4.0	35.0	0.0
pH	4.5	5.0	4.0
Sourness	Presence of sourness	Presence of sourness	Presence of sourness
State	Liquid No use due to aggregation	Paste-like No use due to oil separation	Cream-like

[0055]

Example 1

To 20.0 parts of palm kernel oil (melting point 29°C),
 10 5.0 parts of hardened palm kernel oil (melting point 38°C),

1.0 part of palm fractionated hardened oil (melting point 31°C) and 4.0 parts of rapeseed hardened oil (melting point 35°C) were added 0.15 part of lecithin, and 0.07 part of polyglycerin unsaturated fatty acid ester (trade name SY Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co., Ltd.), and then mixed and melted to obtain an oil phase.

Separately, in 67.84 parts of water were dissolved and dispersed 0.4 part of nonfat dry milk, 0.05 part of sucrose saturated fatty acid ester (trade name: S-570, manufactured by Mitsubishi-Kagaku Foods Corporation), 0.15 part of polyglycerin saturated fatty acid ester (trade name SY Glyster MS-5S, manufactured by Sakamoto Yakuhin Kogyo Co., Ltd.), 0.2 part of sodium hexametaphosphate, 0.02 part of sodium bicarbonate, 0.01 part of xanthan gum, 0.01 part of guar gum, 0.1 part of milk flavor, and 1.0 part of the lactic acid emulsion of Experimental Example 1 to prepare an aqueous phase.

The oil phase and the aqueous phase were stirred with a Homomixer at 65°C for 30 minutes to be pre-emulsified, and then the resultant was subjected to sterilization treatment by direct heating at 144°C for 4 seconds with an ultra high temperature sterilization apparatus (manufactured by Iwai Kikai Kogyo Co., Ltd.), then homogenized at a homogenization pressure of 4 MPa, and immediately cooled to 10°C. After cooling, this was aged

for about 24 hours to obtain a foamable oil-in-water emulsion.

To 1 kg of this foamable oil-in-water emulsion was added 80 g of granulated sugar, this was whipped by the whipping method, and overrun, shape retainability and water separation were measured according to the aforementioned method. In addition, the melting in the mouth, milk taste texture and texture of the whipped foamable oil-in-water emulsion were evaluated.

Formulation and the results were summarized in Table 7.
[0056]

Example 2

The method of Example 1 was carried out with the same formulation as that of Example 1 except that 67.84 parts of water and 0.4 part of nonfat dry milk were changed to 66.24 parts of water and 2.0 parts of nonfat dry milk, and evaluation was performed according to the same manner as that of Example 1. Formulation and the results were summarized in Table 7.

Example 3

The method of Example 1 was carried out with the same formulation as that of Example 1 except that 67.84 parts of water and 0.4 part of nonfat dry milk were changed to 64.84 parts of water and 3.4 parts of nonfat dry milk, and evaluation was performed according to the same manner as

that of Example 1. Formulation and the results were summarized in Table 7.

[0057]

Formulations and the results of Example 1 to Example 3
5 were summarized in Table 7.

[Table 7]

	Example 1	Example 2	Example 3
Oil-in-water emulsion			
Palm kernel oil (melting point 29°C)	20.0	20.0	20.0
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07
Nonfat dry milk	0.4	2.0	3.4
Sucrose saturated fatty acid ester	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	1.0	1.0	1.0
Water	67.84	66.24	64.84
(Component of oil-in-water emulsion)			
Nonfat milk solid	0.5	2.0	3.4
Milk fat	0.0	0.0	0.0
Vegetable fat	30.1	30.1	30.1
Total fat (%)	30.1	30.1	30.2
Viscosity	370 cp	320 cp	300 cp
Plasticization	4 min. 20 sec.	5 min. or longer	5 min. or longer
Whipping time	2 min. 30 sec.	2 min. 50 sec.	3 min. 10 sec.
Overrun	105%	110%	120%
Shape retainability	B	A	A
Water separation	B	A	A
Melting in mouth	⊙	⊙	⊙
Milk taste	△	○	○
Taste	○	○	○
Lactic acid fermentation emulsion	Experimental Example 1	Experimental Example 1	Experimental Example 1
Fat and oil	12.1	12.1	12.1
Milk protein	4.1	4.1	4.1
Lactic acid bacterium starter	1	1	1
Nonfat milk solid	11.4	11.4	11.4
Milk fat	0.1	0.1	0.1
Vegetable fat	12.0	12.0	12.0

[0058]

Example 4

The method of Example 2 was carried out with the same formulation as that of Example 2 except that 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 was changed to 1.0 part of the lactic acid fermentation emulsion of Experimental Example 2, and evaluation was performed according to the same manner as that of Example 2. Formulation and the results were summarized in Table 8.

Example 5

The method of Example 2 was carried out with the same formulation as that of Example 2 except that 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 was changed to 1.0 part of the lactic acid fermentation emulsion of Experimental Example 3, and evaluation was performed according to the same manner as that of Example 2. Formulation and results were summarized in Table 8.

Example 6

The method of Example 2 was carried out with the same formulation as that of Example 2 except that 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 was changed to 1.0 part of the lactic acid fermentation emulsion of Experimental Example 4, and

evaluation was performed according to the same manner as that of Example 2. Formulation and the results were summarized in Table 8.

Example 7

5 The method of Example 2 was carried out with the same
formulation as that of Example 2 except that 1.0 part of
the lactic acid formulation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
10 formulation emulsion of Experimental Example 5, and
evaluation was performed according the same manner as that
of Example 2. Formulation and the results were summarized
in Table 8.

[0059]

15 Formulations and the results of Example 4 to Example 7
were summarized in Table 8.

[Table 8]

	Example 4	Example 5	Example 6	Example 7
Oil-in-water emulsion				
Palm kernel oil (melting point 29°C)	20.0	20.0	20.0	20.0
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07	0.07
Nonfat dry milk	2.0	2.0	2.0	2.0
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	1.0	1.0	1.0	1.0
Water	66.24	66.24	66.24	66.24
(Component of oil-in-water emulsion)				
Nonfat milk solid	2.0	2.0	2.0	2.0
Milk fat	0.0	0.0	0.1	0.0
Vegetable fat	30.1	30.1	30.0	30.1
Total fat (%)	30.1	30.1	30.1	30.1
Viscosity	320 cp	310 cp	320 cp	300 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer	5 min. or longer
Whipping time	2 min. 55 sec.	2 min. 50 sec.	2 min. 45 sec.	2 min. 55 sec.
Overrun	110%	105%	105%	110%
Shape retainability	A	A	A	A
Water separation	A	A	A	A
Melting in mouth	⊙	⊙	⊙	⊙
Milk taste	○	○	⊙	○
Taste	○	○	○	○
Lactic acid fermentation emulsion	Experimental Example 2	Experimental Example 3	Experimental Example 4	Experimental Example 5
Fat and oil	12.1	12.7	11.4	12.1
Milk protein	4.1	4.1	4.2	3.1
Lactic acid bacterium starter	1	1	1	1
Nonfat milk solid	11.4	10.7	12.4	8.6
Milk fat	0.1	0.1	11.4	0.0
Vegetable fat	12.0	12.0	0.0	12.0

[0060]

Example 8

The method of Example 2 was carried out with the same
5 formulation as that of Example 2 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 6, and
evaluation was performed according to the same manner as
10 that of Example 2. Formulation and the results were
summarized in Table 9.

Example 9

The method of Example 2 was carried out with the same
formulation as that of Example 2 except that 1.0 part of
15 the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 7, and
evaluation was performed according to the same manner as
that of Example 2. Formulation and the results were
20 summarized in Table 9.

Example 10

According to the same formulation as that of Example 2
except that 1.0 part of the lactic acid fermentation
emulsion of Experimental Example 1 was changed to 1.0 part
25 of the lactic acid fermentation emulsion of Experimental

Example 8 in Example 2, the same treatment was performed, and assessment was performed according to the same manner as that of Example 2. Formulation and results were summarized in Table 9.

5 Example 11

 The method of Example 2 was carried out with the same formulation as that of Example 2 except that 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 was changed to 1.0 part of the lactic acid
10 fermentation emulsion of Experimental Example 9, and evaluation was performed according to the same manner as that of Example 2. Formulation and the results were summarized in Table 9.

[0061]

15 Formulations and the results of Example 8 to Example 11 were summarized in Table 9.

[Table 9]

	Example 8	Example 9	Example 10	Example 11
Oil-in-water emulsion				
Palm kernel oil (melting point 29°C)	20.0	20.0	20.0	20.0
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07	0.07
Nonfat dry milk	2.0	2.0	2.0	2.0
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	1.0	1.0	1.0	1.0
Water	66.24	66.24	66.24	66.24
(Component of oil-in-water emulsion)				
Nonfat milk solid	2.0	2.0	2.0	2.0
Milk fat	0.0	0.0	0.0	0.0
Vegetable fat	30.1	30.1	30.3	30.1
Total fat (%)	30.1	30.1	30.3	30.1
Viscosity	330 cp	320 cp	295 cp	310 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer	5 min. or longer
Whipping time	3 min. 10 sec.	2 min. 50 sec.	2 min. 45 sec.	2 min. 55 sec.
Overrun	115%	110%	105%	110%
Shape retainability	A	A	A	A
Water separation	A	A	A	A
Melting in mouth	⊙	⊙	⊙	⊙
Milk taste	○	○	○	○
Taste	○	○	○	○
Lactic acid fermentation emulsion	Experimental Example 6	Experimental Example 7	Experimental Example 8	Experimental Example 9
Fat and oil	12.1	6.1	28.1	12.1
Milk protein	6.7	4.1	4.1	4.1
Lactic acid bacterium starter	1	1	1	1
Nonfat milk solid	14.1	11.4	11.4	11.4
Milk fat	0.1	0.0	0.0	0.0
Vegetable fat	12.0	6.0	28.0	12.0

[0062]

Example 12

The method of Example 2 was carried out with the same
5 formulation as that of Example 2 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 10, and
evaluation was performed according to the same manner as
10 that of Example 2. Formulation and the results were
summarized in Table 10.

Example 13

The method of Example 2 was carried out with the same
formulation as that of Example 2 except that 1.0 part of
15 the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 11, and
evaluation was performed according to the same manner as
that of Example 2. Formulation and the results were
20 summarized in Table 10.

Example 14

The method of Example 2 was carried out with the same
formulation as that of Example 2 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
25 Example 1 was changed to 1.0 part of the lactic acid

fermentation emulsion of Experimental Example 12, and evaluation was performed according to the same manner as that of Example 2. Formulation and the results were summarized in Table 10.

5 Example 15

 The method of Example 2 was carried out with the same formulation as that of Example 2 except that 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 was changed to 1.0 part of the lactic acid
10 fermentation emulsion of Experimental Example 13, and evaluation was performed according to the same manner as that of Example 2. Formulation and the results were summarized in Table 10.

[0063]

15 Formulations and the results of Example 12 to Example 15 were summarized in Table 10.

[Table 10]

	Example 12	Example 13	Example 14	Example 15
Oil-in-water emulsion				
Palm kernel oil (melting point 29°C)	20.0	20.0	20.0	20.0
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07	0.07
Nonfat dry milk	2.0	2.0	2.0	2.0
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	1.0	1.0	1.0	1.0
Water	66.24	66.24	66.24	66.24
(Component of oil-in-water emulsion)				
Nonfat milk solid	2.0	2.0	2.1	2.0
Milk fat	0.0	0.0	0.0	0.0
Vegetable fat	30.1	30.1	30.1	30.1
Total fat (%)	30.1	30.1	30.1	30.1
Viscosity	330 cp	345 cp	360 cp	320 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer	5 min. or longer
Whipping time	2 min. 40 sec.	2 min. 30 sec.	2 min. 10 sec.	2 min. 45 sec.
Overrun	105%	105%	100%	110%
Shape retainability	A	A	A	A
Water separation	A	A	A	A
Melting in mouth	⊙	⊙	⊙	⊙
Milk taste	△	△	△	△
Taste	○	○	△	○
Lactic acid fermentation emulsion	Experimental Example 10	Experimental Example 11	Experimental Example 12	Experimental Example 13
Fat and oil	12.1	12.1	12.1	12.1
Milk protein	4.1	4.1	8.4	4.1
Lactic acid bacterium starter	2	3	1	1
Nonfat milk solid	11.4	11.4	15.9	11.4
Milk fat	0.0	0.0	0.1	0.0
Vegetable fat	12.0	12.0	12.0	12.0

[0064]

Example 16

The method of Example 2 was carried out with the same
5 formulation as that of Example 2 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 14, and
evaluation was performed according to the same manner as
10 that of Example 2. Formulation and the results were
summarized in Table 11.

[0065]

Example 17

The method of Example 2 was carried out with the same
15 formulation as that of Example 2 except that 20.0 parts of
palm kernel oil (melting point 29°C), 5.0 parts of hardened
palm kernel oil (melting point 38°C), 4.0 parts of rapeseed
hardened oil (melting point 35°C), 0.15 part of
polyglycerin unsaturated fatty acid ester (trade name SY
20 Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co.,
Ltd.), and 66.24 parts of water were changed to 15.0 parts
of palm kernel oil (melting point 29°C), 3.0 parts of
hardened palm kernel oil (melting point 38°C), 2.0 parts of
rapeseed hardened oil (melting point 35°C), 0.10 part of
25 polyglycerin unsaturated fatty acid ester (trade name SY

Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co., Ltd.), and 75.21 parts of water, and evaluation was performed according to the same manner as that of Example 2. Formulation and the results were summarized in Table 11.

5 [0066]

Example 18

The method of Example 2 was carried out with the same formulation as that of Example 2 except that 20.0 parts of palm kernel oil (melting point 29°C), 5.0 parts of hardened
10 palm kernel oil (melting point 38°C), 1.0 part of palm fractionated hardened oil (melting point 31°C), 4.0 parts of rapeseed hardened oil (melting point 35°C), 0.15 part of polyglycerin unsaturated fatty acid ester (trade name SY Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co.,
15 Ltd.), and 66.24 parts of water were changed to 26.0 parts of palm kernel oil (melting point 29°C), 6.0 parts of hardened palm kernel oil (melting point 38°C), 2.0 parts of palm fractionated hardened oil (melting point 31°C), 6.0 parts of rapeseed hardened oil (melting point 35°C), 0.02
20 part of polyglycerin unsaturated fatty acid ester (trade name SY Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co., Ltd.), and 56.29 parts of water, and evaluation was performed according to the same manner as that of Example 2. Formulation and the results were summarized in
25 Table 11.

[0067]

Example 19

The method of Example 2 was carried out with the same formulation as that of Example 2 except that 20.0 parts of
5 palm kernel oil (melting point 29°C), 5.0 parts of hardened palm kernel oil (melting point 38°C), 1.0 part of palm fractionated hardened oil (melting point 31°C), 4.0 parts of rapeseed hardened oil (melting point 35°C), 0.15 part of polyglycerin unsaturated fatty acid ester (trade name SY
10 Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co., Ltd.), and 66.24 parts of water were changed to 33.0 parts of palm kernel oil (melting point 29°C), 7.0 parts of hardened palm kernel oil (melting point 38°C), 2.0 parts of palm fractionated hardened oil (melting point 31°C), 6.0
15 parts of rapeseed hardened oil (melting point 35°C), 0.01 part of the polyglycerin unsaturated fatty acid ester (trade name SY Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co., Ltd.), and 48.30 parts of water, and evaluation was performed according to the same manner as
20 that of Example 2. Formulation and the results were summarized in Table 11.

[0068]

Formulations and the results of Example 16 to Example 19 were summarized in Table 11.

[Table 11]

	Example 16	Example 17	Example 18	Example 19
Oil-in-water emulsion				
Palm kernel oil (melting point 29°C)	20.0	15.0	26.0	33.0
Hardened palm kernel oil (melting point 38°C)	5.0	3.0	6.0	7.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	2.0	2.0
Rapeseed hardened oil (melting point 35°C)	4.0	2.0	6.0	6.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.10	0.02	0.01
Nonfat dry milk	2.0	2.0	2.0	2.0
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	1.0	1.0	1.0	1.0
Water	66.24	75.21	56.29	48.30
(Component of oil-in-water emulsion)				
Nonfat milk solid	2.0	2.0	2.0	2.0
Milk fat	0.4	0.0	0.0	0.0
Vegetable fat	30.0	21.1	40.1	48.1
Total fat (%)	30.4	21.1	40.1	48.1
Viscosity	305 cp	230 cp	380 cp	420 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer	5 min. or longer
Whipping time	2 min. 55 sec.	3 min. 40 sec.	2 min. 10 sec.	1 min. 45 sec.
Overrun	115%	120%	100%	95%
Shape retainability	A	B	A	A
Water separation	A	B	A	A
Melting in mouth	⊙	⊙	○	○
Milk taste	○	○	○	○
Taste	○	○	○	○
Lactic acid fermentation emulsion	Experimental Example 14	Experimental Example 1	Experimental Example 1	Experimental Example 1
Fat and oil	33.0	12.1	12.1	12.1
Milk protein	8.2	4.1	4.1	4.1
Lactic acid bacterium starter	-	1	1	1
Nonfat milk solid	11.5	11.4	11.4	11.4
Milk fat	33.0	0.1	0.1	0.1
Vegetable fat	0.0	12.0	12.0	12.0

[0069]

Example 20

The method of Example 2 was carried out with the same
5 formulation as that of Example 2 except that 66.24 parts of
water, and 1.0 part of the lactic acid fermentation
emulsion of Experimental Example 1 were changed to 66.64
parts of water, and 0.6 part of the lactic acid
fermentation emulsion of Experimental Example 1, and
10 evaluation was performed according to the same manner as
that of Example 2. Formulation and the results were
summarized in Table 12.

Example 21

The method of Example 2 was carried out with the same
15 formulation as that of Example 2 except that 20.0 parts of
palm kernel oil (melting point 29°C), 66.24 parts of water,
2.0 parts of nonfat dry milk, and 1.0 part of the lactic
acid fermentation emulsion of Experimental Example 1 were
changed to 19.8 parts of the palm kernel oil (melting point
20 29°C), 65.54 parts of water, 1.9 parts of nonfat dry milk,
and 2.0 parts of the lactic acid fermentation emulsion of
Experimental Example 1, and evaluation was performed
according to the same manner as that of Example 2.
Formulation and the results were summarized in Table 12.

25 [0070]

Example 22

The method of Example 2 was carried out with the same formulation as that of Example 2 except that 20.0 parts of palm kernel oil (melting point 29°C), 66.24 parts of water, 2.0 parts of nonfat dry milk, and 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 were changed to 19.6 parts of palm kernel oil (melting point 29°C), 64.04 parts of water, 1.6 parts of nonfat dry milk, and 4.0 parts of the lactic acid fermentation emulsion of Experimental Example 1, and evaluation was performed according to the same manner as that of Examples 2. Formulation and the results were summarized in Table 12.

Example 23

The method of Example 2 was carried out with the same formulation as that of Example 2 except that 20.0 parts of palm kernel oil (melting point 29°C), 66.24 parts of water, 2.0 parts of nonfat dry milk, and 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 were changed to 19.1 parts of palm kernel oil (melting point 29°C), 61.04 parts of water, 1.1 parts of nonfat dry milk, and 8.0 parts of the lactic acid fermentation emulsion of Experimental Example 1, and evaluation was performed according to the same manner as that of Example 2. Formulation and the results were summarized in Table 12.

[0071]

Formulations and the results of Example 20 to Example 23 were summarized in Table 12.

[Table 12]

	Example 20	Example 21	Example 22	Example 23
Oil-in-water emulsion				
Palm kernel oil (melting point 29°C)	20.0	19.8	19.6	19.1
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07	0.07
Nonfat dry milk	2.0	1.9	1.6	1.1
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	0.6	2.0	4.0	8.0
Water	66.64	65.54	64.04	61.04
(Component of oil-in-water emulsion)				
Nonfat milk solid	2.0	2.0	2.0	2.0
Milk fat	0.0	0.0	0.0	0.0
Vegetable fat	30.1	30.0	30.1	30.1
Total fat (%)	30.1	30.1	30.1	30.1
Viscosity	290 cp	300 cp	325 cp	350 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer	5 min. or longer
Whipping time	3 min. 15 sec.	3 min. 00 sec.	2 min. 55 sec.	2 min. 45 sec.
Overrun	120%	110%	110%	105%
Shape retainability	A	A	A	A
Water separation	A	A	A	A
Melting in mouth	⊙	⊙	⊙	⊙
Milk taste	○	⊙	○	△
Taste	○	○	○	○
Lactic acid fermentation emulsion	Experimental Example 1	Experimental Example 1	Experimental Example 1	Experimental Example 1
Fat and oil	12.1	12.1	12.1	12.1
Milk protein	4.1	4.1	4.1	4.1
Lactic acid bacterium starter	1	1	1	1
Nonfat milk solid	11.4	11.4	11.4	11.4
Milk fat	0.1	0.1	0.1	0.1
Vegetable fat	12.0	12.0	12.0	12.0

[0072]

Example 24

The method of Example 2 was carried out with the same
5 formulation as that of Example 2 except that 20.0 parts of
palm kernel oil (melting point 29°C), 66.24 parts of water,
2.0 parts of nonfat dry milk, and 1.0 part of the lactic
acid fermentation emulsion of Experimental Example 1 were
changed to 18.7 parts of palm kernel oil (melting point
10 29°C), 57.84 parts of water, 0.7 part of nonfat dry milk,
and 12.0 parts of the lactic acid fermentation emulsion of
Experimental Example 1, and evaluation was performed
according to the same manner as that of Example 2.
Formulation and the results were summarized in Table 12.

15 [0073]

Formulations and the results of Example 24 were
summarized in Table 13.

[Table 13]

	Example 24
Oil-in-water emulsion	
Palm kernel oil (melting point 29°C)	18.7
Hardened palm kernel oil (melting point 38°C)	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0
Rapeseed hardened oil (melting point 35°C)	4.0
Lecithin	0.15
Polyglycerin unsaturated fatty acid ester	0.07
Nonfat dry milk	0.7
Sucrose saturated fatty acid ester	0.05
Polyglycerin saturated fatty acid ester	0.15
Sodium hexametaphosphate	0.20
Sodium bicarbonate	0.02
Xanthan gum	0.01
Guar gum	0.01
Milk flavor	0.10
Lactic acid fermentation emulsion in the following Table	12.0
Water	57.84
(Component of oil-in-water emulsion)	
Nonfat milk solid	2.0
Milk fat	0.0
Vegetable fat	30.1
Total fat (%)	30.2
Viscosity	390 cp
Plasticization	5 min. or longer
Whipping time	2 min. 25 sec.
Overrun	95%
Shape retainability	A
Water separation	A
Melting in mouth	◎
Milk taste	△
Taste	○
Lactic acid fermentation emulsion	Experimental Example 1
Fat and oil	12.1
Milk protein	4.1
Lactic acid bacterium starter	1
Nonfat milk solid	11.4
Milk fat	0.1
Vegetable fat	12.0

[0074]

Example 25

The method of Example 1 was carried out with the same
5 formulation as that of Example 1 except that 67.84 parts of
water, and 0.4 part of nonfat dry milk were changed to
64.64 parts of water, and 3.6 parts of nonfat dry milk, and
evaluation was performed according to the same manner as
that of Example 1. Formulation and the results were
10 summarized in Table 14.

Example 26

The method of Example 1 was carried out with the same
formulation as that of Example 1 except that 67.84 parts of
water, and 0.4 part of nonfat dry milk were changed to
15 64.14 parts of water, and 4.1 parts of nonfat dry milk, and
evaluation was performed according to the same manner as
that of Example 1. Formulations and the results were
summarized in Table 14.

[0075]

20 Example 27

The method of Example 1 was carried out with the same
formulation as that of Example 1 except that 67.84 parts of
water, and 0.4 part of nonfat dry milk were changed to
61.04 parts of water, and 7.2 parts of nonfat dry milk, and
25 evaluation was performed according to the same manner as

that of Example 1. Formulation and the results were summarized in Table 14.

Example 28

5 The method of Example 1 was carried out with the same formulation as that of Example 1 except that 67.84 parts of water, and 0.4 part of nonfat dry milk were changed to 55.74 parts of water, and 12.5 parts of nonfat dry milk, and evaluation was performed according to the same manner as that of Example 1. Formulation and the results were
10 summarized in Table 14.

[0076]

Formulations and the results of Example 25 to Example 28 were summarized in Table 14.

[Table 14]

	Example 25	Example 26	Example 27	Example 28
Oil-in-water emulsion				
Palm kernel oil (melting point 29°C)	20.0	20.0	20.0	20.0
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07	0.07
Nonfat dry milk	3.6	4.1	7.2	12.5
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	1.0	1.0	1.0	1.0
Water	64.64	64.14	61.04	55.74
(Component of oil-in-water emulsion)				
Nonfat milk solid	3.5	4.0	7.0	12.0
Milk fat	0.0	0.0	0.1	0.1
Vegetable fat	30.1	30.1	30.1	30.1
Total fat (%)	30.2	30.2	30.2	30.2
Viscosity	330 cp	340 cp	380 cp	460 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer	4 min. 30 sec.
Whipping time	3 min. 05 sec.	3 min. 10 sec.	2 min. 45 sec.	2 min. 10 sec.
Overrun	105%	110%	100%	95%
Shape retainability	A	A	A	A
Water separation	A	A	A	A
Melting in mouth	⊙	⊙	⊙	○
Milk taste	○	⊙	⊙	⊙
Taste	○	○	○	○
Lactic acid fermentation emulsion	Experimental Example 1	Experimental Example 1	Experimental Example 1	Experimental Example 1
Fat and oil	12.1	12.1	12.1	12.1
Milk protein	4.1	4.1	4.1	4.1
Lactic acid bacterium starter	1	1	1	1
Nonfat milk solid	11.4	11.4	11.4	11.4
Milk fat	0.1	0.1	0.1	0.1
Vegetable fat	12.0	12.0	12.0	12.0

[0077]

Example 29

The method of Example 26 was carried out with the same
5 formulation as that of Example 26 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 2, and
evaluation was performed according to the same manner as
10 that of Example 26. Formulation and the results were
summarized in Table 15.

Example 30

The method of Example 26 was carried out with the same
formulation as that of Example 26 except that 1.0 part of
15 the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 3, and
evaluation was performed according to the same manner as
that of Example 26. Formulation and the results were
20 summarized in Table 15.

Example 31

The method of Example 26 was carried out with the same
formulation as that of Example 26 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
25 Example 1 was changed to 1.0 part of the lactic acid

fermentation emulsion of Experimental Example 4, and evaluation was performed according to the same manner as that of Example 26. Formulation and the results were summarized in Table 15.

5 Example 32

 The method of Example 26 was carried out with the same formulation as that of Example 26 except that 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 was changed to 1.0 part of the lactic acid
10 fermentation emulsion of Experimental Example 5, and evaluation was performed according to the same manner as that of Example 26. Formulation and the results were summarized in Table 15.

[0078]

15 Formulations and the results of Example 29 to Example 32 were summarized in Table 15.

[Table 15]

	Example 29	Example 30	Example 31	Example 32
Oil-in-water emulsion				
Palm kernel oil (melting point 29°C)	20.0	20.0	20.0	20.0
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07	0.07
Nonfat dry milk	4.1	4.1	4.1	4.1
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	1.0	1.0	1.0	1.0
Water	64.14	64.14	64.14	64.14
(Component of oil-in-water emulsion)				
Nonfat milk solid	4.0	4.0	4.0	4.0
Milk fat	0.0	0.0	0.2	0.0
Vegetable fat	30.1	30.1	30.0	30.1
Total fat (%)	30.2	30.2	30.2	30.2
Viscosity	310 cp	305 cp	310 cp	290 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer	5 min. or longer
Whipping time	3 min. 5 sec.	2 min. 50 sec.	2 min. 45 sec.	3 min. 5 sec.
Overrun	115%	110%	110%	115%
Shape retainability	A	A	A	A
Water separation	A	A	A	A
Melting in mouth	⊙	⊙	⊙	⊙
Milk taste	○	○	⊙	○
Taste	○	○	○	○
Lactic acid fermentation emulsion	Experimental Example 2	Experimental Example 3	Experimental Example 4	Experimental Example 5
Fat and oil	12.1	12.7	11.4	12.1
Milk protein	4.1	4.1	4.2	3.1
Lactic acid bacterium starter	1	1	1	1
Nonfat milk solid	11.4	10.7	12.4	8.6
Milk fat	0.1	0.1	11.4	0.0
Vegetable fat	12.0	12.0	0.0	12.0

[0079]

Example 33

The method of Example 26 was carried out with the same
5 formulation as that of Example 26 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 6, and
evaluation was performed according to the same manner as
10 that of Example 26. Formulation and the results were
summarized in Table 16.

Example 34

The method of Example 26 was carried out with the same
formulation as that of Example 26 except that 1.0 part of
15 the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 7, and
evaluation was performed according to the same manner as
that of Example 26. Formulation and the results were
20 summarized in Table 16.

Example 35

The method of Example 26 was carried out with the same
formulation as that of Example 26 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
25 Example 1 was changed to 1.0 part of the lactic acid

fermentation emulsion of Experimental Example 8, and evaluation was performed according to the same manner as that of Example 26. Formulation and the results were summarized in Table 16.

5 Example 36

 The method of Example 26 was carried out with the same formulation as that of Example 26 except that 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 was changed to 1.0 part of the lactic acid
10 fermentation emulsion of Experimental Example 9, and evaluation was performed according to the same manner as that of Example 26. Formulation and the results were summarized in Table 16.

[0080]

15 Formulations and the results of Example 33 to Example 36 were summarized in Table 16.

[Table 16]

	Example 33	Example 34	Example 35	Example 36
Oil-in-water emulsion				
Palm kernel oil (melting point 29°C)	20.0	20.0	20.0	20.0
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07	0.07
Nonfat dry milk	4.1	4.1	4.1	4.1
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Lactic acid fermentation emulsion	1.0	1.0	1.0	1.0
Water	64.14	64.14	64.14	64.14
(Component of oil-in-water emulsion)				
Nonfat milk solid	4.0	4.0	4.0	4.0
Milk fat	0.0	0.0	0.0	0.0
Vegetable fat	30.1	30.1	30.3	30.1
Total fat (%)	30.2	30.1	30.3	30.2
Viscosity	345 cp	350 cp	315 cp	340 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer	5 min. or longer
Whipping time	2 min. 55 sec.	2 min. 40 sec.	2 min. 40 sec.	2 min. 50 sec.
Overrun	110%	105%	105%	105%
Shape retainability	A	A	A	A
Water separation	A	A	A	A
Melting in mouth	⊙	⊙	⊙	⊙
Milk taste	⊙	⊙	⊙	⊙
Taste	○	○	○	○
Lactic acid fermentation emulsion	Experimental Example 6	Experimental Example 7	Experimental Example 8	Experimental Example 9
Fat and oil	12.1	6.1	28.1	12.1
Milk protein	6.7	4.1	4.1	4.1
Lactic acid bacterium starter	1	1	1	1
Nonfat milk solid	14.1	11.4	11.4	11.4
Milk fat	0.0	0.0	0.0	0.0
Vegetable fat	12.0	6.0	28.0	12.0

[0081]

Example 37

The method of Example 26 was carried out with the same
5 formulation as that of Example 26 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 10, and
evaluation was performed according to the same manner as
10 that of Example 26. Formulation and the results were
summarized in Table 17.

Example 38

The method of Example 26 was carried out with the same
formulation as that of Example 26 except that 1.0 part of
15 the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 11, and
evaluation was performed according to the same manner as
that of Example 26. Formulation and the results were
20 summarized in Table 17.

Example 39

The method of Example 26 was carried out with the same
formulation as that of Example 26 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
25 Example 1 was changed to 1.0 part of the lactic acid

fermentation emulsion of Experimental Example 12, and evaluation was performed according to the same manner as that of Example 26. Formulation and the results were summarized in Table 17.

5 Example 40

 The method of Example 26 was carried out with the same formulation as that of Example 26 except that 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 was changed to 1.0 part of the lactic acid
10 fermentation emulsion of Experimental Example 13, and evaluation was performed according to the same manner as that of Example 26. Formulation and the results were summarized in Table 17.

[0082]

15 Formulations and the results of Example 37 to Example 40 were summarized in Table 17.

[Table 17]

	Example 37	Example 38	Example 39	Example 40
Oil-in-water emulsion				
Palm kernel oil (melting point 29°C)	20.0	20.0	20.0	20.0
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07	0.07
Nonfat dry milk	4.1	4.1	4.1	4.1
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	1.0	1.0	1.0	1.0
Water	64.14	64.14	64.14	64.14
(Component of oil-in-water emulsion)				
Nonfat milk solid	4.0	3.9	4.1	4.0
Milk fat	0.0	0.0	0.0	0.0
Vegetable fat	30.1	30.1	30.1	30.1
Total fat (%)	30.2	30.2	30.2	30.2
Viscosity	365 cp	360 cp	375 cp	350 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer	5 min. or longer
Whipping time	2 min. 35 sec.	2 min. 20 sec.	2 min. 05 sec.	2 min. 40 sec.
Overrun	100%	100%	95%	110%
Shape retainability	A	A	A	A
Water separation	A	A	A	A
Melting in mouth	⊙	⊙	⊙	⊙
Milk taste	△	△	△	△
Taste	○	○	△	○
Lactic acid fermentation emulsion	Experimental Example 10	Experimental Example 11	Experimental Example 12	Experimental Example 13
Fat and oil	12.1	12.1	12.1	12.1
Milk protein	4.1	4.1	8.4	4.1
Lactic acid bacterium starter	2	3	1	1
Nonfat milk solid	11.4	0.0	15.9	11.4
Milk fat	0.0	0.0	0.1	0.0
Vegetable fat	12.0	12.0	12.0	12.0

[0083]

Example 41

The method of Example 26 was carried out with the same
5 formulation as that of Example 26 except that 1.0 part of
the lactic acid fermentation emulsion of Experimental
Example 1 was changed to 1.0 part of the lactic acid
fermentation emulsion of Experimental Example 14, and
evaluation was performed according to the same manner as
10 that of Example 26. Formulation and the results were
summarized in Table 18.

[0084]

Example 42

The method of Example 26 was carried out with the same
15 formulation as that of Example 26 except that 20.0 parts of
palm kernel oil (melting point 29°C), 5.0 parts of hardened
palm kernel oil (melting point 38°C), 4.0 parts of rapeseed
hardened oil (melting point 35°C), 0.07 part of
polyglycerin unsaturated fatty acid ester (trade name SY
20 Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co.,
Ltd.), and 64.14 parts of water were changed to 15.0 parts
of palm kernel oil (melting point 29°C), 3.0 parts of
hardened palm kernel oil (melting point 38°C), 2.0 parts of
rapeseed hardened oil (melting point 35°C), 0.10 part of
25 polyglycerin unsaturated fatty acid ester (trade name SY

Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co., Ltd.), and 73.11 parts of water, and evaluation was performed according to the same manner as that of Example 26. Formulation and the results were summarized in Table 18.

[0085]

Example 43

The method of Example 26 was carried out with the same formulation as that of Example 26 except that 20.0 parts of palm kernel oil (melting point 29°C), 5.0 parts of hardened palm kernel oil (melting point 38°C), 1.0 part of palm fractionated hardened oil (melting point 31°C), 4.0 parts of rapeseed hardened oil (melting point 35°C), 0.07 part of polyglycerin unsaturated fatty acid ester (trade name SY Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co., Ltd.), and 64.14 parts of water were changed to 26.0 parts of palm kernel oil (melting point 29°C), 6.0 parts of hardened palm kernel oil (melting point 38°C), 2.0 parts of palm fractionated hardened oil (melting point 31°C), 6.0 parts of rapeseed hardened oil (melting point 35°C), 0.02 part of polyglycerin unsaturated fatty acid ester (trade name SY Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co., Ltd.), and 54.19 parts of water, and evaluation was performed according to the same manner as that of Example 26. Formulation and the results were summarized in

Table 18.

[0086]

Example 44

The method of Example 26 was carried out with the same
5 formulation as that of Example 26 except that 20.0 parts of
palm kernel oil (melting point 29°C), 5.0 parts of hardened
palm kernel oil (melting point 38°C), 1.0 part of palm
fractionated hardened oil (melting point 31°C), 4.0 parts
of rapeseed hardened oil (melting point 35°C), 0.07 part of
10 polyglycerin unsaturated fatty acid ester (trade name SY
Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co.,
Ltd.), and 64.14 parts of water were changed to 33.0 parts
of palm kernel oil (melting point 29°C), 7.0 parts of
hardened palm kernel oil (melting point 38°C), 2.0 parts of
15 palm fractionated hardened oil (melting point 31°C), 6.0
parts of rapeseed hardened oil (melting point 35°C), 0.01
part of polyglycerin unsaturated fatty acid ester (trade
name SY Glyster MO-3S, manufactured by Sakamoto Yakuhin
Kogyo Co., Ltd.), and 46.20 parts of water, and evaluation
20 was performed according to the same manner as that of
Example 26. Formulation and the results were summarized in
Table 18.

[0087]

Formulations and the results of Example 41 to Example
25 44 were summarized in Table 18.

[Table 18]

	Example 41	Example 42	Example 43	Example 44
Oil-in-water emulsion				
Palm kernel oil (melting point 29°C)	20.0	15.0	26.0	33.0
Hardened palm kernel oil (melting point 38°C)	5.0	3.0	6.0	7.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	2.0	2.0
Rapeseed hardened oil (melting point 35°C)	4.0	2.0	6.0	6.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.10	0.02	0.01
Nonfat dry milk	4.1	4.1	4.1	4.1
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	1.0	1.0	1.0	1.0
Water	64.14	73.11	54.19	46.20
(Component of oil-in-water emulsion)				
Nonfat milk solid	4.0	4.0	4.0	4.0
Milk fat	0.4	0.0	0.0	0.0
Vegetable fat	30.0	21.1	40.1	48.1
Total fat (%)	30.4	21.2	40.2	48.2
Viscosity	325 cp	245 cp	360 cp	450 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer	5 min. or longer
Whipping time	2 min. 45 sec.	3 min. 30 sec.	2 min. 20 sec.	1 min. 35 sec.
Overrun	110%	115%	105%	90%
Shape retainability	A	B	A	A
Water separation	A	B	A	A
Melting in mouth	⊙	⊙	○	○
Milk taste	⊙	○	○	○
Taste	○	○	○	○
Lactic acid fermentation emulsion	Experimental Example 14	Experimental Example 1	Experimental Example 1	Experimental Example 1
Fat and oil	33	12.1	12.1	12.1
Milk protein	8.2	4.1	4.1	4.1
Lactic acid bacterium starter	-	1	1	1
Nonfat milk solid	11.5	11.4	11.4	11.4
Milk fat	33.0	0.1	0.1	0.1
Vegetable fat	0.0	12.0	12.0	12.0

[0088]

Comparative Example 1

5 The method of Example 2 was carried out with the same
formulation as that of Example 2 except that the lactic
acid fermentation emulsion of Experimental Example 1 was
not used, and 67.24 parts of water was used, and evaluation
was performed according to the same manner as that of
Example 2. Formulation and the results were summarized in
10 Table 19.

Comparative Example 2

 The method of Example 2 was carried out with the same
formulation as that of Example 2 except that the lactic
acid fermentation emulsion of Experimental Example 1 was
15 changed to the lactic acid fermentation emulsion of
Comparative Experimental Example 1, and evaluation was
performed according to the same manner as that of Example 2.
Formulation and the results were summarized in Table 19.

Comparative Example 3

20 The method of Example 2 was carried out with the same
formulation as that of Example 2 except that the lactic
acid fermentation emulsion of Experimental Example 1 was
changed to the lactic acid fermentation emulsion of
Comparative Experimental Example 4, and evaluation was
25 performed according to the same manner as that of Example 2.

Formulation and the results were summarized in Table 19.

[0089]

Formulations and the results of Comparative Example 1 to Comparative Example 3 were summarized in Table 19.

[Table 19]

	Comparative Example 1	Comparative Example 2	Comparative Example 3
Oil-in-water emulsion			
Palm kernel oil (melting point 29°C)	20.0	20.0	20.0
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07
Nonfat dry milk	2.0	2.0	2.0
Sucrose saturated fatty acid ester	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10
Lactic acid fermentation emulsion in the following Table	-	1.0	1.0
Water	67.24	66.24	66.24
(Component of oil-in-water emulsion)			
Nonfat milk solid	1.9	2.0	2.0
Milk fat	0.0	0.0	0.1
Vegetable fat	30.0	30.1	30.0
Total fat (%)	30.0	30.1	30.1
Viscosity	300 cp	295 cp	290 cp
Plasticization	5 min. or longer	5 min. or longer	5 min. or longer
Whipping time	3 min. 05 sec.	2 min. 55 sec.	3 min. 05 sec.
Overrun	110%	110%	110%
Shape retainability	A	A	A
Water separation	A	A	A
Melting in mouth	⊙	⊙	⊙
Milk taste	x	x	x
Taste	○	△	△
Lactic acid fermentation emulsion	-	Comparative Experimental Example 1	Comparative Experimental Example 4
Fat and oil	-	12.07	3
Milk protein	-	2.38	3.2
Lactic acid bacterium starter	-	1	-
Nonfat milk solid	-	6.7	9.0
Milk fat	-	0.0	3.0
Vegetable fat	-	12.0	0.0

[0090]

Example 45

To 20.0 parts of palm kernel oil (melting point 29°C),
5 5.0 parts of hardened palm kernel oil (melting point 38°C),
1.0 part of palm fractionated hardened oil (melting point
31°C), and 4.0 parts of rapeseed hardened oil (melting
point 35°C) were added 0.15 part of lecithin and 0.07 part
of polyglycerin unsaturated fatty acid ester (trade name SY
10 Glyster MO-3S, manufactured by Sakamoto Yakuhin Kogyo Co.,
Ltd.), and then mixed and melted to obtain an oil phase.

Separately, in 67.24 parts of water were dissolved and
dispersed 0.4 part of nonfat dry milk, 0.05 part of sucrose
saturated fatty acid ester (trade name: S-570, manufactured
15 by Mitsubishi-Kagaku Foods Corporation), 0.15 part of
polyglycerin saturated fatty acid ester (trade name SY
Glyster MS-5S, manufactured by Sakamoto Yakuhin Kogyo Co.,
Ltd.), 0.2 part of sodium hexametaphosphate, 0.02 part of
sodium bicarbonate, 0.01 part of xanthan gum, 0.01 part of
20 guar gum, and 0.1 part of milk flavor to prepare an aqueous
phase.

The oil phase and the aqueous phase were subjected to
the same process as that of Example 1 to obtain an oil-in-
water emulsion A.

25 To 1 kg of Oil-in-water emulsion which was obtained by

mixing 1.0 part of the lactic acid fermentation emulsion of Experimental Example 1 into 100.0 parts of the oil-in-water emulsion A, 80 g of granulated sugar was added, and then whipped, and evaluation was performed according to the same manner as that of Example 1. Formulation and the results were summarized in Table 20.

[0091]

Example 46

Whipping was carried out according to Example 45 except that 2.0 parts of the lactic acid fermentation emulsion of Experimental Example 1 was mixed into 100.0 parts of the oil-in-water emulsion A made in Example 45, and evaluation was performed according to the same manner as that of Example 1. Formulation and the results were summarized in Table 20.

Example 47

Whipping was carried out according to Example 45 except that 5.0 parts of the lactic acid fermentation emulsion of Experimental Example 1 was mixed into 100.0 parts of the oil-in-water emulsion A made in Example 45, and evaluation was performed according to the same manner as that of Example 1. Formulation and the results were summarized in Table 20.

Example 48

Whipping was carried out according to Example 45

except that 10.0 parts of the lactic acid fermentation emulsion of Experimental Example 1 was mixed into 100.0 parts of the oil-in water emulsion A made in Example 45, and evaluation was performed according to the same manner as that of Example 1. Formulation and the results were summarized in Table 20.

[0092]

Formulations and the results of Example 45 to Example 48 were summarized in Table 20.

[Table 20]

	Example 45	Example 46	Example 47	Example 48
Oil-in-water emulsion A				
Palm kernel oil (melting point 29°C)	20.0	20.0	20.0	20.0
Hardened palm kernel oil (melting point 38°C)	5.0	5.0	5.0	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0	1.0	1.0	1.0
Rapeseed hardened oil (melting point 35°C)	4.0	4.0	4.0	4.0
Lecithin	0.15	0.15	0.15	0.15
Polyglycerin unsaturated fatty acid ester	0.07	0.07	0.07	0.07
Nonfat dry milk	2.0	2.0	2.0	2.0
Sucrose saturated fatty acid ester	0.05	0.05	0.05	0.05
Polyglycerin saturated fatty acid ester	0.15	0.15	0.15	0.15
Sodium hexametaphosphate	0.20	0.20	0.20	0.20
Sodium bicarbonate	0.02	0.02	0.02	0.02
Xanthan gum	0.01	0.01	0.01	0.01
Guar gum	0.01	0.01	0.01	0.01
Milk flavor	0.10	0.10	0.10	0.10
Water	67.24	67.24	67.24	67.24
(Component of oil-in-water emulsion A)				
Nonfat milk solid	1.9	1.9	1.9	1.9
Milk fat	0.0	0.0	0.0	0.0
Vegetable fat	30.0	30.0	30.0	30.0
Total fat (%)	30.0	30.0	30.0	30.0
Viscosity	300 cp	Same as the left	Same as the left	Same as the left
Plasticization	5 min. or longer	Same as the left	Same as the left	Same as the left
Lactic acid fermentation emulsion in the following Table	1.0	2.0	5.0	10.0
(Component at mixing)				
Nonfat milk solid	2.0	2.1	2.4	2.9
Milk fat	0.0	0.0	0.0	0.0
Vegetable fat	29.8	29.6	29.1	28.4
Total fat (%)	29.8	29.7	29.2	28.4
Whipping time	3 min. 20 sec.	3 min. 15 sec.	2 min. 50 sec.	2 min. 25 sec.
Overrun	120%	115%	105%	95%
Shape retainability	A	A	A	A
Water separation	A	A	A	A
Melting in mouth	⊙	⊙	⊙	⊙
Milk taste	○	⊙	⊙	⊙
Taste	○	○	○	○
Lactic acid fermentation emulsion	Experimenta 1	Experimenta 1	Experimenta 1	Experimenta 1
Fat and oil	12.1	12.1	12.1	12.1
Milk protein	4.1	4.1	4.1	4.1
Lactic acid bacterium starter	1	1	1	1
Nonfat milk solid	11.4	11.4	11.4	11.4
Milk fat	0.1	0.1	0.1	0.1
Vegetable fat	12.0	12.0	12.0	12.0

[0093]

Example 49

Whipping was carried out according to Example 45
5 except that 15.0 parts of the lactic acid fermentation
emulsion of Experimental Example 1 was mixed into 100.0
parts of the oil-in-water emulsion A made in Example 45,
and evaluation was performed according to the same manner
as that of Example 1. Formulation and the result were
10 summarized in Table 21.

[Table 21]

	Example 49
Oil-in-water emulsion A	
Palm kernel oil (melting point 29°C)	20.0
Hardened palm kernel oil (melting point 38°C)	5.0
Palm fractionated hardened oil (melting point 31°C)	1.0
Rapeseed hardened oil (melting point 35°C)	4.0
Lecithin	0.15
Polyglycerin unsaturated fatty acid ester	0.07
Nonfat dry milk	2.0
Sucrose saturated fatty acid ester	0.05
Polyglycerin saturated fatty acid ester	0.15
Sodium hexametaphosphate	0.20
Sodium bicarbonate	0.02
Xanthan gum	0.01
Guar gum	0.01
Milk flavor	0.10
Water	67.24
(Component of oil-in-water emulsion A)	
Nonfat milk solid	1.9
Milk fat	0.0
Vegetable fat	30.0
Total fat (%)	30.0
Viscosity	300 cp
Plasticization	5 min. or longer
Lactic acid fermentation emulsion in the following Table	15.0
(Component at mixing)	
Nonfat milk solid	3.4
Milk fat	0.0
Vegetable fat	27.7
Total fat (%)	27.7
Whipping time	2 min. 15 sec.
Overrun	90%
Shape retainability	A
Water separation	A
Melting in mouth	◎
Milk taste	◎
Taste	△
Lactic acid fermentation emulsion	Experimental Example 1
Fat and oil	12.1
Milk protein	4.1
Lactic acid bacterium starter	1
Nonfat milk solid	11.4
Milk fat	0.1
Vegetable fat	12.0

Industrial Applicability

[0094]

5 The present invention relates to an oil-in-water
emulsion comprising a lactic acid fermentation emulsion,
and more particularly, the emulsion relates to a foamable
oil-in-water emulsion.

CLAIMS

1. An oil-in-water emulsion comprising a specific lactic acid fermentation emulsion containing fat and oil, nonfat milk solid and water, wherein the amount of fat and oil is 4.5 to 35.0 wt%, and the amount of milk protein is 2.5 to 11.0 wt%.

2. The oil-in-water emulsion according to claim 1, wherein a lactic acid bacterium used in preparing the lactic acid fermentation emulsion is a combination of the *Streptococcus* family and the *Lactobacillus* family.

3. The oil-in-water emulsion according to claim 1, wherein the lactic acid fermentation emulsion has a pH of 3.5 to 5.3.

4. The oil-in-water emulsion according to claim 1, wherein the state of the lactic acid fermentation emulsion at 5°C is a liquid, cream-like and/or paste-like state.

5. The oil-in-water emulsion according to claim 1, wherein the lactic acid fermentation emulsion is contained in an amount of 0.5 to 13 wt% based on the total oil-in-water emulsion when the lactic acid fermentation emulsion

is blended in the oil-in-water emulsion in advance, and the amount of the lactic acid fermentation emulsion is 0.5 to 15 parts based on 100 parts of an oil-in-water emulsion A when the lactic acid fermentation emulsion and the oil-in-
5 water emulsion A are mixed.

6. The oil-in-water emulsion according to claim 1, wherein the amount of fat and oil is 15 to 50 wt% and the amount of nonfat milk solid is 0.5 to 12.0 wt%.

10

7. The oil-in-water emulsion according to claim 6, wherein the amount of nonfat milk solid in the oil-in-water emulsion is less than 3.5 wt%.

15 8. The oil-in-water emulsion according to claim 6, wherein the amount of nonfat milk solid in the oil-in-water emulsion is 3.5 to 12.0 wt%.

9. The oil-in-water emulsion according to claim 1, wherein 50 wt% or more of total fat and oil is lauric fat and oil.
20

10. The oil-in-water emulsion according to claim 1, wherein a pH of the oil-in-water emulsion is 6.4 to 6.8.

25

11. An oil-in-water emulsion, wherein the oil-in-water emulsion according to any one of claims 1 to 10 is a foamable oil-in-water emulsion.

5 12. The oil-in-water emulsion according to claim 11, wherein the oil-in-water emulsion is a foamable oil-in-water emulsion having an overrun of 40 to 180%.