

DESCRIPTION

BUTTER HAVING EXCELLENT FLAVOR AND HIGH CONTENT OF NONFAT MILK SOLIDS, AND METHOD FOR PRODUCING SAME

Technical Field

[0001]

The present invention relates to a butter that is excellent in flavor despite containing much solids not fat and a method for producing the butter.

Background Art

[0002]

JP 2007-20429 A (Patent Literature 1 mentioned below) discloses a butter having cream flavor and a method for producing the butter. As shown in this document, a butter is generally obtained by the following steps. Specifically, milk fat is concentrated to 30% to 40% from milk by centrifugation or the like to obtain a cream. Subsequently, the cream is heat-sterilized to deactivate lipase. The cream is then quenched to about 5°C and subjected to aging for a predetermined time in that state to adjust fat globules to stable crystals. Furthermore, the fat globules are aggregated by churning (an operation of stirring by a churn container) to form butter globules, and the water-soluble component (butter milk) is removed. In the case of a salted butter, dietary salt and the like are added, and the butter is subjected to working to thereby sufficiently knead butter globules.

[0003]

In JP 2007-20429 A (Patent Literature 1 mentioned below), a cream is added after forming butter globules to thereby increase solids not fat by from 0.06% by weight to 0.3% by weight (Claim 5, paragraph [0009] and paragraph [0012]). On the other hand, this document discloses comparative examples including solids not fat by 1.77%

by weight and 1.92% by weight (paragraph [0016] and paragraph [0017]). In these comparative examples, a cream was added by 15% and 20% after formation of the butter globules. Furthermore, this Patent Literature 1 discloses that, when the solids not fat are increased, the flavor of the cream becomes too strong and thus the flavor of the butter is deteriorated.

Citation List

Patent Literature

[0004]

Patent Literature 1: JP 2007-20429 A

Summary of Invention

Technical Problem

[0005]

Therefore, the present invention aims at providing a fresh-tasting butter that is excellent in flavor despite containing much solids not fat.

[0006]

Furthermore, the present invention aims at providing a butter that is suitable for baked confectioneries despite containing much solids not fat.

[0007]

Moreover, the present invention aims at providing a butter that is suitable as a raw material of sauces despite containing much solids not fat.

[0008]

In addition, the present invention aims at providing a butter that is suitable for a burnt butter despite containing much solids not fat.

Solution to Problem

[0009]

The present invention is essentially based on the finding that a fresh-tasting butter that is excellent in flavor despite containing much solids not fat milk can be obtained by using a cream obtained by obtaining full-fat condensed milk by filtering raw material milk (milk) or obtaining full-fat condensed milk by adding skimmed condensed milk or powder skimmed milk to raw material milk, and centrifuging the full-fat condensed milk to obtain the cream.

[0010]

The first aspect of the present invention relates to a method for producing a butter containing 2% by weight or more and 10% by weight or less of solids not fat. This method includes a filtration step, a centrifugation step and a kneading step.

[0011]

The filtration step is a step of obtaining condensed milk by filtration by filtering raw material milk. The centrifugation step is a step of obtaining a cream by centrifuging the condensed milk. The kneading step is a step of kneading the cream to obtain a butter.

[0012]

As explained above, a butter can be obtained by aggregating crystals of fat globules to obtain butter globules, and subjecting the butter globules to working. Therefore, raw milk is generally used as a raw material milk for a cream. At this time, when homogenized raw material milk such as commercially available milk is used, fat globules and crystals of fat globules are difficult to be obtained. The present invention is such that a fresh-tasting butter that is excellent in flavor despite containing much solids not fat was able to be obtained by daringly using full-fat condensed milk obtained by filtration or full-fat condensed milk obtained by adding skimmed condensed milk or powder skimmed milk to raw material milk.

[0013]

A preferable embodiment of the first aspect of the present invention is such that the raw material milk is full-fat condensed milk obtained by adding either or both of first skimmed condensed milk and first powder skimmed milk to raw milk.

[0014]

By conducting filtration by using raw material milk in which solids not fat have been increased, a butter that is especially excellent in uses such as baked confectioneries and butter sauce can be obtained.

[0015]

A preferable embodiment of the first aspect of the present invention is such that reverse osmosis filtration, nano filtration or dialysis filtration is used as the filtration. Since the solids not fat is increased and the other unpleasant taste components and salts are removed by adopting these methods, the obtained butter has fine flavor.

[0016]

A preferable embodiment of the first aspect of the present invention is such that the kneading step is a step including mixing either or both of second skimmed condensed milk and second powder skimmed milk with the cream and kneading the mixture, or adding either or both of the second skimmed condensed milk and second powder skimmed milk to the cream while kneading the cream.

[0017]

By using the cream to which skimmed condensed milk or powder skimmed milk has been added or by kneading the cream while adding skimmed condensed milk or powder skimmed milk to the cream, during the kneading, a butter that is excellent in flavor as a burnt butter when formed into a burnt butter can be obtained.

[0018]

The second aspect of the present invention relates to a method for producing a butter containing 2% by weight or more and 10% by weight or less of solids not fat. This production method includes a step of obtaining full-fat condensed milk, a

centrifugation step and a kneading step.

[0019]

The step of obtaining full-fat condensed milk is a step of obtaining full-fat condensed milk by adding either or both of first skimmed condensed milk and first powder skimmed milk to raw material milk or by freeze-concentrating the raw material milk. The centrifugation step and kneading step are similar to those of the first aspect.

[0020]

A preferable embodiment of the second aspect of the present invention is such that the kneading step is a step including mixing either or both of second skimmed condensed milk and second powder skimmed milk with the cream and kneading the mixture, or adding either or both of the second skimmed condensed milk and second powder skimmed milk to the cream while kneading the cream.

[0021]

By using the cream to which skimmed condensed milk or powder skimmed milk has been added or by kneading the cream while adding skimmed condensed milk or powder skimmed milk to the cream, during the kneading, a butter that is excellent for uses in baked confectioneries and butter sauce can be obtained.

[0022]

The third aspect of the present invention relates to a method for producing a butter containing 2% by weight or more and 10% by weight or less of solids not fat, including a kneading step including kneading a cream to obtain a butter. The kneading step is a step including mixing either or both of skimmed condensed milk and powder skimmed milk with the cream and kneading the mixture, or adding either or both of the skimmed condensed milk and powder skimmed milk to the cream while kneading the cream.

[0023]

The fourth aspect of the present invention relates to a butter that is excellent in

flavor despite containing much solids not fat. This butter is a butter obtained by any of the above-mentioned production methods. Furthermore, examples of the components of the butter include 80% by weight or more and 93% by weight or less of a fat content, 5% by weight or more and 17% by weight or less of a water content, and 2% by weight or more and 10% by weight or less of solids not fat. A general butter contains about 1.2% by weight of solids not fat. Furthermore, as shown in Patent Literature 1, the flavor of a butter is generally lost by increase of solids not fat by only 0.3% by weight. In the present invention, a butter that is excellent in flavor despite containing much solids not fat can be obtained by adopting the method explained above.

Advantageous Effects of the Invention

[0024]

According to the present invention, a fresh-tasting butter that is excellent in flavor despite containing much solids not fat can be provided by daringly using full-fat condensed milk obtained by filtration or full-fat condensed milk obtained by adding skimmed condensed milk or powder skimmed milk to raw material milk.

[0025]

Furthermore, according to the present invention, a butter that is suitable for baked confectioneries despite containing much solids not fat can be provided by using a cream to which skimmed condensed milk or powder skimmed milk has been added or kneading a cream while adding skimmed condensed milk or powder skimmed milk to the cream, during the kneading.

[0026]

Furthermore, according to the present invention, a butter that is suitable as a raw material for sauce despite containing much solids not fat can be provided by using a cream to which skimmed condensed milk or powder skimmed milk has been added or kneading a cream while adding skimmed condensed milk or powder skimmed milk to

the cream, during the kneading.

[0027]

Furthermore, according to the present invention, a butter that is suitable for a burnt butter despite containing much solids not fat can be provided by kneading a cream while adding skimmed condensed milk or powder skimmed milk to the cream, by using raw material milk that has been subjected to a filtration treatment.

Brief Description of Drawings

[0028]

Fig. 1 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the butters for raw-eating in Test Example 1.

Fig. 2 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the butters for toasts in Test Example 1.

Fig. 3 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the butters for toasts in Test Example 2.

Fig. 4 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the butter sauces in Test Example 2.

Fig. 5 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the butters for toasts in Test Example 3.

Fig. 6 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the butter sauces in Test Example 3.

Fig. 7 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the baked confectioneries in Test Example 4.

Fig. 8 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the butters for toasts in Test Example 5.

Fig. 9 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the butters for raw-eating in Test Example 6.

Fig. 10 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the butters for raw-eating in Test Example 7.

Fig. 11 is a graph as an alternative to a drawing, showing the result of the sensory evaluation of the butters for raw-eating in Test Example 8.

Fig. 12 is a graph as an alternative to a drawing, showing the result of the analysis of methylketones. The graph shows 2-pentanone, 2-heptanone, 2-nonanone, 2-undecanone and 2-tridecanone in order from the left.

Fig. 13 is a graph as an alternative to a drawing, showing the result of the analysis of fatty acids. The graph shows butanoic acid, hexanoic acid, octanoic acid, decanoic acid, dodecanonic acid and tetradodecanonic acid, in order from the left.

Fig. 14 is a graph as an alternative to a drawing, showing the result of the analysis of lactones. The graph shows δ -hexalactone, δ -octalactone, δ -decalactone, δ -dodecalactone, δ -tetradecalactone and γ -dodecalactone in order from the left.

Fig. 15 is a graph as an alternative to a drawing, showing the result of the analysis of furans. The graph shows 2-furanmethanol, 2-furanmethanol-5-methyl, furfural, 5-hydroxymethyl 1-2 furfural (HMF), 2-furancarboxylic acid, hydrazide and maltol in order from the left.

Fig. 16 is a graph as an alternative to a drawing, showing the results of the analyses of furans and ketones. The graph shows 1-hydroxy-2-propanone, 1-(2-furanyl)-ethanone, DMHF (4-hydroxy-2,5-dimethyl 3(2H)-furanone; furaneol) and 3-hydroxy-2,3-dihydromaltol in order from the left.

Description of Embodiments

[0029]

The first aspect of the present invention relates to a method for producing a butter containing solids not fat by 2% by weight or more and 10% by weight or less (for example, 2% by weight or more and 9% by weight or less, 2% by weight or more and

6% by weight or less, 2% by weight or more and 3% by weight or less, or 3% by weight or more and 5% by weight or less, 5% by weight or more and 9% by weight or less). This method includes a filtration step, a centrifugation step and a kneading step.
[0030]

A general method for producing a butter is already known. In the present invention, a butter can be produced by using an already-known apparatus for producing a butter, and by suitably adopting conditions known to persons skilled in the art. The method for producing a butter will be explained below. However, the present invention is not limited to the following examples, and also encompasses methods obtained by suitably modifying the following examples within the scope that is obvious to persons skilled in the art.
[0031]

Butters are generally dairy products formed by subjecting fat grains obtained from raw milk, milk or special milk to working. Butters include fermented butters formed by lactic acid fermentation (acid cream butters) and non-fermented butters formed from raw material milk without fermentation (sweet cream butters). The butter of the present invention may be either a fermented butter or a non-fermented butter. Furthermore, as butters, salted butters and salt-free butters (free from dietary salt) including no salts are present. The butter of the present invention may be a salted butter or a salt-free butter.
[0032]

The filtration step is a step of obtaining condensed milk by filtration by filtering raw material milk. By suitably adjusting the conditions of filtration, the concentration of the solids not fat can be suitably adjusted. Furthermore, by suitably adjusting the conditions of filtration, the concentrations of the unpleasant taste components and salts can also be adjusted. By adjusting the concentrations of the unpleasant taste components and salts, the flavor of the obtained butter is finely

adjusted. It is preferable to concentrate in the filtration step so that the concentration of the solids not fat in the condensed milk become 1.5 times or more and 2.5 times or less (for example, about 2 times) of the raw material milk. By conducting such concentration treatment, although the operations of the steps for the production of the butter increase, it becomes possible to obtain a butter that excellent in flavor despite the increased concentration of solids not fat. At this time, in the case when condensed milk by filtration is mainly added, the water content in the butter can be adjusted to be 10% by weight or more and 15% by weight or less (for example, 13% by weight) to thereby adjust the solids not fat in an actually-obtained butter (salt-free) to, for example, 2% by weight or more and 4% by weight or less, preferably 2% by weight or more and 3.5% by weight or less, more preferably 2% by weight or more and 3% by weight or less.

[0033]

During the filtration, the treatment temperature is preferably 1°C or more and 30°C or less, and further preferably 1°C or more and 10°C or less from the viewpoint of suppression of the growth of bacteria. The conditions for the treatment during the filtration may be either under a negative pressure or under pressurization. Furthermore, in the case when the filtration is conducted under pressurization, the treatment pressure therefor is, for example, preferably 1 MPa or more and 5 MPa or less, and further preferably 1 MPa or more and 3 MPa or less from the viewpoint of increasing of the filtration velocity by suppressing the clogging of the filtration membrane.

[0034]

The raw material milk may be raw milk, or may be non-homogenized milk or the like. Alternatively, the raw material milk may be full-fat condensed milk obtained by adding either or both of first skimmed condensed milk and first powder skimmed milk to raw milk. Full-fat condensed milk is milk including solid contents with an enhanced concentration as compared to those in raw milk and the like, and includes

much solids not fat.

[0035]

In the filtration step, one of or a combination of two or more of reverse osmosis (RO) filtration, a nano filtration (NF) method and a dialysis filtration (DF) method can be used. In the present invention, filtration using nano filtration or dialysis filtration is preferable, and filtration using dialysis filtration is further preferable. Since the other unpleasant taste components and salts are removed by adopting these methods, the obtained butter has fine flavor. In the filtration step, it is preferable to decrease sodium salts or potassium salts without losing calcium salts. At after the filtration step, the residual ratio of the calcium salts is preferably 80% by weight or more, more preferably 90% by weight or more, and further preferably 95% by weight or more. By decreasing these salts, the crystallization of the butter can be promoted, and thus the production of the butter can be promoted even after the filtration and homogenization of the raw material milk.

[0036]

The reverse osmosis (RO) filtration is a method in which filtration is conducted by using a reverse osmosis (RO) membrane and utilizing an osmotic pressure. The RO membrane is a separation membrane that mainly allows the permeation of water. Examples of the material of the RO membrane include polyamides. Examples of the shape of the RO membrane include a plane membrane, a spiral membrane, a plate-like membrane and the like.

[0037]

The nano filtration is a method in which filtration is conducted by using a nano filtration (NF) membrane (an NF membrane: for example, a membrane-like filter having nano-sized through-holes (pore size: 0.5 to 2 nm, and the like)) and utilizing an osmotic pressure. The NF membrane is a separation membrane that mainly allows the permeation of monovalent ions and water. In the present invention, for example,

monovalent ions (sodium ion, potassium ion, chloride ion), urea, lactic acid and the like can be decreased. Therefore, a demineralization treatment for decreasing sodium and potassium can be conducted by using the nano filtration. In the nano filtration, known conditions in known methods can be adopted.

[0038]

Examples of the material for the NF membrane include polyamides, cellulose acetate, polyethersulfones, polyesters, polyimides, vinyl polymers, polyolefins, polysulfones, regenerated celluloses and polycarbonates. In the present invention, in order to efficiently decrease salts, polyamides, cellulose acetate and polyethersulfones are preferable as the materials for the NF membrane, and specifically, NF45 manufactured by Dow Chemical Company (trade name "NF-3838/30-FF") is more preferable. Examples of the shape of the NF membrane include a plane membrane, a spiral membrane, a plate-like membrane and the like. Examples of the handling of the pressure in the filtration include a pressure filtration method and a reduced pressure filtration method. Examples of the handling of the treated liquid in the filtration include a dead-end filtration method and a cross flow filtration method. Meanwhile, it is commercially preferable to use a cross flow filtration method from the viewpoints of suppression of clogging of the filtration membrane to thereby increase the filtration velocity, and by this way, the variation of the components and the like in the condensed milk prepared from the raw material milk can be suppressed to thereby maintain the quality of the butter constant.

[0039]

Furthermore, a retentate and a permeate are obtained from the raw material milk by this nano filtration. By changing the degrees of the pressurization or reduction of the pressure depending on the actually used NF membrane, the ratio of the amount of the retentate and the amount of the permeate is changed. In the retentate obtained by nano filtration (NF condensed milk), the total solids (TS) in the raw material milk has

been concentrated within the range of generally 1.5 to 2.5 times, preferably 1.6 to 2.2 times, more preferably 1.7 to 2.1 times, and further preferably 1.8 to 2 times (for example, about 2 times). Specifically, the total solids in the condensed milk can be, for example, 19% by weight or more and 33% by weight or less, preferably 20% by weight or more and 29% by weight or less, more preferably 22% by weight or more and 28% by weight or less, further preferably 23% by weight or more and 26% by weight or less (for example, about 26% by weight).

[0040]

In the retentate obtained by nano filtration, among the total solids (TS) in the raw material milk, milk fat (FAT), proteins that are major solids not fat (SNF) and lactose, as well as a part of vitamins and salts have been concentrated. In the present specification, the condensed milk obtained by nano filtration is also referred to as nano-filtered condensed milk. The permeate obtained by the nano filtration contains much of the water in the raw material milk, water-soluble vitamins and a part of salts (especially monovalent ions), whereas contains little of the total solids in the raw material milk. As used herein, the vitamins and salts are collective terms of Vitamins A, B1 and B2 and niacin, and inorganic substances such as sodium (Na), potassium (K), magnesium (Mg), calcium (Ca), chlorine (Cl) and phosphorus (P).

[0041]

It is a preferable embodiment of the present invention to add an electrolyte that does not permeate an NF membrane to the raw material milk before conducting nano filtration. In some cases, demineralization can be promoted by adding the electrolyte that does not permeate an NF membrane. Examples of the electrolyte that does not permeate an NF membrane include milk fat, milk casein, whey protein, lactose, vitamins and salts.

[0042]

The dialysis filtration (DF) is a method in which a water content is added to

milk that has been concentrated by filtration, and the like (a retentate) to dilute the retentate to thereby return the amount of the milk and the like (the amount of the retentate) to an amount that is close to the amount of the milk and the like before the filtration, and the diluted retentate is further filtered. In the present invention, the dialysis filtration is, for example, a method in which a water content is added to condensed milk obtained by nano filtration (nano-filtered condensed milk) to thereby dilute the condensed milk, and the diluted condensed milk is further subjected to nano filtration.

[0043]

The centrifugation step is a step of obtaining a cream by centrifuging the condensed milk, or by diluting condensed milk by adding water content and then centrifuging the diluted condensed milk. In the centrifugation step, generally, the condensed milk is centrifuged by using a centrifugal machine to thereby separate the condensed milk into a cream and skimmed milk. The cream contains much milk fat, whereas the skimmed milk contains little milk fat. The centrifugal machine may be an already-known centrifugal machine, and as the treatment conditions for the centrifugation, conditions that are known in the production of creams, powder skimmed milk and the like can be suitably adopted.

[0044]

However, in the present invention, since the centrifuged condensed milk contains more solids not fat than that contained in conventional raw material milk that is centrifuged into a cream and skimmed milk, the conditions for the treatment in the centrifugation may be somewhat different. Specifically, if the difference in the specific gravities of the cream and skimmed milk increases due to the much solids not fat contained in the centrifuged condensed milk, then the cream and skimmed milk are easily separated. The treatment temperature in the centrifugation is, for example, preferably 30°C or more and 80°C or less, and more preferably 35°C or more and 70°C

or less, especially preferably 40°C or more and 60°C or less from the viewpoints of the flavors of the cream and butter, and the like.

[0045]

The kneading step is a step of kneading the cream to obtain a butter. In the kneading step, the cream is kneaded by generally using a kneading machine to separate the cream into a butter and butter milk. The kneading machine may be an already-known kneading machine, and as the treatment conditions for the kneading, conditions that are known in the production of butters can be suitably adopted.

[0046]

However, in the present invention, since the kneaded cream contains much solids not fat as compared to that in a conventional cream that is separated into a butter and butter milk, the treatment conditions in the kneading may be somewhat different. Specifically, if the difference in the specific gravities of the butter and butter milk increases due to the much solids not fat contained in the kneaded cream, then the butter and butter milk are easily separated. The treatment temperature in the kneading is, for example, preferably 30°C or more and 50°C or less, further preferably 35°C or more and 45°C or less from the viewpoints of the flavor of the butter, and the like.

[0047]

In the kneading step, a cream in which either or both of skimmed condensed milk and powder skimmed milk has been mixed may also be kneaded. Alternatively, in the kneading step, either or both of skimmed condensed milk and powder skimmed milk may be added to a cream while kneading the cream. The addition amount of the skimmed condensed milk and powder skimmed milk may be adjusted so that an actually-obtained butter contains solids not fat by 2% by weight or more and 10% by weight or less (for example, 2% by weight or more and 9% by weight or less, 2% by weight or more and 6% by weight or less, 2% by weight or more and 3% by weight or less, or 3% by weight or more and 5% by weight or less, 5% by weight or more and

9% by weight or less). At this time, in the case when skimmed condensed milk is mainly added, the water content in the butter can be adjusted to be 10% by weight or more and 15% by weight or less (for example, 13% by weight) to thereby adjust the solids not fat in an actually-obtained butter (salt-free) to, for example, 2.5% by weight or more and 5% by weight or less, preferably 3% by weight or more and 5% by weight or less, more preferably 3% by weight or more and 4% by weight or less. Furthermore, in the case when powder skimmed milk is mainly added, the water content in the butter can be adjusted to be 10% by weight or more and 15% by weight or less (for example, 13% by weight) to thereby adjust the solids not fat in an actually-obtained butter (salt-free) to, for example, 4% by weight or more and 10% by weight or less, preferably 5% by weight or more and 9% by weight or less, more preferably 4% by weight or more and 8% by weight or less.

[0048]

The method for producing a butter according to the present invention may suitably include known steps relating to the production of a butter. Examples of such steps include a step of fermenting the raw material milk, a step of mixing the cream or butter with fermented milk, a sterilization step, a cooling step and a packaging step.

[0049]

The second aspect of the present invention relates to a method for producing a butter containing solids not fat by 2% by weight or more and 10% by weight or less (for example, 2% by weight or more and 9% by weight or less, 2% by weight or more and 6% by weight or less, 2% by weight or more and 3% by weight or less, or 3% by weight or more and 5% by weight or less, 5% by weight or more and 9% by weight or less). This production method includes a step of obtaining full-fat condensed milk, a centrifugation step and a kneading step.

[0050]

The step of obtaining full-fat condensed milk is a step of obtaining full-fat

condensed milk by adding either or both of first skimmed condensed milk and first powder skimmed milk to raw material milk or by freeze-concentrating the raw material milk. The centrifugation step and kneading step are similar to those of the first aspect. [0051]

Full-fat condensed milk is milk including solid contents with an enhanced concentration as compared to those in raw milk and the like, and includes much solids not fat. The addition amounts of the skimmed condensed milk and powder skimmed milk in the raw material milk may be adjusted so that an actually-obtained butter contains solids not fat by 2% by weight or more and 10% by weight or less (for example, 2% by weight or more and 6% by weight or less, 2% by weight or more and 3% by weight or less, or 3% by weight or more and 5% by weight or less). On the other hand, the method for freeze-concentrating the raw material milk is known. Specifically, the concentration of the solids not fat can be elevated by freezing the raw material milk by using a known freezing equipment to thereby decrease the water content. Alternatively, the concentration of the solids not fat can be elevated by separating the part containing the solids not fat with a high concentration by utilizing the solidifying temperatures that are different among the components in the freezing of the raw material milk.

[0052]

The third aspect of the present invention relates to a method for producing a butter containing solids not fat by 2% by weight or more and 10% by weight or less, including a kneading step including kneading a cream to obtain a butter. The kneading step is a step including mixing either or both of skimmed condensed milk and powder skimmed milk with the cream and kneading the mixture, or adding either or both of the skimmed condensed milk and powder skimmed milk to the cream while kneading the cream.

[0053]

The production method in this aspect can suitably adopt the conditions

explained above.

[0054]

The fourth aspect of the present invention relates to a butter that is excellent in flavor despite containing much solids not fat. This butter is a butter obtained by any of the above-mentioned production methods. Furthermore, the components of the butter include 80% by weight or more and 93% by weight or less of a fat content, 5% by weight or more and 17% by weight or less of a water content, and 2% by weight or more and 10% by weight or less of solids not fat (for example, 2% by weight or more and 6% by weight or less, 2% by weight or more and 3% by weight or less, or 3% by weight or more and 5% by weight or less). Meanwhile, in the case when the concentration of the solids not fat has been increased by mainly a filtration treatment alone, the solids not fat in the obtained butter can be, for example, 2% by weight or more and 3.6% by weight or less (preferably 2% by weight or more and 3% by weight or less). In the case when skimmed condensed milk is mainly added in addition to the filtration treatment, the water content in the butter can be adjusted to 10% by weight or more and 15% by weight or less (for example, 13% by weight) to thereby adjust the solids not fat in the obtained butter to, for example, 2.5% by weight or more and 5% by weight or less (preferably 3% by weight or more and 4% by weight or less). In the case when powder skimmed milk is mainly added in addition to the filtration treatment, the water content in the butter can be adjusted to 10% by weight or more and 15% by weight or less (for example, 13% by weight) to thereby adjust the solids not fat in the obtained butter to, for example, 4% by weight or more and 10% by weight or less (preferably 6% by weight or more and 9% by weight or less).

[Example 1]

[0055]

A general cream (fat content: 45% by weight) was prepared from full-fat milk (solid content: 13% by weight). A salted butter was produced while adding

(incorporating) skimmed condensed milk (solid content: 33% by weight) in the kneading during the kneading of this cream in a butter producing machine but in accordance with conventional methods with respect to the other parts of the production method (a skimmed condensed milk-incorporated product). The skimmed condensed milk-incorporated product had a composition of 80.8% by weight of a milk fat content, 2.9% by weight of solids not fat and 1.5% by weight of a salt content. (Sample 2)

[Example 2]

[0056]

Full-fat condensed milk was obtained by concentrating full-fat milk (solid content: 13% by weight) to a solid content of 26% by weight by using a nano filtration (NF) method (NF full-fat condensed milk). As the NF membrane, NF-3838/30-FF (NF45) manufactured by Dow Chemical Company was used. This NF full-fat condensed milk was centrifuged and sterilized according to conventional methods to obtain a cream (fat content: 45% by weight) (an NF cream). A salted butter was produced from this NF cream according to a conventional method (an NF-filtered product). The NF-filtered product had a composition of 82.5% by weight of a milk fat content, 2.4% by weight of solids not fat and 1.5% by weight of a salt content.

(Sample 3)

[Example 3]

[0057]

A salted butter was produced while adding (incorporating) skimmed condensed milk (solid content: 33% by weight) in the kneading during the kneading of an NF cream obtained in a similar manner to Example 2 in a butter producing machine, but in accordance with conventional methods with respect to the other parts of the production method (NF-filtered skimmed condensed milk-incorporated product). The NF-filtered skimmed condensed milk-incorporated product had a composition of 80.8% by weight of a milk fat content, 3.8% by weight of solids not fat and 1.5% by weight of a salt

content. (Sample 4)

[Comparative Example 1 (Sample 1)]

[0058]

A general cream (fat content: 45% by weight) was prepared from full-fat milk, and a salted butter was produced from this cream according to a conventional method (a control product (salted)).

[0059]

[Test Example 1]

Sensory evaluation by specialized panels (24 persons) was conducted on the butter obtained in Example 1 and the butter obtained in Comparative Example 1. At that time, the butters were scored in such a manner that the item at the same level as Comparative Example got 0 points, the item being (slightly strong) got 1 point and the item being (strong) got 2 points, and the scores were counted. In the cases when the butters were subjected to sensory evaluation as butters for raw-eating, each butter was warmed to 15°C, and 3 g of the butter was subjected to tasting. In the cases when the butters were subjected to sensory evaluation as butters for toasts, a piece from a sandwich loaf cut into 8 pieces was equally cut into about quarters, and each quarter was toasted to put the quarter into a state that 3 g of the butter was melted thereon and subjected to tasting. The results are shown in Table 1 (for raw-eating) and Table 2 (for toasts). The summaries of the results in the respective tables are shown in Fig. 1 (for raw-eating) and Fig. 2 (for toasts). In the cases when the butter obtained in Example 1 and the butter obtained in Comparative Example 1 were subjected to sensory evaluation as butters for raw-eating, there were significant differences in the respective items of degree of milk flavor, sweetness derived from milk and general evaluation, and the butter obtained in Example 1 was valued higher. Furthermore, in the cases when the butter obtained in Example 1 and the butter obtained in Comparative Example 1 were subjected to sensory evaluation as butters for toast, the butter obtained in Example 1

was valued higher in the item of degree of refreshment, and thus it can be considered that the butter had fine flavor.

[0060]

[Table 1]

Table 1. Sensory evaluation of butters (SMC) (raw-eating) Conducted on November 8, 2010

	Sweetness derived from milk	Degree of richness	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Example 1 > Comparative example 1	13	10	9	3	16	14
Example 1 = Comparative example 1	9	5	8	7	2	5
Example 1 < Comparative example 1	2	9	7	14	6	5
Significant difference	**	-	-	*	*	*

	Sweetness derived from milk (**)	Degree of richness	Degree of refreshment	Degree of fat taste (*)	Degree of milk flavor (*)	General evaluation (*)
Example 1	0	0	0	0	0	0
Comparative example 1	0.60	0.10	0.00	-0.60	0.60	0.50

(*) : Significant difference with a significance rate of 5%

(**) : Significant difference with a significance rate of 1%

[0061]

[Table 2]

Table 2. Sensory evaluation of butters (SMC) (toast) Conducted on November 12, 2010

	Sweetness derived from milk	Degree of richness	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Example 1 > Comparative example 1	5	7	10	8	6	9
Example 1 = Comparative example 1	8	2	3	4	6	2
Example 1 < Comparative example 1	7	11	7	8	8	9
Significant difference	-	-	-	-	-	-

	Sweetness derived from milk	Degree of richness	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Example 1	0	0	0	0	0	0
Comparative example 1	0.00	-0.40	0.40	-0.30	0.00	-0.10

(*) : Significant difference with a significance rate of 5%

(**) : Significant difference with a significance rate of 1%

[0062]

[Test Example 2]

Sensory evaluation was conducted by specialized panels (toasts: 29 persons, butter sauces: 18 persons) on the butter obtained in Example 2 and the butter obtained in Comparative Example 1 in a similar manner to that of Test Example 1. In the cases of the sensory evaluation of the butter sauces, each butter sauce was warmed to 25°C, and 30 g of the butter sauce was subjected to tasting. The results are shown in Table 3 (for toasts) and Table 4 (butter sauces). The summaries of the results in the respective tables are shown in Fig. 3 (for toasts) and Fig. 4 (butter sauces). In the cases when the butter obtained in Example 2 and the butter obtained in Comparative Example 1 were subjected to sensory evaluation as butters for toasts, it can be considered that the butter obtained in Example 2 was highly evaluated in the respective items of degree of fragrant flavor, overall fragrance and general evaluation. Furthermore, in the cases when the butter obtained in Example 2 and the butter obtained in Comparative Example 1 were subjected to sensory evaluation as butter sauces, the butter obtained in Example 2 was highly evaluated in the respective items of sweet fragrance of butter and general

evaluation, and thus it is considered that the flavor was fine. When the butter was used in cooked products such as a butter sauce, a result that the milk flavor was especially emphasized and the acidic flavor of wine was made mild by the butter was also obtained.

[0063]

[Table 3]

Table 3. Sensory evaluation of butters (NF) (toasts) Conducted on May 12, 2010

	Overall fragrance	Degree of fragrant flavor	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Example 2 > Comparative example 1	15	14	9	12	10	13
Example 2 = Comparative example 1	5	10	7	7	12	6
Example 2 < Comparative example 1	9	5	13	10	7	10
Significant difference	-	-	-	-	-	-

	Overall fragrance	Degree of fragrant flavor	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Comparative example 1	0	0	0	0	0	0
Example 2	0.34	0.38	-0.14	0.03	0.14	0.24

(*) : Significant difference with a significance rate of 5%

[0064]

[Table 4]

Table 4. Sensory evaluation of butter sauces (NF) Conducted on June 2, 2010

	Sweet fragrance of butter	Degree of mild flavor	Degree of dense taste	General evaluation
Example 2 > Comparative example 1	11	8	7	11
Example 2 = Comparative example 1	1	1	2	0
Example 2 < Comparative example 1	6	9	9	7
Significant difference	—	—	—	—

	Sweet fragrance of butter	Degree of mild flavor	Degree of dense taste	General evaluation
Comparative example 1	0	0	0	0
Example 2	0.39	0.06	-0.22	0.39

(*) : Significant difference with a significance rate of 5%

[0065]

[Test Example 3]

Sensory evaluation was conducted by specialized panels (toasts: 24 persons, butter sauces: 20 persons) on the butter obtained in Example 3 and the butter obtained in Comparative Example 1 in a similar manner to that of Test Examples 1 and 2. In the cases of the sensory evaluation of the butter sauces, each butter sauce was warmed to 55°C, and 30 g of the butter sauce was subjected to tasting. The results are shown in Table 5 (for toasts) and Table 6 (butter sauces). The summaries of the results in the respective tables are shown in Fig. 5 (for toasts) and Fig. 6 (butter sauces). In the cases when the butter obtained in Example 3 and the butter obtained in Comparative Example 1 were subjected to sensory evaluation as butters for toasts, there were significant differences in the respective items of degree of fragrant flavor and degree of fat taste, and thus the butter obtained in Example 3 was highly evaluated. Furthermore, it can be considered that the butter obtained in Example 3 is highly evaluated also in the item of overall fragrance. Furthermore, in the cases when the butter obtained in Example 3 and the butter obtained in Comparative Example 1 were subjected to sensory

evaluation as butter sauces, there were significant differences in the respective items of degree of mild flavor and general evaluation, and thus the butter obtained in Example 3 was highly evaluated. Furthermore, the butter obtained in Example 3 was highly evaluated also in the item of degree of dense taste, and thus it can be considered that the flavor was fine. When the butter was used in cooked products such as a butter sauce, a result that the milk flavor was especially emphasized and the acidic flavor of wine was made mild by the butter was also obtained.

[0066]

[Table 5]

Table 5. Sensory evaluation of butters (NF+SMC) (toasts) Conducted on April 16, 2010

	Overall fragrance	Degree of fragrant flavor	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Example 3 > Comparative example 1	13	14	5	13	9	11
Example 3 = Comparative example 1	2	5	8	7	9	3
Example 3 < Comparative example 1	9	5	11	4	6	10
Significant difference	-	*	-	*	-	-

	Overall fragrance	Degree of fragrant flavor (*)	Degree of refreshment	Degree of fat taste (*)	Degree of milk flavor	General evaluation
Comparative example 1	0	0	0	0	0	0
Example 3	0.25	0.50	-0.29	0.38	0.08	-0.04

(*) : Significance difference with a significance rate of 5%

[0067]

[Table 6]

Table 6. Sensory evaluation of butter sauces (NF+SMC) Conducted on May 17, 2010

	Sweet fragrance of butter	Degree of mild flavor	Degree of dense taste	General evaluation
Example 3 > Comparative example 1	5	13	13	14
Example 3 = Comparative example 1	5	2	1	2
Example 3 < Comparative example 1	10	5	6	4
Significant difference	-	*	-	*

	Sweet fragrance of butter	Degree of mild flavor (*)	Degree of dense taste	General evaluation (*)
Comparative example 1	0	0	0	0
Example 3	-0.25	0.50	0.40	0.75

(*) : Significant difference with a significance rate of 5%

[0068]

The butters of Example 1, Example 2 and Example 3 were overwhelmingly superior to the butter of Comparative Example 1 from the viewpoints of flavor and the like. On the other hand, in the cases when the butters were utilized in baked confectioneries and in the cases when butter sauce were cooked by using the butters, the butters of Example 2 and Example 3 were significantly superior to the butter of Example 1 from the viewpoint of flavor.

[Example 4]

[0069]

A general cream (fat content: 45% by weight) was prepared from full-fat milk (solid content: 13% by weight). A salt-free butter was produced while adding (incorporating) powder skimmed milk in the kneading during the kneading of this cream in a butter producing machine, but in accordance with conventional methods with respect to the other parts of the production method (a powder skimmed milk-incorporated product). The powder skimmed milk-incorporated product had a composition of 80.8% by weight of a milk fat content and 2.3% by weight of solids not

fat. (Sample 6)

[Example 5]

[0070]

Full-fat condensed milk was obtained by concentrating full-fat milk (solid content: 13% by weight) up to a solid content of 26% by weight by using a nano filtration (NF) method (NF full-fat condensed milk). Water was added to this NF full-fat condensed milk until the solid content became 13% by weight, and this was concentrated again by using a nano filtration (NF) method up to a solid content of 26% by weight to thereby give full-fat condensed milk (DF full-fat condensed milk). Furthermore, this DF full-fat condensed milk was centrifuged and sterilized according to conventional methods to obtain a cream (a DF cream). A salt-free butter was produced from this DF cream according to a conventional method (a DF-filtered product). The DF-filtered product had a composition of 82.5% by weight of a milk fat content and 2.1% by weight of solids not fat. (Sample 7)

[Example 6]

[0071]

A salt-free butter was produced while adding (incorporating) powder skimmed milk in the kneading during the kneading of a DF cream obtained in a similar manner to that of Example 5 in a butter producing machine, but in accordance with conventional methods with respect to the other parts of the production method (a DF-filtered skimmed condensed milk-incorporated product). The DF-filtered skimmed condensed milk-incorporated product had a composition of 80.8% by weight of a milk fat content and 5.0% by weight of solids not fat. (Sample 8)

[0072]

[Comparative Example 2 (Sample 5)]

A general cream (fat content: 45% by weight) was prepared from full-fat milk, and a salt-free butter was produced from this cream according to a conventional method

(a control product (salt-free)).

[0073]

[Test Example 4]

The butter obtained in Example 4 and the butter obtained in Comparative Example 2 were utilized in baked confectioneries such as financiers and cookies, and sensory evaluation was conducted on the baked confectioneries by specialized panels (24 persons). In the case when a baked confectionery is subjected to sensory evaluation, the baked confectionery corresponds to a state in which the butter has been heated at 180°C for 10 minutes. The results are shown in Table 7 (baked confectioneries). The summary of the results in this table are shown in Fig. 7 (baked confectioneries). In the cases when the butter obtained in Example 4 and the butter obtained in Comparative Example 2 were subjected to sensory evaluation as baked confectioneries, there were significant differences in the respective items of degree of dense taste and degree of butter flavor, and thus the butter obtained in Example 4 was highly evaluated. Furthermore, the butter obtained in Example 4 was highly evaluated also in the respective items of degree of milk flavor, general evaluation and degree of sweet fragrance, and thus it can be considered that the baked confectioneries had fine flavor. The reason is considered that the milk fragrance and milk sweetness of the butter strongly remained in the case when the butter obtained in Example 4 was used in the baked confectioneries.

[0074]

[Table 7]

Table 7. Sensory evaluation of butters (SMP) (baked confectioneries)

Conducted on February 25, 2011

	Degree of sweet fragrance	Degree of fragrant flavor	Degree of dense taste	Degree of butter flavor	Degree of milk flavor	General evaluation
Example 4 > Comparative example 2	12	9	15	17	12	14
Example 4 = Comparative example 2	7	7	5	5	6	4
Example 4 < Comparative example 2	5	8	4	2	6	6
Significant difference	-	-	*	**	-	-

	Degree of sweet fragrance	Degree of fragrant flavor	Degree of dense taste (*)	Degree of butter flavor (**)	Degree of milk flavor	General evaluation
Comparative example 2	0	0	0	0	0	0
Example 4	0.42	0.13	0.63	0.88	0.33	0.42

(*) : Significant difference with a significance rate of 5%

(**) : Significant difference with a significance rate of 1%

[0075]

[Test Example 5]

Sensory evaluation was also conducted by specialized panels (20 persons) on the butter obtained in Example 5 and the butter obtained in Comparative Example 2 in a similar manner to that of Test Example 1. The results are shown in Table 8 (for raw-eating). The summary of the results in this table are shown in Fig. 8 (for raw-eating). In the cases when the butter obtained in Example 5 and the butter obtained in Comparative Example 2 were subjected to sensory evaluation as butters for raw-eating, the butter obtained in Example 5 was highly evaluated in the respective items of degree of refreshment, degree of milk flavor and general evaluation, and thus it can be considered that the butter had fine flavor.

[0076]

[Table 8]

Table 8. Sensory evaluation of butters (DF) (for raw-eating)

Conducted on December 8, 2009

	Overall fragrance	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Example 5 > Comparative example 2	6	10	7	12	10
Example 5 = Comparative example 2	6	3	2	0	3
Example 5 < Comparative example 2	8	7	11	8	7
Significant difference	-	-	-	-	-

	Overall fragrance	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Comparative example 2	0	0	0	0	0
Example 5	-0.05	0.25	-0.20	0.25	0.25

(*) : Significant difference with a significance rate of 5%

[0077]

[Test Example 6]

Sensory evaluation was also conducted by specialized panels (22 persons) on the butter obtained in Example 6 and the butter obtained in Comparative Example 2 in a similar manner to that of Test Example 1. The results are shown in Table 9 (for raw-eating). The summary of the respective tables are shown in Fig. 9 (for raw-eating). In the cases when the butter obtained in Example 6 and the butter obtained in Comparative Example 2 were subjected to sensory evaluation as butters for raw-eating, there were significant differences in the item of overall fragrance, and thus the butter obtained in Example 6 was valued higher. Furthermore, the butter obtained in Example 6 was highly evaluated also in the respective items of degree of fragrant flavor, degree of fat taste, degree of milk flavor and general evaluation, and thus it can be considered that the butter had fine flavor.

[0078]

[Table 9]

Table 9. Sensory evaluation of butters (DF+SMC) (raw-eating)

Conducted on April 15, 2010

	Overall fragrance	Degree of fragrant flavor	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Example 6 > Comparative example 2	13	10	9	11	11	9
Example 6 = Comparative example 2	4	6	1	4	4	5
Example 6 < Comparative example 2	5	6	12	7	7	8
Significant difference	*	-	-	-	-	-

	Overall fragrance (*)	Degree of fragrant flavor	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Comparative example 2	0	0	0	0	0	0
Example 6	0.68	0.32	-0.18	0.23	0.27	0.23

(*) : Significant difference with a significance rate of 5%

[0079]

The butters of Example 4, Example 5 and Example 6 were overwhelmingly superior to the butter of Comparative Example 2 from the viewpoints of flavor and the like. On the other hand, the butters of Example 5 and Example 6 were significantly superior to the butter of Example 4 from the viewpoint of flavor.

[Example 7]

[0080]

A salt-free butter was produced while adding (incorporating) skimmed condensed milk in the kneading during the kneading of a general cream in a butter producing machine in a similar manner to that of Example 2, but in accordance with conventional methods with respect to the other parts of the production method (a skimmed condensed milk-incorporated product (salt-free)). The skimmed condensed milk-incorporated product (salt-free) had a composition of 82% by weight of a milk fat content and 3% by weight of solids not fat. (Sample 9)

[Example 8]

[0081]

A salt-free butter was produced while adding (incorporating) powder skimmed

milk in the kneading during the kneading of a general cream in a butter producing machine in a similar manner to that of Example 2, but in accordance with conventional methods with respect to the other parts of the production method (a powder skimmed milk-incorporated product (salt-free)). The powder skimmed milk-incorporated product (salt-free) had a composition of 82% by weight of a milk fat content and 7% by weight of solids not fat. (Sample 10)

[0082]

[Test Example 7]

Sensory evaluation was also conducted by specialized panels (21 persons) on the butter obtained in Example 7 and the butter obtained in Comparative Example 1 in a similar manner to that of Test Example 1. The results are shown in Table 10 (for raw-eating). The summary of the results in this table are shown in Fig. 10 (for raw-eating). In the cases when the butter obtained in Example 7 and the butter obtained in Comparative Example 1 were subjected to sensory evaluation as butters for raw-eating, there were significant differences in the item of degree of sweetness, and the butter obtained in Example 7 was valued higher. Furthermore, the butter obtained in Example 7 was highly evaluated also in the respective items of degree of richness, degree of milk flavor and general evaluation, and thus it can be considered that the butter had fine flavor.

[0083]

[Table 10]

Table 10. Sensory evaluation of butters (SMC) (raw-eating)

Conducted on February 4, 2011

	Sweetness derived from milk	Degree of richness	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Example 7 > Comparative example 1	12	11	9	9	11	12
Example 7 = Comparative example 1	5	2	2	4	4	4
Example 7 < Comparative example 1	4	8	10	8	6	5
Significant difference	*	-	-	-	-	-

	Sweetness derived from milk (*)	Degree of richness	Degree of refreshment	Degree of fat taste	Degree of milk flavor	General evaluation
Example 7	0	0	0	0	0	0
Comparative example 1	0.76	0.48	-0.14	0.00	0.52	0.62

(*) : Significant difference with a significance rate of 5%

(**) : Significant difference with a significance rate of 1%

[0084]

[Test Example 8]

Sensory evaluation was also conducted by specialized panels (27 persons) on the butter obtained in Example 8 and the butter obtained in Comparative Example 1 in a similar manner to that of Test Example 1. The results are shown in Table 11 (for raw-eating). The summary of the results in this table are shown in Fig. 11 (for raw-eating). In the cases when the butter obtained in Example 8 and the butter obtained in Comparative Example 1 were subjected to sensory evaluation as butters for raw-eating, there are significant differences in the respective items of degree of sweetness, degree of richness and degree of milk flavor and the butter obtained in Example 8 was valued higher, and thus it can be considered that the butter had fine flavor.

[0085]

[Table 11]

Table 11. Sensory evaluation of butters (SMP) (raw-eating)

Conducted on February 9, 2011

	Degree of sweetness derived from milk	Degree of milk flavor	Degree of richness	Degree of fat taste (greasiness)	Refreshment of aftertaste	General evaluation
Example 8 > Comparative example 1	23	21	18	12	8	13
Example 8 = Comparative example 1	3	3	4	4	1	4
Example 8 < Comparative example 1	1	3	5	11	18	10
Significant difference	**	**	**	-	-	-

	Degree of sweetness derived from milk (**)	Degree of milk flavor (**)	Degree of richness (**)	Degree of fat taste (greasiness)	Refreshment of aftertaste	General evaluation
Comparative example 1	0	0	0	0	0	0
Example 8	1.56	1.00	0.74	-0.04	-0.48	0.00

(*) : Significant difference with a significance rate of 5%

(**) : Significant difference with a significance rate of 1%

[0086]

[Test Example 9]

Burnt butters were prepared for the butter obtained in Example 3 (a NF-filtered skimmed condensed milk-incorporated product: a high SNF product) and the butter obtained in Comparative Example 1, and the aromatic odor components were analyzed and compared. In the preparation of the burnt butters, the butters were each heated at about 180°C for 2 minutes. The aromatic odor components were evaluated by the values of peak areas obtained by using the collection operation in the Dynamic Head Space Method and the analysis of GC/MS in combination.

[0087]

The protocol for the evaluation of the aromatic odor components was as follows.

- (1) A sample (weight: 0.2 g) is collected in a bial bottle (volume: 20 mL), and the bottle is tightly closed.
- (2) The bial bottle is warmed (180°C, 2 min).
- (3) The bial bottle is warmed (50°C, 5 min).

- (4) The bial bottle is heated (50°C) while the gas is substituted with nitrogen (flux: 40 mL/min, 20 minutes).
- (5) The "aromatic odor components" present in the gas substituted with the nitrogen gas are collected on an adsorbent (TENAX TA) in the state that the components are warmed (40°C).
- (6) The adsorbent (TENAX TA) is introduced in a GC/MS and heated (240°C) to thereby desorb the aromatic odor components.
- (7) A chromatogram is obtained by the analysis of the GC/MS (column: DB-WAX).
- (8) The mass spectra of the peaks in the chromatogram are compared with the NIST mass spectral library to thereby qualify the aromatic odor components.
- (9) The peak areas of the major fragment ions of the aromatic odor components are considered as detection amounts.

[0088]

The results are shown in Fig. 12 to Fig. 16. Fig. 12 is a graph as an alternative to a drawing, showing the result of the analysis of methylketones. The graph shows the amounts of 2-pentanone, 2-heptanone, 2-nonanone, 2-undecanone and 2-tridecanone from the left. Fig. 13 is a graph as an alternative to a drawing, showing the result of the analysis of fatty acids. The graph shows butanoic acid, hexanoic acid, octanoic acid, decanoic acid, dodecanonic acid and tetradodecanonic acid from the left. Fig. 14 is a graph as an alternative to a drawing, showing the result of the analysis of lactones. The graph shows δ -hexalactone, δ -octalactone, δ -decalactone, δ -dodecalactone, δ -tetradecalactone and γ -dodecalactone from the left. Fig. 15 is a graph as an alternative to a drawing, showing the result of the analysis of furans. The graph shows 2-furanmethanol, 2-furanmethanol-5-methyl, furfural, 5-hydroxymethyl 1-2 furfural (HMF), 2-furancarboxylic acid, hydrazide and maltol from the left. Fig. 16 is a graph as an alternative to a drawing, showing the results of the analyses of furans and ketones. The graph shows 1-hydroxy-2-propanone, 1-(2-furanyl)-ethanone,

DMHF (4-hydroxy-2,5-dimethyl 3(2H)-furanone; furaneol) and 3-hydroxy-2,3-dihydromaltol from the left. In the butter obtained in Example 3, maltol and furaneol were detected at higher concentrations than those in the butter obtained in Comparative Example 1. Maltol and furaneol are known as preferable aromatic odors that are fragrant like candies, and it can be considered that the flavor of the butter is fine when a burnt butter is prepared.

CLAIMS

1. A method for producing a butter containing 2% by weight or more and 10% by weight or less of solids not fat, comprising:
 - a filtering step of filtering raw material milk to obtain filtered condensed milk,
 - a centrifugation step of centrifuging the condensed milk to obtain a cream, and
 - a kneading step of kneading the cream to obtain the butter.
2. The method for producing a butter according to claim 1, wherein the raw material milk is full-fat condensed milk obtained by adding either or both of first skimmed condensed milk and first powder skimmed milk to raw milk.
3. The method for producing a butter according to claim 1, wherein the filtering is reverse osmosis filtering, nano filtering and/or dialysis filtering.
4. The method for producing a butter according to any of claims 1 to 3, wherein the kneading step is a step comprising
 - kneading a mixture which is obtained by mixing either or both of second skimmed condensed milk and second powder skimmed milk into the cream, or
 - adding either or both of the second skimmed condensed milk and second powder skimmed milk to the cream while kneading the cream.
5. A method for producing a butter containing 2% by weight or more and 10% by weight or less of solids not fat, comprising:
 - a step of obtaining full-fat condensed milk for obtaining full-fat condensed milk by adding either or both of first skimmed condensed milk and first powder skimmed milk to raw material milk or by freeze-concentrating the raw material milk,

a centrifugation step of centrifuging the full-fat condensed milk to obtain a cream, and

a kneading step of kneading the cream to obtain the butter.

6. The method for producing a butter according to claim 5, wherein the kneading step is a step comprising kneading a mixture which is obtained by mixing either or both of second skimmed condensed milk and second powder skimmed milk into the cream, or adding either or both of the second skimmed condensed milk and second powder skimmed milk to the cream while kneading the cream.

7. A method for producing a butter containing 2% by weight or more and 10% by weight or less of solids not fat, comprising a kneading step of kneading a cream to obtain a butter, wherein

the kneading step is a step comprising

kneading a mixture which is obtained by mixing either or both of skimmed condensed milk and powder skimmed milk into the cream, or

adding either or both of the skimmed condensed milk and powder skimmed milk to the cream while kneading the cream.

8. A butter obtained by the method for producing according to any of claims 1 to

7.

9. A butter comprising:

80% by weight or more and 93% by weight or less of a fat content,

5% by weight or more and 17% by weight or less of a water content, and

2% by weight or more and 10% by weight or less of solids not fat.