Prior Art Literature~~Citation List~~

List of Patent Literatures

[0010]

Patent Literature 1: JP S50-6745~~-A~~

Patent Literature 2: JP H03-292853~~-A~~

Patent Literature 3: JP H10-262550~~-A~~

Patent Literature 4: JP H10-99018~~-A~~

Patent Literature 5: JP H09-121763~~-A~~

Patent Literature 6: JP 2000-270844~~-A~~

Patent Literature 7: JP H04-287636~~-A~~

Patent Literature 8: JP 2003-259802~~-A~~

Non-Patent Literatures

[0011] [Non-Patent Literature 1] "Comprehensive Encyclopedia of Milk", Asakura Publishing Co., Ltd., pp. 246, published in 1992

Summary of the Invention

Problems to be Solved by the Invention

[0012] Therefore, an object of the present invention is to provide a method for producing liquid fermented milk which is for suppressing an increase in acidity and a decrease in pH over time during refrigerated storage, keeping a refreshing flavor (sour taste) originating from yogurt lactic acid bacteria (for example, a combination of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*) for a long time, and suppressing production of acids

and a coccus-shaped lactic acid bacteria as lactic acid bacteria to be added to a raw material for fermented milk, and includes a homogenization step of obtaining the liquid fermented milk at a homogenization pressure of from 50 MPa to 100 MPa. According to the present invention, it is possible to suppress changes in acidity and/or pH over time of liquid fermented milk of the present invention or a fermented dairy product containing the liquid fermented milk of the present invention.

[0016] The homogenization pressure is preferably 50 MPa to 90 MPa, more preferably 50 MPa to 85 MPa, still more preferably 60 MPa to 85 MPa, particularly preferably 70 MPa to 85 MPa.

[0017] Further, in the above-mentioned method, it is preferred that the rod-shaped lactic acid bacteria to be used include *Lactobacillus bulgaricus* and the coccus-shaped lactic acid bacteria to be used include *Streptococcus thermophilus*.

[0018] Further, the liquid fermented milk to be produced by the production method according the present invention may be used as a pre-fermentation type drinkable yogurt, a raw material (i.e. one of the components) for the pre-fermentation type drinkable yogurt, a viable cell type lactic acid bacteria beverage, a raw material (i.e. one of the components) for the viable cell type lactic acid bacteria beverage, or the like.

[0019] Further, when the liquid fermented milk produced by the production method according to the present invention is stored at a temperature of 10°C for 25 days from the end of fermentation,

a change in acidity in the ~~the~~ liquid fermented milk after the 25 days is preferably 0.25% or less, more preferably 0.23% or less, still more preferably 0.20% or less, particularly preferably 0.19% or less.

~~Advantageous~~ Effects of the Invention

[0020] According to the present invention, it is possible to suppress an increase in the acidity and a decrease in the pH over time during refrigerated storage without heating or using various additives for suppressing production of an acid during the storage after the end of fermentation, to keep a refreshing flavor originating from yogurt lactic acid bacteria and the number of lactic acid bacteria necessary for yogurt for a long time, and to suppress a change in the flavor during distribution or storage after production more effectively than ever before. Therefore, it becomes possible to produce liquid fermented milk having suppressed sour taste and to extend the expiration date of the liquid fermented milk. In addition, it is possible to suppress an increase in the sour taste over time, and hence the amount of an additive such as a sweetener used heretofore for suppressing the increase in the sour taste can be reduced. Therefore, it is possible to provide liquid fermented milk having original mellow and refreshing flavor and moderate sour taste. Further, the reduction in the amount of the sweetener can be expected to provide an effect of dieting.

[0021] In addition, the present invention can be carried out

only by setting the homogenization pressure to the value specified by the present invention in the homogenization step in a general production line of liquid fermented milk, or only by adopting a homogenizer corresponding to the pressure range specified by the present invention. Therefore, a complicated production step is not required, and economical effects (i.e. effects of reducing production cost) of the method are large.

Embodiment ofs ~~for Carrying Out~~ the Invention

[0022] Hereinafter, the present invention is described in detail. However, the present invention is not limited to individual embodiments described below.

[0023] The term of "raw material for fermented milk" as used herein refers to a liquid containing a milk constituent such as raw milk, whole milk, skim milk, or whey. In this case, the raw milk is, for example, animal milk such as cow's milk. In addition to whole milk, skim milk, whey or the like, the raw material for fermented milk may contain a processed product thereof (e.g. whole milk powder, condensed whole milk, skim milk powder, condensed skim milk, condensed milk, whey powder, cream, butter, or cheese). It should be noted that the raw material for fermented milk is one generally called yogurt mix or the like, and may contain, in addition to the milk constituent, for example, a food or a food ingredient and a food additive such as sugar, a saccharide, a sweetener, a flavoring agent, fruit juice, pulp, a vitamin, or a mineral. Further,

the raw material for fermented milk may contain a stabilizer such as pectin, a soybean polysaccharide, carboxymethylcellulose (CMC), agar, or gelatin as necessary.

[0024] Herein, the "fermented milk" is, for example, post-fermentation type yogurt such as set type yogurt or plain yogurt. Examples of the "fermented dairy product" and "final product" include liquid fermented milk and a lactic acid bacteria beverage, such as a drinkable yogurt prepared by mixing an auxiliary raw material such as a sugar solution in fermented milk. Here, examples of the auxiliary raw material include the foods, food ingredients, food additives, and stabilizers listed above as examples of the raw material for the fermented milk.

[0025] A lactic acid bacterium (i.e. starter) to be added to and mixed (i.e. inoculated) in the raw material for fermented milk is, for example, one kind or two or more kinds of bacteria selected from: lactic acid bacilli (i.e. rod-shaped lactic acid bacteria) such as *Lactobacillus bulgaricus* and *Lactobacillus lactis*; lactic acid cocci (i.e. coccus-shaped lactic acid bacteria) such as *Streptococcus thermophilus*; other lactic acid bacteria and yeast generally used for production of fermented milk; and the like.

Preferred lactic acid bacteria to be used in the present invention are a combination of *Lactobacillus bulgaricus* as the rod-shaped lactic acid bacteria and *Streptococcus thermophilus* as the coccus-shaped lactic acid bacteria.

The combination of *Lactobacillus bulgaricus* and *Streptococcus*

thermophilus is desirable because the combination imparts unique mellow and refreshing flavor to yogurt, resulting in high palatability, and the combination of the bacteria is accepted as the bacteria for a yogurt by the international standard. In the present invention, use of at least *Lactobacillus bulgaricus* as the rod-shaped lactic acid bacteria and at least *Streptococcus thermophilus* as the coccus-shaped lactic acid bacteria is desirable from the viewpoint of exerting the effect of the present invention sufficiently. It should be noted that, in the present invention, it is not necessary to use mutants having specific properties as the rod-shaped lactic acid bacteria and coccus-shaped lactic acid bacteria, and general bacterial strains may be used.

[0026] A preferred example of the fermented dairy product containing the liquid fermented milk of the present invention is a pre-fermentation type drinkable yogurt. In general, the change in the sensuous sour taste (i.e. flavor) caused by an increase in the acidity and a decrease in the pH during refrigerated storage is the largest in a liquid drinkable yogurt (pre-fermentation type) among various forms of the fermented milk. In addition, there are yogurt-based beverages containing lactic acid bacteria (i.e. viable cells of the bacteria) such as lactic acid bacteria beverages as forms similar to the drinkable yogurt, although the lactic acid bacteria beverages are not included in the definition of the fermented milk in Japan. Also in such yogurt-based beverages, the effect of the present invention can be expected. Therefore, the "liquid

the method for producing liquid fermented milk according to the present invention as long as the apparatus has a similar effect.

[0034] In the method for producing liquid fermented milk according to the present invention, any production step known for liquid fermented milk such as a drinkable yogurt or a lactic acid bacteria beverage may be applied except that the fermented milk is liquefied at the predetermined homogenization pressure, and a special step is not required except for the condition of the homogenization pressure.

[0035] When the liquid fermented milk of the present invention is stored at a temperature of 10°C for 25 days after the end of fermentation, the change (i.e. the difference of increase) in the acidity after the 25 days is preferably 0.25% or less, more preferably 0.23% or less, still more preferably 0.20% or less, particularly preferably 0.19% or less.

The lower limit of the change (i.e. the difference of increase) in the acidity is not particularly limited, and is 0.10%, for example.

In the case where the liquid fermented milk of the present invention is stored at a temperature of 10°C for 25 days after the end of fermentation, the acidity after the 25 days is preferably 1.00% or less, more preferably 0.99% or less, still more preferably 0.98% or less, particularly preferably 0.95% or less.

The lower limit of the acidity is not particularly limited, and is 0.80%, for example.

[0036] When the liquid fermented milk of the present invention

to enhance the sweet taste, thereby controlling a balance between the sour taste and the sweet taste so as to improve palatability. In this regard, in the present invention, for example, when the change in the acidity and the change in the pH over time fall within the above-mentioned ranges, it is possible to sufficiently suppress the increase in the sour taste originating from the liquid fermented milk over time and to decrease the amount of an additive such as the sweetener used heretofore. Therefore, the liquid fermented milk of the present invention has a refreshing sour taste while maintaining original mellow and refreshing flavor. In addition, the liquid fermented milk of the present invention does not require an excessive amount of the sweetener, and hence can contribute to the effect of dieting.

Examples

[0040] Hereinafter, the present invention is described in more detail by way of Examples. However, the present invention is not limited thereto.

A raw material (i.e. yogurt mix) for fermented milk was prepared by mixing 723 g of skim milk powder and 4,177 g of tap water. The resultant raw material for fermented milk was subjected to heat sterilization at 95°C for 10 minutes and then cooled to 45°C. Next, 100 g of a mixed starter of *Lactobacillus bulgaricus* and *Streptococcus thermophilus* each isolated from "Meiji Bulgaria Yogurt" was inoculated in the cooled raw material for fermented

Claims

1. A method for producing liquid fermented milk, which uses a rod-shaped lactic acid bacteria and a coccus-shaped lactic acid bacteria as lactic acid bacteria to be added to a raw material for fermented milk, wherein the method comprises a homogenization step of obtaining the liquid fermented milk at a homogenization pressure of from 50 MPa to 100 MPa.

2. A method for producing liquid fermented milk according to claim 1, wherein the homogenization pressure is from 50 MPa to 85 MPa.

3. A method for producing liquid fermented milk according to claim 1 or 2, wherein the rod-shaped lactic acid bacteria comprise *Lactobacillus bulgaricus* and the coccus-shaped lactic acid bacteria comprise *Streptococcus thermophilus*.

4. A method for producing liquid fermented milk according to any one of claims 1 to 3, wherein the liquid fermented milk is a pre-fermentation type drinkable yogurt, a raw material for a pre-fermentation type drinkable yogurt, a viable cell type lactic acid bacteria beverage, or a raw material for a viable cell type lactic acid bacteria beverage.

5. A method for producing liquid fermented milk according to any one of claims 1 to 4, wherein when the liquid fermented milk is stored at a temperature of 10°C for 25 days from the~~an~~ end of fermentation, a change in acidity in the liquid fermented milk after the 25 days is 0.25% or less.

6. A liquid fermented milk, which is produced by the method for producing liquid fermented milk according to any one of claims 1 to 5.