materials can be dissolved.

[0033]

(Sterilization Step)

The method for producing a condensed milk-like composition of the present invention includes a step of sterilizing a condensed milk-like mix to obtain a condensed milk-like composition. In the present specification, the term “sterilization” means reducing or completely killing microorganisms present in the condensed milk-like mix by heating or the like. In an emulsifying machine, mixed powder raw materials, vegetable oils and fats, sugar alcohols, water, and the like can be put, and preliminary mixing and emulsification can be performed. It is preferable to perform preliminary mixing and emulsification under a temperature condition of 50°C to 60°C before sterilization.

The preliminarily mixed and emulsified mix may be sterilized at 85°C to 95°C for 90 seconds to 150 seconds. A sterilization treatment can be performed by a plate type heat exchanger, a tube type heat exchanger, a steam injection type sterilizer, a steam infusion type sterilizer, an electric heating type sterilizer, or the like after mixing and emulsification. Retort sterilization can also be performed after filling. The sterilization method, the sterilization time, and the sterilization temperature are examples, and those skilled in the art can appropriately adjust the sterilization method, the sterilization time, and the sterilization temperature in consideration of the formulation of the condensed milk-like composition, the container, and the like. After sterilization, the mixture is cooled to obtain a condensed milk-like composition.

[0034]

(Seeding Step)

In the present specification, the seeding step is a treatment in which lactose serving as a nucleus is externally added to precipitate fine lactose crystals in advance so that coarse crystals are not formed during storage or during distribution. The sheeting step can be performed by adding the crushed lactose to the condensed milk-like composition at a predetermined temperature and cooling the mixture to a lactose precipitation temperature (20°C to 35°C).

[0035]

By using the concentrated milk protein powder in combination and adjusting the concentration of lactose, it is possible to eliminate the need for the seeding step. In addition, by using concentrated milk protein powder, which is a powder raw material, instead of a

liquid milk raw material, the concentration step can be reduced. In addition, the use of the concentrated milk protein powder can simplify the steps. The concentrated milk protein powder is relatively inexpensive, easily procured, and can be stored at room temperature.

[0036]

Although the solubility of lactose has temperature dependency, crystallization is promoted when the solubility is exceeded, and the formation of coarse crystals is caused when the treatment is not performed. When coarse crystals are formed, a feeling of roughness is generated in a tongue when ingested, and the texture is extremely deteriorated.

The method for producing a condensed milk-like composition of the present invention may include the seeding step, but preferably does not include the seeding step from the viewpoint of simplifying the production step.

[0037]

(Liquid Milk)

In the present specification, the term “liquid milk” refers to a milk raw material to be added to the condensed milk-like composition in a liquid state, and examples thereof includes milk, skim milk, and concentrated milk.

Liquid milk is relatively expensive due to restrictions on the source. In addition, refrigeration facilities are required for receiving and storing, and the investment and transportation of facilities are very costly. In addition, since a large amount of water is contained, the concentration step may be indispensable.

The method for producing a condensed milk-like composition of the present invention may include a step of adding liquid milk to dissolving water, but preferably does not include the step of adding liquid milk to dissolving water from the viewpoint of cost reduction and process simplification.

[0038]

(Condensed Milk)

The product produced by the production method of the present invention contains the concentrated milk protein powder, the milk powder, and the like as a raw material. Therefore, the product produced by the production method of the present invention is a “condensed milk-like composition” that does not correspond to the condensed milk on Japanese Ministerial Ordinance on Milk and the like, but has the same flavor, appearance, and physical properties as that of the condensed milk.

The method for producing a condensed milk-like composition of the present

invention may include a step of adding condensed milk, but preferably does not include the step of adding condensed milk from the viewpoint of cost reduction and process simplification.

A general process for producing sweetened condensed milk is complicated and has a very large number of steps, and it is necessary to install a large-scale production line. In addition, the producing cost tends to increase due to the reason described above. Therefore, a production method in which the process is further simplified is required.

[0039]

The method for producing a condensed milk-like composition of the present invention can be provided by filling a usual packaging container such as a metal can, a paper container combined with a metal foil or a plastic film, a pouch such as an aluminum pouch, a plastic container, a vinyl container, or a glass bottle, and a volume thereof is not particularly limited.

[0040]

Examples of the production facility used in the method for producing a condensed milk-like composition of the present invention include an emulsifying machine having a heating function and a stirring function.

[0041]

Hereinafter, the present invention is specifically described with reference to examples, but these examples do not limit the scope of the present invention. In the present specification, “%” refers to wt% unless otherwise specified.

[Example]

[0042]

Example 1 (Simple Production Method)

420 g of skim milk powder, 158 g of milk protein concentrate (MPC), 385 g of sucrose, 595 g of dextrin, 350 g of trehalose, and 8 g of emulsifiers (sucrose stearate and succinic acid fatty acid monoglyceride) were mixed in a powder state to obtain a powder raw material. The powder raw material, 140 g of rapeseed salad oil, 280 g of glycerin, and 760 g of water were put into an emulsifying machine, heated by steam injection, and dissolved for 10 minutes after reaching 60°C. After the dissolution, a flavor was added, and the mixture was further subjected to a heat treatment by steam injection, followed by sterilization at 88°C to 95°C for 120 seconds to obtain a sweetened condensed milk-like composition. A total amount of added water was adjusted to 1150 g to 1200 g, and the number of revolutions of the

[0052]

[Table 3]

Ratio [%] of protein derived from each raw material

	Example 1	Example 2	Example 3	Comparative Example 1 (method of related art)	Comparative Example 2	Comparative Example 3	Comparative Example 4
Derived from skim milk powder	54.2	72.7	54.4	100	100	100	83.7
Derived from MPC or derived from WPC	45.8	27.3	45.6	0	0	0	16.3
Total	100	100	100	100	100	100	100

[0053]

[Table 4]

Concentration [%] of lactose in water

	Example 1	Example 2	Example 3	Comparative Example 1 (method of related art)	Comparative Example 2	Comparative Example 3	Comparative Example 4
Derived from skim milk powder + (derived from MPC or derived from WPC)	14.8	14.8	14.8	26.1	29.0	23.7	21.1

[0054]

[Table 5]

Evaluation results of each example and comparative example

		Example 1	Example 2	Example 3	Comparative Example 1 (method of related art)	Comparative Example 2	Comparative Example 3	Comparative Example 4
Flavor		A	B	B	A	B	A	A
Color luster		A	B	A	A	A	A	A
Viscosity (mPa·s)		950	670	1400	970	19900	580	580
Texture with or without coarse lactose	Room temperature	A	A	A	-	C	C	A
	Refrigeration	A	A	A	-	C	C	C

crystals								

A: Same level as sugar condensed milk; B: Acceptable, but inferior to sugar condensed milk; C: Clearly inferior to sugar condensed milk.

The viscosity shown in the table is the maximum value at 20°C when a shear rate is $0s^{-1} \rightarrow (2min) \rightarrow 200s^{-1} \rightarrow (2min) \rightarrow 0s^{-1}$ using HAAKE VT550 (manufactured by HAAKE) and a rotor VIISt.

[0055]

Although the present invention has been described in detail with reference to specific examples, it is apparent to those skilled in the art that it is possible to add various alterations and modifications without departing from the spirit and the scope of the present invention.

The present application is based on Japanese Patent Application (No. 2019-165012) filed on September 11, 2019, the entirety of which is incorporated by reference. In addition, all references cited here are entirely incorporated.

INDUSTRIAL APPLICABILITY

[0056]

It is possible to provide a low-calorie, refreshing condensed milk-like composition with the same flavor, viscosity characteristics, and storability as that of sweetened condensed milk of related art using a simple production method.