

**Description****[Title of Invention]**

Method for manufacturing gelatinous food product

**[Technical Field]**

5 [0001]

1. The present invention relates to a method for manufacturing gelatinous food products, which enables effective sterilization.

**[Background Art]**

10 [0002]

When a gelatinous food product such as custard pudding is manufactured, raw materials such as dairy products, raw material water and a gelling agent, etc. are mixed, homogenized by heating, to prepare a mix. Then the mix is sterilized, filled into a container and cooled, so that the mix is gelatinized by the reaction of the gelling agent and thickener.

[0003]

Sterilization of the mix is generally performed by heat treatment at high temperature, and bacteria such as Salmonella and E. coli which are problematic in terms of food sanitation can be killed by such heat treatment. However, unwanted microorganisms that may affect quality of products (e.g., highly heat-resistant spore-forming bacteria) are likely to remain, and therefore complete sterilization has been difficult.

[0004]

In recent years, custard pudding is sometimes manufactured using a raw material containing a large amount of bacteria that may not be completely sterilized by a sterilization process of general heat treatment, and in such manufacturing process of custard pudding, a method to suppress proliferation of highly heat-resistant bacteria has been investigated. For example, a method for manufacturing

vegetable pudding wherein soil bacteria are heat-sterilized using a direct heating type sterilizer equipped with a vacuum chamber (Patent literature 1), a method for manufacturing cocoa pudding wherein the bactericidal property or bacteriostatic property of spore-forming bacteria in the cocoa powder is enhanced by employing a specific emulsifier (Patent literature 2), a method for manufacturing chocolate pudding wherein the bactericidal property or bacteriostatic property of spore-forming bacteria in the chocolate is enhanced by employing a specific emulsifier (Patent literature 3) have been studied. However, any of these methods requires a special device or addition of an emulsifier that affects the flavor of final products, so that the methods are not good enough for manufacturing gelatinous food products.

#### [Citation List]

##### Patent Literature

[0005]

Patent literature 1: JP A 2004-166607

Patent literature 2: JP A 2010-075158

Patent literature 3: JP A 2010-075159

#### [Summary of Invention]

##### Problems to Be Solved by Invention

[0006]

The inventors of the present invention have confronted the following problem in manufacturing gelatinous food products: even though a general manufacturing process uses raw materials containing only a few unwanted microorganisms, the quality of products is not homogeneous due to proliferation of spore-forming bacteria, etc.; for example, in commercial scale (large scale) manufacturing of gelatinous food products, during a step of filling a heat-sterilized mix (preparation liquid) into containers, since an operation of filling the mix from a large-volume tank into containers is carried out

continuously, the mix should be maintained at a high temperature for a long period of time at which gelatinization and thickening do not occur; but during such period, spore-forming bacteria can proliferate, resulting in the deterioration of the quality of the products.

[0007]

Accordingly, the problem to be solved by the present invention is to solve the above new problem and to provide a method that enables suppression of the proliferation of unwanted microorganisms in a reasonable manner during a process of manufacturing gelatinous food products.

#### Means of Solving Problems

[0008]

The present inventors have devoted themselves to solve the above problem; the inventors have focused on the relationship between the water activity of a mix and the proliferation of unwanted microorganisms during constant-temperature step wherein the mix is maintained at a high temperature for a long period of time at which gelatinization and thickening do not occur inside a tank during manufacture of gelatinous food products, and found that the proliferation of unwanted microorganisms can be suppressed by controlling the water activity of the mix to a predetermined value during such constant-temperature step; and the inventors further promoted the research and accomplished the present invention.

[0009]

Namely, the present invention relates to the following method of manufacturing gelatinous food products.

[1] A method for manufacturing a gelatinous food product comprising:

- (1) a preparation step wherein a mix is prepared,
- (2) following said preparation step, a step of heat

sterilization wherein the mix is heat sterilized,  
(3) following said heat sterilization step, a  
constant-temperature step wherein the mix is maintained  
at a temperature lower than the sterilization temperature  
5 and higher than the solidifying temperature,  
wherein the method comprises adjusting the water activity of  
the mix in said constant-temperature step.

[0010]

[2] The method according to [1], wherein the adjustment of  
10 the water activity is performed by preparing the mix in the  
preparation step.

[3] The method according to [1] or [2], wherein the water  
activity of the mix in the constant-temperature step is  
adjusted to 0.90-0.98.

15 [0011]

[4] The method according to any one of [1] to [3] comprising  
the heat sterilization step performed at a temperature of 95°C  
or higher, prior to the constant-temperature step.

[5] The method according to any one of [1] to [4], wherein  
20 the temperature of the constant-temperature step is 40-65°C.

[0012]

[6] The method according to any one of [1] to [5], wherein  
the mix comprises mizuame, and the adjustment of the water  
activity of the mix is performed by adjusting the content of  
25 the mizuame.

[7] The method according to [6], wherein the mix comprises  
the mizuame at 3-10 wt%.

[8] The method according to [6] or [7], wherein the weight  
ratio of the mizuame to the raw material water in the mix is  
30 0.035:1-0.15:1.

[0013]

[9] The method according to any one of [1] to [5], wherein  
the mix comprises sugar, and the adjustment of the water

activity of the mix is performed by adjusting the content of the sugar.

[10] The method according to [9], wherein the mix comprises the sugar at 8-15 wt%.

5 [11] The method according to [9] or [10], wherein the weight ratio of the sugar to the raw material water in the mix is 0.1:1-0.25:1.

[0014]

10 [12] The method according to any one of [1] to [11], wherein the gelatinous food product is a kind of sweets with high water content.

[13] The method according to any one of [1] to [12], wherein the gelatinous food product comprises a raw material derived from egg and/or a raw material derived from milk.

15 [14] The method according to [13], wherein the gelatinous food product is custard pudding or milk pudding.

[0015]

20 [15] The method according to any one of [1] to [14], wherein the proliferation of a microorganism during the constant-temperature step is suppressed by adjusting the water activity of the mix.

[16] The method according to [15], wherein the microorganism is a *Bacillus* bacterium.

#### **Advantageous Effects of Invention**

25 [0016]

According to the present invention, in a method of manufacturing a gelatinous food product such as custard pudding, it is possible to suppress proliferation of unwanted microorganisms, in particular spore-forming bacteria that are resistant to high-temperature conditions, during the stage of manufacture without deteriorating the flavor of raw materials, by means of adjusting water activity. Namely, by controlling the water activity during the middle stage of manufacturing

30

food products, which has not at all been investigated conventionally, it becomes possible to suppress proliferation of bacteria such as spore-forming bacteria, and therefore, there is no need to control the water activity in the stage of final products. In order to decrease the water activity in the stage of final products to a level that suppresses proliferation of bacteria, flavor and texture of the final products are likely to be sacrificed; however, according to the present invention, deterioration of flavor and quality can be prevented or suppressed by controlling bacterial proliferation during the middle stage of manufacturing food products while retaining the freedom of making the water activity of final products at a desired value from the viewpoint of flavor and texture. Moreover, in the present invention, no special equipment is necessary.

[0017]

In addition, when a fairly long time of constant-temperature step is required, for example when a mix is filled from a large-volume tank into containers or when preparation of containers requires a long period of time, then, maintaining an already-sterilized mix at a high temperature (for example, 75-95°C) may accelerate deterioration of flavor; in contrast, maintaining a mix at a low temperature (for example, 5-10°C) may induce gelatinization (solidification) or thickening because the mix comprises a gelling agent or a thickener, so that re-heating is necessary to fill the mix into containers, which may also cause deterioration of the flavor. According to the present invention, gelatinous food products such as custard pudding can be continuously manufactured without causing such problems of sterilization and flavor deterioration. Furthermore, when an emulsifier is used (for example, Patent literatures 2 and 3), the emulsifier must be added at a concentration that suppresses proliferation of

heat-resistant bacteria, resulting in an influence on the flavor of final products; however, according to the present invention, final products can be made to have a desired flavor without requiring such emulsifier.

5    **[Embodiments for Carrying out Invention]**

[0018]

          The method for manufacturing gelatinous food products of the present invention is characterized in that the water activity during a constant-temperature step is adjusted in  
10    conventional manufacturing steps of gelatinous food products. Namely, a mix is prepared in accordance with a conventional method, then the mix is heat-sterilized, the temperature is decreased if necessary, then the mix is filled in a container and cooled to cause gelatinization or thickening, thereby  
15    manufacturing a gelatinous food product; during the period between the heat sterilization and filling into containers, a constant-temperature condition is maintained wherein the temperature is decreased to a value lower than the sterilization temperature and higher than the solidifying  
20    temperature; during which the mix is stored in a surge tank, etc., and the water activity of the mix during the storage is adjusted in this step (constant-temperature step) of preparing for the operation of filling into containers.

          Here, this operation of adjusting the water activity of  
25    the mix may be performed in any steps (stages) including preparation step, heat-sterilization step, and constant-temperature step.

          The constant-temperature step may take a long time depending on the size (volume) of a tank actually used and timing  
30    (required time) for the preparation of containers into which the product is to be filled; the level of necessity to adjust the water activity increases when the time period of this step is approximately 2-24 hours, and 3-18 hours, in particular 4-15

hours in relation to spore-forming bacteria.

[0019]

In the present invention, the term "gelatinous food product" refers to a food product gelatinized or solidified by the action of a gelling agent, and the examples include sweets with high water content such as custard pudding, mousse, Bavarian cream, jelly, almond jelly, and sweet bean jelly, etc., as well as tofu and konnyaku. Here, sweets with high water content have been defined in the norm of sanitation of Western-style sweets and Japanese-style sweets that "those which comprises 40% or more of water content immediately after their completion (here, when bean jam, cream, jam, agar or similar materials are used, those which comprises 30% or more of water content immediately after their completion are included);" and the gelatinous food product claimed in the present invention includes these sweets.

[0020]

In the present invention, a "mix" refers to a mixture of raw materials. Raw materials actually used are not particularly limited as long as they are generally used in food products, and for example, dairy products, eggs, sugars and raw material water may be used as main raw materials.

In the present invention, "preparation step" refers to a step of preparing (blending) a mix by selecting and adjusting kinds of raw materials and amounts of formulation.

[0021]

In the present invention, the water activity is preferably 0.98 or less, from the viewpoint of suppression of bacterial proliferation. In addition, from the viewpoint of maintaining the texture of gelatinous food products, it is desirable that the water activity is 0.90 or more, preferably 0.95 or more, more preferably 0.97 or more. Adjustment of water activity during a constant-temperature step may be carried out

appropriately; for example, the water activity of a mix may be adjusted in a preparation step of a mix, and for example, the water activity of a mix in a constant-temperature step can be adjusted by adjusting kinds of raw materials and amounts of formulation and an amount of water in the mix.

[0022]

Furthermore, the water activity of a mix may be adjusted during a constant-temperature step. For example, the water activity of a mix in a constant-temperature step can be adjusted after heat-sterilization by adjusting the amount of water in the mix by dilution or concentration with water, or by adding the same kinds or different kinds of raw materials that have been subjected to sterilization.

[0023]

Dairy products are not particularly limited as long as they are generally employed in food products, such as milk, whole concentrated milk, whole dry milk, non-fat milk, concentrated non-fat milk, non-fat dry milk, butter, cheese, cream, unsweetened condensed milk, sweetened condensed milk, butter oil, butter milk, butter milk powder, whey, whey powder, milk protein concentrate (MPC), whey protein concentrate (WPC), whey protein isolate (WPI), etc.; these may be used alone, or used in combination of two or more kinds. The amount of addition of a dairy product is determined with consideration given to water activity of a mix during constant-temperature step as well as desirable flavor, texture, physical properties and quality, etc. of an actually-manufactured gelatinous food product.

[0024]

As the eggs, egg yolk or egg white alone may be used, and whole egg may also be used. For example, raw materials processed into liquid egg or powdered form may also be used. The amount of addition of eggs is determined with consideration

given to water activity of a mix during constant-temperature step as well as desirable flavor, texture, physical properties and quality, etc. of an actually-manufactured gelatinous food product.

5 [0025]

Sugars are not particularly limited, as long as they are generally used for manufacturing food products, such as sugar (sucrose), honey, maple syrup, mizuame (starch syrup), liquid sugar, glucose, hydrated crystalline glucose, fructose, 10 sorbitol, xylitol, palatinose, etc.; and they may be used alone, or used in combination of two or more kinds. From the viewpoint of decreasing water activity, the use of glucose and/or mizuame is preferred, and the use of mizuame is more preferred because it can provide an appropriate degree of sweetness in addition 15 to the reduction of water activity.

[0026]

The amount of addition of sugar is determined with consideration given to desirable sweetness in an actually-manufactured gelatinous food product and an effect 20 on the water activity of a mix. For example, when mizuame is used, its amount of addition relative to the total amount of the mix is 3-10 wt%, preferably 3-8 wt%, and more preferably 4-6 wt%. Here, co-use of mizuame with liquid sugar is desirable, and when liquid sugar is used, its amount of addition relative 25 to the total amount of the mix is 9-18 wt%, preferably 10-15 wt%, and more preferably 11-13 wt%. Similar to mizuame, when sugar is used for example, its amount of addition relative to the total amount of the mix is 8-15 wt%, preferably 9-13 wt%, and more preferably 10-11 wt%.

30 [0027]

In addition, from the viewpoint of flavor and texture of actually-manufactured gelatinous food products, the concentration of raw material water in a mix relative to the

total amount of the mix is 20-35 wt%; when the gelatinous food product is custard pudding comprising an egg-derived raw material, it is preferably 23-33 wt%, and more preferably 25-31 wt%; when the gelatinous food product is milk pudding or chocolate pudding that does not comprise an egg-derived raw material, it is preferably 20-30 wt%, and more preferably 21-25 wt%. The weight ratio of miuazme to raw material water in the mix is 0.035:1-0.15:1, preferably 0.04:1-0.1:1, more preferably 0.05:1-0.8:1. Meanwhile, the weight ratio of sugar to raw material water in the mix is 0.1:1-0.25:1, preferably 0.1:1-0.2:1, more preferably 0.1:1-0.15:1.

[0028]

As other raw materials, any components that can be used in food products may be comprised; for example, flavors, seasoning agents, emulsifiers, thickeners, stabilizers, and coloring agents may be used. Application of the present invention is effective for gelatinous food products using raw materials in which heat-resistant bacteria are mixed. Meanwhile, the use of the present invention is suitable for custard pudding and milk pudding in which the ratio of eggs and dairy products in a mix is high.

[0029]

In the present invention, "heat sterilization temperature" means a temperature that is sufficient to kill general bacteria other than heat-resistant bacteria, and the temperature differs depending on sterilization method. From the viewpoint of maintenance of flavor and effect of sterilization, continuous sterilization method is often used, in which a sterilization temperature of 120°C or more to 150°C or less is preferable, 125°C or more to 145°C or less is more preferable, and 130°C or more to 140°C or less is still more preferable. Here, as duration of sterilization 1 second or more to 5 seconds or less is preferable, 1 second or more to

4 seconds or less is more preferable, and 1 second or more to 3 seconds or less is still more preferable. Here, batch-type sterilization method may be used, in which a sterilization temperature of 90°C or more to less than 100°C is preferable, 5 93°C or more to 97°C or less is more preferable, and approximately 95°C is still more preferable. Here, as duration of sterilization, 1 minute or more to 10 minutes or less is preferable, 2 minutes or more to 7 minutes or less is preferable, and approximately 5 minutes is still more preferable.

10 In the present invention, sterilization processing method is not particularly limited, and examples include low-temperature long-time sterilization method (LTLT method: 61.7°C-65°C, 30 minutes or more), high-temperature short-time sterilization method (HTST method: 72°C-75°C, 15 seconds or 15 more), ultrahigh-temperature sterilization method (UHT method: 120°C-150°C, 1 second or more to 5 seconds or less); from the viewpoint of maintenance of flavor and sterilization effect, UFT method is preferred.

[0030]

20 In the present invention, "unwanted microorganisms" refer to microorganisms that are unintentionally mixed from raw materials, such as filamentous fungi, yeasts and bacteria, and in particular microorganisms present in the mix during constant-temperature step. Of such microorganisms, those 25 which are particularly problematic include bacteria that are not possibly killed by sterilization process, including spore-forming bacteria, and more specifically, Bacillus bacteria, etc.

In the present invention, "solidifying temperature" 30 means a temperature at which a mix is gelled (solidified) or thickened by the action of a gelling agent or thickener, which differs depending on the kind of gelling agent and thickener as well as mixture ratio; typically it is approximately 0°C to

25°C.

[0031]

In the present invention, gelling agents and thickeners are not particularly limited, as long as they dissolve in a mix and are gelled or solidified by cooling; examples include  
5 agar, gelatin, gellan gum, xanthan gum, locust bean gum, guar gum, pectin, tamarind gum, Carob bean gum, carrageenan, carboxymethyl cellulose (CMC), etc.

Here, when the gelatinous food product is custard pudding  
10 comprising an egg-derived raw material, because a smooth texture is generally preferred, it is preferable to co-use carrageenan and locust bean gum; when the gelatinous food product is milk pudding or chocolate pudding not-comprising an egg-derived raw material, because a light and sharp texture  
15 is generally preferred, it is preferable to co-use agar and gelatin.

The kind of a gelling agent and its amount of addition are determined with consideration given to desirable texture of an actually-manufactured gelatinous food product as well  
20 as characteristics of each gelling agent; for example, relative to the total weight of a gelatinous food product, it is 0.2-1 wt%, preferably 0.3-0.9 wt%, and more preferably 0.4-0.8 wt%.  
[0032]

In the present invention, "constant-temperature step"  
25 means a step of holding a mix at a constant temperature, or at a variable temperature within an acceptable range for manufacture. Such a temperature is lower than a sterilization temperature and higher than a solidifying temperature. The temperature of a constant-temperature step depends on the  
30 sterilization temperature actually applied and the solidifying temperature at which gelling occurs; from the viewpoint of prevention of thickening of a mix (increase in viscosity) and prevention of deterioration of flavor, etc., it is 40-65°C,

preferably 45-60°C, and more preferably 50-55°C. In addition, duration of a constant-temperature step is a time period required for the entire amount of the mix in a tank to be filled into containers, and it can be varied depending on the size of the tank and the time required for preparation of containers; it is typically 1 to 6 hours. When the duration of a constant-temperature step is 2 hours or longer, 3 hours or longer, and in particular, 4 hours or longer, then there is a possibility that the quality of products significantly deteriorates due to proliferation of spore-forming bacteria, etc.

[0033]

Hereinafter, the present invention is further described based on examples; however, such examples are for illustrative purposes, and they do not intend to limit the present invention.

[Examples]

[0034]

In accordance with the composition (weight ratio) listed in Table 1, a mix was prepared by mixing nonfat dry milk (Meiji Dairies Corporation), cream (Meiji Dairies Corporation), mizuame (composition: 8 wt% glucose, 48 wt% maltose, 16 wt% maltotriose, and 28 wt% other carbohydrates) (Meiji Food Materia Co., Ltd.) and raw material water.

[0035]

[Table 1]

Table 1: Composition of mix

|                          | Comparative<br>Example 1 | Comparative<br>Example 2 | Comparative<br>Example 3 | Example<br>1 | Example<br>2 |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------|--------------|
| Nonfat<br>dry milk       | 7.0                      | 7.0                      | 7.0                      | 7.0          | 7.0          |
| Cream                    | 6.5                      | 6.5                      | 6.5                      | 6.5          | 6.5          |
| Mizuame                  | 13.2                     | 18.5                     | 22.5                     | 26.5         | 39.9         |
| Raw<br>material<br>water | 73.3                     | 68.0                     | 64.0                     | 60.0         | 46.6         |
| Total                    | 100.0                    | 100.0                    | 100.0                    | 100.0        | 100.0        |

[0036]

The water activities of the mixes obtained here were measured using a water-activity meter EZ-100ST (Freund Corporation); results are shown in Table 2.

As an index bacterium, a thermophilic aerobic bacterium which is a flat-sour spoilage bacterium that forms highly heat-resistant spores, i.e., *Bacillus stearothermophilus*, was inoculated to the mix, then the mix was subjected to sterilization process at 95°C for 5 minutes. After the sterilized mix was cultured at 60°C for 8 hours, the number of thermophilic bacteria was counted; results are shown in Table 2.

[0037]

[Table 2]

Table 2: Relationship between water activity and bacterial proliferation property of mix.

|                                | Comparative<br>Example 1 | Comparative<br>Example 2 | Comparative<br>Example 3 | Example<br>1 | Example<br>2 |
|--------------------------------|--------------------------|--------------------------|--------------------------|--------------|--------------|
| Water<br>activity              | 0.990                    | 0.985                    | 0.983                    | 0.980        | 0.970        |
| Bacterial<br>prolifera<br>tion | +                        | +                        | +                        | -            | -            |

[0038]

From the above results, it was found that, by adjusting the water activity of the mix to 0.98 or less, proliferation of highly heat-resistant spore-forming bacteria can be suppressed in the long period of constant-temperature step.

[0039]

We attempted to find the amount of addition of each kind of sugars (the amount of addition necessary to suppress proliferation of thermophilic bacteria) to achieve the water activity of the mix of 0.98 or less, using 7% nonfat dry milk, 6.5% cream and an appropriate amount of water for the total of 100%. In the case of aqueous solution of sugar (sucrose) (1 wt%), its sweetness was defined to be "1", and the sweetness

of each case was evaluated with a score relative to this sugar; results are shown in Table 3.

Furthermore, as a control, the water activity and sweetness of the mix using a general amount of sugar (6.2%) were also evaluated.

[0040]

[Table 3]

Table 3: Relationship between kind of sugar and water activity.

|                              | Amount of addition [wt%] | Solid content [wt%] | Water activity [Aw] | Sweetness | Bacterial proliferation |
|------------------------------|--------------------------|---------------------|---------------------|-----------|-------------------------|
| Hydrated crystalline glucose | 13.0                     | 11.8                | 0.976               | 8.3       | -                       |
| Fructose                     | 14.0                     | 14.0                | 0.972               | 16.8      | -                       |
| Sorbitol                     | 22.8                     | 13.7                | 0.972               | 8.2       | -                       |
| Sugar                        | 17.0                     | 17.0                | 0.978               | 17.0      | -                       |
| Maltose mizuame              | 26.7                     | 20.0                | 0.980               | 6.0       | -                       |
| Sugar                        | 6.2                      |                     | 0.990               | 6.2       | +                       |

[0041]

The amount of addition differed depending on the kind of sugars, and the sugar that exhibited an effect with the minimum amount of addition was glucose. In addition, the sugar that exhibited the most preferable degree of sweetness when the amount necessary to suppress the proliferation of thermophilic bacteria was added was maltose mizuame.

[0042]

Table 4 shows examples of composition of custard pudding. When the gelatinous food product is custard pudding comprising an egg-derived raw material, because a smooth texture is generally preferred, carrageenan and locust bean gum are co-used as a gelling agent; when the gelatinous food product is milk pudding or chocolate pudding not-comprising an egg-derived raw material, because a light and sharp texture is generally preferred, agar and gelatin are co-used. Other raw materials include fat sources, protein sources and sugar

sources, etc. in addition to flavors.

[0043]

[Table 4]

Table 4: Examples of composition of custard pudding.

|                                                          | Example<br>3 | Example<br>4 | Example<br>5 | Example<br>6 |
|----------------------------------------------------------|--------------|--------------|--------------|--------------|
| Nonfat dry milk [wt%]<br>(Meiji Dairies Corporation)     | 4.8          | 5.3          | 8.7          | 6.3          |
| Cream [wt%]<br>(Meiji Dairies Corporation)               | 1.0          |              | 3.5          |              |
| Butter [wt%]<br>(Meiji Dairies Corporation)              |              | 1.3          |              |              |
| Mizuame [wt%]<br>(Meiji Food Materia Co., Ltd.)          | 4.0          | 4.0          |              |              |
| Sugar [wt%]<br>(Meiji Food Materia Co., Ltd.)            | 1.8          | 1.3          | 5.9          | 10.0         |
| Liquid sugar F42 [wt%]<br>(Meiji Food Materia Co., Ltd.) | 9.0          | 11.4         |              |              |
| Vegetable oil [wt%]                                      | 4.3          | 8.7          | 2.7          | 2.7          |
| Gelling agent [wt%]                                      | 0.8          | 0.7          | 0.4          | 0.8          |
| Other raw materials [wt%]<br>(flavors, etc.)             | 4.3          | 2.2          | 3.2          | 3.6          |
| Water                                                    | 70.0         | 65.1         | 75.6         | 76.6         |
| Total                                                    | 100.0        | 100.0        | 100.0        | 100.0        |

## 5 [Industrial Applicability]

[0044]

According to the present invention, it is possible to manufacture gelatinous food products having desired texture without deterioration of flavor of raw materials, while  
 10 suppressing the proliferation of microorganisms that are not killed by general sterilization process.

**Claims**

1. A method for manufacturing a gelatinous food product comprising:
  - i. a preparation step wherein a mix is prepared;
  - ii. following said preparation step, a step of heat sterilization wherein the mix is heat sterilized;
  - iii. following said heat sterilization step, a constant-temperature step wherein the mix is maintained at a temperature lower than the sterilization temperature and higher than the solidifying temperature; and

wherein the water activity of the mix at the time of said constant-temperature step is adjusted by adjusting content of mizuame in the mix.
2. The method according to claim 1, wherein the water activity of the mix is adjusted by preparing the mix in the preparation step.
3. The method according to claim 1 or 2, wherein the water activity of the mix at the time of the constant-temperature step is adjusted to 0.90-0.98.
4. The method according to any one of claims 1 to 3, wherein the heat sterilization step is performed at a temperature of 95°C or higher.
5. The method according to any one of claims 1 to 4, wherein the constant-temperature step is performed at a temperature of 40-65°C.
6. The method according to any one of claims 1 to 5, wherein the mix comprises 3-10 wt% of mizuame.
7. The method according to any one of claims 1 to 6, wherein the weight ratio of the mizuame to the raw material water in the mix is 0.035:1 – 0.15:1.
8. The method according to any one of claims 1 to 7, wherein the mix further comprises sugar, and the adjustment of the water activity of the mix is performed by adjusting the content of the mizuame and the sugar.
9. The method according to any one of claims 1 to 8, wherein the gelatinous food product is a kind of sweets with 40% or more of water content immediately after their completion.

10. The method according to any one of claims 1 to 9, wherein the gelatinous food product is a sweets using bean jam, cream, jam and/or agar and comprises 30% or more of water content immediately after their completion.
11. The method according to any one of claims 1 to 10, wherein the gelatinous food product comprises a raw material derived from egg and/or a raw material derived from milk.
12. The method according to claim 11, wherein the gelatinous food product is custard pudding or milk pudding.
13. The method according to any one of claims 1 to 12, wherein proliferation of a microorganism during the constant-temperature step is suppressed by adjusting the water activity of the mix.
14. The method according to claim 13, wherein the microorganism is a *Bacillus* bacterium.
15. The method according to any one of claims 1 to 14, wherein the constant temperature step is performed for 2 hours or longer.
16. A method for manufacturing a gelatinous food product comprising:
  - i. a preparation step wherein a mix is prepared;
  - ii. following said preparation step, a step of heat sterilization wherein the mix is heat sterilized;
  - iii. following said heat sterilization step, a constant-temperature step wherein the mix is maintained at a temperature lower than the sterilization temperature and higher than the solidifying temperature; andwherein the water activity of the mix at the time of said constant-temperature step is adjusted;  
  
wherein the proliferation of a *Bacillus* bacterium during the constant-temperature step is suppressed by adjusting the water activity of the mix.
17. The method according to claim 16, wherein the water activity adjusted by preparing the mix in the preparation step.

18. The method according to claim 16 or 17, wherein the water activity of the mix at the time of the constant-temperature step is adjusted to 0.90-0.98.
19. The method according to any one of claims 16 to 18, the heat sterilization step is performed at a temperature of 95°C or higher.
20. The method according to any one of claims 16 to 19, wherein the constant-temperature step is performed at a temperature of 40-65°C.
21. The method according to any one of claims 16 to 20, wherein the mix further comprises sugar, and the adjustment of the water activity of the mix is performed by adjusting the content of the sugar.
22. The method according to claim 21, wherein the mix comprises 8-15 wt% of sugar.
23. The method according to claim 21 or 22, wherein the weight ratio of the sugar to the raw material water in the mix is 0.1:1-0.25:1.
24. The method according to any one of claims 16 to 23, wherein the gelatinous food product is a kind of sweets with 40% or more of water content immediately after their completion.
25. The method according to any one of claims 16 to 24, wherein the gelatinous food product is a sweets using bean jam, cream, jam and/or agar and comprises 30% or more of water content immediately after their completion.
26. The method according to any one of claims 16 to 25, wherein the gelatinous food product comprises a raw material derived from egg and/or a raw material derived from milk.
27. The method according to claim 26, wherein the gelatinous food product is custard pudding or milk pudding.
28. The method according to any one of claims 16 to 27, wherein the constant temperature step is performed for 2 hours or longer.