

CHOCOLATE AND METHOD FOR MANUFACTURING SAME

Technical Field

[0001]

5 The present invention relates to a method for producing a tempering-type chocolate, and more particularly, a method including a seed tempering.

Background Art

10 [0002]

 Tempering-type chocolate generally contains cocoa butter or cocoa butter substitute as a main fat. However, a heat resistant temperature of cocoa butter is about 31°C. Thus, there is a problem that a fat in chocolate melts
15 during the distribution in summer in Japan and in a hot area near the equator. When the melted chocolate is solidified once again in the absence of crystal nuclei, fat bloom (a phenomenon in which white fat crystals are formed on the surface of the chocolate, hereinafter referred to as
20 "bloom") is generated, which impairs a commercial value of the chocolate.

[0003]

 As a method for suppressing a bloom, a method of seed tempering including adding a powdery chocolate additive
25 (hereinafter, referred to as "powdery BOB seed agent"),

containing stable crystal of a fat containing triglyceride in which fatty acids at 1,3-positions are behenic acid and fatty acid at 2-position is oleic acid (hereinafter, referred to as "BOB"), as a crystal nuclei to chocolate, is disclosed (Patent Document 1). A chocolate prepared by the method does not cause bloom because that a part of BOB stable crystals will remain without melting even if it exposes to high temperature, e.g. exceeding body temperature, and that the chocolate is a state being subjected to tempering by the remained seed during the solidification once again.

[0004]

As used herein, the phenomenon of restoration to normal chocolate without a bloom generation when cooling to solidify after exposing the chocolate to high temperature, where the most of fat in the chocolate will melt at this temperature, for a certain period, is referred to as automatic restoration. In addition, as used herein, the upper limit temperature for the automatic restoration is referred to as maximum temperature of automatic restoration. A maximum temperature of automatic restoration of a chocolate, which is prepared by adding 3% by weight powdery BOB seed agent (containing 50% by weight sugar as an excipient) and subjecting to a tempering, is 37°C.

[0005]

A maximum temperature of automatic restoration of a chocolate can be raised to a temperature exceeding 37°C by increasing an adding amount of the powdery BOB seed agent to 3% by weight or more. However, the addition of large
5 amount of the seed agent as described above is not always easy in the operation in terms of uniform dispersibility into chocolate dough due to its powder form. This is because there is large difference in specific gravity between the powdery BOB seed agent and the chocolate, in
10 addition, the powdery BOB seed agent coagulates with each other to produce lumps, which makes it difficult to conform to chocolate. Furthermore, a problem of temporarily-increasing viscosity of chocolate by adding the large amount has been observed in some cases.

15 [0006]

Patent Document 2 discloses a paste form chocolate seed agent in which stable crystals of BOB are dispersed in a paste form fat, for the purpose of improving the above-mentioned dispersibility. In addition, Patent Document 3
20 discloses a paste form chocolate seed agent in which stable crystals of BOB are contained in fat mainly composed with MCT. Further, Patent Document 4 discloses a shortening-like chocolate seed agent characterized in that BOB and SSU and/or SUS glycerides containing no constituent saturated
25 fatty acids having 20 or more carbon atoms are present as

eutectic, and the former crystal is stable.

Prior Art Documents

Patent Documents

5 [0007]

Patent Document 1: JP S63-240745 A

Patent Document 2: JP 2008-206490 A

Patent Document 3: WO 2009/060809 A1

Patent Document 4: JP H09-103244 A

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Summary of Invention

Problems to Be Solved by Invention

[0008]

15 The present inventors have studied an improvement of a maximum temperature of automatic restoration in a chocolate seeding method with a seed agent containing stable crystals of BOB. They have found that as an amount of seed agent added is increased, a maximum temperature of automatic restoration is increased accordingly. However, they have
20 also found that an addition of large amount of seed agent causes softening chocolate and decrease in snappiness.

Thus, an object of the present invention is to provide a method of producing a chocolate meeting both improvement of a maximum temperature of automatic restoration and
25 suppression of a decrease in hardness in biting of

chocolate in a chocolate seeding method with a seed agent containing stable crystals of BOB.

Another object of the present invention is to make a maximum temperature of automatic restoration of a chocolate
5 to 37°C or more.

Means for Solving Problems

[0009]

The present inventors have intensively studied to
10 solve these problems. As a result, they have found that if a chocolate dough contains a specific emulsifier, a maximum temperature of automatic restoration may be sufficiently improved with addition of small amount of seed agent containing stable crystals of BOB, and softening of
15 chocolate and decrease in snappiness of chocolate may be suppressed. The present invention has been completed based on these findings.

[0010]

That is, the present invention is:

20 (1) a method for producing a chocolate including adding a seed agent for chocolate to a melted chocolate dough containing an emulsifier containing 50 % by weight or more saturated fatty acid having 16 to 24 carbon atoms as a constituent fatty acid, where the seed agent contains
25 stable crystal of triglyceride in which constituent fatty

acids of 1,3-positions are behenic acid and 2 position is oleic acid (BOB);

(2) the method of (1), where the emulsifier has 7 or less HLB;

5 (3) the method of (1), where the emulsifier is one or more emulsifiers selected from the group consisting of sorbitan fatty acid ester and sucrose fatty acid ester;

(4) the method of (1), where the chocolate dough further contains a fat containing 20 % by weight or more saturated
10 fatty acid having 20 to 24 carbon atoms as a constituent fatty acid;

(5) the method of (4), where the fat is one or more fats selected from an extremely hydrogenated oil and an interesterified fat, and where the fat contains high erucic
15 rapeseed oil as at least a part of raw material fat;

(6) The method of (1), where the seed agent for chocolate is a fat crystal dispersion in which BOB fat crystals are dispersed in a liquid oil, and the fat crystal dispersion contains 5 to 30% by weight BOB;

20 (7) a chocolate including an emulsifier containing 50 % by weight or more saturated fatty acid having 16 to 24 carbon atoms as a constituent fatty acid, where a maximum temperature of automatic restoration of the chocolate is 37°C or more, and where unmelted BOB stable crystal is
25 remained in the chocolate at the maximum temperature;

(8) a method for imparting a function of automatic restoration at 37°C or more to a chocolate, including adding a fat crystal dispersion in which BOB fat crystals are dispersed in a liquid oil to a melted chocolate dough
5 containing an emulsifier containing 50 % by weight or more saturated fatty acid having 16 to 24 carbon atoms as a constituent fatty acid;

(9) a fat composition for chocolate including a fat containing 20% by weight or more saturated fatty acid
10 having 20 to 24 carbon atoms as a constituent fatty acid and an emulsifier containing 50% by weight or more saturated fatty acid having 16 to 24 carbon atoms as a constituent fatty acid;

(10) a seed agent for chocolate containing stable crystals
15 of BOB, including an emulsifier containing 50% by weight or more saturated fatty acids having 16 to 24 carbon atoms as a constituent fatty acid.

Effect of Invention

20 [0011]

A method for producing chocolates of the present invention enables to reduce an adding amount of expensive seed agent. As a result, the production cost is lowered, and at the same time, the seed agent is easily dispersed
25 into a chocolate uniformly, so that the workability is

improved. Further, when the seed agent is a fat crystal dispersion in which stable crystals of BOB are dispersed in a continuous oil phase, the dispersibility is further improved. Further, a maximum temperature of automatic
5 restoration may be increased to 37°C or higher, or 46°C or higher by adding a specific emulsifier or a specific fat.

Mode for Carrying Out Invention

[0012]

10 Hereinafter, the present invention will be specifically described.

An emulsifier contained in a chocolate dough of the present invention needs to contain 50% by weight or more, more preferably 70% by weight or more, further preferably
15 90% by weight or more saturated fatty acid having 16 to 24 carbon atoms in the constituent fatty acid. And, it is more preferable that 50% by weight or more, more preferably 60% by weight or more behenic acid is contained in the constituent fatty acid. Further, a content of stearic acid
20 in the constituent fatty acid is more preferably 50% by weight or more, further preferably 60% by weight or more.

An adding amount of the emulsifier contained in the chocolate dough of the present invention is preferably 0.03% by weight or more, more preferably 0.1% by weight or
25 more, further preferably 0.3% by weight or more, most

preferably 0.5% by weight or more. The amount is preferably 2% by weight or less, more preferably 1.5% by weight or less, further preferably 1% by weight or less, most preferably 0.8% by weight or less. When the amount of emulsifier exceeds the upper limit, an increase in viscosity of chocolate may occur during seed tempering. And, it may cause a deterioration of workability and quality of chocolate because it becomes difficult to dissolve in chocolate or fat formulated in chocolate and it is necessary to raise temperature of the chocolate or the fat to high temperature. When it is less than the lower limit, the maximum temperature of automatic restoration may not be sufficiently improved.

[0013]

The emulsifier contained in the chocolate dough of the present invention preferably has 7 or less HLB value. It is preferably 6 or less, more preferably 5.5 or less, further preferably 4.5 or less, most preferably 3.5 or less HLB value. In addition, it is preferably 0.5 or more, more preferably 1 or more, further preferably 2 or more. When the HLB value exceeds the upper limit, the solubility in fat may be reduced, and it may cause a problem that the dispersion is difficult. In addition, the maximum temperature of automatic restoration may not be sufficiently improved.

The emulsifier contained in the chocolate dough of the present invention is not particularly limited as long as it contains 50% by weight or more saturated fatty acid having 16 to 24 carbon atoms in the constituent fatty acid, and
5 examples thereof include natural emulsifier and synthetic emulsifier. In the latter case, it is preferably one or more emulsifiers selected from sorbitan fatty acid ester or sucrose fatty acid ester.

[0014]

10 Examples of a seed agent containing stable crystals of BOB in the present invention include a powdery seed agent and a fat crystal dispersion in which stable crystal particles are dispersed in a continuous oil phase.

The seed agent is added to a melted chocolate dough.
15 While a powdery seed agent has good dispersibility, a fat crystal dispersion is more favorable in the point that it is dispersed easier than the powdery seed agent because its continuous phase is fat. When the continuous oil phase is liquid oil, the BOB seed agent has a paste form at 20 to
20 35°C, preferably 25 to 35°C, and the dispersibility into the chocolate dough is further improved.

As used herein, a stable crystal or a stabilized crystal is a crystal form in which peaks of a short surface interval (side interval) are four or more in an X-ray
25 diffraction spectrum, and preferably, it is a stable

crystal of V-type crystal or more in nomenclature of crystal type of cocoa butter by R. L. Wille and E. S. Lutton [JAOCS, 43, 491-496 (1966)].

[0015]

5 In the case of where the seed agent is the fat crystal dispersion, a BOB content contained in the seed agent is preferably 5% by weight or more, more preferably 10% by weight or more, further preferably 12% by weight or more. And, it is preferably 40% by weight or less, and more
10 preferably 30% by weight or less. When the BOB content is less than the lower limit, the maximum temperature of automatic restoration may not be sufficiently improved. When the BOB content exceeds the upper limit, a plasticity
15 of the seed agent is poor, and a dispersibility of the added seed agent to chocolate may be insufficient.

 In addition, in the case of the fat crystal dispersion in which the continuous oil phase is liquid oil, the dispersion contains preferably 40% by weight or more, more preferably 45% by weight or more, and further preferably
20 50% by weight or more liquid oil. It is preferably 90% by weight or less, more preferably 80% by weight or less. When the liquid oil is less than 40% by weight, a plasticity of the seed agent is poor, and a dispersibility of the added seed agent to chocolate may be insufficient.

25 [0016]

A method of producing the seed agent is not particularly limited as long as the seed agent contains stable crystals of BOB. For example, in the case of the fat crystal dispersion in which the continuous oil phase is liquid oil, it may be produced by the following steps: a step of providing a BOB-containing fat itself or a mixture produced by dissolving a BOB-containing fat to a liquid oil; a step of cooling the BOB-containing fat or the mixture while kneading; and a step of stabilizing the BOB crystals with an aging treatment.

The kneading and cooling may be carried out under normal operating conditions using a known cooling and stirring device, such as combinator, commonly used in a general shortening production. In addition, plasticity may be improved by blowing air or nitrogen gas during the kneading.

Further, the BOB seed agent of the present invention may be produced by adding stable crystals of BOB prepared in advance to a liquid oil, and then stirring and dispersing the mixture with a homomixer.

In addition, the aging may be carried out while keeping the temperature lower than a temperature at which the entire BOB seed agent is completely melted, and the temperature is preferably raised stepwise according to a transition of the crystal type accompanying the aging. As

a specific example of the stepwise temperature rise, it is always stored at a temperature 2 to 3°C lower than the melting point of the crystal. Actually, it is complicated to be continuously stored. Thus, it is enough to change
5 the temperature for every fixed period.

[0017]

Any edible fat having liquid state at ordinary temperature may be used as the liquid oil. Examples thereof include soybean oil, rapeseed oil, high oleic
10 safflower oil, safflower oil, high oleic sunflower oil, palm fractionated liquid oil (soft oil), coconut oil, palm kernel fractionated liquid oil (soft oil), medium chain fatty acid fat, and interesterified oil and fractionated oil thereof.

15 The BOB-containing fat may be produced by, for example, subjecting fatty acids mainly containing behenic acid or lower alcohol esters thereof and a fat mainly having oleic acid at the 2-position of glycerides to an interesterification to selectively introduce behenic acids
20 into 1,3-positions, and if necessary, subjecting the obtained fat to fractionation and concentration.

[0018]

In the case of where a seed agent of the present invention is the fat crystal dispersion in which the fat is
25 continuous phase, an adding amount of the seed agent to be

added to a chocolate dough of the present invention is preferably 0.8% by weight or more, more preferably 1.5% by weight % or more, further preferably 1.8% by weight or more. And, it is preferably 6% by weight or less, more preferably 5% by weight or less, further preferably 4.5% by weight or less, most preferably 4.0% by weight or less. When the adding amount of seed agent exceeds 6% by weight, a hardness in biting may be decreased, and the seed agent may be difficult to disperse in the chocolate dough. When it is less than the lower limit, the maximum temperature of automatic restoration may not be sufficiently improved.

A temperature of adding to chocolate is not particularly limited as long as the chocolate dough is melted at the temperature and the seed agent has sufficient plasticity, for example, it is preferable 33°C to 37°C.

[0019]

In the case of where the seed agent of the present invention is powdery seed agent, the seed agent may contain an excipient such as sugar. A BOB content in a fat contained in the seed agent is preferably 40% by weight or more, more preferably 50% by weight or more, further preferably 60% by weight or more. And, it is preferably 80% by weight or less, more preferably 70 % by weight or less.

[0020]

In the case of where the seed agent of the present invention is powdery seed agent, an adding amount of the seed agent to be added to a chocolate dough of the present invention is preferably 0.5% by weight or more, more preferably 1% by weight % or more, further preferably 1.2% by weight or more. And, it is preferably 3.5% by weight or less, more preferably 3% by weight or less, further preferably 2% by weight or less, most preferably 1.8% by weight or less. When the adding amount of BOB seed agent exceeds 3.5% by weight, a hardness in biting of the chocolate may be decreased, and the BOB seed agent may be difficult to disperse in the chocolate dough. When it is less than the lower limit, the maximum temperature of automatic restoration may not be sufficiently improved.

[0021]

A seed agent of the present invention contains BOB. In addition, a seed agent containing SUS triglyceride containing constituent saturated fatty acids having 20 to 24 carbon atoms, where SUS triglyceride is a triglyceride in which saturated fatty acids (S) are bound at 1,3-positions and unsaturated fatty acid (U) is bound at 2-position, such as a triglyceride in which arachidic acids are bound at 1,3-positions and oleic acid is bound at 2-position and a triglyceride in which behenic acid is bound at 1-position, oleic acid is bound at 2-position and

stearic acid is bound at 3-position, may provide an effect of improving the maximum temperature of automatic restoration although it is inferior to BOB.

[0022]

5 A chocolate dough of the present invention preferably contains a fat containing 40% by weight or more of saturated fatty acid having 20 to 24 carbon atoms as a constituent fatty acid in addition to the emulsifier because the maximum temperature of automatic restoration is
10 further improved. Examples of the fat include an extremely hydrogenated oil of high erucic rapeseed oil and an interesterified oil containing behenic acid as a constituent fatty acid. Examples of the latter include BOB containing fat and random interesterified oil. The fat may
15 be a single fat as mentioned above, or may be a mixture thereof. In addition, the random interesterified oil may be prepared with a chemical catalyst or an enzyme catalyst.
[0023]

 In the case of where the fat containing 40% by weight
20 or more of saturated fatty acid having 20 to 24 carbon atoms as a constituent fatty acid of the present invention is a BOB-containing fat, a BOB content of the fat is preferably 40% by weight or more, more preferably 50% by weight or more, further preferably 60% by weight or more.
25 And, it is preferably 80% by weight or less, more

preferably 70% by weight or less. In addition, a content of the fat in chocolate dough is preferably 0.2% by weight or more, more preferably 0.5% by weight or more. And, it is preferably 3% by weight or less, more preferably 2% by weight or less, further preferably 1.5% by weight or less, most preferably 1% by weight or less.

In the case of where the fat containing 40% by weight or more of saturated fatty acid having 20 to 24 carbon atoms as a constituent fatty acid of the present invention is a random interesterified oil, a behenic acid content in a constituent fatty acid of the fat is preferably 20% by weight or more, more preferably 25% by weight or more, further preferably 30% by weight or more. And, it is preferably 60% by weight or less, more preferably 50% by weight or less. In addition, a content of the fat in chocolate dough is preferably 0.2% by weight or more, more preferably 0.5% by weight or more. And, it is preferably 3% by weight or less, more preferably 2% by weight or less, further preferably 1.5% by weight or less, most preferably 1% by weight or less.

[0024]

In the case of where the fat containing 40 % by weight or more of saturated fatty acid having 20 to 24 carbon atoms as a constituent fatty acid of the present invention is an extremely hydrogenated high erucic rapeseed oil, the

content is preferably 0.05% by weight or more, more preferably 0.07% by weight or more, further preferably 0.1% by weight or more, most preferably 0.2% by weight or more, further most preferably 0.3% by weight or more. And, it is
5 preferably 1.5% by weight or less, more preferably 1% by weight or less. When the content exceeds the upper limit, the melting speed in the mouth of chocolate tends to be deteriorated. In addition, there is a possibility that a viscosity of the chocolate dough may be increased and that
10 tempering may be inhibited at the time of automatic restoration.

[0025]

An ability of automatic restoration from a storage at high temperature, exhibited by a chocolate of the present
15 invention, is defined as a function that a bloom is not occurred after a storage for 16 hours at specific high temperature, i.e. tempering is succeeded. The high temperature used herein means 37 to 45°C, preferably 37°C, 38°C, 39°C, 40°C, 41°C, 42°C, 43°C, 44°C, 45°C, 46°C in
20 this order.

[0026]

A mechanism that an addition of specific emulsifier enables to improve the maximum temperature of automatic restoration is still unclear. However, it is expected that
25 the emulsifier may suppress a partial melting of stable

crystals of BOB in the seed agent at the time of seed tempering or high temperature storage of chocolate, and thus, the maximum temperature of automatic restoration may be improved by increasing in an amount of the residual seed.

5 [0027]

A preferred embodiment of a chocolate of the present invention is a chocolate containing an emulsifier containing 50 % by weight or more saturated fatty acid having 16 to 24 carbon atoms as a constituent fatty acid, 10 having a maximum temperature of automatic restoration of 37°C or more, and containing unmelted BOB stable crystal at the above maximum temperature.

[0028]

A chocolate targeted in the present invention is a fat 15 processed food in which fat forms a continuous phase, and a tempering-type chocolate, that is, blended fat is tempering fat including cocoa butter, as well as fat rich in SUS (2-unsaturated 1,3-disaturated glycerides), such as enzyme interesterified oil, shea butter, palm oil, sal fat, mango 20 kernel oil, kokum fat, illipe fat, and fractionated oil thereof.

In addition, a fat other than the fat rich in SUS component may be blended into a chocolate of the present invention according to desired texture and physical 25 properties as long as tempering may be performed. Examples

of the fat include vegetable oil such as soybean oil, rapeseed oil, corn oil, cottonseed oil, peanut oil, sunflower oil, rice oil, safflower oil, high-oleic safflower oil, olive oil, sesame oil, palm oil, coconut oil, and palm kernel oil; animal fat such as beef tallow, and lard; and processed fat thereof such as fractionated fat, hydrogenated fat, and interesterified fat; alone or in combination thereof.

[0029]

10 An emulsifier containing 50 % by weight or more saturated fatty acid having 16 to 24 carbon atoms as a constituent fatty acid and a fat containing 40% by weight or more of saturated fatty acid having 20 to 24 carbon atoms as a constituent fatty acid may be added at melting state in the same manner as another blended fat. Alternatively, they may be post-added to a prepared chocolate dough.

In addition, they may be added to a fat part of seed agent instead of blending or adding to a chocolate dough.

20

Examples

[0030]

Hereinafter, Examples will be described. However, the technical concept of the present invention is not limited by these Examples. In the Examples, part and % are in the

25

weight basis.

[0031]

(Preparation of BOB-containing fat)

Seventy parts behenic acid ethyl ester and 30 parts
5 high oleic sunflower oil were mixed. The obtained mixture
was subjected to interesterification with an enzyme agent
selectively acting on the 1,3-positions to obtain the
reaction oil. The obtained reaction oil was fractionated
with a solvent to obtain a high melting point fraction.
10 The fraction contained 62% by weight BOB.

[0032]

(Preparation of BOB-containing shortening (fat crystal
dispersion))

Thirty five parts the high melting point fraction
15 obtained by the above and 65 parts high oleic sunflower oil
were mixed. The obtained mixture was heated and melted at
50°C or higher temperature, and then rapidly cooled and
kneaded with a combinator to obtain BOB-containing
shortening A1 as a fat crystal dispersion. BOB-containing
20 shortening A2 was also obtained by using 50 parts the high
melting point fraction and 50 parts high oleic sunflower
oil in a similar manner as the above. BOB-containing
shortening B was also obtained by using 35 parts the high
melting point fraction and 65 parts palm super olein
25 (iodine value: 67) in a similar manner as the above. The

BOB content of each shortening was A1: 21.7% by weight, A2: 31.0% by weight, and B: 21.7% by weight.

[0033]

(Stabilization of crystal)

5 These BOB-containing shortenings were allowed to stand at temperatures of 30°C, 35°C, and 40°C for one day to gradually raise the temperature. Then, the crystal type was confirmed by X-ray analysis. As a result, the short surface interval showed predominant peak at 4.6 Å, and the
10 long surface interval showed predominant peak at 37 to 39 Å. The BOB crystal was stabilized.

[0034]

(Chocolate preparation with BOB-containing shortening (fat crystal dispersion))

15 According to the formulation of chocolate dough in Table 1, chocolate doughs of Examples 1 to 8 and Comparative Examples 1 and 2 in melted state were prepared by mixing, roll refining and conching according to a conventional method.

20 (Example 1)

 BOB-containing shortening A1 which is a fat crystal dispersion was added and dispersed to the chocolate dough of Example 1 at a content of 2% by weight relative to the chocolate dough to carry out seed tempering while stirring
25 and maintaining the temperature at 35°C, and then the dough

was poured into mold plate, and solidified at 10°C for 30 minutes to obtain a chocolate of Example 1.

(Comparative Example 1)

5 A chocolate of Comparative Example 1 was obtained in the same manner as in Example 1 except that the chocolate dough of Comparative Example 1 was used.

(Comparative Example 2)

10 A chocolate of Comparative Example 2 was obtained in the same manner as in Example 1 except that the chocolate dough of Comparative Example 2 was used and 4.3% by weight BOB-containing shortening A1 was added to the chocolate dough.

(Example 2)

15 A chocolate of Example 2 was obtained in the same manner as in Example 1 except that the chocolate dough of Example 2 was used.

(Example 3)

20 A chocolate of Example 3 was obtained in the same manner as in Example 1 except that the chocolate dough of Example 3 was used.

(Example 4)

A chocolate of Example 4 was obtained in the same manner as in Example 1 except that the chocolate dough of Example 4 was used.

25 (Example 5)

A chocolate of Example 5 was obtained in the same manner as in Example 1 except that the chocolate dough of Example 5 was used.

(Example 6)

5 A chocolate of Example 6 was obtained in the same manner as in Example 1 except that the chocolate dough of Example 6 was used and 4.3% by weight BOB-containing shortening A1 was added to the chocolate dough.

(Example 7)

10 A chocolate of Example 7 was obtained in the same manner as in Example 1 except that BOB-containing shortening A2 was used instead of BOB-containing shortening A1.

(Example 8)

15 The chocolate of Example 8 was obtained in the same manner as in Example 1 except that BOB-containing shortening B is used instead of BOB-containing shortening A1.

[0035]

20 (Evaluation of dispersibility to chocolate)

A workability of addition and dispersion of BOB-containing shortening in each Example and Comparative Example to the chocolate dough was evaluated. The evaluation, "2" or more was evaluated as acceptable. The
25 results are shown in Table 1.

4: BOB seed agent is dispersed into chocolate in a short time.

3: BOB seed agent is dispersed into chocolate in a short time, but longer than "4".

5 2: It takes certain time, but BOB seed agent is dispersed into chocolate.

1: BOB seed agent is not sufficiently dispersed into chocolate even if it takes a long time.

[0036]

10 (Evaluation of maximum temperature of automatic restoration)

Each chocolate was aged for 7 days under the temperature condition at 20°C. The aged chocolate was placed in an incubator set at each 1°C increments in
 15 between 35 and 50°C for 16 hours with standing. Then, the chocolate was placed in an incubator set at 20°C to be cooled and solidified under conditions of relatively slow cooling. Subsequently, the chocolate was stored at 20°C for 7 days, and then observed to confirm an occurrence of
 20 bloom.

A maximum temperature of automatic restoration, which is maximum temperature without an occurrence of bloom, in each chocolate is shown in Table 1.

[0037]

Table 1

Formulation of chocolate dough (part by weight)	Example 1	Comparative Example 1	Comparative Example 2	Example 2	Example 3	Example 4	Example 5	Example 6	Example 7	Example 8
Cacao mass	25.2									
Whole milk powder	12.5									
Sugar	44.4									
Cocoa butter	15.5	15.9	13.6	15.39	15.22	15.15	15.4	12.3	15.5	15.5
S-370 *1	0.1	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.1	0.1
F-10 *2	0.0	0.0	0.0	0.06	0.08	0.0	0.0	0.0	0.0	0.0
S-60V *3	0.0	0.0	0.0	0.0	0.0	0.45	0.0	0.0	0.0	0.0
Extremely hydrogenated high erucic rapeseed oil *4	0.3	0.0	0.0	0.45	0.6	0.3	0.0	0.3	0.3	0.3
Seed tempering of chocolate										
Chocolate dough (% by weight)	98.0	98.0	95.7	98.0	98.0	98.0	98.0	95.7	98.0	98.0
Type of BOB-containing shortening	A1	A1	A1	A1	A1	A1	A1	A1	A2	B
Adding amount (% by weight)	2.0	2.0	4.3	2.0	2.0	2.0	2.0	4.3	2.0	2.0
Dispersibility	4	4	3	4	4	4	4	3	2	4
Maximum temperature of automatic restoration	40°C	35°C	37°C	40°C	41°C	39°C	40°C	46°C	41°C	40°C

- S-370 *1: S-370 is commercially available sucrose fatty acid ester (HLB: 3.0, constitution fatty acids are shown in Table 2, product name: "Ryoto Sugar Ester S-370", manufactured by Mitsubishi Kagaku Foods Co. Ltd.).

- F-10 *2: F-10 is commercially available sucrose fatty acid ester (HLB: 1.0, constituent fatty acids are shown in Table 2, product name: "DK Ester F-10", manufactured by DKS Co. Ltd.).

- S-60V *3: S-60V is commercially available sorbitan fatty acid ester (HLB: 5.1, constituent fatty acids are shown in Table 2, product name: "POEM S-60V", manufactured by RIKEN

VITAMIN Co. Ltd.).

- Extremely hydrogenated high erucic rapeseed oil *4:
Extremely hydrogenated high erucic rapeseed oil has 55 wt%
of saturated fatty acid having 20 to 24 carbon atoms in the
5 constituent fatty acids.

[0038]

- Comparative Example 1, which was prepared by adding
2% by weight BOB-containing shortening to a chocolate
without containing a specific emulsifier, showed lower
10 maximum temperature of automatic restoration, 35°C.
Meanwhile, Examples 1 to 5, which was prepared by adding 2%
by weight BOB-containing shortening to a chocolate
containing a specific emulsifier or a specific fat, showed
maximum temperature of automatic restoration of 39 to 41°C.
15 Thus, it improved 4 to 6°C relative to Comparative Example
1.

- Comparative Example 2, which was prepared by adding
4.3% by weight BOB-containing shortening to a chocolate
without containing a specific emulsifier, showed maximum
20 temperature of automatic restoration of 37°C. Meanwhile,
Example 6, which was prepared by adding 4.3% by weight BOB-
containing shortening to a chocolate containing a specific
emulsifier and a specific fat, showed maximum temperature
of automatic restoration of 46°C. Thus, it improved 9°C
25 relative to Comparative Example 2.

- Examples 1 to 5 and Comparative Example 1 prepared by adding 2% by weight BOB-containing shortening had good hardness in biting (snappiness), but Example 6 and Comparative Example 2, the adding amount was 4.3% by weight, were slightly softened.

- Examples 1 to 5 showed better hardness in biting (snappiness) and 2 to 4°C higher maximum temperature of automatic restoration than Comparative Example 2.

[0039]

The constituent fatty acid compositions of sucrose fatty acid ester S-370, sucrose fatty acid ester F-10, and sorbitan fatty acid ester S-60V were measured. The results are shown in Table 2.

Table 2

(% by weight)	C16	C18	C18:1	C18:2	C20	C22	C22 or more
S-370	31.3	68.1	0.0	0.0	0.6	0.0	0.0
F-10	28.6	71.1	0.0	0.0	0.3	0.0	0.0
S-60V	44.5	54.9	0.0	0.0	0.6	0.0	0.0

[0040]

(Chocolate preparation with powdery BOB seed agent)

(Example 9)

According to the formulation of chocolate dough in Table 3, chocolate dough of Example 9 in melted state was prepared by mixing, roll refining and conching according to a conventional method. Commercially available BOB seed agent (fat: 50% by weight, sugar: 50% by weight, BOB

content in the fat: 62% by weight, product name: "Chocoseed B", manufactured by Fuji Oil, Co., Ltd.) was added and dispersed to the prepared chocolate dough at a content of 3% by weight relative to the chocolate dough to carry out
5 seed tempering while stirring and maintaining the temperature at 35°C, and then the dough was poured into mold plate, and solidified at 10°C for 30 minutes to obtain a chocolate of Example 9.

(Comparative Example 3)

10 A chocolate dough was obtained in the same manner as in Example 9 except that the formulation was according to Table 3, Comparative Example 3. The BOB seed agent was added to the prepared chocolate dough at a content of 3% by weight relative to the chocolate dough, and a chocolate of
15 Comparative Example 3 was obtained in the same manner as in Example 9.

(Example 10)

A chocolate dough was obtained in the same manner as in Example 9 except that the formulation was according to
20 Table 3, Example 10. The BOB seed agent was added and dispersed to the prepared chocolate dough at a content of 1% by weight relative to the chocolate dough to carry out seed tempering, and the obtained dough was poured into mold plate, and solidified at 10°C for 30 minutes in the same
25 manner as in Example 9 to obtain a chocolate of Example 10.

(Comparative Example 4)

A chocolate dough was obtained in the same manner as in Example 9 except that the formulation was according to Table 3, Comparative Example 4. The BOB seed agent was added to the prepared chocolate dough at a content of 1% by weight relative to the chocolate dough, and a chocolate of Comparative Example 4 was obtained in the same manner as in Example 9.

[0041]

The maximum temperature of automatic restoration in each chocolate of Examples 9, 10 and Comparative Examples 3, 4 was evaluated. The result is shown in Table 3.

[0042]

Table 3

Formulation of chocolate dough (part by weight)	Example 9	Comparative Example 3	Example 10	Comparative Example 4
Cacao mass	34.2	34.2	34.2	34.2
Whole milk powder	6.3	6.3	6.3	6.3
Sugar	47.0	47.0	47.0	47.0
Cocoa butter	8.5	9.5	9.5	11.5
B-370 *1	1.0	0.0	1.0	0.0
BOB fat *2	0.0	0.0	1.0	0.0
Seed tempering of chocolate				
Chocolate dough (% by weight)	97.0	97.0	99.0	99.0
Powdery BOB seed agent (% by weight)	3.0	3.0	3.0	3.0
Maximum temperature of automatic restoration	39°C	37°C	40°C	Less than 37°C

- B-370 *1: B-370 is commercially available sucrose fatty acid ester (HLB: 3.0, constituent fatty acids are shown in Table 5, product name: "Ryoto Sugar Ester B-370", manufactured by Mitsubishi Kagaku Foods Co. Ltd.).

- BOB fat *2: BOB fat is a fat mainly containing BOB (BOB content is 62 % by weight).

[0043]

5 - Comparative Example 3, which was prepared by adding
3% by weight BOB seed agent to a chocolate without
containing a specific emulsifier, showed a maximum
temperature of automatic restoration of 37°C. Meanwhile,
Example 9, which was prepared by adding 3% by weight BOB
10 seed agent to a chocolate containing a specific emulsifier,
showed maximum temperature of automatic restoration of 39°C.
Thus, it improved 2°C relative to Comparative Example 3.

 - Comparative Example 4, which was prepared by adding
1% by weight BOB seed agent to a chocolate without
15 containing a specific emulsifier, showed lower maximum
temperature of automatic restoration, less than 37°C.
Meanwhile, Example 10, which was prepared by adding 1% by
weight BOB seed agent to a chocolate containing a specific
emulsifier and a specific fat, showed maximum temperature
20 of automatic restoration of 40°C. Thus, it improved 3°C or
more relative to Comparative Example 4.

 - Example 10 and Comparative Example 4 prepared by
adding 1% by weight BOB seed agent had good hardness in
biting (snappiness), but Example 9 and Comparative Example
25 3, the adding amount was 3% by weight, were slightly

softened.

- Example 10 showed better hardness in biting (snappiness) and 3°C higher maximum temperature of automatic restoration than Comparative Example 3.

5 - There was substantially no problem in the workability of adding and dispersing the powdery seed agent to the chocolate dough, but Example 10 and Comparative Example 4, which were prepared by adding 1% by weight powdery seed agent, were better than Example 9 and
10 Comparative Example 3, which were prepared by adding 3% by weight seed agent. However, Examples 1 to 6 and 8, and Comparative Examples 1 and 2, which were obtained by adding BOB shortening were clearly better than Examples 9 and 10, and Comparative Examples 3 and 4, which were prepared by
15 adding powdery seed agent.

[0044]

(Examples 11 to 19, Comparative Example 5)

A chocolate dough was obtained in the same manner as in Example 9 except that the formulation was according to
20 Table 4, Examples 11 to 19, and Comparative Example 5. The BOB seed agent was added to the prepared chocolate dough at a content of 2% by weight relative to the chocolate dough, and chocolates of Examples 11 to 19 and Comparative Example 5 were obtained in the same manner as in Example 9.

25 [0045]

The maximum temperature of automatic restoration in each chocolate was evaluated. The result is shown in Table 4.

[0046]

5 Table 4

Formulation of chocolate dough (part by weight)	Comparative Example 5	Example 11	Example 12	Example 13	Example 14	Example 15	Example 16	Example 17	Example 18	Example 19
Cacao mass	34.2									
Whole milk powder	6.3									
Sugar	47.0									
Cocoa butter	10.5	10.1	10.1	9.7	9.2	10.1	9.7	9.2	10.1	9.7
B-150 *1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B-370 *2	0.0	0.0	0.0	0.0	0.0	0.1	0.5	1.0	0.0	0.0
S-370 *3	0.0	0.0	0.1	0.5	1.0	0.0	0.0	0.0	0.0	0.0
F-10 *4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
S-60V *5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Extremely hydrogenated high erucic rapeseed oil *6	0.0	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Seed tempering of chocolate										
Chocolate dough (% by weight)	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0
Powdery BOB seed agent (% by weight)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Maximum temperature of automatic restoration	Less than 37°C	40°C	40°C	41°C	43°C or more	41°C	41°C	41°C	40°C	40°C

- B-150 *1: B-150 is commercially available sorbitan fatty acid ester (HLB: 2.5, constituent fatty acids are shown in Table 5, product name: "POEM B-150", manufactured by RIKEN VITAMIN Co. Ltd.).

10 - B-370 *2: B-370 is commercially available sucrose fatty acid ester (HLB: 3.0, constituent fatty acids are shown in Table 5, product name: "Ryoto Sugar Ester B-370",

manufactured by Mitsubishi Kagaku Foods Co. Ltd.).

- S-370 *3: S-370 is commercially available sucrose fatty acid ester (HLB: 3.0, constitution fatty acids are shown in Table 5, product name: "Ryoto Sugar Ester S-370",
5 manufactured by Mitsubishi Kagaku Foods Co. Ltd.).

- F-10 *4: F-10 is commercially available sucrose fatty acid ester (HLB: 1.0, constituent fatty acids are shown in Table 5, product name: "DK Ester F-10", manufactured by DKS Co. Ltd.).

10 - S-60V *5: S-60V is commercially available sorbitan fatty acid ester (HLB: 5.1, constituent fatty acids are shown in Table 5, product name: "POEM S-60V", manufactured by RIKEN VITAMIN Co. Ltd.).

- Extremely hydrogenated high erucic rapeseed oil *6:
15 Extremely hydrogenated high erucic rapeseed oil has 55 wt% of saturated fatty acid having 20 to 24 carbon atoms in the constituent fatty acids.

[0047]

- Comparative Example 5, which was prepared by
20 adding 2% by weight powdery seed agent to a chocolate without containing a specific emulsifier, showed a maximum temperature of automatic restoration of less than 37°C. Meanwhile, Examples 11 to 19, which were prepared by adding 2% by weight BOB seed agent to a chocolate containing a
25 specific emulsifier or a specific fat, showed maximum

temperature of automatic restoration of 40 to 43°C. Thus, it improved 3 to 6°C relative to Comparative Example 5.

- There was substantially no problem in the workability of adding and dispersing the powdery seed agent to the chocolate dough, but Examples 1 to 6 and 8, and Comparative Examples 1 and 2, which were obtained by adding BOB shortening, were clearly better.

[0048]

The constituent fatty acid compositions of sucrose fatty acid ester S-370, sucrose fatty acid ester B-370, sorbitan fatty acid ester B-150, sucrose fatty acid ester F-10, and sorbitan fatty acid ester S-60V were measured. The results are shown in Table 5.

Table 5

(% by weight)	C16	C18	C18:1	C18:2	C20	C22	C22 or more
S-370	31.3	68.1	0.0	0.0	0.6	0.0	0.0
B-370	1.2	21.9	0.0	0.0	6.6	69.3	1.0
B-150	8.3	18.8	0.0	0.0	3.9	67.5	1.5
F-10	28.6	71.1	0.0	0.0	0.3	0.0	0.0
S-60V	44.5	54.9	0.0	0.0	0.6	0.0	0.0

Industrial Applicability

[0049]

The present invention enables to produce chocolates which do not occur bloom even when exposed to high temperatures of 37°C or higher, and thus, promote the use of chocolates in the field of confectionery which has hitherto been considered impossible.

CLAIMS

1. A method for producing a chocolate comprising adding a seed agent for chocolate to a melted chocolate
5 dough containing an emulsifier containing 50 % by weight or more saturated fatty acid having 16 to 24 carbon atoms as a constituent fatty acid and an extremely hydrogenated high erucic rapeseed oil, wherein the seed agent contains stable crystal of triglyceride in which constituent fatty acids of
10 1,3-positions are behenic acid and 2 position is oleic acid (BOB), wherein the chocolate has a maximum temperature of automatic restoration of 39°C or more, and wherein the seed agent is not a water-in-oil emulsion.

15 2. The method according to claim 1, wherein the emulsifier has 7 or less HLB.

3. The method according to claim 1, wherein the emulsifier is one or more emulsifiers selected from the
20 group consisting of sorbitan fatty acid ester and sucrose fatty acid ester.

4. The method according to claim 1, wherein the seed agent for chocolate is a fat crystal dispersion in which
25 BOB fat crystals are dispersed in a liquid oil, and the fat

crystal dispersion contains 5 to 30% by weight BOB.

5. A method for imparting a function of automatic restoration at 39°C or more to a chocolate, comprising
5 adding a fat crystal dispersion in which BOB fat crystals are dispersed in a liquid oil to a melted chocolate dough, wherein the chocolate dough contains an emulsifier containing 50 % by weight or more saturated fatty acid having 16 to 24 carbon atoms as a constituent fatty acid
10 and an extremely hydrogenated high erucic rapeseed oil, and wherein the chocolate does not contain a water-in-oil emulsion.