

CHOCOLATE AND PRODUCTION METHOD THEREFOR

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]

 A tempering of chocolate is an important operation in a production of chocolate, and it generates fine crystal nucleus when chocolate is solidified. A tempering is carried out in order to improve a release of the solidified product from a mold and to obtain a product having good properties such as gloss, glazing and texture. However, this operation is not simple, and various methods for skipping a tempering have been attempted.

[0003]

20 One method is a seed tempering including adding a shortening for chocolates, the shortening contains StOSt (a triglyceride in which fatty acids at 1,3-positions are stearic acid and fatty acid at 2-position is oleic acid) as a main component and main crystal of the shortening is stable, as a crystal nuclei to chocolate dough (Patent

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Document 1). This method enables to carry out a tempering only by adding about 0.5% by weight (wt%) of the shortening to chocolate at about 30°C and agitating, and thus is very simple. However, increasing viscosity may be occurred by generating crystal of fat in the chocolate after adding the shortening due to the temperature of about 30°C. Thus, in some cases, there has been a problem that workability of chocolate production becomes remarkably poor.

[0004]

In addition, a method of seed tempering including adding a chocolate additive (hereinafter, referred to as "BOB seed agent"), containing stabilized 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 2). In this method, 3 wt% of BOB seed agent is generally added to chocolate dough at about 35°C. The BOB seed agent includes 50 wt% of sugar as an excipient. In this case, the reason of the necessity of adding relatively large amount, 3 wt%, of seed agent is that a part of fat crystals having a function of simplifying the tempering, included in the seed agent, loses the function by melted in the chocolate.

[0005]

In general, a heat resistant temperature of a chocolate containing only cocoa butter, contained in cacao beans, as a fat component is about 31°C. Thus, there is a problem that a fat in chocolate melts 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 "bloom") is generated. However, when a seed tempering with a BOB seed agent is carried out as shown in Patent Document 2, the chocolate does not cause bloom. It is because that a part of BOB seed will remain without melting even if it exposes to such high temperature, and that the chocolate is a state being subjected to tempering by the remained seed during the solidification once again.

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 wt% of BOB seed agent and subjecting to a tempering, is 37°C.

[0006]

However, the addition of large amount of BOB seed agent as described above is not always easy in the operation in terms of uniform dispersibility into chocolate dough. This is because there is large difference in specific gravity between the BOB seed agent and the chocolate, in 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.

[0007]

Patent Document 3 describes that an adding amount can be reduced, and thus, the deterioration of workability due to the addition in large amount can be reduced and an automatic restoration of chocolate can be maintained, by blending a melted BOB-containing fat in advance into a chocolate dough.

[0008]

Meanwhile, there is a demand from a market for chocolate that can be automatically restored after exposed to high temperature, 37°C or higher.

Prior Art Documents

Patent Documents

[0009]

Patent Document 1: JP H02-406 A

5 Patent Document 2: JP S63-240745 A

Patent Document 3: JP 2007-259737 A

Summary of Invention

Problems to Be Solved by Invention

10 [0010]

As shown in Patent Document 3, for the purpose of improving the maximum temperature of automatic restoration, blending BOB-containing fat into a chocolate dough or adding a large amount of BOB seed agent enables to improve a maximum temperature of automatic restoration to 37°C or higher. However, the inventor of the present invention has found that the obtained chocolate has had a decrease in a hardness in biting, i.e. a decrease in snappiness, at room temperature, and thus, a snappy texture, which is unique to chocolate, has been lost.

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That is, an object of the present invention is to suppress a decrease in snappiness of chocolate while a maximum temperature of automatic restoration of the chocolate is improved as high as possible. More specific object is to make a maximum temperature of automatic

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restoration of a chocolate 37 to 45°C.

Means for Solving Problems

[0011]

5 As a result of intensive study in order to solve the
above problems, the present inventor has reached an idea
that the decrease in snappiness is caused by a presence of
BOB component partially melted from a blended BOB-
containing fat or BOB seed agent into chocolate fat. Thus,
10 the present inventor has intensively studied a method of
suppressing a decrease in snappiness by minimizing BOB
content in chocolate while maintaining the maximum
temperature of automatic restoration. As a result, he has
found that if a chocolate dough contains an emulsifier
15 having 7 or less HLB, the problem of the present invention
may be solved with addition of small amount of BOB seed
agent. The present invention has been completed by the
findings.

[0012]

20 That is, the present invention is:

(1) a method for producing a chocolate including adding a
powdery seed agent for chocolate to a melted chocolate
dough containing an emulsifier having 7 or less HLB,
wherein the seed agent contains stabilized crystal of
25 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), wherein the emulsifier is one or more emulsifiers selected from the group consisting of sorbitan fatty acid ester and sucrose fatty acid ester;

(3) the method of (1), wherein the emulsifier contains 50 wt% or more of saturated fatty acid having 16 to 24 carbon atoms as a constituent fatty acid;

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

(5) the method of (4), wherein the fat is extremely hydrogenated high erucic rapeseed oil or interesterified fat containing 20 wt% or more of behenic acid as a constituent fatty acid;

(6) a chocolate containing an emulsifier having 7 or less HLB and a BOB as essential components, wherein a maximum temperature of automatic restoration of the chocolate is 37 to 45°C, and wherein unmelted BOB stabilized crystal is remained in the chocolate at 37 to 45°C;

(7) a method for imparting a function of automatic restoration at 37 to 45°C to a chocolate, including adding a powdery seed agent for chocolate to a melted chocolate dough containing an emulsifier having 7 or less HLB,

wherein the seed agent contains stabilized crystal of BOB;
(8) a chocolate containing a BOB added in powder state, an emulsifier having 7 or less HLB, and extremely hydrogenated high erucic rapeseed oil.

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Effect of Invention

[0013]

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A method for producing a chocolate of the present invention enables to suppress a decrease in snappiness of the chocolate while keeping the maximum temperature of automatic restoration as high as possible. In addition, the method enables to reduce an adding amount of BOB seed agent which is expensive, and thus reduce the production costs. Further, the method may solve the problem of increasing viscosity that may occur immediately after the addition of the agent because the BOB seed agent is easily dispersed uniformly. Moreover, the maximum temperature of automatic restoration may be raised to 37°C or more depending on an adding amount and kinds of emulsifier and fat.

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Mode for Carrying Out Invention

[0014]

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Hereinafter, the present invention will be specifically described.

An emulsifier contained in the chocolate dough of the present invention needs to have 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 has 7 or less HLB value, but is preferably one or more emulsifiers selected from sorbitan fatty acid ester or sucrose fatty acid ester.

A mechanism that an addition of emulsifier enables to suppress a decrease in snappiness of the chocolate while keeping the maximum temperature of automatic restoration as high as possible even if an addition of BOB seed agent is small is still unclear. However, it is expected that the emulsifier may suppress a partial melting of stable crystals in the BOB 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. On the contrary, it is thought that a decrease in snappiness is suppressed since the BOB component which exists in melting state in chocolate fat reduces.

5 [0015]

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

An adding amount of the emulsifier contained in chocolate dough of the present invention is preferably 0.05 wt% or more, more preferably 0.1 wt% or more, further preferably 0.3% by weight or more, most preferably 0.5 wt% or more. The amount is preferably 2 wt% or less, more preferably 1.5 wt% or less, further preferably 1 wt% or less, most preferably 0.8 wt% or less. If 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. If it is less than the lower limit, the maximum temperature of automatic restoration may not be sufficiently improved.

[0016]

A BOB seed agent of the present invention is powdered and contains BOB triglyceride. It may also contain an excipient such as sugar. A BOB content in a fat contained in the BOB seed agent is preferably 40 wt% or more, more preferably 50 wt% or more, further preferably 60 wt% or more. And, it is preferably 80 wt% or less, more preferably 70 wt% or less. A fat containing BOB triglyceride may be produced by, for example, applying a selective interesterification method using enzyme activity. That is, fatty acids mainly containing behenic acid may be obtained by, for example, hydrogenating, decomposing and refining high erucic rapeseed oil, fish oil or whale oil, and then the obtained fatty acids or esters thereof are interesterified with fat mainly having oleic acid at the 2-position of glycerides to selectively bind behenic acid to the 1,3-positions, and if necessary, the obtained fat is fractionated and concentrated to obtain the fat.

[0017]

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

[0018]

A chocolate dough of the present invention preferably contains a fat containing 40 wt% or more of saturated fatty acid having 20 to 24 carbon atoms as a constituent fatty acid. The reason why containing the fat is preferable in the present invention is not clear. However, it is expected that the fat may suppress a partial melting of stable crystals in the BOB seed agent like an emulsifier. 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. An example of the latter includes BOB containing fat and random interesterified oil. The fat may 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.

[0019]

5 In the case of where the fat containing 40 wt% 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 wt% or more, more preferably 50 wt% or more, further preferably 60 wt% or more. And, it is preferably 80 wt% or less, more preferably 70 wt% or less. In addition, a content of the fat in chocolate dough is preferably 0.2 wt% or more, more preferably 0.5 wt% or more. And, it is preferably 3 wt% or less, more preferably 2 wt% or less, further preferably 1.5 wt% or less, most preferably 1 wt% or less.

20 In the case of where the fat containing 40 wt% 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 wt% or more, more preferably 25 wt% or more, further preferably 30 wt% or more. And, it is preferably 60 wt% or less, more preferably 50 wt% or less. In addition, a content of the fat in chocolate dough is preferably 0.2 wt% or more, more preferably 0.5 wt% or more. And, it is preferably 3 wt% or

less, more preferably 2 wt% or less, further preferably 1.5 wt% or less, most preferably 1 wt% or less.

[0020]

In the case of where the fat containing 40 wt% or more
5 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 wt% or more, more preferably
0.07 wt% or more, further preferably 0.1 wt% or more, most
10 preferably 0.2 wt% or more, further most preferably 0.3 wt%
or more. And, it is preferably 1.5 wt% or less, more
preferably 1 wt% 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
15 possibility that a viscosity of the chocolate dough may be
increased and that tempering may be inhibited at the time
of automatic restoration.

[0021]

An ability of automatic restoration from a storage at
20 high temperature, exhibited by a chocolate of the present
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,
25 38°C, 39°C, 40°C, 41°C, 42°C, 43°C, 44°C, 45°C in this

order. If it exceeds 45°C, adding amounts of BOB seed agent, emulsifier having 7 or less HLB, and fat containing 40 wt% or more of saturated fatty acid having 20 to 24 carbon atoms become too much, and a deterioration of snappiness of the chocolate tends to be remarkable.

[0022]

A preferred embodiment of a chocolate of the present invention is a chocolate having a maximum temperature of automatic restoration of 37 to 45°C, containing an emulsifier having 7 or less HLB and a BOB as essential components and containing unmelted BOB stabilized crystal at 37°C to 45°C. The BOB content in the oil component is preferably 1 wt% or more, more preferably 1.5 wt% or more, further preferably 2 wt% or more. And, it is preferably 4 wt% or less, more preferably 3 wt% or less.

[0023]

A chocolate targeted in the present invention is a fat 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 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 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.

Further, an emulsifier having 7 or less HLB and a fat containing 40 wt% 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.

Examples

[0024]

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 weight basis.

Table 1

Formulation of chocolate dough (part by weight)	Example 1	Comparative Example 1	Example 2	Comparative Example 2	Comparative Example 3	Comparative Example 4	Comparative Example 5
Cacao mass	34.2	34.2	34.2	34.2	34.2	34.2	34.2
Whole milk powder	6.3	6.3	6.3	6.3	6.3	6.3	6.3
Sugar	47	47	47	47	47	47	47
Cocoa butter	8.5	8.5	9.5	9.5	11.5	12	9.5
B-370*1	1	0	1	0	0	0	0
BOB fat *2	0	0	1	2	0	0	0
Seed tempering of chocolate							
Chocolate dough (wt%)	97	96	99	99	99	99.5	97
BOB seed agent (wt%)	3	4	1	1	1	0	3
StOSt seed agent (wt%)	0	0	0	0	0	0.5	0
BOB content in oil component (wt%)	3.0	4.0	2.9	4.8	1.0	0.0	3.0
Oil content of chocolate (wt%)	31.4	30.9	32.4	32.4	32.4	32.9	31.4
Maximum temperature of automatic restoration	39°C	39°C	40°C	40°C	Less than 37°C	Less than 37°C	37°C

*1 B-370 is commercially available sucrose fatty acid ester (HLB: 3.0, constituent fatty acids are shown in table 6, product name: "Ryoto Sugar Ester B-370", manufactured by Mitsubishi Kagaku Foods Co. Ltd.).

*2 BOB fat is a fat mainly containing BOB (Content of saturated fatty acid having 20 to 24 carbon atoms is 70.4 wt%, BOB content is 62 wt%).

[0025]

(Example 1)

According to the formulation of chocolate dough in table 1, a chocolate dough of Example 1 in melted state was prepared by mixing, roll refining and conching according to a conventional method. Into the prepared chocolate dough, commercially available BOB seed agent (50 wt% of fat, 50

wt% of sugar, the content of BOB in the fat: 62 wt%,
product name: "Chocoseed B (manufactured by Fuji Oil Co.,
Ltd.)" was added and dispersed at the content of 3 wt% with
respect to the chocolate dough while stirring and
controlling the temperature at 35°C, and then the chocolate
dough was subjected to seed tempering and poured onto a
template, and solidified at 10°C for 30 minutes to obtain a
chocolate of Example 1. The condition of the addition and
dispersion was good.

(Comparative Example 1)

A chocolate dough was prepared in the same manner as
in Example 1 except that the formulation was according to
Comparative Example 1 of Table 1. BOB seed agent was added
to the prepared chocolate dough in the same manner as in
Example 1 at the content of 4 wt% with respect to the
chocolate dough, to obtain a chocolate of Comparative
Example 1. The condition of the addition and dispersion
was poor.

[0026]

(Example 2)

A chocolate dough was prepared in the same manner as
Example 1 except that the formulation was according to
Example 2 of Table 1. BOB seed agent was added and
dispersed to the prepared chocolate dough in the same
manner as in Example 1 at the content of 1 wt% with respect

to the chocolate dough, and then the chocolate dough was subjected to seed tempering and poured onto a template, and solidified at 10°C for 30 minutes to obtain a chocolate of Example 2. The condition of the addition and dispersion was good.

(Comparative Example 2)

A chocolate dough was prepared in the same manner as in Example 1 except that the formulation was according to Comparative Example 2 of Table 1. BOB seed agent was added to the prepared chocolate dough in the same manner as in Example 1 at the content of 1 wt% with respect to the chocolate dough, to obtain a chocolate of Comparative Example 2.

(Comparative Example 3)

A chocolate dough was prepared in the same manner as in Example 1 except that the formulation was according to Comparative Example 3 of Table 1. BOB seed agent was added to the prepared chocolate dough in the same manner as in Example 1 at the content of 1 wt% with respect to the chocolate dough, to obtain a chocolate of Comparative Example 3.

(Comparative Example 4)

A chocolate dough was prepared in the same manner as in Example 1 except that the formulation was according to Comparative Example 4 of Table 1. SOS seed agent (product

name: "Chocoseed A (manufactured by Fuji Oil Co., Ltd.)" was added and dispersed at the content of 0.5 wt% with respect to the chocolate dough, and then the chocolate dough was subjected to seed tempering and poured onto a template, and solidified at 10°C for 30 minutes to obtain a chocolate of Comparative Example 4. The condition of the addition and dispersion was good.

(Comparative Example 5)

A chocolate dough was prepared in the same manner as in Example 1 except that the formulation was according to Comparative Example 5 of Table 1. BOB seed agent was added to the prepared chocolate dough in the same manner as in Example 1 at the content of 3.0 wt% with respect to the chocolate dough, to obtain a chocolate of Comparative Example 5. The condition of the addition and dispersion was good.

[0027]

After each chocolate was aged for 7 days under a temperature condition of 20°C, evaluation of maximum temperature of automatic restoration, evaluation of texture of the chocolate at room temperature, and hardness evaluation by breaking weight measurement were performed as follows. In addition, oil components of each chocolate were extracted by the conventional method, and the content of BOB component was measured by HPLC method. The results

are shown in Tables 1 and 2.

[0028]

(Evaluation of maximum temperature of automatic restoration)

5 The aged chocolate was placed in an incubator set at each 1°C increments in between 37 and 43°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.

10 Subsequently, the chocolate was stored at 20°C for 7 days, and then observed to confirm an occurrence of bloom.

 A maximum temperature of automatic restoration, which is maximum temperature without an occurrence of bloom, in each chocolate is shown in table 1. A chocolate having
15 37°C or more of maximum temperature of automatic restoration was considered as accepted. A chocolate having less than 37°C of maximum temperature of automatic restoration, i.e. bloom occurrence was observed in storage test at 37°C was considered as rejected.

20 [0029]

 Comparative Example 3, which is prepared by adding 1 wt% of BOB seed agent, showed insufficient, less than 37°C of, maximum temperature of automatic restoration. In addition, Comparative Example 5, which is prepared by
25 adding 3 wt% of BOB seed agent, showed acceptable, 37°C,

but the hardness in biting was soft and the snappiness was poor. Comparative Example 1, which is prepared by adding 4 wt% of BOB seed agent in order to improve the maximum temperature, showed 39°C of maximum temperature, but there was a problem of poor dispersibility due to an addition of large amount of seed agent, and the hardness in biting at room temperature was soft and the snappiness was poor.

In contrast, Example 1, which is prepared by adding 3 wt% of BOB seed agent, as in Comparative Example 5, to a chocolate dough containing sucrose fatty acid ester B-370, showed 39°C of maximum temperature, which was 2°C higher than that in Comparative Example 5. In addition, Example 1 showed clearly improved snappiness at room temperature as compared with Comparative Example 1, which achieved 39°C of maximum temperature without adding an emulsifier.

Further, Example 2, which is prepared by adding 1 wt% of BOB fat in addition to sucrose fatty acid ester B-370, achieved 40°C of maximum temperature with adding a very small amount, 1 wt%, of BOB seed agent. In addition, Example 2 showed clearly improved snappiness at room temperature as compared with Comparative Example 2, which achieved 40°C of maximum temperature without adding an emulsifier.

[0030]

Table 2

	Example 2	Comparative Example 2
Breaking weight (g) at 20°C	7300	6800
Breaking weight (g) at 25°C	3600	3400

[0031]

(Evaluation of hardness of chocolate)

5 A hardness (breaking weight) at 20°C and 25°C of the chocolates of Example 2 and Comparative Example 2 was measured with a Rheoner (manufacturer: Yamaden Co., Ltd. Condition: φ3 mm, 1.0 mm/s).

10 As a result, it was confirmed that Example 2 had a higher breaking weight and was harder at any temperature as evaluated in the texture. (Table 2).

[0032]

Table 3

Formulation of chocolate dough (parts by weight)	Example 3	Comparative Example 6	Comparative Example 7
Cacao mass	34.2	34.2	34.2
Whole milk powder	6.3	6.3	6.3
Sugar	47	47	47
Cocoa butter	10.1	8.5	10.5
B-150*1	0.1	0	0
BOB fat *2	0	2	0
Extremely hydrogenated high erucic rapeseed oil *3	0.3	0	0
Seed tempering of chocolate			
Chocolate dough (wt%)	98	98	98
BOB seed agent (wt%)	2	2	2
BOB content in oil component (wt%)	1.9	5.8	1.9
Oil content of chocolate (wt%)	31.9	31.9	31.9
Maximum temperature of automatic restoration	40°C	40°C	Less than 37°C

*1 B-150 is commercially available sorbitan fatty acid ester (HLB: 2.5, constituent fatty acids are shown in table 6, product name: "POEM B-150", manufactured by RIKEN VITAMIN Co. Ltd.).

5 *2 BOB fat is a fat mainly containing BOB (Content of saturated fatty acid having 20 to 24 carbon atoms is 70.4 wt%, BOB content is 62 wt%).

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

[0033]

(Example 3)

A chocolate dough was prepared in the same manner as
15 in Example 1 except that the formulation was according to Example 3 of Table 3. BOB seed agent was added to the prepared chocolate dough in the same manner as in Example 1 except that a content of BOB seed agent was 2 wt% with respect to the chocolate dough, to obtain a chocolate of
20 Example 3.

(Comparative Example 6)

A chocolate dough was prepared in the same manner as
in Example 1 except that the formulation was according to Comparative Example 6 of Table 3. BOB seed agent was added
25 to the prepared chocolate dough in the same manner as in

Example 1 at the content of 2.0 wt% with respect to the chocolate dough, to obtain a chocolate of Comparative Example 6.

(Comparative Example 7)

5 A chocolate dough was prepared in the same manner as in Example 1 except that the formulation was according to Comparative Example 7 of Table 3. BOB seed agent was added to the prepared chocolate dough in the same manner as in Example 1 at the content of 2 wt% with respect to the
10 chocolate dough, to obtain a chocolate of Comparative Example 7.

[0034]

 After each chocolate was aged for 7 days under a temperature condition of 20°C, evaluation of maximum
15 temperature of automatic restoration, evaluation of texture of the chocolate at room temperature, and hardness evaluation by breaking weight measurement were performed. In addition, oil components of each chocolate were extracted by the conventional method, and the content of
20 BOB component was measured by HPLC method. The results are shown in Tables 3 and 4.

[0035]

 Example 3, which is prepared by adding extremely hydrogenated high erucic rapeseed oil was added in addition
25 to sorbitan fatty acid ester B-150, achieved 40°C of

maximum temperature of automatic restoration by adding 2 wt% of BOB seed agent. The snappiness at room temperature was clearly improved as compared with Comparative Example 6, which achieved 40°C of maximum temperature of automatic restoration without adding an emulsifier.

[0036]

Table 4

	Example 3	Comparative Example 6
Breaking weight (g) at 20°C	7800	6800
Breaking weight (g) at 25°C	3700	3400

(Evaluation of hardness of chocolate)

A hardness at 20°C and 25°C of the chocolates of Example 3 and Comparative Example 6 was measured with a Rheoner (manufacturer: Yamaden Co., Ltd. Condition: $\phi 3$ mm, 1.0 mm/s). As a result, it was confirmed that Example 3 had a higher breaking weight and was harder at any temperature as evaluated in the texture. (Table 4).

[0037]

(Examples 4 to 9)

Chocolate doughs were prepared in the same manner as in Example 1 except that the formulations were according to Examples 4 to 9 of Table 5. BOB seed agent was added to the prepared chocolate dough in the same manner as in Example 1 except that a content of BOB seed agent was 2 wt% with respect to the chocolate dough, to obtain chocolates

of Examples 4 to 9.

[0038]

Table 5

Formulation of chocolate dough (part by weight)	Example 4	Example 5	Example 6	Example 7	Example 8	Example 9
Cacao mass	34.2	34.2	34.2	34.2	34.2	34.2
Whole milk powder	6.3	6.3	6.3	6.3	6.3	6.3
Sugar	47	47	47	47	47	47
Cocoa butter	10.1	9.7	9.2	10.1	9.7	9.2
B-370*1	0	0	0	0.1	0.5	1
S-370*1	0.1	0.5	1	0	0	0
Extremely hydrogenated high erucic rapeseed oil *3	0.3	0.3	0.3	0.3	0.3	0.3
Seed tempering of chocolate						
Chocolate dough (wt%)	98	98	98	98	98	98
BOB seed agent (wt%)	2	2	2	2	2	2
BOB content in oil component (wt%)	1.9	1.9	1.9	1.9	1.9	1.9
Oil content of chocolate (wt%)	31.9	31.9	31.9	31.9	31.9	31.9
Maximum temperature of automatic restoration	40°C	41°C	43°C or more	41°C	41°C	41°C

*1 S-370 is commercially available sucrose fatty acid ester (HLB: 3.0, constituent fatty acids are shown in table 6, product name: "Ryoto Sugar Ester S-370", manufactured by Mitsubishi Kagaku Foods Co. Ltd.).

*2 B-370 is commercially available sucrose fatty acid ester (HLB: 3.0, constituent fatty acids are shown in table 6, product name: "Ryoto Sugar Ester B-370", manufactured by Mitsubishi Kagaku Foods Co. Ltd.).

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

[0039]

After each chocolate was aged for 7 days under a temperature condition of 20°C, evaluation of maximum temperature of automatic restoration, evaluation of texture of the chocolate at room temperature, and hardness evaluation by breaking weight measurement were performed. In addition, oil components of each chocolate were extracted by the conventional method, and the content of BOB component was measured by HPLC method. The results are shown in Table 5.

[0040]

All of Examples 4 to 9 showed 40°C or more of the maximum temperature of automatic restoration, and thus, they were good. Especially, Example 6 showed a very good result with 43°C or more.

[0041]

The chocolates of Examples 4 to 9 and Comparative Example 2 were subjected to sensory evaluation of hardness in biting, snappiness, at a product temperature of 20°C.

As a result, the chocolate of Example 4 having the maximum temperature of automatic restoration of 40°C was a chocolate having good hardness in biting, good snappiness and good melting speed in the mouth as compared with the chocolate of Comparative Example 2 having the same maximum temperature of automatic restoration of 40°C. In addition,

Examples 5 to 9 provided chocolates having a higher maximum temperature of automatic restoration, 41 to 43°C, than that of Comparative Example 2, and the chocolates had good hardness in biting, good snappiness and good melting speed in the mouth as compared with Comparative Example 2.

[0042]

The constituent fatty acid compositions of sucrose fatty acid ester B-370, sorbitan fatty acid ester B-150, and sucrose fatty acid ester S-370 were measured. The results are shown in Table 6.

Table 6

(wt%)	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

[0043]

(Examples 10 and 11)

Chocolate doughs were prepared in the same manner as in Example 1 except that the formulations were according to Examples 10 and 11 of Table 7. BOB seed agent was added to the prepared chocolate dough in the same manner as in Example 1 except that a content of BOB seed agent was 2 wt% with respect to the chocolate dough, to obtain chocolates of Examples 10 and 11.

[0044]

Table 7

Formulation of chocolate dough (part by weight)	Example 10	Example 11
Cacao mass	34.2	34.2
Whole milk powder	6.3	6.3
Sugar	47	47
Cocoa butter	10.1	9.7
F-10 *1	0.1	
S-60V *2		0.5
Extremely hydrogenated high erucic rapeseed oil *3	0.3	0.3
Seed tempering of chocolate		
Chocolate dough (wt%)	98	98
BOB seed agent (wt%)	2	2
BOB content in oil component (wt%)	1.9	1.9
Oil content of chocolate (wt%)	31.9	31.9
Maximum temperature of automatic restoration	40°C	40°C

*1 F-10 is commercially available sucrose fatty acid ester (HLB: 1.0, constituent fatty acids are shown in table 8, product name: "DK Ester F-10", manufactured by DKS Co. Ltd.).

*2 S-60V is commercially available sorbitan fatty acid ester (HLB: 5.1, constituent fatty acids are shown in table 8, product name: "POEM S-60V", manufactured by RIKEN VITAMIN Co. Ltd.).

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

[0045]

After each chocolate was aged for 7 days under a

temperature condition of 20°C, evaluation of maximum temperature of automatic restoration, evaluation of texture of the chocolate at room temperature, and hardness evaluation by breaking weight measurement were performed.

5 In addition, oil components of each chocolate were extracted by the conventional method, and the content of BOB component was measured by HPLC method. The results are shown in Table 7.

[0046]

10 The maximum temperature of automatic restoration of Examples 10 and 11 was 40°C, and thus, they were good.

[0047]

The chocolates of Examples 10 and 11 and Comparative Example 2 were subjected to sensory evaluation of hardness
15 in biting, snappiness, at a product temperature of 20°C.

As a result, the chocolates of Examples 10 and 11 having the maximum temperature of automatic restoration of 40°C were chocolates having good hardness in biting, good snappiness and good melting speed in the mouth as compared
20 with the chocolate of Comparative Example 2 having the same maximum temperature of automatic restoration of 40°C.

[0048]

The constituent fatty acid compositions of sucrose fatty acid ester F-10 and sorbitan fatty acid ester S-60V
25 were measured. The results are shown in Table 8.

Table 8

(wt%)	C16	C18	C18:1	C18:2	C20	C22	C22 or more
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]

5 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 powdery seed agent for chocolate to a melted chocolate dough comprising an emulsifier having 7 or less HLB, wherein the seed agent comprises stabilized 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 according to claim 1, wherein the emulsifier is one or more emulsifier selected from the group consisting of sorbitan fatty acid ester and sucrose fatty acid ester.

3. The method according to claim 1, wherein the emulsifier comprises 50 wt% or more of saturated fatty acid having 16 to 24 carbon atoms as a constituent fatty acid.

4. The method according to claim 1, wherein the chocolate dough further comprises a fat comprising 20 wt% or more of saturated fatty acid having 20 to 24 carbon atoms as a constituent fatty acid.

5. The method according to claim 4, wherein the fat is

extremely hydrogenated high erucic rapeseed oil or interesterified fat comprising 20 wt% or more of behenic acid as a constituent fatty acid.

5 6. A chocolate comprising an emulsifier having 7 or less HLB and a BOB as essential components, wherein a maximum temperature of automatic restoration of the chocolate is 37 to 45°C, and wherein unmelted BOB stabilized crystal is remained in the chocolate at 37 to
10 45°C.

 7. A method for imparting a function of automatic restoration at 37 to 45°C to a chocolate, comprising adding a powdery seed agent for chocolate to a melted chocolate
15 dough containing an emulsifier having 7 or less HLB, wherein the seed agent comprises stabilized crystal of BOB.

 8. A chocolate comprising a BOB added in powder state, an emulsifier having 7 or less HLB, and extremely
20 hydrogenated high erucic rapeseed oil.