

DESCRIPTION

Title of Invention: CHOCOLATE

Technical Field

[0001] The present invention relates to a high cacao mass content chocolate with a reduced bitterness and astringency.

Background Art

[0002] Cacao polyphenol contained in cacao mass is verified to have an antioxidant effect, and thus chocolates produced using the cacao mass as the main ingredient are also expected to provide the same effect. However, the cacao mass has an intense bitterness and astringency. Chocolates having a high cacao mass content increase a cacao polyphenol intake per unit amount and enable an efficient cacao polyphenol intake, however the bitterness and astringency are intensified thereby reducing the palatability.

[0003] Patent Literature 1 discloses a technique for producing a cacao mass with a favorable flavor by treating a roasted cacao mass with an oxygen gas to reduce unpleasant components that cause a acidity and astringency. Patent Literature 2 discloses a technique for reducing a bitter-astringent by adding a taste modifier to a chocolate, and describes that a heated product obtained by heating palatinose from 140°C to 200°C is the effective component of the taste modifier.

Citation List

Patent Literature

[0004]

Patent Literature 1: Japanese Unexamined Patent Publication No. H3-15344

Patent literature 2: Japanese Unexamined Patent Publication No. 2004-2241

Summary of Invention

Technical Problem

5 [0005] An object to be solved by the invention is to reduce the bitterness and astringency of chocolates having a high cacao mass content.

Solution to Problem

10 [0006] The present inventors conducted extensive studies and have consequently accomplished a technique for reducing the bitterness and astringency by modifying the shape of a chocolate and further adding an emulsifier.

More specifically, the present invention provides the following (1) and (2).

15 (1) A chocolate bar containing sucrose palmitate and having a cacao mass content of 35 mass% or more, wherein

(i) a sucrose palmitate content is between 0.2 mass% and 0.5 mass%, inclusive, and a thickness of the chocolate bar is between 1 mm and 3 mm, inclusive, or

20 (ii) a sucrose palmitate content is between 0.1 mass% and 0.5 mass%, inclusive, and a thickness of the chocolate bar is between 1 mm and 2 mm, inclusive.

(2) The chocolate bar according to (1) having a mass of between 2 g and 6 g, inclusive, per bar.

Advantageous Effects of Invention

25 [0007] According to the present invention, in the chocolate having a

cacao mass content of 35 mass% or more, the bitterness and astringency can be reduced by adding a predetermined amount of sucrose palmitate and adjusting the chocolate to have a predetermined thickness.

Description of Embodiments

5 [0008] Hereafter, embodiments to carry out the present invention are described in detail.

[0009] The chocolate bar of the present invention contains 35 mass% or more of a cacao mass based on a total mass of the chocolate bar. Chocolates having a cacao mass content below 35 mass% do not have
10 an intense bitterness or astringency, hence not the object to be solved by the present invention. It is preferable that a cacao mass content be 60 mass% or more since the reducing effect on the chocolate bitterness and astringency of the present invention is notably demonstrated. Ingredients other than the cacao mass may be those used for producing
15 the common chocolates such as sugars, milk powders, cocoa butters, vegetable oils and fats, lecithin and flavors. The moisture content in the chocolate bar of the present invention is not particularly limited but preferably 3 mass% or less and more preferably 2 mass% or less based on a total mass of the chocolate bar. A moisture content in such a
20 range is preferable because it provides the chocolate bar with a suitable hardness and achieves a superior snap.

[0010] The chocolate bar of the present invention comprises the combination of a predetermined sucrose palmitate content and a predetermined thickness thereof. More specifically, (1) when a
25 sucrose palmitate content is between 0.2 mass% and 0.5 mass% , inclusive, based on a total mass of the chocolate bar, a thickness of the

chocolate bar is between 1 mm and 3 mm, inclusive, or (2) when a sucrose palmitate content is between 0.1 mass% and 0.5 mass%, inclusive, based on a total mass of the chocolate bar, a thickness of the chocolate bar is between 1 mm and 2 mm, inclusive. Thus, the
5 reducing effect on the bitterness and astringency can be remarkably enhanced by the synergistic effect of including the sucrose palmitate in the chocolate and thinning the thickness of the chocolate.

[0011] In the chocolate bar of the present invention, the viscosity of the chocolate in a melted state hardly changes even when sucrose palmitate
10 is added. For this reason, the workability such as easily molding the chocolate in a melted state into a thin shape is assured. Meanwhile, sucrose palmitate when contained in the chocolate bar of the present invention can achieve the reducing effect on the bitterness and astringency caused by a high cacao mass content and the strength of the
15 chocolate bar after solidified can be increased. The HLB value of sucrose palmitate contained in the chocolate bar of the present invention is not particularly limited and preferably 10 to 19 and more preferably 14 to 18. With HLB values in such a range, the reducing effect on the bitterness and astringency of the present invention is easily
20 demonstrated.

[0012] The chocolate bar of the present invention has a thickness of between 1 mm and 3 mm, inclusive, or between 1 mm and 2 mm, inclusive. The typical chocolate bars have a thickness of about 5 mm at the thinnest. Generally, when a chocolate bar is thinner than 5 mm,
25 it is difficult to provide a hardness accordingly failing to achieve a superior snap. The chocolate bar of the present invention, when

containing a predetermined amount of sucrose palmitate, can increase the strength after solidified thereby being thinner than the common chocolate bars.

[0013] The method for producing the chocolate may be those used for producing the common chocolates. For example, some of the chocolate ingredients are mixed, ground using a refiner roll and the like, and subsequently conched and the remaining chocolate ingredients are fed, followed by further mixing to obtain a chocolate in a melted state. Sucrose palmitate may be added at any stage of the production steps but is preferably added after the refiner roll treatment because the chocolate ingredients mixture is more efficiently crushed with a refiner roll than added before the refiner roll treatment.

[0014] Then, the chocolate in a melted state is molded into a predetermined shape, cooled and solidified to obtain the final product.

During this operation, the molding is carried out to obtain the thickness of between 1 mm and 3 mm, inclusive, or between 1 mm and 2 mm, inclusive. It is preferable that a mass be between 2 g and 6 g, inclusive, per bar. Thus, the reducing effect on the bitterness and astringency of the present invention is easily demonstrated while the chocolate flavor is maintained. The method for molding the chocolate in a melted state into a predetermined shape is not particularly limited. The melted chocolate may be injected into a mold of predetermined shape, cooled, solidified and subsequently detached or may be molded into a large chocolate bar having a thickness of between 1 mm and 3 mm, inclusive, or between 1 mm and 2 mm, inclusive, using a stencil and the like, solidified and subsequently cut in to achieve a

predetermined mass.

[0015] In an embodiment of the present invention, the shape of a chocolate is bar form but may be curved or bent, or may even have for example, a hemispherical or box-shaped shell structure. In this instance, the thickness of the wall forming the shell may be between 1 mm and 3 mm, inclusive, or between 1 mm and 2 mm, inclusive. The chocolate bar surface may be adorned with patterns and projections as long as the effect of the present invention can be provided. In this instance, the thickness of the thinnest part of the chocolate may be between 1 mm and 3 mm, inclusive, or between 1 mm and 2 mm, inclusive.

[0016] A B-type viscometer is used for the viscosity measurement of the chocolate. The viscosity is calculated from the stress imposed when a No. 6 rotor is rotated at 4 rpm in a melted chocolate at a product temperature of 40°C.

Examples

[0017] Hereinafter, the embodiments of the present invention are further described in detail with reference to Examples but the present invention is not limited thereto.

[0018] (Production Example 1)

A chocolate dough (chocolate ingredients mixture) was obtained by a routine method using 25 mass parts of a sugar, 64 mass parts of a cacao mass, 5 mass parts of a cocoa powder, 4.5 mass parts of a cocoa butter, 0.5 mass parts of lecithin and 1 mass part of a flavor. 99.5 Mass parts of the obtained chocolate dough and 0.5 mass parts of sucrose palmitate were mixed to obtain a sucrose palmitate-containing chocolate

dough.

(Test Example 1)

The obtained sucrose palmitate-containing chocolate dough was tempered in accordance with a routine method, 4 g of which was injected to each of the molds of various sizes to mold chocolate bars of different thicknesses.

[0019] The sizes of the obtained chocolate bars are shown in Table 1. The overall quality of each of the chocolates when consumed was evaluated with the aroma, bitterness and astringency of the chocolate as indicators, according to the following scale: A: Very desirable, B: Desirable, C: somewhat desirable, D: somewhat undesirable, E: Undesirable and F: Very undesirable.

[0020]

[Table 1]

Shape and quality evaluation of chocolates

Test plot	Shape			Quality evaluation
	Length (mm)	Width (mm)	Thickness (mm)	
Example 1	60.00	28.50	1.20	A
Example 2	43.00	43.00	2.88	A
Comparative Example 1	38.00	40.00	3.39	B
Comparative Example 2	34.00	18.00	5.39	D
Comparative Example 3	43.00	22.00	6.00	E
Comparative Example 4	12.00	12.00	10.00	F

[0021] [Example 1]

When put in the mouth, the chocolate had an aroma and the aftertaste had little bitterness and little astringency thereby providing a very desirable quality.

[Example 2]

5 When put in the mouth, the chocolate had an aroma and the aftertastes had little bitterness and little astringency thereby providing a very desirable quality.

[0022] [Comparative Example 1]

10 When put in the mouth, the chocolate had a slight aroma and the aftertastes had slightly little bitterness and slightly little astringency thereby providing a desirable quality.

[Comparative Example 2]

15 When put in the mouth, the chocolate had a slightly weak aroma and the aftertastes had slightly intense bitterness and slightly intense astringency thereby providing a somewhat undesirable quality.

[Comparative Example 3]

20 When put in the mouth, the chocolate had a weak aroma and the aftertastes had intense bitterness and intense astringency thereby providing an undesirable quality.

[Comparative Example 4]

 When put in the mouth, the chocolate had a weak aroma and the aftertastes had very intense bitterness and astringency thereby providing a very undesirable quality.

[0023] (Test example 2)

25 Chocolate bars each having a different sucrose palmitate content and chocolate thickness were produced and evaluated for the quality and

strength. The quality points present the evaluation results on the total quality. The evaluation was conducted according to the following 10-point scale: 10 = the most desirable quality to 1 = the most undesirable quality.

- 5 [0024] The strength measurement was carried out using a rheometer (model name: RTC-301 D-CW, manufactured by FUDOH), and the maximum stress at which a 3 mm diameter-cylindrical plunger was advanced at a speed of 20 mm/second until the chocolate bar broke was defined as the strength. The results are shown in Table 2 and Table 3.
- 10 The relative strengths, when the strength of the chocolate bar at the time of not adding sucrose palmitate was defined as 1, were shown in Table 4. The chocolate doughs used and the viscosity of sucrose palmitate-containing chocolate doughs are shown in Table 5.
- [0025]

[Table 2]

Chocolate thickness, sucrose palmitate content and quality

Thickness (mm)	Sucrose palmitate content (mass%)	0.0%	0.1%	0.2%	0.5%
1.20	Evaluation	Not so astringent. Slightly astringent aftertaste.	Not astringent. Weak bitterness.	Not astringent. Weak bitterness.	Least astringent. Weak bitterness.
	Point	6	7	9	10
2.88	Evaluation	Bitter, astringent. Heavy aftertaste.	Bitter, astringent. Heavy aftertaste. Weak astringency moderating effect.	Not astringent. Weak bitterness.	Not astringent. Weak bitterness.
	Point	4	6	8	9
3.39	Evaluation	Bitter, astringent. Heavy aftertaste.	Bitter, astringent. Heavy aftertaste.	Not astringent. Weak bitterness.	Not astringent. Weak bitterness.
	Point	4	5	8	9
5.39	Evaluation	Bitter, astringent. Heavy aftertaste.	Bitter, astringent. Heavy aftertaste.	Bitter, astringent. Heavy aftertaste.	Not astringent. Weak bitterness.
	Point	3	4	6	8
6.00	Evaluation	Bitter, astringent. Heavy aftertaste.	Bitter, astringent. Heavy aftertaste.	Bitter, astringent. Heavy aftertaste.	Not astringent. Weak bitterness.
	Point	3	4	6	7

10.00	Evaluation	Bitter, astringent. Heavy aftertaste.	Bitter, astringent. Heavy aftertaste.	Bitter, astringent. Heavy aftertaste.	Bitter, astringent. Heavy aftertaste.
	Point	2	3	5	6

[0026] [Table 3]

Chocolate strength (Unit: kgf)

	Sucrose palmitate content (mass%)			
Thickness (mm)	0.0%	0.1%	0.2%	0.5%
1.20	0.89	1.16	1.23	1.50
2.88	3.19	3.31	3.51	4.10
3.39	4.39	3.55	4.01	4.09
5.39	5.76	5.81	6.12	6.33
10.00	7.33	7.41	6.93	7.21

[0027] [Table 4]

5 Chocolate relative strength

Thickness (mm)	0.0%	0.1%	0.2%	0.5%
1.20	1.00	1.31	1.39	1.69
2.88	1.00	1.04	1.10	1.29
3.39	1.00	0.81	0.91	0.93
5.39	1.00	1.01	1.06	1.10
10.00	1.00	1.01	0.95	0.98

[0028] [Table 5]

Chocolate dough viscosity

Sucrose palmitate content (mass%)	Viscosity (CPS)
0	29500
0.1	29750
0.2	30250
0.5	31750

10 [0029] The chocolate bars having a thickness of 1.20 mm and 2.88 mm had notably increased strengths as the sucrose palmitate content increased. However, the chocolate bars having a thickness greater than 3 mm did not have significant increases in the strengths by sucrose

palmitate. Additionally, the viscosity increase of the chocolate dough was 7.6% when 0.5 mass% of sucrose palmitate was added.

[0030] When the chocolate bars molded to have a thickness of 1.20 mm was consumed, the chocolate bars to which 0.5 mass% of sucrose palmitate was added had a desirable texture with a superior snap as a chocolate bar compared with the chocolate bars to which sucrose palmitate was not added.

[0031] Various emulsifier-containing chocolates were produced with the same formulation as Production Example 1, except that sucrose palmitate was replaced with another emulsifier, and molded into a square bar form each sized to have a length of 20 mm, a width of 20 mm and a thickness of 2 mm.

[0032] The obtained chocolate bars were each evaluated for the bitterness, astringency and quality. The reducing effects on the bitterness and astringency were evaluated according to the following scale: 4 = very effective to 1 = not effective. The results are shown in Table 6.

[0033]

[Table 6]

Reducing effects of different emulsifiers on bitterness and astringency

Test plot	Sample names	Maker	HLB	Composition	Evaluation	Comment
Comparative Example 5	Sunsoft Q-12S	Taiyo Kagaku Co., Ltd.	15.5	Decaglycerol monolaurate	1	Heavy taste in the middle. Bitterness diminished thereafter, slightly left in the end but the aroma was also slightly left in the end.
Comparative Example 6	Sunsoft Q-14S	Taiyo Kagaku Co., Ltd.	14.5	Decaglycerol monomyristate	1	Lighter taste than Comparative Example 5. Weak flavor. Sourness tends to be noted.
Comparative Example 7	Sunsoft Q-17S	Taiyo Kagaku Co., Ltd.	12	Decaglycerol monooleate	3	More favorable aroma than Comparative Examples 5 and 6. Less bitter than Control. Slight bitterness lingered but light taste.
Comparative Example 8	Sunsoft Q-18S	Taiyo Kagaku Co., Ltd.	12	Decaglycerol monostearate	-	Not evaluated.
Comparative Example 9	Sunsoft A-121E	Taiyo Kagaku Co., Ltd.	14	Pentaglycerol monolaurate	1	Astringent from the middle to the end. More astringent than Comparative Examples 5, 6 and 1.

Comparative Example 10	Sunsoft A-141E	Taiyo Kagaku Co., Ltd.	13	Pentaglycerol monomyristate	1	Astringent with no aroma. As astringent as Comparative Example 8.
Comparative Example 11	Sunsoft A-171E	Taiyo Kagaku Co., Ltd.	13	Pentaglycerol monooleate	3	Substantially no bitterness or astringency but had an aroma in good balance. Light taste. A sharp finish.
Comparative Example 12	Sunsoft A-181E	Taiyo Kagaku Co., Ltd.	13	Pentaglycerol monostearate	-	Not evaluated due to the spherical emulsifier particles.
Comparative Example 13	Sunsoft Q-12D	Taiyo Kagaku Co., Ltd.	8.5	Diglycerol monolaurate	2	Dissolved well but had a bitterness.
Comparative Example 14	RYOTO Sugar Ester S1670	Mitsubishi-Kagaku Foods Corporation	16	Sucrose stearate	3	Slightly astringent but dissolved well.
Example 3	RYOTO Sugar Ester P1670	Mitsubishi-Kagaku Foods Corporation	16	Sucrose palmitate	4	Very light taste, dissolved quickly and well.
Comparative Example 15	RYOTO Sugar Ester M1695	Mitsubishi-Kagaku Foods Corporation	16	Sucrose myristate	1	Very intense astringency. Dissolved slowly.

Comparative Example 16	RYOTO Sugar Ester O170	Mitsubishi-Kagaku Foods Corporation	1	Sucrose oleate	1	Dissolved slowly.
Comparative Example 17	RYOTO Sugar Ester L1695	Mitsubishi-Kagaku Foods Corporation	16	Sucrose laurate	1	Molded afterward. Sensed a bitterness. Hardly dissolved.
Comparative Example 18	None	-	-	-	2	Control

[0034] The chocolates containing decaglycerol monooleate, pentaglycerol monooleate or sucrose palmitate had suppressed bitterness and astringency with good aroma, hence were desirable. The chocolates particularly containing sucrose palmitate had a very refreshing quality, hence were particularly desirable.

[0035] The chocolate doughs produced using chocolate doughs each having a different cacao mass content by the method as in Production Example 1, to some of which sucrose palmitate was added and to some other of which sucrose palmitate was not added, were each molded into a 2.6 mm-thickness bar form, solidified and subsequently consumed to compare the qualities thereby evaluating the reduction of the bitterness and astringency when sucrose palmitate was added. Table 7 shows the chocolates used and Table 8 shows the results of quality evaluation. The reducing effects of the emulsifiers on the bitterness and astringency were evaluated according to the following scale: A: Notably effective, B: Effective, C: Slightly effective and D: Not effective.

[0036]

[Table 7]

Chocolate formulation

Ingredients	Example 4	Example 5	Example 6	Example 7	Comparative Example 17	Comparative Example 18	Comparative Example 19
Sugar	1.6	10.8	25.2	43.9	42.1	33.7	35.0
Cacao mass	87.0	73.2	64.7	37.0	22.4	13.2	-
Cocoa powder	10.8	12.0	5.0	-	-	-	-
Cocoa butter	-	3.3	4.4	0.5	16.8	11.7	21.5
Vegetable fats and oils	-	-	-	13.8	-	11.6	10.1
Whole milk powder	-	-	-	4.2	18.1	25.2	31.0
Defatted milk powder	-	-	-	-	-	4.0	1.7
Lecithin	0.5	0.5	0.5	0.5	0.5	0.5	0.6
Flavor	0.1	0.2	0.2	0.1	0.1	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[0037]

[Table 8]

Main components of chocolate doughs

Test plot	Cacao mass amount (mass%)	Whole milk powder content (mass%)	Defatted milk powder content (mass%)	Oil content	Reducing effect on bitterness and astringency
				(mass%)	
Example 4	87.0	0.0	0.0	51.0	A
Example 5	73.2	0.0	0.0	46.0	A
Example 6	64.7	0.0	0.0	41.5	A
Example 7	37.0	4.3	0.0	36.5	C
Comparative Example 17	22.4	18.0	0.0	34.5	D
Comparative Example 18	13.2	25.2	0.0	38.0	D
Comparative Example 19	0.0	31.5	1.7	40.0	D

[0038] The chocolates having a cacao mass content of 64.7 mass% or more demonstrated notable reduction in the chocolate bitterness and astringency by the addition of sucrose palmitate. The chocolates having a cacao mass content of 37 mass% also demonstrated to be effective. However, the chocolates having a cacao mass content of 22.4 mass% or less demonstrated no effect when sucrose palmitate was added.

CLAIMS

1. A chocolate bar containing sucrose palmitate and having a cacao mass content of 35 mass% or more, wherein
 - (i) a sucrose palmitate content is between 0.2 mass% and 0.5 mass%, inclusive, and a thickness of the chocolate bar is between 1 mm and 3 mm, inclusive, or
 - (ii) a sucrose palmitate content is between 0.1 mass% and 0.5 mass%, inclusive, and a thickness of the chocolate bar is between 1 mm and 2 mm, inclusive.
2. The chocolate bar according to claim 1 having a mass of between 2 g and 6 g, inclusive, per bar.