

CHOCOLATE CRUMB PRODUCING METHOD

BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

[0001] The present invention relates to a method for producing a chocolate crumb. More particularly, the present invention relates to a method for producing a chocolate crumb with the rich, savory, caramel or caramel-like flavor of heated milk.

2. DESCRIPTION OF THE RELATED ART

[0002] The production of crumbs includes processes such as the Maillard reaction with proteins and saccharides. Crumbs are also often used as an intermediate product in the production of chocolate. For example, in the production of chocolate products, crumbs are mixed with chocolate ingredients, followed by refining, conching, and temperature conditioning. Crumbs may make up the majority (about 70%) of the ingredients in milk chocolate.

[0003] The flavor from crumbs is attributed to flavor precursors produced by the Maillard reaction. Thus, the Maillard reaction imparts the flavor and color required for the crumbs. In the Maillard reaction, saccharides in the crumb ingredients react with free amino acids and peptides to produce a brown substance. This is said to affect the flavor and color. The free amino acids and peptides are known to be derived from solid milk and proteins.

[0004] In conventional techniques, the Maillard reaction is regulated by adjusting the type and amount of crumb ingredients. For example, Patent Literature 1 describes the invention of manipulating the raw materials used in crumb processing or using other raw materials to increase the consumption of amino flavor precursors during crumb processing and to alter the flavor intensity and profile of the resulting crumbs. More specifically, there is disclosed a method of making crumbs in which about 15 to about 70 mass% (i.e., % by mass) of milk solid is mixed and heated with about 10 to about 75 mass% of saccharide and about 0.1 to

about 10 mass% of milk or plant protein hydrolysate, the percentages being in terms of weight of the mixture.

[0005] In the conventional method of producing chocolate crumbs, it is difficult to produce chocolate crumbs having the rich, savory, caramel or caramel-like flavor of heated milk, and a more convenient method of producing chocolate crumbs is required.

[0006] [Patent Literature 1] JP2004-514453A

SUMMARY OF THE INVENTION

[0007] It is an object of the present invention to provide a method for producing chocolate crumbs with the rich, savory, caramel or caramel-like flavor of heated milk.

[0008] In order to achieve the above-mentioned object, a method for producing chocolate crumbs was diligently studied. As a result, it was found that not only mixing crumb raw materials in specific amounts and performing a Maillard reaction but also adjusting the Maillard reaction in advance so that a specific moisture content ratio is reached before heating in order to adjust the way the Maillard reaction occurs, can produce the desired chocolate crumb.

[0009] In other words, the present invention may include the following aspects.

The first aspect of the invention provides a method for producing a chocolate crumb comprising 1 to 70 mass% of solid milk or protein-containing raw material, 0 to 20 mass% of oil-and/or-fat, and 15 to 96 mass% of saccharide, the method comprising an adjustment process, in which, before Maillard reaction with the solid milk or protein-containing raw material and saccharide occurs, a moisture regulator is added to adjust moisture content during the reaction to 5 to 12 mass% per 100 mass% of a chocolate crumb raw material, and a Maillard reaction process, in which the chocolate crumb raw material with the adjusted moisture content during the reaction is heated to cause the Maillard reaction.

The second aspect of the invention provides the method for producing the chocolate crumb according to the first aspect, wherein in the Maillard reaction process, the reaction temperature is 100 to 120 degrees C and the reaction is carried out for 1 to 60 minutes.

The third aspect of the invention provides the method for producing the chocolate crumb according to the first aspect, wherein in the Maillard reaction process, the reaction temperature is 100 - 120 degrees C and the reaction is carried out for 3 - 40 minutes.

The fourth aspect of the invention provides the method for producing the chocolate crumb according to the first aspect, wherein in the Maillard reaction process, the reaction temperature is 100 - 120 degrees C and the reaction is carried out for 5 - 30 minutes.

The fifth aspect of the invention provides the method for producing the chocolate crumb according to the first aspect, wherein in the Maillard reaction process, the reaction temperature is 110 - 115 degrees C and the reaction is carried out for 3 - 40 minutes.

The sixth aspect of the invention provides the method for producing the chocolate crumb according to any one of the first to fifth aspects, wherein after the Maillard reaction process, cacao mass is added.

The seventh aspect of the invention provides the method for producing the chocolate crumb according to any one of the first to sixth aspects, further comprising a drying process after the Maillard reaction process.

The eighth aspect of the invention provides the method for producing the chocolate crumb according to the seventh aspect, wherein the drying process is a process for removing moisture by decompression or vacuum drying.

The ninth aspect of the invention provides a food product using the chocolate crumb obtained by the method for producing the chocolate crumb according to any one of the first to eighth aspects.

The tenth aspect of the invention provides the food product according to the ninth aspect, wherein the food product is selected from the group consisting of chocolate, chocolate cream and ice cream mixes, drinks, baked goods, and fresh confectionery.

[0010] Advantageous Effects of the Invention

The invention can impart the rich, savory, caramel or caramel-like flavor of heated milk to chocolate and other food products.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0011] [Chocolate crumb]

The “chocolate crumb” of the present invention is a crumb produced from solid milk or protein-containing raw material, oil-and/or-fat, and saccharide (hereafter, solid milk or protein-containing raw material, oil-and/or-fat, saccharide, and other raw materials are collectively referred to as “chocolate crumb raw material”). The term “100 mass% of chocolate crumb ingredients” means the sum of mass% (percent by mass) of the milk solids or protein-containing ingredients, mass% of the oil-and/or-fat, mass% of the saccharides, and mass% of the other ingredients, which together constitute 100 mass%. The term “crumb” refers to a solid substance with flavor precursors obtained by the Maillard reaction of free amino acids or peptides contained in the solid milk or protein-containing raw material with saccharide. For example, in the production of milk chocolate, it is mixed with chocolate ingredients, followed by refining, conching and tempering.

[0012] (Raw material containing milk solids or protein)

In the present invention, the term “solid milk or protein-containing raw material” refers to any raw material that contains protein, such as whole milk powder, skimmed milk powder, whey powder, buttermilk powder, creaming powder, and soy flour. Whole milk powder is a powder obtained by removing water from raw milk, cow’s milk, or special milk. Also, skimmed milk powder is dried skimmed milk (from animal milk from which most of the milk fat has been removed; in the case of cow’s milk, the nonfat solids content is 8.0% or more

and the milk fat content is less than 0.5%). Whey is the supernatant that is produced when cheese and other products are prepared from milk, and is also called milk serum. Whey powder is the powdered product of whey. Buttermilk powder is a powder made by drying the liquid obtained during the churning process when butter is made from cream, and contains high levels of phospholipids. Creaming powder is a food product made mainly from dairy products such as skimmed milk powder to which cream, vegetable fat, saccharide, and flavorings are added. Soybean flour includes full-fat soybean flour made by grinding dehulled whole soybeans, defatted soybean flour made by grinding defatted soybeans, deodorized full-fat soybean flour made by heating and deodorizing full-fat soybean flour, etc. In the present invention, it is preferable to use one or more of the following as the “raw material containing solid milk or protein”: whole milk powder, skimmed milk powder, whey powder, buttermilk powder, creaming powder, and soybean powder.

[0013] The amount of the “raw material containing solid milk or protein” used in the present invention is from 1 to 70 mass%, more preferably from 10 to 60 mass%, and even more preferably from 20 to 50 mass% when the chocolate crumb raw material is 100 mass%. Such an amount allows the Maillard reaction to occur in a controlled manner, thus obtaining desirable chocolate crumbs.

[0014] (Oil-and/or-fat)

The oil-and/or-fat in the present invention is not limited as long as it is an edible oil-and/or-fat, and any known edible oil-and/or-fat can be used. For example, vegetable oils such as rapeseed oil, high oleic rapeseed oil, soybean oil, high oleic soybean oil, corn oil, cottonseed oil, safflower oil, high oleic safflower oil, olive oil, sunflower oil, high oleic sunflower oil, rice oil, peanut oil, palm oil, sesame oil, grapeseed oil, macadamia nut oil, hazelnut oil, almond oil, pumpkin oil, walnut oil, camellia oil, tea oil, wheat germ oil, palm kernel oil, coconut oil, animal fats such as beef fat, pork fat, fish oil, chicken oil, milk fat, and hardened, fractionated or esterified oil-and/or-fat of these oils-and/or-fats. The above edible oil-and/or-

fat may be used alone or in the combination of two or more types. It is preferable to use one or more of the oils-and/or-fats in the present invention, which are selected from the group consisting of cacao butter (i.e., cocoa butter), coconut oil, and olive oil.

The aforementioned cacao butter may be added in the state of cacao raw material containing cacao butter, such as cacao mass (i.e., cocoa mass) (cacao mass contains about 55% cacao butter). Therefore, oil-and/or-fat in the present invention shall also include cacao raw material containing cacao butter such as cacao mass. The oil-and/or-fat in the present invention shall not include raw materials containing oil-and/or-fat other than the aforementioned cacao raw material.

It is more preferred that the oil-and/or-fat in the present invention be made from cacao mass.

[0015] The use amount of oil-and/or-fat in the present invention is from 0 to 20 mass%, preferably from 0 to 18 mass%, more preferably from 1 to 18 mass%, and even more preferably from 1 to 15 mass%, when the chocolate crumb raw material is 100 mass%. Such an amount allows the Maillard reaction to occur in a controlled manner, thus obtaining a desirable chocolate crumb.

[0016] (Saccharide)

Saccharides in the present invention can be any edible saccharide such as sucrose, glucose, dextrose, lactose, maltose, maltose syrup, malt extract, fructose, invert sugar, solid corn syrup, rhamnose, fucose, or polyols, such as sorbitol, mannitol, xylitol, maltitol, lactitol, polydextrose, and other sugar substitutes or mixtures thereof can be used. Sucrose alone is preferred as the saccharide used, but one or more other saccharides can be used in combination with sucrose as a necessity. If necessary, a low-calorie sweetener can also be used as part of the saccharide.

[0017]

The amount of saccharide used in the present invention is from 15 to 96 mass%, more preferably from 30 to 90 mass%, and even more preferably from 50 to 80 mass%, when the

chocolate crumb raw material is 100 mass%. Such an amount allows the Maillard reaction to occur in an adjustable manner, thus obtaining a desirable chocolate crumb.

[0018] (Moisture regulator)

The moisture regulator in the present invention can be any liquid that contains moisture and has a characteristic moisture and flavor, such as water, milk, cream, soy milk, coconut milk, cacao pulp (i.e., cocoa pulp), and fruit juice. Each of the moisture regulators used is preferably used alone, but can also be used in combination with other moisture regulators if necessary. It is preferred to use one or more of the following moisture regulators from the group consisting of water, milk, cream, cacao pulp, and fruit juice.

[0019] (Other Raw Materials)

As other raw materials included in the chocolate crumb ingredients of the present invention, those normally used in the manufacture of crumbs can be used, such as sodium chloride and other salts, dietary fiber, emulsifiers, antioxidants, thickening agents, minerals, flavorings, food colorings, and the like. And one or more of these other raw materials can be used in any combination. Conventional methods for adding the above other raw materials can be used. The amount of other raw materials added can be determined by a person skilled in the art to the extent that the effect of the invention is not impaired.

[0020] The moisture regulator in the present invention is used to achieve 5 to 12 mass% of moisture content during the reaction per 100 mass% of the chocolate crumb raw material. For example, 5 to 12 mass% of moisture regulator is added to 40 mass% of solid milk or protein-containing raw material, 15 mass% of cacao mass, and 45 mass% of saccharide. The moisture regulator is added based on the moisture equivalent. That is, when the moisture regulator is water, 5 to 12 mass% of water is added to 100 mass% of the chocolate crumb ingredients. On the other hand, when milk is used, since the moisture content of milk is approximately 88.5 mass%, 5.6 to 13 mass% of milk is added to 100 mass% of the chocolate crumb ingredient. The moisture content during the reaction is preferably 6 to 10 mass%, and more preferably 8

to 10 mass%. By adjusting the moisture content during the reaction, it is possible to adjust the way the Maillard reaction occurs and obtain a desirable chocolate crumb.

[0021] [Production of Chocolate Crumbs]

The method for manufacturing chocolate crumbs in the present invention includes two steps: an adjustment process, in which, before the Maillard reaction with solid milk or protein-containing raw materials and saccharide occurs, a moisture regulator is added to adjust the moisture content during the reaction to 5 to 12 mass% per 100 mass% of a chocolate crumb raw material, and a Maillard reaction process, in which the chocolate crumb raw material with the adjusted moisture content during the reaction is heated to cause the Maillard reaction. The chocolate crumb obtained by said manufacturing process includes 1 to 70 mass% of solid milk or protein containing raw materials, 0 to 20 mass% of oil-and/or-fat, and 15 to 96 mass% of saccharide. The solid milk or protein-containing raw material, oil-and/or-fat, and saccharide constituting the chocolate crumb ingredients hardly change their mass even if the water evaporates in the heating or drying process.

[0022] (Adjustment process to adjust the moisture content at the time of reaction to 5-12 mass% by adding a moisture regulator before the Maillard reaction with the solid milk or protein-containing raw material and saccharide occurs)

First, solid milk or protein-containing raw material, oil-and/or-fat, and saccharide as described above should be purchased or prepared. The solid milk or protein-containing raw material and saccharide, or the solid milk or protein-containing raw material, oil-and/or-fat and saccharide are mixed by adding the moisture regulator described above to obtain a mixture, and the moisture content during the reaction is adjusted to be within a predetermined numerical range. The process of adding and mixing the above-mentioned moisture regulator can be performed according to conventionally known methods. For example, raw material containing solid milk or protein and saccharide, or raw material containing solid milk or protein, oil-and/or-fat, and saccharides are placed in a device (reactor), and the moisture

regulator is added to these materials to obtain the predetermined moisture content during the reaction and stirred well to obtain a mixture in a sufficiently dispersed or mixed state. The moisture content during a reaction of this mixture is 5 to 12 mass%, more preferably 6 to 10 mass%, and even more preferably 8 to 10 mass%. Here, the temperature at which the mixture is mixed and stirred should generally be about room temperature (20 degrees C), and for mixing, mechanical devices such as mixers, paddle mixers, Nauter mixers, Henschel mixers, fluidized bed mixers, V blenders, homogenizers, etc., which are regularly used for ordinary mixing, can be used.

As mentioned above, there are two possible patterns of adding oil-and/or-fat: before and after the Maillard reaction. The reason for this is that oil-and/or-fat does not mix well with solid milk or protein-containing raw material and hydrophilic substances such as saccharide, which are raw materials that can be ignored when considering the moisture content during the reaction. Therefore, some patterns exist in which oil-and/or-fat are added after the Maillard reaction. However, as with solid milk or protein-containing raw material, oil-and/or-fat, and saccharides, it is easier to understand that the moisture regulator is uniformly weighed based on 100 mass% of the chocolate crumb raw material, so it was handled as described above. In the chocolate crumb manufacturing process in the present invention, the oil-and/or-fat is preferably added after the Maillard reaction process.

[0023] (The Maillard reaction process in which the material having the adjusted water content at the time of reaction is adjusted is heated to cause the Maillard reaction)

This is a process in which the mixture obtained as described above, in which the moisture content during the reaction is adjusted, is heated to cause the Maillard reaction. More precisely, this is the process of heating the mixture with adjusted moisture content during the reaction to cause a Maillard reaction between free amino acids and peptides contained in the solid milk or protein-containing raw material and saccharide. By this heating, the moisture contained in the mixture gradually evaporates by heating, and the final moisture content in

the chocolate crumb is 3 mass% or less, more preferably 2 mass% or less, and even more preferably 1 mass% or less. As for the heating method, for example, an oil bath is heated to a predetermined temperature and a reaction bath (bowl) is placed in the oil bath, and the mixture in the reaction bath is heated to cause the Maillard reaction at the desired reaction temperature and desired reaction time. The reaction temperature and reaction time are not limited as long as the Maillard reaction is caused to achieve the desired color difference value. In the Maillard reaction process, the reaction temperature is 100 to 120 degrees C and the reaction time is preferably 1 to 60 minutes, more preferably 3 to 40 minutes, and more preferably 5 to 30 minutes. In the Maillard reaction process, the product is reacted at a reaction temperature of 110 - 115 degrees C, preferably for 3 - 40 minutes, more preferably for 5 - 30 minutes, and even more preferably for 10 - 15 minutes. This allows for obtaining a chocolate crumb with the desired flavor and physical properties. The reaction temperature in the present invention is the final temperature attained. Also, the reaction time in the present invention refers to the holding time at the final attained temperature.

[0024] In order to ensure the elimination of moisture, a further drying process may be provided after the Maillard reaction as an optional step. The drying process can be performed by known methods. For example, moisture can be removed by decompression or vacuum drying using an aspirator or the like. By this drying process, a chocolate crumb with low moisture content can be produced.

[0025] [Food Products]

The food product of the present invention is a food product made using the chocolate crumb described above. Such food products include, for example, chocolate, chocolate cream, ice cream mixes, drinks, baked goods, and fresh confections. In particular, it is preferred to be selected from the group consisting of chocolate, chocolate cream and ice cream mixes, drinks, baked confectionery, and fresh confectionery. The production and processing of these foods can be carried out by known general methods.

[Examples]

[0026] The present invention will be explained by way of examples, but the invention is not limited by these examples. In the following, “part” and “%” mean “part by mass” and “mass%”, respectively, unless otherwise stated.

[0027]

[Table 1]

Table 1: Chocolate crumb formula (percentage of water content)						
	Example 1		Example 2		Example 3	
Formulation of raw materials	(part)	(%)	(part)	(%)	(part)	(%)
Sugar	270	45	270	45	270	45
Whole milk powder	249.6	41.6	249.6	41.6	249.6	41.6
Cacao mass	80.4	13.4	80.4	13.4	80.4	13.4
Subtotal	600	100	600	100	600	100
Water	30	5	36	6	60	10
Total	630	105	636	106	660	110
Reaction temperature	115°C		115°C		115°C	
Reaction time	10 min		10 min		10 min	
Production possibility	○		○		△	
Flavor	○		○		○	

[0028]

[Table 2]

Table 2: Chocolate crumb formula (reaction temperature and time)								
	Example 4		Example 5		Example 6		Example 7	
Formulation of raw materials	(part)	(%)	(part)	(%)	(part)	(%)	(part)	(%)
Sugar	270	45	270	45	270	45	270	45
Whole milk powder	249.6	41.6	249.6	41.6	249.6	41.6	249.6	41.6
Cacao mass	80.4	13.4	80.4	13.4	80.4	13.4	80.4	13.4
Subtotal	600	100	600	100	600	100	600	100
Water	36	6	48	8	54	9	36	6
Total	636	106	648	108	654	109	636	106
Reaction temperature	100°C		105°C		111°C		113°C	
Reaction time	30 min		30 min		15 min		3 min	
Production possibility	○		○		○		○	

Flavor	○	○	○	○
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[0029]

[Table 3]

Table 3: Chocolate crumb formulation (reaction temperature and time)								
	Example 8		Example 9		Example 10		Example 11	
Formulation of raw materials	(part)	(%)	(part)	(%)	(part)	(%)	(part)	(%)
Sugar	270	45	270	45	270	45	270	45
Whole milk powder	249.6	41.6	249.6	41.6	249.6	41.6	249.6	41.6
Cacao mass	80.4	13.4	80.4	13.4	80.4	13.4	80.4	13.4
Subtotal	600	100	600	100	600	100	600	100
Water	36	6	36	6	36	6	36	6
Total	636	106	636	106	636	106	636	106
Reaction temperature	113°C		113°C		113°C		120°C	
Reaction time	20 min		30 min		40 min		5 min	
Production possibility	○		○		○		○	
Flavor	○		○		△		○	

[0030]

[Table 4]

Table 4: Chocolate crumb formulation (reaction temperature and time)		
	Example 12	
Formulation of raw materials	(part)	(%)
Sugar	270	45
Whole milk powder	249.6	41.6
Cacao mass	80.4	13.4
Subtotal	600	100
Water	54	9
Total	654	109
Reaction temperature	120°C	
Reaction time	10 min	
Production possibility	○	
Flavor	○	

[0031]

[Table 5]

Table 5: Chocolate crumb formula (percentage of water content)
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	Comparative example 1		Comparative example 2	
Formulation of raw materials	(part)	(%)	(part)	(%)
Sugar	270	45	270	45
Whole milk powder	249.6	41.6	249.6	41.6
Cacao mass	80.4	13.4	80.4	13.4
Subtotal	600	100	600	100
Water	18	3	84	14
Total	630	105	636	106
Reaction temperature	115°C		115°C	
Reaction time	10 min		10 min	
Production possibility	×		×	
Flavor	×		○	

[0032]

[Table 6]

Table 6: Formulation Table of Chocolate Crumbs (Reaction Temperature)				
	Comparison Example 3		Comparison Example 4	
Formulation of raw materials	(Part)	(%)	(Part)	(%)
Sugar	270	45	270	45
Whole milk powder	249.6	41.6	249.6	41.6
Cacao mass	80.4	13.4	80.4	13.4
Subtotal	600	100	600	100
Water	36	6	36	6
Total	636	106	636	106
Reaction temperature	90°C		125°C	
Reaction time	15 min.		5 min.	
Production possibility	○		×	
Flavor	×		×	

[0033] <Production Possibility Evaluation Criteria>

In Tables 1 to 6, the evaluation criteria for manufacturability are as follows.

○ (Good): Possible to manufacture without any problem, and the crumb is powdered. Or there are small lumps in the crumbs, but the percentage of powder is high.

△ (Acceptable): There are large lumps in the crumb, but the powder ratio is high and there is no problem.

× (Bad): The crumb adheres during degassing, and the crumb does not turn into powder. Or, oil is oozing into the powder. Other hazards involved in manufacturing.

[0034] <Flavor Evaluation Criteria>

In Tables 1 to 6, the evaluation criteria for flavor are as follows. A panel of five experts evaluated the overall flavor of the chocolate crumbs when they were eaten.

○ (Good): The crumb has a rich caramel-like flavor typical of crumbs.

△ (Acceptable): The crumb-like caramel-like richness is weak. Or, there is some bitter or sour taste of burnt crumb.

× (Bad): No caramel-like richness that is typical of crumb. Or, there is a strong bitter or sour taste of burnt caramel.

[0035]

<Examples 1 - 12>

Saccharide, whole milk powder, and water were put into a reactor (Irie Shokai Co., Ltd., model number: PNV-1) according to the recipe in Tables 1 to 4. After feeding, stirring was started and the reactor was heated until it reached the temperature specified in each recipe. After reaching the temperature, the mixture was allowed to react for the time specified in the respective recipe lists while maintaining the temperature in order to cause the Maillard reaction. After the reaction was completed, cacao mass was added and stirred. Thereafter, chocolate crumbs were made by drying under reduced pressure for 5 to 10 minutes using a circulating aspirator with a vacuum controller (Shibata Kagaku Co., Ltd., model number: WJ-20) to remove moisture.

[0036]

<Comparative Example 1>

Saccharide, whole milk powder, and 3% water were fed into a reactor (model number: PNV-1 manufactured by Irie Shokai Co. After feeding, stirring was started, but due to the low water content, the dough was difficult to blend, and the reactor produced an unusual noise in the

early stages of production. As the reactor was heated, the dough was somewhat acclimated and the noise subsided, so production was continued. The reactor was heated until it reached 115 degrees C. After reaching said temperature, the reaction was allowed to continue for 10 minutes while maintaining the temperature. After the reaction was completed, the cacao mass was fed in, and then the water content was removed by decompression drying for 5 to 10 minutes using a circulating aspirator with a vacuum controller (Shibata Kagaku Corporation, model number: WJ-20). The resulting crumbs were uneven because the caramel and cacao mass portions did not mix due to the low moisture content and poor dough incorporation. In addition, when dissolved in hot water, soft grains like protein denatured material remained dissolved, resulting in a poor texture.

[0037]

<Comparative Example 2>

Saccharide, whole milk powder, and 14% water were fed into a reactor (Irie Shokai Co., Ltd., model number: PNV-1) according to the recipe in Table 5. After feeding, stirring was started and the reactor was heated until the temperature reached 115°C. During heating, the temperature of the dough did not rise as easily as in the Example, and the temperature of the heat source had to be set excessively high, which was dangerous and therefore considered difficult for normal production. After reaching the same temperature, the dough was allowed to react for 10 minutes while maintaining the same temperature in order to cause the Maillard reaction. After the reaction was completed, cacao mass was added and stirred. After that, moisture was removed by decompression drying for 5 to 10 minutes using a circulating aspirator with a vacuum controller (Shibata Kagaku Co., Ltd., model number: WJ-20). There were no problems with the flavor of the resulting crumb, but some of the powder had large lumps. In addition, the high temperatures required were dangerous and inefficient for production.

[0038]

<Comparative Example 3>

Saccharide, whole milk powder, and water were fed into a reactor (Irie Shokai Co., Ltd., model number: PNV-1) according to the recipe in Table 6. After feeding, stirring was started and the reactor was heated until the temperature reached 90 degrees C. After reaching said temperature, the reaction was allowed to continue for 15 minutes while maintaining the temperature. After the reaction was completed, the cacao mass was fed in, and then the water content was removed by decompression drying for 5 to 10 minutes using a circulating aspirator with a vacuum controller (Shibata Kagaku Corporation, model number: WJ-20).

The resulting crumbs had a weak Maillard reaction due to the low reaction temperature, and the caramel-like richness typical of crumbs was not obtained due to the flavor of cacao mass.

[0039]

<Comparative Example 4>

Saccharide, whole milk powder, and water were fed into a reactor (Irie Shokai Co., Ltd., model number: PNV-1) according to the recipe in Table 6. After feeding, stirring was started and the reactor was heated until the temperature reached 124 - 126°C. After reaching said temperature, the reaction was allowed to continue for 5 minutes while maintaining the temperature. After the reaction was completed, the cacao mass was fed in, and then the water content was removed by decompression drying for 5 to 10 minutes using a circulating aspirator with a vacuum controller (Shibata Kagaku Corporation, model number: WJ-20).

The resulting crumb had a strong burnt flavor due to the high reaction temperature, as well as a sour taste like the degraded flavor of milk, which spoiled the unique flavor of the crumb.

The high temperature required was also dangerous.

[0040]

<Chocolate using chocolate crumbs>

Chocolate crumbs from Examples 4, 8, and 11 or Comparative Examples 3 and 4 were each blended with cacao butter at a ratio of 65:35, to which a certain amount of emulsifier was

added, and the usual chocolate manufacturing methods (mixing, atomizing, kneading, tempering, cooling) were applied to this mixture to produce chocolate.

[0041]

<Sensory evaluation>

The evaluation criteria for the flavor of chocolate made with the chocolate crumbs of Examples 4, 8, and 11 or Comparative Examples 3 and 4 were as follows: A panel of five persons evaluated the chocolate crumbs comprehensively. The results of each evaluation are shown in Table 7.

4: Strong bitter or sour taste of burnt

3: Crumb-like caramel-like richness, with some bitter and sour taste of burning.

2: Crumb-like caramel-like richness

1: A little caramel-like richness, typical of crumb.

0: No crumb-like caramel-like richness.

[0042]

<Passing criteria for sensory evaluation>

The acceptance criteria for the sensory evaluation were as follows: 0 points or 4 points were considered to be a failure. A score of 1 to 3 was considered acceptable.

[0043]

[Table 7]

Table 7: Evaluation Results					
	Chocolate using Example 4	Chocolate using Example 8	Chocolate using Example 11	Chocolate using Comparison Example 3	Chocolate using Example 4
Flavor	1	2	3	0	4

[0044]

As shown above, the chocolate using chocolate crumbs of Examples 4, 8, and 11 had a more balanced crumb-like caramel-like richness than the chocolate of Comparative Examples 3 and 4. Thus. By adjusting the moisture content during the specific reaction and the reaction temperature and time to produce chocolate crumbs, chocolate crumbs with a unique flavor were able to be provided. This allows us to supply a variety of products with a caramel-like richness.

Claims:

1. A method for producing a chocolate crumb comprising 1 to 70 mass% of solid milk or protein-containing raw material, 0 to 20 mass% of oil-and/or-fat, and 15 to 96 mass% of saccharide, the method comprising:

an adjustment process, in which, before Maillard reaction with the solid milk or protein-containing raw material and saccharide occurs, a moisture regulator is added to adjust moisture content during the reaction to 5 to 12 mass% per 100 mass% of a chocolate crumb raw material, and

a Maillard reaction process, in which the chocolate crumb raw material with the adjusted moisture content during the reaction is heated to cause the Maillard reaction.

2. The method for producing the chocolate crumb according to claim 1, wherein in the Maillard reaction process, the reaction temperature is 100 to 120 degrees C and the reaction is carried out for 1 to 60 minutes.

3. The method for producing the chocolate crumb according to claim 1, wherein in the Maillard reaction process, the reaction temperature is 100 - 120 degrees C and the reaction is carried out for 3 - 40 minutes.

4. The method for producing the chocolate crumb according to claim 1, wherein in the Maillard reaction process, the reaction temperature is 100 - 120 degrees C and the reaction is carried out for 5 - 30 minutes.

5. The method for producing the chocolate crumb according to claim 1, wherein in the Maillard reaction process, the reaction temperature is 110 - 115 degrees C and the reaction is carried out for 3 - 40 minutes.
6. The method for producing the chocolate crumb according to any one of claims 1 to 5, wherein after the Maillard reaction process, cacao mass is added.
7. The method for producing the chocolate crumb according to any one of claims 1 to 6, further comprising:
 - a drying process after the Maillard reaction process.
8. The method for producing the chocolate crumb according to claim 7, wherein the drying process is a process for removing moisture by decompression or vacuum drying.
9. A food product using the chocolate crumb obtained by the method for producing the chocolate crumb according to any one of claims 1 to 8.
10. The food product according to claim 9, wherein the food product is selected from the group consisting of chocolate, chocolate cream and ice cream mixes, drinks, baked goods, and fresh confectionery.