

DESCRIPTION

TITLE OF INVENTION: MEAT SUBSTITUTE FOOD PRODUCT INCLUDING CURD AND METHOD FOR PRODUCING THE SAME

TECHNICAL FIELD

[0001]

The present invention relates to a meat substitute. More specifically, the invention relates to a meat substitute including curd containing curdlan and a cellulose derivative as constituent, and the like.

BACKGROUND ART

[0002]

In recent years, there has been a concern about a protein crisis, in which it is difficult to intake protein from meat derived from an animal due to a climate change, worldwide population growth, and the like. Various technologies for producing a meat substitute from plant-derived protein as a food product capable of being in place of meat have been developed.

[0003]

For example, Patent Document 1 discloses a technology for providing a meat-like food product by using texturized vegetable Protein containing starch, a starch-containing

material, wheat protein, and the like, to produce the texturized vegetable Protein containing a specific amount of water with respect to 100 mass parts based on the of dry matter. Patent Document 1 also discloses that the meat-like food product can be used as a substitute for meat or the like for processed meat food products such as steak, grilled meat, and roast beef, and has a texture (elasticity, hardness, and fibrous texture) similar to that of natural meat.

In addition, Patent Document 2 discloses an emulsion base prepared by using methyl cellulose, denatured gluten, vegetable protein, and oil in a stepwise manner. It is also disclosed a technology for producing an analog of plant-based meat which can be used for a burger patty, a sausage, and the like by cooking the emulsion base.

Further, Patent Document 3 discloses a composition and the like for a processed soybean protein food product, as a substitute for a processed meat food product, which contains soybean protein, a gelling agent, a coagulant, and water and which is gelled by heating.

[0004]

As described above, various meat substitutes have been developed by using vegetable protein including wheat protein having a special shape such as a tissue-like shape, or protein derived from a soybean. However, since it is necessary to use vegetable protein having a special shape,

and starch, thickening polysaccharide or the like is used for binding as a meat substitute, there are problems that the various meat substitutes are sticky at the time of cooking and, on the contrary, crumble. Further, there are problems that when the various meat substitutes are cooked and then eaten, it is felt that the cooked various meat substitutes are sticky or gluey, and they do not feel the elasticity or hardness like meat. Therefore, it is difficult to sufficiently obtain a meat substitute equivalent to meat derived from an animal by these technologies.

CITATION LIST

PATENT LITERATURE

[0005]

Patent Document 1: JP2020-150892A

Patent Document 2: JP2005-21163A

Patent Document 3: JP2007/013146A1

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0006]

An object of the invention is to provide a meat substitute having a physical property similar to that of meat derived from an animal and having good workability. Further, another object of the invention is to provide a

meat substitute having, when it is cooked, a texture, a flavor, an appearance, and the like similar to meat derived from an animal when it is cooked.

SOLUTION TO PROBLEM

[0007]

The present inventors have conducted intensive studies to solve the above-described problems, and as a result, have found that a meat substitute having a physical property similar to that of meat derived from an animal and having good workability can be obtained by including curd containing curdlan and a cellulose derivative as constituents. As a result, the inventors accomplished the invention. By using the meat substitute according to the invention, it can be provided a meat substitute food product having a texture, a flavor, an appearance, and the like at the time of eating equivalent to those in a case of using meat derived from an animal. Furthermore, since there is less concern about spoiling for the meat substitute according to the invention, in a case in which meat derived from an animal (raw meat) is not completely used or is partially used, it can be provided a meat substitute food product having excellent storage stability.

[0008]

That is, the invention relates to a meat substitute

and the like described in the following (1) to (8).

(1) A meat substitute including curd containing curdlan and a cellulose derivative as constituents.

(2) The meat substitute according to (1), in which the cellulose derivative is at least one of methyl cellulose or hydroxypropyl methyl cellulose.

(3) The meat substitute according to (1) or (2), further including vegetable protein.

(4) The meat substitute according to any one of (1) to (3), further including powder containing starch as a constituent.

(5) The meat substitute according to (4), in which the powder is powder containing a cellulose derivative.

(6) The meat substitute according to (5), in which the cellulose derivative is at least one of methyl cellulose or hydroxypropyl methyl cellulose.

(7) A method for producing a meat substitute, including the following steps:

A. a step of preparing curd containing curdlan and a cellulose derivative as constituents; and

B. a step of mixing the curd prepared in the step of A with other materials

(8) A method for producing a meat substitute food product, including a step of processing the meat substitute according to any one of (1) to (6).

ADVANTAGEOUS EFFECTS OF INVENTION

[0009]

According to the invention, a meat substitute having a physical property similar to that of meat derived from an animal and having good workability can be provided. It is felt that a food product using the meat substitute of the invention is juicy when eaten, and exhibits a texture, a flavor, an appearance, and the like, similar to a food product using meat derived from an animal. Therefore, the food product using the meat substitute of the invention can be used for various dishes such as a hamburger steak, a sausage, a meat loaf, a meatball, and a dumpling (*gyoza*). These meat substitutes can also be used to provide a frozen food product and the like.

BRIEF DESCRIPTION OF DRAWINGS

[0010]

[FIG. 1] FIG. 1 is a figure showing an appearance of a meat substitute food product (Example 1).

[FIG. 2] FIG. 2 is a figure showing a photograph of a meat substitute during grilling (Example 6).

[FIG. 3] FIG. 3 is a figure showing an appearance of a meat substitute food product and a cross section thereof (Example 6).

DESCRIPTION OF EMBODIMENTS

[0011]

Hereinafter, the invention is described in detail.

The "meat substitute" of the invention refers to a substance which has a physical property equivalent to that of meat derived from an animal and in which a food product similar to that produced using meat derived from an animal can be produced when cooked.

Such a "meat substitute" of the invention may include curd containing "curdlan and a cellulose derivative" as constituents. The "curdlan and cellulose derivative" may be any substance as long as the "meat substitute" of the invention can be produced.

Examples of the "cellulose derivative" include methyl cellulose, hydroxypropyl methyl cellulose, and the like. These "cellulose derivatives" can be used in combination of two or more kinds.

[0012]

The "meat substitute" of the invention can be produced by adding an arbitrary amount of the "curdlan and cellulose derivative".

The "curdlan and cellulose derivative" are preferably added so as to be 3.0 w/w% or more in total with respect to the total amount of the curd. This is because when the total amount of the "curdlan and cellulose derivative" contained

in the curd is less than 3.0 w/w%, the moldability of the meat substitute food product tends to be poor, or the hardness as a meat substitute food product tends to be insufficient.

The ratio of the "curdlan and cellulose derivative" contained in the curd may be any ratio as long as the "meat substitute" of the invention can be produced. However, for example, the ratio of the "curdlan and cellulose derivative" is preferably blended at a ratio of from 1:9 to 9:1, and more preferably from 2:8 to 8:2.

[0013]

The amounts of the "curdlan" and the "cellulose derivative" contained in the "meat substitute" of the invention may be any amounts as long as the total amount of the "curdlan and cellulose derivative" contained in the curd is 3.0 w/w% or more and the "meat substitute" of the invention can be produced.

The "curdlan" may be contained in an amount of, for example, 0.05 w/w% or more and 10.0 w/w% or less, 0.1 w/w% or more and 9.0 w/w% or less, or 0.2 w/w% or more and 8.0 w/w% or less, but the upper limit and the lower limit are not limited thereto. Further, the "cellulose derivative" may be contained, for example, in an amount of 0.05 w/w% or more and 10.0 w/w% or less, 0.1 w/w% or more and 9.0 w/w% or less, or 0.2 w/w% or more and 8.0 w/w% or less, but the upper

limit and the lower limit are not limited thereto.

[0014]

The "curdlan and cellulose derivative" which are constituents of the "meat substitute" of the invention may be any substance as long as they can be used as a food product, and an originally prepared substance, a commercially available substance and the like can be used.

The curdlan may be any substance as long as the "meat substitute" of the invention can be produced, and for example, finely pulverized curdlan is preferably used. Examples of such curdlan include Curdlan NS (Mitsubishi Corporation Life Sciences Limited.) and the like.

Further, when methyl cellulose is used as the cellulose derivative, examples thereof include Heatgel (registered trademark) *Cho*, Heatgel (registered trademark) *Kiwami* (Unitec Foods Co, Ltd.), Heatgel (registered trademark) *Cho* CL (all Unitec Foods, Co., Ltd.), Metolose MCE-100TS (Shin-Etsu Chemical Co., Ltd.) and the like, and Thermomate (Aoba Kasei Co., Ltd.) formulated by blending methyl cellulose and other components, and the like may also be used.

Further, when hydroxypropyl methyl cellulose is used, examples thereof include Heatsol (registered trademark) *Yurumi*, Heatsol (registered trademark) *Yawara* (both Unitec Foods, Co., Ltd.) and the like.

These cellulose derivatives may be used alone or in

combination of two or more kinds.

[0015]

The "meat substitute" of the invention preferably further includes "vegetable protein". The "vegetable protein" may be included as a constituent of the curd, or may be included as other materials besides the curd.

Examples of such "vegetable protein" include protein derived from beans such as soybean protein, and wheat protein, pea protein, and protein derived from grains such as a mushroom, brown rice, a sunflower seed, and a pumpkin seed. These vegetable protein may also be a substance which can be used as a food product, and an originally prepared substance, a commercially available substance, and the like can be used. Any of these vegetable protein can be used in combination of two or more kinds.

For example, in the case of soybean protein, powdered soybean protein Sunlover 20, granular Fujinic, Fujinic 550RN, Vegetex, Apex (all Fuji Oil Co., Ltd.) and the like can be used. In addition, in the case of wheat protein, powdered wheat protein A-Glu K (Glico Nutrition Co., Ltd.), granular wheat protein (Unitec Foods Co., Ltd.), granular wheat gluten (Unitec Foods Co., Ltd.), can be used. In the case of pea protein, Nutralys (registered trademark) (Roquette) and the like can be used.

These vegetable protein may be produced by any

production method, but are preferably produced by cutting a product extruded by an extruder into an arbitrary size, followed by drying. The granular wheat protein (Unitec Foods Co., Ltd.) used as a sample in the Examples was produced by this production method.

[0016]

It is particularly preferable that the "meat substitute" of the invention further includes a "powder" containing substance that contains starch as a constituent. Here, the "powder" refers to a powdery substance containing starch as a constituent, and "other powdery components" may be contained in addition to the starch.

The starch may be any starch as long as it can be used as a food product, and originally prepared starch, commercially available starch, and the like can be used regardless of the origin. Examples of such "starch" include potato-derived starch, tapioca starch, corn starch, mung bean starch, wheat starch, rice starch, and the like. Processed starch such as dehydroxypropylated phosphate cross-linked starch may also be used. As the potato starch, for example, commercially available starch such as Swely Gel 700 (Oji Corn Starch Co., Ltd.) may be used.

[0017]

The "powder" may further be powder containing a "cellulose derivative". Examples of the "cellulose

derivative" include methyl cellulose, hydroxypropyl methyl cellulose, and the like. These "cellulose derivatives" may be used in combination of two or more kinds.

Further, the "powder" can contain "other powdery components", and examples of such components include curdlan and the like. As necessary, an umami component such as trehalose, salt, sodium glutamate, and kelp (*kombu*) powder, and a mixture (powder MIX) of seasonings such as a spice may be used.

The "cellulose derivative" and the "other powdery components" such as curdlan contained in these "powder" may be any substance as long as they can be used as a food product, and an originally prepared substance, a commercially available substance, and the like can be used.
[0018]

The "meat substitute" of the invention may include "other materials" in addition to the "curd".

Examples of the "other materials" include, in addition to the above-mentioned "vegetable protein" and "powder", a vegetable such as an onion, a carrot, a bell pepper, and a green onion; an ingredient such as meat derived from an animal (raw meat); a seasoning such as salt, soy sauce, sugar, bean paste (*miso*), sweet sake, and oil; an umami component such as kelp (*kombu*), and dried bonito; flavor such as champignon extract, and *sumiyaki* oil; and flavor such as

flavor oil.

The ingredient can be prepared and used in any shape and size by chopping, dicing, cutting into thin strips, or the like depending on the type and the form of the target food product. The synergistic effect of the umami such as guanylic acid, or inosinic acid can be obtained by adding the champignon extract, the kelp (*kombu*), or the like. A delicious meat substitute having a better flavor can be produced by adjusting the flavor by adding the flavor oil or the like.

[0019]

The meat substitute of the invention can be stored at room temperature as prepared, can be stored by refrigeration, chilling, freezing, or the like, and can be distributed in various storage conditions. A frozen-stored meat substitute can also be defrosted at the time of use and processed for the production of the meat substitute food product.

[0020]

The "method for producing a meat substitute" of the invention may be a method including the following steps A and B, and may also include other steps useful for producing the meat substitute.

A. a step of preparing curd containing curdlan and a cellulose derivative as constituent components

B. a step of mixing the curd prepared in the step of

A with other materials

The method may further include the following step.

C. a step of molding a mixture prepared in the step of
B

[0021]

The preparation of the curd in the step of A can be carried out, for example, by dispersing each component (powder) contained in the curd, such as curdlan and a cellulose derivative, in oil, and then adding cold water and stirring, or the like. At this time, each component of the "powder" may also be dispersed in the oil simultaneously.

Any apparatus may be used for stirring as long as the curd can be prepared, and examples thereof include a vertical blender, a food processor (MK-K61, Panasonic Holdings Corporation), and the like.

The curd may be used immediately after preparation, or may be used after storage for a certain period of time such as refrigeration for 8 hours or more after preparation.

[0022]

When each component of the "powder" is not added in the step of A, the "powder" as the "other materials" may be mixed with the curd in the step B.

The hardness of the curd is easily adjusted by mixing the "powder" in the steps of A or B. As a result, the "meat substitute" having the hardness which is easily mixed at the

time of molding in the step of C or the like is realized. Therefore, the workability in the production of the "meat substitute" can be further improved.

[0023]

The meat substitute molded in the step of C preferably has a shape of a visually observable size, such as a block shape, a thick-sliced meat shape, and a thin-sliced meat shape. The size and shape can be arbitrarily adjusted depending on the form of the target food product, as in the case of using meat derived from an animal. For example, when the target food product is a hamburger steak, examples of the shape include an oval shape, a round shape, a quadrangular shape, a triangular shape, a star shape, a heart shape, and the like.

[0024]

The "method for producing a meat substitute food product" of the invention may be a production method including a step of processing a meat substitute, and may include other steps useful for the production of the meat substitute food product.

Here, examples of the "processing" include a heat treatment such as grilling, steaming, boiling, deep-frying, and shallow-frying.

Examples of the "meat substitute food product" thus produced include a hamburger steak, a sausage, a meat loaf,

a ham, a meatball, a dumpling (*gyoza*), a meat bun, steamed dumplings (*shumai*), a minced meat cutlet, a hamburger patty, a nugget, a deep-fried food, cooked ground meat (*soboro*), a stuffed cabbage roll, and the like. Further, curry, stew and the like using the "meat substitute" of the invention as an ingredient are also included in the "meat substitute food product" of the invention.

It is preferable that the "meat substitute food product" containing the "meat substitute" of the invention does not contain meat derived from an animal, but the meat derived from an animal may be used in combination as necessary. In addition, the "meat substitute food product" of the invention also includes a mixture in which the meat substitute of the invention is mixed as a part of a food product mainly-containing meat derived from an animal.

The meat substitute food product of the invention can be stored at room temperature as prepared, can be stored by refrigeration, chilling, freezing, or the like, and can be distributed in various storage conditions. A frozen-stored meat substitute food product can be eaten by defrosting, reheating or the like at the time of eating.

[0025]

Hereinafter, specific embodiments of the invention are described with reference to examples. Note that the invention is not limited to these examples.

Examples

[0026]

In the Examples of the invention, unless otherwise stated, the following basic compositions of samples and meat substitutes were used to evaluate each of the produced meat substitute food product. The examples of the invention were studied in collaboration with and in cooperation with Cosmo Japan Co., Ltd.

1. Sample

In the examples herein, the following samples were used, respectively, unless otherwise stated.

1) Curdlan

Curdlan NS (Mitsubishi Corporation Life Sciences Limited.)

2) Cellulose Derivative (Methyl Cellulose)

Heatgel (registered trademark) Cho (Unitec Foods Co, Ltd.)

3) Soybean Protein

A. Fujipro FR (Fuji Oil Co., Ltd.)

B. Powdered Soybean Protein Sunlover 20 (Fuji Oil Co., Ltd.)

4) Wheat Protein

Granular Wheat Protein (Unitec Foods, Co., Ltd.)

5) Potato starch: Swely Gel 700 (Oji Corn Starch Co., Ltd.)

[0027]

2. Basic Composition of Meat Substitute

The basic compositions of the meat substitutes are shown in Tables 1 and 2.

[0028]

[Table 1]

Basic Composition (1)

Raw Material		w/w%
Curd		32.3
Protein	Soybean Protein A	8.1
	Wheat Protein	3.7
Liquid Seasoning	Water	16.11
	Salad Oil	12.4
	Soy Sauce	1.9
	Champignon Extract	1.5
	Sumiyaki Oil	0.3
Ingredient	Frozen Onion (Chopped)	17.4
Powder a	Potato Starch	0.62
	Powder MIX (Seasoning)	5.67
Total		100

[0029]

[Table 2]

Basic Composition (2)

Raw Material		w/w%
Curd		32.3
Protein	Soybean Protein B	8.1
	Wheat Protein	3.7
Liquid Seasoning	Addition of Water (Soaking Water)	15
	Salad Oil	12.4
	Soy Sauce	1.9
	Champignon Extract	1.5
	Sumiyaki Oil	0.3
Ingredient	Frozen Onion (Chopped)	17.4
Powder b	Methyl Cellulose	0.74
	Potato Starch	0.62
	Curdlan	0.37
	Powder MIX (Seasoning)	5.67
Total		100

[0030]

3. Evaluation of Meat Substitute Food Product

[Evaluation Method]

40g of a meat substitute was molded into a circular shape (a diameter of about 65 mm and a height of about 10 mm) and grilled (at 240 °C for 2 minutes on each side (4 minutes in total), at a core temperature of 75 °C (an electric griddle KX-E13E, manufactured by Sharp

Corporation)), to produce a meat substitute food product.

After the meat substitute food product that had been frozen and stored for 3 days was reheated in a microwave (at 600W, for 1 minute), the resultant was eaten, and sensory evaluation was performed based on the evaluation criteria for each of the following items. The average score of the five panelists was used as the evaluation result.

[0031]

[Evaluation Criteria]

1) Shape Retainability

Score 5: Having firm shape retainability and it could be handled like ordinary meat

Score 4: Having slightly strong shape retainability, and it could be handled in a manner equivalent to ordinary meat.

Score 3: Having moderate shape retainability, and it could be handled like ordinary meat.

Score 2: Having slightly weak shape retainability, and it was difficult to handle like ordinary meat due to its softness compared to ordinary meat.

Score 1: Having no shape retainability, and it could not be handled like ordinary meat since it was too soft and easily fell apart.

[0032]

2) Favorability

Score 5: Having good texture and flavor similar to or better than those of ordinary meat, and very suitable as a meat substitute.

Score 4: Having texture and flavor equivalent to those of ordinary meat, and suitable as a meat substitute.

Score 3: Having texture and flavor substantially similar to those of ordinary meat, and could be used as a meat substitute.

Score 2: Having texture and flavor slightly inferior to those of ordinary meat, and it was felt slightly unsatisfactory as a meat substitute.

Score 1: Having texture and flavor inferior to ordinary meat, and unsuitable as a meat substitute.

[0033]

Method for Producing Meat Substitute

The meat substitute was prepared by the following steps.

A. a step of preparing curd containing curdlan and a cellulose derivative as constituents

B. a step of mixing the curd prepared in the step of A with other materials

[0034]

[Example 1]

Production of Meat Substitute (1)

After powdered samples such as the curdlan and the cellulose derivative were dispersed in salad oil so as to

have the composition shown in Table 3, cold water was added and stirred to prepare curd A to curd E. The curd A was prepared by not only adding each component shown in Table 3 but also adding each component of the powder a of the basic composition (1) to the salad oil simultaneously. The ingredient, the protein, and the liquid seasoning were added to this curd so as to have the basic composition (1), and the resulting mixture was molded to obtain a meat substitute (patty).

For the curd B to curd E, after the ingredient, the protein, and the liquid seasoning were added to each curd so as to have the basic composition (1), the powder a was added little by little while stirring and mixed, and the resulting mixture was molded to obtain meat substitutes (patties).

[0035]

[Table 3]

		Curd				
		A	B	C	D	E
Composition w/w%	Salad Oil	15.4	15.4	15.4	15.4	15.4
	Soybean Protein A	11.5	11.5	11.5	11.5	11.5
	Curdlan	4.2	5.9	2.3	2.5	3.4
	Methyl Cellulose	3.0	1.5	1.6	1.8	2.4
	Addition of Water	65.9	65.7	69.2	68.8	67.3
	Total	100	100	100	100	100

Evaluation	Shape Retainability	5	3	3	3	4
Result	Favorability	4	3	3	3	4

[0036]

The meat substitute food products produced using the meat substitutes including the curd A to curd E were subjected to sensory evaluation, and the evaluation results are shown in Table 3.

As a result, it was confirmed that by using the curd A to curd E in which the curdlan and methyl cellulose were blended in combination, the meat substitute food products having both good shape retainability and excellent favorability could be produced. The meat substitute food product having the curd A to which the powder a was added in the preparation step had particularly firm shape retainability and could be handled like ordinary meat. Further, the meat substitute food products in which the curd B to curd E were prepared and then mixed with the powder a could also be handled equivalent to ordinary meat or handled like ordinary meat.

A photograph of the meat substitute food product produced using the curd B is shown in FIG. 1. It was confirmed that all of the meat substitute food products using the curd A to curd E exhibited an appearance equivalent to that of a commercially available patty (comparative product).

In addition, the texture, the flavor, and the like at the time of eating were also equivalent, and it was confirmed that by using the meat substitute of the invention, the meat substitute food product, when cooked, having the texture, the flavor and the like similar to a case in which meat derived from an animal was cooked could be produced.

[0037]

[Example 2]

Production of Meat Substitute (2)

After powdered samples such as the curdlan and the cellulose derivative were dispersed in salad oil so as to have the composition shown in Table 4, cold water was added and stirred to prepare curd F.

After the ingredient, the protein, and the liquid seasoning were added to the curd F so as to have the basic composition (2), the powder b was added little by little and mixed while stirring, and the resulting mixture was molded to obtain a meat substitute (patty).

[0038]

[Table 4]

		Curd	Comparative Product		
		F	a	b	c
Composition	Salad Oil	15.4	15.4	15.4	15.4

w/w%	Soybean Protein B	11.5	11.5	11.5	11.5
	Curdlan	3.1	-	-	3.1
	Methyl Cellulose	0.8	-	0.8	-
	Xanthan Gum	-	3.9	3.1	0.8
	Addition of Water	69.2	69.2	69.2	69.2
	Total	100	100	100	100
Evaluation Result	Shape Retainability	4	1	1.7	2.7
	Favorability	4	1	1.3	2.7

[0039]

The meat substitute food product produced using the meat substitute including the curd F and each of the comparative products produced using the curd containing xanthan gum (SATIAXANE CX90, Cargill, Incorporated) (comparative products a to c) were subjected to sensory evaluation, and the evaluation results are shown in Table 4.

As a result, it was confirmed that by using the curd F in which the curdlan and methyl cellulose were blended in combination, the meat substitute food product having good shape retainability and excellent favorability could be produced.

[0040]

[Example 3]

Production of Meat Substitute (3)

After powdered samples such as the curdlan and the cellulose derivative were dispersed in salad oil so as to have the composition shown in Table 5, cold water was added and stirred to prepare curd (G to K). The appearance of each curd was observed and the tactile impression was examined to evaluate the curd. Thereafter, these curd (G to K) and the other materials were mixed so as to have the basic composition (2), and molded to obtain meat substitutes. At this point, the workability during molding was also evaluated. Further, the meat substitute food products using the meat substitutes were subjected to sensory evaluation.

[0041]

[Table 5]

(w/w%)

	Curd					Comparative Product	
	G	H	I	J	K	d	e
Salad Oil	15.4	15.4	15.4	15.4	15.4	15.4	15.4
Soybean Protein B	11.5	11.5	11.5	11.5	15.4	11.5	11.5
Curdlan	3.4	3.1	1.9	0.7	0.4	3.8	-
Methyl Cellulose	0.4	0.7	1.9	3.1	3.4	-	3.8
Addition of Water	69.3	69.3	69.3	69.3	69.3	69.3	69.3
Total	100	100	100	100	100	100	100

[0042]

[Table 6]

	Curd					Comparative Product	
	G	H	I	J	K	d	e
Aspect of Curd	-	Having Moderate Viscosity and Shape Retainability	Having Moderate Viscosity and Shape Retainability	Having Slight Hardness	Having High Hardness	No Shape Retainability	Hard and Crumbling
Moldability	Slightly Sticky	Slightly Sticky	Slightly Less Sticky	Less Sticky	Less Sticky	Very Sticky	Not Sticky
Shape Retainability	3	3	4	5	5	1	4
Favorability	3	4	4	3	3	1	2

[0043]

The prepared curd (G to K) was prepared by blending the curd and methyl cellulose in combination at a ratio of from 1:9 to 9:1. As shown in Table 6, some of the curd had moderate viscosity and shape retainability, some had slight hardness, and some had high hardness.

When the viscosity of the curd was high, stickiness was strong and moldability deteriorated, and as the curd was harder, shape retainability tended to improve. However, although some of the curd (G to K) were slightly sticky, all of the curd exhibited suitable moldability and shape retainability. In contrast, the comparative product d had no hardness and was too sticky. On the other hand, the comparative product e was hard and had no viscosity, therefore, the comparative product e had the physical property of crumbling. The comparative products d and e were not suitable for the production of meat substitutes.

It was confirmed that the meat substitute food products produced using the meat substitutes including the curd (G to K) were the food products excellent in shape retainability and favorability, similar to the food product using ordinary meat.

Such characteristics were not obtained in the curd containing only the curdlan (comparative product d) or the curd containing only methyl cellulose (comparative product e). It was shown that it was important to use the curd containing the curdlan and methyl cellulose in combination at a ratio of from 1:9 to 9:1 in the production of the meat substitute.

[0044]

[Example 4]

Production of Meat Substitute (4)

After powdered samples such as the curdlan and the cellulose derivative were dispersed in salad oil so as to have the composition shown in Table 7, cold water was added and stirred to prepare curd (L to N). Thereafter, these curd and the other materials were mixed so as to have the basic composition (2) and molded to obtain meat substitutes. Further, the meat substitute food products produced using the meat substitutes were subjected to sensory evaluation.

[0045]

[Table 7]

		Curd		
		L	M	N
Composition w/w%	Salad Oil	15.4	15.4	15.4
	Soybean Protein B	11.5	11.5	11.5
	Curdlan	3.2	3.1	2.4
	Methyl Cellulose	0.8	0.8	0.6
	Addition of Water	69.1	69.2	70.1
	Total	100	100	100
Evaluation Result	Shape Retainability	4	3	3

[0046]

As shown in Table 7, when the curdlan and methyl cellulose were blended so that the total amount of the curdlan and methyl cellulose contained in the curd was 3.0

w/w% or more (curd M and N), and further when the curdlan and methyl cellulose were blended so that the total amount of the curdlan and methyl cellulose contained in the curd was 4.0 w/w% or more (curd L), it could be confirmed that moderate shape retainability and slightly strong shape retainability were exhibited. In addition, it was felt that the meat substitute food products were favorable and juicy when eaten.

[0047]

[Example 5]

Production of Meat Substitute (5)

Meat substitutes were produced using the curd F prepared in the same manner as in Example 3 and the powder b or the powder c prepared so as to have the composition shown in Table 8. Each meat substitute food product produced using these meat substitutes was subjected to sensory evaluation.

[0048]

[Table 8]

		Powder	
		b	c
Composition w/w%	Methyl Cellulose	0.74	1.11
	Potato Starch	0.62	0.62
	Curdlan	0.37	-

	Powder MIX (Seasoning)	5.67	5.67
Evaluation	Shape Retainability	4	3
Result	Favorability	4	4

[0049]

As shown in Table 8, it was confirmed that by the meat substitute produced using the powder b containing methyl cellulose and the curdlan or using the powder c containing methyl cellulose, the meat substitute food products having excellent in shape retainability and favorability could be produced. In addition, it was felt that the meat substitute food products were favorable and juicy when eaten.

[0050]

[Example 6]

A meat substitute was produced using the curd F prepared in the same manner as in Example 3 and the powder b prepared so as to have the composition shown in Table 2. 40g of the meat substitute was molded into a circular shape (a diameter of about 65 mm and a height of about 10 mm) and grilled by a steam convection oven to produce a meat substitute food product. A photograph of the meat substitute during grilling is shown in FIG. 2. The appearance of the meat substitute during cooking was similar to that of a commercially available patty (using meat derived from an animal).

In addition, the commercially available patty (using the meat derived from an animal) was also grilled in the same manner, and the appearance, the texture, the flavor, and the like were compared. As a result, as shown in FIG. 3, it was confirmed that the meat substitute food product of the invention exhibited an appearance equivalent to that of the commercially available patty (comparative product). In addition, the texture, the flavor, and the like at the time of eating were also equivalent, and it was confirmed that by using the meat substitute of the invention, the meat substitute food product, when cooked, having the texture, the flavor, and the like similar to a case in which the meat derived from an animal was cooked could be produced.

Industrial Applicability

[0051]

According to the invention, the meat substitute having a physical property similar to that of meat derived from an animal and having good workability can be provided. It is felt that the food product using the meat substitute of the invention is juicy when eaten, and exhibits the texture, the flavor, the appearance, and the like, similar to the food product using the meat derived from an animal. Therefore, the food product using the meat substitute of the invention can be used for various dishes such as a hamburger steak, a

sausage, a meat loaf, a meatball, and a dumpling (*gyoza*). These meat substitutes can also be used to provide a frozen food product and the like.

CLAIMS

[Claim 1]

A meat substitute comprising curd containing curdlan and a cellulose derivative as constituents.

[Claim 2]

The meat substitute according to claim 1, wherein the cellulose derivative is at least one of methyl cellulose or hydroxypropylmethyl cellulose.

[Claim 3]

The meat substitute according to claim 1 or 2 further comprising vegetable protein.

[Claim 4]

The meat substitute according to any one of claims 1 to 3, further comprising powder containing starch as a constituent.

[Claim 5]

The meat substitute according to claim 4, wherein the powder is powder containing a cellulose derivative.

[Claim 6]

The meat substitute according to claim 5, wherein the cellulose derivative is at least one of methyl cellulose or hydroxypropylmethyl cellulose.

[Claim 7]

A method for producing a meat substitute comprising the following steps:

- A. a step of preparing curd containing curdlan and a cellulose derivative as constituents; and
- B. a step of mixing the curd prepared in the step of A with other materials.

[Claim 8]

A method for producing a meat substitute food product, comprising a step of processing the meat substitute according to any one of claims 1 to 6.