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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] The present invention relates to the processed food containing wheat flour and plant sterol. In more detail, lipid in blood, such as cholesterol, is reduced and it is related with processed foods, such as a bread for improving the condition of prostatic hypertrophy, a sponge cake, and fried noodles.

[0002]

[Related Art] plant sterol, such as beta sitosterol, has the cholesterol absorption inhibitory action of an intestinal tract (West J Med 2000 -- Jul; 173 (1) --) Eur J Clin Nutr 2000 Sep; 54 (9) etc., It is known that the condition improvement of prostatic hypertrophy has an effect, and it is used as drugs for some time (Lancet 1995 Jun 17; 345 (8964), Urology 1996 Jul; 48 (1) etc.). However, in the case of drugs, taking in continuously is troublesome, and a method of taking in plant sterol daily and easily has been desired.

[0003] Processed foods which added plant sterol for foodstuffs, such as margarine and cooking oil, are variously examined so that plant sterol can be taken in daily now, but. Plant sterol was solid matter of the high-melting point, and since a crystal deposited if it adds for foodstuffs so much, the problem of impairing mouthfeel remarkably had produced it. although fats-and-oils content foodstuffs, such as cooking oil which added the plant sterol of the solubility to fats and oils which improved, are developed in order to solve this problem (the republication WO 99/No. 48378 gazette --) When JP, 2000-159792, A etc. also added these so much, they had the difficulty that crystal deposition will arise. In order to make cholesterol in blood be deteriorated effectively, it is necessary to take in the plant sterol more than a constant rate every day. However, these processed foods were difficult to take in the plant sterol more than a constant rate not the foodstuffs taken in in large quantities daily but every day.

[0004]

[Problem to be solved by the invention] An object of the present invention is to provide the processed food which can take in daily an effective dose of plant sterol as which an effect is regarded by the lipid improvement in blood, and the condition improvement of prostatic hypertrophy without having been made in view of the above-mentioned problem, and spoiling the value as foodstuffs, such as mouthfeel and a taste.

[0005]

[Means for solving problem] By heating plant sterol with wheat flour, it does not deposit as a crystal, but the added plant sterol finds out that the processed food which does not impair mouthfeel can be manufactured, and the inventor completes the present invention, as a result of inquiring intensively, in order to solve an aforementioned problem.

[0006] In order to solve an aforementioned problem, the plant sterol content processed food of the present invention, It is a processed food which uses wheat flour and plant sterol as an essential ingredient, the content ratio of plant sterol is 0.1-6 parts by weight per 100 parts by weight of wheat flour, and it heat-treats under existence of wheat flour to this plant sterol, and was made to decrease separated type plant sterol.

[0007] 1 type chosen from the group which the above-mentioned plant sterol becomes from beta sitosterol,

manufactured processed food, although not limited. After mixing plant sterol with material sufficiently, for example, mixing plant sterol with the material of wheat flour and/or others previously, it can be made to exist uniformly easily by the method of mixing with the remaining material. Since especially plant sterol is powdered, it can make the processed food in which plant sterol exists uniformly simply by mixing with wheat flour sufficiently previously.

[0018]

[Working example]Although the working example of the present invention is described below, the present invention is not limited to these working examples.

[0019]The soybean extract (44.3% of 92.5% of total sterol content; beta-sitosterol and campesterol 24.6% and stigmasterol 15.4% and BURASHIKA sterol 6.7%) was used as a plant sterol inclusion.

(The working examples 1-3 and comparative examples 1 and 2)

The following material was prepared in order to make the bread (2 kin) containing working-example 1 plant sterol.

(i) Wheat flour (strong flour) : 600g (100 parts by weight)

(ii) plant sterol inclusion: -- 13g(2.2 parts by weight) [-- plant sterol content: -- 12g(amount part of duplexs)]

(iii) Sugar : 30g (5.0 parts by weight)

(iv) Salt : 12g (2.0 parts by weight)

(v) Powdered skim milk : 18g (3.0 parts by weight)

(vi) Active yeast : 15g (2.5 parts by weight)

(vii) Shortening : 24g (4.0 parts by weight)

(viii) Water : 350g (58.3 parts by weight)

[0020]After adding a plant sterol inclusion to wheat flour and mixing sufficiently previously, the above-mentioned material is mixed and baker's dough is made, and after making it ferment for 90 minutes in the fermentation chamber where an internal temperature was kept at 28 degrees C, and humidity was maintained to 72%, degassing is performed, the surface is rounded off and it lays down for 30 minutes at 30-32 degrees C again. Next, shaping and **** of baker's dough are performed, and it is made to ferment for 50 minutes with a 32 degrees C fermentation machine. Then, an internal temperature burned for 50 minutes in the oven kept at 220 degrees C.

[0021]Bread was manufactured in the same conditions and procedure as the working example 1 except the addition amount of the working-example 2 plant-sterol inclusion having been 26 g (24 g of plant sterol content, 4.0 parts by weight per 100 parts by weight of wheat flour).

[0022]Bread was manufactured in the same conditions and procedure as the working example 1 except the addition amount of the working-example 3 plant-sterol inclusion having been 39 g (36 g of plant sterol content, 6.0 parts by weight per 100 parts by weight of wheat flour).

[0023]Bread was manufactured in the same conditions and procedure as the working example 1 except not adding a comparative example 1 plant-sterol inclusion.

[0024]Bread was manufactured in the same conditions and procedure as the working example 1 except the addition amount of the comparative example 2 plant-sterol inclusion having been 52 g (48 g of plant sterol content, 8.0 parts by weight per 100 parts by weight of wheat flour).

[0025]10 g is separated from the bread manufactured by the working examples 1-3 and the comparative examples 1 and 2, and it filters after flowing back for 10 minutes in petroleum ether 100mL. The obtained residue was dissolved in chloroform 10mL after condensing filtrate, and the quantitative analysis of separated type plant sterol was carried out by GLC. The analysis condition of GLC is as follows. The weight S of the coupled type plant sterol in all the bread was calculated using the following formula (1) from the separated type plant sterol weight A in the GLC measured value 10g, i.e., bread. With the content ratio (% by weight) of coupled type plant sterol S to all the plant sterol E, the result is shown in Table 1.

[0026]

[Mathematical formula 1]

$$S = E - \left(\frac{1}{10} \times A \times B \right) \quad \text{----- (1)}$$

[0027](In a formula (1), coupled type plant sterol weight (g) and A show the separated type plant sterol weight (g) in the bread 10g, B shows total bread weight (g), and, as for S, E shows total plant sterol weight (g), respectively.)

[0028]GLC Analysis-condition GLC: Shimazu GC-14B column: J&WDBand5 (0.25 mm x 15 m, 0.25 micrometer)

Column temperature: 250 degrees C -> 260 degrees C (a part for 0.5 degree-C/)

injection temperature: -- 250 degree-C detection temperature: -- 260 degree-C carrier gas: -- helium (99.9999%)

Carrier flow rate: A part for 7.3mL/(235KPa)

SP ratio: -- 1/26 assay: -- one inside mark analytical curve pretreatment: -- nothing -- standard substance: stigmasterol (99.1%, Tama Biochemical Co., Ltd. make)

Internal standard: C₂₄H₅₀ (tetracosane) (99.7%, made in Tokyo Chemicals)

[0029]Organic-functions evaluation was performed using 12 persons' panel to the bread manufactured by the working examples 1-3 and the comparative examples 1 and 2. The result is shown in Table 1.

[0030]

[Table 1]

	植物ステロール 添加量*1	結合型植物 ステロール*2	ザラザラ感	味	香り	色、艶
実施例 1	12g (2 重量部)	10.8g (90.0%)	なし	良好	良好	良好
実施例 2	24g (4 重量部)	20.9g (87.1%)	なし	良好	良好	良好
実施例 3	36g (6 重量部)	29.0g(80.6%)	なし	良好	良好	良好
比較例 1	0g	0g	なし	良好	良好	良好
比較例 2	48g (8 重量部)	30.0g(62.5%)	ややあり	良好	良好	良好

[0031]The notes in Table 1 are as follows.

*1) A number is a plant sterol addition amount in all the bread.

() An inner display shows a weight section of plant sterol per 100 parts by weight of wheat flour.

*2) A number is the abundance of coupled type plant sterol in all the bread.

() An inner display shows a content ratio (% by weight) of coupled type plant sterol to all the plant sterol.

[0032]As shown in Table 1, like the comparative example 1, very good bread, such as mouthfeel and a taste, is obtained and the great portion of plant sterol of the working examples 1-3 is coupled type.

There was also dramatically little crystal deposition.

On the other hand, the comparative example 2 continues being separated type plant sterol rather than has a great portion of coupled type plant sterol.

Mouthfeel is also a little inferior by crystal deposition.

[0033](The working examples 4-6 and comparative examples 3 and 4)

The following material was prepared in order to make the sponge cake (one round shape 15 cm in diameter) containing working-example 4 plant sterol.

(i) Wheat flour (weak flour) : 50g (100 parts by weight)

(ii) Plant sterol inclusion : 1.1g (2.2 parts by weight) [1.0g (2.0 parts by weight) of plant sterol content]

(iii) Sugar : 40g (80.0 parts by weight)

(iv) Cow's milk : 15.5g (31.0 parts by weight)

(v) Whole egg : 100g (200 parts by weight)

[0034]Previously, a plant sterol inclusion is added to wheat flour, and it mixes sufficiently. After stirring a whole egg and sugar, plant sterol content wheat flour and cow's milk are thrown in, and also it stirs, and the done cloth is put into a mold. Then, an internal temperature burned for 20 minutes in the oven kept at 160 degrees C.

[0035]The sponge cake was manufactured in the same conditions and procedure as the working example 4 except the addition amount of the working-example 5 plant-sterol inclusion having been 2.2 g (2.0 g of plant sterol content, 4.0 parts by weight per 100 parts by weight of wheat flour).

[0036]The sponge cake was manufactured in the same conditions and procedure as the working example 4 except the addition amount of the working-example 6 plant-sterol inclusion having been 3.3 g (3.0 g of plant sterol content, 6.0 parts by weight per 100 parts by weight of wheat flour).

[0037]The sponge cake was manufactured in the same conditions and procedure as the working example 4 except not adding a comparative example 3 plant-sterol inclusion.

[0038]The sponge cake was manufactured in the same conditions and procedure as the working example 4 except the addition amount of the comparative example 4 plant-sterol inclusion having been 4.4 g (4.0 g of plant sterol content, 8.0 parts by weight per 100 parts by weight of wheat flour).

[0039]10 g was separated from the sponge cake manufactured by the working examples 4-6 and the comparative examples 3 and 4, and the quantitative analysis of the separated type plant sterol by GLC was carried out in the same conditions and procedure as the working examples 1-3. The coupled type plant sterol weight S in all the sponge cakes and the content ratio (% by weight) of coupled type plant sterol S to all the plant sterol E as well as the above were calculated except having replaced bread to the sponge cake. A result is shown in Table 2.

[0040]Organic-functions evaluation was performed using 12 persons' panel to the sponge cake manufactured by the working examples 4-6 and the comparative examples 3 and 4. The result is shown in Table 2.

[0041]

[Table 2]

	植物ステロール 添加量*3	結合型植物 ステロール*4	ザラザラ感	味	香り	色、艶
実施例 4	1g (2 重量部)	0.972g(97.2%)	なし	良好	良好	良好
実施例 5	2g (4 重量部)	1.926g(96.3%)	なし	良好	良好	良好
実施例 6	3g (6 重量部)	2.205g(73.5%)	なし	良好	良好	良好
比較例 3	0g	0g	なし	良好	良好	良好
比較例 4	4g (8 重量部)	2.396g(59.9%)	ややあり	良好	良好	良好

[0042]The notes in Table 2 are as follows.

*3) A number is an addition amount of plant sterol in all the sponge cakes.

() An inner display shows a weight section of plant sterol per 100 parts by weight of wheat flour.

*4) A number is the abundance of coupled type plant sterol in all the sponge cakes.

() An inner display shows a content ratio (% by weight) of coupled type plant sterol to all the plant sterol.

[0043]As shown in Table 2, like the comparative example 3, very good sponge cakes, such as mouthfeel and a taste, are obtained, and the great portion of plant sterol of the working examples 4-6 is coupled type. There was also dramatically little crystal deposition.

On the other hand, compared with the working examples 4-6, as for the comparative example 4, a coupled type plant sterol content ratio is decreasing.

Mouthfeel is also a little inferior by crystal deposition.

[0044](The working examples 7-9 and comparative examples 5 and 6)

The following material was prepared in order to make the fried noodles containing working-example 7 plant

sterol.

(i) Wheat flour (semi- strong flour) : 5000g (100 parts by weight)

(ii) plant sterol inclusion: -- 108g(2.2 parts by weight) [-- plant sterol content: -- 100g(2.0 parts by weight)]

(iii) Salt : 49.5g (0.99 part by weight)

(iv) Kansui : 25g (0.5 part by weight)

(v) Water : 1650g (33 parts by weight)

[0045]Previously, a plant sterol inclusion is added to wheat flour, and it mixes sufficiently. A pasta production is carried out, after mixing the above-mentioned material and kneading sufficiently. After steaming these noodles, deep-fried tofu was performed for 1.5 minutes in a 140 degrees C oil, after that, it cooled radiationally for 1 to 2 hours, and fried noodles were manufactured. What boiled these fried noodles for 2.5 minutes in boiling water was made into the sample.

[0046]Fried noodles were manufactured in the same conditions and procedure as the working example 7 except the addition amount of the working-example 8 plant-sterol inclusion having been 216 g (200 g of plant sterol content, 4.0 parts by weight per 100 parts by weight of wheat flour).

[0047]Fried noodles were manufactured in the same conditions and procedure as the working example 7 except the addition amount of the working-example 9 plant-sterol inclusion having been 324 g (300 g of plant sterol content, 6.0 parts by weight per 100 parts by weight of wheat flour).

[0048]Fried noodles were manufactured in the same conditions and procedure as the working example 7 except not adding a comparative example 5 plant-sterol inclusion.

[0049]Fried noodles were manufactured in the same conditions and procedure as the working example 7 except the addition amount of the comparative example 6 plant-sterol inclusion having been 432 g (400 g of plant sterol content, 8.0 parts by weight per 100 parts by weight of wheat flour).

[0050]10 g was separated from the fried noodles manufactured by the working examples 7-9 and the comparative examples 5 and 6, and the quantitative analysis of the separated type plant sterol by GLC was carried out in the same conditions and procedure as the working examples 1-3. The coupled type plant sterol weight S in all the fried noodles and the content ratio (% by weight) of coupled type plant sterol S to all the plant sterol E as well as the above were calculated except having replaced bread to fried noodles. A result is shown in Table 3.

[0051]Organic-functions evaluation was performed using 12 persons' panel to the fried noodles manufactured by the working examples 7-9 and the comparative examples 5 and 6. The result is shown in Table 3.

[0052]

[Table 3]

	植物ステロール 添加量*5	結合型植物 ステロール*6	ザラザラ感	味	香り	色、艶
実施例 7	100g (2 重量部)	98.1g(98.1%)	なし	良好	良好	良好
実施例 8	200g (4 重量部)	192g(96.0%)	なし	良好	良好	良好
実施例 9	300g (6 重量部)	268g(89.3%)	なし	良好	良好	良好
比較例 5	0g	0g	なし	良好	良好	良好
比較例 6	400g (8 重量部)	304g(76.0%)	ややあり	良好	良好	良好

[0053]The notes in Table 3 are as follows.

*5) A number is an addition amount of plant sterol in all the fried noodles.

() An inner display shows a weight section of plant sterol per 100 parts by weight of wheat flour.

*6) A number is the abundance of coupled type plant sterol in all the fried noodles.

() An inner display shows a content ratio (% by weight) of coupled type plant sterol to all the plant sterol.

[0054]As shown in Table 3, like the comparative example 5, very good fried noodles, such as mouthfeel and a taste, are obtained, and the great portion of plant sterol of the working examples 7-9 is coupled type.

There was also dramatically little crystal deposition.

On the other hand, compared with the working examples 7-9, as for the comparative example 6, a coupled type plant sterol content ratio is decreasing.

Mouthfeel is also a little inferior by crystal deposition.

[0055]

[Effect of the Invention]As stated above, according to the present invention, the plant sterol content processed food which can take in daily the plant sterol of quantity which can expect an effect from the lipid improvement in blood and the condition improvement of prostatic hypertrophy can be provided, without spoiling the value as foodstuffs, such as mouthfeel and a taste.

[Translation done.]