[0113]

Example 5: Sensory evaluation test of ice creams

(1) Sensory evaluation test of low-fat ice creams

i) Sensory evaluation test

Ice creams were produced by the method described in Example 2 (1) according to formulations specified in Table 10. Here the whey protein aggregate used was one obtained in Example 1 (2). The fat content in Test Example 13 was 1% by weight, and the fat content in Comparative Example 5 was 10% by weight. In Comparative Example 5, an ice cream was prepared so that the solid mixing ratio was equal to that in Test Example 13.

[0114]

[Table 10]

Table 10: Studies on conditions for preparation of low-fat air bubble-containing emulsions (2)
(Influence of presence or absence of whey protein aggregates)

		Test Example 13	Comparative Example 5
Raw material		Fat ingredient with MP incorporated therein 2.5 ~~4~~% by weight	Fat ingredient with MP not incorporated therein 10% by weight
Protein	Whey protein aggregate	30.0	0
	Defatted concen-trated milk	14.6	30.0
Lipid	Vegetable fat and oil	2.5	10.0
Saccha-rides	Glutinous starch syrup	15.3	15.3
	Powdered candy	6.0	6.0
	Sugar	7.9	7.9
Egg yolk	Sweetened (20%) egg yolk	1.5	1.5
Dye	Annatto dye	0.02	0.02

CLAIMS

[1] A low-fat or fat-free air bubble-containing emulsion comprising, as an alternative to fat, a whey protein aggregate ~~as an alternative to fat,~~

~~wherein the whey protein aggregate is produced by simultaneously subjecting a whey protein solution to heat treatment and mechanical shearing treatment, and~~

~~wherein the whey protein aggregate~~ that contains particles having a 50% mean particle diameter of 2 to 10 μm,

wherein the air bubble-containing emulsion is a food selected from the group consisting of ice creams, ice confectioneries, frozen yogurts, whip creams, whip deserts, margarines, spreads, and whip-type soft cheeses, and

when the food is one selected from ice creams, ice confectioneries, or frozen yogurts, the content of milk fat-containing fat in the food is 0.5 to 5% by weight or less than 0.5% by weight, based on the food,

when the food is one selected from whip creams, the content of milk fat-containing fat in the food is 0.5 to 10% by weight or less than 0.5% by weight, based on the food,

when the food is one selected from whip deserts, the content of milk fat-containing fat in the food is 0.5 to 5% by weight or less than 0.5% by weight, based on the food,

when the food is one selected from margarines, the content of milk fat-containing fat in the food is less than 0.5% by weight, based on the food,

when the food is one selected from spreads, the content of milk fat-containing fat in the food is less than 0.5% by weight, based on the food, or

when the food is one selected form whip-type soft cheeses, the content of milk fat-containing fat in the food is 0.5 to 5% by weight or less than 0.5% by weight, based on the food.

[2] The low-fat or fat-free air bubble-containing emulsion according to claim 1, wherein the food is one selected from ice creams, ice confectioneries, or frozen yogurts, and the content of

milk fat-containing fat in the food is 0.5 to 5% by weight or less than 0.5% by weight, based on the food.

~~[2] The low-fat or fat-free air bubble-containing emulsion according to claim 1, wherein the heat treatment is carried out at 75 to 85°C for 5 to 10 min.~~

~~[3] The air bubble-containing emulsion according to claim 1 or 2, wherein the whey protein solution has a solid content of 5 to 20% by weight.~~

~~[4] The air bubble-containing emulsion according to any one of claims 1 to 3, which is a food.~~

~~[5] The air bubble-containing emulsion according to claim 4, wherein the food is one selected from the group consisting of ice creams, ice confectoineries, frozen yogurts, whip creams, margarines, spreads, and whip-type soft cheeses.~~

[3] The low-fat or fat-free air bubble-containing emulsion according to claim 1 or 2, wherein the low-fat or fat-free air bubble-containing emulsion is substantially free from stabilizers and/or emulsifiers.

[4~~6~~] A process for producing a low-fat or fat-free air bubble-containing emulsion, the process comprising:

mixing a whey protein aggregate that has been produced by simultaneously subjecting a whey protein solution to heat treatment and mechanical shearing treatment and contains particles having a 50% mean particle diameter of 2 to 10 μm, into water and

stirring the mixture to form air bubbles,

wherein the air bubble-containing emulsion is a food selected from the group consisting of ice creams, ice confectioneries, frozen yogurts, whip creams, whip deserts, margarines, spreads, and whip-type soft cheeses, and

when the food is one selected from ice creams, ice confectioneries, or frozen yogurts, the content of milk fat-containing fat in the food is 0.5 to 5% by weight or less than 0.5% by weight, based on the food,

when the food is one selected from whip creams, the content of milk fat-containing fat in the food is 0.5 to 10% by weight or less than 0.5% by weight, based on the food,

when the food is one selected from whip deserts, the content of milk fat-containing fat in the food is 0.5 to 5% by weight or less than 0.5% by weight, based on the food,

when the food is one selected from margarines, the content of milk fat-containing fat in the food is less than 0.5% by weight, based on the food,

when the food is one selected from spreads, the content of milk fat-containing fat in the food is less than 0.5% by weight, based on the food, or

when the food is one selected form whip-type soft cheeses, the content of milk fat-containing fat in the food is 0.5 to 5% by weight or less than 0.5% by weight, based on the food.

[5] The process according to claim 4, substantially without using stabilizers and/or emulsifiers.

[6~~7~~] A process for producing a low-fat or fat-free ice creams, ice confectionery~~ies~~, or frozen yogurts, the process comprising:

mixing a whey protein aggregate that has been produced by simultaneously subjecting a whey protein solution to heat treatment and mechanical shearing treatment and contains particles having a 50% mean particle diameter of 2 to 10 μm, into water and

stirring and freezing the mixture to form air bubbles,

wherein the content of milk fat-containing fat in the low-fat or fat-free ice creams, ice confectioneries, or frozen yogurts is 0.5 to 5% by weight or less than 0.5% by weight, based on the low-fat or fat-free ice creams, ice confectioneries, or frozen yogurts.

[7] The process according to claim 6, substantially without using

stabilizers and/or emulsifiers.

[8] The process according to claim 7, wherein the air bubbles are formed at a temperature of -2.5°C or below.

[9] The process according to any one of claims 4~~6~~ to 8, wherein the whey protein aggregate is used as an alternative to fat without drying.