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(54) Title: COLD SOLUBLE FOAMER

(57) Abstract: The invention pertains to a powdered foamer composition or ingredient suitable for producing enhanced foam in foodstuffs and beverages, said composition or ingredient comprising, fat, carbohydrate and protein and entrapped gas, said composition or ingredient containing,on a dry weight basis, 0.1 -3 wt% of lecithin and/or at least one, preferably the sum of at least two, more preferably at least three phospholipids selected from the group consisting of phosphatidylserine (PS), phosphatidylcholine (PC), phosphatidylethanolamine (PE) and phosphatidylinositol (PI).

Cold soluble foamer

FIELD OF THE INVENTION

The present invention pertains to a foaming composition or foamer for use in cold beverages and other instant foodstuffs. A soluble foamer composition, or, for that matter, a soluble foamer ingredient, induces the formation of or forms a foam upon addition of a liquid.

BACKGROUND DESCRIPTION

Instant powders that upon dissolution produce foaming beverages are well known, and unmistakably different from those compositions applied in preparing dough and referred to as foaming agents ("Schäummittel") in DE 42 13 258. The "Schäummittel" according to DE 41 13 258 is blended with other dry components and then mixed with water to provide a dough. No means are taken to maintain gas entrapped in the composition to be released only upon contact with a liquid. Obviously, problems related with dough preparation are of a different kind than those faced when dealing with the formation of a foaming top layer on a beverage, particularly in case of cold beverages.

Conventional foamers for beverages involve a dry mix of a soluble beverage powder and a soluble foamer. The soluble foamer contains vacuoles with gas entrapped, which upon reconstitution of the powder, produce foam. Upon the addition of (hot) water or milk, a beverage is formed, which has a foam layer on its upper surface. Such soluble foamers are often associated with hot beverages such as coffee and tea, particularly with cappuccino.

When the conventional foamers would be applied to cold beverages, these powders tend to be sparingly soluble, usually merely floating on the surface of the liquid, even if added by means of vigorous stirring. Even worse, lumping, flocculation, oil scum, and white flecks are observed, which leave the beverage with a very unattractive appearance. This makes these powdered foamers unsuited for use in cold water or cold milk beverages. Yet, there is an increasing demand for e.g. cold versions of traditionally warm milk-type beverages, juices and milkshakes. This creates a need for a powdered foamer that will provide a foamed water-based drink when reconstituted in cold aqueous environment

Although creamers and foamers often relate in application, these should be carefully distinguished from one another. Creamers are intended to deliver mouthfeel benefits to a beverage that, in the perception or according to the preference of the consumer, provides whitening, lightening or creaming. Foaming power and foam stability are no issue there. Yet, the literature sometimes confusingly considers creamers and foamers interchangeable, despite the fact that there are significant differences. Given the sensitive and delicate nature of a foam, there is no need to say that the skilled person carefully needs to select the components of a foamer. In contrast with foamers, creamers contain only a minor amount of entrapped gas as a result of the drying process, and different levels and types of surfactants like proteins and synthetic emulsifiers.

WO 2008/031600 relates to beverage creamers and how to improve their mouthfeel without increasing fat content. In one embodiment, the creamer may contain a foaming agent, i.e. an edible water-soluble carbonate or bicarbonate salt that evolves carbon dioxide when it reacts with an acid component contained in the composition. It is silent on the amounts to be applied, and no actual foaming agent-containing compositions are disclosed.

It is noted that such foaming agent does not render the composition fit as a foamer. There is little or no gas entrapped; the tapped bulk density of the compositions exemplified is above 600 g/l. In order to obtain for instance 3 mm foam on top of a coffee - typically requiring about 10 g creamer - about 5 g of the foaming agent is needed, adding to 5 gram of the creamer composition of example 1 of WO 2008/031600. Even at these extremely high numbers on foaming agent, it is noted that a foam layer of about 3 mm is on the low end; typically at least 7 mm is regarded acceptable for foamer applications. It is the entrapped gas and associated lower densities of the foamers that plays an important role in the interplay between foamer dissolution and floating behaviour. The tendency to 'float' hampers rapid dissolution of the foam particles. It is an object of the present invention to improve dispersing abilities and dissolution abilities of foamers. In practice, proper dissolution should be achievable within 10 to 20 seconds.

The potential of foamers and creamers in cold beverages has been recognized by the inventors of US-2001/0041211, although sadly making no distinction between the two product lines either. They disclose creamer comprising agglomerated particles that contain about 25 – 45 % of oil, about 30 – 70 % of sweetener, about 0.5 – 6.0 % of

protein and about 0.3 – 1.5 % of an emulsifier. The examples all concern 'foam-free' creamers, with little or no gas entrapped into the composition. Evidently, these creamers are also not tested for any foam characteristics. Example 1 shows a powdered, cold water dispersible creamer produced by spraying a small amount of lecithin on the surface of a creamer resulting in improved cold water dispersibility /solubility.

WO-2006/022540 addresses the same problems for cold beverage applications. At page 2 lines 11 – 15 it is taught that for applications with a desired foam layer on top the use of lecithin is undesirable. The surface active properties are deemed to have a considerable and sometimes tremendous negative effect on the foam layer and on the stability of the foam layer on top of a (cold) beverage. Therefore, WO-2006/022540 focuses on cold soluble foamers that comprise a mixture of foam stabiliser and medium chain triglyceride (MCT) oil instead. In the context of WO-2006/022540, "cold applications" means 10 °C. Application at lower temperatures is limited, due to the cloud point of the MCT. Further, MCT has a disadvantageous effect on taste.

It is an object of the present invention to provide a foaming ingredient or composition which can be used in cold water- or milk-based beverages, even at lower temperatures, even ice-water, while maintaining or possibly improving foam characteristics (both in terms of foam power and foam stability). It is also an object of the present invention to provide an improved foamer with little impact on taste.

SUMMARY OF THE INVENTION

Surprisingly, the inventors have found that a powdered cold soluble foamer can be provided that is not troubled by any of the above dissolution problems and exhibits excellent foaming properties, by adding significant amounts of phospholipids, preferably as lecithin, thereto. Lecithin may constitute a suitable ingredient in creamers, however, it is strongly believed in the art that one should avoid such fatty components in foaming applications such as present.

Even more surprisingly, it was observed that solubility was enhanced but foaming not adversely affected when lecithin was provided as a mixture in oil. While the skilled person would expect the mere addition of oil to result in strong antifoaming behaviour, the opposite has been found true.

Although good results are achieved when lecithin is dissolved in the emulsion phase, before spray-drying, best results are obtained when lecithin is sprayed onto the

surface of the individual foamer powder particles . Such a composition is recognized by the presence of lecithin on the outer layer of the powder particles. The lecithinization procedure results in a foamer that, upon instantization, shows good solubility, and yet renders excellent foam.

DESCRIPTION OF THE INVENTION

The invention thus pertains to a foamer composition or foamer ingredient suitable for hot and cold liquid foodstuffs, in view of the above particularly intended for cold water or milk foodstuffs, comprising, on a dry weight basis, fats, carbohydrates and proteins, containing 0.1 - 3 wt% of lecithin or at least one, preferably the sum of at least two, more preferably at least three phospholipids selected from the group consisting of phosphatidylserine (PS), phosphatidylcholine (PC), phosphatidylethanolamine (PE) and phosphatidylinositol (PI), said weight percentage based on the dry weight of the composition.

Additionally or alternatively, the invention pertains to a foamer composition or ingredient for producing enhanced foam in foodstuffs and beverages, preferably cold foodstuffs and beverages, wherein the composition or ingredient comprises fat, carbohydrate and protein and entrapped gas, and contains 0.1 - 3 wt% of lecithin or at least one, preferably the sum of at least two, more preferably at least three phospholipids selected from the group consisting of phosphatidylserine (PS), phosphatidylcholine (PC), phosphatidylethanolamine (PE) and phosphatidylimine (PI), said weight percentage based on the dry weight of the composition.

It is preferred that the lecithin provides for (at least part) of the phospholipids. In other words, it is particularly an object of the invention to provide a foamer composition or ingredient, comprising fat, carbohydrate and protein and entrapped gas, and further containing 0.1 - 3 wt% lecithin.

By the interchangeable terms “foamer composition” or “foamer ingredient” it is understood a powder, powdered or particulate (all considered interchangeable) composition that contains pockets or vacuoles of gas which, upon dissolution of the powder, produce a good and stable foam. From now on, here below the composition of the invention will be addressed functionally as a “foamer”. The term “powder” may incorporate “concentrate”. The moisture content, i.e. water content, of the particulate

fat-containing composition is preferably below 5, more preferably below 4 wt% more preferably below 3 wt%, based on the total weight of the composition. Preferably the powder is a spray-dried composition. It is preferably a cold soluble powder .

The powder may be characterized in terms of its bulk density. "Bulk density" used herein in connection with the gasified foamer is determined by measuring the volume that a given weight of the foamer occupies when poured through a funnel into a stationary graduated cylinder. The foamer preferably has a tapped bulk density of between 100 and 400 g/L, preferably between 150 and 300 g/L, more preferably between 180 and 250 g/L. However, it is possible to manufacture a foamer heaving a tapped bulk density of at least 250 g/l, making use of pressurized gas entrapped in a matrix; details are given below. For the poured bulk density the above limits are preferably 50 g/l lower. Therewith, the free flowing powder behaves quite distinct from e.g. creamers existing in the art. The bulk density of the dry foamer can be controlled by adjusting the volume of gas pockets.

Additionally or alternatively, the powder can be characterized by its foaming capacity, particularly in those embodiments where the foamer has a relatively high bulk density (due to application of pressurized gas technology). A foam layer height of at least 7 mm is considered acceptable, using simple conditions as laid down in the examples.

Either way, by bulk density and/or by foaming capacity, the foamer composition distinguishes from creamer compositions known in the art.

Lecithin

The phospholipids-containing foamer yields excellent foam power and stability, even in cold foodstuffs. It is preferred that the foamer contains at least PE, PC and PI. More preferably, phospholipids are present in amounts ranging from 0.2 to 1 wt%, most preferably 0.3 – 0.8 wt%.

In practice, good results are obtained with lecithin, which is a complex mixture containing approximately 30% triglycerides and about 55% phosphatides (acetone insolubles), the remainder comprising sugars, glycolipids, partial glycerides, free fatty acids, and residuals. It is preferred that lecithin provides at least part, preferably all of the phospholipids present in the foamer composition . It is thus preferred that the foamer contains 0.2 – 5 wt%, preferably 0.1 – 3 wt% lecithin, on dry weight.

Phospholipids are separated from the majority of the glyceride oil in the miscella in a process known as "degumming". In conventional water degumming, this is generally done by removing the hexane solvent, hydrating the phospholipids with hot water or steam, which make them insoluble in hexane, and centrifuging. Removal of some or all of the water gives the crude lecithin material. However, other de-gumming processes are also available.

Lecithin is admitted by the EU as a food additive (see EEC Regulation 95/2/EEC), designated by E number E322. The term "lecithin" incorporates food-grade acceptable modifications thereof. Lecithins are usually designated depending on their origin (e.g. soybean lecithin, sunflower lecithin, rapeseed lecithin, canola lecithin, cotton seed lecithin, egg lecithin, etc). By far the most important native lecithin is soybean lecithin, which is derived from soya bean oil. Next to native soybean lecithin, also de-oiled soybean lecithin (from which the oil fraction has been removed), hydrolyzed soybean lecithin (lyso-lecithin) are marketed. All are comprised in the term "lecithin" in the context of the invention. Fractionation and de-oiling is for instance addressed in US 5,214,171 and references contained therein; their contents is herein incorporated by reference.

It is preferred to use a phosphatidylcholine-enriched soybean lecithin, preferably containing at least 40 wt% PC, based on the total weight of phospholipids. It is preferred to use Metarin CP IP, commercially available from Cargill. In terms of spraying, best results are obtained when the lecithin is applied as mixture with an oil, preferably soy oil, preferably in a weight ratio of lecithin-to-oil of 2:1 to 1:2.

The foamer is primarily a powder containing fat, carbohydrate, protein and entrapped gas. The phospholipids are preferably present on the surface of the powder particles.

Fat

The fat preferably provides about 10 % to 65 % by weight of the dry weight of the powder); preferably 15 – 45 %, more preferably 20 - 40 % by weight. The fat in the powder may be any suitable fat or fat mixture. Suitable examples include milk fat, vegetable fat, animal fat. The lecithin amounts to the fat fraction.

The origin of the fat, its composition and its physical characteristics such as melting or crystallisation temperatures may influence both the foaming capacity of the

soluble foamer ingredient and the stability of the foam obtained. Although the term "oil" is often used in the art to characterise fats which are in liquid form at room temperature, in the context of the invention the terms "fat" and "oil" are considered interchangeable. Both fats and oils may be applied, in view of the above restrictions. Obviously, all fats and oils applied should be edible.

The fat may be natural, i.e. unhydrogentated (in the art designated as refined vegetable oil)..partially or fully hydrogenated fats are also suitable provided they are substantially free from trans fatty acids (less than 1 %).

On fatty acid basis, the proportion of C_8-C_{14} fatty acids is preferably at least 35% (w/w), up to e.g. 98%, more preferably between 45 and 95%, most preferably between 55 and 90 % (w/w). The proportion of C_{12} and C_{14} fatty acids is preferably between 30 and 80%, more preferably 40 and 75%. The level of unsaturated fatty acids is preferably below 50%, more preferably below 30% (w/w). The level of trans fatty acids is preferably low, preferably lower than 1% of the fat component.

It is preferred that the fat fraction comprises soy, palm, palm kernel, coconut, and/or canola oil, or mixtures of these fats and oils. Especially preferred are so-called lauric fats, i.e. fats having a relatively high level of C12 and C14 fatty acids, mostly more than 40 wt. %, especially palm kernel oil and/or coconut oil. The amount of lauric fats is preferably at least 50 % of the fat fraction.

Preferably, the fat contains more than 20, 40, 50, 70, 80, 90% saturated fat so as to minimize or avoid the formation of rancidity. The fat may also be fully hardened, or fully hydrogenated. The level of trans fatty acids is preferably low, preferably lower than 1% of the fat component.

The fat may comprise mainly triglycerides, but may also comprise other fat substances, such as waxes and/or emulsifiers and the like. If the powder contains triglycerides, it is preferred that these triglycerides contain less than 1 % trans-unsaturated fatty acids.

The fat may also comprise so-called MCT (Medium Chain Triglyceride) oils, a triglyceride source having fatty acid chain lengths of 6 – 12 carbon atoms.

Protein

The protein in the powder may be any suitable protein or protein mixture. Proteins may play an important role in vacuoles formation. Thereto, a foamer preferably comprises

relatively high amounts of proteins, which may be of dairy or non-dairy origin. The protein preferably provides about 4% to about 20% by dry weight of the powder); more preferably from 5% to about 15% by weight, most preferably 6 – 12 wt%. Suitable examples include milk proteins (casein, caseinate or whey, or mixtures thereof), soy proteins, wheat proteins, gelatine, ovalbumin and the like. Combinations may also be employed. A particularly suitable source of protein is non-fat milk solids. These solids may be provided in dry or liquid form (as skimmed milk). Another suitable source of protein is sweet whey, demineralised and/or delactosed whey powder, whey protein concentrate (WPC); preferably a WPC selected from WPC 30, WPC 35, WPC 60 or WPC 80; and whey protein isolate (WPI, having a protein purity of > 90 % w/w). It is preferred to apply a mixture of skim milk or skim milk solids and whey protein concentrate. The weight ratio between whey protein and casein is preferably 0.25 to 10, more preferably 0.5 – 5.

Carbohydrate

The carbohydrate source in the powder may be any suitable carbohydrate or carbohydrate mixture, and may be selected from mono-, di-, oligo- or polysaccharides or mixtures thereof. Carbohydrates are often applied to provide at least some sweetness to the application, and/or it may serve as a filling agent to enhance spray drying. They preferably amount to 25 – 70 wt%, more preferably 35 – 60 wt% of the dry weight of the powder. Suitable examples include lactose, dextrose, fructose, sucrose, maltose, maltodextrin,, corn syrup, invert sugar, starch, modified starch, cyclodextrin, dextrose, inulin or oligofructose, and the like, and mixtures of these carbohydrates. Mixtures containing maltodextrin are particularly preferred. Maltodextrin having a DE value of 13 to 32 are particularly suitable, as are glucose syrups having DE of 27 – 47. Lactose may be used in amounts of 4 – 20 wt/wt % in the particulate powder.

In one embodiment, at least part of the carbohydrates is selected from low-calorie carbohydrates, preferably inulin. Most preferably, up to 50 wt% of carbohydrates present are of the high-caloric type, i.e. having caloric content of higher than 1.5 kcal/g. .

Entrapped gas

A gas is entrapped in the powder. Gas is preferably present in such amounts as to yield a foam height of at least 7 mm upon reconstitution of the powder into a liquid, using the test method as given in the examples. Said otherwise, the entrapped gas is preferably present in such amount as to be capable to yield a foam volume of at least 18 ml, more preferably at least 20 ml, upon reconstitution of 15 g of said foamer composition or ingredient in 100 ml water, preferably cold water. Reconstitution involves stirring, but the foam volume is measured after a period of preferably at least 5 minutes with no agitation. Although not limiting, the test is preferably performed in a beaker having conventional dimensions, preferably about 6 cm diameter. The foam layer is stable for at least 5 minutes, preferably 30 minutes, preferably up to several hours. For sake of completeness , a creamer produces hardly any foam (typically about 0.1 mm), let alone a stable foam. This applies to hot and cold applications.

The gas may be any suitable food grade gas. For example, the gas may be nitrogen, N_2O (nitrous oxide), carbon dioxide or air, and mixtures of these gases. Gases which are substantially inert are preferred. The gas may be introduced into the powder by any suitable process, for instance by gasifying an emulsion comprising protein, fat and carbohydrates and then spray-drying.

In one embodiment, at least part, more preferably all of the gas contained in the fat powder is entrapped in a matrix of protein and/or carbohydrate and/or fat, wherein said part or all of the gas is entrapped under pressure, to enhance foaming; "under pressure" relates to a pressure higher than atmospheric, being approximately 1 bar. This is for instance described in WO-01/08504, its contents herein incorporated by reference. Another suitable technique for pressurizing gas vacuoles into a molten mass of the matrix which contains little or no moisture is by using an extruder. The gas may be injected at a pressure of about 100 kPa gauge to about 20 MPa gauge. The temperature required will depend upon the composition of the matrix since this will influence the melt temperature. However, the temperature may be readily set for any matrix by the skilled person. Generally, however, temperatures above about 150 °C should be avoided. The molten mass may then be extruded through a small orifice and comminuted into a powder.

Depending upon the rapidity of solidification of the matrix, the matrix may need to be cured or quenched under pressure before being formed into a powder. This will

prevent the gas from escaping from the matrix. The curing or quenching is preferably carried out rapidly but the time may vary from about 10 seconds to about 90 minutes. The matrix may further contain one or more plasticizers to improve the robustness (resistance to cracks) of the matrix. The plasticizers are preferably selected from the group consisting of polyols or sugar alcohols, such as glycerol, mannitol, sorbitol, lactitol, erythritol, trehalose and/or lipids, and are used in an amount of 0-10% by weight, preferably 3-7% by weight, more preferably 4-6% by weight, most preferably 5% by weight on the matrix. Preferably glycerol and/or mannitol is used.

If desired, the foamer may contain other components such as artificial sweeteners, stabilisers, thickeners, flowing agents, colours, flavours, aromas and the like. Suitable artificial sweeteners include saccharin, cyclamates, acesulfame, L-aspartyl based sweeteners such as aspartame, and mixtures of these. Suitable stabilisers include dipotassium phosphate and sodium citrate.

The invention further relates to a process of preparing a dry foaming composition in accordance with the present invention. Traditional foamers are produced by sequentially dispersing all components in water using a specific order of addition, mixing the components to produce a uniform slurry, heating the slurry to provide microbiological stability, homogenizing the slurry to form an oil-in-water emulsion having a specific oil droplet size distribution, and then gasifying the slurry prior to spray-drying. The foamer of the invention is no different there from; it can be prepared following methods known to the skilled person. In short, the process involves mixing or blending the ingredients, homogenising, heating, followed by introducing the gas into the liquid composition, and then spray-drying, to obtain the powder. Alternative ways exist in the art and may equally well be applied, such as taught in US 6,129,943, its contents herein incorporated by reference.

The phospholipids source, preferably lecithin, is preferably mixed with a solvent, preferably a food grade oil, prior to spraying. Best results are obtained when the phospholipids are sprayed onto the foamer powder containing fats, proteins, carbohydrates and gas pockets, using fluid bed technology. Another suitable technique involves spraying the lecithin using an agglomerator.

In one embodiment, the invention pertains to a process of preparing a foamer composition or ingredient using conventional techniques, first providing a mixture

containing fat, carbohydrate, protein and lecithin. Hence, lecithin is added prior to any gasifying and spraying steps.

in a preferred embodiment, the invention pertains to a process of preparing a foamer composition or ingredient according to the present invention, comprising providing a fat, carbohydrate and protein-containing emulsion or slurry, gasifying said emulsion or slurry, and then spray-drying said emulsion or slurry, to obtain a powder, wherein lecithin or a lecithin-containing composition is sprayed onto said powder. Optionally, part of the lecithin or lecithin-containing composition is mixed with fat, carbohydrate and protein prior to gasifying. In accordance with the present invention, the above-used wording "lecithin or a lecithin-containing composition" may be interpreted as "a composition containing at least one, preferably at least two, more preferably at least three types of phospholipids as mentioned above.

The invention also pertains to the use of the foamer in foodstuffs and/or beverages, preferably cold applications, and/or the use of lecithin in cold foodstuffs and/or beverage foamers, i.e. foamers suitable for cold foodstuffs and/or beverages. The preparation of the foodstuff or beverage involves a step of contacting the fat-containing powder with a liquid, i.e. water and/or milk. Although this step may involve hot liquid, the beneficial effects of the invention are most pronounced when the liquid is cold. With "cold" applications it is understood liquids having a temperature below 30 ˚C, more preferably below 25 ˚C, most preferably below 10 °C. Good results are still obtained for (alcoholic) beverages below 0 °C. The product and the process of the invention results in beverages having an attractive and tasty foam layer. The beverages can also be hot beverages such as coffee, especially of the cappuccino type, cocoa, milk, tea, soup, or cold beverages such as ice cappuccino, ice tea, cocoa drinks, milk shake, cold soups, but also semi-liquid products such as sauces. The foam layer is stable for at least 30 minutes up to several hours. It is typically applied in amounts of 1 – 10 wt%, preferably 2 – 9 wt%, more preferably 3 – 8 wt% in a foodstuff.

The foaming composition thus forms a foaming layer on top of the foodstuff and/or beverage, and the original constituent profile of the foamer will substantially be maintained. A composite foodstuff or beverage having a lecithin-containing foaming top layer is distinguishable from the foodstuff/beverage comprising lecithin only in the bulk phase of the foodstuff/beverage itself.

Also, the foamer may be contained in instant powder foodstuff formulations, and is thus suitable for preparing ready-to-drink beverages and/or sauces. The amount of the foamer component in the dry-mix instant composition may vary considerably. In general, the foamer composition makes up for 20 – 50 wt% of the dry mix instant formulation. The instant foodstuff powder may be selected from the non-limiting list of coffee powder, milk-shake powder, soup powder, sauce powder, ice tea powder, cocoa-containing powder.

The foamer may also suitable be used in vending machines.

It is also an object of the invention to provide single servings containing the foamer composition or ingredient according to the present invention, and/or said foamer composition or ingredient packaged in an amount that would be suitable for use with a single serving of beverage.

EXAMPLES

Example 1 – Effect of lecithinization

A foamer was first prepared from a conventional foamer emulsion recipe. The typical recipe based on dry matter involved 26 % coconut oil (GR GH30-40, Unimills, the Netherlands), 17 % WPC30, 18 % SMP (skim milk powder), 34 % glucose syrup (72 % solids, DE value of 35, Syral, France) and 2 % dipotassium phosphate.

This emulsion was subsequently pasteurized, homogenized at 150/30 bar, nitrogen gas was injected and the mixture was spray-dried. The powder had a tapped bulk density of 210 g/l.

The powder was cooled and treated separately in a fluid bed agglomerator with lecithin. This extra step could be integrated in the cooling bed of the spray drier. In the agglomerator the powder was heated on the fluid bed up to 50 °C. Several experiments were carried out with different lecithins. The lecithins were Topcithin NGM (standard fluid lecithin), Metarin EWD NGM (hydrolysed fluid lecithin) and Metarin CP IP (phosphatidylcholin-enriched lecithin). All lecithins were provided by Cargill and they were dissolved in soy oil where needed. The lecithin mixture was heated up to 50 °C and sprayed onto the powder. During subsequent transport, the mixture was cooled to

ambient temperature. Six experiments were performed, wherein the powders were each sprayed with 1% and 2 % of the above mentioned lecithins.

The powders were analysed by blending 1 g instant coffee, 5 g powder sugar and 5 g foamer, and mixing the blend with 100 ml cold water, at a temperature of 10°C, and compared with an untreated sample. All lecithinated powders dissolved directly and gave a nice and stable foam without any lumps. The reference powder however, did not really dissolve and yielded a foam with lumps, having unacceptable appearance. The lecithinated powders in the order Topcithin, Metarin EWD and Metarin CP improved whitening. The lecithinated powders with 1% yielded more foam than the powders with 2% lecithin.

Example 2.- Effect on processing

A foamer was made from a spray-dried emulsion with both lecithin in the emulsion and lecithin sprayed on the powder. The powder contained on dry matter basis 25.5 % coconut oil (GR GH30-40, Unimills, the Netherlands), 17 % WPC30, 18 % SMP, 34 % glucose syrup (72 % solids, DE value of 35, Syral, France), 2 % dipotassium phosphate and 0.5% Metarin CP IP (Cargill, the Netherlands).

The emulsion was pasteurized, homogenized at 150/30 bar, nitrogen gas was injected and the mixture was spray-dried. The powder had a tapped bulk density of 210 g/l.

The powder was cooled and treated separately in a fluid bed agglomerator with 1% lecithin marketed as Metarin CP IP. This extra step could be integrated in the cooling bed and the spray drier. In the agglomerator, the powder was heated on the fluid bed up to 50 ˚C. The lecithin was dissolved in soy oil. The lecithin mixture was heated up to 50 ˚C and sprayed onto the powder.

The powder was analysed by blending 1 g instant coffee, 5 g powder sugar and 5 g foamer, and mixing it with 100 ml cold water, at a temperature of 10°C. The powder dissolved directly and yielded a nice and stable foam without any lumps. Compared to example 1, the present embodiment resulted in more whitening and gave excellent mouthfeel.

Foam height testing

15 g foamer powder is dissolved in 100 ml of a cold liquid (at 10 °C), in a 250 ml beaker (Ø 5.8 cm), and left to stand for 5 minutes (without agitation).

The foam surface is then brought into contact with a spindle directly above [spindle diameter 5.6 cm, spindle having 6 holes with a 5 mm diameter evenly distributed 1 mm from outside diameter over the spindle base], wherein the foam is allowed to penetrate into the holes of the spindle. The foam height is measured as the height between the bottom of the spindle and the borderline between the liquid and foam layer in the beaker; the foam height reported in mm.

A foam height of at least 7 mm is regarded acceptable for foamer applications.

CLAIMS

1. A powdered foamer composition or ingredient suitable for producing enhanced foam in foodstuffs and beverages, said composition or ingredient comprising fat, carbohydrate and protein and entrapped gas, said composition or ingredient containing, on a dry weight basis, 0.1 - 3 wt% of lecithin or at least one, preferably the sum of at least two, more preferably at least three phospholipids selected from the group consisting of phosphatidylserine (PS), phosphatidylcholine (PC), phosphatidylethanolamine (PE) and phosphatidylinositol (PI), and said composition or ingredient having a tapped bulk density of between 100 and 400 g/L.

2. The foamer composition or ingredient according to claim 1, said composition or ingredient comprising fat, carbohydrate and protein and entrapped gas, and, on a dry weight basis, 0.1 - 3 wt% of lecithin, and said composition or ingredient having a tapped bulk density of between 100 and 400 g/L.

3. The foamer composition or ingredient according to any one of the preceding claims, wherein at least part of said gas is entrapped in a matrix of protein and/or carbohydrate and/or fat, wherein said part is entrapped under pressure.

4. The foamer composition or ingredient according to any one of the preceding claims, wherein said entrapped gas is present in such amount as to be capable to yield a foam volume of at least 18 ml upon reconstitution of 15 g of said foamer composition or ingredient in 100 ml water.

5. The foamer composition or ingredient according to any one of the preceding claims, packaged as a single serving.

6. A cold liquid foodstuff or beverage, having a foamed top layer formed from the foamer composition or ingredient according to any one of claims 1 - 5.

7. An instant foodstuff formulation containing the foamer composition according to any one of claims 1 – 6.

8. A process of preparing a foamer composition or ingredient, by providing a fat, carbohydrate and protein-containing emulsion or slurry, gasifying said emulsion or slurry, and then spray-drying said emulsion or slurry, to obtain a powder, wherein lecithin or a lecithin-containing composition is sprayed onto said powder after spray-drying and/or added to the fat, carbohydrate and protein prior to gasifying.

9. The process according to claim 8, wherein all of the lecithin present in the foamer composition or ingredient is provided for by spraying lecithin or a lecithin-containing composition onto the powder.

10. The process according to claim 8 or9, wherein the lecithin or lecithin-containing composition is provided as a mixture with oil.

11. Use of lecithin in cold liquid foodstuff foamers or cold liquid beverage foamers.