has been made to external sources of information, including patent specifications and other documents, this is generally for the purpose of providing a context for discussing the features of the present invention. Unless stated otherwise, reference to such sources of information is not to be construed, in any jurisdiction, as an admission that such sources of information are prior art or form part of the common general knowledge in the art.

SUMMARY

[0010] Accordingly, the disclosure broadly comprises a cream composition comprising lipid, optionally protein, one or more emulsifiers, and one or more thickeners or stabilisers, and having acceptable properties after temperature cycling, including acceptable composition:serum phase viscosity, overrun, change in apparent viscosity, and change in fat globule volume weighted mean diameter (D[4,3]).

[0011] The disclosure provides a cream composition, such as a UHT whipping cream composition comprising

a) about 25% to about 40% by weight lipid, the lipid comprising one or more mammalian milk lipids;

b) about 0% to about 3%, preferably about 0.5% to about 3% by weight protein;

c) about 0.01% to about 1.0% by weight of one or more emulsifiers;

d) about 0.05% to about 5%, preferably to about 0.3% by weight of one or more thickeners or stabilisers.

[0012] The disclosure provides a cream composition, such as a UHT whipping cream composition comprising

a) about 25% to about 40% by weight lipid, the lipid comprising one or more mammalian milk lipids;

b) about 0% to about 3%, preferably about 0.5% to about 3% by weight protein;

c) about 0.01% to about 1.0% by weight of one or more emulsifiers;

d) about 0.05% to about 3% by weight of one or more thickeners or stabilisers.

[0013] The disclosure provides a cream composition, such as a UHT whipping cream composition comprising

a) about 25% to about 40% by weight lipid, the lipid comprising one or more mammalian milk lipids;

b) about 0% to about 3%, preferably about 0.5% to about 3% by weight protein;

c) about 0.01% to about 1.0% by weight of one or more emulsifiers;

d) about 0.05% to about 5%, preferably to about 0.3% by weight of one or more thickeners or stabilisers;

wherein

e) the ratio of the viscosity of the composition to the viscosity of an extracted aqueous phase of the composition is less than about 20 when measured at a shear rate of 1 s^{-1} at 5 °C; and/or

f) the composition exhibits an overrun of at least about 80% when whipped at 4 to 10°C using a bowl and whisk; and/or

g) the composition exhibits a change in apparent viscosity of less than about 100% measured at a shear rate of 1 s^{-1} at 5 °C after holding at 25°C for 24 hours followed by holding at 10°C for 24 hours; and/or

h) the composition exhibits a change in fat globule volume weighted mean diameter (D[4,3]) of less than about 100% after holding at 25°C for 24 hours followed by holding at 10°C for 24 hours.

[0014] The disclosure provides a cream composition, such as a UHT whipping cream composition comprising

a) about 25% to about 40% by weight lipid, the lipid comprising one or more mammalian milk lipids;

b) about 0% to about 3%, preferably about 0.5% to about 3% by weight protein;

c) about 0.01% to about 1.0% by weight of one or more emulsifiers;

d) about 0.05% to about 3% by weight of one or more thickeners or stabilisers;

wherein

e) the ratio of the viscosity of the composition to the viscosity of an extracted aqueous phase of the composition is less than about 20 when measured at a shear rate of 1 s^{-1} at 5 °C; and/or

f) the composition exhibits an overrun of at least about 80% when whipped at 4 to 10°C using a bowl and whisk; and/or

g) the composition exhibits a change in apparent viscosity of less than about 100% measured at a shear rate of 1 s^{-1} at 5 °C after holding at 25°C for 24 hours followed by holding at 10°C for 24 hours; and/or

h) the composition exhibits a change in fat globule volume weighted mean diameter (D[4,3]) of less than about 100% after holding at 25°C for 24 hours followed by holding at 10°C for 24 hours.

[0014a] In one aspect, the disclosure provides a cream composition comprising

a) about 25% to about 40% by weight lipid, the lipid comprising one or more mammalian milk lipids;

b) about 0% to about 3% by weight protein;

c) about 0.01% to about 1.0% by weight of one or more emulsifiers;

d) about 0.05% to about 3% by weight of one or more thickeners or stabilisers;

wherein

e) the ratio of the viscosity of the composition to the viscosity of an extracted aqueous phase of the composition is less than about 20 when measured at a shear rate of 1 s^{-1} at 5 °C; and/or

f) the composition exhibits an overrun of at least about 80% when whipped at 4 to 10°C using a bowl and whisk; and/or

g) the composition exhibits a change in apparent viscosity of less than about 100% measured at a shear rate of 1 s^{-1} at 5 °C after holding at 25°C for 24 hours followed by holding at 10°C for 24 hours; and/or

h) the composition exhibits a change in fat globule volume weighted mean diameter (D[4,3]) of less than about 100% after holding at 25°C for 24 hours followed by holding at 10°C for 24 hours.

[0015] The following examples may relate to any of the above examples in any combination.

[0016] In various examples the composition may comprise about 25% to about 40% by weight lipid, the lipid comprising one or more mammalian milk lipids, preferably one or more bovine milk lipids, selected from the group consisting of cream, high fat cream, reconstituted cream powder, anhydrous milk fat (AMF), ghee, butter, ß-serum powder, whole milk powder (WMP), high fat milk protein concentrate, or any combination of any two or more thereof, the lipid optionally further comprising one or more refined and/or hydrogenated vegetable fat sources selected from the group consisting of palm, palm kernel, coconut, soybean, rapeseed, cottonseed, sunflower seed, corn, safflower seed, rice bran oil, sesame oil, olive oil, fractions thereof, or any combination of any two or more thereof. In various examples the composition may comprise any two or more, or any three or more, or any four or more of these components. Preferably the lipid comprises cream, high fat cream, reconstituted cream powder, anhydrous milk fat (AMF), or any combination of any two or more thereof.

[0017] In various examples the composition may comprise about 25, 27, 30, 33, 35, 37, or 40% by weight lipid, and useful ranges may be selected between any of these values (for example, about 25 to about 40, about 25 to about 35, about 25 to about 30,

about 27 to about 40, about 30 to about 40, about 33 to about 40, about 35 to about 40, or about 37 to about 40%).

[0018] In various examples the composition may comprise about 0% to about 3% by weight protein, preferably one or more mammalian milk proteins, preferably one or more bovine milk proteins, wherein the protein comprises or comprises a source of protein selected from the group consisting of milk, skim milk, cream, whole milk, whole milk powder (WMP), skim milk powder (SMP), buttermilk powder (BMP), caseinate, sodium caseinate, calcium caseinate, whey protein concentrate (WPC), whey protein isolate (WPI), milk protein isolate (MPI), milk protein concentrate (MPC), modified MPC derivatives, micellar casein, the protein optionally further comprising one or more non-dairy sources selected from plant or animal sources such as soy protein or egg protein, or any combination of any two or more thereof. In various examples the composition may comprise any two or more, or any three or more, or any four or more of these components. Preferably the protein comprises milk, skim milk, cream, whole milk, whole milk powder (WMP), skim milk powder (SMP), buttermilk powder (BMP), caseinate, sodium caseinate, calcium caseinate, whey protein concentrate (WPC), whey protein isolate (WPI), milk protein isolate (MPI), milk protein concentrate (MPC), modified MPC derivatives, micellar casein, or any combination of any two or more thereof.

[0019] In various examples the composition may comprise about 0, 0.25, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.25, 2.5, 2.75, or 3% by weight protein, and useful ranges may be selected between any of these values (for example, about 0 to about 3, 0.5 to about 1.5, about 0.5 to about 3, about 1 to about 2, about 1 to about 3, about 1.5 to about 2.5, about 1.5 to about 3, about 2 to about 3, or about 2.5 to about 3%).

[0020] In various examples the composition may comprise about 0.01% to about 1.0% by weight of one or more emulsifiers selected from the group consisting of protein, phospholipids, including phospholipids from milkfat globule membrane, buttermilk powder, β-serum powder (the dried aqueous phase removed from pasteurised dairy cream during the manufacture of AMF), or an emulsifier listed in Codex Standard 288-1976 for creams such as lecithin, mono and diglycerides, distilled monoglycerides, acid esters of mono-diglycerides including lactic, citric, acetic, diacetyltartaric and tartaric, polysorbates (Tweens), sorbitan esters of fatty acids (SPANS), sucrose esters, polyglycerol esters of fatty acids, propylene glycol esters of fatty acids, sodium or calcium stearoyl lactylate, or any combination of any two or more thereof. In various examples the composition may comprise any two or more, or any three or more, or

any four or more of these components. Preferably the one or more emulsifiers are selected from the group consisting of protein, phospholipids from milkfat globule membrane, buttermilk powder, β-serum powder, lecithin, mono and diglycerides, distilled monoglycerides, acid esters of mono-diglycerides including lactic, citric, acetic, diacetyltartaric and tartaric, polysorbates, sorbitan esters of fatty acids, sucrose esters, polyglycerol esters of fatty acids, propylene glycol esters of fatty acids, sodium or calcium stearoyl lactylate, or any combination of any two or more thereof. More preferably the one or more emulsifiers comprise two or more of lecithin, mono and diglycerides, polysorbates, sucrose esters, and propylene glycol esters of fatty acids.

[0021] In various examples the composition may comprise about 0.01, 0.025, 0.05, 0.075, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, or 1.0% by weight of one or more emulsifiers, and useful ranges may be selected between any of these values (for example, about 0.01 to about 1.0, about 0.025 to about 1.0, about 0.05 to about 1.0, about 0.075 to about 1.0, about 0.1 to about 1.0, about 0.2 to about 1.0, about 0.4 to about 1.0, about 0.5 to about 1.0, or about 0.6 to about 1.0%).

[0022] In various examples the composition may comprise about 0.05% to about 5%, preferably to about 0.3%, or about 0.05% to about 3% by weight of one or more thickeners or stabilisers selected from the group consisting of, for example, carrageenan, guar gum, locust bean gum, Tara gum, gellan gum, xanthan gum ,acacia gum, microcrystalline cellulose (MCC), carboxymethyl cellulose (CMC), cellulose derivatives, propylene glycol alginate, sodium alginate, pectin, gelatin, starch, starch derivatives, citrus fibre, or any combination of any two or more thereof. In various examples the composition may comprise any two or more, or any three or more, or any four or more of these components. Preferably the one or more thickeners or stabilisers are selected from the group consisting of carrageenan, guar gum, locust bean gum, Tara gum, gellan gum, xanthan gum, acacia gum, microcrystalline cellulose (MCC), carboxymethyl cellulose (CMC), cellulose derivatives, propylene glycol alginate, sodium alginate, pectin, gelatin, starch or starch derivatives, or citrus fibre, or any combination of any two or more thereof. More preferably the one or more thickeners or stabilisers comprise xanthan, carrageenan, and guar gum.

[0023] In various examples the composition may comprise about 0.05, 0.075, 0.1, 0.15, 0.2, 0.25, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, or 5% by weight of one or more thickeners or stabilisers, and useful ranges may be selected between any of these values (for example, about 0.05 to about 5, about 0.05 to about 4,

about 0.05 to about 3, about 0.05 to about 2, about 0.05 to about 1, about 0.05 to about 0.9, about 0.05 to about 0.8, about 0.05 to about 0.7, about 0.05 to about 0.6, about 0.05 to about 0.5, about 0.05 to about 0.4, or about 0.05 to about 0.3%).

[0024] In various examples the ratio of the viscosity of the composition to the viscosity of an extracted aqueous phase of the composition may be about or less than about 20, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, or 8 when measured at a shear rate of 1 s^{-1} at 5 °C, and useful ranges may be selected between any of these values (for example, about or less than about 8 to about 20, about 8 to about 18, or about 8 to about 12). Preferably the ratio is less than about 20 or less than about 9.

[0025] In various examples the composition may exhibit an overrun of at least about 80, 85, 90, 95, 100, 105, 110, 115, or 120% when whipped at 4 to 10°C using a bowl and whisk and useful ranges may be selected between any of these values (for example, about 80 to about 120, about 90 to about 120, about 100 to about 120, or about 110 to about 120%). Preferably the overrun is at least about 100 or about 120%. In some examples, the UHT whipping cream composition maintains an overrun following whipping of greater than about 150%, for example greater than about 160%, greater than about 170%, greater than about 180%, greater than about 190%, or greater than about 200%.

[0026] In various examples the composition may exhibit a change in apparent viscosity of less than about 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, or 100% measured at a shear rate of 1 s^{-1} at 5 °C after holding at 25°C for 24 hours followed by holding at 10°C for 24 hours, and useful ranges may be selected between any of these values (for example, about 50 to about 100, about 50 to about 90, about 50 to about 80, or about 60 to about 100%). Preferably the change is less than about 100% or less than about 50%.

[0027] In various examples the composition may exhibit a change in apparent viscosity of less than about 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, or 100% measured at a shear rate of 1 s^{-1} at 5 °C after two, or three or more cycles of holding at 25°C or 30°C for 24 hours followed by holding at 10°C for 24 hours, and useful ranges may be selected between any of these values (for example, about 50 to about 100, about 50 to about 90, about 50 to about 80, or about 60 to about 100%). Preferably the change is less than about 100% or less than about 50%.

[0028] In various examples the composition may exhibit a change in apparent viscosity of less than about 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, or 100% measured at a shear rate of 1 s^{-1} at 5 °C after one, two, or three or more cycles of holding at 30°C for 24 hours followed by holding at 10°C for 24 hours, and useful ranges may be selected between any of these values (for example, about 50 to about 100, about 50 to about 90, about 50 to about 80, or about 60 to about 100%). Preferably the change is less than about 100% or less than about 50%.

[0029] In various examples the composition may exhibit a change in fat globule volume weighted mean diameter (D[4,3]) of less than about 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, or 100% after holding at 25°C for 24 hours followed by holding at 10°C for 24 hours, and useful ranges may be selected between any of these values (for example, about 50 to about 100, about 50 to about 90, about 50 to about 80, or about 60 to about 100%). Preferably the change is less than about 100% or less than about 50%.

[0030] In various examples the composition may exhibit acceptable pourability, where the composition pours from the pack without sticking, or lumping after one, two, or three or more cycles of holding at 25°C for 24 hours followed by holding at 10°C for 24 hours.

[0031] In certain examples, the UHT whipping cream may further comprise a buffering or chelating salt, preferably about 0 to about 0.03% by weight, for example about 0.01 to about 0.025% by weight of the buffering or chelating salt. Buffering or chelating salts can be selected from but not limited to, orthophosphates, polyphosphates and citrates, or any combination of any two or more thereof. For example, in certain exemplary examples the buffering or chelating salt is a polyphosphate salt, such as sodium or potassium polyphosphate.

[0032] Other examples of the disclosure may become apparent from the following description which is given by way of example only and with reference to the accompanying drawings.

[0033] As used herein the term "and/or" means "and" or "or", or both.

[0034] As used herein "(s)" following a noun means the plural and/or singular forms of the noun.

[0035] It is intended that reference to a range of numbers disclosed herein (for example, 1 to 10) also incorporates reference to all rational numbers within that range

(for example, 1, 1.1, 2, 3, 3.9, 4, 5, 6, 6.5, 7, 8, 9 and 10) and also any range of rational numbers within that range (for example, 2 to 8, 1.5 to 5.5 and 3.1 to 4.7) and, therefore, all sub-ranges of all ranges expressly disclosed herein are hereby expressly disclosed. These are only examples of what is specifically intended and all possible combinations of numerical values between the lowest value and the highest value enumerated are to be considered to be expressly stated in this application in a similar manner.

[0036] The term "comprising" as used in this specification means "consisting at least in part of". When interpreting statements in this specification which include that term, the features, prefaced by that term in each statement or claim, all need to be present but other features can also be present. Related terms such as "comprise" and "comprised" are to be interpreted in the same manner.

[0037] This disclosure may also be said broadly to consist in the parts, elements and features referred to or indicated in the specification of the application, individually or collectively, and any or all combinations of any two or more of said parts, elements or features, and where specific integers are mentioned herein which have known equivalents in the art to which this disclosure relates, such known equivalents are deemed to be incorporated herein as if individually set forth.

BRIEF DESCRIPTION OF THE DRAWINGS

[0038] Figure 1 shows a plot of % change in apparent viscosity against the ratio of composition:aqueous phase viscosity for compositions of the present invention (black box, points 1 to 5) and comparator commercially available compositions (C1 to C5) where commonly numbered points are duplicate assessments of the same composition.

DETAILED DESCRIPTION OF THE INVENTION

[0039] This application provides UHT creams and/or whipping creams comprising a specific combination of ingredients resulting in a temperature robust, stable cream that can withstand temperature fluctuations while maintaining functionality and avoiding defects.

[0040] Furthermore, the present invention provides UHT creams and/or whipping creams compositions resistant to temperature cycling, temperature fluctuations, tempering and/or heat-shock having excellent stability, pourable, good whipping ability and functionality.