

DAIRY-ANALOGUE COMPOSITION

FIELD OF THE INVENTION

The invention relates to dairy analogue compositions comprising from 1% to 90% by weight of a fat composition; and up to 99% by weight of water; wherein the fat composition comprises a blend of (a) a lauric vegetable fat; and (b) an interesterified blend of a lauric fat and non-lauric vegetable fat. In particular, the invention relates to the use of certain fat compositions in dairy analogue compositions to improve various properties of the dairy analogue compositions.

BACKGROUND OF THE INVENTION

There is an increasing demand for plant-based foods due to consumers' increasing desire to eat healthy, sustainably sourced food products and to generally lower their meat and dairy intake. There is also an increasing number of vegans who require food products to be completely absent of animal-derived products for ethical and health reasons.

This has led to the development of various plant-based food products such as plant-based meats (meat analogue compositions) and plant-based cheeses (cheese analogue compositions) which aim to mimic certain qualities of the animal-derived meat and cheese products, such as the texture, taste and/or appearance. Plant-based alternatives for other dairy applications such as whipped cream and similar aerated food products; ice cream and other frozen desserts; and liquid non-dairy creamers have also been developed. When providing dairy analogue compositions, it is important that the properties of the corresponding dairy product which the analogue is intended to mimic are provided. It has been found that the nature of the fat used in dairy analogue compositions is key to being able to effectively mimic the properties of the corresponding dairy product that the analogue is intended to mimic.

In the case of whipped creams and other aerated products such as toppings, mousses and aerosols, the nature of the fat used in the product is important for determining key functional properties of the whipped cream. To be suitable for use as a whipping cream or other aerated product, compositions must have various properties such as appropriate whipping time, a good overrun (the volume of air whipped into the product), a firm and stable foam and a good mouth feel. It is also necessary for whipping cream compositions

to have storage stability which prevents them thickening when stored in containers prior to use. The nature of the fat composition present in the whipped cream composition is important for achieving these effects. The fat used in the whipped cream compositions should have the correct type of fat crystals present therein and correct balance of solid and liquid fat. In the whipping process, air is incorporated into the cream. Shearing forces applied to fat globules cause the fat globules to aggregate and coalesce which traps air bubbles present in the cream causing a foam to be produced. This process and the extent to which the air is successfully trapped prevents the foam from shrinking and exhibiting syneresis. The extent to which the fat globules successfully coalesce and form stabilising aggregates depends, at least in part, on the balance between solid and liquid fat present in the composition and also the fat crystal morphology. These features of the fat also effect the extent to which a sufficient overrun is provided by the composition when whipped. Whipped creams are thus complex systems that require specific properties of the fats used therein.

In conventional dairy whipped creams, the animal fats present in the dairy cream are responsible for providing the functional properties of the whipped cream discussed above. In non-dairy whipped cream compositions (i.e. dairy analogue compositions), hydrogenated lauric fats such as partially or fully hydrogenated coconut oil have previously been used. A non-hydrogenated fat solution based on palm kernel stearin has also previously been used as the fat in non-dairy whipped cream compositions.

In recent years, there has been a trend for consumers to want to avoid or minimise their intake of partially or fully hydrogenated fats in foods. A disadvantage of using partially hydrogenated fats is the high content of trans unsaturated fatty acids present in them. Trans fatty acids are undesirable for health reasons as they are linked to the incidence of heart disease and higher cholesterol in consumers, amongst other conditions. A disadvantage of fully hydrogenated fat is that the fat typically has a poor melting behaviour resulting in an undesirable and unpleasant waxy mouth feel when included in food products such as dairy analogue compositions. There has also been a trend for consumers to want to avoid palm oil, palm kernel oil and other palm derived products in food due to the sustainability concerns associated with palm oil production. Palm oil is also believed to be associated with negative health effects for consumers. The inventors of the present invention have thus appreciated that there is a need in the art for a plant-based fat that is suitable for use in non-dairy whipped cream compositions, providing the

advantages and effects described above, but that is also free of palm-based products and partially or fully hydrogenated fat.

WO2019/185444 discloses plant derived, non-hydrogenated, non-palm derived fat compositions comprising from 3.2% to 10% by weight of total caprylic acid and capric acid; and from 13% to 32% by weight lauric acid; from 20% to 45% by weight stearic acid. The fat compositions contain from 7% to 15% by weight CN46 triglycerides; from 4% to 30% by weight CN54 triglycerides; and from 15% to 28% by weight of total CN42 and CN54 triglycerides. The fat compositions are disclosed for use in bakery and confectionary applications to improve the textural and sensory performance of baked goods and confections. In particular, the fat compositions are taught as being useful for inclusion in whipped cream compositions and beneficial for allowing air to be entrained therein. However, it has been appreciated by the inventors of the present invention that the fat compositions disclosed in these documents do not provide whipped cream compositions with sufficient firmness or long-term stability. It has been found that, over time, the whipped cream compositions produced using these fats lose firmness, stability, and exhibit syneresis.

The inventors of the present invention have also appreciated that there is a need in the art for further fat compositions that are suitable for use in other plant-based dairy applications such as plant-based frozen desserts and liquid non-dairy creamers. In particular, the inventors have appreciated that there is a need in the art for plant-derived, non-palm derived, non-hydrogenated fats that have the desired properties for use in dairy analogue compositions.

In applications such as ice cream, it is vital that the non-dairy ice cream has similar sensory properties to dairy ice cream when consumed. For example, it is important that non-dairy ice cream has a similar melting profile to dairy ice cream compositions as this will affect the mouth feel when consumed. If the ice cream composition melts too fast, then the ice cream composition will be unsuitable for use as a frozen dessert as it will melt rapidly when removed from the freezer. In contrast, if the frozen dessert composition melts too slowly in relation to comparable dairy ice cream compositions, then the ice cream will not melt sufficiently quickly when consumed and could result in a waxy sensation when consumed in comparison to a dairy ice cream. The sensory properties of dairy ice creams are typically affected by the milk fats and proteins in the composition. A fat included in a non-dairy ice cream or other frozen dessert should desirably be able to mimic the

properties of the dairy ice cream or frozen dessert. The majority of non-dairy ice cream compositions contain coconut oil which aids in providing the above-described effects. However, there remains a need in the art for alternative plant-based fats for use in non-dairy frozen desserts. For example, it would be useful if a plant-based fat solution lower in saturated fat than coconut oil could be provided.

In the case of liquid non-dairy creamers, it is important for the fat used therein to provide good texture and mouthfeel and also deliver a long lasting, shelf-stable particular flavour. Partially and fully hydrogenated oils have previously been used in liquid non-dairy creamers to provide these effects. For example, hydrogenated soybean oil has previously been used for this purpose. The inventors of the present invention have appreciated that there is a need in the art for alternative fats for use in liquid non-dairy creamers that can provide these effects. In particular, the inventors have appreciated the need for a non-hydrogenated fat for use in liquid non-dairy creamers that can provide equally good texture, mouthfeel and flavour as the hydrogenated fats known in the art to be used for this purpose.

SUMMARY OF THE INVENTION

The present invention is based on the surprising finding that certain fat compositions solve and alleviate many of the problems discussed above associated with fats known in the art for use in dairy analogue compositions. In particular, it has been found that certain plant based, non-hydrogenated, non-palm derived fats provide the properties discussed above necessary for fats for use in non-dairy whipped cream compositions. Additionally, it has surprisingly been found that the certain fats provide improvement in certain desired properties over fats known in the art for use in non-dairy whipped cream compositions such as the fats disclosed in WO2019/185444. In particular, it has been found that the certain fat compositions provide whipped creams with comparative overrun, but increased firmness and stability over time compared with the fat compositions disclosed in WO2019/185444.

In addition to the above, it has also surprisingly been found that the certain fat compositions have the desired properties for use in other dairy analogue compositions such as cheese analogue compositions, frozen dessert analogue compositions, cream, fermented products such as yoghurt, acidified products, drinks, spread, margarine analogue compositions, non-dairy creamer compositions such as liquid non-dairy creamer compositions, and milk compositions such as reconstituted milk products (products that

are the products resulting from addition of water to the dried or condensed form of product in the amounts necessary to re-establish the specified water/solids ratio), recombined milk products (products that are manufactured by mixing milk fat and milk solids-non-fat (MSNF), with water, e.g. so as to re-establish the specified fat to MSNF ratio and dry matter (DM) to water ratio), recombined modified milk and milk products (products that are made from dairy-product ingredients with compositions other than normal dairy products, e.g. flavoured products, butter from fractionated fat, or dietary evaporated or condensed milk), and filled milks and milk products (products that are "semi-dairy" products in which the milk fat is replaced by vegetable oils, e.g. liquid milk, evaporated milk, condensed milk or cheese, which are also known as "imitation" or "substitute" milk products).

In the case of non-dairy frozen dessert compositions, it has surprisingly been found that the certain fat compositions provide a desirable mouth feel and have a suitable melting profile for use in said compositions. Surprisingly, the certain fat compositions have been found to be able to effectively mimic the mouthfeel, melting profile and other properties of dairy fats found in conventional dairy ice cream.

In the case of liquid non-dairy creamer compositions, it has surprisingly been found that the certain fats provide desired properties such as comparative texture, mouthfeel and flavour as the hydrogenated fats known in the art to be used for this purpose in liquid non-dairy creamers.

According to a first aspect of the invention, there is provided a dairy analogue composition comprising from 1% to 90% by weight of a fat composition, such as 1% to 75% and even 1% to 50%; and up to 99% by weight of water; wherein the fat composition comprises a blend of (a) a lauric vegetable fat; and (b) an interesterified blend of a lauric fat and non-lauric vegetable fat.

Preferably, the interesterified blend and/or the fat composition comprise from 20% to 85% by weight of saturated fatty acid residues; such as from 25% to 70% by weight of saturated fatty acids or such as from 30% to 60% by weight of saturated fatty acids (it will be appreciated that such ranges include 20 to 70% and 20 to 60%); wherein said percentages of fatty acid residues refers to fatty acids bound as acyl groups in glycerides in the fat composition and being based on the total weight of C4 to C24 fatty acid residues bound as acyl groups present in the fat composition.

Notably, the fat compositions for use in compositions of the invention have a lower saturated fat content than partially or fully hydrogenated coconut oil, which is known for use in non-dairy whipped cream compositions. Accordingly, fat compositions for use in the invention improve the nutritional profile of compositions of the invention compared to those containing partially or fully hydrogenated coconut oil.

Typically, the interesterified blend and/or the fat composition comprise from 10% to 50% by weight of stearic acid residues (C18:0); and from 2% to 35% by weight of lauric acid residues (C12:0); wherein said percentages of fatty acid residues refers to fatty acids bound as acyl groups in glycerides in the fat composition and being based on the total weight of C4 to C24 fatty acid residues bound as acyl groups present in the fat composition. It is believed that these contents of stearic acid residues (C18:0) and lauric acid residues (C12:0) contribute to the texture of the dairy analogue composition. In particular, it is believed that these contents of stearic acid residues (C18:0) improve the firmness and the stability of dairy analogue compositions and these contents of lauric acid residues (C12:0) improve the aeration and especially the whipping properties of dairy analogue compositions.

Typically, the interesterified blend and/or the fat composition comprise less than 10% by weight of palm oil, preferably, wherein the interesterified blend comprises less than 5% by weight of palm oil, more preferably, wherein the interesterified blend comprises less than 2% by weight of palm oil, and most preferably wherein the interesterified blend does not comprise palm oil, including fractions derived therefrom.

The interesterified blend and/or the fat composition preferably comprise a greater amount of stearic acid than palmitic acid. This is advantageous from a nutritional perspective since stearic acid has a neutral effect upon total cholesterol and LDL cholesterol levels, whereas palmitic acid is known to increase total cholesterol and LDL cholesterol levels. Typically, the interesterified blend and/or the fat composition comprise 20% by weight or less, and preferably 10% by weight or less of palmitic acid (C16:0). Typically, the interesterified blend and/or the fat composition have a weight ratio of stearic acid (C18:0) to palmitic acid (C16:0) of from 1:1 to 12:1.

Typically, the interesterified blend and/or the fat composition have a weight ratio of lauric acid (C12:0) to stearic acid (C18:0) of from 1:4 to 4:1. Preferably, the interesterified blend and/or the fat composition comprise from 10% to 40% by weight lauric acid (C12:0); and/or from 15% to 45% by weight stearic acid (C18:0). More preferably, the interesterified blend

and/or the fat composition comprise from 10% to 40% by weight lauric acid (C12:0); and from 15% to 45% by weight stearic acid (C18:0).

Typically, the interesterified blend is non-hydrogenated, and/or wherein all fats used to produce the interesterified blend are non-hydrogenated. Preferably, the interesterified blend is non-hydrogenated, and all fats used to produce the interesterified blend are non-hydrogenated.

Typically, (i) the interesterified blend and/or the fat composition have a solid fat content (SFC) N40 of less than 10, measured on unstabilised fat according to ISO 8292-1, preferably from 1 to 9, and more preferably from 2 to 8;

(ii) the interesterified blend and/or the fat composition have a solid fat content (SFC) N20 of from 25 to 60, preferably from 25 to 56, more preferably from 30 to 50, as measured on the unstabilised fat according to ISO 8292-1;

(iii) the interesterified blend and/or the fat composition have a solid fat content (SFC) N30 of from 5 to 35, preferably from 8 to 32; more preferably from 8 to 30, as measured on the unstabilised fat according to ISO 8292-1;

(iv) the interesterified blend and/or the fat composition have a solid fat content (SFC) N10 above 65, preferably from 65 to 85, as measured on the unstabilised fat according to ISO 8292-1; and/or

(v) the interesterified blend and/or the fat composition have a solid fat content (SFC) N35 of from 5 to 20, preferably from 5 to 15, as measured on the unstabilised fat according to ISO 8292-1.

Preferably, the interesterified blend has two or more of the above properties and preferably all five of the above properties.

It is believed that the interesterified blend and/or the fat composition has a solid fat content that is high enough at the lower temperatures to give enough firmness and stability over lifetime to dairy analogue products, in particular to whipped toppings. Additionally, it is believed that the solid fat content also decreases relatively steeply so that it will melt as desired during eating without being excessively waxy in contrary to partly or fully hydrogenated fats and/or non-palm derived fats.

The terms "solid" or "semi-solid" as used herein refer to a fat composition that is a solid or semi-solid at 20°C.

The term "liquid oil" as used herein refers to a liquid oil that is liquid at room temperature (e.g. 20°C) and that does not require heating to above this temperature in order to be a liquid. Such oils include sunflower oil and rapeseed oil.

The term "fat" as used herein refers to glyceride fats and oils containing fatty acid acyl groups and does not imply any particular melting point. The term "oil" is used synonymously with "fat" herein.

The term "fatty acid", as used herein, refers to straight chain saturated or unsaturated (including mono- and poly unsaturated) carboxylic acids having 4 to 24 carbon atoms. A fatty acid having x carbon atoms and y double bonds may be denoted C_x:_y. For example, palmitic acid may be denoted C16:0, oleic acid may be denoted C18:1. Percentages of fatty acids in compositions referred to herein include acyl groups in tri-, di- and mono-glycerides present in the glycerides and are based on the total weight of C4 to C24 fatty acids. The fatty acid profile (i.e. composition) may be determined, for example, by fatty acid methyl ester analysis (FAME) using gas chromatography according to ISO 12966-2 and ISO 12966-4.

Triglyceride content may be determined for example based on molecular weight differences (Carbon Number (CN)) by AOCS Ce 5-86. The notation triglyceride CN_{xx} denotes triglycerides having xx carbon atoms in the fatty acyl groups, e.g. CN54 includes tristearin. Amounts of triglycerides specified with each carbon number (CN) as is customary terminology in the art are percentages by weight based on total triglycerides of CN26 to CN62 present in the fat composition.

The interesterified blend may be produced by chemical interesterification, enzymatic interesterification, or a combination thereof.

Processes for the preparation of the fat compositions such as the interesterification reactions discussed above are known in the art, and are discussed in, for example, Dijkstra, A. J. Interesterification. In: The Lipids Handbook 3rd Edition, pages 285 – 300 (F. D. Gunstone, J. L. Harwood, and A. J. Dijkstra (eds.), Taylor & Francis Group LLC, Boca Raton, FL) (2007).

Typically, the non-lauric fat of the interesterified blend comprises or is selected from shea butter, shea stearin, shea olein, cocoa butter, cocoa stearin, cocoa olein, allanblackia fat, kokum fat, mango kernel fat, sal fat, illipe butter, or mixtures thereof. Preferably, the non-

lauric fat of the interesterified blend is selected from shea butter, shea stearin, shea olein, cocoa butter, cocoa stearin, cocoa olein, allanblackia fat, kokum fat, mango kernel fat, sal fat, illipe butter, or mixtures thereof.

More preferably, the non-lauric fat of the interesterified blend comprises shea butter, shea stearin, or a mixture thereof. Most preferably, the non-lauric fat of the interesterified blend is selected from shea butter, shea stearin, or a mixture thereof.

Typically, the lauric fat of the interesterified blend comprises or is selected from coconut oil, coconut oil stearin, coconut oil olein, palm kernel oil, palm kernel olein, palm kernel stearin, babassu oil, or mixtures thereof. Preferably, the lauric fat of the interesterified blend is selected from coconut oil, coconut oil stearin, coconut oil olein, palm kernel oil, palm kernel olein, palm kernel stearin, babassu oil, or mixtures thereof.

More preferably, the lauric fat of the interesterified blend comprises coconut oil. Most preferably, the lauric fat of the interesterified blend is coconut oil.

Typically, the interesterified blend is an interesterified blend of from 10% to 90% by weight of non-lauric vegetable oil; and from 10% to 90% by weight of lauric vegetable oil. Preferably, the interesterified blend is an interesterified blend of from 20% to 80% by weight of non-lauric vegetable oil; and from 20% to 80% by weight of lauric vegetable oil. More preferably, the interesterified blend is an interesterified blend of from 60% to 80% by weight of non-lauric vegetable oil; and from 20% to 40% by weight of lauric vegetable oil. Most preferably, the interesterified blend is an interesterified blend of from 65% to 75% by weight of non-lauric vegetable oil; and from 25% to 35% by weight of lauric vegetable oil.

In preferable embodiments, the interesterified blend is an interesterified blend of shea butter and coconut oil or an interesterified blend of shea stearin and coconut oil. For example, in some embodiments, the interesterified blend is an interesterified blend of from 20% to 80% by weight of shea butter and from 20% to 80% by weight of coconut oil. In other embodiments, the interesterified blend is an interesterified blend of from 20% to 80% by weight of shea stearin and from 20% to 80% by weight of coconut oil.

Typically, the lauric vegetable fat (a) comprises coconut oil, coconut oil stearin, coconut oil olein, palm kernel oil, palm kernel olein, palm kernel stearin, babassu oil, or mixtures thereof. Preferably, the lauric vegetable fat (a) comprises coconut oil.

Typically, the fat composition comprises from 5% to 95% by weight of the fat composition of the lauric vegetable oil (a); and from 5% to 95% of the interesterified blend (b). Preferably, the fat composition comprises from 10% to 90% by weight of the fat composition of the lauric vegetable oil (a); and from 10% to 90% of the interesterified blend (b). More preferably, the fat composition comprises from 20% to 50% by weight of the fat composition of the lauric vegetable oil (a); and from 50% to 80% of the interesterified blend (b). Still more preferably, the fat composition comprises from 20% to 40% by weight of the fat composition of the lauric vegetable oil (a); and from 60% to 80% of the interesterified blend (b). Most preferably, the fat composition comprises from 25% to 40% by weight of the fat composition of the lauric vegetable oil (a); and from 60% to 75% by weight of the fat composition of the interesterified blend (b).

Preferably, the fat composition is a non-hydrogenated fat composition.

Typically, (a) the fat composition comprises caprylic acid and capric acid in amount of from 5% to 10% by weight; (b) the fat composition comprises lauric acid in an amount of from 20% to 30% by weight; and/or (c) the fat composition comprises stearic acid in an amount of from 25% to 40% by weight. Preferably, the fat composition is as defined in all of (a) to (c). Alternatively, (a) the fat composition comprises caprylic acid and capric acid in amount of from 5% to 10% by weight; (b) the fat composition comprises lauric acid in an amount of from 15% to 30% by weight; and/or (c) the fat composition comprises stearic acid in an amount of from 25% to 40% by weight. Preferably, the fat composition is as defined in all of (a) to (c).

Preferably, (a) the fat composition comprises oleic acid (C18:1) in amount of from 10% to 25% by weight, preferably from 15% to 25%; (b) the fat composition comprises linoleic acid (C18:2) in an amount of less than 5% by weight, preferably from 1% to 5% by weight; and/or (c) the fat composition comprises linolenic acid (C18:3) in an amount of less than 1% by weight; preferably less than 0,1% by weight; preferably wherein the fat composition is as defined in all of (a) to (c).

Typically, the fat composition comprises:

- (a) CN32, CN34, CN36 and CN38 triglycerides in a total amount of from 5% to 35% , preferably from 10 to 25%, by weight; and
- (b) CN48 triglycerides in an amount of from 10% to 22% by weight.

Preferably, the fat composition comprises:

- (a) CN 40 triglycerides in a total amount of less than 8%, preferably from 1% to 5% by weight;
- (b) CN42 triglycerides in an amount of less than 10%, preferably from 1% to 7% by weight;
- (c) CN44 triglycerides in an amount of less than 10%, preferably from 1% to 7% by weight; and/or
- (d) CN50 and C52 triglycerides in an amount of from 5 to 30%, preferably from 10% to 20% by weight; preferably wherein the fat composition is as defined in all of (a) to (d).

It is believed that the fat composition comprises these triglycerides may further increase firmness and stability over time of dairy analogue products such as whipped creams. Moreover, the fat composition comprises these triglycerides may further increase the mouthfeel due to a desirable melting profile of dairy analogue products, in particular for non-dairy frozen dessert compositions. Additionally, the fat composition comprises these triglycerides may further increase texture, mouthfeel and flavour of liquid non-dairy creamers.

Preferably, the fat composition, more preferably the dairy analogue composition, does not comprise a liquid oil selected from a group consisting of: sunflower oil, high oleic sunflower oil, high oleic rapeseed oil, high oleic canola oil, high oleic soybean oil, rapeseed oil, rice oil, soybean oil, chia oil, flaxseed oil, corn oil, safflower oil, olive oil, canola oil, rapeseed oil, pumpkin oil, sesame oil, walnut oil, hazelnut oil, a fraction thereof and a mixture thereof. In a preferred embodiment, the fat composition, preferably the dairy analogue composition, is substantially free of liquid oils. In a highly preferred embodiment, the fat composition, advantageously the dairy analogue composition, is substantially free of liquid oils. Without willing to be bound by any theory, it has been found that the presence of these liquid oils may decrease the firmness and the structure of the dairy analogue composition.

Preferably, the fat composition is solid or semi-solid. It is believed that the physical state of the fat composition may have an impact on the structure and texture of the dairy analogue composition. In particular, it is believed that when the fat composition is solid or

semi-solid, the fat composition provides whipped creams with increased firmness and structure compared with the fat compositions comprising a liquid oil. Preferably, the fat composition contains a substantially major portion of fat with very little water (i.e. the fat composition consists essentially of fat molecules). However, in some embodiments, the fat composition may contain water and be present in the form of an emulsion such as an oil-in-water emulsion or a water-in-oil emulsion, typically with a suitable emulsifier. In such embodiments, the weight percentage ranges provided above for the amount that the fat composition is present in the meat analogue composition refers to only fat molecules present in the fat composition, and not any water present in the composition. Similarly, the weight percentages given above for the amount of water present in the dairy analogue composition refers to both water added in its own right during manufacture of the dairy analogue composition, and also to any water present in other components of the dairy analogue composition (such as water present in an emulsified fat composition), or water bound to any protein.

The dairy analogue composition comprises water, which may be added as a separate component to the composition, or derive from other components of the composition as discussed above. The amount of water is not particularly limited and, as the skilled person will appreciate, will vary depending on the intended consistency of the dairy-analogue composition. Reference to 'water' herein is intended to include drinking water, demineralized water or distilled water, unless specifically indicated. Preferably, the water employed in connection with the present invention is demineralised or distilled water. As the skilled person will appreciate, deionized water is also a sub-class of demineralized water.

The fat composition can be present in any suitable amount in the dairy analogue compositions within the limits given above. It will be appreciated that the fat compositions are included in the dairy analogue compositions in an amount dependent upon the intended use of the dairy analogue composition.

The dairy analogue compositions of the invention may be any type of dairy analogue composition that comprises a fat. Examples of dairy analogue compositions include cheese analogue compositions, frozen dessert analogue compositions, whipping cream analogue compositions and other aerated products, cream, fermented products such as yoghurt, acidified products, drinks, spread, margarine analogue compositions, and non-dairy creamer compositions such as liquid non-dairy creamer compositions. Preferably, the dairy analogue compositions of the invention are non-dairy whipped cream or other

aerated products compositions, non-dairy frozen dessert compositions, or liquid non-dairy creamer compositions. More preferably, the dairy analogue compositions are whipped cream or other aerated product compositions.

In preferable embodiments, the dairy analogue compositions of the invention are suitable for consumption by vegetarians and vegans. Accordingly, in preferable embodiments, the dairy analogue compositions are substantially free of animal protein, and more preferably, the dairy analogue compositions are free of animal protein.

In preferable embodiments, the dairy analogue composition is substantially free of animal-derived products, and more preferably, the dairy analogue composition is free of animal-derived products.

However, in some embodiments, the dairy analogue compositions may comprise animal-derived products such as animal derived proteins or fats. Accordingly, in some embodiments, the dairy analogue composition further comprises one or more animal-derived products such as animal oils, marine oils, animal-derived proteins, animal-derived polysaccharides, or any combination thereof. In some embodiments, the one or more animal-derived products comprise animal milk proteins, animal milk fats, or a combination thereof. In these embodiments, the dairy analogue compositions may be suitable for consumption by vegetarians on the basis that they comprise non-animal protein and proteins or fats derived from animal milk. These dairy analogue compositions are suitable for consumption by vegetarians since they do not include fats or proteins derived from meat. However, it will of course be understood that such dairy analogue compositions are not suitable for consumption by vegans.

In embodiments where the dairy analogue compositions comprise one or more animal-derived products, the one or more animal-derived products are typically present in the dairy analogue composition in an amount of from 0.1% to 20% by weight of the dairy analogue composition.

Whipped cream compositions

The compositions of the invention may be whipping cream analogue compositions such as non-dairy whipping cream compositions. The terms "whipped cream composition" and "whipping cream composition" as used herein are used interchangeably.

Typically, the dairy analogue compositions comprise from 1% to 40% by weight of the fat composition. Preferably, the dairy analogue composition comprises from 10% to 40% by

weight of the fat composition. More preferably, the dairy analogue compositions comprise from 15% to 40% by weight of the fat composition.

Typically, the dairy analogue compositions comprise up to 85% by weight water. Preferably, the dairy analogue compositions comprise from 30% to 85% by weight of water; more preferably from 50% to 70% by weight of water.

The specific fat compositions for inclusion in the whipped cream analogue compositions can be any of those discussed above.

The dairy analogue composition, when a whipping cream composition, may further comprise one or more hydrocolloid stabilisers. Preferably, the one or more hydrocolloid stabilisers are present in an amount of up to 5% by weight of the dairy analogue composition; such as 0.001% to 5% and 0.01% to 5% by weight of the dairy analogue composition.

Preferably, the one or more hydrocolloid stabilisers comprise starch, xanthan gum, guar gum, locust bean gum, gum karaya, gum tragacanth, gum Arabic, cellulose, cellulose derivatives, carrageenan, pectin, or a combination thereof.

Hydrocolloid stabilisers may be added to the compositions to further improve the stability of the whipped cream and improve whipping properties such as overrun and foam firmness. Hydrocolloid stabilisers may be particularly desirable when the whipping cream compositions are free of protein.

The whipping cream compositions may further comprise protein, such as non-animal protein. When included, the protein is preferably present in the whipping cream analogue composition in an amount of from 0.1% to 10% by weight of the composition. In alternative embodiments, the whipping cream compositions may be free of protein.

The whipping cream compositions typically comprise one or more emulsifiers. Preferably the one or more emulsifiers are present in an amount of up to 5% by weight of the dairy analogue composition, and more preferably up to 1% by weight of the dairy analogue composition. Any suitable emulsifier may be included. For example, an anionic emulsifier may be included such as sodium steryl lactylate, diacetyltartaric acid esters of monoglycerides or diglycerides, polyglycerol esters of fatty acids, polysorbates, monoglycerides, mono-diglycerides, lactic acid esters of mono and diglycerides, lecithins, sorbitan monostearates, or combinations thereof. Such emulsifiers are often important in contributing to the whipping properties of the whipped cream compositions.

The dairy analogue compositions, when whipping cream compositions, may also comprise one or more sugars. Preferably, the one or more sugars are present in an amount of from 10% to 20% by weight of the dairy analogue composition.

Typically, the one or more sugars comprise corn syrup, glucose syrup, glucose, fructose, sucrose, dextrin, dextrose, artificial sweeteners, lactose, or a combination thereof, although any suitable sugar may be used.

Typically, the dairy analogue composition further comprises one or more edible salts. Preferably, the one or more edible salts are present in an amount of from 0.05% to 0.5% by weight of the dairy analogue composition. Preferably, the one or more edible salts comprise sodium chloride.

The term whipping cream as used herein is used to refer to an oil-in-water emulsion, which can be aerated by whipping, whereby fat globules collide and partially coalesce, forming aggregates or clusters that stabilise the foam structure.

The whipping cream compositions may include additional additives such as sweeteners, bulking agents, flavourings, and other additives known in the art for inclusion in such compositions.

In some embodiments, the whipped cream analogue composition further comprises an animal milk-derived protein, such as lactose, preferably wherein the animal-milk derived protein comprises casein and/or whey protein.

The whipped cream compositions can be used in any suitable application known in the art such as dessert toppings or accompaniments or ice cream.

Frozen dessert compositions

In some embodiments, the dairy analogue composition comprises a frozen dessert analogue composition.

Typically, where a frozen dessert analogue composition, the dairy analogue composition comprises from 1% to 30% by weight of the fat composition (such as 1 to 20%); from 10% to 40% by weight sugar; and from 40% to 80% by weight of water.

Preferably, the dairy analogue composition comprises from 50% to 70% by weight water, from 1% to 10% by weight of the fat composition; and from 20% to 40% by weight sugar.

The specific fat compositions for inclusion in the frozen dessert analogue compositions can be any of those discussed above.

Examples of frozen dessert analogue compositions include non-dairy ice cream compositions. In some embodiments, the frozen dessert analogue composition is a vegan ice cream composition being free of dairy fats and also other animal derived material such as animal derived proteins such as casein. Whilst preferred, the frozen dessert analogue compositions of the invention are not limited to ice cream compositions, and may be any frozen dessert composition that contains fat.

The term frozen as used herein refers to products that are solidified under freezing conditions. The ice content of the frozen confection should be more than 15% but less than 45% when measured at -18°C. The frozen confection is preferably a water-continuous emulsion.

The frozen confection of the invention is preferably aerated, i.e., it has an overrun of more than 20 percent and preferably less than 200%. Most preferably the product is a product having an overrun of from 20-100%. Overrun is defined by the following equation and is measured at atmospheric pressure: $\text{Overrun \%} = ((\text{density of mix} - \text{density of frozen confection}) / \text{density of frozen confection}) \times 100$.

The frozen dessert composition preferably comprises protein, optionally wherein the protein is present in the dairy analogue composition in an amount of from 0.1% to 10% by weight of the composition. Preferably, the protein is a non-animal protein. Any suitable protein may be used. Particular types of protein that can be used include pea protein, chickpea protein, soy protein, rice protein, potato protein, and wheat protein.

The frozen dessert composition may comprise solids derived from nuts or fruit, which are typically present in an amount of from 1% to 10% by weight of the composition. Sources for nut solids include almonds, cashews, pecans, peanuts, macadamia nuts, brazil nuts, pine nuts, coconuts, butternuts, hazelnuts, walnuts, beechnuts, hickory nuts, chestnuts, pistachios, and mixtures thereof, although it will be understood that any suitable solids derived from nuts or fruit may be included.

The frozen dessert compositions comprise one or more sugars. Sources of sugar include corn syrup, glucose syrup, glucose, fructose, sucrose, maltose, galactose, dextrin, artificial sweeteners, lactose, or a combination thereof, although it will be understood that other similar sugars and sources of sugar may be included in the compositions.

Typically, the frozen dessert compositions comprise one or more emulsifiers, which one or more emulsifiers are typically present in an amount of up to 1% by weight of the dairy analogue composition. Examples of emulsifiers that can be used include proteins and phospholipids such as lecithin and mono- and diglycerides.

Typically, the frozen dessert compositions further comprise one or more hydrocolloid stabilisers, wherein the one or more hydrocolloid stabilisers are typically present in an amount of up to 1% by weight of the dairy analogue composition. Examples of hydrocolloid stabilisers include gums such as guar gum and locust bean gum and alginate and carrageenan. Stabilisers are useful so as to ensure adequate properties of the composition such as suitable aeration, mouth feel and viscosity as well as provide stability to the composition.

In some embodiments, the frozen dessert composition further comprises an animal milk-derived protein, such as lactose, preferably wherein the animal-milk derived protein comprises casein and/or whey protein.

Other additives that can be included will be familiar to the skilled person and include preservatives, sweeteners, salts, bulking agents, flavourings, and inclusions such as nut pieces, fruit pieces, chocolate and biscuit pieces etc.

Liquid non-dairy creamer compositions

The dairy analogue compositions of the invention may be liquid non-dairy creamer compositions.

Where the dairy analogue composition is a liquid non-dairy creamer composition, the composition typically comprises from 10% to 50% by weight of the fat composition; and up to 90% by weight water.

Preferably, the dairy analogue composition comprises from 5% to 10% by weight of the fat composition; and more preferably from 6.5% to 10% by weight of the fat composition.

Preferably, the dairy analogue composition comprises up to 70% by weight of water.

Typically, the dairy analogue composition comprises one or more emulsifiers. Preferably, the one or more emulsifiers are present in the dairy analogue composition in an amount of up to 5% by weight, such as from 0.001 to 5% or even 0.01 to 5% by weight.

Typically, where the dairy analogue composition is a liquid non-dairy creamer composition, the dairy analogue composition comprises one or more hydrocolloids; preferably, wherein the one or more hydrocolloids are present in the dairy analogue composition in an amount up to 5% by weight (for example up to 3%), such as 0.001 to 5% (such as 0.001 to 3%) or 0.01 to 5% (such as 0.01 to 3%) by weight.

Typically, where the dairy analogue composition is a liquid non-dairy creamer composition, the dairy analogue composition comprises one or more sugars. Preferably, the one or more sugars are present in the dairy analogue composition in an amount of from 1% to 35% by weight.

Suitable sugars, hydrocolloids, emulsifiers and other additives that may be used in the liquid non-dairy creamers include those known in the art for this purpose. Suitable emulsifiers and hydrocolloids are also discussed above in the context of different types of dairy analogue compositions.

Typically, where the dairy analogue composition is a liquid non-dairy creamer composition, the dairy analogue composition comprises one or more proteins. Preferably, the one or more proteins comprise casein and/or whey protein or a derivative thereof. More preferably, the one or more proteins comprise sodium caseinate. However, in alternative embodiments, where it is desired that the composition is completely free of animal derived products, the protein may comprise plant derived protein such as the plant derived proteins discussed above in the context of other types of dairy analogue compositions.

Preferably, the one or more proteins are present in the dairy analogue composition in an amount of from 0.1% to 5% by weight.

According to a second aspect of the invention, there is provided a food product comprising a dairy analogue composition according to the first aspect of the invention.

Preferably, the food product is a vegetarian or vegan dairy substitute food product such as a vegan or vegetarian cheese substitute, frozen dessert substitute, plant based dairy analogue drink, plant based dairy analogue powder, ghee, fermented product for example yoghurt, yellow fat, spread, liquid non-dairy creamer or whipping cream substitute food product.

More preferably, the food product is a whipping cream, an aerated food product, a frozen dessert, or a liquid non-dairy creamer food product. Most preferably, the food product is a whipping cream food product.

The properties of the dairy-analogue composition or food products prepared using the composition may be measured by any suitable means. Properties of interest may include hardness, adhesiveness, springiness, cohesiveness, mouth feel, coldness, iciness, rate of melt, smoothness, creaminess, mouthcoating, sweetness, flavour and resilience. Such means include taste testers, which can provide feedback on properties of the composition or food product such as juiciness (or dryness), texture, chewiness and hardness. Typically multiple testers will be asked to mark one or more properties of the composition or food product, such as on a scale from 1 to 15. If multiple testers are asked, an average of the results can be taken to observe the general impression of the food product.

Properties of the composition or food product may also be measured using specialised equipment. For example, texture profile analysis (TPA) is a technique used to characterize textural attributes of solid and semisolid materials and may be used to determine the hardness, adhesiveness, springiness, cohesiveness, gumminess, chewiness and resilience. In this technique, the test material may be compressed two times in a reciprocating motion, mimicking the chewing movement in the mouth, producing a Force versus Time (and/or distance) graph, from which the above information can be obtained. TPA and the classification of textural characteristics is described further in Bourne M. C., *Food Technol.*, 1978, 32 (7), 62-66 and Trinh T. and Glasgow S., 'On the texture profile analysis test', Conference Paper, Conference: Chemeca 2012, Wellington, New Zealand, and may be performed as described therein.

The Force versus Time (and/or distance) graph typically includes two peaks in force, corresponding to the two compressions, separated by a trough. Force may be measured in gravitational force equivalent (g-force, g) or Newtons (N).

Hardness (g or N) is defined as the maximum peak force experienced during the first compression cycle.

Adhesiveness is defined as the negative force area for the first bite, i.e. the area of the graph between the two peaks in force which is at or below a force of 0 g or N. This represents the work required to overcome the attractive forces between the surface of a food and the surface of other materials with which the food comes into contact, i.e. the total force necessary to pull the compression plunger away from the sample. For materials with a high adhesiveness and low cohesiveness, when tested, part of the sample is likely to adhere to the probe on the upward stroke. Lifting of the sample from the base of the testing platform should, if possible, be avoided as the weight of the sample on the probe would become part of the adhesiveness value. In certain cases, gluing of the sample to the base of a disposable platform has been advised but is not applicable for all samples.

Springiness, also known as elasticity, is related to the height that the food recovers during the time that elapses between the end of a first compression and the start of a second compression. During the first compression, the time from the beginning of the compression at force = 0 g or N to the first peak in force is measured (referred to as 'Cycle 1 Duration'). During the second cycle, the time from the beginning of the second compression at force = 0 g or N to the second peak in force is measured (referred to as 'Cycle 2 Duration'). Springiness is calculated as the ratio of these values, i.e. 'Cycle 2 Duration' / 'Cycle 1 Duration'.

Cohesiveness is defined as the ratio of the positive force area, i.e. the area under the curve above a force of 0 g or N, during the second compression to that during the first compression. Cohesiveness may be measured as the rate at which the material disintegrates under mechanical action. Tensile strength is a manifestation of cohesiveness. If adhesiveness is low compared with cohesiveness then the probe is likely to remain clean as the product has the ability to hold together. Cohesiveness is usually tested in terms of the secondary parameters brittleness, chewiness and gumminess.

Resilience is a measurement of how the sample recovers from deformation both in terms of speed and forces derived. It is taken as the ratio of areas from the first probe reversal point, i.e. the point of maximum force, to the crossing of the x-axis, i.e. at 0 g or N, and

the area produced from the first compression cycle between the start of compression and the point of maximum force. In order to obtain a meaningful value of this parameter, a relatively slow test speed should be selected that allows the sample to recover, if the sample possesses this property.

According to a third aspect of the invention, there is provided the use of a fat composition in a dairy analogue composition, wherein the fat composition comprises a blend of (a) a lauric vegetable fat; and (b) an interesterified blend of a lauric fat and non-lauric vegetable fat.

Preferably, the comprises using the dairy analogue composition in a food product.

Preferably, the dairy analogue composition, fat composition, and/or food product are as described above in accordance with the first and second aspects of the invention.

Preferably, the use comprises using the fat composition to improve the nutritional profile of the dairy analogue composition when compared to an analogous dairy analogue composition comprising the same amount by weight of coconut oil, palm kernel oil, or palm oil; or fully or partially hydrogenated palm kernel oil, palm oil or coconut oil.

The term analogous dairy analogue composition as used herein is used to refer to an equivalent weight of a dairy analogue composition that is identical to the dairy analogue composition of the invention, with the exception of the nature of the fat present therein. The analogous dairy analogue composition contains the same amount by weight of the fats listed above as the dairy analogue composition of the invention contains the fat composition.

The nutritional profile of dairy analogue compositions of the invention may be improved when compared to analogous dairy analogue compositions comprising the same amount by weight of coconut oil and fully hydrogenated fats since the fat compositions described herein comprise a lower amount of saturated fatty acids per unit weight when compared to these fats. The nutritional profile of dairy analogue compositions of the invention may be improved when compared to analogous dairy analogue compositions comprising the same amount by weight of partially hydrogenated fats since partially hydrogenated fats typically contain higher amounts of trans unsaturated fatty acids which have various negative health implications associated therewith. The nutritional profile of dairy analogue compositions of the invention may be improved when compared to analogous dairy

analogue compositions comprising the same amount by weight of palm derived fats due to the negative health implications associated with palm derived products.

Where the use comprises using the fat compositions in whipping cream compositions or similar aerated food products, the use may comprise using the fat composition to provide an improved foam firmness, improved foam stability, and/or improved overrun relative to an analogous whipping cream composition or aerated food product composition comprising the same amount by weight of the interesterified blend component (b) of the fat composition.

The term "overrun" as used herein in the context of a whipped cream composition is used to refer to the percentage volume increase of the composition achieved during the whipping process. For example, an overrun of 100% means that the volume of the whipped cream is double that of the unwhipped cream.

According to a fourth aspect of the invention, there is provided a process of manufacturing a dairy analogue composition according to the first aspect of the invention, or a food product according to the second aspect of the invention, wherein the process comprises combining a fat composition as described herein with water, and optionally, one or more additional components to form the dairy analogue composition, and optionally forming the dairy analogue composition into food products.

Suitable processes for forming the dairy analogue compositions described herein include those known in the art already for the formation of said compositions.

DESCRIPTION OF THE DRAWINGS

Figures 1 and 2 show the results of a whipping firmness test carried out on various whipped cream compositions of the invention and on various reference examples.

Figure 3 shows photographs of whipped creams produced from various dairy analogue compositions of the invention and also various reference dairy analogue compositions.

DETAILED DESCRIPTION OF THE INVENTION

The following examples are for illustrative purposes only, and are not intended to limit the scope of the invention in any way.

Example 1

Non-dairy whipped cream compositions comprising the components shown in Table 2 were manufactured and whipped. The values indicated in Table 2 for each component correspond to the weight percentage that the component is present in the dairy analogue composition.

The fats used in each composition were as follows.

Reference Example: Fully hydrogenated palm kernel oil

Composition 1: 100 wt% Fat A

Composition 2: 100 wt% Fat B

Composition 3: 80 wt% Fat B and 20 wt% coconut oil.

Composition 4: 70 wt% Fat B and 30 wt% coconut oil.

Fat A is an interesterified blend of 50 wt% shea stearin and 50 wt% coconut oil. Fat B is an interesterified blend of 70 wt% shea stearin and 30 wt% coconut oil. These interesterified fat blends are plant-based, non-palm derived, non-hydrogenated fat compositions of a type known in the art to be used in non-dairy whipped cream compositions. Such types of fat composition are disclosed in e.g. WO2019/185444.

Compositions 1 and 2 thus comprise only the interesterified blend component b), and so the dairy analogue compositions comprising these fats are not according to the present invention. On the other hand, since compositions 3 and 4 comprise both the interesterified blends and also a lauric vegetable fat (i.e. coconut oil), they are according to the present invention.

The fatty acid composition of each of compositions 1 to 4 is shown below in Table 1. The values expressed in the table (with the exception of iodine value) relate to weight percentage of the fatty acid bound as acyl groups in glycerides in the composition by weight of C4 to C24 fatty acid residues bound as acyl groups present in the fat composition.

Table 1

	Fat Composition 1	Fat Composition 2	Fat Composition 3	Fat Composition 4
C6:0	0.3	0.2	0.2	0.3
C6:0	3.3	2	3	3.5
C10:0	2.6	1.6	2.4	2.8

C12:0	21.3	12.9	19.4	22.6
C14:0	8.7	5.2	7.8	9.1
C15:0	<0.1	<0.1	<0.1	<0.1
C16:0	6.5	7	7.6	7.9
C16:1 cis	<0.1	<0.1	<0.1	<0.1
C16:1 trans	<0.1	<0.1	<0.1	<0.1
C17:0	<0.1	<0.1	<0.1	<0.1
C18:0	32.1	40.8	33.5	29.7
C18:1 cis	20.9	25.3	21.8	19.9
C18:1 trans	0.1	0.1	0.1	0.1
C18:2 cis	2.8	3.1	2.9	2.8
C18:2 trans	<0.1	<0.1	<0.1	<0.1
C18:3 cis	0.1	<0.1	<0.1	<0.1
C18:3 trans	<0.1	<0.1	<0.1	<0.1
C20:0	1	1.2	1	0.9
C20:1 cis	<0.1	<0.1	<0.1	<0.1
C22:0	0.2	0.1	0.1	0.1
C22:1 cis	<0.1	<0.1	<0.1	<0.1
C24:0	<0.1	<0.1	<0.1	<0.1
C24:1 cis	<0.1	<0.1	<0.1	<0.1
Trans fatty acids (total)	0.1	0.1	0.1	0.1
Iodine value	23.2	27.6	24.1	22.3
Triglyceride CN32	1,2	0,4	1,8	3,3
Triglyceride CN34	1,8	0,5	2,7	4,6
Triglyceride CN36	3,4	1,1	3,9	6,2
Triglyceride CN38	6,1	2,5	4,9	6,8
Triglyceride CN40	4.1	1.9	3.4	4.3
Triglyceride CN42	10,6	5,4	5,7	6,1
Triglyceride CN44	9,3	5,7	5,6	5,6
Triglyceride CN48	18,2	18,6	16	14,2

Triglyceride CN50+CN52	10,6	13,8	14,8	13
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Table 2

Ingredient	Reference Example	Composition 1	Composition 2	Composition 3	Composition 4
Water	55.68	55.68	55.68	55.68	55.68
Fat	25.01	25.01	25.01	25.01	25.01
Sugar	13.01	13.01	13.01	13.01	13.01
Hamultec VCND1	3.20	3.20	3.20	3.20	3.20
Dextrose C*DEX 02001	3.00	3.00	3.00	3.00	3.00
Salt	0.10	0.10	0.10	0.10	0.10
Total	100.00	100.00	100.00	100.00	100.00

Hamultec VCND1 is a stabilizer system comprising a hydrocolloid blend of glucose syrup solids, starch, polysorbate (E435), sodium citrate (E331), hydroxypropylmethylcellulose (E464), sodium stearoyl lactylate (E481), cellulose (E460), mono- and di-glycerides of fatty acids (E475), polyglycerol esters of fatty acids (E475), cellulose gum (E466), and sodium phosphate (E339).

Dextrose C*DEX 02001 is a commercially available dextrose sugar.

The reference example and compositions 1 to 4 were whipped and subjected to whipping firmness tests. The results of the firmness tests are shown in Figures 1 and 2. A higher foam firmness is desirable since this is indicative of a more robust and stable foam. It can be seen that the reference composition (fully hydrogenated palm kernel oil) which is the industry standard fat for use in non-dairy whipping cream compositions has the highest firmness. It can also be seen that the dairy analogue compositions of the invention (compositions 3 and 4) have a higher firmness than the compositions comprising the fats disclosed in WO2019/185444 (i.e. compositions 1 and 2). This is entirely unexpected. The data shown in Figure 1 thus shows that dairy analogue compositions of the invention have improved foam firmness than compositions comprising prior art fat compositions that are

disclosed in WO2019/185444. The foam firmness of the compositions of the invention is also close to those of compositions comprising the industry standard fully hydrogenated palm kernel oil. The foam firmness of compositions 3 and 4 of the invention is acceptable whereas the foam firmness of compositions 1 and 2 is not acceptable for whipping cream compositions.

The data shown in Figure 2 shows that the compositions of the invention have comparable total whipping time to the reference composition comprising fully hydrogenated palm kernel oil.

The data in Figures 1 and 2 thus indicates that the fat compositions present in dairy analogue compositions of the invention could be useful non-palm derived, non-hydrogenated alternative fats for use in non-dairy whipped cream compositions.

Photographs of the whipped creams produced are shown in Figure 3. Figure 3 shows a photograph of each whipped cream immediately after whipping and also after a 24 hour time period. The overrun of the fresh whipped cream is also shown in Figure 3 for each composition.

The overrun achieved for all compositions was acceptable. The foam stability after 24 hours was acceptable for the reference example and for compositions 3 and 4 of the invention. On the other hand, the foam stability of compositions 1 and 2 was unacceptable meaning that the compositions are unsuitable for use as whipping cream compositions. A comparison of the photographs of the whipped cream after 24 hours for compositions 1 to 4 shows that for compositions 1 and 2, the foam has started to lose its shape after 24 hours. A serum separation was also observed after 2 hours for composition 1 and 2 indicating that syneresis has occurred. On the other hand, compositions 3 and 4 have good foam stability after 24 hours which is indicated by the shape retention of the foam after 24 hours. Compositions 3 and 4 also did not exhibit any syneresis after 24 hours. Foam stability is important where, for example, the whipped cream is designed to be whipped and stored for some time prior to consumption of the food product. Of compositions 3 and 4, composition 4 was superior.

In a separate set of tests, the sensory properties of the whipped creams were analysed. It was found that the reference example containing fully hydrogenated palm kernel oil and composition 4 had the slowest melt-off. This was followed by composition 3. Compositions 1 and 2 had the fastest melt-off. A slow melt-off is more desirable for whipped cream products as it is associated with a more desirable mouth feel.

In a separate set of tests, the stability after freezing of each whipped cream composition was analysed. All compositions had sufficient stability after freezing.

CLAIMS

1. A dairy analogue composition comprising from 1% to 90% by weight of a fat composition; and up to 99% by weight of water; wherein the fat composition comprises a blend of (a) a lauric vegetable fat; and (b) an interesterified blend of a lauric fat and non-lauric vegetable fat.
2. A dairy analogue composition according to Claim 1, wherein the interesterified blend and/or the fat composition comprise from 20% to 85% by weight of saturated fatty acid residues; preferably from 20% to 70% by weight of saturated fatty acids such as from 20% to 60% by weight of saturated fatty acids; wherein said percentages of fatty acid residues refers to fatty acids bound as acyl groups in glycerides in the fat composition and being based on the total weight of C4 to C24 fatty acid residues bound as acyl groups present in the fat composition.
3. A dairy analogue composition according to Claim 1 or Claim 2, wherein the interesterified blend and/or the fat composition comprise from 10% to 50% by weight of stearic acid residues (C18:0); and from 2% to 35% by weight of lauric acid residues (C12:0); wherein said percentages of fatty acid residues refers to fatty acids bound as acyl groups in glycerides in the fat composition and being based on the total weight of C4 to C24 fatty acid residues bound as acyl groups present in the fat composition.
4. A dairy analogue composition according to any preceding claim, wherein the interesterified blend and/or the fat composition comprise less than 10% by weight of palm oil, preferably, wherein the interesterified blend comprises less than 5% by weight of palm oil, more preferably, wherein the interesterified blend comprises less than 2% by weight of palm oil, and most preferably wherein the interesterified blend does not comprise palm oil, including fractions derived therefrom.
5. A dairy analogue composition according to any preceding claim, wherein the interesterified blend and/or the fat composition comprise 20% by weight or less, preferably 10% by weight or less of palmitic acid (C16:0).
6. A dairy analogue composition according to any preceding claim, wherein the interesterified blend and/or the fat composition have a weight ratio of stearic acid (C18:0) to palmitic acid (C16:0) of from 1:1 to 12:1.
7. A dairy analogue composition according to any preceding claim, wherein the interesterified blend and/or the fat composition have a weight ratio of lauric acid (C12:0) to stearic acid (C18:0) of from 1:4 to 4:1.
8. A dairy analogue composition according to any preceding claim, wherein the interesterified blend and/or the fat composition comprise from 10% to 40% by weight

lauric acid (C12:0); and/or from 15% to 45% by weight stearic acid (C18:0); preferably, the interesterified blend and/or the fat composition comprise from 10% to 30% by weight lauric acid (C12:0); and from 15% to 35% by weight stearic acid (C18:0).

9. A dairy analogue composition according to any preceding claim, wherein the interesterified blend is non-hydrogenated, and/or wherein all fats used to produce the interesterified blend are non-hydrogenated.

10. A dairy analogue composition according to any preceding claim, wherein:

(i) the interesterified blend and/or the fat composition have a solid fat content (SFC) N40 of less than 10, measured on unstabilised fat according to ISO 8292-1, preferably from 1 to 9, and more preferably from 2 to 8;

(ii) the interesterified blend and/or the fat composition have a solid fat content (SFC) N20 of from 25 to 60, preferably from 25 to 56, more preferably from 30 to 50, as measured on the unstabilised fat according to ISO 8292-1;

(iii) the interesterified blend and/or the fat composition have a solid fat content (SFC) N30 of from 5 to 35, preferably from 8 to 32; more preferably from 8 to 30, as measured on the unstabilised fat according to ISO 8292-1;

(iv) the interesterified blend and/or the fat composition have a solid fat content (SFC) N10 above 65, preferably from 65 to 85, as measured on the unstabilised fat according to ISO 8292-1; and/or

(v) the interesterified blend and/or the fat composition have a solid fat content (SFC) N35 of from 5 to 20, preferably from 5 to 15, as measured on the unstabilised fat according to ISO 8292-1.

11. A dairy analogue composition according to any preceding claim, wherein the interesterified fat blend has been produced by chemical interesterification or enzymatic interesterification.

12. A dairy analogue composition according to any preceding claim, wherein the non-lauric fat of the interesterified blend comprises or is selected from shea butter, shea stearin, shea olein, cocoa butter, cocoa stearin, cocoa olein, allanblackia fat, kokum fat, mango kernel fat, sal fat, illipe butter, or mixtures thereof.

13. A dairy analogue composition according to any preceding claim wherein the lauric fat of the interesterified blend comprises or is selected from coconut oil, coconut oil

stearin, coconut oil olein, palm kernel oil, palm kernel olein, palm kernel stearin, babassu oil, or mixtures thereof.

14. A dairy analogue composition according to any preceding claim, wherein the interesterified blend is an interesterified blend of from 10% to 90% by weight of non-lauric vegetable oil; and from 10% to 90% by weight of lauric vegetable oil.

15. A dairy analogue composition according to any preceding claim, wherein the interesterified blend is an interesterified blend of from 20% to 80% by weight of non-lauric vegetable oil; and from 20% to 80% by weight of lauric vegetable oil.

16. A dairy analogue composition according to any preceding claim, wherein the interesterified blend is an interesterified blend of from 60% to 80% by weight of non-lauric vegetable oil; and from 20% to 40% by weight of lauric vegetable oil.

17. A dairy analogue composition according to any preceding claim, wherein the interesterified blend is an interesterified blend of from 65% to 75% by weight of non-lauric vegetable oil; and from 25% to 35% by weight of lauric vegetable oil.

18. A dairy analogue composition according to any preceding claim, wherein the non-lauric fat of the interesterified blend is shea butter, shea stearin, or a mixture thereof.

19. A dairy analogue composition according to any preceding claim, wherein the lauric fat of the interesterified blend is coconut oil.

20. A dairy analogue composition according to any preceding claim, wherein the lauric vegetable fat (a) comprises coconut oil, coconut oil stearin, coconut oil olein, palm kernel oil, palm kernel olein, palm kernel stearin, babassu oil, or mixtures thereof.

21. A dairy analogue composition according to any preceding claim, wherein the lauric vegetable fat (a) comprises coconut oil.

22. A dairy analogue composition according to any preceding claim, wherein the fat composition comprises from 5% to 95% by weight of the fat composition of the lauric vegetable oil (a); and from 5% to 95% of the interesterified blend (b).

23. A dairy analogue composition according to any preceding claim, wherein the fat composition comprises from 10% to 90% by weight of the fat composition of the lauric vegetable oil (a); and from 10% to 90% of the interesterified blend (b).

24. A dairy analogue composition according to any preceding claim, wherein the fat composition comprises from 20% to 50% by weight of the fat composition of the lauric vegetable oil (a); and from 50% to 80% of the interesterified blend (b).

25. A dairy analogue composition according to any preceding claim, wherein the fat composition comprises from 20% to 40% by weight of the fat composition of the lauric

vegetable oil (a); and from 60% to 80% of the interesterified blend (b); preferably from 25% to 40% by weight of the fat composition of the lauric vegetable oil (a); and from 60% to 75% by weight of the fat composition of the interesterified blend (b).

26. A dairy analogue composition according to any preceding claim, wherein the fat composition is a non-hydrogenated fat composition.

27. A dairy analogue composition according to any preceding claim, wherein:

(a) the fat composition comprises caprylic acid and capric acid in amount of from 5% to 10% by weight;

(b) the fat composition comprises lauric acid in an amount of from 20% to 30% or 15 to 30% by weight; and/or

(c) the fat composition comprises stearic acid in an amount of from 25% to 40% by weight; preferably wherein the fat composition is as defined in all of (a) to (c).

28. A dairy analogue composition according to any preceding claim, wherein:

(a) the fat composition comprises oleic acid (C18:1) in amount of from 10% to 25% by weight, preferably from 15% to 25%;

(b) the fat composition comprises linoleic acid (C18:2) in an amount of less than 5% by weight, preferably from 1% to 5% by weight; and/or

(c) the fat composition comprises linolenic acid (C18:3) in an amount of less than 1% by weight; preferably less than 0,1% by weight; preferably wherein the fat composition is as defined in all of (a) to (c).

29. A dairy analogue composition according to any preceding claim, wherein the fat composition comprises:

(a) CN 32, CN34, CN36 and CN38 triglycerides in a total amount of from 5% to 35% (such as 10 to 25%) by weight; and

(b) CN48 triglycerides in an amount of from 10% to 22% by weight.

30. A dairy analogue composition according to any preceding claim, wherein the fat composition comprises:

(a) CN 40 triglycerides in a total amount of less than 8%, preferably from 1% to 5% by weight;

- (b) CN42 triglycerides in an amount of less than 10%, preferably from 1% to 7% by weight;
- (c) CN44 triglycerides in an amount of less than 10%, preferably from 1% to 7% by weight; and/or
- (d) CN50 and C52 triglycerides in an amount of from 5 to 30%, preferably from 10% to 20% by weight; preferably wherein the fat composition is as defined in all of (a) to (d).

31. A dairy analogue composition according to any preceding claim, wherein the fat composition, preferably the dairy analogue composition, does not comprise a liquid oil selected from a group consisting of: sunflower oil, high oleic sunflower oil, high oleic rapeseed oil, high oleic canola oil, high oleic soybean oil, rapeseed oil, rice oil, soybean oil, chia oil, flaxseed oil, corn oil, safflower oil, olive oil, canola oil, rapeseed oil, pumpkin oil, sesame oil, walnut oil, hazelnut oil, a fraction thereof and a mixture thereof.

32. A dairy analogue composition according to any preceding claim, wherein the fat composition, preferably the dairy analogue composition, is substantially free of liquid oils; more preferably, the fat composition, advantageously the dairy analogue composition, is substantially free of liquid oils.

33. A dairy analogue composition according to any preceding claim, wherein the fat composition is solid or semi-solid.

34. A dairy analogue composition according to any preceding claim, wherein the dairy analogue composition comprises from 10% to 40% by weight of the fat composition.

35. A dairy analogue composition according to any preceding claim, wherein the dairy analogue composition comprises from 15% to 40% by weight of the fat composition.

36. A dairy analogue composition according to any preceding claim, wherein the dairy analogue composition comprises from 30% to 85% by weight of water; preferably from 50% to 70% by weight of water.

37. A dairy analogue composition according to any preceding claim, wherein the dairy analogue composition further comprises one or more hydrocolloid stabilisers, preferably wherein the one or more hydrocolloid stabilisers are present in an amount of up to 5% by weight of the dairy analogue composition.

38. A dairy analogue composition according to Claim 37, wherein the one or more hydrocolloid stabilisers comprise starch, xanthan gum, guar gum, locust bean gum, gum karaya, gum tragacanth, gum Arabic, cellulose, cellulose derivatives, carrageenan, pectin, or a combination thereof.

39. A dairy analogue composition according to any preceding claim, wherein the dairy analogue composition comprises one or more sugars; preferably wherein the one or more sugars are present in an amount of from 10% to 20% by weight of the dairy analogue composition.
40. A dairy analogue composition according to Claim 39, wherein the one or more sugars comprise corn syrup, glucose syrup, glucose, fructose, sucrose, dextrin, dextrose, artificial sweeteners, lactose, or a combination thereof.
41. A dairy analogue composition according to any preceding claim, wherein the dairy analogue composition further comprises one or more emulsifiers, preferably wherein the one or more emulsifiers is present in an amount of up to 5% by weight of the dairy analogue composition; and preferably up to 1% by weight of the composition.
42. A dairy analogue composition according to any preceding claim, wherein the dairy analogue composition further comprises protein, optionally wherein the protein is present in the dairy analogue composition in an amount of from 0.1% to 10% by weight of the composition; preferably wherein the protein is a non-animal protein.
43. A dairy analogue composition according to any preceding claim, wherein the dairy analogue composition further comprises one or more edible salts; preferably wherein the one or more edible salts are present in an amount of from 0.05% to 0.5% by weight of the dairy analogue composition; more preferably wherein the one or more edible salts comprise sodium chloride.
44. A dairy analogue composition according to any one of Claims 1 to 33, wherein the dairy analogue composition comprises from 1% to 20% by weight of the fat composition; from 10% to 40% by weight sugar; and from 40% to 80% by weight of water; preferably, wherein the dairy analogue composition comprises from 50% to 70% by weight water, from 1% to 10% by weight of the fat composition; and from 20% to 40% by weight sugar.
45. A dairy analogue composition according to Claim 44, wherein the sugar comprises corn syrup, glucose syrup, glucose, fructose, sucrose, dextrin, dextrose, artificial sweeteners, lactose, or a combination thereof.
46. A dairy analogue composition according to Claim 44 or Claim 45, wherein the dairy analogue composition further comprises from 1% to 10% by weight of solids derived from fruit or nut.
47. A dairy analogue composition according to any one of Claims 44 to Claim 46, further comprising protein, optionally wherein the protein is present in the dairy

analogue composition in an amount of from 0.1% to 10% by weight of the composition; preferably wherein the protein is a non-animal protein.

48. A dairy analogue composition according to any one of Claims 44 to 47, wherein the dairy analogue composition further comprises one or more emulsifiers, preferably wherein the one or more emulsifiers is present in an amount of up to 1% by weight of the dairy analogue composition.

49. A dairy analogue composition according to any one of Claims 44 to 48, wherein the dairy analogue composition further comprises one or more hydrocolloid stabilisers, preferably wherein the one or more hydrocolloid stabilisers are present in an amount of up to 5% by weight of the dairy analogue composition.

50. A dairy analogue composition according to any one of Claims 1 to 33, wherein the dairy analogue composition comprises from 5% to 10% by weight of the fat composition; and up to 70% by weight water.

51. A dairy analogue composition according to Claim 50, wherein the dairy analogue composition comprises from 6.5% to 10% by weight of the fat composition.

52. A dairy analogue composition according to Claim 50 or Claim 51, wherein the dairy analogue composition comprises up to 70% by weight of water.

53. A dairy analogue composition according to any one of Claims 50 to 52, wherein the dairy analogue composition comprises one or more emulsifiers; optionally, wherein the one or more emulsifiers are present in the dairy analogue composition in an amount of up to 5% by weight.

54. A dairy analogue composition according to any one of Claims 50 to 53, wherein the dairy analogue composition comprises one or more hydrocolloids; optionally, wherein the one or more hydrocolloids are present in the dairy analogue composition in an amount of up to 5% by weight.

55. A dairy analogue composition according to any of Claims 50 to 54, wherein the dairy analogue composition comprises one or more sugars; optionally wherein the one or more sugars are present in the dairy analogue composition in an amount of from 1% to 35% by weight.

56. A dairy analogue composition according to any of Claims 50 to 55, wherein the dairy analogue composition comprises one or more proteins; optionally wherein the one or more proteins comprise casein or a derivative thereof; preferably wherein the one or more proteins comprise sodium caseinate.

57. A dairy analogue composition according to Claim 56, wherein the one or more proteins are present in the dairy analogue composition in an amount of from 0.1% to 5% by weight.
58. A dairy analogue composition according to any preceding claim, wherein the dairy analogue composition further comprises an animal milk-derived protein, preferably wherein the animal-milk derived protein comprises casein and/or whey protein.
59. A dairy analogue composition according to any one of Claims 1 to 57, wherein the dairy analogue composition is substantially free of animal protein and/or animal fats, preferably, wherein the dairy analogue composition is free of animal protein and/or animal fats.
60. A dairy analogue composition according to any one of Claims 1 to 57 or Claim 54, wherein the dairy analogue composition is substantially free of animal-derived products, preferably, wherein the dairy analogue composition is free of animal-derived products.
61. A dairy analogue composition according to any one of Claims 1 to 58, wherein the dairy analogue composition further comprises one or more animal-derived products such as animal oils, marine oils, animal-derived proteins, animal-derived polysaccharides, or any combination thereof; preferably wherein the one or more animal-derived products comprise animal milk proteins, animal milk fats, or a combination thereof.
62. A dairy analogue composition according to Claim 61, wherein the one or more animal-derived products are present in the dairy analogue composition in an amount of up to 20% by weight of the dairy analogue composition, such 0.1 to 20% by weight.
63. A food product comprising a dairy analogue composition according to any preceding claim; optionally, wherein the food product is a vegetarian or vegan dairy substitute food product, such as a vegan or vegetarian cheese substitute, frozen dessert substitute, plant based dairy analogue drink, plant based dairy analogue powder, ghee, fermented product for example yoghurt, yellow fat, spread, liquid non-dairy creamer or whipping cream substitute food product.
64. A food product according to Claim 63, wherein the food product is a whipping cream, an aerated food product, a frozen dessert, or a liquid non-dairy creamer food product.
65. A food product according to Claim 64, wherein the food product is a whipping cream food product or an aerated food product, and wherein the dairy analogue composition is according to any one of Claims 34 to 43.

66. A food product according to Claim 63 or Claim 64, wherein the food product is a frozen dessert composition, and wherein the dairy analogue composition is according to any of Claims 46 to 51.
67. A food product according to Claim 63 or Claim 64, wherein the food product is a liquid non-dairy creamer food product, and wherein the dairy analogue composition is according to any of Claims 52 to 56.
68. Use of a fat composition in a dairy analogue composition, wherein the fat composition comprises a blend of (a) a lauric vegetable fat; and (b) an interesterified blend of a lauric fat and non-lauric vegetable fat.
69. Use according to Claim 68, wherein the use further comprises using the dairy analogue composition in a food product.
70. Use according to Claim 68 or Claim 69, wherein the dairy analogue composition, fat composition and/or food product are as defined in any one of Claims 1 to 62.
71. Use according to any of Claims 68 to 70, wherein the use comprises using the fat composition to improve the nutritional profile of the dairy analogue composition when compared to an analogous dairy analogue composition comprising the same amount by weight of coconut oil, palm kernel oil, or palm oil; or fully or partially hydrogenated palm kernel oil, palm oil or coconut oil.
72. Use according to any one of Claims 68 to 70, wherein the dairy analogue composition is a whipping cream composition or aerated food product composition according to any one of Claims 68 to 70, and wherein the use comprises using the fat composition to provide an improved foam firmness, improved foam stability, and/or improved overrun relative to an analogous whipping cream composition or aerated food product composition comprising the same amount by weight of the interesterified blend component (b) of the fat composition.
73. A process of manufacturing a dairy analogue composition according to any one of Claims 1 to 62, wherein the process comprises combining a fat composition as defined in any one of Claims 1 to 33 with water, and optionally, one or more additional components to form the dairy analogue composition.