

KARITENE IN FOOD PRODUCTS**FIELD OF THE INVENTION**

The invention relates to dairy and dairy analogue food products comprising karitene stabilised emulsions. In particular, the invention relates to the use of karitene as an emulsifier in said food products and the use of the karitene to enhance the organoleptic perception of the food products.

BACKGROUND OF THE INVENTION

A great many natural and processed food products contain emulsions. In some cases, the entire food product is an emulsion (for example, certain types of sausages) whereas in others the emulsion forms a component of the food product. In the case of processed foods, emulsification of the food products or a component thereof often happens during manufacture of the food product. Emulsions are common components of food products such as milk, cream, butter, margarine, juice, soup, cake, pastry, mayonnaise, sausages, cream liqueur, coffee creamer, sauces, meats (in particular processed meats), ice cream, and many others. An emulsion is a fine dispersion of minute droplets of a first liquid in a second liquid in which the first liquid is not soluble or miscible. The dispersed droplets are referred to as the dispersed phase and the liquid in which they are dispersed is referred to as the continuous phase. Emulsions are typically divided into oil-in-water emulsions in which water forms a continuous phase with oil droplets dispersed therein and water-in-oil emulsions in which the oil forms the continuous phase with water droplets dispersed therein. Both of these types of emulsions are found in food products. The presence of the emulsion in the food products typically provides structure and texture to the food products. Emulsions typically keep the food matrix of the food product intact and prevent phase separation which often leads to stickiness in the food products. Emulsions often don't stay stable for a sufficiently long time and can undesirably separate into their constituent oil and water phases. This is a particular problem with food products that may be stored for a long period of time. In order to minimise and prevent separation of emulsions, emulsifiers are often added to food products to stabilise the emulsions. Examples of emulsifiers often added to food products include egg lecithin, mono- and diglycerides, polysorbates and hydrocolloids such as guar gum, gellan gum and carrageenan. Certain food ingredients also often contain emulsifying components (for example certain vegetable oils that contain mono- and diglycerides).

Despite the widespread use of emulsifiers in food products, there has been an increased negative public perception associated with their use due to the general undesirability of using chemical additives in food products and a desire for “clean label” food products. In Europe, chemical food additives are allocated an “E number” by the European Food Safety Authority (EFSA). In recent years, there has been an increased desire by consumers for food products that are free of or contain only low amounts of E numbers.

Many processed food products such as those listed above comprise emulsions formed from oil/fat and water. Examples of fats and oils used in the emulsions include animal fats such as tallow, lard, poultry fat and milk fat, and also plant-derived fats such as palm oil, coconut oil, palm kernel oil, shea butter, soyabean oil, sunflower oil, rapeseed oil, safflower oil and olive oil. Shea butter has been added to food products such as breads and pastries, sauces, dressings, plant-based food products, and confectionary. Shea butter is an oil that is extracted from the nut of the African shea tree. It is used in food products such as those discussed above and also in many cosmetic products. Shea butter, like most plant derived fats comprises mostly triglycerides. Shea butter also comprises a small fraction of compounds known collectively as karitene. Karitene refers to several highly viscous rubber-like macromolecular substances. Karitene is found in shea butter at a concentration of around 3% by weight. Karitene has the formula: $\text{H}[-\text{CH}_2-\text{C}(\text{CH}_3)=\text{CH}-\text{CH}_2]_{n+2}\text{H}$, where n is typically between 100 and 10,000. The value of n varies from molecule to molecule and is always greater than 100. In the majority of cases n is less than 10,000 but may occasionally be higher than 10,000. In these cases, the karitene has a similar molecular structure to natural rubber.

Before shea butter is used in food products and cosmetic products, the karitene is typically removed from shea butter since it renders the shea butter oxidatively unstable due to the large number of carbon-carbon double bonds present in the molecule. Karitene is typically removed from the shea butter by various processes such as acetone fractionation or hexane fractionation. The removed karitene is generally considered to be a waste product with limited use other than being burned as a fuel.

US2015/0264956 discusses the use of shea butter fractions as a cocoa butter equivalent in chocolate and other confectionary products. The document discusses that karitene is removed from the shea butter before inclusion of the shea butter in food products due to the problems associated with the oxidation of the karitene; the fact that the karitene causes problems with filtering of the shea butter; and that it causes taste corruption of the confectionary products.

SUMMARY OF THE INVENTION

The present invention is based on the surprising finding that karitene can act as an emulsifier in dairy and dairy analogue food products as well as imparting desirable organoleptic properties to the dairy or dairy analogue food products such as improved texture and homogeneity. The karitene has also been unexpectedly found to provide an improved mouthfeel and texture to dairy and dairy analogue food products.

According to a first aspect of the invention, there is provided the use of karitene as an emulsifier in a dairy or dairy analogue food product, wherein the food product comprises an emulsion comprising one or more oils and water; wherein the food product comprises karitene in an amount of from 0.01% to 10% by weight of the food product; and wherein the food product comprises at least 0.5% of karitene by weight of the total amount of the one or more oils present in the food product.

The terms emulsion composition and emulsion as used herein are used, consistent with their normal meaning in the art, to refer to a mixture of two immiscible liquids (typically water and oil). In the emulsion or emulsion composition, one liquid forms a continuous phase with droplets of a dispersed phase dispersed therein. The boundary between the continuous phase and dispersed phase is referred to as the interface. Typically, the emulsion droplets of the dispersed phase have a mean droplet diameter of from 0.1 μm to 100 μm . The continuous phase may be water and the dispersed phase may be oil in which case the emulsion is referred to as an oil-in-water emulsion. Alternatively, the continuous phase may be oil and the dispersed phase water in which case the emulsion is referred to as a water-in-oil emulsion. The terms emulsion composition and emulsion as used herein are intended to cover both of these types of emulsion unless stated otherwise.

Surprisingly, it has been found that karitene can improve the stability of an emulsion to phase separation and/or to prevent degradation of the emulsion making the karitene a useful component of dairy analogue and dairy food products which contain emulsions.

Surprisingly, as well as acting as an emulsifier, it has been found that karitene can improve the organoleptic perception of dairy and dairy analogue food product relative to analogous dairy analogue food products and dairy products with lower karitene content. The term analogous dairy or dairy analogue food product as used herein is used to refer to an equivalent weight of a dairy or dairy analogue food product that is identical to the dairy or dairy analogue food products of the invention, with the exception that the analogous dairy

or dairy analogue food product contains a lower amount of karitene than food products of the invention.

Specifically, use according to the invention may comprise using karitene to improve the texture of the food product and/or the homogeneity of the food product relative to an analogous food product with lower karitene content. The use may also comprise using karitene to improve the homogeneity of homogenous food products relative to analogous food products with lower karitene content. These desirable and unexpected effects have been found to be imparted to the food products of the invention to an extent greater than other emulsifiers known in the art for use in dairy and dairy analogue food products.

The term karitene as used herein is used to refer to the group of compounds that occur naturally in shea butter that have the following formula: $H[-CH_2-C(CH_3)=CH-CH_2]_{n+2}H$, where n is between 100 and 10,000.

The amount of karitene present in the dairy/dairy analogue food products will typically be dependent on the specific nature of the food product. For example, for the majority of dairy and dairy analogue food products, the karitene content of the food products will be at the higher end or mid-point of the range described above. Examples of such dairy and dairy analogue food products with higher karitene contents include, but are not limited to, butter and margarine food products, cheese analogue products, frozen dessert analogue products, whipped cream analogue products, non-dairy creamer food products, and certain plant-based yoghurt products such as plant-based Greek yoghurt products. Such dairy and dairy analogue food products are referred to herein as "higher karitene content food products". On the other hand, certain dairy and dairy analogue food products typically contain only very low amounts of karitene at the bottom end of the range described above. Examples of such food products include plant-based milks, and certain plant-based yoghurt food products such as plant-based drinking yoghurt and plant-based spoonable yoghurt. Such dairy and dairy analogue food products are referred to herein as "lower karitene content food products".

Typically, the "higher karitene content food products" comprise higher amounts of fat or oil present in the food products. In contrast, typically, the "lower karitene content food products" comprise lower amounts of fat or oil present in the food products. For example, butter and margarine food products typically comprise high amounts of fat and also typically comprise high amounts of karitene in the food products. Food products such as cheese analogue compositions, frozen dessert compositions and other high karitene

content food products discussed above typically comprise lower amounts of fat than butter and margarine food products and so typically also contain lower amounts of karitene. However, these food products will typically comprise more fat and more karitene by percentage weight than the lower karitene content food products discussed above such as plant-based milk which typically contain very low amounts of karitene. These food products and their components are discussed in further detail below.

In the case of the lower karitene content food products, surprisingly, it has been found that the advantageous properties associated with the use of karitene in dairy and dairy analogue food products such as emulsifier properties and improvements in organoleptic properties for the food products when compared to using known emulsifiers are still achieved at low concentrations of karitene in the food products such as at concentrations at the lower end of the ranges discussed above.

Typically, use according to the invention comprises using karitene in dairy and dairy analogue food products that comprise an emulsion where the emulsion is an emulsion composition comprising one or more oils and water. The emulsion composition may comprise any suitable amount of oil and water suitable for forming an emulsion, as discussed in further detail below.

Higher karitene content food products

In some instances, and particularly in the case of the higher karitene content food products discussed above, use according to the invention may comprise using the karitene in dairy or dairy analogue food products comprising an emulsion where the emulsion is an emulsion composition comprising one or more oils and water. Typically, the emulsion composition comprises from 0.1% to 20% of karitene by total weight of water and the one or more oils present in the emulsion composition; and wherein the emulsion composition comprises at least 1.0% of karitene by weight of the total amount of the one or more oils present in the emulsion composition.

Typically, the emulsion composition comprises karitene in an amount of from 1.0% to 10.0%; preferably from 1.5% to 9.0%; more preferably 1.5% to 7.5% (including 1.5% to 6.0%); still more preferably from 1.5% to 5.0%; and most preferably from 2.0% to 5.0% (including 3.0% to 5.0% and 4.0% to 5.0%) by weight of the total amount of the one or more oils present in the emulsion composition.

The emulsion composition may comprise karitene in an amount of from 0.1% to 5% by total weight of water and the one or more oils present in the emulsion composition;

preferably wherein the emulsion composition comprises karitene in an amount of from 0.05% to 5% (such as 0.075% to 3.5%) by total weight of water and the one or more oils present in the emulsion composition; more preferably wherein the emulsion composition comprises karitene in an amount of from 0.1% to 2% by total weight of water and the one or more oils present in the emulsion composition; and most preferably, wherein the emulsion composition comprises karitene in an amount of from 0.2% to 1% by total weight of water and the one or more oils present in the emulsion composition.

The emulsion composition may comprise any suitable amount of oil and water suitable for forming an emulsion.

Typically, the one or more oils are present in the emulsion composition in a total amount of from 1% to 99% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 1% to 99% by weight of the total amount of water and oil present in the emulsion composition.

Preferably, the one or more oils are present in the emulsion composition in a total amount of from 10% to 90% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 10% to 90% by weight of the total amount of water and oil present in the emulsion composition.

More preferably, the one or more oils are present in the emulsion composition in a total amount of from 15% to 90% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 10% to 85% by weight of the total amount of water and oil present in the emulsion composition.

As discussed above, the emulsion composition may be a water-in-oil emulsion or an oil-in-water emulsion. Typically, water-in-oil emulsions will form where the emulsion composition comprises relatively more oil than water and oil-in-water emulsions will form where the emulsion composition comprise relatively more water than oil.

In some instances, the one or more oils are present in the emulsion composition in a total amount of from 50% to 99% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 1% to 50% by weight of the total amount of water and oil present in the emulsion composition. Preferably, in these instances, the one or more oils are present in the

emulsion composition in a total amount of from 70% to 99% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 1% to 30% by weight of the total amount of water and oil present in the emulsion composition. Typically, in these instances, the emulsion composition is a water-in-oil emulsion. Typically, in these instances described above, the emulsion composition is a water-in-oil emulsion.

In other instances, the one or more oils are present in the emulsion composition in a total amount of from 1% to 70% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 30% to 99% by weight of the total amount of water and oil present in the emulsion composition. Preferably, in these instances, the one or more oils are present in the emulsion composition in a total amount of from 1% to 60% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 40% to 99% by weight of the total amount of water and oil present in the emulsion composition.

In other instances, the one or more oils are present in the emulsion composition in a total amount of from 1% to 50% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 50% to 99% by weight of the total amount of water and oil present in the emulsion composition. Preferably, in these instances, the one or more oils are present in the emulsion composition in a total amount of from 5% to 40% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 60% to 95% by weight of the total amount of water and oil present in the emulsion composition. Typically, in these instances, the emulsion composition is an oil-in-water emulsion composition.

Typically, in instances where the food product is a higher karitene content food product, the food product comprises karitene in an amount of from 0.05% to 5.0% (such as 0.075% to 4.5%, preferably 0.1% to 4.0%) by weight of the food product. Preferably, the food product comprises karitene in an amount of from 0.1% to 3.0% by weight of the food product; and more preferably the food product comprises karitene in an amount of from 0.2% to 2.0% by weight of the food product.

The higher karitene content food products described herein in the context of the invention typically comprise karitene in any of the amounts described above. Emulsion compositions

in these food products typically comprise karitene in any of the amounts described above. Accordingly, use according to the invention may comprise using karitene in food products such as butter and margarine food products, cheese analogue products, frozen dessert analogue products, whipped cream analogue products, non-dairy creamer food products, certain plant-based yoghurt products such as plant-based Greek yoghurt products, and other food products; where the food products comprise karitene in any of the amounts described above, and/or wherein the food products comprise emulsion compositions that comprise karitene in any of the amounts described above.

Lower karitene content food products

In some instances, and particularly in the case of the lower karitene content food products discussed above, use according to the invention may comprise using the karitene in dairy or dairy analogue food products comprising an emulsion where the emulsion is an emulsion composition comprising one or more oils and water. Typically, the emulsion composition comprises from 0.01% to 5.0% of karitene by total weight of water and the one or more oils present in the emulsion composition; and wherein the emulsion composition comprises at least 0.5% of karitene by weight of the total amount of the one or more oils present in the emulsion composition.

Typically, the emulsion composition comprises karitene in an amount of from 0.5% to 5.0% (such as 0.5% to 4.0%); preferably from 0.5% to 3.0% (such as 1.0% to 3.0%); and more preferably from 1.0% to 2.0% by weight of the total amount of the one or more oils present in the emulsion composition.

Typically, the emulsion composition comprises karitene in an amount of from 0.01% to 2% by total weight of water and the one or more oils present in the emulsion composition; preferably wherein the emulsion composition comprises karitene in an amount of from 0.01% to 1% by total weight of water and the one or more oils present in the emulsion composition.

Typically, the one or more oils are present in the emulsion composition in a total amount of from 1% to 20% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 80% to 99% by weight of the total amount of water and oil present in the emulsion composition. Preferably, the one or more oils are present in the emulsion composition in a total amount of from 2% to 15% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an

amount of from 85% to 98% by weight of the total amount of water and oil present in the emulsion composition. Typically, in these instances, the emulsion composition is an oil-in-water emulsion composition.

Typically, in instances where the food product is a lower karitene content food product, the food product comprises karitene in an amount of from 0.01% to 2.0% by weight of the food product. Preferably, the food product comprises karitene in an amount of from 0.01% to 1.0% by weight of the food product; and more preferably the food product comprises karitene in an amount of from 0.01% to 0.1% by weight of the food product.

The lower karitene content food products described herein in the context of the invention typically comprise karitene in any of the amounts described above. Emulsion compositions in these food products typically comprise karitene in any of the amounts described above. Accordingly, use according to the invention may comprise using karitene in food products such as plant-based milks, certain plant-based yoghurt food products such as plant-based drinking yoghurt and plant-based spoonable yoghurt, and other food products; where the food products comprise karitene in any of the amounts described above, and/or wherein the food products comprise emulsion compositions that comprise karitene in any of the amounts described above.

Fats and oils used in food products and emulsion compositions

Use according to the invention comprises using karitene in dairy or dairy analogue food products that comprise emulsions that comprise water and one or more oils. The emulsions may be emulsion compositions that comprise water and one or more oils.

The oils can be any known fat or oil suitable for forming an emulsion with water. Typically, the one or more oils comprise one or more edible oils.

Preferably, the one or more oils comprise one or more triglyceride oils, although the emulsions may alternatively or additionally comprise other edible oils such as diglyceride or monoglyceride oils. Preferably, the one or more triglyceride oils are non-hydrogenated triglyceride oils.

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 “glyceride oil” is used synonymously with “fat” herein.

The term “oil” as used herein also does not imply any particular melting point for the oil.

The term "fatty acid", as used herein, refers to straight chain saturated or unsaturated (including mono- and poly unsaturated) carboxylic acids having 8 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 C8 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 or oil.

The one or more triglyceride oils may comprise any edible triglyceride oil. Typically, the one or more oils comprise one or more plant-derived triglyceride oils, one or more animal-derived triglyceride oils, or a combination thereof.

Examples of triglyceride oils derived from animals that may be used in the emulsion compositions of the invention include milk fat, tallow, lard, poultry fat and other animal derived oils. For example, where the food products are dairy food products, the one or more oils may comprise milk fat.

Preferably, the emulsion composition comprises one or more plant-derived triglyceride oils. More preferably, the one or more oils comprise high oleic sunflower oil, sunflower oil, rapeseed oil, high oleic rapeseed oil, soybean oil, linseed oil, olive oil, corn oil, cottonseed oil, groundnut oil, safflower oil, high oleic safflower oil, peanut oil, rice oil, camelina oil, sesame oil, walnut oil, palm fat, coconut fat, shea butter, cocoa butter, allanblackia fat, kokum fat, mango kernel fat, sal fat, illipe butter, palm kernel fat, babassu fat, any fractions thereof, any interesterified forms thereof, or any combinations thereof. Still more preferably, the one or more oils comprise palm fat, coconut fat, shea butter, cocoa butter, allanblackia fat, kokum fat, mango kernel fat, sal fat, illipe butter, palm kernel fat, babassu fat, any fractions thereof, any interesterified forms thereof, or any combinations thereof.

Most preferably, the one or more oils comprise shea butter, any fractions thereof, any interesterified forms thereof, or any combinations thereof. Most preferably of all, the one or more oils comprise shea olein.

Where shea butter is used in food products (either as the sole fat present or in combination with other fats), there is no need for the shea butter to have the karitene removed before use. Where the shea butter is to be used in emulsions in the food products, the karitene can remain in the shea butter so that it acts as the emulsifier in the food product. This is advantageous as it means that no additional emulsifiers need to be added to the food products meaning that they can desirably be marketed as clean label products since the karitene is a natural component of the shea butter. The cost of additional emulsifiers can also be avoided as well as the costs of carrying out karitene removal processes on the shea butter.

Alternatively, where it is not desired for shea butter to be included in the food products but it is desired to include other fats, karitene that has been removed from shea butter can still be added to the food products to act as a "clean label" emulsifier.

In some instances, the emulsion composition may have karitene added thereto so as to increase the karitene content of the emulsion composition to within the amounts described above. This may be desirable, for example, where the emulsion composition does not comprise shea butter or where shea butter present in the emulsion composition does not comprise the necessary amount of karitene. The karitene added to the emulsion compositions may have been itself previously extracted from shea butter or a fraction thereof using karitene extraction processes known in the art.

The emulsion composition of the invention may also comprise mixtures of shea butter with one or more additional oils such as the oils described above, provided that the karitene content of the emulsion composition are within the limits described above.

Where shea butter, a fraction thereof or interesterified form thereof is used in the emulsion composition, the emulsion composition comprises triglycerides typically found in shea butter. It will be appreciated by the skilled person that the triglycerides present and their relative amounts may vary depending on whether or not the shea butter has been interesterified prior to use.

Typically, the one or more oils comprise SOS triglycerides in an amount of from 0.1% to 25% by weight; preferably from 0.5% to 15% by weight; and more preferably from 1% to

10% by weight of the total amount of the one or more oils present in the emulsion composition.

As discussed above, the emulsion composition may comprise interesterified fats or blends of fats (such as shea butter or other fats described above). For example, the emulsion composition may comprise an interesterified fat such as an interesterified fat blend. The interesterified fat or interesterified fat blend may be produced by chemical interesterification, enzymatic interesterification, or a combination thereof. Processes for the preparation of interesterified fats 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).

Other typical ingredients of emulsions

The emulsions/emulsion compositions of the food products also comprise water. The amount of water is as described above. 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.

As discussed above, the emulsions/emulsion compositions comprise karitene as the emulsifier. However, optionally, the emulsions/emulsion compositions may also comprise one or more additional emulsifiers such as food grade emulsifiers. Examples of such emulsifiers include lecithin (such as egg lecithin), mono- and diglycerides, polysorbates and hydrocolloids such as guar gum, gellan gum and carrageenan, with lecithin being particularly preferred. However, preferably, the emulsions/emulsion compositions are free or substantially free of emulsifiers other than the karitene.

The emulsions/emulsion compositions may also optionally include any other ingredients typically present in emulsions/emulsion compositions such as typical ingredients of edible emulsions intended for use in food products.

Cheese & cheese analogue food products

In some instances, use according to the invention comprises using the karitene in cheese analogue food products or cheese food products.

Typically, the cheese analogue food products are formed from 15% to 30% by weight of fat; from 0% to 45% by weight of a starch; from 0% to 30% by weight of non-animal protein; and from 35% to 65% by weight of water.

Preferably, the fat is present in the cheese analogue food products in an amount of from 20% to 30% by weight.

Preferably, the starch is present in the cheese analogue food products in an amount of from 1% to 45% by weight.

Preferably, the non-animal protein is present in the cheese analogue food products in an amount of from 0.1% to 15% by weight.

The cheese analogue food products may comprise one or more non-animal proteins, such as one or more proteins derived from fungi, plants, microorganisms, or a combination thereof.

Typically, the non-animal protein comprises plant protein. Preferably, the plant protein is selected from algae protein, black bean protein, canola protein, wheat protein, chickpea protein, fava protein, lentil protein, lupin bean protein, mung bean protein, oat protein, pea protein, potato protein, rice protein, soy protein, sunflower seed protein, wheat protein, white bean protein, and protein isolates or concentrates thereof. In other embodiments, the non-animal protein comprises seitan, rice protein, mushroom protein, legume protein, tempeh, yam flour, tofu, mycoprotein, peanut flour, yuba, nuts, protein derived from nuts, nut derived milk products, or a combination thereof.

Plant protein is a source of protein which is obtained or derived from plants. The plant protein may be any suitable plant protein and may comprise a mixture of plant proteins and/or may include protein isolates or concentrates. Examples of suitable plant proteins include those discussed above.

The weight percentage ranges referred to above for water present in the cheese analogue food products include both water added in its own right to the food products and water present in other components of the cheese analogue food products such as in vegetable proteins or emulsified with fat. Similarly, the weight percentage ranges discussed herein for the amount of non-animal protein present in the cheese analogue food products refer to dry weight of protein, and do not include water bound to the non-animal protein.

The plant protein used in the preparation of the cheese analogue food products may be either dry (also referred to as 'dry phase' herein) or moist. Thus, in embodiments, the plant protein may be included in a dry mix of ingredients, which may include additional ingredients intended for inclusion in the cheese analogue food products, such as carbohydrates, fibre and/or hydrocolloids, in addition to protein. If the plant protein is dry, it may be hydrated prior to and/or during the formation of the cheese analogue food products. The term 'dry' used in relation to the plant protein and 'dry phase' used herein, is intended to mean that the phase comprising plant protein comprises less than 5 wt.% water, preferably less than 2 wt.% water, more preferably less than 1 wt.% water, even more preferably that it is substantially free from water. In other preferred embodiments, the a_w of the dry phase is 0.90 or lower, more preferably below 0.80. The dry phase comprising plant protein is typically provided in a substantially dehydrated state to reduce microbial growth as far as possible so as to extend shelf life.

If present in the cheese analogue food products, the non-animal proteins are typically present in the cheese analogue food products in an amount of up to 15% by weight of the cheese analogue food products. Preferably, the non-animal protein is present in an amount of 12.5% or less by weight of the cheese analogue food products, such as 10% by weight or less of the cheese analogue food product.

The cheese analogue food products may comprise one or more starches. The starches may comprise any suitable type of starch such as those starches known in the art for inclusion in cheese analogue food products. Examples of starches that can be included include non-modified starches, modified starches, or a combination thereof. In some embodiments, the starch comprises non-modified or modified vegetable starch, rice starch, tapioca starch, wheat starch, or a combination thereof. In one embodiment, the starch comprises modified starch derived from potatoes. Preferably, the starch comprises potato starch, waxy maize starch, tapioca starch, or a combination thereof.

Specific examples of starches and modified starches that can be included in the cheese analogue food products include a mixture of oxidised starch E1404 and starch sodium octenyl succinate E1450 where the modified starches are derived from potato starch; SIMPLISTICA™ VCP 1214 OG which comprises starch derived from potato, maize and tapioca; KaTech NDG 1098.72 which comprises potato starch and carrageenan; Perfectasol™ D500 which comprises enzymatically modified potato starch and potato protein, modified waxy maize starch (E1450); and Perfectasol™ D510 which comprises

acid treated potato starch, hydroxypropylated distarch phosphate of potato origin, and pregelatinized starch sodium octenyl succinate of potato origin.

Without being limited by theory, it is believed that the starch is important for contributing to the various sensory and functional properties of the cheese analogues such as how hard or soft the cheese is, and also various functional properties of the cheese such as its stretchability on heating (an important function in the case of pizza cheese), and sliceability. The starches are believed to help aid in providing the effects provided by casein in dairy cheeses, such as providing the requisite properties for various different applications.

The starches are preferably present in the cheese analogue food product in an amount of from 1% to 45% by weight of the cheese analogue food product, such as 5% to 40% by weight. Typically, the starch is present in an amount of from 20% to 30% by weight of the cheese analogue food product.

As discussed above, if the cheese analogue food products contain protein, the protein is typically present in the food products in amount of up to 15% by weight of the cheese analogue food products.

Typically, the combined weight percent of starch and non-animal protein in the cheese analogue food products does not exceed 45%. Preferably, the combined weight percent of starch and non-animal protein in the cheese analogue food product is less than 35% and preferably from 20% to 30%. In these embodiments, the non-animal protein is typically present in an amount of less than 12.5% by weight of the cheese analogue food product such as from 5% to 12.5%, or from 5% to 10% by weight of the cheese analogue food product, although it will be appreciated that even less protein may be present, or in some embodiments protein may be completely omitted from the food products.

In this respect, when protein is included in the cheese analogue food products, the protein included is used as a replacement for starch, since the combined amount of protein and starch does not exceed the limits discussed above. The protein may also carry out the same role as starch discussed above in the cheese analogue food products.

The cheese-analogue food product comprises water, which may be added as a separate component to the food product, or derive from other components of the food product 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 cheese-analogue food product, as discussed in further detail below. 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. In some embodiments, water may be added to the composition where the water is a condensate from steam used to heat the various components or combination of components of the cheese analogue food product during manufacture.

The cheese analogue food product typically comprises one or more additional ingredients. Whilst these one or more additional ingredients may be preferable to include in the cheese analogue food products, it will be understood that the inclusion of the one or more additional ingredients is not essential.

Preferably, the cheese analogue product comprises one or more flavouring additives, preferably wherein the one or more flavouring additives are present in an amount of from 0.1% to 5% by weight of the cheese analogue product.

Preferably, the cheese analogue product comprises one or more colouring additives, preferably wherein the one or more colouring additives are present in an amount of from 0.01% to 1% by weight of the cheese analogue product.

In some instances, the cheese analogue food products further comprise an ionic or non-ionic emulsifier, a polyhydroxy compound, milk, liquid flavours, alcohols, humectants, honey, liquid preservatives, liquid sweeteners, liquid oxidising agents, liquid reducing agents, liquid anti-oxidants, liquid acidity regulators, liquid enzymes, milk powder, hydrolysed protein isolates (peptides), amino acids, yeast, sugar substitutes, salt, spices, fibre thickening and gelling agents, egg powder, enzymes, gluten, vitamins, preservatives, sweeteners, oxidising agents, reducing agents, anti-oxidants, acid, one or more flavouring additives, one or more colouring additives, or acidity regulators.

The specific properties of the cheese analogue food products may be tailored by controlling the relative amounts of fat, water, starch, and protein (if present), in the compositions. The properties of the cheese analogue food product may be tailored and optimised so as to provide different types of cheese analogue food products. For example, there are many types of cheese analogue food products in existence with very different properties. As will be appreciated by the skilled person, different properties are desirable

for different applications. For example, a spreadable cheese (such as a cream cheese analogue) will desirably be soft and spreadable and have very different properties than for example a parmesan cheese product which will desirably be hard but grateable into small particles, or sandwich cheese which must be more resilient but easily sliceable. Other properties that the cheese analogue may be desirable to have include stretchiness at elevated temperature such as mozzarella pizza cheese analogues.

When optimising and tailoring the physical properties of a particular cheese analogue, typically, the weight percentage of the fat in the cheese analogue food product will remain similar between the different types of cheese analogue. For example, both cream cheese and hard cheese would typically contain similar amounts of the fat, such as in an amount of from 15% to 30% by weight of the cheese analogue food product. In contrast, the water content of the cheese analogue food products and the combined protein and starch content of the food products are typically varied and optimised for providing different sorts of cheese food products. Typically, for harder cheese analogue food products, the products contain a relatively lower water content and a relatively higher combined protein and starch content. The opposite is the case for softer cheese. Spreadable cheeses such as cream cheese food products will have the highest water content and lowest relative combined starch and protein content.

In some embodiments, the cheese analogue food product comprises from 35% to 55% by weight of water; and wherein the combined weight percent of starch and non-animal protein in the cheese analogue food product is from 25% to 35%. Typically, the fat will be present in an amount of from 15% to 30% by weight of the food product. Typically, such cheeses will have the desired properties of harder cheeses and the cheese analogue food products will be compositions such as a cheddar cheese, parmesan cheese, pizza type cheese, sandwich cheese, or similar-type cheese analogue food products.

In other embodiments, the cheese analogue food products comprises from 45% to 55% by weight of water; and wherein the combined weight percent of starch and non-animal protein in the cheese analogue food product is from 20% to 35%. Typically, the fat will be present in an amount of from 15% to 30% by weight of the food product. Typically, such cheeses will have the desired properties of softer cheeses and the cheese analogue food product will be a brie or brie-type cheese, feta cheese, or similar-type cheese analogue food product.

In other embodiments, the cheese analogue food product comprises from 50% to 65% by weight of water; and wherein the combined weight percent of starch and non-animal protein in the cheese analogue food product is from 5% to 25%. Typically, the fat will be present in an amount of from 15% to 30% by weight of the food product. Typically, such cheeses will have the desired properties of spreadable cheeses such as cream cheeses and the like, and the cheese analogue products will be spreadable cheese analogue products.

The cheese analogue products may comprise any of the fats or oils described above, and other suitable fats or oils. However, preferably, the cheese analogue products comprise coconut oil, shea butter, a fraction thereof, any combination thereof, or any interesterified form thereof. More preferably, the fat comprises a mixture of shea olein and coconut oil, or shea olein.

Preferably, where the cheese analogue product is a spreadable cheese analogue product as discussed above, the one or more fats or oils comprise shea olein.

Where the cheese analogue product is a harder cheese type analogue product such as those discussed above, the one or more fats or oils comprise a mixture of shea olein and coconut oil; preferably wherein the one or more fats or oils comprise from 40% to 60% by weight of coconut oil and from 40% to 60% by weight of shea olein.

Frozen dessert compositions

In some instances, the dairy analogue food product comprises a frozen dessert analogue food product.

Typically, the frozen dessert analogue products are formed from 1% to 20% by weight of fat; from 10% to 40% by weight sugar; and from 30% to 80% by weight of water. Preferably, the frozen dessert analogue composition is formed from 50% to 70% by weight of water, from 1% to 10% by weight of fat; and from 20% to 35% by weight sugar.

Preferably, the frozen dessert analogue products are formed from 50% to 70% by weight of water, from 1% to 10% by weight of fat; and from 20% to 35% by weight sugar.

Any of the fats or oils discussed above can be included in the frozen dessert food products, as well as other suitable fats or oils.

Examples of frozen dessert analogue products include non-dairy ice cream products. In some embodiments, the frozen dessert analogue product is a vegan ice cream product

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 products of the invention are not limited to ice cream products, and may be any frozen dessert product 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 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 product preferably comprises protein, optionally wherein the protein is present in the frozen dessert analogue food product in an amount of from 0.1% to 10% by weight of the product; preferably wherein the protein is a non-animal protein. Any suitable protein may be used such as those discussed above in the context of cheese analogue food products. Particular types of protein that can be used include pea protein, chickpea protein, soy protein, rice protein, potato protein, and wheat protein. The percentages by weight of protein and water in the food products are determined as discussed above in the context of cheese analogue food products.

The frozen dessert product may comprise solids derived from nuts or fruit, which are typically present in an amount of from 1% to 10% by weight of the product. 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 products may comprise one or more sugars. Typically, the sugars are present in an amount of from 10% to 40% by weight of the product. Sources of sugar include corn syrup, glucose syrup, glucose, fructose, sucrose, maltose, galactose, dextrin,

or a combination thereof, although it will be understood that other similar sugars and sources of sugar may be included in the food products.

Typically, the frozen dessert products 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 food product. Examples of emulsifiers that can be used include proteins and phospholipids such as lecithin and mono- and diglycerides.

Typically, the frozen dessert products 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 product. 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 product such as suitable aeration, mouth feel and viscosity as well as provide stability to the product.

In some embodiments, the frozen dessert product further comprises an animal milk-derived protein, preferably wherein the animal-milk derived protein comprises casein.

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. Other suitable additives will be apparent to the skilled person given the benefit of the present disclosure.

The frozen dessert analogue products may comprise any of the fats or oils described above, and other suitable fats or oils.

Whipped cream compositions

The food products may be whipping cream analogue food products such as non-dairy whipping cream food products.

Typically, the whipping cream food products are formed from 1% to 40% by weight of fat and up to 80% by weight of water. Preferably, the whipping cream analogue food product comprises from 4% to 35% by weight of fat.

The specific fat or oils for inclusion in the whipped cream analogue products are typically any of those discussed above.

The whipping cream products may further comprise protein, such as non-animal protein. When included, the protein is preferably present in the whipping cream food product in an amount of from 0.1% to 5% by weight of the food product. In alternative embodiments, the whipping cream compositions may be free of protein. Suitable proteins include those discussed above in the context of cheese analogue food products. The percentages by weight of protein and water in the food products are determined as discussed above in the context of cheese analogue food products.

The whipping cream products typically comprise one or more emulsifiers. Preferably the one or more emulsifiers are present in an amount of up to 1% by weight of the dairy analogue product. 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 food products.

The whipping cream products typically comprise one or more hydrocolloid stabilisers. Preferably, the one or more hydrocolloid stabilisers are present in the products in an amount of up to 1% by weight of the dairy analogue products. Hydrocolloid stabilisers may be added to the products 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 products are free of protein. Examples of suitable hydrocolloid stabilisers include cellulose ether products such as methyl cellulose, hydroxypropylmethyl cellulose and hydroxypropyl cellulose.

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 products may include additional additives such as sugars, sweeteners, bulking agents, flavourings, salts, and other additives known in the art for inclusion in such products.

In some embodiments, the whipped cream analogue products further comprises an animal milk-derived protein, preferably wherein the animal-milk derived protein comprises casein.

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

The whipped cream analogue products may comprise any of the fats or oils described above, and other suitable fats or oils.

Liquid creamer food products

The dairy analogue food products may be liquid non-dairy creamer food products or liquid dairy creamer food products.

Where the dairy analogue food product is a liquid non-dairy creamer product, the product typically is formed from 10% to 50% by weight fat; and up to 95% by weight water. Preferably, the food product is formed from 5% to 15% fat; and up to 95% water, preferably up to 70% water.

Preferably, the dairy analogue product is formed from 5% to 15% by weight fat; and more preferably from 6.5% to 10% by weight fat.

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

Typically, the non-dairy creamer food product comprises one or more emulsifiers. Preferably, the one or more emulsifiers are present in the non-dairy creamer food product 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 product is a liquid non-dairy creamer product, the dairy analogue product comprises one or more hydrocolloids; preferably, wherein the one or more hydrocolloids are present in the dairy analogue product in an amount up to 5% by weight; more preferably from 0.1% to 5% by weight; and most preferably from 0.1% to 3% by weight.

Typically, where the dairy analogue product is a liquid non-dairy creamer product, the dairy analogue product comprises one or more sugars. Preferably, the one or more sugars are present in the dairy analogue product 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 products such as frozen dessert products and whipping cream products.

Typically, where the food product is a liquid creamer product, the dairy analogue product 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 products. The percentages by weight of protein and water in the food products are determined as discussed above in the context of cheese analogue food products.

Preferably, the one or more proteins are present in the dairy analogue product in an amount of from 0.1% to 5% by weight where the product is a non-dairy creamer product.

The one or more oils used in the creamer food products can be any of the oils discussed above or any other suitable oil. Preferably, the one or more oils comprise shea butter, or a fraction thereof; and more preferably shea olein. In these embodiments, preferably, the liquid creamer product is a liquid non-dairy creamer food product.

Preferably, the liquid creamer food product is a liquid non-dairy creamer food product.

However, in alternative embodiments, the liquid creamer food product may be a liquid dairy creamer food product. Typically, in these instances the food product comprises milk fat and/or one or more proteins derived from animals such as casein or sodium caseinate.

Yoghurt food products

The dairy analogue or dairy food products may be yoghurt food products.

Typically, the yoghurt food product is a dairy analogue yoghurt product formed from 45% to 95% water; from 1% to 20% non-animal protein; and from 5% to 15% by weight of fat. Preferably, the water is present in the food product in an amount of from 70% to 90% by weight.

The dairy analogue food product may further comprise one or more hydrocolloids. Typically, the one or more hydrocolloids are present in the dairy analogue product in an amount of from 0.1% to 10% by weight. Preferably, the one or more hydrocolloids are present in the dairy analogue product in an amount of from 0.1% to 5% by weight; more preferably from 0.1% to 3% by weight; and most preferably from 1% to 3% by weight.

Typically, the one or more hydrocolloids comprise one or more gums, one or more starches, or a combination thereof.

Preferably, the one or more hydrocolloids comprise one or more modified vegetable starches or non-modified vegetable starches. More preferably, the one or more hydrocolloids comprise rice starch, tapioca starch, wheat starch, or a combination thereof. Most preferably, the one or more hydrocolloids comprise tapioca starch.

Alternatively, the one or more hydrocolloids comprise one or more gums. In these embodiments, preferably, the one or more gums comprise xanthan gum, guar gum, locust bean gum, gum karaya, gum tragacanth, gum Arabic, celluloses, cellulose derivatives, carrageenan, or a combination thereof.

The one or more hydrocolloids may function to add thickness and texture to the dairy analogue yoghurt food products so that the food products more closely resemble dairy products that the dairy analogue is intended to mimic. For example, hydrocolloid may be used to thicken the product so that it more closely resembles the appearance and texture of dairy yoghurts.

The non-animal protein may comprise any suitable non-animal protein for inclusion in food products. Typically, the non-animal protein comprises pea protein, chickpea protein, fava protein, lentil protein, oat protein, potato protein, rice protein, soy protein, or a combination thereof. Preferably, the non-animal protein comprises pea protein.

Typically, the non-animal protein is present in the food product in a total amount of from 1% to 15% by weight, preferably from 1% to 10% by weight, and more preferably from 1% to 5% by weight. Typically, the non-animal protein comprises pea protein and the pea protein is present in the food product in an amount of from 1% to 15% by weight, preferably

from 1% to 10% by weight, and more preferably from 1% to 5% by weight. The percentages by weight of protein and water in the food products are determined as discussed above in the context of cheese analogue food products.

Typically, the dairy analogue food product further comprises sugar. Typically, the sugar is present in the food product in an amount of from 0.1% to 15% by weight; preferably from 0.1% to 10% by weight; more preferably an amount of from 0.1% to 5% by weight; and most preferably from 1% to 5% by weight.

It is preferred that the yoghurt food product comprises sugar so that the yoghurt product closely mimics dairy yoghurts. In dairy yogurts, the yoghurts are produced from fermenting milk. Lactose sugars present in the milk are fermented by bacteria to produce lactic acid which lowers pH of the milk. The lowered pH causes the casein milk proteins present in the milk to coagulate and the mixture to thicken which gives dairy yoghurt its thickened appearance and consistency.

Typically, the dairy analogue yoghurt food product further comprises a plant-based milk; preferably wherein the plant-based milk comprises oat milk, almond milk, coconut milk, rice milk, soy milk, or a combination thereof. The plant-based milk may impart flavour to the food product. The plant-based milk may also be used as a source of sugar to be fermented by bacteria as discussed above.

Typically, the plant-based milk is present in the food product in an amount of from 0.1% to 15% by weight; and preferably 1% to 10% by weight.

The yoghurt food product also comprises water. Typically, the water is present in the food product in an amount of from 50% to 90% by weight; preferably from 70% to 90% by weight; and more preferably from 80% to 90% by weight.

The non-dairy yoghurt products may comprise any of the fats or oils described above, and other suitable fats or oils. Preferably, the fats or oils comprise shea butter, coconut oil, a fraction thereof, a combination thereof, or any interesterified form thereof. More preferably, the one or more fats or oils comprise shea olein and coconut oil.

Where the food products are plant-based Greek yoghurt products or plant-based spoonable yoghurt products, it is preferable that the one or more oils comprise coconut oil and shea olein; preferably wherein the one or more oils comprise from 40% to 60% of coconut oil and from 40% to 60% of shea olein.

Where the food products are plant-based drinking yoghurt products, it is preferable that the one or more oils comprise coconut oil and shea olein; preferably wherein the one or more oils comprise from 70% to 90% by weight of coconut oil and from 10% to 30% by weight of shea olein.

In some instances, the food product is a plant-based Greek yoghurt food product. As discussed above, in such instances it is preferable that the food products or emulsion compositions present in the food products are the higher karitene content food products and emulsion compositions discussed above.

In other instances, the food product is a drinkable or spoonable yoghurt product. As discussed above, in such instances it is preferable that the food products or emulsion compositions present in the food products are the lower karitene content food products and emulsion compositions discussed above.

The yoghurt food products may alternatively be dairy yoghurt products. Such products typically comprise milk fat and proteins derived from milk fat such as casein and sodium caseinate. However, the dairy yoghurt products may also comprise any of the additives discussed above in the context of non-dairy yoghurt products.

Milks and milk-substitute food products

In some instances, the food product is a milk or milk-substitute food product formed of from 1% to 7.5% by weight of fat; from 1% to 10% by weight of plant derived proteins, and up to 98% by weight water.

The one or more proteins may be any of those discussed above in the context of other dairy or dairy analogue food products. The percentages by weight of protein and water in the food products are determined as discussed above in the context of cheese analogue food products.

Other additives known to be suitable for inclusion in plant-based milks may also be included in the food products and will be apparent to the skilled person given the benefit of the present disclosure. Such additives include colorants, flavourants, sugars and other suitable additives.

The milk or milk-substitute products may comprise any of the fats or oils described above, and other suitable fats or oils. Preferably, the fats or oils comprise shea butter, coconut oil, a fraction thereof, a combination thereof, or any interesterified form thereof. More preferably, the one or more fats or oils comprise shea olein and coconut oil; preferably

wherein the one or more oils comprise from 70% to 90% by weight of coconut oil and from 10% to 30% by weight of shea olein.

Butters and margarine food products

In some instances, the food product is a butter or margarine food product, wherein the food product is formed from 75% to 90% by weight of fat; and from 10% to 25% by weight water.

As discussed above, where the food product is a butter or margarine food product, the food product is preferably a higher karitene content food product as discussed above.

Where the food product is a margarine food product, preferably, the total fat content of the margarine is from 80% to 85% by weight.

The one or more fats or oils may be any suitable fat or oil known in the art for inclusion in margarine products. Examples of suitable fats are discussed above. Preferably, the one or more fats or oils included comprise shea butter or a fraction thereof; and more preferably shea olein.

The margarine compositions may also comprise any suitable margarine additive known in the art. Such additives will be apparent to the skilled person given the benefit of the present disclosure and include milk, milk powder, emulsifiers such as lecithin or similar food grade emulsifiers, salt, acidulants such as citric acid or lactic acid, and preservatives.

In some embodiments, the food product may be a dairy butter food product. Accordingly, in some embodiments, the food product is a butter food product. In such embodiments, the fat or oil present in the butter composition comprises milk fat and optionally one or more of the fats discussed above.

Preferably, the total fat content of the butter is from 80% to 85% by weight.

The butter food product may also comprise other typical butter ingredients such as salt and milk solids such as milk derived proteins. The butter may also comprise certain of the ingredients discussed above in the context of margarine food products. Additives suitable for inclusion in butter products will be apparent to the skilled person given the benefit of the present disclosure.

Other features of dairy and dairy analogue food products

In preferable embodiments, the food product is suitable for consumption by vegetarians and vegans. Accordingly, in preferable embodiments, the food product is substantially free of animal protein, and more preferably, the food product is free of animal protein.

In preferable embodiments, the food product is substantially free of animal-derived products, and more preferably, the food product is free of animal-derived products.

However, in some embodiments, the food product may comprise animal-derived products such as animal derived proteins or fats. Accordingly, in some embodiments, the food product 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 food product 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 food products 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 food products are not suitable for consumption by vegans.

In embodiments where the food product comprises one or more animal-derived products, the one or more animal-derived products are typically present in the food products in an amount of from 1% to 20% by weight of the food product.

In some embodiments, the food product is substantially free of palm oil and palm oil derived products; preferably wherein the food product is free of palm oil or palm oil derived products.

Typically, the food product comprises from 60% to 95% by weight of a combined weight of water and one or more oils that are present in the form of an emulsion.

Where the food product comprises, for example, less than 100% by weight of a combined weight of water and one or more oils that are present in the form of an emulsion, the food product may comprise water and oil that are not part of the emulsion. However, it is preferable that all oil and water present in the food products are part of an emulsion.

The properties of the dairy-analogue food products 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 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 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 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 second aspect of the invention, there is provided a dairy or dairy analogue food product comprising an emulsion comprising one or more oils and water; wherein the food product comprises karitene in an amount of from 0.1% to 10% (such as 0.1% to 7.5%), preferably 1.0% to 7.5%, for example 2.0% to 6.0%, such as 4.0% to 5.0%) by weight of the food product; and wherein the food product comprises at least 1.0% of karitene by weight of the total amount of the one or more oils present in the food product.

Preferably, the dairy or dairy analogue food product is as described above in accordance with the first aspect of the invention.

Preferably, the dairy or dairy analogue food product is a higher karitene content food product as discussed above in accordance with the first aspect of the invention.

Accordingly, preferably, the food product is a cheese or cheese analogue food product; a frozen dessert analogue food product; a whipping cream analogue food product; a non-dairy creamer analogue food product; or a plant-based Greek yoghurt food product, as described above in accordance with the first aspect of the invention.

Typically, the dairy or dairy analogue food products comprise an emulsion where the emulsion is an emulsion composition comprising one or more oils and water. Typically, the emulsion composition comprises from 0.1% to 20% of karitene by total weight of water and the one or more oils present in the emulsion composition; and wherein the emulsion composition comprises at least 1.0% of karitene by weight of the total amount of the one or more oils present in the emulsion composition.

Typically, the emulsion composition comprises karitene in an amount of from 1.0% to 10.0%; preferably from 1.5% to 9.0%; more preferably 1.5% to 7.5% (including 1.5% to 6.0%); still more preferably from 1.5% to 5.0%; and most preferably from 2.0% to 5.0% (including 3.0% to 5.0% and 4.0% to 5.0%) by weight of the total amount of the one or more oils present in the emulsion composition.

Typically, the emulsion composition comprises karitene in an amount of from 0.1% to 5% by total weight of water and the one or more oils present in the emulsion composition; preferably wherein the emulsion composition comprises karitene in an amount of from 0.5% to 5% (such as 1.5% to 3.5%) by total weight of water and the one or more oils present in the emulsion composition; more preferably wherein the emulsion composition comprises karitene in an amount of from 0.1% to 2% by total weight of water and the one or more oils present in the emulsion composition; and most preferably, wherein the emulsion composition comprises karitene in an amount of from 0.2% to 1% by total weight of water and the one or more oils present in the emulsion composition.

The emulsion composition may comprise any suitable amount of oil and water suitable for forming an emulsion.

Typically, the one or more oils are present in the emulsion composition in a total amount of from 1% to 99% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 1% to 99% by weight of the total amount of water and oil present in the emulsion composition.

Preferably, the one or more oils are present in the emulsion composition in a total amount of from 10% to 90% by weight of the total amount of water and oil present in the emulsion

composition; and the water is present in the emulsion composition in an amount of from 10% to 90% by weight of the total amount of water and oil present in the emulsion composition.

More preferably, the one or more oils are present in the emulsion composition in a total amount of from 15% to 90% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 10% to 85% by weight of the total amount of water and oil present in the emulsion composition.

As discussed above, the emulsion composition may be a water-in-oil emulsion or an oil-in-water emulsion. Typically, water-in-oil emulsions will form where the emulsion composition comprises relatively more oil than water and oil-in-water emulsions will form where the emulsion composition comprise relatively more water than oil.

In some instances, the one or more oils are present in the emulsion composition in a total amount of from 50% to 99% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 1% to 50% by weight of the total amount of water and oil present in the emulsion composition. Preferably, in these instances, the one or more oils are present in the emulsion composition in a total amount of from 70% to 99% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 1% to 30% by weight of the total amount of water and oil present in the emulsion composition. Typically, in these instances, the emulsion composition is a water-in-oil emulsion. Typically, in these instances described above, the emulsion composition is a water-in-oil emulsion.

In other instances, the one or more oils are present in the emulsion composition in a total amount of from 1% to 70% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 30% to 99% by weight of the total amount of water and oil present in the emulsion composition. Preferably, in these instances, the one or more oils are present in the emulsion composition in a total amount of from 1% to 60% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 40% to 99% by weight of the total amount of water and oil present in the emulsion composition.

In other instances, the one or more oils are present in the emulsion composition in a total amount of from 1% to 50% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 50% to 99% by weight of the total amount of water and oil present in the emulsion composition. Preferably, in these instances, the one or more oils are present in the emulsion composition in a total amount of from 5% to 40% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 60% to 95% by weight of the total amount of water and oil present in the emulsion composition. Typically, in these instances, the emulsion composition is an oil-in-water emulsion composition.

Typically, the food product comprises karitene in an amount of from 0.05% to 5.0% (such as 0.075% to 4.0%) by weight of the food product. Preferably, the food product comprises karitene in an amount of from 0.1% to 3.0% by weight of the food product; and more preferably the food product comprises karitene in an amount of from 0.2% to 2.0% by weight of the food product.

According to a third aspect of the invention, there is provided a plant-based milk food product comprising an emulsion comprising one or more oils and water; wherein the food product comprises karitene in an amount of from 0.01% to 1% by weight of the food product; and wherein the food product comprises at least 0.5% of karitene by weight of the total amount of the one or more oils present in the food product; wherein the food product is formed from 1% to 7.5% by weight of plant derived oils, from 1% to 10% by weight of plant derived proteins, and up to 98% by weight water.

Preferably, the plant-based milk food product is as described above in the context of the first aspect of the invention.

According to a fourth aspect of the invention, there is provided a dairy or dairy analogue yoghurt food product comprising one or more oils and water; wherein the food product comprises karitene in an amount of from 0.01% to 1% by weight of the food product; and wherein the food product comprises at least 0.5% of karitene by weight of the total amount of the one or more oils present in the food product; wherein the food product is formed from 1% to 15% by weight fat, from 1% to 20% protein, and from 45% to 95% by weight water.

Preferably, the dairy or dairy analogue yoghurt food product is as described above in the context of the first aspect of the invention.

Preferably, the plant-based milk food product of the third aspect of the invention and the dairy or dairy analogue yoghurt food product according to the fourth aspect of the invention product are lower karitene content food products as discussed above in accordance with the first aspect of the invention.

Accordingly, the dairy or dairy analogue food products typically comprise an emulsion where the emulsion is an emulsion composition comprising one or more oils and water. Typically, the emulsion composition comprises from 0.01% to 5.0% of karitene by total weight of water and the one or more oils present in the emulsion composition; and wherein the emulsion composition comprises at least 0.5% of karitene by weight of the total amount of the one or more oils present in the emulsion composition.

Typically, the emulsion composition comprises karitene in an amount of from 0.5% to 5.0% (such as 0.5% to 4.0%); preferably from 0.5% to 3.0%; and more preferably from 1.0% to 2.0% by weight of the total amount of the one or more oils present in the emulsion composition.

Typically, the emulsion composition comprises karitene in an amount of from 0.01% to 2% by total weight of water and the one or more oils present in the emulsion composition; preferably wherein the emulsion composition comprises karitene in an amount of from 0.01% to 1% by total weight of water and the one or more oils present in the emulsion composition.

Typically, the one or more oils are present in the emulsion composition in a total amount of from 1% to 20% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 80% to 99% by weight of the total amount of water and oil present in the emulsion composition. Preferably, the one or more oils are present in the emulsion composition in a total amount of from 2% to 15% by weight of the total amount of water and oil present in the emulsion composition; and the water is present in the emulsion composition in an amount of from 85% to 98% by weight of the total amount of water and oil present in the emulsion composition. Typically, in these instances, the emulsion composition is an oil-in-water emulsion composition.

Typically, the food product comprises karitene in an amount of from 0.01% to 2.0% by weight of the food product. Preferably, the food product comprises karitene in an amount of from 0.01% to 1.0% by weight of the food product; and more preferably the food product comprises karitene in an amount of from 0.01% to 0.1% by weight of the food product.

The dairy products and dairy analogue food products discussed herein may be manufactured using any suitable process known in the art for the manufacture of such types of food product. Suitable processes will be apparent to the skilled person given the benefit of the present disclosure.

According to a fifth aspect of the invention, there is provided a process for preparing a food product according to the second, third or fourth aspects of the invention, wherein the process comprises contacting water, one or more oils, karitene, and one or more additional components so as to form the food product.

In some instances, the one or more oils comprise karitene prior to the combining step. This may be particularly preferred where the one or more oils comprise shea butter or a fraction thereof that has not been dekaritinated and where the shea butter or fraction thereof comprises a desired amount of karitene already to be present in the food product.

In other instances, the one or more oils do not comprise karitene prior to the combining step. This may be preferred where the one or more oils to be used in the food product does not naturally comprise karitene (for example where the preferred oil for inclusion is not shea butter or a fraction thereof and instead comprises a different oil such as coconut oil). In these instances, the karitene may have been first extracted from shea butter or a fraction thereof using processes known in the art. The extracted karitene may then be added to the water and one or more oils in the combining step so as to form the food product.

In some instances, the process comprises forming an emulsion comprising the water, one or more oils and karitene; and then combining the emulsion with the one or more additional components so as to form the food product.

In other instances, an emulsion is not formed in the process until the final food product is formed. For example, the process may comprise combining the one or more oils, water, karitene and one or more additional components so as to form the food product comprising an emulsion.

The process of forming the food products of the invention and disclosure may also be as described below.

In instances where the dairy analogue food product is a cheese analogue food product, typically, the process comprises combining one or more oils as described herein, water, starch, and optionally non-animal protein and/or one or more additional components to

form the cheese analogue food product. In some instances, the process comprises combining the ingredients at a temperature of from 60°C to 95°C; preferably from 70°C to 85°C, and more preferably from 75°C to 80°C. At such temperatures, the fat/oil will melt and be able to be mixed intimately and uniformly with the water, starch and protein and other components if present so as to form a uniform system. The components can be mixed with each other in any suitable order, as will be appreciated by those skilled in the art. On combining, the ingredients of the composition are typically mixed with a shear mixer. Typically, a higher shear is used to mix the ingredients when the cheese analogue food product is softer such as a cream cheese or other spreadable cheese analogue food product. A relatively lower shear is typically used for harder cheese analogue food products. Whilst the above-described steps are preferable steps for manufacturing the cheese analogue food products or food products described herein, it will be appreciated that other suitable processes may also be used to manufacture the cheese analogue food products.

DESCRIPTION OF THE DRAWINGS

Figures 1 to 4 show emulsion compositions as disclosed herein at different concentrations of oil and water compared to comparative emulsions.

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

The following emulsions as shown in Table 1 were prepared. For compositions 1 to 4, the oil used was shea olein comprising 3 wt.% karitene. For comparative compositions 1 to 4, shea olein processed to remove karitene was used.

Table 1

	Type of emulsion	Shea Olein (weight percentage)	Water (weight percentage)
Composition 1	Oil in water (O/W)	20	80
Composition 2	Oil in water (O/W)	40	60
Composition 3	Oil in water (O/W)	65	35
Composition 4	Water in oil (W/O)	80	20

Comparative composition 1	Oil in water (O/W)	20	80
Comparative composition 2	Oil in water (O/W)	40	60
Comparative composition 3	Oil in water (O/W)	65	35
Comparative composition 4	Water in oil (W/O)	80	20

For the preparation of all emulsions, water was heated to 30°C. For compositions 1 to 3 and comparative compositions 1 to 3, oil was then added to the water slowly whilst mixing the mixture with an Ultra-turrax homogenizer. For composition 4 and comparative composition 4, water was added to the oil whilst mixing the mixture with an Ultra-turrax homogenizer.

For each composition, the following homogenizer conditions were used.

Composition 1 and comparative composition 1: 7 minutes at 7000 rpm and 3 minutes at 9000 rpm.

Compositions 2 and 3 and comparative compositions 2 and 3: An initial mixing speed of 5000 rpm followed by increasing to 10,000 rpm. After full addition of the oil, 12,000 rpm for two minutes was used. A total mixing time of around 15 minutes was used.

Composition 4 and comparative composition 4: An initial mixing speed of 6000 rpm was used for two minutes followed by an increase to 7000 rpm. All water was added after 5 minutes. Mixing was then continued at 9000 rpm for 1 minute.

Photographs taken of the emulsions after production are shown in Figures 1 to 4 respectively for compositions 1 to 4 and comparative compositions 1 to 4.

As shown in Figure 1, right after preparation, comparative composition 1 (on the right hand side of Figure 1) was homogenous, but showed clear phase separation in a few minutes, indicating separation of the emulsion. Composition 1 (on the left hand side of Figure 1) on the other hand showed only very minimal phase separation and was a stable emulsion.

As shown in Figure 2, comparative composition 2 (on the left hand side of Figure 2) immediately demonstrated phase separation. In contrast, composition 2 (on the right hand side of Figure 2) remained as a white, creamy liquid.

As shown in Figure 3, comparative composition 3 (on the right-hand side of Figure 3) immediately demonstrated phase separation. In contrast, composition 3 (on the left hand side of Figure 3) remained as a white, creamy liquid.

As shown in Figure 4, after preparation, composition 4 (shown on the left-hand side of Figure 4) showed more resistance to phase separation than comparative composition 4 (shown on the right-hand side of Figure 4).

The results of these experiments thus demonstrate that where karitene is included in the emulsions, the karitene acts as an emulsifier and stabilises the emulsions to failure via phase separation.

Example 2

Using shea olein to which varying amounts of karitene was added (4.0%, 5.0% and 6.0% by wight), a series of dairy analogue coffee creamer products were prepared. The recipe for the dairy analogue coffee creamer is as shown below in Table 2.

Table 2

Ingredient	Weight percentage
Water	61.61
Cane sugar	28.29
Shea olein containing karitene	10.00
Salt	0.10

A comparative dairy analogue coffee creamer product was prepared according to the recipe above using a shea olein processed to remove karitene.

The emulsion stability of the compositions produced was assessed using an emulsion stability index. The emulsion stability index was calculated as the percentage ratio of the emulsion height (i.e. analogue coffee creamer) to the sum of the emulsion height plus the height of separated oil phase after 5 minutes. The results of the assessment are shown below in Table 3.

Table 3

Sample	A	B	C	D
Amount of karitene in fat after 5 minutes	Treated to remove	4.0%	5.0%	6.0%
Instability	25.86%	4.29%	2.10%	1.39%

As can be seen from the results, the dairy analogue coffee creamer product of the invention was significantly more stable as a result of the added karitene.

CLAIMS

1. Use of karitene as an emulsifier in a dairy or dairy analogue food product, wherein the food product comprises an emulsion comprising one or more oils and water; wherein the food product comprises karitene in an amount of from 0.01% to 10% by weight of the food product; and wherein the food product comprises at least 0.5% of karitene by weight of the total amount of the one or more oils present in the food product.
2. Use according to Claim 1, wherein the use comprises using the karitene to improve the stability of the emulsion to phase separation or to prevent degradation of the emulsion.
3. Use according to Claim 1 or Claim 2, wherein the use comprises using the karitene to improve the organoleptic perception of the food product relative to an analogous food product with lower karitene content.
4. Use according to any preceding claim, wherein the use comprises using the karitene to improve the texture of the food product, the homogeneity of the food product, and/or the mouthfeel of the food product.
5. Use according to any preceding claim, wherein the use comprises using the karitene to increase the homogeneity of the food product relative to a comparative food product with lower karitene content.
6. Use according to any preceding claim, wherein the emulsion is an emulsion composition comprising one or more oils and water; wherein the emulsion composition comprises from 0.1% to 10% of karitene by total weight of water and the one or more oils present in the emulsion composition; and wherein the emulsion composition comprises at least 1.0% of karitene by weight of the total amount of the one or more oils present in the emulsion composition.
7. Use according to any preceding claim, wherein the emulsion composition comprises karitene in an amount of from 1.0% to 10.0%; preferably from 1.5% to 9.0%; and more preferably from 1.5% to 5.0%, 2.0% to 5.0% (including 3.0% to 5.0% and 4.0% to 5.0%) by weight of the total amount of the one or more oils present in the emulsion composition.
8. Use according to any preceding claim, wherein the emulsion composition comprises karitene in an amount of from 0.1% to 5% (such as 1.5% to 3.5%) by total weight of water and the one or more oils present in the emulsion composition; preferably wherein the emulsion composition comprises karitene in an amount of from 0.1% to 2%

by total weight of water and the one or more oils present in the emulsion composition; more preferably wherein the emulsion composition comprises karitene in an amount of from 0.2% to 1% by total weight of water and the one or more oils present in the emulsion composition.

9. Use according to any preceding claim, wherein the one or more oils are present in the emulsion composition in a total amount of from 1% to 99% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 1% to 99% by weight of the total amount of water and oil present in the emulsion composition; preferably wherein the one or more oils are present in the emulsion composition in a total amount of from 10% to 90% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 10% to 90% by weight of the total amount of water and oil present in the emulsion composition; more preferably wherein the one or more oils are present in the emulsion composition in a total amount of from 15% to 90% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 10% to 85% by weight of the total amount of water and oil present in the emulsion composition.

10. Use according to any preceding claim, wherein the one or more oils are present in the emulsion composition in a total amount of from 50% to 99% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 1% to 50% by weight of the total amount of water and oil present in the emulsion composition; preferably wherein the one or more oils are present in the emulsion composition in a total amount of from 70% to 99% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 1% to 30% by weight of the total amount of water and oil present in the emulsion composition.

11. Use according to Claim 10, wherein the emulsion composition is a water-in-oil emulsion.

12. Use according to any preceding claim, wherein the one or more oils are present in the emulsion composition in a total amount of from 1% to 50% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 50% to 99% by weight of the

total amount of water and oil present in the emulsion composition; preferably wherein the one or more oils are present in the emulsion composition in a total amount of from 5% to 40% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 60% to 95% by weight of the total amount of water and oil present in the emulsion composition.

13. Use according to Claim 12, wherein the emulsion composition is an oil-in-water emulsion composition.

14. Use according to any preceding claim, wherein the food product comprises karitene in an amount of from 0.05% to 5.0% (such as 0.075% to 3.5% or even 0.1% to 4.0%) by weight of the food product; preferably wherein the food product comprises karitene in an amount of from 0.1% to 3.0% by weight of the food product; and more preferably wherein the food product comprises karitene in an amount of from 0.2% to 2.0% by weight of the food product.

15. Use according to any one or more of Claims 1 to 5, wherein the emulsion is an emulsion composition comprising one or more oils and water; wherein the emulsion composition comprises from 0.01% to 5.0% of karitene by total weight of water and the one or more oils present in the emulsion composition; and wherein the emulsion composition comprises at least 0.5% of karitene by weight of the total amount of the one or more oils present in the emulsion composition.

16. Use according to any one or more of Claims 1 to 5 or 15, wherein the emulsion composition comprises karitene in an amount of from 0.5% to 5.0% (such as 0.5% to 4.0%); preferably from 0.5% to 3.0%; and more preferably from 1.0% to 2.0% by weight of the total amount of the one or more oils present in the emulsion composition.

17. Use according to any one or more of Claims 1 to 5, 15 or 16, wherein the emulsion composition comprises karitene in an amount of from 0.01% to 2% by total weight of water and the one or more oils present in the emulsion composition; preferably wherein the emulsion composition comprises karitene in an amount of from 0.01% to 1% by total weight of water and the one or more oils present in the emulsion composition.

18. Use according to any one or more of Claims 1 to 5 or Claims 15 to 17, wherein the one or more oils are present in the emulsion composition in a total amount of from 1% to 20% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 80% to 99% by weight of the total amount of water and oil present in the emulsion composition;

preferably wherein the one or more oils are present in the emulsion composition in a total amount of from 2% to 15% by weight of the total amount of water and oil present in the emulsion composition; and wherein the water is present in the emulsion composition in an amount of from 85% to 98% by weight of the total amount of water and oil present in the emulsion composition.

19. Use according to Claim 18, wherein the emulsion composition is an oil-in-water emulsion composition.

20. Use according to any one or more of Claims 1 to 5 or Claims 15 to 19, wherein the food product comprises karitene in an amount of from 0.01% to 2.0% by weight of the food product; preferably wherein the food product comprises karitene in an amount of from 0.01% to 1.0% by weight of the food product; and more preferably wherein the food product comprises karitene in an amount of from 0.01% to 0.1% by weight of the food product.

21. Use according to any preceding claim, wherein the one or more oils comprise one or more plant-derived triglyceride oils, one or more animal-derived triglyceride oils, or a combination thereof.

22. Use according to any preceding claim, wherein the one or more oils comprise one or more plant-derived triglyceride oils.

23. Use according to any preceding claim, wherein the one or more oils comprise high oleic sunflower oil, sunflower oil, rapeseed oil, high oleic rapeseed oil, soybean oil, linseed oil, olive oil, corn oil, cottonseed oil, groundnut oil, safflower oil, high oleic safflower oil, peanut oil, rice oil, camelina oil, sesame oil, walnut oil, palm fat, coconut fat, shea butter, cocoa butter, allanblackia fat, kokum fat, mango kernel fat, sal fat, illipe butter, palm kernel fat, babassu fat, any fractions thereof, any interesterified forms thereof, or any combinations thereof.

24. Use according to any preceding claim, wherein the one or more oils comprise palm fat, coconut fat, shea butter, cocoa butter, allanblackia fat, kokum fat, mango kernel fat, sal fat, illipe butter, palm kernel fat, babassu fat, any fractions thereof, any interesterified forms thereof, or any combinations thereof.

25. Use according to any preceding claim, wherein the one or more oils comprise shea butter, any fractions thereof, any interesterified forms thereof, or any combinations thereof.

26. Use according to any preceding claim, wherein the one or more oils comprise shea olein.
27. Use according to Claim 26, wherein the one or more oils comprise SOS triglycerides in an amount of from 0.1% to 25% by weight; preferably from 0.5% to 15% by weight; and more preferably from 1% to 10% by weight of the total amount of the one or more oils present in the emulsion composition.
28. Use according to any preceding claim, wherein the dairy or dairy analogue food product further comprises an emulsifier, such as an emulsifier selected from lecithin (such as egg lecithin), mono- and diglycerides, polysorbates and hydrocolloids such as guar gum, gellan gum and carrageenan.
29. Use according to any one or more of Claims 1 to 14 or 21 to 28 when dependent on Claims 1 to 14, wherein the food product is a cheese analogue food product or a cheese food product formed from 15% to 30% by weight of fat; from 0% to 45% by weight of a starch; from 0% to 30% by weight of non-animal protein; and from 35% to 65% by weight of water; preferably wherein the food product is formed from 1% to 45% by weight of starch and from 0.1% to 15% by weight of non-animal protein.
30. Use according to Claim 29, wherein the starch comprises non-modified starch, modified starch, or a combination thereof.
31. Use according to Claim 31 or Claim 32, wherein the starch comprises a non-modified or modified vegetable starch, rice starch, tapioca starch, wheat starch, or a combination thereof; preferably wherein the starch comprises potato starch, waxy maize starch, tapioca starch, or a combination thereof.
32. Use according to any one or more of Claims 29 to 31, wherein the non-animal protein comprises plant protein such as algae protein, black bean protein, canola protein, chickpea protein, fava protein, lentil protein, lupin bean protein, mung bean protein, oat protein, pea protein, potato protein, rice protein, soy protein, sunflower seed protein, wheat protein, white bean protein, laboratory produced protein, and protein isolates or concentrates thereof; or wherein the non-animal protein comprises seitan, mushroom protein, legume protein, tempeh, yam flour, tofu, mycoprotein, peanut flour, yuba, nuts, protein derived from nuts, or a combination thereof.
33. Use according to any one or more of Claims 29 to 32, wherein the cheese analogue composition further comprises an ionic or non-ionic emulsifier, a polyhydroxy

compound, milk, liquid flavours, alcohols, humectants, honey, liquid preservatives, liquid sweeteners, liquid oxidising agents, liquid reducing agents, liquid anti-oxidants, liquid acidity regulators, liquid enzymes, milk powder, hydrolysed protein isolates (peptides), amino acids, yeast, sugar substitutes, salt, spices, fibre thickening and gelling agents, egg powder, enzymes, gluten, vitamins, preservatives, sweeteners, oxidising agents, reducing agents, anti-oxidants, acid, one or more flavouring additives, one or more colouring additives, or acidity regulators.

34. Use according to any one or more of Claims 29 to 33, wherein the fat comprises a mixture of shea olein and coconut oil.

35. Use according to any one or more of Claims 1 to 14 or 21 to 28 when dependent on Claims 1 to 14, wherein the food product is a frozen dessert food product formed from 1% to 20% by weight of fat; from 10% to 40% by weight sugar; and from 30% to 80% by weight of water; preferably, wherein the food product is formed from 50% to 70% by weight of water, from 1% to 10% by weight of fat; and from 20% to 35% by weight sugar.

36. Use according to Claim 35, wherein the sugar comprises corn syrup, glucose syrup, glucose, fructose, sucrose, dextrin, dextrose, or a combination thereof.

37. Use according to Claim 35 or Claim 36, wherein the dairy analogue food product further comprises from 1% to 10% by weight of solids derived from fruit or nut.

38. Use according to any one of Claims 35 to 37, wherein the food product is a whipping cream food product formed from 1% to 40% by weight of fat and up to 80% by weight of water; preferably, wherein the food product is formed from 4% to 35% by weight of fat.

39. Use according to any one of Claims 35 to 38, further comprising protein, optionally wherein the protein is present in the food product in an amount of from 0.1% to 10% by weight of the food product; preferably wherein the protein is a non-animal protein.

40. Use according to any one of Claims 35 to 39, wherein the food product 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 food product.

41. Use according to any one of Claims 35 to 40, wherein the food product further comprises one or more hydrocolloid stabilisers, preferably wherein the one or more hydrocolloid stabilisers are present in an amount of up to 1% by weight of the food product.

42. Use according to any one of Claims 1 to 14 or 21 to 28 when dependent on Claims 1 to 14, wherein the food product is a non-dairy creamer food product; and wherein the food product is formed from 5% to 15% fat; and up to 95% water, preferably up to 70% water.

43. Use according to Claim 42, wherein the food product comprises one or more emulsifiers; optionally, wherein the one or more emulsifiers are present in the food product composition in an amount of up to 5% by weight.

44. Use according to Claim 42 or Claim 43, wherein the food product further comprises one or more hydrocolloids; optionally, wherein the one or more hydrocolloids are present in the food product in an amount of from 0.1% to 3% by weight.

45. Use according to any one of Claims 42 to 44, wherein the food product comprises one or more sugars; optionally wherein the one or more sugars are present in the food product in an amount of from 1% to 35% by weight.

46. Use according to any one of Claims 42 to 45, wherein the food product comprises one or more proteins; optionally wherein the one or more proteins comprise casein or a salt thereof; preferably wherein the one or more proteins are present in the food product in an amount of from 0.1% to 5% by weight.

47. Use according to any preceding claim, wherein the food product is a yoghurt food product formed from 45% to 95% water; from 1% to 20% non-animal protein; and from 5% to 15% by weight of fat; preferably wherein the water is present in the food product in an amount of from 70% to 90% by weight.

48. Use according to Claim 47, wherein the food product further comprises one or more hydrocolloids; preferably wherein the one or more hydrocolloids comprise one or more gums, one or more starches, or a combination thereof; and preferably wherein the one or more hydrocolloids are present in the food product in an amount of from 0.1% to 10% by weight.

49. Use according to Claim 47 or Claim 48, wherein the non-animal protein comprises pea protein, chickpea protein, fava protein, lentil protein, oat protein, potato protein, rice protein, soy protein, or a combination thereof.
50. Use according to any one of Claims 47 to 48, wherein the dairy analogue food product further comprises sugar; optionally wherein the sugar is present in the food product in an amount of from 0.1% to 15% by weight; and preferably from 0.1% to 10% by weight.
51. Use according to any one of Claims 47 to 50, wherein the food product further comprises a plant-based milk; preferably wherein the plant-based milk is present in the food product in an amount of from 1% to 10% by weight.
52. Use according to any one of Claims 47 to 51, wherein the emulsion is an emulsion composition as defined in any one or more of Claims 6 to 13; wherein the food product is as defined in Claim 14; and wherein the yoghurt food product is a plant-based Greek yoghurt food product.
53. Use according to any one of Claims 47 to 51, wherein the emulsion is an emulsion composition as defined in any one or more of Claims 15 to 19; wherein the food product is as defined in Claim 20; and wherein the yoghurt food product is a drinkable yoghurt or spoonable yoghurt food product.
54. Use according to any one of Claims 1 to 5 or 15 to 28 when dependent on Claims 1 to 5, wherein the food product is a milk or milk-substitute food product formed of from 1% to 7.5% by weight of fat; from 1% to 10% by weight of plant derived proteins, and up to 98% by weight water.
55. Use according to any one of Claims 1 to 14 or 21 to 28 when dependent on Claims 1 to 14, wherein the food product is a margarine food product, and wherein the food product is formed from 75% to 90% by weight of fat; and from 10% to 25% by weight water.
56. Use according to any preceding claim, wherein the food product is substantially free of animal-derived products, preferably, wherein the food products is free of animal-derived products.
57. Use according to any one of Claims 1 to 55, wherein the food product further comprises one or more animal-derived products such as animal oils, marine oils, animal-derived proteins, animal-derived polysaccharides, or any combination thereof.

58. Use according to Claim 57, wherein the one or more animal-derived products comprise animal milk proteins, animal milk fats, or a combination thereof.
59. Use according to any one or more of Claims 1 to 55, 57 or 58, wherein the one or more animal-derived products are present in the food product in an amount of from 1% to 20% by weight of the food product.
60. Use according to any preceding claim, wherein the food product is substantially free of palm oil and palm oil derived products; preferably wherein the food product is free of palm oil or palm oil derived products.
61. Use according to any preceding claim, wherein the food product comprises from 60% to 95% by weight of a combined weight of water and one or more oils that are present in the form of an emulsion.
62. A dairy or dairy analogue food product comprising an emulsion comprising one or more oils and water; wherein the food product comprises karitene in an amount of from 0.1% to 10% by weight of the food product; and wherein the food product comprises at least 1.0% of karitene by weight of the total amount of the one or more oils present in the food product.
63. A dairy or dairy analogue food product according to Claim 62, wherein the dairy or dairy analogue food product is as defined in any one or more of Claims 1 to 14; 21 to 52; or 55 to 61.
64. A plant-based milk food product comprising an emulsion comprising one or more oils and water; wherein the food product comprises karitene in an amount of from 0.01% to 1% by weight of the food product; and wherein the food product comprises at least 0.5% of karitene by weight of the total amount of the one or more oils present in the food product; wherein the food product is formed from 1% to 7.5% by weight of plant derived oils, from 1% to 10% by weight of plant derived proteins, and up to 98% by weight water.
65. A plant-based milk food product according to Claim 64, wherein the food product is as defined in any one or more of Claims 1 to 5; 15 to 28; or 54 to 61.
66. A dairy or dairy analogue yoghurt food product comprising one or more oils and water; wherein the food product comprises karitene in an amount of from 0.01% to 1% by weight of the food product; and wherein the food product comprises at least 0.5% of karitene by weight of the total amount of the one or more oils present in the food product;

wherein the food product is formed from 1% to 15% by weight fat, from 1% to 20% protein, and from 45% to 95% by weight water.

67. A dairy or dairy analogue yoghurt food product according to Claim 66, wherein the food product is as defined in any one or more of Claims 1 to 5; 15 to 28; 47 to 51; 53; or 55 to 61.

68. A process for preparing a food product according to any one of Claims 62 to 67, wherein the process comprises contacting water, one or more oils, karitene, and one or more additional components so as to form the food product.

69. A process according to Claim 68, wherein the one or more oils comprise karitene prior to the combining step.

70. A process according to Claim 68 or Claim 69, wherein the process comprises forming an emulsion comprising the water, one or more oils and karitene; and then combining the emulsion with the one or more additional components so as to form the food product.