

Cold-soluble non-dairy creamer powder

The present invention relates to a non-dairy creamer powder and, in particular, to a powder that has a good cold-water-solubility. This permits the provision of cold milky
5 beverages, such as iced-latte beverages, reconstituted from a powder composition.

Creamers are well-known in the art. A creamer composition is a composition suitable for the whitening of a beverage, such as tea or coffee. It is used as a substitute for milk or cream which would otherwise be used in such beverages. The creamer may
10 take the form of a dry powder or a liquid creamer composition and, when reconstituted in water or a beverage, has a whitening effect. This is a consequence of the dispersion of fine fat droplets from the creamer which diffract light reflected from the beverage.

15 A range of creamer concentrates are known for dispensing from beverage sachets and cartridges. These are desirably concentrates or powders so that a small volume can be shipped while, on reconstitution with water, a larger milk-like beverage can be achieved by dilution and/or dispersion. The range of beverages that can be obtained are generally limited to those which can be reconstituted using hot water in view of
20 the limited solubility of such powders.

EP0923301 discloses a powdered creamer which is made up of agglomerated creamer particles. The creamer particles are each made up of a sweetener, a water-dispersible or water-soluble protein and an edible oil having a melting point below 10
25 DEG C. The powdered creamer is soluble in cold water.

JPS5820578 discloses a method for the production of a readily cold-water dispersible wholemilk-powder, where fats or oils including medium chain triglycerides, are used as part of the fat phase of the dried powder.
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JPS59118043 discloses a cold water-soluble powdered cream comprising a vegetable oil having an iodine value of 86 to 95 and a melting point of 20 °C. or less as an oil component. The oil component can be rapeseed oil, soybean oil,

corn oil, rice bran oil, sunflower oil, safflower oil and others.

EP1791438 and EP1639899 relate to a composition suitable as a foamer or topping of a food product, in particular, for a cold beverage and a method of preparing such
5 composition. In particular, the disclosure relates to a powdered, cold-water soluble/dispersible, foamable composition, having particles that comprise a mixture of a water-soluble/dispersible foam stabiliser and a medium chain triglyceride oil.

KR1020130112972 discloses a low calorie, cold water soluble creamer comprising of
10 sugar alcohols and a low melting point vegetable oil.

US6426110 discloses a composition for a creamer powder that comprises approximately 40% to approximately 60% by weight water-soluble protein, edible fat, at least one emulsifier, at least one stabilizer and less than 5% by weight
15 carbohydrate. The creamer powder composition is dispersible in either hot or cold water-based liquids. The low-carbohydrate high-protein creamer powder may be used in the preparation of nutritious, low-carbohydrate foods.

JP1986074538 discloses fats and oils for fat-containing powders easily soluble in
20 cold water. The fats and oils are produced by transesterifying a medium-chain saturated fatty acid with a vegetable oil.

US6589586 discloses a powdered creamer soluble in cold water down to the freezing point of a solution.

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WO2020/095663 discloses a cold-water-soluble creaming powder or the like characterized in that at least a part of the surface of the creaming powder is coated with a mixture of an edible oil and fat and diglycerol monooleate.

30 It is an object of the present invention to provide a creamer powder with improved cold solubility so that cold beverages such as iced-lattes can be produced by a home-consumer and, ideally one which is optimised for the space constraints of a

single-serve beverage container, or at least to tackle problems associated therewith in the prior art or provide a commercially viable alternative thereto.

Accordingly, the present invention provides a non-dairy creamer powder comprising:

- 5 (i) 25 to 55wt% of a fat blend, based on a total weight of the creamer powder,
- (ii) dried glucose syrup, and
- (iii) an emulsion stabiliser system,
- wherein the fat blend comprises 48-62wt% high oleic sunflower oil (HOSO),
- 10 based on the total weight of the fat blend, and the balance is coconut oil,
- wherein the HOSO has a C18:1 content of at least 75wt%, based on the total weight of the HOSO.

The present disclosure will now be described further. In the following passages

15 different aspects/embodiments of the disclosure are defined in more detail. Each aspect/embodiment so defined may be combined with any other aspect/embodiment or aspects/embodiments unless clearly indicated to the contrary. In particular, any feature indicated as being preferred or advantageous may be combined with any other feature or features indicated as being preferred or advantageous. It is intended

20 that the features disclosed in relation to the product may be combined with those disclosed in relation to the method and vice versa.

The present invention relates to a creamer powder. A creamer powder is a powder composition which on reconstitution with water provides an opaque beverage and

25 generally one which is white and resembles milk. The creamer powder is a dry particulate mass. The powder may be, for example, a spray-dried powder or may have further been agglomerated to improve the dissolution properties. Preferably the creamer powder has a particle size distribution (as measured by Helos dry laser diffraction) with an x50 of from 80 to 300 µm, preferably 200 to 250 µm. The powder

30 may have an x90 of 200 to 650 µm, preferably less than 500 µm, preferably from 350 to 450 µm. The powder may have a bulk density of from 500 to 700 g/L, preferably 550 to 650 g/L.

The creamer powder disclosed herein is a non-dairy creamer powder. That is, the creamer powder does not contain any dairy fats. This is different from a dairy creamer composition which is one which contains and is preferably based on dairy fats. A dairy fat is one derived from milk and this therefore covers a full range of milk, cream and butter-type products. For the avoidance of doubt, however, the non-dairy creamer may still contain sodium caseinate where the caseinate can have a dairy origin.

Typically, creamers are made with hydrogenated vegetable fats or dairy fat with high saturated fat contents. These fats do not dissolve well in cold water due to their high melting points and therefore creamer use is generally restricted to hot beverages. Using oils high in unsaturated fats overcomes this problem as these oils have lower melting points. Unsaturated fats, however, have the disadvantage of being more unstable and prone to oxidation so generally they are avoided. The present inventors have now shown that it is possible to use oils with a high oleic acid content and at a high level within the creamer without oxidation and stability problems.

In particular, in their creamer development lab trials, the inventors found that creamer made from refined coconut oil can be dissolved in room temperature water (about 25°C). Separately, they subjected a range of greases to refrigerator storage and found that sunflower oil with high oleic acid would not solidify no matter how long it was put in the refrigerator at 4°C. However, they found that the flavour associated with the use of HOSO was undesirably "vegetably". The inventors found that they could strike a particular balance to address this, without compromising the cold solubility and while avoiding stability problems.

The non-dairy creamer powder contains 25 to 55wt% of a fat blend, based on a total weight of the creamer powder. Preferably the fat blend is present in an amount of 30 to 52wt% of the non-dairy creamer powder, and preferably is at least 45wt%, more preferably from 47 to 50wt%. Typically, creamers have fat content of around 30%. It is beneficial to use higher fat contents so that less creamer can be used in application – this is particularly key for use in single-serve containers where space constraints are significant. However, high fat levels of around 50% are more difficult

to stabilise in an emulsion system. The present inventors have now shown that it is also possible is to stabilise the high oil level in the emulsion without necessarily requiring dairy protein typically used in creamers.

- 5 The fat blend comprises 48-62wt%, preferably 50 to 60wt%, high oleic sunflower oil (HOSO), based on the total weight of the fat blend. The HOSO has a C18:1 content of at least 75wt% (in some embodiments at least 85%), based on the total weight of the HOSO. The inventors have found, in particular, that if the oleic acid (C18:1) content of the fat blend in the creamer is sufficiently high then the creamer will
10 dissolve easily in cold water and a good foam layer can be seen.

- Other high-oleic oils are available, such as high-oleic peanut oil and high-oleic canola oil. The inventors have found that while these could be used as the basis for a cold-soluble creamer, their special plant flavors (peanut aroma and canola flavor)
15 can greatly interfere with the flavor of creamer in coffee, making the coffee drink taste strange. Accordingly, the inventors have found that the use of HOSO is key.

- The balance of the fat blend is coconut oil. That is, the fat blend (and consequently the entire powder) is free from any other fats, including any dairy or vegetable fats.
20 The use of coconut oil helps to provide a good milk texture and helps to address the product stability. Preferably the coconut oil comprises hydrogenated and/or refined coconut oil. Both forms of coconut oil have the advantage of a neutral taste. Hydrogenated CNO oil has the advantage of being the most stable against oxidation due to the process of hydrogenation. RCNO, while more prone to instability than
25 HCNO (although significantly more stable than HOSO) has the advantage of higher unsaturated fat levels resulting in it being more healthy. Preferably the coconut oil has not been subjected to esterification, or any further such treatment.

- The non-dairy creamer powder comprises dried glucose syrup. This term has been
30 used to avoid any confusion given that the product is a dried powder and since the ingredient used is a "syrup", but the specific nature of glucose syrups is also more complex than just glucose *per se*. This is because glucose syrups contain a range of longer glucose-containing saccharides and other polysaccharides. Preferably the

dried glucose syrup is present is from 35 to 65wt% by total weight of the creamer powder. When the creamer has a higher fat content, such as 45 to 55%, preferably the dried glucose syrup is 35 to 45wt%. When the creamer has a lower fat content, such as 30 to 40%, preferably the dried glucose syrup is 45 to 60wt%. A person skilled in the art would have no difficulty determining that a creamer is based on a dried glucose syrup ingredient.

The non-dairy creamer powder comprises an emulsion stabiliser system. Preferably the emulsion stabiliser system is from 2 to 10wt% by total weight of the creamer powder. Preferably the emulsion stabiliser system comprises one or more of the group consisting of: lecithin, acacia fibers, modified starch, E471 (mono- and diglycerides of fatty acids, e.g. glycerol monostearate, glycerol distearate, also known as "distilled monoglycerides" or DMG), E481 (sodium stearyl lactylate), DKP (dipotassium phosphate) and SHMP (sodium hexametaphosphate). These components help to stabilise the emulsion of the powder before it is dried and in the final beverage, as well as contributing to the stability of the fat blend.

Preferably the emulsion stabiliser system comprises, based on a total weight of the creamer powder, E471 in an amount of from 0.5 to 2wt%, preferably 0.75 to 1.5wt%. As shown in the examples, this has desirable benefits for masking a vegetable flavour and improves the product stability.

Dipotassium phosphate is a desirable additive for creamer stability. The role of phosphate in the recipe is to buffer the system to protect the protein against pH changes particularly when coffee is added. Adding too much phosphate to the formula will affect the solubility of the sample in cold water, particularly if the formulation contains an additive such as starch. If the amount of phosphate addition is too low then the sample may not be stable enough and the appearance may be bad. The inventors have optimised the amount of phosphate to find a relatively appropriate amount. Preferably the DKP is present in an amount of from 0.5 to 2wt%. Preferably the emulsion stabiliser system comprises E481 and/or DKP and preferably both.

The emulsion, especially when having a high fat content such as around 50wt%, can be stabilised with sodium caseinate, N-osa starch (starch particles modified by esterification with dicarboxylic acids to give octenyl succinic anhydride) or acacia fibre (fibre from the acacia tree). Adding too much modified starch (N-osa starch) to
5 the formula will affect the solubility of the sample in cold water. It is especially desirable that each of these is used in combination with E481 then the high level of fat can be especially stabilised.

Preferably the emulsion stabiliser system comprises acacia fiber. Preferably the
10 emulsion stabiliser system comprises N-osa starch. Preferably the composition comprises N-osa starch and/or acacia fibre in a total amount of less than 10wt%, preferably 1 to 8wt%. When the creamer composition comprises N-osa starch to stabilise the emulsion, phosphate components such as DKP are less necessary to protect the protein although they can still help with the flavour as N-osa works at a
15 lower pH than protein and, therefore, the product can taste too acidic. Therefore a blend of N-osa starch and DKP is preferred.

Preferably the non-dairy creamer powder further comprises up to 8wt% of a protein source, preferably from 1 to 5wt% of a protein source, preferably wherein the protein
20 source comprises or consists of sodium caseinate. Sodium caseinate contains protein which is often derived from dairy sources. However, as discussed above it does not contain native dairy proteins as they are denatured in the formation of the salt. Sodium caseinate is a well-known ingredient for acting as a stabiliser and protein supplement. Often, sodium caseinate is obtained through acidification, curd
25 formation, washing and drying of milk to create acid casein. When the curd obtained is neutralized, sodium caseinate is produced. Also, dried acid casein can be used as starting material. Nowadays, also spray-drying and extrusion are widely used to obtain sodium caseinate. Sodium caseinate is sufficiently soluble to be used in the present cold-soluble powders.

30 The form of the powder can vary. Preferably, the creamer powder is a homogeneous, preferably spray-dried, creamer powder. Preferably the powder is a spray-dried powder.

- Before spray-drying, a composition is prepared including the ingredients discussed herein and these are then homogenised. Homogenisation is preferably performed with a two-stage homogenisation and such systems are well known in the art. It is
- 5 critical that the homogenised mixture has a fine dispersal of the fat component in order to ensure that a stable emulsion is formed. Preferably the homogenised mixture has a fat droplet size D50 of less than 2 μm and more preferably less than 1 μm . Preferably the particle size distribution (PSD) is monomodal.
- 10 Before the spray-drying step it is desirable to set the solids content of the homogenised mixture to ensure that spray-drying can be performed efficiently. If the solids are too high, then the process may not produce a desirable powder. If the solids are too low, then the process has a high energy cost due to the amount of water to be removed. Preferably the mixture before spray-drying has a solids content
- 15 of >45% by weight of the mixture, preferably >55% and most preferably >60%. Solids contents above 65% may not be readily dryable.

- Spray-drying is a technique well known in the art. It is preferred that the spray-drying occurs at a temperature of at least 60 $^{\circ}\text{C}$, preferably between 90-105 $^{\circ}\text{C}$, although
- 20 excessive temperatures may be avoided to prevent burning of the product. Spray pressures in excess of 5 Bar are desirable.

- According to a further aspect there is provided a composition for forming a beverage, the composition comprising the non-dairy creamer as described herein and one or
- 25 more beverage powders, the beverage powders selected from one or more of the group consisting of coffee, tea, cocoa, chocolate, sugar, maltodextrin powders or plant-based powders. Examples of plant-based powders include cereal powders, such as oat and nut powders such as almonds.

- 30 According to a further aspect there is provided a beverage container comprising the non-dairy creamer powder or the composition as described herein.

Preferably the beverage container is a single-serve container, preferably a cartridge, sachet or a stick-pack. A single-serve container is one which only contains enough of the powder to reconstitute a milky beverage in a serving size of water, typically 150 to 320 mL, preferably 150 to 250 mL. Examples of single serve containers include
5 stickpacks and sachets (ripped open by a consumer), as well as beverage cartridges for dispensing a beverage from a beverage preparation machine. The requirement that the container is a single serve excludes multi-serve containers, such as multi-serve pots of powder or certain vending machine arrangements. In multi-serve arrangements, better whitening effects can be achieved by dispensing more of the
10 powder, whereas this is not an option within the constraints of a single-serve arrangement (25-35g).

According to a further aspect there is provided a method of forming a beverage comprising contacting the non-dairy creamer or the composition as described herein,
15 with a beverage medium, preferably water and preferably wherein the medium has a temperature of less than 30 °C, preferably less than 10 °C, and optionally further in the presence of ice.

Preferably the non-dairy creamer or the composition are provided in a beverage
20 container and wherein the beverage is formed by flushing the non-dairy creamer or the composition from the beverage container with the beverage medium. In beverage cartridges the ability of the powder to be flushed from the container is key and hence the ability to include less volume of ingredient to improve mixing and dispersal can be key.

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Examples

The invention will now be described further in relation to the following non-limiting examples.

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Creamer formulations were prepared on the basis of the recipe below. The amounts have been rounded, but would total 100wt% in a complete formulation.

Basic recipe:

	Fat blend	~30wt%
	Glucose	~60wt%
	Sodium caseinate	~2wt%
5	Stabiliser system	~3wt%
	E471	~1wt%, if present
	Water	~3wt%

10 The creamers were tested for their cold water solubility by reconstitution with 10 °C water and a coffee powder. The taste testing was performed on these cold coffee drinks.

Variations are then shown in the table, together with the observed product performance.

Table 1

Sample	Fat blend	E471
1	100% Hydrogenated Coconut oil (CNO)	Present
2	100% High Oleic Sun flower oil (HOSO)	Not present
3	50% HOSO: 50% Hydrogenated CNO	Not present
4	50% HOSO: 50% Refined CNO	Present
5	60% HOSO: 40% Refined CNO	Present
6	50% HOSO: 50% Refined CNO	Not present
7	60% HOSO: 40% Refined CNO	Not present

Table 2

Sample	Appearance	Sensory
1	oil droplets on surface	clean milky taste with good mouthfeel and whiteness
2	fully dissolved	strong plant taste but mouthfeel comparable to reference
3	did not dissolve well; white specs observed	close to the reference
4	fully dissolved	close to the reference
5	fully dissolved	close to the reference
6	acceptable but some white specs observed	acceptable versus the reference
7	acceptable but some white specs observed	acceptable versus the reference but slight plant taste

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Table 3

Sample	Dissolution time (average)
1	Did not fully dissolve
2	1:25 minutes
3	55 seconds
4	45 seconds
5	50 seconds
6	45 seconds
7	40 seconds

As can be seen, the inventive examples had a good or at least acceptable flavour, while having good dissolution and whitening. Working above 60wt% HOSO lead to a strong plant taste, but this could be addressed with the addition of E471.

- 5 Based on the full suite of examples the inventors were able to make the following further observations:
- The vegetable taste associated with HOSO was more perceptible in hot applications and more so for higher HOSO levels. The high amounts of the
10 inventive formulations were therefore acceptable for the intended cold beverage applications.
 - The additional presence of E471 helped masking the vegetable taste and does not appear to be affecting foam performance.
 - Higher protein content did not affect the PSD or improve foam performance or
15 affect solubility.
 - The fat blend provided the product with an optimised stability when held in a beverage capsule over its shelf-storage life.

All percentages are by weight unless otherwise specified.

20 The foregoing detailed description has been provided by way of explanation and illustration and is not intended to limit the scope of the appended claims. Many variations in the presently preferred embodiments illustrated herein will be apparent to one of ordinary skill in the art and remain within the scope of the appended claims
25 and their equivalents.

For the avoidance of doubt, the entire contents of all documents acknowledged herein are incorporated herein by reference.

Claims:

1. A non-dairy creamer powder comprising:
 - (i) 25 to 55wt% of a fat blend, based on a total weight of the
5 creamer powder,
 - (ii) dried glucose syrup, and
 - (iii) an emulsion stabiliser system,
wherein the fat blend comprises 48-62wt% high oleic sunflower oil (HOSO),
based on the total weight of the fat blend, and the balance is coconut oil,
10 wherein the HOSO has a C18:1 content of at least 75wt%, based on the total
weight of the HOSO.
2. The non-dairy creamer powder according to claim 1, wherein the fat blend is
present in an amount of 30 to 52wt% of the non-dairy creamer powder, and
15 preferably is at least 45wt%, more preferably from 47 to 50wt%.
3. The non-dairy creamer powder according to claim 1 or claim 2, wherein the
coconut oil comprises hydrogenated and/or refined coconut oil.
- 20 4. The non-dairy creamer powder according to any preceding claim, wherein the
non-dairy creamer powder further comprises up to 8wt% of a protein source,
preferably from 1 to 5wt% of a protein source, preferably wherein the protein source
comprises or consists of sodium caseinate.
- 25 5. The non-dairy creamer powder according to any preceding claim, wherein the
emulsion stabiliser system comprises one or more of the group consisting of:
lecithin, acacia fibers, modified starch, E471, E481, DKP and SHMP.
6. The non-dairy creamer powder according to any preceding claim, wherein the
30 emulsion stabiliser system comprises, based on a total weight of the creamer
powder E471 in an amount of from 0.5 to 2wt%.

7. The non-dairy creamer powder according to any preceding claim, wherein the emulsion stabiliser system comprises and preferably consists of E481 and DKP.
8. The non-dairy creamer powder according to any preceding claim, wherein the emulsion stabiliser system comprises acacia fiber.
9. The non-dairy creamer powder according to any preceding claim, wherein the emulsion stabiliser system comprises N-osa starch.
10. The non-dairy creamer powder according to any preceding claim, wherein the dried glucose syrup is from 35 to 65wt% by total weight of the creamer powder, preferably 35 to 45wt%.
11. The non-dairy creamer powder according to any preceding claim, wherein the emulsion stabiliser system is from 2 to 10wt% by total weight of the creamer powder.
12. The non-dairy creamer powder according to any preceding claim, wherein the powder is a spray-dried powder.
13. A composition for forming a beverage, the composition comprising the non-dairy creamer according to any preceding claim and one or more beverage powders, the beverage powders selected from one or more of the group consisting of coffee, tea, cocoa, chocolate, sugar, maltodextrin or plant-based powders.
14. A beverage container comprising the non-dairy creamer powder according to any of claims 1 to 12, or the composition according to claim 13.
15. The beverage container according to claim 14, wherein the beverage container is a single-serve container, preferably a cartridge, a sachet or a stick-pack.
16. A method of forming a beverage comprising contacting the non-dairy creamer according to any of claims 1 to 12, or the composition according to claim 13, with a beverage medium, preferably water and preferably wherein the medium has a

temperature of less than 30°C, preferably less than 10°C, and optionally further in the presence of ice.

17. The method according to claim 16, wherein the non-dairy creamer or the composition are provided in a beverage container and wherein the beverage is formed by flushing the non-dairy creamer or the composition from the beverage container with the beverage medium.
- 5