purpose of providing a context for discussing the features of the present invention. Unless stated otherwise, reference to such sources of information is not to be construed, in any jurisdiction, as an admission that such sources of information are prior art or form part of the common general knowledge in the art.

SUMMARY

[0007] Accordingly, the disclosure broadly comprises a cheese or cheese-like product comprising α_s-casein and/or β-casein, one or more hydrocolloids comprising at least one of a starch or a gum, optionally one or more non-dairy proteins and optionally one or more emulsifying salts, and having one or more characteristics of a dairy product, such as flavour, taste, aroma, body, appearance, texture, firmness, handling, density, structure, coagulation, binding, leavening, aeration, foaming, emulsification, elasticity, viscoelasticity, melt, creaminess and mouthfeel.

[0008] The disclosure relates to a cheese or cheese-like product comprising

a) about 0.2 to about 35% by weight α_s-casein, the α_s-casein comprising α_{s1}-casein and/or α_{s2}-casein,

b) one or more hydrocolloids, comprising at least one of a starch or a gum,

c) optionally one or more non-dairy proteins,

d) optionally one or more emulsifying salts,

e) optionally about 15 to about 65% by weight moisture, and

f) optionally about 0.05 to about 35% by weight lipid.

[0009] The disclosure relates to a cheese or cheese-like product comprising

a) about 0.2 to about 6% by weight α_s-casein, the α_s-casein comprising α_{s1}-casein and/or α_{s2}-casein,

b) one or more hydrocolloids, comprising at least one of a starch or a gum,

c) optionally one or more non-dairy proteins,

d) optionally one or more emulsifying salts,

e) optionally about 15 to about 65% by weight moisture, and

f) optionally about 0.05 to about 35% by weight lipid.

[0010] The disclosure relates to a cheese or cheese-like product comprising

a) about 0.2 to about 35% by weight α_s-casein, the α_s-casein comprising α_{s1}-casein and/or α_{s2}-casein,

b) one or more hydrocolloids, comprising at least one of a starch or a gum,

c) optionally one or more non-dairy proteins,

d) optionally one or more emulsifying salts,

e) about 15 to about 65% by weight moisture, and

f) about 0.05 to about 35% by weight lipid.

[0011] The disclosure relates to a cheese or cheese-like product comprising

a) about 0.2 to about 6% by weight α_s-casein, the α_s-casein comprising α_{s1}-casein and/or α_{s2}-casein,

b) one or more hydrocolloids, comprising at least one of a starch or a gum,

c) optionally one or more non-dairy proteins,

d) optionally one or more emulsifying salts,

e) about 15 to about 65% by weight moisture, and

f) about 0.05 to about 35% by weight lipid.

[0012] In one aspect, the disclosure provides a cheese or cheese-like product comprising

a) about 0.2 to about 6% by weight of α_s-casein, β-casein, or a combination thereof,

b) at least about 5% by weight of one or more hydrocolloids, wherein the one or more hydrocolloids comprises one or more starches, and

c) about 0.2 to about 20% by weight total dairy protein,

wherein total casein in the cheese or cheese-like product comprises

i) at least about 55% by weight α_s-casein, and/or

ii) at least about 40% by weight β-casein.

[0013] The disclosure provides a cheese or cheese-like product comprising

a) about 0.2 to about 6% by weight of α_s-casein,

b) at least about 5% by weight of one or more hydrocolloids, wherein the one or more hydrocolloids comprises one or more starches, and

c) about 0.2 to about 20% by weight total dairy protein,

wherein total casein in the cheese or cheese-like product comprises at least about 55% by weight α_s-casein.

[0014] The disclosure provides a cheese or cheese-like product comprising

a) about 0.2 to about 6% by weight of β-casein,

b) at least about 5% by weight of one or more hydrocolloids, wherein the one or more hydrocolloids comprises one or more starches, and

c) about 0.2 to about 20% by weight total dairy protein,

wherein total casein in the cheese or cheese-like product comprises at least about 40% by weight β-casein.

[0015] In another aspect the disclosure provides a cheese or cheese-like product comprising

a) about 0.2 to about 6% by weight α_s-casein,

b) at least about 5% by weight of one or more hydrocolloids, comprising at least one starch,

c) about 0.5 to about 20% by weight total protein;

wherein the α_s-casein comprises

i) at least about 60% of the casein in the cheese or cheese-like product, and/or

ii) at least about 55% by weight of the total protein in the cheese or cheese-like product.

[0015a] In another aspect, the disclosure relates to a cheese or cheese-like product comprising

a) about 0.2 to about 35% by weight α_{s1}-casein or α_{s2}-casein,

b) one or more hydrocolloids, comprising at least one of a starch or a gum,

wherein total casein in the cheese or cheese-like product comprises at least about 95% by weight of the α_{s1}-casein or α_{s2}-casein.

[0016] The disclosure relates to a method for preparing a cheese or cheese-like product, the method comprising

a) providing a composition comprising

i) α_s-casein, the α_s-casein comprising α_{s1}-casein and/or α_{s2}-casein,

ii) one or more hydrocolloids, comprising at least one of a starch or a gum,

iii) optionally one or more lipids

iv) optionally one or more non-dairy proteins,

v) optionally one or more emulsifying salts, and

vi) optionally one or more additional ingredients,

b) heating the composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

c) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product,

wherein the cheese or cheese-like product comprises

1. about 0.2 to about 35% by weight α_s-casein,

2. optionally about 15 to about 65% by weight moisture, and

3. optionally about 0.05 to about 35% by weight lipid.

[0017] The disclosure relates to a method for preparing a cheese or cheese-like product, the method comprising

a) providing a composition comprising

i) α_s-casein, the α_s-casein comprising α_{s1}-casein and/or α_{s2}-casein,

ii) one or more hydrocolloids, comprising at least one of a starch or a gum,

iii) optionally one or more lipids

iv) optionally one or more non-dairy proteins,

v) optionally one or more emulsifying salts, and

vi) optionally one or more additional ingredients,

b) heating the composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

c) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product,

wherein the cheese or cheese-like product comprises

1. about 0.2 to about 6% by weight α_s-casein,

2. optionally about 15 to about 65% by weight moisture, and

3. optionally about 0.05 to about 35% by weight lipid.

[0018] The disclosure relates to a method for preparing a cheese or cheese-like product, the method comprising

a) providing a composition comprising

i) α_s-casein, the α_s-casein comprising α_{s1}-casein and/or α_{s2}-casein,

ii) one or more hydrocolloids, comprising at least one of a starch or a gum,

iii) one or more lipids

iv) optionally one or more non-dairy proteins,

v) optionally one or more emulsifying salts, and

vi) optionally one or more additional ingredients,

b) heating the composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

c) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product,

wherein the cheese or cheese-like product comprises

1. about 0.2 to about 35% by weight α_s-casein,
2. about 15 to about 65% by weight moisture, and
3. about 0.05 to about 35% by weight lipid.

[0019] The disclosure relates to a method for preparing a cheese or cheese-like product, the method comprising

a) providing a composition comprising

i) α_s-casein, the α_s-casein comprising α_{s1}-casein and/or α_{s2}-casein,

ii) one or more hydrocolloids, comprising at least one of a starch or a gum,

iii) one or more lipids,

iv) optionally one or more non-dairy proteins,

v) optionally one or more emulsifying salts, and

vi) optionally one or more additional ingredients,

b) heating the composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

c) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product,

wherein the cheese or cheese-like product comprises

1. about 0.2 to about 6% by weight α_s-casein,
2. about 15 to about 65% by weight moisture, and
3. about 0.05 to about 35% by weight lipid.

[0020] In another aspect the disclosure provides a method for preparing a cheese or cheese-like product, the method comprising

a) providing a cheese composition comprising

i) α_s-casein, β-casein, or a combination thereof,

ii) one or more hydrocolloids, comprising one or more starches,

iii) optionally one or more lipids, and

iv) optionally one or more additional ingredients,

b) heating the composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

c) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product,

wherein the cheese or cheese-like product comprises

i) about 0.2 to about 6% by weight of α_s-casein, β-casein, or a combination thereof, and

ii) at least about 5% by weight of one or more hydrocolloids, and

iii) about 0.2 to about 20% by weight total dairy protein,

wherein total casein in the cheese or cheese-like product comprises

1. at least about 55% by weight α_s-casein, and/or

2. at least about 40% by weight β-casein.

[0021] The disclosure provides a method for preparing a cheese or cheese-like product, the method comprising

a) providing a cheese composition comprising

i) α_s-casein,

ii) one or more hydrocolloids, comprising one or more starches,

iii) optionally one or more lipids, and

iv) optionally one or more additional ingredients,

b) heating the composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

c) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product,

wherein the cheese or cheese-like product comprises

i) about 0.2 to about 6% by weight of α_s-casein, and

ii) at least about 5% by weight of one or more hydrocolloids, and

iii) about 0.2 to about 20% by weight total dairy protein,

wherein total casein in the cheese or cheese-like product comprises at least about 55% by weight α_s-casein.

[0022] The disclosure provides a method for preparing a cheese or cheese-like product, the method comprising

a) providing a cheese composition comprising

i) β-casein,

ii) one or more hydrocolloids, comprising one or more starches,

iii) optionally one or more lipids, and

iv) optionally one or more additional ingredients,

b) heating the composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

c) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product,

wherein the cheese or cheese-like product comprises

i) about 0.2 to about 6% by weight of β-casein, and

ii) at least about 5% by weight of one or more hydrocolloids, and

iii) about 0.2 to about 20% by weight total dairy protein,

wherein total casein in the cheese or cheese-like product comprises at least about 40% by weight β-casein.

[0023] The disclosure provides a method for preparing a cheese or cheese-like product, the method comprising

a) providing a cheese composition comprising

i) α_s-casein,

ii) one or more hydrocolloids, comprising at least one starch,

iii) optionally one or more lipids, and

iv) optionally one or more additional ingredients,

b) heating the composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

c) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product,

wherein the cheese or cheese-like product comprises

i) about 0.2 to about 6% by weight of α_s-casein,

ii) at least about 5% by weight of one or more hydrocolloids, and

iii) about 0.5 to about 20% by weight total protein,

and wherein the α_s-casein comprises

a. at least about 60% of the casein in the cheese or cheese-like product, and/or

b. at least about 55% by weight of the total protein in the cheese or cheese-like product.

[0024] The following embodiments may relate to any of the above aspects.

[0025] In various embodiments the cheese or cheese-like product comprises about 0.2% w/w to about 6% w/w α_s-casein, β-casein, or a combination thereof. In various embodiments the cheese or cheese-like product comprises at least about 0.2, 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, or at least about 6% by weight of α_s-casein, β-casein, or a

CLAIMS

1. A cheese or cheese-like product comprising

a) about 0.2 to about 6% by weight of α_s-casein, β-casein, or a combination thereof,

b) at least about 5% by weight of one or more hydrocolloids, wherein the one or more hydrocolloids comprises one or more starches, and

c) about 0.2 to about 20% by weight total dairy protein,

wherein total casein in the cheese or cheese-like product comprises

i) at least about 55% by weight α_s-casein, and/or

ii) at least about 40% by weight β-casein.

2. The cheese or cheese-like product according to claim 1, comprising 0.2 to about 6% by weight α_s-casein, wherein the total casein in the cheese or cheese-like product comprises at least about 55% by weight α_s-casein, and wherein the cheese or cheese-like product optionally comprises β-casein, κ-casein, p-κ-casein, or any combination of any two or more thereof.

3. The cheese or cheese-like product according to claim 1 or 2, comprising 0.2 to about 6% by weight β-casein, wherein the total casein in the cheese or cheese-like product comprises at least about 40% by weight β-casein, and wherein the cheese or cheese-like product optionally comprises α_s-casein, κ-casein, p-κ-casein, or any combination of any two or more thereof.

4. The cheese or cheese-like product according to any one of claims 1 to 3, wherein the α_s-casein comprises α_{s1}-casein, α_{s2}-casein, or a combination thereof.

5. The cheese or cheese-like product according to any one of claims 1 to 4, comprising

(a) from about 0.2 to about 15% or about 0.2 to about 10% by weight total dairy protein,

(b) from about 0.2 to about 20%, about 0.2 to about 15% or about 0.2 to about 10% by weight total casein

(c) at least about 10%, 15% or 20% by weight of one or more hydrocolloids

(d) from about 0.2 to about 10%, about 0.2 to about 6%, about 0.2 to about 5%, or about 0.2 to about 3% by weight total protein, or

(e) any combination of any two or more of (a) to (d).

6. The cheese or cheese-like product according to any one of claims 1 to 5, wherein the α_s-casein and/or β-casein is provided by a protein ingredient comprising an α_s-casein enriched fraction, a β-casein enriched fraction, recombinant α_{s1}-casein, recombinant α_{s2}-casein, recombinant β-casein, or any combination of any two or more thereof.

7. The cheese or cheese-like product of any one of claims 1 to 6, wherein the cheese or cheese-like product comprises

a) at least about 10% by weight starch,

b) at least about 15% by weight starch, or

c) about 5% to about 30% by weight starch.

8. The cheese or cheese-like product according to any one of claims 1 to 7, wherein the one or more starches are selected from the group comprising potato starch, maize starch, rice starch, tapioca (cassava) starch, wheat starch, pea starch, sweet potato starch, banana starch, barley starch, oat starch, sago starch, amaranth starch, arrowroot starch, canna starch, sorghum starch, chia seed starch, fava bean starch, jackfruit starch, bamboo starch, chickpea starch, cassava starch, carrot starch, and any combination of any two or more thereof.

9. The cheese or cheese-like product according to claim 8, wherein the one or more starches comprises one or more modified starches, optionally selected from the group comprising pre-gelatinised starch, thin-boiling starch, oxidised starch, octenyl succinic anhydride (OSA) modified starch, or a combination of any two or more thereof.

10. The cheese or cheese-like product according to any one of claim 1 to 9, wherein the one or more hydrocolloids further comprises one or more gums, optionally selected from the group comprising xanthan gum, guar gum, locust bean gum, tragacanth gum, acacia gum, karaya gum, tara gum, gellan gum, konjac gum (konjac mannan), carboxymethylcellulose (CMC), tragacanth, agar, pectin, alginate, carrageenan (κ-carrageenan, ι-carrageenan, λ-carrageenan),

Arabic gum, pectin, alginate, flaxseed gum, guar gum, or any combination of any two or more thereof.

11. The cheese or cheese-like product according to any one of claims 1 to 10, wherein the cheese or cheese-like product comprises one or more non-dairy proteins, the one or more non-dairy proteins comprising or consisting of one or more plant proteins or hydrolysed plant proteins.

12. The cheese or cheese-like product according to any one of claims 1 to 11, wherein the cheese or cheese-like product comprises

a) one or more emulsifying salts,

b) about 15 to about 65% by weight moisture,

c) about 0.05 to about 35% by weight lipid, or

d) any combination of any two or more of a)-c).

13. A method for preparing a cheese or cheese-like product, the method comprising

a) providing a cheese composition comprising

   i) α_s-casein, β-casein, or a combination thereof,

   ii) one or more hydrocolloids, comprising one or more starches,

   iii) optionally one or more lipids, and

   iv) optionally one or more additional ingredients,

b) heating the composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

c) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product,

wherein the cheese or cheese-like product comprises

   i) about 0.2 to about 6% by weight of α_s-casein, β-casein, or a combination thereof, and

   ii) at least about 5% by weight of one or more hydrocolloids, and

iii) about 0.2 to about 20% by weight total dairy protein,

wherein total casein in the cheese or cheese-like product comprises

1. at least about 55% by weight α_s-casein, and/or

2. at least about 40% by weight β-casein.

14. The method according to claim 13, comprising

a) providing an aqueous composition comprising α_s-casein, β-casein, or a combination thereof,

b) adding the one or more hydrocolloids, lipid and, optionally, the one or more additional ingredients, to the aqueous composition to produce a cheese composition,

c) heating the cheese composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

d) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product;

or

a) providing an aqueous composition comprising α_s-casein, β-casein, or a combination thereof,

b) adding lipid to the aqueous composition and mixing to form an emulsion,

c) adding the emulsion to a second aqueous composition comprising the one or more hydrocolloids and, optionally, the one or more additional ingredients, to produce a cheese,

d) heating the cheese composition at a temperature and for a time sufficient to produce a heated cheese mass or cheese-like mass, and

e) cooling the heated cheese mass or cheese-like mass to produce the cheese or cheese-like product.

15. The method according to claim 13 or 14, comprising

(a) dispersing the α_s-casein and/or β-casein in water at a temperature of from about 20 to about 50°C to substantially completely dissolve the α_s-casein and/or β-casein to produce the aqueous composition,

(b) dispersing α_s-casein in water at a temperature of from about 40 to about 55°C to substantially completely dissolve the α_s-casein to produce the aqueous composition, or

(c) dispersing β-casein in water at a temperature of from about 15 to about 30°C, or at ambient temperature, to substantially completely dissolve the β-casein to produce the aqueous composition.

16. The method according to any one of claims 13 to 15, comprising providing an aqueous composition comprising a protein ingredient comprising an α_s-casein enriched fraction, a β-casein enriched fraction, recombinant α_{s1}-casein, recombinant α_{s2}-casein, recombinant β-casein, or any combination of any two or more thereof.

17. The cheese or cheese-like product according to any one of claims 6 to 12 or the method of claim 16, wherein

the protein ingredient comprises an α_s-casein enriched fraction, and wherein:

a) total casein in the protein ingredient comprises at least about 50% or at least about 75% by weight α_s-casein, and/or

b) the protein ingredient comprises α_s-casein and β-casein in a weight ratio of at least about 50:50, preferably at least about 80:20, and/or

the protein ingredient comprises a β-casein enriched fraction, and wherein:

(c) total casein in the β-casein enriched fraction comprises at least about 50% by weight β-casein, and/or

(d) the β-casein enriched fraction comprises β-casein and α_s-casein in a weight ratio of at least about 50:50.

18. The cheese or cheese-like product or method of any one of claims 1 to 17, wherein the cheese or cheese-like product is a processed cheese or processed cheese-like product.

19. A cheese or cheese-like product comprising

a) about 0.2 to about 6% by weight α_s-casein,

b) at least about 5% by weight of one or more hydrocolloids, comprising at least one starch,

c) about 0.5 to about 20% by weight total protein;

wherein the α_s-casein comprises

i) at least about 60% of the casein in the cheese or cheese-like product, and/or

ii) at least about 55% by weight of the total protein in the cheese or cheese-like product.

20. A cheese or cheese-like product comprising

a) about 0.2 to about 35% by weight α_{s1}-casein or α_{s2}-casein,

b) one or more hydrocolloids, comprising at least one of a starch or a gum,

wherein total casein in the cheese or cheese-like product comprises at least about 95% by weight of the α_{s1}-casein or α_{s2}-casein.