Claims

1. A method for obtaining a casein composition comprising:
    i) providing a microorganism composition, wherein the microorganism composition comprises microorganisms that have been transformed with at least one nucleic acid coding for a casein, and wherein the microorganisms have been cultured in culture conditions so as to express and produce casein, wherein the pH of the composition is equal or above 6.5 and preferably below 9
    ii) optionally washing the microorganism composition to remove the culture medium
    iii) optionally lysing the microorganism composition to obtain a liquid composition wherein the liquid composition is in a first container
    iv) flowing the liquid composition out of the first container through a device comprising a pipe and wherein the liquid composition is heated at a temperature equal or above 110°C during at least part of the flowing for at most 5 minutes, wherein heating is performed in a tubular heat exchanger, wherein the composition is pre-heated at a temperature between 20°C and 60°C less than the heating temperature before flowing at the heating temperature, and wherein the composition is cooled after heating
    v) recovering the soluble fraction out of the pipe

    thereby obtaining a casein composition in the soluble fraction.

2. The method of claim 1, wherein the caseins represent at least 60 %, preferably at least 62 %, preferably at least 65 %, preferably at least 67 %, preferably at least 70 % of the total proteins of the soluble fractions.

3. The method of claim 1 or 2, wherein the ratio of casein as compared to the total proteins is increased in the soluble fraction as compared to the ration in the microorganism composition.

4. The method of any one of claims 1 to 3, wherein heating is performed at a temperature equal or lower than 140°C.

5. The method of any one of claims 1 to 4, wherein heating is performed for at most 2 minutes.

6. The method of any one of claims 1 to 5, wherein heating is performed for at least 2 seconds.

7. The method of any one of claims 1 to 6, wherein heating is performed for at most 60 seconds.

8. The method of any one of claims 1 to 7, wherein the duration from pre-heating to cooling is between 150 to 350 seconds.

9. The method of any one of claims 1 to 8, wherein the composition is circulated within the pipe at a flow rate with a comprised between 15 L/h and 30L/h.

10. The method of any one of claims 1 to 9, wherein the composition is delivered to a second container after flowing.

11. The method of any one of claims 1 to 9, wherein the soluble fraction is recovered by centrifugation and/or filtration after flowing and heating before being delivered to a second container.

12. The method of any one of claims 1 to 11, wherein the microorganisms in the microorganism composition are not lysed and heating in iv) lyses the microorganisms.

13. The method of any one of claims 1 to 12, wherein the microorganisms have been transformed with one or more nucleic acid coding for more than one casein.

14. The method of any one of claims 1 to 13, wherein the casein is selected from beta casein, alpha-S1 casein, alpha-S2 casein and mixture of these caseins.

15. The method of any one of claims 1 to 13, wherein the casein is selected from beta casein, alpha-S1 casein and mixture of these caseins.

16. The method of any one of claims 1 to 15, further comprising a step of performing a further purification of casein of the soluble fraction obtained in iii).

17. The method of claim 16, wherein the further step applied to the soluble fraction comprises at least one step selected in the group consisting of addition of activated charcoal, membrane filtration, chromatography and casein precipitation.

18. The method of claim 17, wherein the further step is acidic precipitation of casein.

19. The method of claim 18, wherein the further step of acidic precipitation of casein is conducted by heating at 90°C at pH=4.6.

20. The method of any one of claims 1 to 19, wherein the microorganism composition is a bacterial composition

21. The method of claim 20, wherein the bacteria are *E. coli*.

22. A casein composition susceptible to be obtained by a method according to any one of claims 1 or 21.