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EP-A1- 1 364 582
EP-A1- 1 593 309
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US-A1- 2005 208 630
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Germano Mucchetti ET AL: "The pre-concentration of milk by nanofiltration in the production of Quarg-type fresh cheeses", Lait, 2000, Seiten 43-50, XP055087166, DOI: 10.1051/lait:2000106 Gefunden im Internet: URL:http://lait.dairy-journal.org/articles /lait/pdf/2000/01/L0107.pdf [gefunden am 2013-11-07]

GROUND MASS FOR CURD CHEESE WITH IMPROVED TASTE PROPERTIES III

Technical field

This invention is in the field of milk products and concerns a curd cheese with improved taste and a method for its production.

Prior art

Generally, for the production of curd cheese, skimmed milk is subjected to a heat treatment and the proteins obtained are denatured.

By means of the subsequent addition of lactic acid bacteria and rennet, there results the so-called coagulation (phase inversion) of the milk. The casein coagulates and formed the technically designated curd. After the maturation (8 to 20 h), the curd is stirred up. Thus the whey separation triggered and in the separator the two phases are then separated. The fluid acid whey is used for other purposes and the ground mass for curd cheese is set to the desired fat and protein content through the addition of cream.

The technical production methods are dominated by appropriate separation methods. By means of variation of the separation conditions and technical modifications of the separators, at this time a wide range of method designs is possible. At a protein content of the skimmed milk of 3.3 to 3.5 wt%, the skimmed milk batch is in the range of 4.10 to 4.15 kg skimmed milk per kilogram of low-fat curd cheese or cream cheese to be produced (4.10 to 4.15 kg skimmed milk/kg low-fat curd cheese), when the latter have 18% dry mass. Thus, 3.10 to 3.15 kg acid whey accumulate per kilogram of low-fat curd cheese (3.10 to 3.15 kg acid whey/kg low-fat curd cheese). The protein content in this case reaches orders of magnitude of 12.6 to 12.8 wt%.

In addition to the production methods characterised by separation, methods are also known in which the concentration of the fermented processing milk is carried out by means of ultrafiltration. Thus, for example, it is known from **US 2003/0129275 A1** (Lact Innovation) that also microfiltration and ultrafiltration steps can be used in the production of cheese and curd cheese. The use of microfiltration and skimmed milk for the production of cheese and whey protein products is for example described in **US 2003/0077357 A1** (Cornell Research Foundation).

From **EP1752046 A1** (Tuchenhagen) is known a method for the production of fermented milk products, in which one ferments process milk, subjects the fermentation product to a microfiltration and processes further only the acidified retentate. Further methods for the

production of ground masses for curd cheese comprising the use of nanofiltration are known from Germano Mucchetti et al 2000; Schkoda 1997 and EP 1 364 582 A1.

US 2005/208630 A1 and DE 601 29 217 T2 describe ground masses for curd cheese which are produced by using different starter culture mixtures.

These methods of the prior art, however, have two significant disadvantages:

(i) If skimmed milk is pre-concentrated by means of ultrafiltration to form a ground mass for curd cheese and subsequently acidified, the product has a very bitter taste and is not acceptable sensorially. This sensory deviation is in particular induced by the presence of phosphates. Alkali metal ions, in particular sodium tend to induce a metallic taste. The methods of the prior art for the concentration of non-soured skimmed milk to form curd cheese have until now not been able to separate out in a quantitative manner phosphates and alkali metal ions, such that quantities remain in the product such that a taste impairment cannot be prevented.

(ii) Furthermore, the acid whey constitutes a coupled product which is per se not desired. The separation of the whey from the curd is technically complicated and delivers a product for which there is only a small market.

The task of the present invention has thus involved the provision of a ground mass for curd cheese having improved taste properties which, without the addition of additives, can be directly charged and is ready to eat. Simultaneously, the corresponding production method should be able to avoid accruing acid whey as a waste product.

Description of the invention

A first subject-matter of the invention concerns a ground mass for curd cheese having improved taste properties, which can be obtained in that

(a) unpasteurised milk is subjected to heat treatment and the cream is separated-off,

(b) the skimmed milk obtained thus is subjected to an ultrafiltration, and thus a first retentate R1, which contains a milk protein concentrate, and a first permeate P1 is produced,

(c) the first permeate P1 is subjected to a nanofiltration and thereby a second retentate R2 and a second permeate P2, containing alkali salts, are produced,

(d) the second retentate R2 is subjected to an alkaline demineralisation and thereby a third retentate R3, containing phosphate salts, and a third permeate P3 are produced,

(e) the third permeate P3 is united with the retentate R1 such that a non-soured ground mass for curd cheese results, and

(f) the mixture thus obtained is subjected to a heat treatment until denaturing occurs,

(g) to the denatured product are added starter cultures and rennet and where necessary

(h) the ground mass for curd cheese obtained after culmination of the fermentation is set to a defined dry mass and protein content,

and in step (g) as starter culture are used

(i) a first mixture of five microorganisms comprising (i-1) *Streptococcus thermophilus*, (i-2) *Leuconostoc species*, (i-3) *Lactococcus lactis subsp. lactis biovar diacetylactis*, (i-4) *Lactococcus lactis subsp. lactis* and (i-5) *Lactococcus lactis subsp. cremoris*, and

(ii) a second mixture of three microorganisms comprising (ii-1) *Streptococcus thermophilus*, (ii-2) *Lactococcus lactis subsp. lactis* and (ii-3) *Lactococcus lactis subsp. cremoris*,

wherein the starter culture contains 25 to 75 wt% of the mixture (i) and 75 to 25 wt% of the mixture (ii), with the proviso that the quantities add up to 100 wt% and in the mixture (i) the five microorganisms are contained respectively in quantities of 20 ± 5 wt% and in the mixture (ii) the three microorganisms are contained respectively in quantities of 33 ± 5 wt%.

A second subject matter of the invention is directed to a method for the production of a ground mass for curd cheese having improved taste properties, in which

(a) unpasteurised milk is subjected to heat treatment and the cream is separated-off,

(b) the skimmed milk obtained thus is subjected to an ultrafiltration, and thus a first retentate R1, which contains a milk protein concentrate, and a first permeate P1 is produced,

(c) the first permeate P1 is subjected to a nanofiltration and thereby a second retentate R2 and a second permeate P2, containing alkali salts, are produced,

(d) the second retentate R2 is subjected to an alkaline demineralisation and thereby a third retentate R3, containing phosphate salts, and a third permeate P3 are produced,

(e) the third permeate P3 is united with the retentate R1 such that a non-soured ground mass for curd cheese results, and

(f) the mixture thus obtained is subjected to a heat treatment until denaturing occurs,

(g) to the denatured product are added starter cultures and rennet and where necessary

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(ii) a second mixture of three microorganisms comprising (ii-1) *Streptococcus thermophilus*, (ii-2) *Lactococcus lactis subsp. lactis* and (ii-3) *Lactococcus lactis subsp. cremoris*,

wherein the starter culture contains 25 to 75 wt% of the mixture (i) and 75 to 25 wt% of the mixture (ii), with the proviso that the quantities add up to 100 wt% and in the mixture (i) the five microorganisms are contained respectively in quantities of 20 ± 5 wt% and in the mixture (ii) the three microorganisms are contained respectively in quantities of 33 ± 5 wt%.

Surprisingly it was found that with the aid of the method according to the invention a curd cheese was obtained with a significantly improved taste and simultaneously the undesirable occurrence of acid whey, which is also still difficult to separate-out, is avoided.

In particular the use of the selected starter cultures results in a curd cheese which tastes creamy and leaves behind no slimy impression as a whole. By means of the method described here, furthermore, the occurrence of acid whey can be reduced in that during the uniting of the protein fraction and the demineralised milk permeate, only that quantity of permeate is added such as is needed to achieve the required values in the final product (e.g. curd cheese with at least 18 wt% dry mass and at least 12 wt% absolute protein). The remaining quantity of milk permeate can be further used in an economical manner; for example for the production of lactose or as an inexpensive filler in other products.

Production of the skimmed milk

For the production of the skimmed milk, first there takes place a separation of solid non-milk components and the skimming of the fat content of approximately 4 wt% out of the unpasteurised milk. This usually takes place in a special component, preferably a separator. Components of this sort are sufficiently well known from the prior art. Widely used in the milk industry are separators from the firm GEA Westfalia Separator GmbH, with which the two steps can be carried out singly or together.[1] Appropriate components are for example also described in **DE 10036085 C1** (Westfalia) and very well known to the skilled person, such that there is no need for explanations regarding the carrying-out of this method step, since they can be entrusted to general expert knowledge.

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[1] (http://www.westfalia-separator.com/de/anwendungen/molkereitechnik/milch-molke.html)

The heat treatment of the unpasteurised milk takes place preferably in heat exchangers, wherein especially plate heat exchangers have proved to be particularly suitable. A temperature gradient is applied to the heat exchangers which is however selected such that the unpasteurised milk is heated for a dwell time of at least 20 and at most 60 seconds, preferably approximately 30 seconds to a temperature of approximately 70 to 80°C and in particular approximately 72 to 74°C.

Ultrafiltration, microfiltration

In the second process step, the skimmed milk is separated out with the aid of an ultrafiltration and/or microfiltration into a milk protein concentrate, which accrues as a retentate, and a milk permeate.

A filtration through membranes with a pore size < 0.1 µm is generally called ultrafiltration, while the filtration in the case of pore sizes > 0.1 µm is normally described as microfiltration. In both cases it is a purely physical, i.e. mechanical membrane separation method, which work according to the principle of mechanical size exclusion: all particles in the fluids which are larger than the membrane pores are retained by the membrane. The driving force in both separation methods is the differential pressure between inflow and outflow to and from the filter surface, which lies at between 0.1 and 10 bar. The raw material of the filter surface can be made of stainless steel, plastic, ceramic or textile weave, depending on usage area. There are different manifestations of the filter elements: cartridge filter, flat membranes, spiral wound membranes, pocket filters and hollow fibre modules, which in the sense of the current invention are all basically suitable.

The ultrafiltration takes place preferably at temperatures in the range of approximately 10 to approximately 55, preferably 10 to 20°C, wherein the membranes have preferably a pore diameter in the range of approximately 1,000 to approximately 50,000, and preferably approximately 5,000 to approximately 25,000 Dalton. Used are preferably so-called spiral wound membranes or plate-frame modules made of polysulfone or polyethylene membranes.

The use of microfiltration has the advantage that also a part of the whey proteins is separated-off and thus a bitter taste note is avoided in the final product.

Reverse osmosis constitutes an alternative to ultrafiltration, not according to the invention. Here, skimmed milk is dewatered using a semi-permeable membrane and thus the concentration of the valuable milk proteins is increased. The principle involves subjecting the system to a pressure which is higher than the pressure which results from the osmotic demand for concentration compensation. Thus, the molecules of the solvent can wander against their “natural” osmotic propagation direction. The method compresses them into the compartment in which dissolved

substances are present at a lesser concentration. Milk has an osmotic pressure of less than 2 bar, the pressure used for the reverse osmosis of milk is 3 to 30 bar, depending on membrane used and configuration of the system. The osmotic membrane, which allows only the solvent to permeate and retains the dissolved substances (solute), must be able to withstand these high pressures. When the pressure difference more than compensates the osmotic gradient, the solvent molecules pass through the membrane such as in a filter, while the milk proteins are retained. In contrast to a classical membrane filter, osmosis membranes do not have continuous pores. The reverse osmosis is preferably reverse osmosis carried out at a temperature in the range of 10 to 55, preferably 10 to 20°C with semi-permeable membranes which have a separation precision of 0 to 1,000 Dalton.

Nanofiltration

As third method step after the ultrafiltration comes the separating-out of alkali salts, especially sodium and potassium salts, which is achieved via a nanofiltration.

The nanofiltration is classified between ultrafiltration and reverse osmosis and is basically carried out analogously to ultrafiltration. Admittedly, the membranes are even more fine-pored and the separation precision is between 100 and 1,000 Dalton (corresponding to an average pore diameter of 0.01 to 0.001 µm), wherein the differential pressure lies generally at approximately 3 to 40 bar. Nanofiltration membranes are similar to the membranes for reverse osmosis. Against a support layer is laid a thin selective layer. In the context of the method according to the invention, spiral wound membranes are usually used. By means of their compact construction, it is possible to accommodate large membrane surfaces on a small surface. This allows the treatment of relatively large volume flows. The prerequisite for the use of such spiral wound membranes is, admittedly, a feed flow with low solid load.

Demineralisation

The retentate from the prior step has – where relevant after concentrating – a content of dissolved phosphates in the order of magnitude from 1 to 2 wt%. After the separating-out of sodium and potassium salts, also these salts are removed.

In order to separate-out the phosphates as completely as possible, the solutions are set to a virtually neutral pH value in the range of 6 to 8 by the addition of bases and the minerals which substantially constitute soluble phosphates are displaced by a quantity of a solution of a water-soluble calcium salts such that sparingly soluble calcium salts are precipitated. For the setting of the

pH value and for the precipitation, NaOH, an aqueous preparation of calcium chloride and alkali hydroxide or calcium hydroxide is used. Basically, for setting the pH value, also other alkali or alkaline earth bases, such as e.g. KOH can be used. Also the nature of the precipitation salt is per se non-critical, for example barium salts can be precipitated. The use of calcium salts has however the advantage that the precipitation means is inexpensive and the salts have a very low solubility product, that is the precipitation is substantially complete. Also without the addition of precipitation means, the demineralisation takes place in stirred tanks, wherein it is been proved to be advantageous to set a temperature in the range of approximately 50 to 90 and preferably of approximately 80°C. The precipitation time is typically approximately 20 to 120 and preferably approximately 30 to 45 min, wherein these specifications are to be understood only as indications, since lower temperatures require longer reaction times and vice versa. After the precipitation, the salts are separated-out, for example in separators, which exploit the greater specific weight of the precipitated particles. However, it is also possible to carry out the separation for example by means of membrane filters in the context of a further ultrafiltration in the range 5,000 to 150,000 Dalton, preferably 10,000 to 50,000 Dalton.

Denaturing

In the following step, the protein-rich fraction from the ultrafiltration, that is the retentate R1, is united with the permeate from the demineralisation step and subjected to a thermal treatment. The denaturing now taking place can take place in a manner which is known per se, that is over a time duration of approximately 5 to approximately 10 min and preferably approximately 6 min and at temperatures of approximately 85 to approximately 90°C and in particular approximately 88°C.

Fermentation and standardisation

Also the fermentation of the denatured pre-product can take place according to the known method of the prior art. To this end, suitable starter cultures and rennet are added.

As starter culture is used

(i) a first mixture of five microorganisms comprising (i-1) Streptococcus thermophilus, (i-2) Leuconostoc species, (i-3) Lactococcus lactis subsp. lactis biovar diacetylactis, (i-4) Lactococcus lactis subsp. lactis and (i-5) Lactococcus lactis subsp. cremoris, and

(ii) a second mixture of three microorganisms comprising (ii-1) Streptococcus thermophilus, (ii-2) Lactococcus lactis subsp. lactis and (ii-3) Lactococcus lactis subsp. cremoris,

wherein the starter culture contains 25 to 75 wt% of the mixture (i) and 75 to 25 wt% of the mixture (ii),

with the proviso that the quantities add up to 100 wt% and in the mixture (i) the five microorganisms are contained respectively in quantities of 20 ± 5 wt% and in the mixture (ii) the three microorganisms are contained respectively in quantities of 33 ± 5 wt%.

Especially preferred are starter cultures which contain

- approximately 40 to approximately 60 wt% of the mixture (i) and
- approximately 60 to approximately 40 wt% of the mixture (ii)

with the above provisos.

Instead of using the two preparations (i) and (ii), available commercially, together, it is of course basically also possible to use the five microorganisms individually and then to mix them in such a manner that a starter culture mixture as above and defined in the claims is achieved, with which the curd cheese products with improved taste are obtained. Such starter cultures contain then preferably

- approximately 20 to approximately 30 wt% *Streptococcus thermophilus*,
- approximately 5 to approximately 15 wt% *Leuconostoc species*,
- approximately 5 to approximately 10 wt% *Lactococcus lactis subsp. lactis biovar diacetylactis*,
- approximately 20 to approximately 30 wt% *Lactococcus lactis subsp. lactis,*
- approximately 20 to approximately 30 wt% *Lactococcus lactis subsp. cremoris*, and

with the proviso that the quantities add up to 100 wt%.

Especially preferred are starter cultures containing

- 25 wt% *Streptococcus thermophilus*,
- 12 wt% *Leuconostoc species*,
- 13 *Lactococcus lactis subsp. lactis biovar diacetylactis*,
- 25 wt% *Lactococcus lactis subsp. lactis,*
- 25 wt% *Lactococcus lactis subsp. cremoris*,

All named microorganisms are freely commercially available.

The temperature at which the fermentation takes place depends on the temperature range which is optimal for the respectively use microorganisms; typically, the temperature lies in the range of approximately 18 to approximately 35°C and preferably at approximately 30°C. The ground mass for curd cheese obtained after the fermentation is subsequently set to the desired content of dry mass and proteins, for example by means of the addition of cream. Preferably, the dry mass

content is approximately 15 to approximately 20 wt% and in particular approximately 18 wt%. The protein content can be approximately 10 to approximately 15 wt% and preferably approximately 12 wt%.

Examples

Comparison example V1

4 kg of skimmed milk was treated for 6 min at 88°C and the obtained proteins were denatured. Bifidobacterium and rennet were added to the mass, and it was matured at 30°C for approximately 18 h and subsequently stirred up. Subsequently, the fermentation product was placed in a centrifuge and approximately 3.2 kg of acid whey was separated-off as a liquid component. The remaining curd cheese mass (approximately 800 g) was set to a dry mass of 18 wt% and a protein content of 12 wt% by the addition of cream.

At the tasting, the product proved to be bitter/gritty and to be unfit for consumption.

Example 1

4 kg of skimmed milk was subjected at 20 °C to an ultrafiltration using a spiral wound membrane (separation precision 25,000 Dalton). The protein-rich retentate was separated-out and the permeate subjected at 20 °C to a nanofiltration using a spiral wound membrane (separation precision 500 Dalton). With the permeate, sodium and potassium salts were separated-out. The retentate was subsequently treated with the addition of an aqueous calcium chloride solution, set to pH=6 with NaOH, and the phosphates precipitated as calcium phosphate. The permeate thus obtained was unified with the protein-rich retentate from the first step, treated for 6 min at 88 °C and the proteins obtained were denatured. To the mass was added a mixture of the two starter culture mixtures (i) and (ii) in the weight ratio 60:40 and rennet, and stirred at 30 °C for approximately 2 h. Subsequently, the fermentation product was put in a centrifuge and the acid whey was separated-off as a liquid component. The remaining curd cheese mass was set to a dry mass of 18 wt% and a protein content of 12 wt% by the addition of cream.

At the tasting, the product was deemed to be free of bitter substances and to be immediately fit for consumption.

The two methods are represented as flow diagrams in **Drawing 1**.

Examples 2 to 4, comparison examples V2 to V4

Example 1 was repeated, but different starter cultures were used. Subsequently, the products were judged by a panel comprising 5 experienced testers regarding taste and sensory properties, on a scale of 1 (=is not applicable) to 6 (=is fully applicable). The results are summarised

in **Table 1**. The examples 2 to 7 are according to the invention, example V2 serves again for comparison. Given are the average values of the judgements.

Table 1

Judgement regarding taste and sensory properties of the ground masses for curd cheese

Example	Starter culture	Taste	Sensory properties		
		bitter	creamy	smooth	slimy
V2	Bifidobacterium	5.5	3.0	2.0	5.5
V3	Mixture (i)	3.0	2.5	2.0	4.0
V4	Mixture (i)	4.0	2.0	2.0	4.0
2	Mixture (i+ii) = 75:25	2.0	4.0	3.5	2.0
3	Mixture (i+ii) = 50:50	1.5	4.5	4.0	1.0
4	Mixture (i+ii) = 25:75	2.5	4.0	3.5	1.5

The tests and comparison tests show clearly that the selection of the starter cultures has a significant influence on the taste and sensory properties of the ground mass for curd cheese. The ground mass for curd cheese with the best properties, i.e. the lowest bitterness, the highest creaminess, which in addition does not leave behind a slimy impression, was achieved with a combination according to the invention of the mixtures (i) and (ii) the weight ratio 1:1.

Patentkrav

1. Kvarkgrundmasse med forbedrede smagsegenskaber, som kan opnås ved, at man

(a) underkaster råmælk en temperaturbehandling og skiller fløden fra,

(b) underkaster den således opnåede skummetmælk en ultrafiltration og/eller mikrofiltrering og derved fremstiller et første retentat R1, der indeholder et mælkeproteinkoncentrat, og et første permeat P1,

(c) underkaster det første permeat P1 en nanofiltrering og derved fremstiller et andet retentat R2 og et andet permeat P2, der indeholder alkalimetalsalte,

(d) underkaster det andet retentat R2 en alkalisk demineralisering og derved fremstiller et tredje retentat R3, som indeholder phosphatsalte, og et tredje permeat P3,

(e) forener det tredje permeat P3 med retentatet R1, således at der opstår en usyrnet kvarkgrundmasse, og

(f) underkaster den således opnåede blanding en temperaturbehandling indtil denaturering og endelig

(g) sætter starterkulturer og osteløbe til det denaturerede produkt og eventuelt

(h) indstiller den efter afsluttet fermentering opnåede kvarkgrundmasse til et defineret tørstof- og proteinindhold,

og i trin (g) som starterkultur tilsætter

(i) en første blanding af fem mikroorganismer omfattende (i-1) *Streptococcus thermophilus,* (i-2) *Leuconostoc species,* (i-3) *Lactococcus lactis subsp. lactis biovar diacetylactis,* (i-4) *Lactococcus lactis subsp. lactis* og (i-5) *Lactococcus lactis subsp. cremoris,* og

(ii) en anden blanding af tre mikroorganismer omfattende (ii-1) *Streptococcus thermophilus,* (ii-2) *Lactococcus lactis subsp. lactis* og (ii-3) *Lactococcus lactis subsp. cremoris*,

hvor starterkulturen indeholder 25 til 75 vægtprocent af blanding (i) og 75 til 25 vægtprocent af blanding (ii),

med det forbehold, at mængderne tilsammen giver 100 vægtprocent, og hvor i blandingen (i) forekommer de fem mikroorganismer hver i mængder af 20 ± 5 vægtprocent, og i blandingen (ii) forekommer de tre

mikroorganismer hver i mængder af 33 ± 5 vægtprocent.

2. Fremgangsmåde til fremstilling af en kvarkgrundmasse med forbedrede smagsegenskaber, ved hvilken man

(a) underkaster råmælk en temperaturbehandling og skiller fløden fra,

(b) underkaster den således opnåede skummetmælk en ultrafiltration og/eller mikrofiltrering og derved fremstiller et første retentat R1, der indeholder et mælkeproteinkoncentrat, og et første permeat P1,

(c) underkaster det første permeat P1 en nanofiltrering og derved fremstiller et andet retentat R2 og et andet permeat P2, der indeholder alkalimetalsalte,

(d) underkaster det andet retentat R2 en alkalisk demineralisering og derved fremstiller et tredie retentat R3, som indeholder phosphatsalte, og et tredje permeat P3,

(e) forener det tredje permeat P3 med retentatet R1, således at der opstår en usyrnet kvarkgrundmasse, og

(f) underkaster den således opnåede blanding en temperaturbehandling indtil denaturering og endelig

(g) sætter starterkulturer og osteløbe til det denaturerede produkt og eventuelt

(h) indstiller den efter afsluttet fermentering opnåede kvarkgrundmasse til et defineret tørstof- og proteinindhold,

og i trin (g) som starterkultur tilsætter

(i) en første blanding af fem mikroorganismer omfattende (i-1) *Streptococcus thermophilus,* (i-2) *Leuconostoc species,* (i-3) *Lactococcus lactis subsp. lactis biovar diacetylactis,* (i-4) *Lactococcus lactis subsp. lactis* og (i-5) *Lactococcus lactis subsp. cremoris,* og

(ii) en anden blanding af tre mikroorganismer omfattende (ii-1) *Streptococcus thermophilus,* (ii-2) *Lactococcus lactis subsp. lactis* og (ii-3) *Lactococcus lactis subsp. cremoris*,

hvor starterkulturen indeholder 25 til 75 vægtprocent af blanding (i) og 75 til 25 vægtprocent af blanding (ii),

med det forbehold, at mængderne tilsammen giver 100 vægtprocent, og hvor i blandingen (i) forekommer de fem mikroorganismer hver i mængder af 20 ± 5 vægtprocent, og i blandingen (ii) forekommer de tre mikroorganismer hver i

mængder af 33 ± 5 vægtprocent.

3. Fremgangsmåde ifølge krav 2, **kendetegnet ved, at** ultrafiltreringen gennemføres med membraner, der har en selektivitet fra 1.000 til 50.000 Dalton.

4. Fremgangsmåde ifølge mindst et af kravene 2 til 3, **kendetegnet ved, at** ultrafiltreringen eller mikrofiltreringen gennemføres med spiralviklede moduler eller plade-ramme-moduler.

5. Fremgangsmåde ifølge mindst et af kravene 2 til 4, **kendetegnet ved, at** ultrafiltreringen eller mikrofiltreringen gennemføres ved en temperatur i området fra 10 til 55 °C.

6. Fremgangsmåde ifølge mindst et af kravene 2 til 5, **kendetegnet ved, at** nanofiltreringen gennemføres med membraner, der har en afskæring fra 100 til 1.000 Dalton.

7. Fremgangsmåde ifølge mindst et af kravene 2 til 6, **kendetegnet ved, at** nanofiltreringen gennemføres med spiralviklede moduler.

8. Fremgangsmåde ifølge mindst et af kravene 2 til 7, **kendetegnet ved, at** nanofiltreringen gennemføres ved en temperatur i området fra 10 til 55 °C.

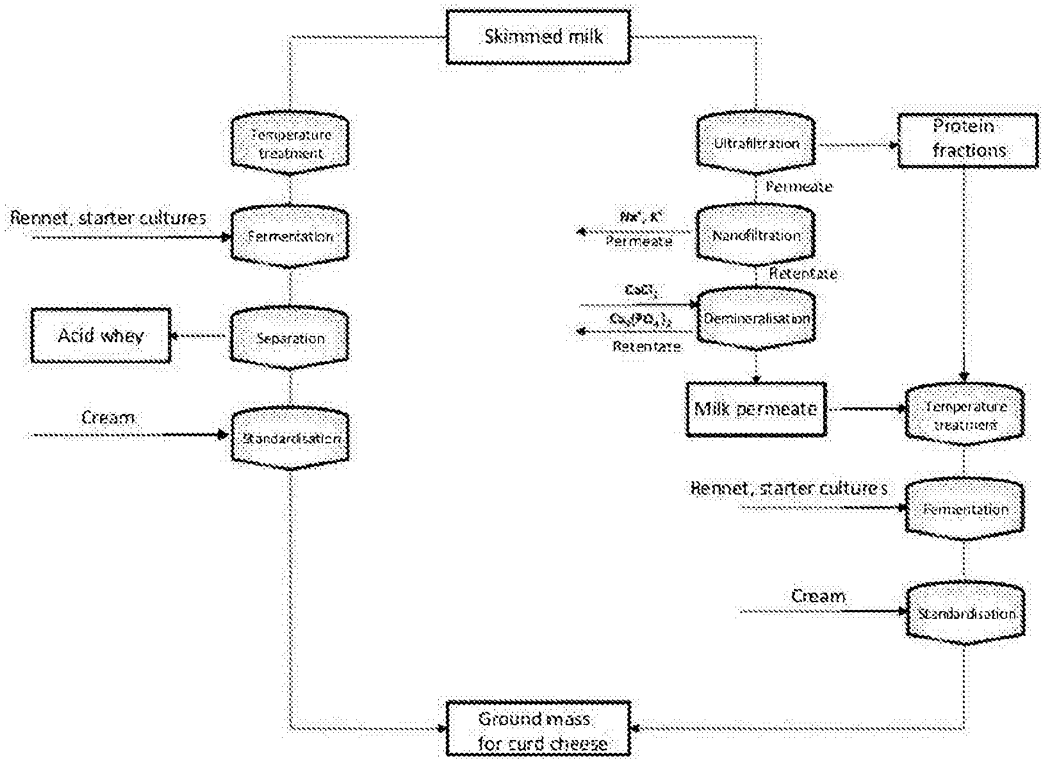
9. Fremgangsmåde ifølge mindst et af kravene 2 til 8, **kendetegnet ved, at** phosphaterne udfældes som calciumsalte med henblik på demineralisering.

10. Fremgangsmåde ifølge mindst et af kravene 2 til 9, **kendetegnet ved, at** demineraliseringen gennemføres ved en temperatur i området fra 50 til 90 °C.

11. Fremgangsmåde ifølge mindst et af kravene 2 til 10, **kendetegnet ved, at** kombinationen af permeatet P3 og retentatet R1 underkastes en temperaturbehandling fra 85 til 90 °C i et tidsrum fra 5 til 10 min. og derved denatureres.

12. Fremgangsmåde ifølge mindst et af kravene 2 til 11, **kendetegnet ved, at** kulturer og løbe sættes til den således opnåede denaturerede masse ved 25 til 35 °C.

Drawings



Drawing 1

Conventional method for the production of curd cheese (left) versus method according to the invention (right)