

ALPMA technology

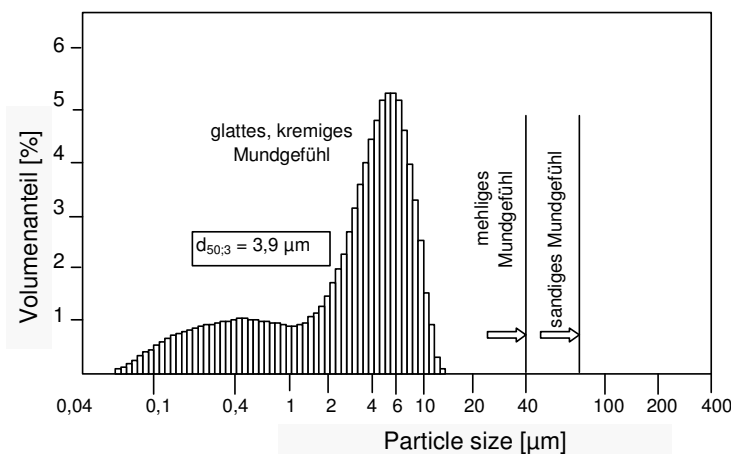
CreamoPretTM

**particulated whey protein concentrate for
soft- and semi-hard cheese, fresh cheese**

What is CreamoProt™ ?

Native whey proteins occur as an in itself folded structure in the milk/whey. Through heat denaturation and systematic shear stress the original bonds are broken up and new bonds are formed. Thus whey protein spheres with a mean diameter of 2 - 7 μm can be produced.

Product structure is very creamy and flavour in the mouth is excellent.
We therefore call it CreamoProt™ .

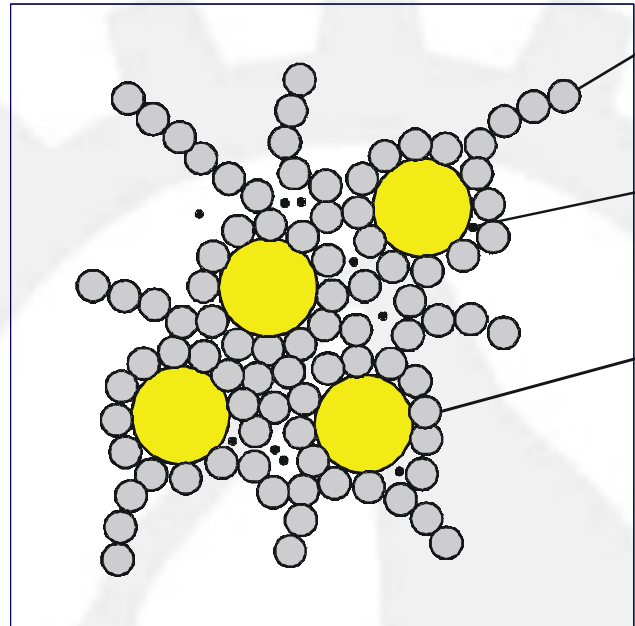


Ideal distribution of the diameters of particulated whey proteins $d_{50,3}$ approx. 2.0 – 7.0 μm

Particulation of whey proteins requires pre-concentration of the whey via UF.

Integration

Acid- / rennet gel



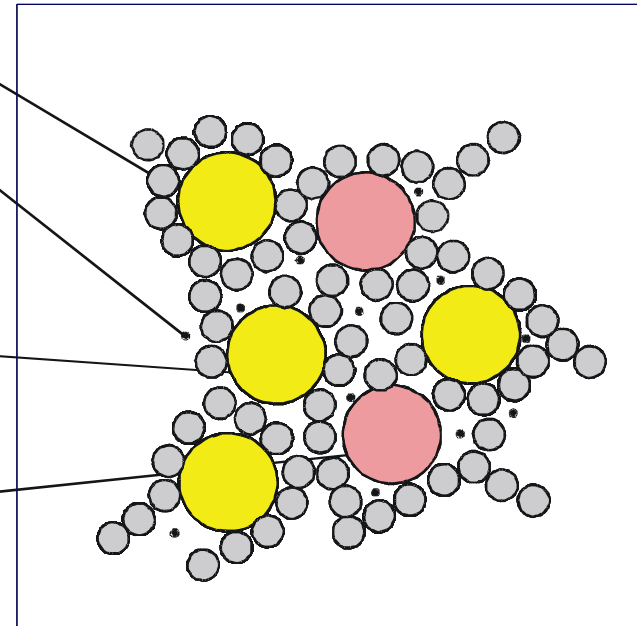
Casein
(100 - 300 nm)

Whey protein
(3 - 5 nm)

Fat
(1 - 10 μm)

CreamoProtTM
(1 - 10 μm)

Acid- / rennet gel
with CreamoProtTM

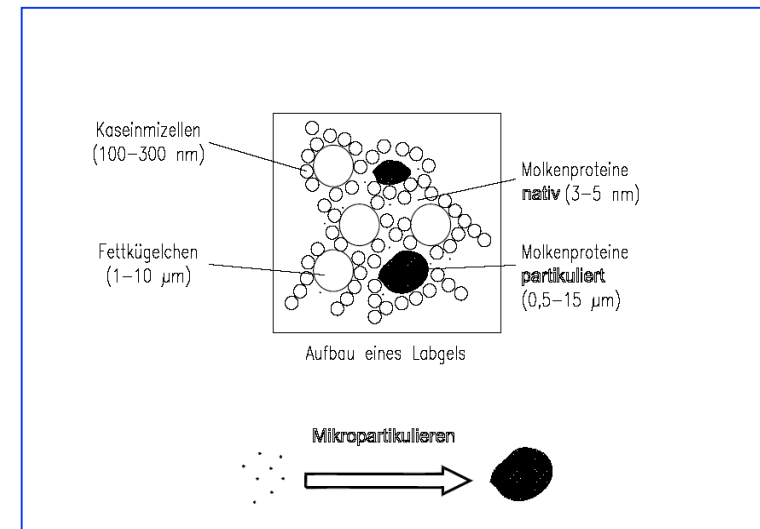


From: Hinrichs, 2007

➔ Whey protein particles (CreamoProtTM) are retained in the gel matrix like fat globules

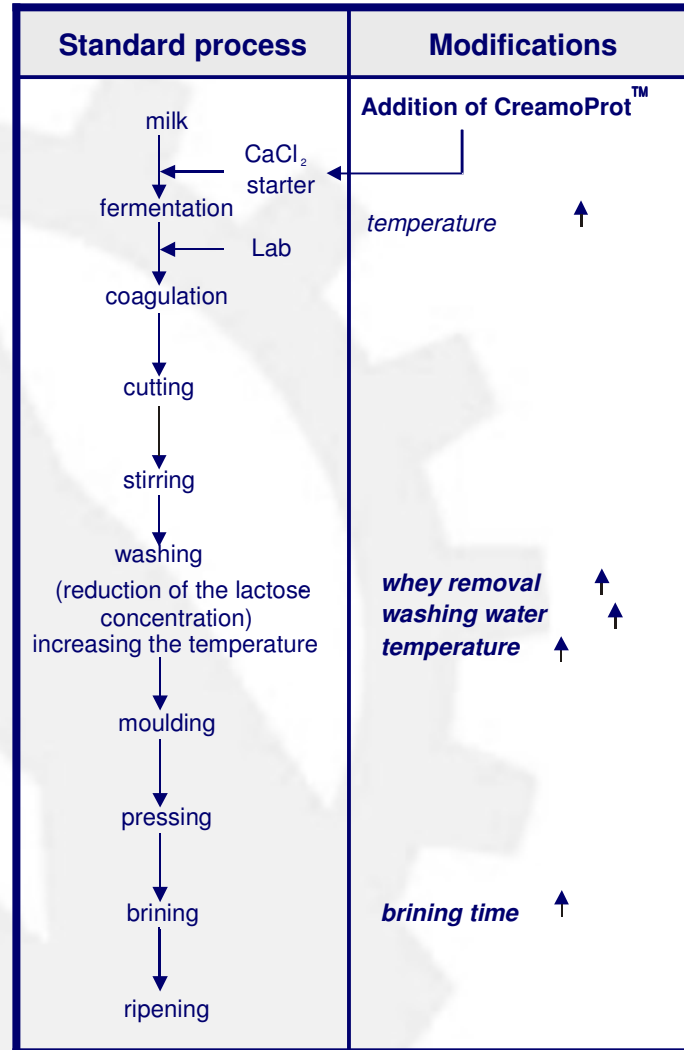
Determination of yield increase

- ➔ In the tests up to 65 % of the added whey protein particles **CreamoProt™** could be integrated in feta or white cheese
- ➔ The sensory properties of feta with fat were improved significantly.
- ➔ Yield increases between 3 % and 6 % are possible

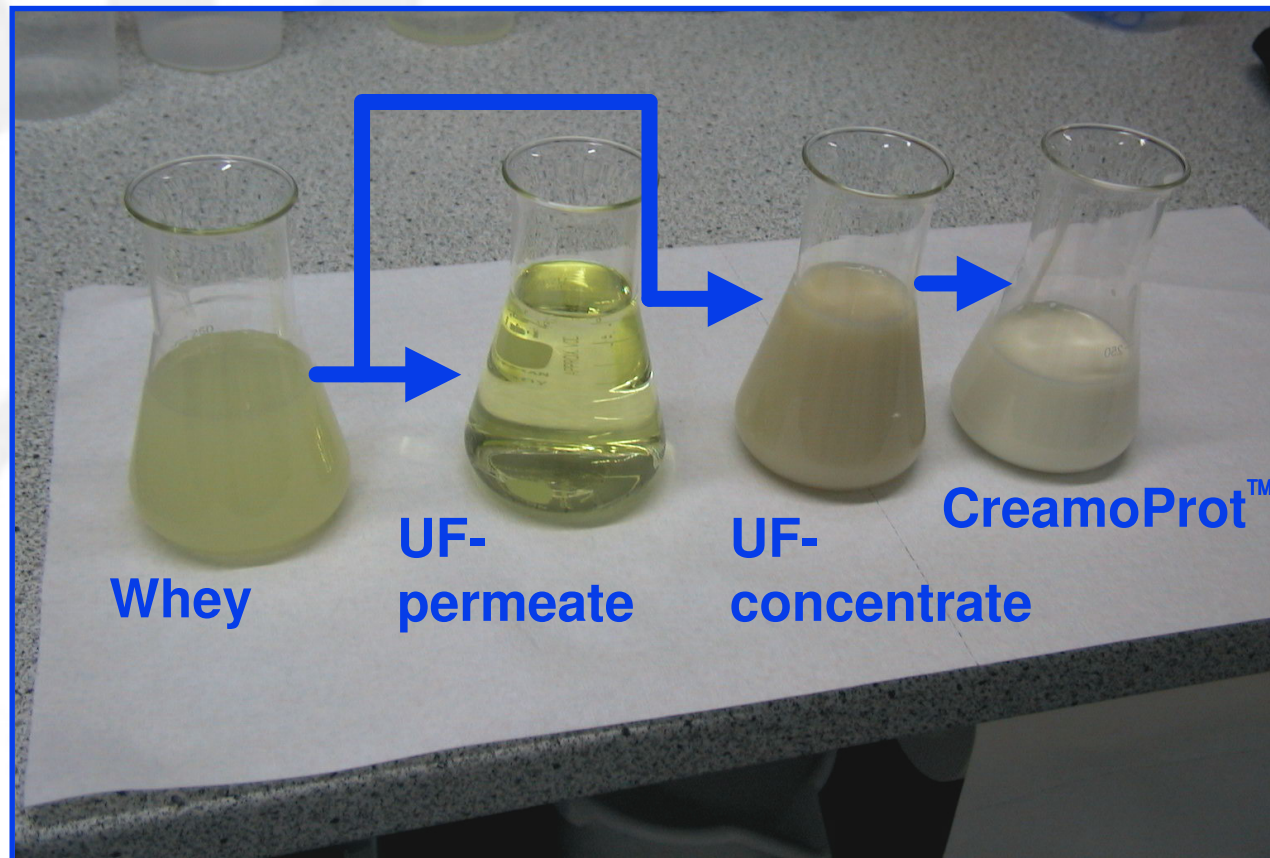


From: Huss/Spiegel

Process modifications/Fat replacer



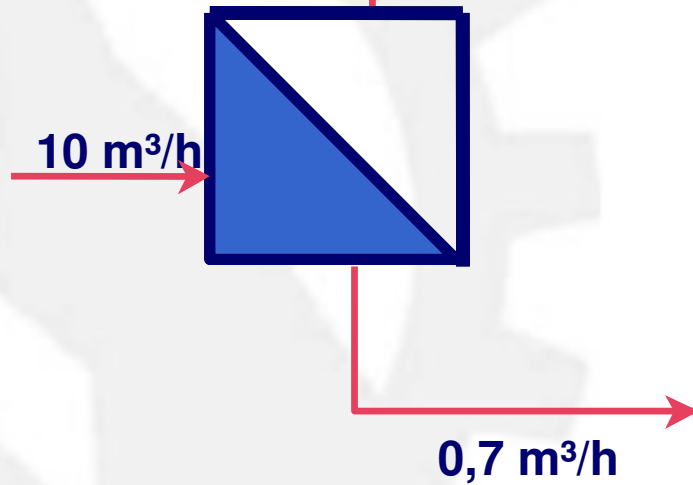
Product CreamoProt™, sweet whey



UF pre-concentration of whey proteins for the production of particulated whey concentrate (CreamoProt™)

concentration-factor: 15

<u>Feed</u>	
TS:	5,98 %
Protein:	0,73 %
NPN:	0,20 %
Lactose:	4,45 %
Ash:	0,55 %
Fat:	0,05 %



<u>Permeate</u>	
TS:	5,11 %
Protein:	0,03 %
NPN:	0,17 %
Lactose:	4,40 %
Ash:	0,51 %
Fat:	0,00 %

<u>Retentate</u>	
TS:	17,51 %
Protein:	10,00 %
NPN:	0,54 %
Lactose:	5,15 %
Ash:	1,07 %
Fat:	0,75 %



Process parameters/influence factors

- ➔ High whey quality (whey from 1st whey extraction and curd filling, no dripping whey)
- ➔ Immediate further processing (cheese fines removal, skimming, pasteurisation, cold storage)
- ➔ UF pre-concentration:
- ➔ Heat denaturation & shear stress of the UF concentrate and holding time
- ➔ Cold storage and quantity-proportional dosing into the cheese milk

Division Process Technology



CreamoProt™ - complete plant sweet whey



Pilot plant for particulation CreamoProt™



Test no. 1: Feta 45% fat in dry matter
without and with CreamoProt™

Test no. 1, standard



Test no. 1, feta with 2% particulate



Advantages

- ➔ Added value: whey refinement remains in-house, cost savings
- ➔ Known origin and controllable quality: own fresh whey is utilised in-house
- ➔ simplification of process: no costly storage, mixing and dissolving of dry powders required
- ➔ Increase in yield of approx 3 – 6 % with existing cheese equipment capacity
- ➔ Quality improvement (creaminess and sensory properties) of low-fat cheese products

Years 2000 - 2007

Planning, construction and put into operation including control and electrical engineering

- CreamoProt-plant with a capacity of 1.500 l/h for Hard cheese whey (Austria - 2000)
- CreamoProt-plant with a capacity of 1.500 l/h for cottage-cheese-whey (Austria - 2005)
- CreamoProt-plant with a capacity of 1.000 l/h for sweet whey (Poland - 2006)
- CreamoProt-plant with a capacity of 500 l/h for sweet whey (Germany - 2006)
- CreamoProt-plant with a capacity of 500 l/h for sweet whey (Italy - 2006)
- CreamoProt-plant with a capacity of 1.000 l/h for sheep whey (Greece - 2006)
- CreamoProt-plant with a capacity of 1.000 l/h for sheep whey (Greece - 2007)
- CreamoProt-plant with a capacity of 1.000 l/h for acid whey (Spain - 2007)
- CreamoProt-plant with a capacity of 250 l/h for acid whey (USA - 2007)
- CreamoProt-plant with a capacity of 1.800 l/h for white cheese whey (Turkey - 2008)
- CreamoProt-plant with a capacity of 1.500 l/h for ideal whey (France - 2008)