Versatile quality processed cheese
with flexible Nutrilac® solutions


VISCOSITY

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Making processed cheese?

Processed cheese is an extremely versatile product, characterised by its optimal shelf life and broad functional benefits. Processed cheeses have been produced for more than 100 years, in ever increasing volumes, and approximately 12% of the current global production of natural cheeses is used as ingredients in processed cheese production.

The numerous applications, possible ingredients and production methods used for processed cheese products, make functional milk proteins a perfect choice to optimise all processed cheese formulations and processes.

Try functional milk proteins!

Arla Foods Ingredients' functional milk protein solutions can partly replace natural cheese as an ingredient and help improve the quality of your processed cheese products. These solutions can provide the following advantages:

- Improved sensory qualities and milky flavour
- Improved emulsification effect and texture
- Effective fat simulation
- Cost optimisation through:
  … simplified processes
  … natural cheese substitution
  … improved water binding properties

The Manufacturing process

Processed cheese products are produced by melting and emulsifying cheese via a thermal process. The cheeses are selected by flavour profile, fat and moisture content, and then grated and mixed with emulsifying salts, milk fat, milk proteins, milk solids and water in different amounts. It is also common to add other ingredients as desired, such as aromas, colouring agents, ham, mushrooms, and spices.

Processed cheese contains 10-70% natural cheese and it contributes not only to taste, but also to the structure and functionality of the processed cheese. The percentage is highly dependant on the level of intact casein in the used cheeses, which is regulated by mixing young cheeses with more ripened cheeses in the formulations.

Thermal treatment is performed in powerful batch cookers, with pasteurisation temperatures varying from 70°C to 95°C, and is often combined with a UHT treatment to increase the shelf life of the end product. In some markets the combination of ingredients and the thermal treatment defines the processed cheese type.

Uses of processed cheese

Processed cheese is used in many different ways – as a slice in a toasted sandwich or burger, shredded on pizzas, in Cordon Bleu type products, as a spread on bread, as a dip for snacks, or even for cheese sauces, or as an ingredient for ready meals.

Challenges facing producers

There are a number of recognised challenges that can affect the quality and cost effectiveness of processed cheese.

The main challenges for the producers are as follows:

- Controlling textural properties
- Reducing the need for natural cheese ingredients
- Producing high quality low fat products
- Lowering sodium content
- Optimising the production process

Better control of textural properties

The properties of processed cheeses, such as spreadability, shreddability, sliceability, meltability, remeltability, etc., are of utmost importance for producers. These properties are highly dependant on the type of cheese ingredient, and the degree of proteolysis in this cheese.

Producers try to be in control of this by mixing different cheese types, at young, medium ripened and ripened stages, and then combining them with different emulsifying salts.

Using different natural cheeses often causes variations in the processed cheese properties, and the functionality of the cheese will change from time to time because of this. Stabilisers are often used to create better control of the described parameters, which of course has an immediate effect on the processed cheese labelling.

Functional milk proteins are a perfect choice to overcome this. They offer the possibility to control the key textural properties of processed cheeses in a natural way, and thereby create less variation in the product quality over time.

Reducing natural cheese ingredients

As described, it is possible to adjust the textural properties in processed cheese with functional milk proteins, but another interesting prospect, is the possibility for you to reduce the need for natural cheeses in your formulations.

The amount of natural cheese needed is often as high as 50-70% in total, requiring large quantities of cheese to be purchased and stored every year.
Before use, the cheeses must be evaluated, unpacked, and grated, before it is ready to be added to the processing equipment (batch cooker etc.).

It is an attractive proposal to reduce the need for natural cheese, especially for those who don't produce it themselves. A viable and cheaper alternative is to replace the raw material cheese with functional milk proteins, water and butter (or vegetable fat if desired).

For example, reducing the amount of natural cheese from 60% to 30% can easily be done with our functional milk protein solutions, without compromising on textural properties or taste.

It is even possible to reduce the desired total amount of cheese to below 10%, but we then recommend boosting the cheese flavour by using cheese powder, enzyme modified cheese (EMC) or cheese flavours.

Producing high quality low fat products

Low fat processed cheeses are challenging to produce, and they have a tendency to have a jellified and rubbery texture, often combined with a dry mouthfeel and transparent appearance.

One of the big advantages when using our functional milk proteins in your processed cheese formulations is that they are able to imitate fat in cheese products. This gives a significantly creamier, soft textured and less transparent processed cheese.

Lowering total sodium content

In the western world consumers typically eat 2-5 times more sodium than is recommended by dieticians and this can increase the potential risk of developing cardiovascular diseases!

It is therefore a growing trend to reduce the sodium content in food stuffs as much as possible. Processed cheese is one of the products in focus, as these products contribute to sodium intake, from both emulsifying salts, as well as from NaCl.

AFI has been able to develop high quality formulations for processed cheese products that reduce sodium content by more than 50% compared to standard products. This is achieved by using our specific milk protein fractions, in combination with an altered manufacturing process.

Optimisation of production process

It is possible to alter the processed cheese manufacturing process, in a way that offers clear advantages to the producer. If you reduce natural cheese as the main ingredient in processed cheese formulations, and replace it with functional milk proteins, water and fat, the results can be impressive!

The time used for cleaning and grating the cheese can be significantly reduced, and, in some cases, fully removed from the production line. Additionally, the typical creaming time needed of 20-60 minutes, can easily be reduced to 2-10 minutes when taking full advantage of functional milk proteins in your production!

This means that you can reduce the total processing time, reduce the size of the creaming tanks, and have much less product to rework if you have a break down in your production line.

Improved processed cheese

Arla Foods Ingredients can help to solve some of the major challenges processed cheese producers face, by utilising the functionality of our milk protein solutions.

Our main working areas within the processed cheese application are:

1. Blocks & slices
2. Spreads & portions
3. Sodium reduced processed cheeses
4. Processed cream cheeses (jar cheese)
5. Cheese snacks

For all of these solutions, AFI offers expertise and knowledge regarding optimal processing equipment, parameters and production in general.

Blocks & slices

This category of processed cheese includes products that very much resemble natural cheeses in terms of hardness, sliceability, and shreddability. They are also often used in sandwiches, toasted sandwiches, on pizzas and in burgers etc.

The production takes place in batch cookers, and the cheese mass is either made into blocks, or filled inside plastic foils. Herbs and spices can be added to the blocks, and they can also be smoked to bring a delicious flavour profile to the cheese product.

The blocks are either sold as blocks, where they are sliced or shredded later, or they are sliced after 3-5 days and packed as slice on slice (SOS) toast cheese. When the slices are filled directly into a plastic foil, they are sold as individually wrapped slices (IWS) typically in stacks of 10 pieces.

Typical processed cheese blocks and slices have dry matter contents (DM) in the range of 50% – 58%, and fat in dry matter (FIDM) from 45% – 60%.

For these products, AFI offers a full range of solutions that gives you the following possibilities as a producer:

- Fully recombined formulations
- Formulations with 10-40% natural cheese
- Reduction of caseinate/rennet casein in your formulations
- Optimised sliceability and shreddability
- Controlled remeltability
- Improved flavour and consistency of your low fat product range

Sliceable block cheese

Ingredients	
Nutrilac® CH-7694	10.00%
Cheese, Cheddar 50+, mature	5.00%
Cheese, Cheddar 50+, mild	16.00%
Skimmed milk powder	7.00%
Emulsifying salt, Joha PZ 7	1.85%
Salt, NaCl	0.50%
Citric acid	0.15%
Butter, unsalted	28.00%
Water, tap	22.50%
Water, condensate	9.00%

Nutritive values	
Protein	15.7%
Fat	30.2%
Carbohydrates	4.8%
Total Solids	55.0%
Fat In Dry Matter	55.0%

Process

Add to batch cooker	cheese, fat and water
Indirect heating	45°C, 750 r.p.m., blunt knife
Add rest of dry ingredients	mixing 3 min., 750 r.p.m.
Adjust pH (citric acid)	pH 5.7
Mixing	3 min., 750 r.p.m.
Indirect heating	50°C, 750 r.p.m.
Holding time	30 seconds
Direct heating	to 85°C, 750 r.p.m.
Pasteurisation	85°C, 2 min., 750 r.p.m.
Filling	
Final cooling	to 5°C

Spreads & portions

Spreadable processed cheeses are recognised as having a smooth and spreadable consistency, often mixed with ham, herbs & spices, and filled in tubes, beakers, or jars or wrapped in foil as portions.

Typical processed cheese spreads have a dry matter content (DM) in the range of 33% – 50%, and fat in dry matter (FIDM) from 20% – 60%.

In this category, AFI offers a full range of solutions that gives you the following possibilities as a producer:

- Fully recombined formulations
- Formulations with 10-40% natural cheese
- Reduced day to day quality variations
- Improved flavour and consistency of your low fat and low sodium product range
- Cost effective alternatives to your current formulations

All of our solutions for this category meet the specific requirements for spreadability, creaminess, peelability, shininess and filling viscosity that producers expect and require.

Low sodium processed cheeses

Processed cheese is recognised as a significant source of sodium for consumers, because of the sodium phosphates and citrates that are used to emulsify the cheese, but also as NaCl is added to intensify the flavours of the products.

There is a growing consumer focus on reducing this sodium intake, as a lot of consumers are a long way above the daily recommended dosage. The ability of producing low sodium products is then an interesting prospect for any processed cheese producer wanting to expand their portfolio.

AFI has solutions for this. We can take full advantage of the emulsification properties in milk proteins, and are able to reduce the total sodium content significantly!

In this category, AFI offers a natural way to reduce the sodium content in processed cheeses that gives you the following advantages as a producer:

- Processed cheese products with more than 50% sodium reduction
- Improved emulsification effect
- Fast production method – without the need for creaming

Low sodium processed cheese spread

Ingredients	
Nutrilac® CH-6540	8.5%
Cheese, Gouda 48+	38.0%
Butter, unsalted	11.4%
Citric acid	0.1%
Water, tap	34.0%
Water, condensate	8.0%

Nutritive values	
Protein	14.3%
Fat	21.0%
Carbohydrates	1.6%
Total Solids	40.6%
Fat In Dry Matter	51.8%
Sodium*	370-390 mg/100 g

** Typical market sample with 30-40% cheese: sodium content 900-1200 mg/100 g*

Process

Add to batch cooker	cheese, fat and water
Indirect heating	40°C, 1500 r.p.m.
Add rest of dry ingredients	mixing 5 min., 1500 r.p.m.
Adjust pH (citric acid)	pH 5.5
Indirect heating	50°C, 1500 r.p.m.
Holding time	30 seconds
Direct heating	to 85°C, 1500 r.p.m.
Pasteurisation	85°C, 5 min., 1500 r.p.m.
Homogenisation**	200 bar
Filling	
Final cooling	to 5°C

** Homogenisation can be avoided by adding a small amount of emulsifying salt and NaCl to the product initially (approx. 600 mg Na/100 g final product)

Processed cream cheese (jar cheese)

This special kind of processed cheese, sometimes also described as jar cheese or processed fresh cheese, is very well known in the Middle East region, where it is one of the most consumed dairy products.

It differs from other kinds of processed cheeses, as it includes a fermentation step with mesophilic lactic acid cultures, prior to the addition of emulsifying salts and final processing.

As a producer of processed cream cheese, AFI can offer you the following advantages through our product solutions:

- Fully recombined solutions
- Creamy and shiny end products
- Optimum texture profile throughout entire shelf life period
- Improved water binding effect
- Improved mild dairy flavour
- Improved flavour and consistency of your low fat product range

Cheese snacks

Processed cheese has become a popular choice in the snack category, or as part of many starter dishes.
It can be used as cheese sticks in different shapes, colours and flavours, as well as breaded cheese fingers and balls; to be fried or heated in a microwave.

The main requirements for these processed cheese products, is that they need to be frying stable, and non-sticky when consumed hot.

For these products, AFI offers a full range of solutions that gives you the following advantages as a producer:

- Smooth textured and mild tasting solutions
- Controlled remeltability

Deep fried cheese fingers

Ingredients	
Nutrilac® CH-7694	9.0%
Cheese, Cheddar 50+, mature	19.0%
Cheese, Gouda 48+	46.0%
Butter, unsalted	9.0%
Salt (NaCl)	1.0%
Emulsifying salt, Joha PZ 7	1.5%
Alginate, Grindsted FD 155	0.4%
Water, tap	5.1%
Water, condensate	9.0%

Nutritive values	
Protein	22.4%
Fat	27.0%
Carbohydrates	1.1%
Total Solids	58.4%
Fat In Dry Matter	46.3%

Process

- Add to batch cooker — cheese, fat and water
- Indirect heating — 40°C, 750 r.p.m.
- Add rest of dry ingredients — mixing 5 min., 750 r.p.m.
- Adjust pH (emulsifying salt) — pH 5.4
- Indirect heating — 50°C, 750 r.p.m.
- Holding time — 30 seconds
- Direct heating — to 80°C, 750 r.p.m.
- Pasteurisation — 80°C, 5 min., 750 r.p.m.
- Filling
- Rapid cooling — to 5°C

- Ready for slicing after 3 days
- Place in batter mix and bread crumbs
- Deep frying

Recommended Nutrilac® solutions for processed cheese production

Nutrilac® solution	Blocks & slices	Spreads & portions	Low sodium concept	Processed cream cheese	Cheese snacks
Nutrilac® CH-4560	+	+		+	
Nutrilac® CH-6540			+		
Nutrilac® CH-7694	+	+		+	+

Frequently asked questions

Will the same emulsifying salts have the best function when replacing natural cheese with functional milk proteins?
No, not automatically. It is often necessary to change the type of emulsifying salts, when your processed cheese formulation is based on functional milk proteins. At AFI we have the experience to help you choose the most appropriate emulsifying salt for your production.

Will functional milk proteins be able to cope with a UHT treatment, which is often used for processed cheese production?
Yes, the solutions that we recommend for retort stable productions are “retort stable”.

Will the cheese flavour be affected, if e.g. 30-40% of natural cheese is replaced in the formulation?
No, this is almost never a problem. Often you will be surprised how much flavour 20-40% natural cheeses will bring to a processed cheese. If further flavour enhancement is required, we have the expertise to guide in the use of cheese powders and EMC´s.

What are the optimal Nutrilac® storage conditions?
AFI’s Nutrilac® solutions are stable when stored at ambient temperature. The product has a minimum one year storage life if kept under the prescribed storage conditions. A cooler storage temperature will give an even longer shelf life.

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