Methods of reduction of sodium chloride in cheese

Reduction of NaCl in cheese

Identification

Key words
Salt concentration, cheese, taste enhancer

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How does it work?

Primary objective
To reduce consumed NaCl content in cheese, without affecting the taste or structure in order to minimize the side health effect especially for elderly people with lower intake of drinks.

Working principle
Reducing the sodium chloride content of cheese presents particular challenges to cheese makers since salt has many roles in cheese. There are more approaches based on different working principles:

It is known that while eating there is the transfer of various elements and substances occurring during the release of salt from different kinds of cheese into saliva. This can be considered as an effective diffusion process where the two co-ionic species Na+ and Cl- seem to diffuse together as their respective concentration profiles are well superimposed. The value of the diffusion coefficient depends on the cheese composition (structure and texture). When the diffusion process is adequate it is possible to reduce the amount of used salt in the matrix [1], [2].

Another approach proved the salt content reduction by replacing sodium salts with sodium/potassium blends. Even though the used amount of potassium needs to be controlled with respect to possible change in development of metallic, bitter, and other off-flavours. (mixtures of NaCl/KCl (3:1 or 1:1, w/w basis) and filling the cans with brine made with NaCl or the NaCl/KCl mixtures, result: up to a 50% reduction of sodium content in Feta cheese is feasible, with partial replacement of NaCl by KCl, without an adverse effect on its quality) [3].

The use of taste enhancers, such as monosodium glutamate, hydrolyzed vegetable protein, and yeast extracts, is another alternative for reducing sodium content in food. New trend appeared to be an interesting and efficient solution for salt reduction. The effect is provided by substitution of the alanine moiety in alapyridaine by an arginine moiety revealed a one-dimensional taste enhancer exclusively increasing the human sensitivity for salty taste [4], [5], [6].

Images

Additional effects
Off-flavours when added amount (of taste enhancer) exceeded.

Important process parameters
Diffusion coefficient.

Important product parameters
Chemical composition of used substances, their quantities.
What can it be used for?

**Products**

There is now 33 per cent less salt in Dairylea Cheese Spreads (tubs and portions), Cheese Slices, Strip Cheese and Dairylea Dunkers, compared with pre-reduction levels. Kraft reduced the salt in Dairylea Lunchables by one third, with the salt content of the average pack falling from 3.1g to 2.1g.

Feta cheese up to 50% sodium content.

It can be used too for wide scale of food products (bread, meat, ready to eat products i.e.).

**Operations**

Salting

**Solutions for short comings**

Existing cheese making technologies use the Natrium chloride (salt) in large quantities. There is the need to lower the salt content in these products, especially when aimed at elderly consumers.

Taste enhancers represent a challenge for the future of food industry and together with the conventional used technologies the protection of consumers (f.e. in a sense of high salt content) can be offered.

What can it NOT be used for?

**Products**

Not observed or specified.

**Operations**

The taste enhancers are often peptide based. They can be unstable during processing and degraded or modified while microbial maturation

**Other limitations**

Legislative requirements.

Recipe and technological cheese processing

**Risks or hazards**

- Undesired taste effects (off-flavours) which is dependent on used substances and quantities.
- Precaution is required while selecting the proper amount of salt and taste enhancer due to the cheese recipe to avoid difficulties or changes in the individual cheese characteristics (from the technological point of view).
- Changing the sensory proprieties of low salt cheese.
- Shorter shelf-life: Modelling techniques enabling firms to predict how a reduced salt product would behave over its shelf-life after factoring in a range of variables (storage temperatures, pH, water activity, preservatives, temperature) were increasingly being used to predict the impact of reformulation on shelf-life and food safety. (Campden BRI)
- Retaining quality and safety.
- Reduced levels of NaCl showed an increase in adhesiveness, cohesiveness, acidity, bitterness, unpleasant aftertaste, and a concomitant decrease in firmness and saltiness.
- Cheese with less salt supported higher lactic acid bacteria populations.

Implementation

**Maturity**

It has been tested on various food products.

**Modularity**

It can be inserted in an existing production line.

**Consumer aspects**

Consumers are interested in products with lower salt and fat contents but on the other side they are not willing to make a reduction of the quality and especially the taste of the food and do not want to minimize the sensorial experience of the product.
Legal aspects

- Regulation no. 1334/2008/ES
- Regulation no. 2232/96/ES
- ČSN 56 9801 – Food flavours and aromatic substances

Food and Drink Federation Salt leaflet outlines what salt and sodium are and sets out practical guidance on how to reduce our sodium intake.

Environmental aspects

Not known, no.

Facilities that might be interesting for you

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Further Information

Institutes
- INRA, CDR UW-Madison, DFA, WWU Münster IL

Companies
- Nu-Tek, Kraft Foods

References