Salt replacers in meat and fish products

Identification

Key words  
salt replacer, meat product, fish product

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How does it work?

Primary objective  
The aim of the technology or modified formulation is to decrease the salt content in meat and fish products while keeping the sensorial and cooking quality (water loss during thermal processing).

Working principle  
Review of salt replacers for meat products [1] gives brief overview of recently examined cases. Transglutaminase enzyme combined with sodium caseinate, KCl and wheat fibre were tested as salt replacer in frankfurters. The greatest efficiency as predicted by hardness, springiness and chewiness together with water- and fat-binding properties (emulsion stability and cooking loss), was predicted for transglutaminase combined with sodium caseinate [2]. Beta-glucan [3] can replace part of the NaCl in high pressure treated chicken breast protein (treated at 40°C). KCl, MgCl2, CaCl2 combined with 0.4 % sodium tripolyphosphate and tripotassium phosphate salt replacers were tested on how they influence the water content, water holding capacity, emulsion stability and extractable salt soluble proteins of chicken meat emulsion [4]. Emulsions with KCl level up to 1% and MgCl2/CaCl2 up to 0.5 % along with phosphates can be used in product preparation with acceptable above mentioned properties. Salt replacers can have the antimicrobial effect in meat and meat products. The important consequence of salt replacers for microbial stability of cooked ham and white sauce (spoilage microorganism Lactobacillus sakei) was described in [5]. As salt replacers, CaCl2, MgCl2, KCl and MgSO4 were tested. Decrease of salt content by 28 % of the original value had no effect on ham stability (L. sakei as target microorganism). Differences in chloride content can be explained by the different chemical composition of the salts and granulometry. Potassium Lactate, Glycine and Potassium chloride in Fermented Sausages and Dry-cured Pork Loin can be used as natrium chloride substitute [6]. Calcium ascorbate was tested as a potential partial substitute for NaCl in dry fermented sausages [7].

Images

Additional effects  
The important side effect of this technology is the problem of changed water activity and pH that can influence the food stability. As a consequence of salt reduction, there is a risk of less microbial stability of meat and fish products.

Important process parameters  
heat treatment intensity, use high pressure pasteurisation

Important product parameters  
salt reduction rate, sensorial properties, heating properties (juice loss), combination of salt replacers, combination of salt reduction with some other operation – hurdle effect.
What can it be used for?

**Products**
- Meat and fish products (meat emulsions).

**Operations**
- Stabilisation, structure forming.

**Solutions for short comings**
- Advice how to reduce the salt content in meat and fish product and keep the quality and microbial stability at the same time.

What can it NOT be used for?

**Products**
- Not known.

**Operations**
- Simple decrease the salt content without any study of the changed microbial stability and shelf life.

**Other limitations**
- Changes in sensorial quality.

**Risks or hazards**
- Lowering of salt content opens the window for microbial growth. New challenge tests are recommended for given product before market release.

Implementation

**Maturity**
- New products with reduced salt content are already marketed but this area still needs research and development efforts mainly on the factory level.

**Modularity**
- This technology does not need any special equipment (meat and fish products are formulated mostly in meat cutter or mixer).

**Consumer aspects**
- Good quality products with lower salt content are welcomed by consumers seeking for healthier products.

**Legal aspects**
- No regulation is valid, there are recommendations only (WHO) for salt reduction daily intake. Food safety regulations have to be re-considered for each novel products with aim whether new product fall or not within limits of products supporting the survival and growth of pathogens (L. monocytogenes, E. coli O157:H7 etc.)

**Environmental aspects**
- Lowering salt content may increase energy demand on pasteurisation of meat products (longer holding times on temperature).

Facilities that might be interesting for you

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<thead>
<tr>
<th>Title</th>
<th>Institute/company</th>
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<tbody>
<tr>
<td>Batchmixer - HES-SO Valais-HEI</td>
<td>HES-SO Valais-HEI</td>
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<td>Laboratory mixer - TTZ</td>
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<td>UIP1000hd Ultrasonic Processor - TTZ</td>
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Further Information

**Institutes**
- University of Limerick, University of Hohenheim, Instituto de Ciencia y Tecnología de Alimentos y Nutrición, Catholic University College Ghent, Ghent University - NutriFOODchem, University of Alberta AFNS, AZTI Tecnalia

Source: