



Strengthening knowledge on low salt products



Sodium surplus

Evaluating the nutritional benefits of salt reduction against impacts on flavour and microbiological risks has enabled **SINTEF** researchers to gain valuable insight into this contentious but important debate

SALT HAS BEEN used for centuries to preserve food and improve its taste. However, in recent decades excessive salt consumption has led to significant increases in associated medical conditions, particularly in the developed world. In many European countries, much of the salt consumed by the public is hidden away in the processing of foods and snacks to prolong its shelf-life and increase microbiological safety.

The issue has now reached a critical point. According to the World Health Organization (WHO), only around 20 per cent of salt intake is actually under the control of the consumer, with a staggering 75-80 per cent added during food production. This means people are generally unaware of the level of salt they are consuming and how they can reduce it.

Several epidemiological studies have demonstrated that high salt intake is associated with increased risk of high blood pressure, a significant factor for the development of cardiovascular disease and stroke. It is also documented that intake of salt increases the risk of stomach cancers. As a result, WHO Europe has listed salt reduction as one of the five priority interventions in its most recent Action Plan for the implementation of the European Strategy on the Prevention and Control of Non-communicable Diseases (2012-16). In addition, individual countries are addressing the problem with their own policies. For example, the Norwegian health authorities recommend that adults reduce salt intake to a maximum of 6-7 grams per day before 2018, and then to 5 grams per day before 2025. How best to achieve this is the major question now facing health authorities and communities.

GETTING TO GRIPS

Research underway at SINTEF Fisheries and Aquaculture is exploring this conundrum by addressing knowledge gaps in Norway's industry and research institutions about low-salt products, with an emphasis placed on food quality, shelf-life and economy. PhD student and research scientist, Kirsti Greiff, is among the team measuring the effects of reducing salt content on the food matrix structure in relation to texture and sensorial properties. In addition, methods are being developed for shelf-life prediction in products with reduced salt, as well as identification of important changes in industrial processes and technologies necessary to support an increased shelf-life. "My work will

be successful if I find a simple and consistent method to measure sodium in foods; a method that can be made readily applicable for the food industry," Greiff reveals. "Furthermore, I hope to establish quantitatively appropriate combinations of salt substitutes for use in fish and meat products."

FOCUS ON SALT INTAKE

While various salt-reducing strategies have been employed across Europe for many years, one major shift has been to increase public information about the sodium content of products via a form of labelling designed to inform the consumer in the supermarket. However, the criteria for food products labelled with low salt or reduced sodium information are dependent on national governance and the type of product. As such, they can become confusing for the consumer.

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There is no official requirement for declaring salt contents in food or labelling of salt contents in Norway today, except for foods labelled with health-promoting effects. However, the Nordic countries do have a positive and voluntary food label known as The Keyhole, which identifies healthy food products within each food category. Foods labelled with the symbol contain less fat, sugars and salts, and more dietary fibres, than their counterparts. "The Nordic countries are evaluating the criteria for The Keyhole at present, and new requirements for the maximum allowable content of sodium in fish and meat products will appear in the revised version," Greiff notes.

New EU regulations on food information to consumers will be implemented during the coming years and the amount of salt (as opposed to 'sodium') in the product must be stated on the label. The work comprises case studies undertaken in close partnership with the food industry to increase knowledge related to the effects of reducing salt in specific products:



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This is a truly collaborative project in which a significant part of the Norwegian food industry is involved. They are using raw materials from both the marine and agricultural sectors and RTD institutes (Project leader SINTEF Fisheries and Aquaculture together with NOFIMA and NTNU), who are working together in a multidisciplinary fashion to address and resolve the main challenges involved in producing low-salt fish and meat products in order to meet health recommendations from the authorities and ensure that key consumer benefits are delivered. Food industry stakeholders have shown particular interest in obtaining better information for measuring sodium precisely, both in raw materials and end products. To this end, the study is also investigating the possibility of establishing a consistent non-destructive method for the determination of sodium – which, if successful, should be readily applicable for the food industry.

WIDELY COMMUNICATING RESULTS

The experimental part of this study has been completed and the focus is now on publishing

the results in high profile journals. The findings from the case studies are being communicated directly to the project partners. In addition, some of the data have been presented at national workshops on salt reduction and at international conferences.

Greiff and her colleagues have made some interesting discoveries, with preliminary results showing that salt can be reduced by 25-40 per cent in meat products, compared with present levels, and that it is possible to replace some of the sodium with potassium salt without negatively impacting taste. Model food products will be discussed and selected with industrial partners; low-salt versions will subsequently be produced. Plans are also in place to test the products in a sensory panel made up of industry representatives.

In sum, the work has highlighted the possibility of measuring salt quantitatively with non-destructive methods, although this needs further development and refinement before it can be applied in an industrial setting. From Greiff’s perspective, the results hold much potential in the effort to produce reduced-salt foods and support Norway’s drive towards a lower salt diet.

INTELLIGENCE

LOW SALT PRODUCTS

OBJECTIVES

The main goal is to strengthen the knowledge and competence in industry and research institutes on low salt products with emphasis on food quality, shelf-life and economy by:

- Measuring effects of reducing salt content on the food matrix structure in relation to food quality, emphasising texture and sensorial properties
- Developing methods for shelf-life prediction in products with reduced salt and strategies (eg. hurdle technology, salt substitutes) to maintain food shelf-life
- To identify industrial process and technological changes needed to ensure acceptable quality and shelf-life of low-salt products
- To develop decision models to facilitate optimal choice of profitable production technology
- Knowledge-based production of second generation low salt products

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FUNDING

Research Council of Norway

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KIRSTI GREIFF is working as a researcher and PhD student at SINTEF Fisheries and Aquaculture (SFH) and Norwegian University of Science and Technology (NTNU) in Trondheim. Previous to this, she worked for nine years in the Norwegian Meat industry with R&D, product development and dry cured products. The main focus in her PhD work and research is the reduction and replacement of sodium in fish and meat products and different measuring techniques for measuring sodium. She conducts her research in close collaboration with the food industry.



Sans salt

With low-salt foods a growing priority for the public and the food industry, **Kirsti Greiff's** research is contributing vital knowledge to the development of innovative new food products



Can you explain the key criteria for new low-salt food products on the market?

In some products, such as dry cured ham and salted fish, salt is very important for product characteristics and food safety, whereas in others, salt is added simply to enhance flavour and texture. One of the main strategies to decrease salt intake is through the reformulation of products by partial replacement of sodium by phosphates, yeast extract, other mineral salts and flavour enhancers. When developing new low-salt products, it is very important to be aware of how salt replacements may alter end-product properties such as taste and physicochemical properties, as well as issues related to food safety.

step-by-step; consumers will then gradually get used to a less salty taste. Considering competition in the market, I'm sure that the food industry is keen to keep solutions on achieving this in-house. Nevertheless, it will be necessary to broker dialogue between the food industry and authorities to establish realistic levels for maximum salt content in products. The positive effects of salt reduction must be weighed against issues related to altered product characteristics and microbiological safety.

Have you collaborated with other research organisations or industry professionals over the course of the project?

In the Low Salt Products project, financed by the Norwegian Research Council, researchers from SINTEF, NOFIMA and the Norwegian University of Science and Technology are collaborating with players from the food industry, including Mills, Stabburet, Nortura, Finsbråten, Brødrene Remø and Berggren. Several case studies have been carried out in close collaboration with industry partners. I have been visiting the Polytechnic University of Valencia for three months, where I have collaborated with Spanish researchers to test alternative instrumental methods for measuring salt at low levels.

Finally, why do you feel it is so important for PhD researchers such as yourself to be included in the project?

Educating PhD students is often one of the main goals in projects supported by the Norwegian Research Council. Therefore, much of the practical research is usually done by the PhD students with support from their supervisors. Ultimately, however, it will be important to translate the scientific findings to ensure our results are more easily accessible to the food industry.

What are the key objectives of your investigations into low-salt produce?

The key objectives of my investigations are to address the main technological and economic challenges related to taste, palatability, texture and shelf-life of fish and meat products with reduced salt, in order to produce healthier foods. I am studying how different sodium replacers such as potassium affect the properties of various products. Another important objective is to establish a method for measuring sodium in low-salt products. The method should be fast and appropriate for use in the food industry.

Why is there so much salt in what we consume?

Salt (sodium chloride) is the world's most established food additive, because of its excellent preservative effect and sensorial properties, and increased potential for food processing. This combination of factors has resulted in the use of salt at higher levels than necessary in most processed foods.

What challenges or existing problems does the food industry currently face in the attempt to reduce salt content?

Food manufacturers are faced with the dilemma of how to reduce the salt content of foods without losing their palatability, texture properties, processing yield and long shelf-life. It is possible to reduce the salt content in different products to a low level. However, if the sodium levels become too low, this can result in loss of water (drip loss), altered taste and softer texture. Moreover, salt replacers like potassium chloride are more expensive than sodium chloride and may have a bitter taste when added in high levels.

How are you focusing on assessing existing products while also contributing to new low-salt product development? What are your main priorities in this regard?

In my opinion, it would be a good idea for the Norwegian food industry to collaborate to reduce the salt content in processed foods