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Sensory acceptance of low-salt ready meals



Key external stakeholders:

Food manufacturers, food policymakers, food safety policymakers, food researchers

Practical implications for stakeholders:

Chilled ready meals are becoming increasingly popular but often contain appreciable amounts of salt. Food manufacturers are under increasing pressure from regulators and consumers to reduce salt in food. The present project focused on the impact of salt reduction and reformulation on sensory acceptability of low salt ready meals.

- The addition of key herbs and spices individually can help compensate for shortfalls in sensory acceptability for chilled ready-meals
- The addition of salt substitutes into all 3 frozen ready-meals made it possible to achieve the FSAI salt reduction targets of 0.63g salt (250mg sodium) per 100g in ready-meals and 0.58g salt (230mg sodium) per 100g in soup
- By adopting a gradual salt reduction strategy the following salt reductions could be achieved without adversely affecting sensory properties and consumer preference for the meals

Main results:

Sensory perceptions of low salt ready meals were investigated and the impact of reformulation on sensory acceptability was probed. Following were the main results:

- A number of herb/spice blends were formulated that resulted in acceptable sensory acceptability in comparison to meals with normal salt contents.
- The use of herbs and spices also increased the microbial stability of the meals and enhanced their antioxidant status.
- In conjunction with an industrial manufacturer the reformulated low salt meals were manufactured and analyzed for sensory acceptability using a consumer panel. In all cases the reformulated meals were of comparable sensory acceptability to their full salt counterparts.

Opportunity / Benefit:

The outputs of this project have shown that research driven reformulation can off-set perceived losses in flavour as a result of salt reduction. The strategies developed could be applied to a range of prepared foods and identify effective measures for reducing salt levels in foods without comprising on sensory acceptability. Expressions of interest in this research are welcome.

Collaborating Institutions:

University of Limerick; Dawn Fresh Foods Ltd.; All in All Ingredients

Teagasc project team:	Dr. Nigel Brunton (PI) Dr. Michelle Mitchell
External collaborators:	Dr. Martin Wilkinson (UL) Pr. Dick Fitzgerald (UL) Mr. John Quealy (Dawn Fresh Foods Ltd) Dr. Eoin Desmond (All in All Ingredients)

1. Project background:

Due to modern consumer lifestyles high quality chilled ready meals are now one of the fastest growing areas of demand within the Irish food industry with annual growth up to 10%. Consequently, this sector is a major driver of innovation and value-added growth. However, this sector faces serious challenges regarding the nutritional status of their products especially their high sodium content. Adverse consumer perceptions present a serious impediment to continued expansion. This project proposal seeks to proactively remedy these obstacles by (1) significantly reducing the sodium content in a range of chilled ready meals and (2) reformulate chilled ready meals using specialized ingredients with demonstrated benefits. European and national regulation (FSAI) on functional foods or ingredients bearing health claims now requires the food industry to provide scientific evidence for such activities, and this is a major focus of this project. Successful development of reduced sodium nutritionally enhanced chilled ready meals will provide the Irish Food industry with a scientific and technological platform to further expand the market for these products.

2. Questions addressed by the project:

The key questions addressed are:

- Could a range of innovative prototype chilled low sodium ready meals with enhanced nutritional, sensory and safety properties be developed?
- What are the consumers' perceptions on the prototype products developed?

3. The experimental studies:

A range of model chilled ready meals with sodium contents below current recommendations of FSAI or UK Food Standards Agency were produced and their sensory and safety properties were determined. Then a range of herbs and spices were assessed for antimicrobial, and antioxidant activities including both synergistic/inhibitory effects. The assays/techniques used involved flow cytometry, fluorescence activated cell sorting, physiological assays and determination of efficacy at laboratory scale and in finished chilled food products (soups, meat, vegetable and sauce combination products). The reduced sodium chilled ready meals were then reformulated with selected ingredient groups and Pilot scale manufacture and optimization of the selected products was carried out along with assessment of their sensory, nutritional and food safety properties.

4. Main results:

A principal objective of the present work was to develop a range of reduced salt ready-meals with enhanced sensory properties. It is hoped that the following recommendations to the ready-meal industry in Ireland will assist them in developing reduced salt products with enhanced taste properties which will ultimately help them to achieve the FSAI salt reduction targets of 0.63g salt (250mg sodium) per 100g in ready-meals and 0.58g salt (230mg sodium) per 100g in soup by 2012. The main outcomes of the study are summarized below:

- Adoption of a gradual salt reduction strategy made it possible to achieve the FSAI salt reduction targets of 0.63g salt (250mg sodium) per 100g in chicken curry and chilli con carne frozen ready-meals.
- The addition of salt substitutes also made it possible to achieve the FSAI salt reduction targets
- Additional reductions in salt content can be achieved by using combinations of herbs and spices without compromising sensory acceptability. The following product specific recommendation can be made for chilled ready-meals:
 - Incorporation of 0.25% of a spice blend consisting of 1.5 parts garlic, 2.5 parts rosemary, 2.5 parts oregano, 2.5 parts sage and 1 part pimento into reduced salt cottage pies results in acceptability scores higher than those of the commercial regular salt cottage pie
 - A mixture of garlic, rosemary and sage (2.5:1.5:1), added at a concentration of 0.1%, significantly improves the acceptability of reduced salt chicken supreme ready-meals.
 - The addition of spice blends in vegetable soup ready-meals is not recommended due to the

negative effect on the sensory properties on the meals.

5. Opportunity/Benefit:

Food manufacturers are under constant pressure from regulators to reduce salt levels in foods. Ready meals make a significant contribution to daily salt intakes and are increasing in popularity. The outputs of this project have shown that research driven reformulation can off-set perceived losses in flavor as a result of salt reduction. The strategies adopted could be applied to a range of prepared foods and identify effective measures for reducing foods without comprising on sensory acceptability.

6. Dissemination:

Results were disseminated at several Relay workshops and presentations are available at the following link: <http://www.relayresearch.ie/Public/Restricted/WorkshopComplete.aspx?WorkshopID=631>

Main publications:

- Mitchell, M., Brunton, N., and Wilkinson, M. (2009). Optimization of the Sensory Acceptability of Reduced Salt Chicken Curry Ready Meal. *Journal of Sensory Studies*, 24(1), 133-147.
- Mitchell, M., Brunton, N.P., and Wilkinson, M.G. (2009). Sensory acceptability of a reformulated reduced salt frozen ready meal. *Journal of Foodservice*, 20(6), 298-308.
- Mitchell, M., Brunton, N.P., and Wilkinson, M.G. (2011). Current salt reduction strategies and their effect on sensory acceptability: a study with reduced salt ready-meals. *European Food Research & Technology*, 232(3), 529-539.

Popular publications:

- Mitchell, M and Brunton, N. (2010). Reducing salt in ready meals. *TResearch*. (2), 12-13.
 - Mitchell, M., Brunton, N.P., and Wilkinson, M.G. (2011). Impact of Reducing Salt on the Instrumental and Sensory Flavour Profile of a Vegetable Soup. *Food Research International*, 44, 1036-1043.
 - Mitchell, M., Brunton, N.P., and Wilkinson, M.G. (2011). Sodium and ready meals: a survey of Irish consumer awareness. *International Journal of Consumer Studies*. Doi: 10/1111/j.1470-6431.2011.00997.
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