

REDUCING SALT: A CHALLENGE FOR THE FOOD INDUSTRY

An Ingredients Perspective

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AllinAll Ingredients



Presentation Outline

- **Introduction to AllinAll**
- **Salt Reduction**
 - Background
 - Functions of Salt
 - Approaches to Salt reduction

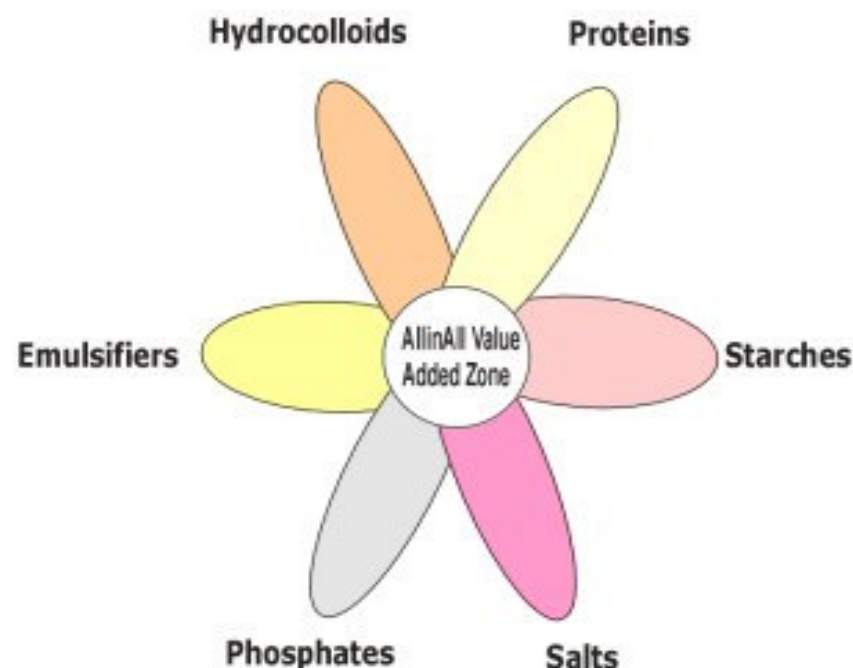
What does AllinAll do?

We design blends that make ingredients work harder to achieve our customers objectives.

To achieve this we maximise the synergies between the ingredients chosen

Products include:

- Cures & Brines
- Sausage Seasonings
- Burger/Patty Seasonings
- Batters & Breadings
- Flavoured Glazes & Marinades
- Functional blends for bakery/
dessert applications, ready meals etc. etc.



Salt Reduction



Salt Reduction-Background

- 1994:** Committee on Medical Aspects of Food And Nutrition (COMA) recommended reducing average salt intake from 9g/day to 6g/day
- 2002:** Project Neptune (UK) - an industry-wide sodium reduction programme in the soups and sauces sector.
- 2003:** Scientific Advisory Committee on Nutrition (SACN) launch report on Salt and Health
- **found average intake of salt was 10g/day (8-13g/day)**
- 2004:** FSA (UK) campaign on salt commences
- Salt model
 - **6g salt/day by 2010**
- 2005:** FSAI publishes “Salt and Health” document and salt reduction undertakings by Irish food industry
- 2006:** FSA publishes revised targets for foodstuffs to be achieved by 2010
- 2006:** American Medical Assoc. (AMA) calls for measures to reduce sodium intake in U.S. diet
- 2007:** CASH issues report on salt reduction
- 2009:** FSA publishes revised targets for foodstuffs to be achieved by 2012

Legal Requirements for Salt/Sodium Reduction

| Reduced | Low | Very Low | Sodium/Salt-free |
|--|--|---|--|
| 5% reduction compared to similar product | $\leq 0.12\text{g}$ of sodium or 0.3g salt per 100g or 100 ml In the case of food naturally low in salt/sodium the claim must be made in the form “a low salt/sodium food” | $\leq 40\text{mg}$ sodium/ 0.1g salt per 100g or 100 ml | $\leq 5\text{mg}$ sodium/ 12.5mg salt per 100g |

Source: Regulation (EC) No. 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods. Available: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_404/l_40420061230en00090025.pdf
http://www.fsai.ie/uploadedFiles/Cor_Reg1924_2006.pdf

Reasons for reduced salt

Hypertension and Cardiovascular Disease (CVD)

- CVD is main cause of death in Europe.
- It is estimated that at least one third of premature deaths from CVD in Europe are attributable to unhealthy diets.
- 60,000 premature deaths could be saved by dietary changes.
- The cost of CVD to the EU economy is estimated at €169B per annum (Petersen *et al.* 2005) while in the US the estimated direct and indirect cost of CVD for 2006 will be \$403.1B (Thomson *et al.* 2006)

Sources: Eurodiet, 2001; European cardiovascular disease statistics (2005); American Heart Association (2006)



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BBC NEWS

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Last Updated: Wednesday, 22 March 2006, 09:01 GMT

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Salt

The government watchdog the Food Standards Agency has announced targets for reducing salt in a range of food products.

The move is designed to cut average daily salt intake in the diet, as too much salt is linked to high blood pressure, which in turn can increase the risk of heart attacks and strokes.



Bread is a major source of salt

CNN.com health

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Daily Mail

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Health

Salt levels in bacon twice as high as seawater

by FIONA MACRAE and ROBIN YAPP, Daily Mail
09:29am 11th October 2005

Reader comments (4)

It may look more appetising than seawater. But having a bacon sandwich for breakfast is hardly better for your health.

A study has found that, gram for gram, bacon contains twice as much salt as the Atlantic Ocean.

And the brown sauce that is sometimes

bacon sandwich

Bacon contains twice as much salt as seawater.

The £10 P... that's a be... it has no d... and is che... snap up w... but this £1

Getting the salt balance right

The food sector is working hard, but the levels of salt in food cannot be reduced overnight, writes M...

Since 2003, Food and Drink Industries' Federation (FID) has been working closely with the Food Safety Authority of Ireland (FSAI) to facilitate agreement between the industry and the government to implement the recommendation that there should be a gradual reduction in the salt content of processed foods.

This recommendation is outlined in the FSAI report on 'Salt & Health' which was published last April. The report, which summarises the recommendations of the FSAI Scientific Committee, concluded that excessive salt intake is one of several factors which contribute to the onset of hypertension or high blood pressure. It also acknowledges that other issues including physical inactivity, overweight and obesity have a causal effect.

However, since current trends in these factors are generally unfavourable, it fits that it has a role to play in helping to regulate salt intake and in taking positive steps to address the issue.

Since the release of the FSAI report, work already ongoing for several years has intensified. As well as agreeing salt reductions in standard products, many lower salt 'health alternatives' have been launched recently. Furthermore, the industry is also working hard to improve product labels, within legislative constraints, to help give consumers the information they need to make healthy choices.

While new lower salt products will continue to be researched, developed and launched, reducing the salt content of current products represents a greater challenge for industry.

Technological difficulties mean that removing salt from food is not as straightforward as it might seem. Salt plays a number of key functional roles, ranging from taste and texture to improved shelf life and preservation, in a wide range of products. Reducing the salt content of products cannot simply happen overnight.

The step-by-step approach to the issue recommended by the FSAI, is perceived as the best way forward. If the reductions are carried out gradually, manufacturers have valuable time to solve the key question of how to remove an integral ingredient without compromising the quality, safety and taste of their products.


Meanwhile, consumers don't perceive a difference in taste, yet they are still reaping benefits from having less salt in their diet.

The commitments made so far by industry to the FSAI, were made public last September. They demonstrate that food manufacturers are rising to the challenges presented by salt reduction. Speaking at that launch, Dr Wayne Anderson, chief specialist in food science at the FSAI, acknowledged the work carried out to date.

'We are pleased with the positive response by industry overall and understand the issues involved for manufacturers and the need to gradually reduce salt levels so that Irish palates become accustomed to low salt.'

To date, FDI has reductions in key groups:

- The Irish Association
- The Irish Bread Bakers
- The Irish Breakfast Cereals
- The Irish Soups and Sauces
- The Snack Food Association



Study: Reducing salt really does lower blood pressure

January 3, 2001
Web posted at: 5:21 p.m. EST (2221 GMT)

In this story:

The big 'if'

The argument for salt

By Elizabeth Cohen

CSPI NEWSROOM

CENTER FOR SCIENCE IN THE PUBLIC INTEREST

'Forgotten Killer' Salt Kills 150,000 a Year, Says CSPI Report

CSPI Sues FDA to Force End to 20-Year Delay in Regulating Salt

For Immediate Release:
February 24, 2005

Related Links:
Salt The Forgotten Killer

Too much salt in the diet is boosting Americans' blood pressure and is prematurely killing roughly 150,000 people each year, according to a new report issued today by the nonprofit Center for Science in the Public Interest (CSPI). Despite the pleas of health experts to cut back, salt consumption has drifted upward over the past 30 years to the point where a now consuming about 4,000 milligrams of sodium per day—far more than the recommended amount. CSPI is filing a lawsuit against the U.S. Food and Drug Administration (FDA) in federal court to compel the agency to act on a food additive. Presently, FDA classifies salt as GRAS, or Generally Recognized as Safe, which means that it is not closely

Daily Mail

24 HOURS A DAY

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Could your sausage kill you?!

11:09am 4th September 2003

Most of us know that a full English fry-up can raise our cholesterol levels, risking our health.

Now scientists say there is another danger to look out for - rising salt levels in sausages.

The Food Standards Agency has discovered that the amount of salt in sausages has increased to worryingly high levels.

High salt levels have been linked to high blood pressure, heart disease and stroke.

FSA tests found that two standard sausages when cooked contain, on average, more than a third of the amount of salt an adult should consume in a whole day.

Salt levels in these type of sausages has actually increased over the past 12 years - from 2.2g per portion to 2.4g.

The rise comes despite attempts to encourage manufacturers to cut salt levels.

Around 75 per cent of the salt in our diets from processed food.

The daily salt target for adults and children from the age of 11 is just 6g.

Advice for younger children differs by age, from less than 1g a day for babies under six months old up to 5g for seven to 10-year-olds.

Recent scientific advice has linked high levels of salt in the diet to high blood pressure, which increases the risk of heart disease.

The FSA tested the amount of salt in uncooked sausages by make, ingredient and quality.

The brand with the highest level of salt was Richmond



Danger: salt in sausages has...

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Reasons to cut the salt

Thursday September 23, 2004
The Guardian

The evidence that the reduction of dietary salt intake by 35% lowers blood pressure and prevents 70,000 strokes and heart attacks nationally was reported in a paper published in Hypertension last year (Letters, September 21). This was a meta-analysis of a number of salt studies that looked at salt restriction in people with hypertension and those with normal blood pressure. The beneficial effect on blood pressure was evident in both groups.

I'VE ALWAYS KNOWN TOO MUCH SALT IS BAD FOR YOUR HEART

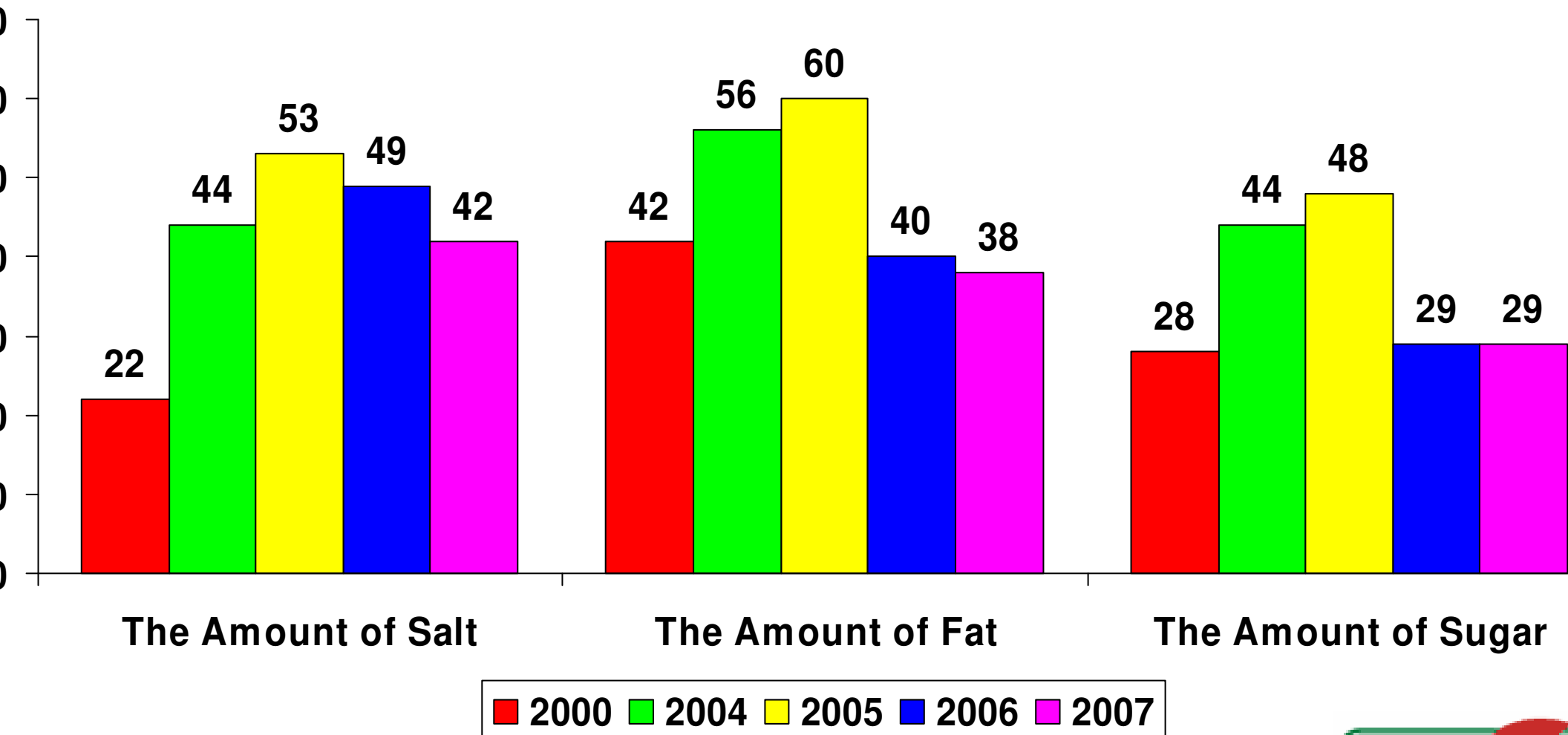
Sid the slug



Consumer Attitudes

Information usually looked for on Food Labels when buying
a product for the first time

Source: Consumer Attitudes to Food Standards. FSA (2006-2008)



Salt in the Diet

| Food Sector | Na Contribution (%) | | |
|--|----------------------|-----------------|------------------|
| | Ireland ¹ | UK ² | USA ³ |
| Cereals and Cereal Products (inc. bread, breakfast cereals, biscuits, cakes, pastries) | 34.6 | 37.7 | 26.8 |
| Meat & Meat Products | 20.5 | 20.8 | 21.0 |
| Soups & Sauces | 7.0 | 12.7 | 8.2 |
| Processed Vegetables (inc. crisps and snacks) | 4.0 | 8.5 | 6.6 |
| Milk and Cream | 8.5 | 5.4 | 6.5 |

SAI (2005). Salt and Health: Review of the Scientific Evidence and Recommendations for Public Policy in Ireland. Food Safety Authority of Ireland.
 ACN (2003). Salt and Health. Scientific Advisory Committee on Nutrition. The Stationary Office, Norwich, UK.
 Angstrom et al. (1997). Sodium intake trends and food choices. American Journal of Clinical Nutrition, 65, 704S-707S.

FSA (UK) Targets of salt levels in food products

| Product | 2010 (g or mg per 100g) | Rev. 2010(g or mg per 100g) | 2012(g or mg per 100g) |
|---------------------------|----------------------------|-----------------------------|------------------------------|
| Bakery Products | | | |
| Bread | 3.5g salt/1.4g Na | 3.0g salt/1.25g Na | 2.88g salt/1.15g Na |
| Cured meats | 2.5g salt/1g Na | 2.0g salt/0.8g Na | 1.63g salt/0.65g Na |
| Crackers | 1.4g salt/550mg Na | | 1.13g/450mg Na |
| Flat pies | 1.3-1.5g salt/450-500mg Na | 1.1-1.38g salt/400-550mg Na | 0.75-1.13g salt/300-450mg Na |
| Hamburgers/Grillsteaks | 1.0g salt/400mg Na | | 0.75g salt/300mg Na |
| Canned fish | 1-1.5g salt/400mg-600mg | | 0.93-1.0g salt/370-400mg Na |
| Cereal Products | | | |
| Pre-packed Bread | 1.1g salt/430mg Na | | 1.0g/400mg Na |
| Biscuits (unfilled) | 1.1g salt/416mg Na | | 0.68g/270mg Na |
| Biscuits (filled) | 0.5g salt/205mg Na | | 0.68g/270mg Na |
| Breakfast cereals | 0.8g salt/300mg Na | | 0.68g/270mg Na |
| Cheese Products | | | |
| Hard-pressed | 1.7g salt/670mg Na | | 1.8g salt/720mg Na |
| Soft | 0.8g salt/320mg Na | | 0.55g/320mg Na |
| Canned Beans | 0.8g salt/300mg Na | | 0.63g/250mg Na |
| Ready Meals | 0.6-1.0g salt/250-400mg Na | | 0.60g/250mg Na |
| Legumes (dried & wet) | 0.6g salt/250mg Na | | 0.56g/230mg Na |
| Spices | 1.5g salt/600mg sodium | | 1.38g/500mg Na |
| Condiments | | | |
| Ketchup | 2.4g salt/1g Na | 2.25g/900mg Na | 1.83g/730mg Na |
| Tomato Sauce | 1.5g salt/600mg Na | | 1.5g/600mg Na |
| Soy | 1.5g salt/600mg Na | | 1.25g/500mg Na |
| Pasta Sauces | 1.1g salt/430mg Na | | 0.83g/330mg Na |
| Processed Potato Products | 0.5g salt/195mg Na | 0.49g/195mg Na | 0.49g/195mg Na |

Source: Food Standards Agency UK



Nutritional composition (per 100g) of typical meats and meat products

| Product | Moisture (g) | Protein (g) | Fat (g) | Sodium (mg) | Salt (g) |
|--------------------------|--------------|-------------|---------|-------------|----------|
| Irish/UK Products | | | | | |
| Beef | 71.9 | 22.5 | 4.3 | 63 | 0.16 |
| Pork | 74.0 | 21.8 | 4.0 | 70 | 0.18 |
| Chicken | 74.2 | 24.0 | 1.1 | 60 | 0.15 |
| Turkey | 74.9 | 24.4 | 0.8 | 50 | 0.13 |
| Beef burgers | 56.1 | 15-17 | 21-25 | 290-400 | 0.7-1.0 |
| Sausages | 49.4 | 11-12 | 25-36 | 520-1080 | 1.3-2.5 |
| Frankfurters | 54.2 | 13-15 | 15-25 | 720-920 | 1.8-2.3 |
| Cooked Ham | 73.2 | 18-22 | 3-4 | 900-1200 | 1.8-2.6 |
| Bacon/rashers | 63.9 | 16-17 | 14-16 | 1000-1540 | 2.2-3.8 |
| Lami | 33.7 | 20.9 | 39.2 | 1800 | 4.6 |
| Breaded Chicken | 53.2 | 18.0 | 9-12 | 200-420 | 0.5-1.1 |
| Chicken Nuggets | - | 16.0 | 5.5 | 600 | 1.5 |
| Crispy Chicken | - | 17.4 | 14.5 | 300 | 0.8 |
| US Products | | | | | |
| Beef patties | 58.7 | 17.1 | 23.2 | 68 | 0.17 |
| Pork Sausage | 56.2 | 15.1 | 26.5 | 636 | 1.6 |
| Frankfurters | 56.0 | 11.5 | 27.6 | 1120 | 2.8 |
| Cured Ham | 64.5 | 22.6 | 9.0 | 1210 | 3.0 |
| Roasted Beef | 66.6 | 14.7 | 14.9 | 1217 | 3.1 |
| Canadian-style Bacon | 73.0 | 16.9 | 4.9 | 1016-1400 | 2.5-3.5 |
| Lami | 34.6 | 21.7 | 37.0 | 1890 | 4.8 |

Sources: McCance & Widdowson's The Composition of Foods Sixth Summary Edition (2002). The Royal Society of Chemistry, Food Standards Agency and Institute of Food Research.
 USDA Food Nutrient Database Ver. SR21. Available from <http://www.nal.usda.gov/>
 Data also sourced from products retailing in Irish/UK Supermarkets

Reduced Salt Meat Products



2.4% Salt



2.0% Salt



0.75% Salt



2.1% Salt



1.7% Salt



1.58% Salt



2.5% Salt



1.3% Salt



UK Salt Reduction (CASH) 2007

66% of foods re-surveyed by CASH have reduced their salt content

- 100% reduction in Looney tunes pasta
- 70% reduction in chicken breast dippers
- 50% reduction in white crusty bread
- ~30% reduction in most cornflakes
- 20-32% reduction in sausages
- 21% reduction in cheese strings
- 9% reduction in turkey nuggets

Most bread now contains 0.8g-1.0g of salt per 100



Other reduced salt products



0.36% salt



0.20% salt



0.40% salt



0.30% salt



Trace amount of salt



10.67% salt



0.5% salt



0.6% salt



0.6% salt



Technological Functions of Salt

Bread

- Imparts flavour
- Makes wheat gluten more stable and less extensible
- Controls yeast growth and fermentation rate
- Assists in preservation and reduces spoilage

Biscuits

- Gluten development, toughens the gluten and gives a less sticky dough
- Assists in preservation and reduces spoilage

Cheese

- Regulates the activity of starter culture microorganisms
- modifies enzyme activity and has a direct effect on water content during maturation.

Technological Functions of Salt in Meat Products

Used as a flavouring or flavour enhancer

Responsible for the desired textural properties of processed meats (tenderness and juiciness)

Safety (Preservation)

Technological Functions of Salt in Meat Products

Flavour

- Fat and salt jointly contribute too many of the sensorial properties in meat products
- Improves overall flavour balance
- Cooked hams
 - Hams with 1.7% salt were rated as salty as hams with 2-2.3% salt, but saltier than those with 1.1-1.4%

Technological Functions of Salt in Meat Products

Texture

- Main function is the solubilisation of the functional myofibrillar proteins
- Activates the proteins to increase hydration and water binding capacity resulting in a more juicy product
- Increases the negative charges of proteins, thereby causing repulsion between the proteins causing them to swell

Technological Functions of Salt in Meat Products

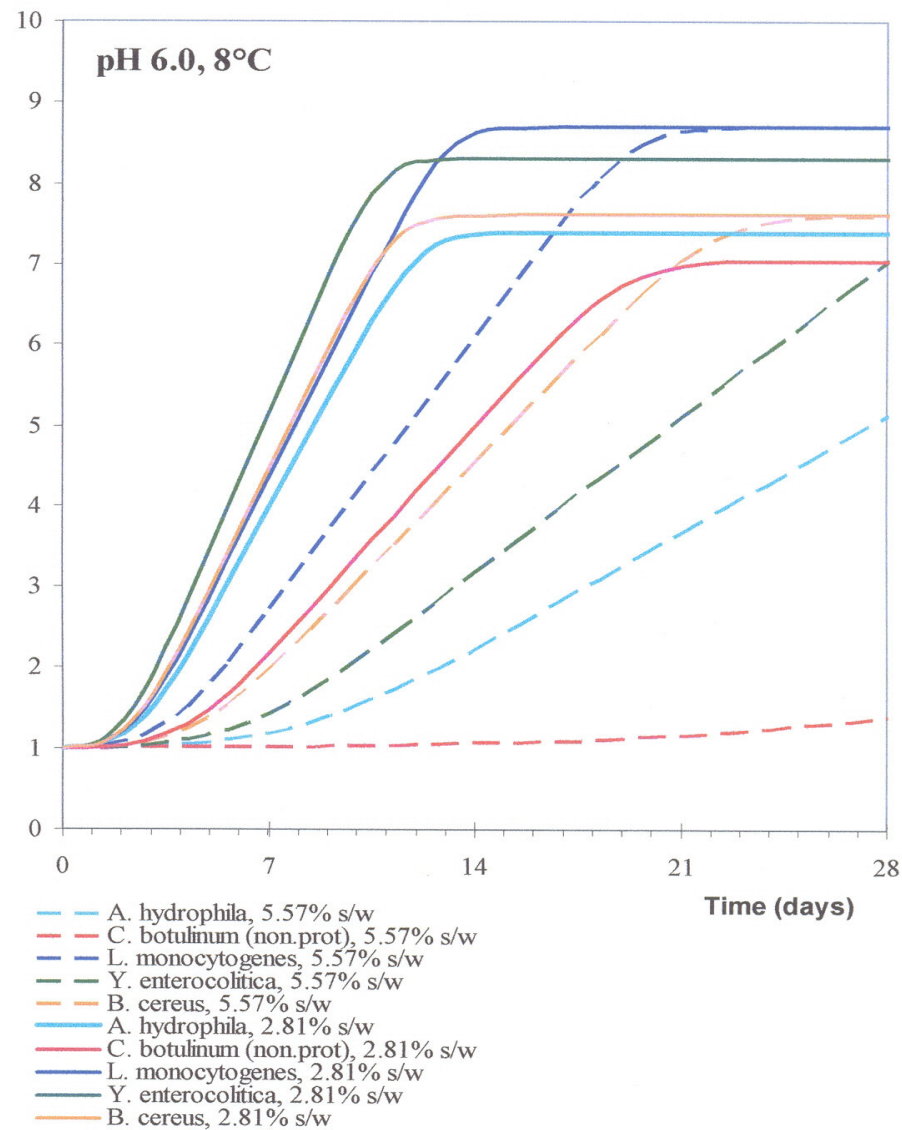
Preservation

- Reducing salt concentrations may alter spoilage patterns. Bacon produced with 1% salt w/w produced vinegary off odours after 2 week storage at 6 °C compared to 3 weeks for bacon containing 2.3% salt w/w. (Applegate *et al.* 1987) .
- When the salt content of bacon was reduced from 3.5% w/w to 2.3% w/w the shelf-life was reduced from 56 days to 28 days

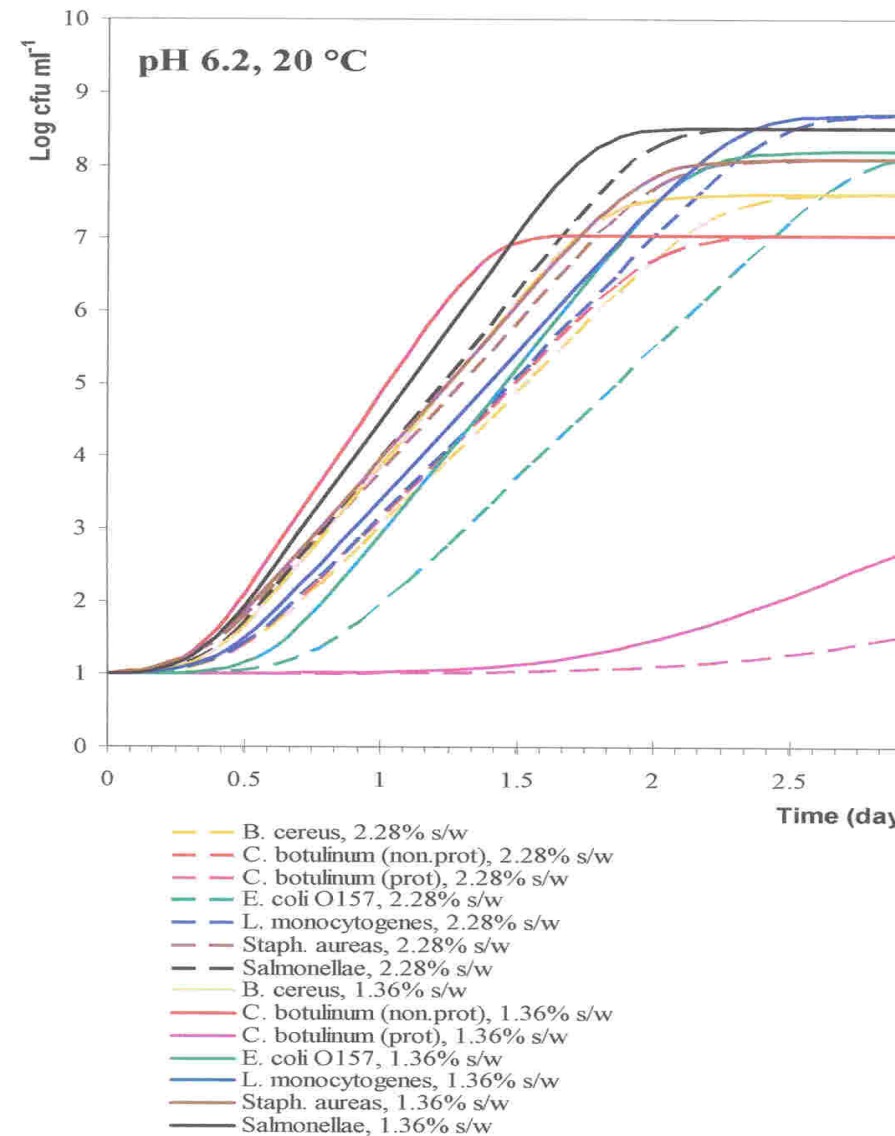
Source: Stringer and Pin (2005). Microbial risks associated with salt reduction in certain foods and alternative options for preservation. Institute of Food Research UK

The effect of reducing salt on pathogen growth in a model food systems

"Typical Ham"



"Typical Beef Burger"



Stringer & Pin (2005). Microbial risks associated with salt reduction in certain foods and alternative options for preservation. Institute of Food Research, Norwich, UK.

Approaches for Salt Reduction

- Reduce peoples' expectations of saltiness
- Reduce salt content
- Substitution of salt with other ingredients
- Enhance salt properties

Substitution of salt with other ingredients

Substitution with other ionic salts including calcium chloride, magnesium chloride, magnesium sulphate, glutamic acid, potassium glutamate and **potassium chloride**

Substitution of NaCl with KCl can be undertaken without functional loss but metallic and astringent tastes can limit its use.

Resistance to potassium chloride







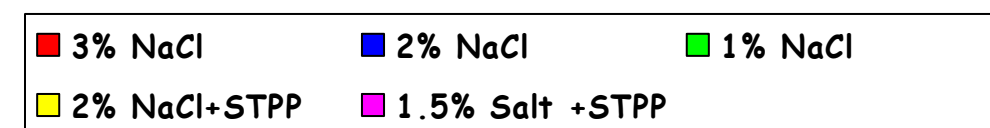
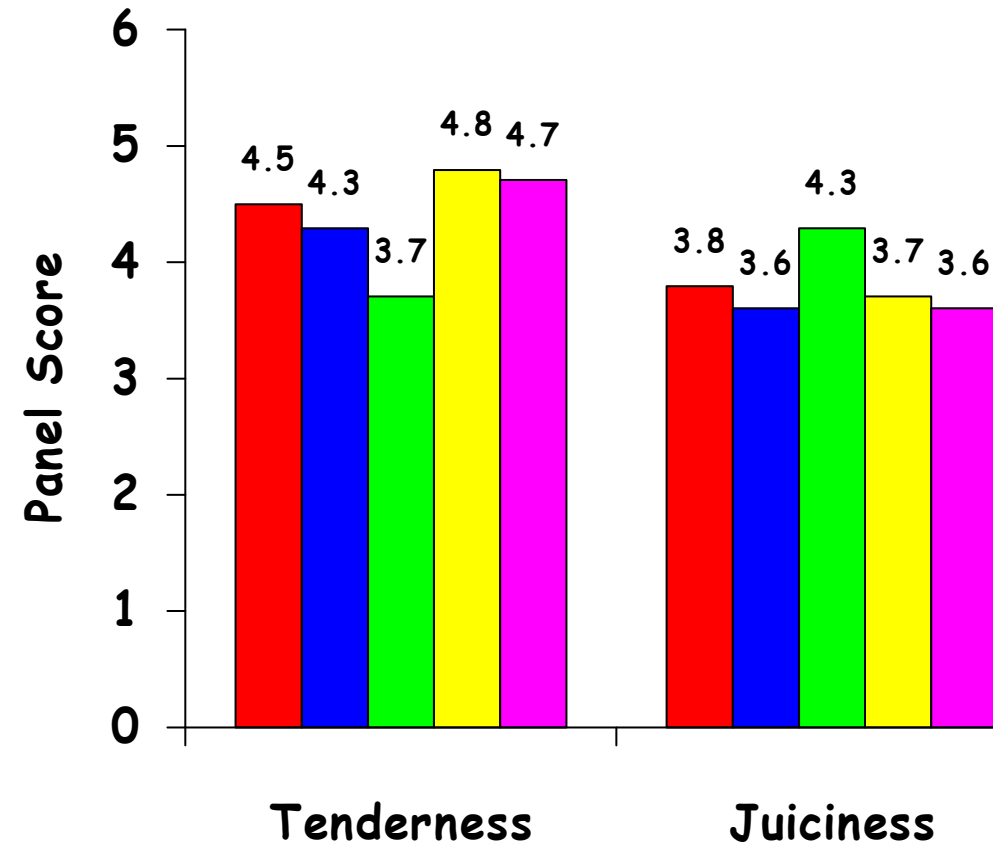
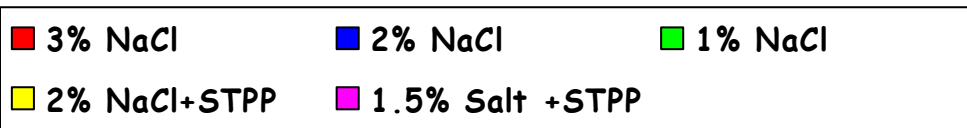
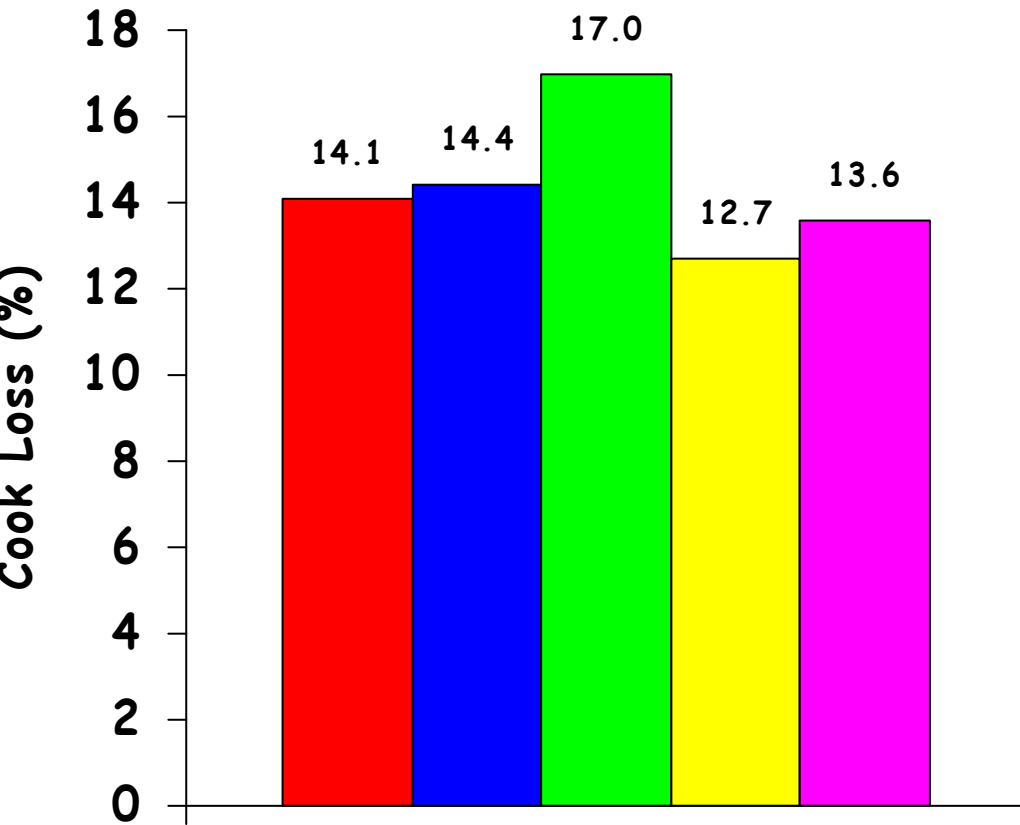
Use of Phosphates

Sodium polyphosphate contains 31.2% Na compared to 39.3% in NaCl and is typically used at 0.5% compared to 2-4% usage rate for salt

Potassium salts of phosphate are also available and can be equally effective

Research has shown that the addition of phosphates improves the overall quality in terms of yield and sensory perception of reduced salt meat products

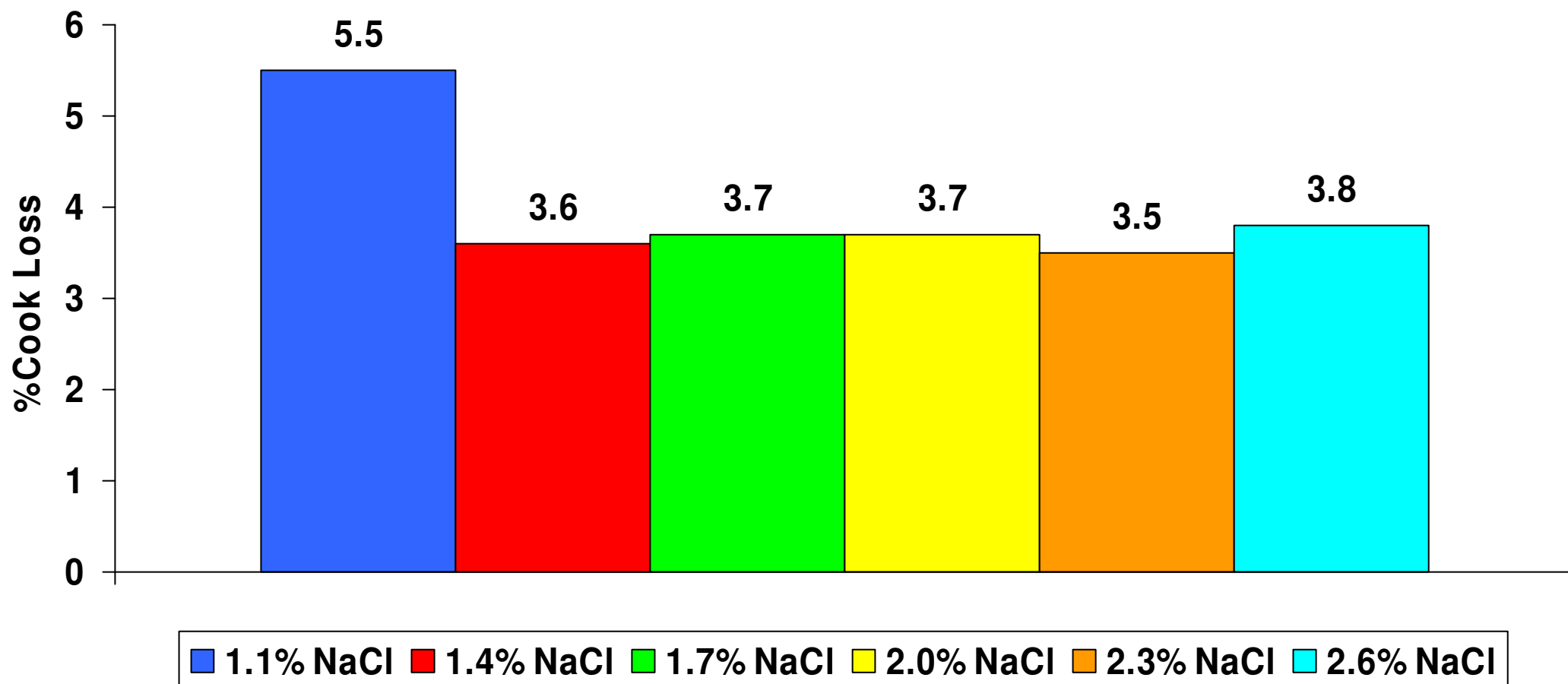
Effects of Salt Reduction and Phosphate Addition on loss and Sensory Attributes of Frankfurters





Research Data

Cook loss of cooked hams with various salt contents



Source: Ruusunen *et al.* (2001). *Agricultural and Food Science*
Volume 10 27-32

Use of flavour enhancers/masking agents



Reduce sodium while maintaining good flavour

Reduce salt levels up to 50%

Enhance overall flavour

Provide a more balanced flavour

Mask undesirable flavour notes

Use of flavour enhancers/masking agents



Yeast extracts

MSG, glutamates & glutamic acid

Nucleotides

- **Adenosine 5'-monophosphate (AMP). This works by blocking the bitter taste in the mouth**
- **Disodium inosinate (E631) or guanylate (E627)**

Peptides and Amino Acids (L-lysine)

Hydrolysed Vegetable Protein (HVP)

Lactates

Flavonoids

Salt Substitutes/Replacers



Yeast extracts

- containing peptides, amino acids and nucleotides
- “umami” and “kokumi”
- Mixed with HVP

Mycoscent (derived from mycoprotein)

- Delivers succulent salty, brothy taste
- Source of ribonucleotides that deliver flavour enhancing properties

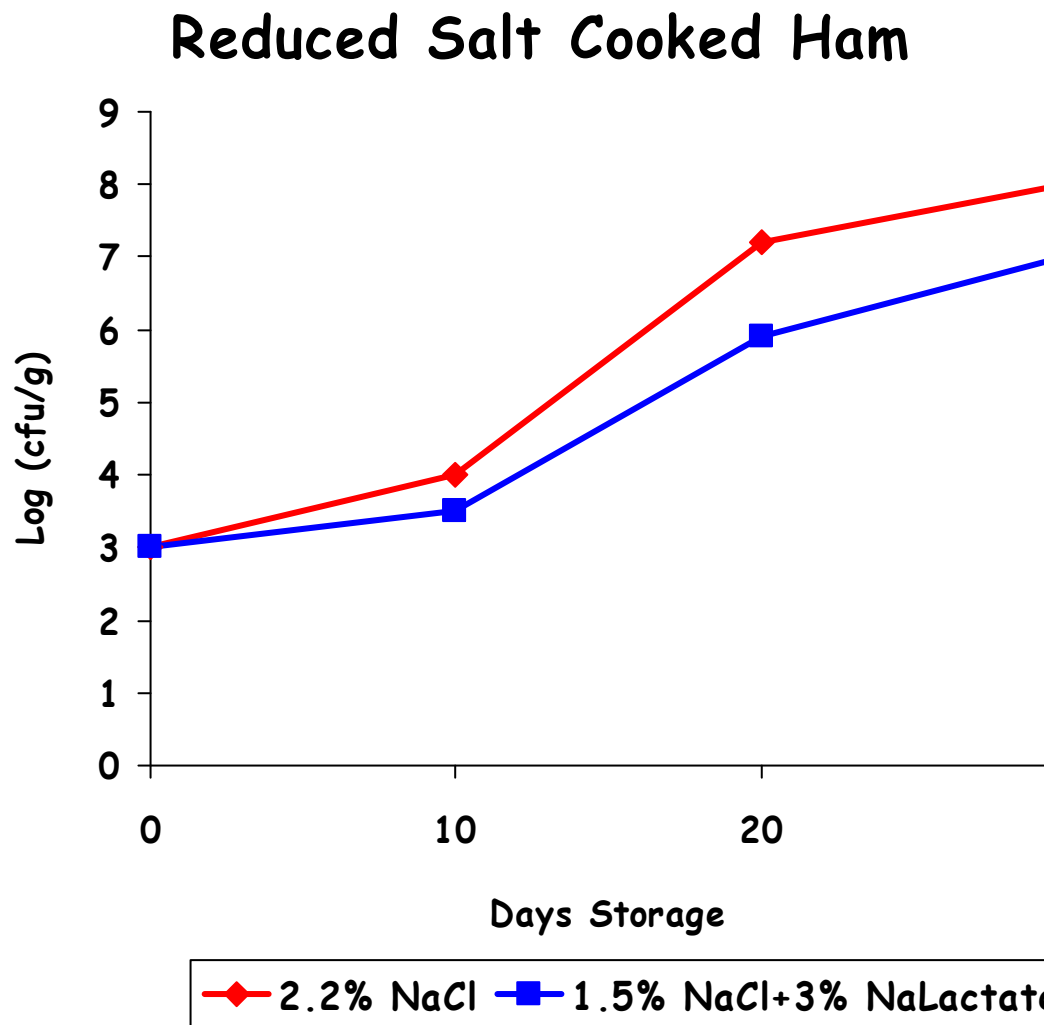
Pansalt®

- a patented salt replacer high in minerals containing KCl, magnesium sulphate and lysine hydrochloride

Salt Substitutes/Replacers



- **Lactates**
 - improves water binding
 - improves yield and sliceability
 - Increases shelf-life
 - Potassium lactate with no “off” tastes



Enhancing salt properties



Perception of salt in the solid form is affected by crystal shape and size

Flake type salt has been shown to be more functional

Research has been looking at changing the physical form of salt so that it becomes more taste bioavailable and therefore less can be added

Many different forms of salt

- Granulated
- Dendritic
- Flake

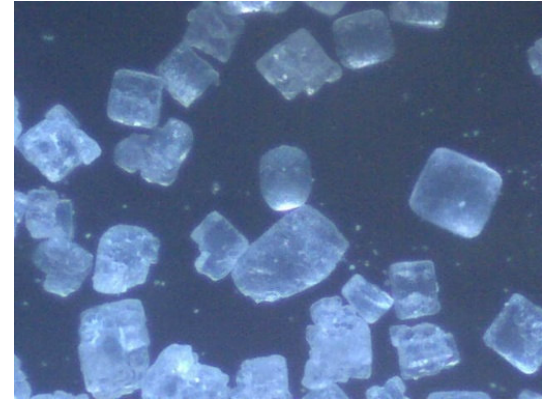
Patented process for producing natural sea salt with 45-51% less sodium than ordinary salt



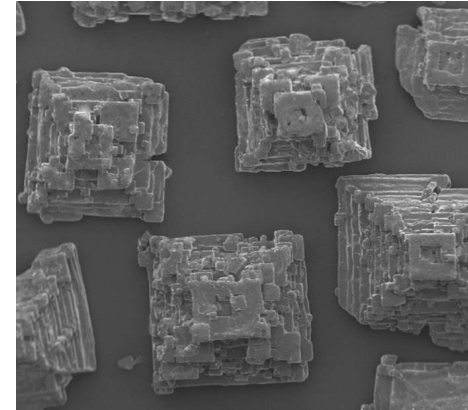
Enhancing salt properties



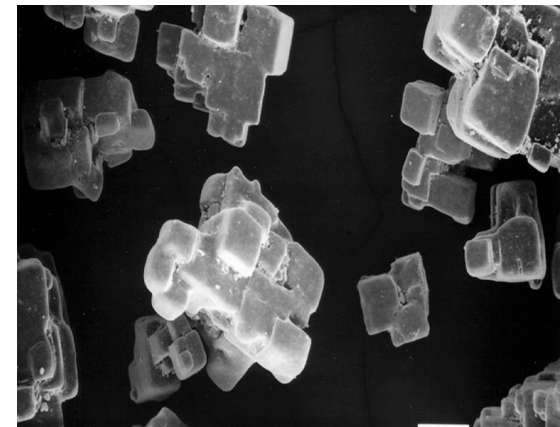
Fine flake salt can produce meat batters with superior fat and water binding properties compared with dendritic or vacuum evaporated salts



Moisture was more tightly bound within the fine flake salt meat batter



Significantly less cook loss



Enhancing salt properties



Results from model meat blends

| Salt Type | pH | Soluble Phase Protein (mg/ml) | Total Cook Loss |
|-------------------|-----|-------------------------------|-----------------|
| Fine Flake | 6.2 | 34.6 | 2.6 |
| Dendritic | 5.9 | 29.4 | 4.2 |
| Vacuum Evaporated | 6.0 | 22.9 | 7.2 |

Salt Reduction

**“We can only move at the pace dictated by customers
A reduced salt product which is left on the shelf or t
which customers add salt at the table will not benef
anyone”**

UK Food and Drink Federation 2004

Salt Reduction

- **No Silver Bullet available**
 - each product has to be reformulated as a unique entity and that taking away salt adds cost
- **Reduce Salt without:**
 - Without compromising taste
 - Without compromising functionality
 - Allowing for cleanest ingredient declarations

RECAP: Reducing Salt

Reduce, Replace, Remove

No Single Technology Solution, need to use ingredient combinations. No one size fits all solution

Salt Reduction

- Reduce salt addition**
- Substitution of salt with other ingredients**
- Enhance salt properties**

Contact Information

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THANK YOU FOR YOUR TIME:
Any questions?