REDUCING SALT IN MEAT PRODUCTS

IMPLICATIONS & CHALLENGES FOR THE MEAT INDUSTRY

Arno Hugo
Introduction

Sodium & Salt Content – SA Meat Products

Other Sources of Sodium in Meat Products

Functions of Salt in Meat Products

Salt Requirements of Specific Meat Products

Strategies to Reduce Salt in Meat Products

Conclusions

Acknowledgements
INTRODUCTION

- Ancient Times – Salt
  - Preservation of Meat Products

- Most Commonly Used Ingredient in Processed Meat Products
  - Flavouring or Flavour Enhancer
  - Textural Properties of Processed Meat

- Risks associated with High Salt Intake
  - Hypertension
  - Heart Disease
  - Stroke
  - Stomach Cancer
  - Kidney Failure

Desmond, 2006; Freeman, 2012
SA’s Non-Communicable Diseases Target
- Reduce Mean Population Intake of Salt to 5 g/day
- 40 – 50% Reduction of Current Salt Intake

DoH – Range Products Primarily responsible for Salt Intake
- Processed Meats
- Raw Processed Meat Sausages

Identified Range = Easier Monitoring

Manufacturers – Five Year Process
- Reduce Sodium Levels
- Avoid Product Rejection

Set Targets met by 30 June 2017

SA Targets Not Announced Yet
Current Typical Inclusion Levels of Salt in SA Processed Meat Products are 1 – 2.5g/100 g product

- 393 – 983mg Added Sodium/100 g Product

Higher – Bacon, Hams, Salami’s & Dried Products

Salt Reduction in SA Meat Products is a Given

Food Standards Agency (FSA) Model in UK – Example of International Sodium Reduction Model

- 2003 – 2010

Stepwise Reduction in Sodium Targets

Some Idea of what to Expect

Food Standards Agency UK, 2012; Freeman, 2012
## FSA (UK) Proposed Targets of Sodium & Equivalent Salt Levels In Meat Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Final FSA Targets 2010</th>
<th>FSA Proposed Targets 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(g salt &amp; mg Na/100 g)</td>
<td>(g salt &amp; mg Na/100 g)</td>
</tr>
<tr>
<td>Bacon</td>
<td>3.50g Salt / 1400mg Na</td>
<td>2.88g Salt / 1150mg Na</td>
</tr>
<tr>
<td>Ham / Cured Meats</td>
<td>2.50g Salt / 1000mg Na</td>
<td>1.63g Salt / 650mg Na</td>
</tr>
<tr>
<td>Fresh Sausages</td>
<td>1.40g Salt / 550mg Na</td>
<td>1.13g Salt / 450mg Na</td>
</tr>
<tr>
<td>Cooked Sausages</td>
<td>1.80g Salt / 550mg Na</td>
<td>1.50g Salt / 600mg Na</td>
</tr>
<tr>
<td>Cooked Uncured Meats</td>
<td>1.50g Salt / 600mg Na</td>
<td>0.75g Salt / 300mg Na</td>
</tr>
<tr>
<td>Burgers, Grill Steak Products</td>
<td>1.00g Salt / 400mg Na</td>
<td>0.75g Salt / 300mg Na</td>
</tr>
<tr>
<td>Coated Poultry Products</td>
<td>1.00g Salt / 400mg Na</td>
<td>——</td>
</tr>
<tr>
<td>Canned Frankfurters, Hotdogs &amp; Burgers</td>
<td>1.40g Salt / 550mg Na</td>
<td>1.38g Salt / 450mg Na</td>
</tr>
</tbody>
</table>
Sodium & Salt Content of SA Meat Products

Classification of Food Products – British Dietetic Association

- High: > 1.5 g Salt (600 mg Sodium)/100 g Food
- Medium: 0.3 – 1.5 g Salt (120 – 600 mg Sodium)/100 g Food
- Low: < 0.3 g Salt (120 mg Sodium)/100 g Food

Where does SA Meat Products fit in?
# Sodium & Salt Content of SA Whole Muscle Meat Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Sodium (mg/100 g)</th>
<th>Salt Equivalent (g/100 g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacon</td>
<td>632 - 1028</td>
<td>1.58 - 2.60</td>
</tr>
<tr>
<td>Dry Cured Ham</td>
<td>1918 - 1978</td>
<td>4.78 – 4.95</td>
</tr>
<tr>
<td>Cooked Ham</td>
<td>1282 - 1360</td>
<td>3.21 – 3.40</td>
</tr>
<tr>
<td>Canned Ham</td>
<td>600</td>
<td>1.50</td>
</tr>
<tr>
<td>Canned Corned Meat</td>
<td>880</td>
<td>2.20</td>
</tr>
<tr>
<td>Pastrami</td>
<td>911</td>
<td>2.28</td>
</tr>
<tr>
<td>Crumbed Chicken Schnitzel</td>
<td>317</td>
<td>0.79</td>
</tr>
<tr>
<td>Marinated Pork Spare Ribs</td>
<td>526</td>
<td>1.32</td>
</tr>
</tbody>
</table>
## Sodium & Salt Content of SA Minced Meat Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Sodium (mg/100 g)</th>
<th>Salt Equivalent (g/100 g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boerewors</td>
<td>678</td>
<td>1.70</td>
</tr>
<tr>
<td>Pork Sausage</td>
<td>696</td>
<td>1.74</td>
</tr>
<tr>
<td>Beef Sausage</td>
<td>366</td>
<td>0.92</td>
</tr>
<tr>
<td>Lamb Sausage</td>
<td>696</td>
<td>1.74</td>
</tr>
<tr>
<td>Fresh Beef Hamburger Patties</td>
<td>794</td>
<td>1.99</td>
</tr>
<tr>
<td>Frozen Beef Hamburger Patties</td>
<td>576 - 643</td>
<td>1.44 – 1.61</td>
</tr>
<tr>
<td>Salami</td>
<td>1469 - 1640</td>
<td>3.67 - 4.10</td>
</tr>
<tr>
<td>Frozen Chicken Nuggets</td>
<td>365 - 609</td>
<td>0.91 – 1.52</td>
</tr>
</tbody>
</table>
# Sodium & Salt Content of SA Emulsion Meat Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Sodium (mg/100 g)</th>
<th>Salt Equivalent (g/100 g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vienna Sausage</td>
<td>746 - 1215</td>
<td>1.87 – 3.04</td>
</tr>
<tr>
<td>Canned Vienna</td>
<td>600</td>
<td>1.50</td>
</tr>
<tr>
<td>Polony</td>
<td>920 - 1100</td>
<td>2.30 – 2.75</td>
</tr>
<tr>
<td>Liverspread</td>
<td>925 – 1020</td>
<td>2.31 – 2.55</td>
</tr>
<tr>
<td>Russian Sausage</td>
<td>762 - 982</td>
<td>1.91 – 2.46</td>
</tr>
</tbody>
</table>
### Sodium & Salt Content of SA Dried Meat Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Sodium (mg/100 g)</th>
<th>Salt equivalent (g/100 g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biltong</td>
<td>1323 - 2967</td>
<td>3.30 – 7.42</td>
</tr>
<tr>
<td>Dry Sausage</td>
<td>825 - 1663</td>
<td>2.06 – 4.16</td>
</tr>
</tbody>
</table>

- **Portion Size & Nutrient Density of Different Products**
- **Crumbed Chicken Schnitzel vs Biltong**
- **Person will not likely eat 100 g Salami or Biltong**
- **“Salt Reduced” Products – Scarce**
Sources of Sodium in Meat Products

- Typical Meat Product – 2% Salt

- Salt contributes ± 79% of Sodium in Final Product

- Remaining ± 21% Sodium – Other Sources

- Inclusion Level of Some Additives – Very Low

Ruusunen & Puolanne, 2005; Desmond, 2006; Maccullum, 2012; Tranarc, 2012
## Sources of Sodium in Meat Products

<table>
<thead>
<tr>
<th>Ingredient or additive</th>
<th>Sodium content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt</td>
<td>39.30</td>
</tr>
<tr>
<td>Fresh Beef, Pork &amp; Chicken (50 – 70 mg/100 g)</td>
<td>0.05 – 0.07</td>
</tr>
<tr>
<td>Mechanically Deboned Meat (MDM)</td>
<td>0.05 - 0.25</td>
</tr>
<tr>
<td>Sodium Tripolyphosphate</td>
<td>31.20</td>
</tr>
<tr>
<td>Sodium Nitrate</td>
<td>27.10</td>
</tr>
<tr>
<td>Monosodium Glutamate (MSG)</td>
<td>13.60</td>
</tr>
<tr>
<td>Sodium Metabisulphite</td>
<td>23.94</td>
</tr>
<tr>
<td>Sodium Lactate</td>
<td>0.24</td>
</tr>
<tr>
<td>Sodium Citrate</td>
<td>26.72</td>
</tr>
<tr>
<td>HVP</td>
<td>18.00</td>
</tr>
<tr>
<td>Soya Protein Isolate</td>
<td>1.20 – 1.55</td>
</tr>
<tr>
<td>Sodium Caseinate</td>
<td>1.45</td>
</tr>
<tr>
<td>Xanthan</td>
<td>1.94</td>
</tr>
</tbody>
</table>

Sources: Al-Najdawi & Abdullah, 2002; Ruusunen & Puolanne, 2005; Desmond, 2006; Maccullum, 2012; Tranarc, 2012
Functions of Salt in Meat Products

- Flavour contribution

- Protein solubilization
  - Water binding
  - Adhesion
  - Fat emulsification

- Preservative
Perceived Saltiness of NaCl in Meat Products

- Na⁺ Cation & Cl⁻ Anion modifying Perception

Flavour Enhancer

- Increase Characteristic Meat Flavour

Fat content – Cooked Sausages – Perceived Saltiness

- More Fat Tissue & Less Lean Meat (Protein)
- Increase Salt Perception

Meat Patties with High Meat Content

- More Salt needed
- Same Saltiness than in Low Meat Content Patties

Perceived Saltiness Higher in Meat Products – Weakly Bound H₂O

Lower Eating Temperature – Lower Salt Perception

Factor in Formulation of Reduced Salt Products

Protein Solubilization

- One of Main Functions in Processed Meats
  - Activates Meat Proteins – Increase Hydration & Water Binding
    - Reduce Cooking Loss
    - Increase Tenderness
    - Increase Juiciness
  - Increase Adhesion & Binding Properties – Improve Texture
  - Solubilized Proteins can Emulsify Fat

Desmond, 2006
Water Binding

- Role of NaCl in Water Binding of Meat – Two Hypotheses

- Hypothesis 1
  - Cl⁻ Ions of NaCl penetrate Miofilaments
  - Miofibril Swelling

- Hypothesis 2
  - Na⁺ Ions – Ion “Cloud” around Filaments
  - Selective Binding of Cl⁻ Ions to Myofibrillar Proteins
  - Repulsion between Molecules of Myosin Filament
  - Miofibrillar Lattice loosens (Water move in)
Both Hypotheses play a Role

- Cl\(^-\) Ions – More Closely bound to Meat Proteins than Na\(^+\)
- Protein – Increased Negative Charge
- Myofibrillar Proteins – Repulsion
- Myofibril Swelling
- Negatively Charged Cl\(^-\) Ions bind Positively Charged Myosin Groups
- Shift in IEP – to lower pH
- Oppositely Charged Groups weakens @ pH Greater than IEP
- Increased Swelling
- Increased Water Holding Capacity

Larmuth, 1984; Hamm, 1986; Offer & Knight, 1988
Adhesion & Binding

- Myosin Extraction from Myofibrils during Swelling – Important to Meat Processors

- Salt-solubilized Myofibrillar Proteins
  - Sticky Exudate on Surface of Meat Pieces
  - Binds Meat Pieces together after Cooking

- Matrix of Heat-coagulated Protein
  - Entraps Free Water

- Very Important – Some sausages, Reformed & Restructured Meat Products

- Synergistic Effect – Salt & Phosphate – Myofibril Swelling & Myosin Extraction

- Myofibril Swelling – Start @
  - 0.5 M NaCl without Phosphate
  - 0.4 M with Added Phosphate

Ruusunen & Puolanne, 2005
Fat Emulsification

- Finely Chopped Emulsified Products
  - Viennas
  - Frankfurters
  - Polony

- Manufacturing
  - Salt-solubilized Protein
  - Film around Fat Globules

- Raw Emulsion
  - Only Stable for a Few Hours

- Cooked Emulsion
  - Salt-extracted Protein Layer Coagulate around Each Fat Globule
  - Entraps Fat = Stable Emulsion

Kramlich et al., 1975
Preservative Microbiological Aspects

- Preservative Effect – Reduce Water Activity of Meat Products
- 2% NaCl = Bacteriostat
- 4% NaCl = Bacteriocide
- Salt Content Reduction = Reduced Shelf-life
  ♦ Hot SA Climate
- 60% NaCl Reduction → 1.5%
  ♦ Frankfurters – Faster Natural Flora Growth
- 50% NaCl Reduction → 1.25%
  ♦ Ground Pork – Increased *Lactobacillus* spp. Growth
- Sorbate
  ♦ Efficient Antimicrobial Properties – Salt Reduced Sausages
- Reducing NaCl Levels or Replacing with Other Ingredients
  ♦ Microbial Shelf-life
  ♦ Safety of Processed Meat Products

Sofos, 1983; Terrell, 1983; Whiting *et al.*, 1984; Sofos, 1985
Salt – Pro-oxidant – Rancid Fats

Ground Pork

- 50% NaCl Reduction → 1.25%
- Replaced by KCl or MgCl₂
- No Significant Differences – Fat Oxidation

Compared

- NaCl Accelerates Fat Rancidity vs KCl or MgCl₂

Changing Salt Levels or Salt Replacement

- Chemical stability

Desmond, 2006
Salt Requirements of Specific Products

Minced Meat & Restructured Products

- With & Without Phosphates
- No Technological Minimum for NaCl
  - Hamburger Patties – Without NaCl
  - Transglutamase – Increase Gel Formation in Patties
  - NaCl Content usually determined by Sensory Aspects
- Restructured Products
  - Salt Content Increased from 0 – 1%
  - Decreased Cooking Losses
  - Best Bind @ 4% Salt
- Successful Restructured Pork Product
  - 0.75% NaCl & 0.125% Sodium Tripolyphosphate
- Minced Meat Products
  - Decreased Sodium Content = No problems
- Restructured Products – Increased Sodium Content
  - Increased Bind, Firmness, Cook Yield & Taste
- Minced & Restructured Products – Salt Content reduced to < 1%

Ruusunen & Puolanne, 2005
Cooked Sausages & Hams

Salt: Linearly Increases Water Binding in Meat
- Ionic Strengths = 0 to 0.8-1.0 in Water Phase
- < 5% Salt in Lean Meat with 75% Water
- < 2% Salt in Total Formulation with 40% Lean Meat
- Synergistic Action – Salt & Phosphate
  - Water Holding Capacity
  - Salt Content can be reduced by a further 0.3-0.5% with Phosphate

Simultaneous Reduction – Fat & Salt
- Low Fat – Low Sodium Product = Problems
  - Fat usually replaced with Water
  - Ionic Strength too Low – Improper Gel Formation

Without jeopardizing Technological Quality & Yield
- NaCl Content Reduced to
  - 1.5 – 1.7% Without Phosphate
  - 1.4% With Phosphate

Hams – Salt Recommendation ± 0.3% Higher than Cooked Sausages
- Lower Fat Content

Ruusunen & Puolanne, 2005
Fermented Meat Products

- Dry Fermented Meat Products – Hurdle Technology
  - Salt, Nitrite, pH & Temperature Controls
  - Fermentation, Safety & Quality

- Interrelated – One Reduced – One or More Other Factor(s) Increased
  - Safety & Technological Quality

- Salt = Essential Ingredient of Fermented Meats – Reducing Difficult

- Good Quality Salami – Lower Limit = 2.5% Salt

- Fermented Sausages – 2.25 % Salt
  - Less Firm
  - Weaker Aroma than those with Higher Salt Levels

- Fermentation Regulation – Decisive Factor – Fermented Sausages
  - Lowering Level Limit : > 2 % NaCl

Petaja et al., 1985; Leistner et al., 1991
SA Dried Meat Products

- SA Dry Sausage & Biltong = Very High Salt Content
  - Reason for Concern

- Not Fermented or Cured

- Salt – Important – Controlling Microbiological Safety
  - Early Drying Stages – $A_w$ still High

- Research
  - Investigate Salt Reduction without Compromising Safety
Strategies to Reduce Salt in Meat Products

• Salt = Cheap Food Ingredient – Difficult to Replace
• Consumers – Uncomfortable – New Ingredient Names on Label
• Five Approaches to Reduce Salt Content

1. Lowering Salt Content

• Minimum Salt Requirements was Discussed
• 25 % Reduction – Highest without Negative Effect on Product
  ♦ Flavour
  ♦ Texture
  ♦ Shelf-life
• Gradually & Accompanied by Shelf-life Studies & Sensory Panels

Olsen, 1982; Desmond, 2006; Searly, 2006; Ruusunen & Puolanne, 2005
2. **Salt Substitutes**

- Potassium Chloride (KCl) – Most Common Salt Substitute
- Blends > 50:50 NaCl:KCl
  - Bitterness & Loss of Saltiness
  - High K – Risky – Diabetes, Kidney & Heart Disease
- Salt Mixtures – Good to Reduce Sodium Content
- Pansalt® – 50% of Sodium removed
  - Potassium Chloride
  - Magnesium Sulphate
  - Amino Acid L-Lysine Hydrochloride
    - Enhances Saltiness
    - Masks Potassium & Magnesium Taste
    - Increases Human Excretion of Sodium

- **Other Commercial NaCl & KCl Mixtures**
  - Lo® Salt
  - Saxa So-low
  - Morton Lite Salt®
- Morton Lite Salt® = 60% NaCl : 40% KCl
  - Ham, Bacon & Turkey Ham
  - Similar Flavour Scores to Control Salt Products

- Morton Lite Salt® – Meat Products – Maintained Protein Hydration

- KCl Replaced NaCl – 25 – 40%: Flavour Impact not as Noticable

- Higher KCl Levels – Increased Flavour Intensity
  - Salty, Spicy & Acidic

- Cooked Hams – 50% of NaCl Replaced with KCl
  - Superior Binding
  - Acceptable Sensory Scores

- Sectioned & Formed Ham
  - 70/30% NaCl/KCl or 70/30% NaCl/MgCl₂ Mixtures
  - Not Different Compared to Hams made with 100% Salt
    - Flavour
    - Tenderness
    - Overall Acceptability

Frye et al., 1986; Morton Salt, 1994; Collins, 1997; Price, 1997
Fermented Sausages – NaCl Replaced with KCl
- Texture – No Effect
- Bitter Taste @ 30% Replacement
- Bitter Taste Important to Panel @ 60% Replacement
- Reducing NaCl in Fermented Sausages – Microbiological Safety

Dry Cured Loins
- 40% NaCl replaced by KCl & Potassium Lactate – No Negative Flavour Effect

Patent – Low Sodium Cured Meat Product – Brine injected
- KCl, Calcium Citrate, Calcium Lactate, Lactose, Dextrose, Potassium Phosphate, Ascorbic Acid & Sodium Nitrite
- “Normal Sodium”

Sausages with 2.8% Salt
- 35% of Salt replaced with KCl
- No Effect on Shrinking
- Not with MgCl₂

sub4salt® – Mixture of NaCl, KCl & Sodium Gluconate
- 25 – 50 % Sodium Reduction in Meat Products without any detrimental effects

Hand et al., 1982; Gou et al., 1986; Riera et al., 1996; Innovations in Food Technology, May 2008
Phosphates
- Lowers NaCl Content in Meat Products
- Increase Water Holding Capacity
- Improve Cooking Yield

Increased Ionic Strength – Synergistic Action with Salt

Na Content of Phosphates
- Lower than Salt
- Lower Usage Level

Further Na Content Decrease – Potassium Phosphate replaces Sodium Phosphate

Low Salt Meat Products – Absence of Salt Extract – Other Ingredients bind Water
- Meat Proteins:
  - Functional Proteins – Soya Isolate & Sodium Caseinate
  - Hydrocolloids – Carrageenan & Xanthan
  - Starches
- Protein Coagulation & Gel Formation = Water Binding rather than Interaction with Muscle Proteins

Barbut *et al.*, 1988; Collins, 1997; Desmond, 2005
3. Use of Flavour Enhancers & Masking Agents

- Yeast Extracts
- Lactates
- Monosodium Glutamate (MSG)
- Nucleotides
- Taste Enhancers
  - Activate Receptors in Mouth & Throat
  - Help Compensate for Salt Reduction
- Reduced Salt Pork Patties by 75%
  - Modified KCl Salt, Co-crystallized with Ribotide
- Sausage Products – Added MSG – More NaCl Replaced with KCl
- Added MSG or Ribotide = Increased Flavour Intensity in Sausages
- KCl as Replacement for NaCl – Bitter Blockers Used
  - Adenosine 5’-Monophosphate (AMP)
    - Blocking Activation of Taste Receptors
    - Preventing Taste Nerve Stimulation

Ruusuunen et al., 2001; McGregor, 2004; Desmond, 2005; Brandsma, 2006
AMP – Marketed as Betra® – Improve Taste of NaCl/KCl

Other Bitter Blockers: NeutralFres®, SaltTrim®

Lysine & Succinic Acid also Salt Substitutes
- Salty Flavour, Antimicrobial & Antioxidative Properties
- Can replace 75% NaCl from Flavour Perspective
- Combined with Phosphates, Starches & Gums – Water Binding

Sodium or Potassium Lactate – Reduction in NaCl
- Maintain Saltiness
- Reduce Sodium Content in Products

Fermented Sausages & Dry Cured Loins
- Potassium Lactate or Glycine: 30 – 40% Reduction in NaCl

Yeast Autolysates
- Mask Metallic Flavour of KCl
- Up to 20% NaCl Reduction
- Provesta® & Aromild®

Turk, 1993; Price 1997; Desmond, 2006
4. Changing the Physical Form of Salt

- **Flaked vs Granular**
  - Method of Reducing Salt Content in Meat Products

- **Flake Type Salt – More Functional**
  - Binding
  - Increasing pH
  - Increasing Protein Solubilization
  - Improving Cooking Yield in Emulsion Systems

- **Flake Salt – Better & More Rapid Solubility than Granular Salt**

- **Alberger® Flake Salt**
  - Cube Agglomerate Structure – Recommended
  - Produced Red Meat Batters
    - Better Fat & Water Binding Properties
    - Dendritic or Regular Vacuum Evaporated Salt

- **Flake Salt – Better Yield & Increased Protein**

Campbell, 1979; Turk, 1993; Price 1997; Lutz, 2005; Desmond, 2006
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- **Flake Salt – Better Yield & Increased Protein**
Meat Batters
- Flake Salt – Higher pH than Other Salt
- Better Myofibrillar Protein Solubilization = Better Water Binding
- Saltier Taste

Moisture in Batters from Flaked Salt vs Those from Other Salt
- More Tightly Bound
- Superior Binding Properties

Flake Salt Batters – Less Cooking Losses

Increased Functionality of Flaked Salt – Possibilities
- Using Less Salt
- Similar Quality Products with Less Sodium

Star Flake® – “Hybrid” Salt
- Best Features of Vacuum Granulated Salt & Grainer Flake Salt

Cargill Salt, 2001; Lutz, 2005; Desmond, 2006
5. Alternative Processing Techniques

- Research on Salt Reduction – Directed @ Processing Technology
  - Enhance Meat Functionality without Salt Addition

- Pre-rigor Meat – Better Functionality
  - Extractability of Myofibrillar Proteins
  - Bind
  - Water Holding Capacity
  - Pre-rigor Meat in Meat Batters
    - Less Salt
    - Lower Sodium
    - Emulsion Products – No Negative Effect – Physical, Chemical & Sensory Properties

- High Pressure Treatment of Meat
  - Improve Protein Functionality
  - Allow Lower Salt Usage & Lower Sodium Content
  - Reduced Salt High Pressure Manufactured Frankfurters
    - Sensory Analysis Panellists Prefer these Products to Controls with Normal Salt
  - Texture of Low Salt High Pressure Treated Frankfurters – Better than Controls

Puolanne & Terrell, 1983; Cheftel & Culioli, 1997; Monahan & Troy, 1997; Crehan et al., 2000; Claus & Sørheim, 2006
Salt Reduction Legislation in SA – a Given & on the Way

Knowledge & Technology to Reduce Salt in Meat Products Available

Some Products – Up to 25 % Reduction in Salt Content
  ♦ Condition Consumers Gradually – Lower Salt Content
    • Combined Effort by All Manufacturers of a Specific Product

Further Salt Reduction
  ♦ Salt Mixtures e.g. NaCl + KCl + Flavour Enhancers

Compensate for Loss of Functionality of Meat Proteins in Salt Reduced Products
  ♦ Functional Proteins
  ♦ Starches
  ♦ Hydrocolloids
  ♦ Alternative Processing Methods
All Attempts to Reduce Salt must be accompanied by
- Product Reformulation
- Shelf-life Studies (Microbiological & Chemical)
- Sensory Evaluation (Consumer & Trained Panels)

Avoid @ All Cost
- Reduced Salt Products left on Shelf
- Consumer Adding Salt to Reduced Salt Products @ Home

Salt Reduction – Opportunity rather than Threat to Meat Industry

Opportunity
- Improve Image of Meat Products among Consumers
- Gain Some Market Share
ACKNOWLEDGEMENTS

- SAAFoST for Organizing this Workshop
- Francois van Schalkwyk from Maccullum for Technical Advice
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- Garry Osthoff of the UFS for Technical Advice
- Eileen Roodt of the UFS for help with preparing the slides
Thank You
Dankie