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Bioactive compounds in commercial nitrite-cured cooked pork products

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Introduction
Nitrite is a key-responsible for the oxidative and microbial stability of cured meat products. However, residual nitrite levels go down during cooking and storage while the product retains a relatively long shelf life. Some of the added nitrite reacts with myoglobin to form the cured meat pigment, nitrosyl-myoglobin while some reacts with secondary amines to form carcinogenic nitrosamines. Decades ago nitrite was reported to also react readily with other proteins than myoglobin.

Aim
To see if extract of cooked nitrite-cured pork possessed antioxidant activity and whether it could be related to peptides present in the extracts.

Method
3 types of commercial hams
- Cold storage 0 days
- Cold storage 37 days
- 10kDa MWCO dialysis
- Analysis of dialysate:
  - Protein determination (BCA)
  - Antioxidant in vitro assays
    - Reducing power
    - ABTS radical scavenging
    - Fe chelating ability
- 10kDa MWCO dialysis
- Size exclusion chromatography
- Analysis of effluent:
  - Protein determination (BCA)
  - Antioxidant in vitro assays
    - Reducing power
    - ABTS radical scavenging

Results 1 – Specific antioxidant activity (0 days)
Generally the specific antioxidant activity initially increased with peptide content towards a steady level. The peptide specific antioxidant activity was very similar between the three products in regard to reducing power and ABTS radical scavenging activity. Iron chelating activity did not appear to correlate with peptide content.

<table>
<thead>
<tr>
<th>Commercial Ham</th>
<th>Fe chelating</th>
<th>Reducing Power</th>
<th>ABTS radical scavenging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danish sandwich ham</td>
<td>2151.1</td>
<td>46.42</td>
<td>11993</td>
</tr>
<tr>
<td>Swedish dinner ham</td>
<td>Activity</td>
<td>42.12</td>
<td>14324</td>
</tr>
<tr>
<td>Swedish pork saddle</td>
<td>2237.4</td>
<td>37.93</td>
<td>10470</td>
</tr>
<tr>
<td>Positive control</td>
<td>24222⁺</td>
<td>330.57⁻</td>
<td>23956⁻</td>
</tr>
</tbody>
</table>

Table 1. Initial specific activity expressed in activity % (Fe chelating and ABTS radical scavenging) or OD700 (reducing power) per mg of peptide or positive control (0.5mM EDTA, 0.5mM ascorbic acid and 2.5mM trolox).

Results part 2 – Antioxidant activity and peptide content in fractionated extracts (37 days)
The previously observed antioxidant activities were mainly associated with a fraction giving a high reading at 254nm indicating that the activity might be related to compounds containing an aromatic ring.
The ham extracts displayed ABTS radical scavenging activities of different kinetics.

Conclusion
- Commercial ham extracts possess reducing power and the ability to chelate iron and scavenge radicals
- Reducing power and radical scavenging activities correlate with protein content
- Specific antioxidant activity is related to specific fractions