Comparative study of commercial cold-cuts used NIRS and sensory analysis

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Introduction

• Healthy nutrition is a spreading trend
• Improvement of the nutritional science and the health-sound behaviour of consumers
• Sensory and chemical characterization of heat-treated meat products
• Sensory properties have primary importance from the aspect of consumer perception
• BUT: The ingredients are also highlight of food
Introduction

- Sensory analysis:
  - Answer important questions during processing
  - Help to elucidate production faults, to monitor the quality
  - Help to compare production lots or differently developed products

- Need the chemical composition as well → near infrared spectroscopy → used widely in the food industry:
  - Minimal sample preparation
  - Give multitude information from a single spectrum
  - Quantitative and qualitative analysis
  - Estimation methods
The Purpose

This study aimed to classify commercial cold-cut sorts (Lyoner samples of different quality and price), based on sensory tests and NIR spectroscopy.
Materials and methods

**Material**

<table>
<thead>
<tr>
<th>sample code</th>
<th>price HUF/kg</th>
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<tbody>
<tr>
<td>1</td>
<td>1188 (cca. 4 Euro/kg)</td>
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<tr>
<td>2</td>
<td>941 (cca. 3 Euro/kg)</td>
</tr>
<tr>
<td>3</td>
<td>941 (cca. 3 Euro/kg)</td>
</tr>
<tr>
<td>4</td>
<td>710 (cca. 2.5 Euro/kg)</td>
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<tr>
<td>5</td>
<td>1878 (cca. 6 Euro/kg)</td>
</tr>
</tbody>
</table>

**Sensory analysis**

- Full profile analysis (MSZ ISO 6564:2001)
- 13 university students and teachers
- 10 cm long, unstructured scale
- SPSS 10.0. for Windows
- PanelCheck V.1.3.2. statistical softwares

**NIR spectroscopy**

- FOSS NIRSystems 6500 spectrometer equipped with:
  - OptiProbe fiber optic module
  - Regular Sample Transport Module (STM)
  - WinISI II v1.5 spectral analytical software
Results and discussion
Results of the Panel Check
PCA analysis of Sensory results

- 1
  (~4 euro)

- 2
  (~3 euro)

- 3
  (~3 euro)

- 4
  (~2.5 euro)

- 5
  (~6 euro)
DFA analysis of Sensory results

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<table>
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<td>18.2</td>
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</table>

- **Classification**: 76.3%
- **Cross-validation**: 49.1%
Near Infrared Spectroscopy

STM

Optiprobe
PCA analysis of Near Infrared Spectroscopy results

STM

Optiprobe

(~3 euro)

(~2.5 euro)

(~4 euro)

(~6 euro)
## Comparative table of the methods

<table>
<thead>
<tr>
<th>Method</th>
<th>PCA</th>
<th>DFA  (Cross-validation)</th>
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<tbody>
<tr>
<td>NIRS - STM</td>
<td>94%</td>
<td>98%</td>
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<tr>
<td>NIRS - Optiprobe</td>
<td>85%</td>
<td>71%</td>
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<td>Sensory analysis</td>
<td>n.d.</td>
<td>49.1%</td>
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Summary

• Based on the human panel test, the cold-cut sorts of lower quality and price provide compromised homogenity.
• In connection with this, panellists found air sacs and gel bubbles in these samples.
• The preference was markedly higher by samples of higher price-niveau, mostly attributed to the “overall impression” and “preference” characteristics.
• As compared to the discriminant factor analysis based on the sensory panel test, the NIR based classification was more successful.
• Latter method can be adapted to industrial processes even in an on-line manner, and provides a low-cost analytical possibility at high sample numbers.
Thank you for your attention