A. Good practices and experience of the paper and board industry

B. Calibsensory project.

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Iggesund Paperboard, Sweden
Outline

- Short presentation (personal and company)
- Paper and board based food packages
- Food contact topics (special sensory focus)
- Methodology/methods applied for measuring
  - instrumental
  - sensory
  - some points from a practical point of view
- Some experience drawn from "real cases"
- Calibsensory project
  - idea
  - project work
  - outcome
  - possibilities
<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnover</td>
<td>4,849 MSEK (~ MEUR 547)</td>
</tr>
<tr>
<td>Capacity</td>
<td>530,000 tonnes of paperboard</td>
</tr>
<tr>
<td>Employed</td>
<td>1,528</td>
</tr>
</tbody>
</table>
Production Capacity 2010

Paperboard: 530,000 tonnes per year on three board machines.

- **Iggesund**
  330,000 tonnes paperboard (SBB)

- **Strömsbruk**
  45,000 tonnes laminated and plastic coated board

- **Workington**
  200,000 tonnes paperboard (FBB)
Lab. for Sensory and Chemical Analysis

Resources
Staff: 4 people

Sensory Analysis
External sensory panel
(app. 25 people)
Accredited for certain packaging tests

Instrumental Analysis
Headspace GC (warm, cold sampling)
GC-MS, GC-Olfactometry
Specialised instruments (e.g. permeation of aroma compounds)
Systems for concentrating volatiles
Components of board based food packages

Example

- Varnish
- Printing ink
- Board
- Barrier

Food
Example chocolate box?

- Printing inks
- Wrapping foil
- Varnish
- Glue
- Plastics like PE and PP
- Grease proof paper
- Paperboard
Types of paperboard

- **SBB (GZ)**
- **FBB (GC1, GC2)**
- **SUB (SUS)**
- **WLC (GT, GD)**
- **LPB**

Legend:
- Coating
- Recycled pulp
- Bleached chemical pulp
- Recycled or chemical pulp (bleached or unbleached)
- Bleached or unbleached mechanical pulp
- Unbleached chemical pulp and in some products
- Unbleached chemical pulp
- CTMP
Typical chemicals used in board making process

- Fillers (kaolin, TiO2, talc, gypsum)
- Retention aids (retention of fillers)
- Sizing (generation of hydrophobicity and wet strength)
- Colourants (to give a harmonized brightness)
- Biocides (product purity)
- Production aids (antifoamers etc)
Food contact topics interactions

- Environment
- Migration
- Permeation
- Scalping
- Confectionary Food
- Board based packaging
Article 3, Framework Regulation

Chemical migration

- Migration tests of substances migrating into food simulants (direct contact)
- Instrumental measurements of moderately volatile substances

Organoleptic deterioration

- Instrumental measurements of volatile substances
- Sensory tests of food simulant indirect contact
Instrumental analysis, sensory related
Headspace analysis

- Static
- Dynamic
Gas chromatograph schematic
Gas chromatograms related to board composition
Sensory analysis
Example investigation + sample preparation

Tests

The samples have been analysed with instrumental analysis
(all samples - warm headspace gas chromatography;
One sample- room temperature headspace gas chromatography)
Sensory tests: Taint tests (Details in appendix):
   a) (mod. EN-1230) using chocolate as taste medium according to accredited procedures.
   b) prepared roughly as a) using water as taste medium
Sensory testing
sample presentation

Reference sample

Coded samples

Odour, EN1230-1 (mod)

49 12 61 54 38

Duplicate sample

Taint, EN1230-2 (mod)

0 34 78 22 97 51

Concealed reference sample
Assessment results

- EN-scale applied
  0 = No deviation from reference sample
  1 = Just perceptible deviation from reference sample
  2 = Weak deviation from reference sample
  3 = Distinct deviation from reference sample
  4 = Strong deviation from reference sample

- Half points are allowed to be used

- Descriptions of the odour/off flavour may be used
Applications of sensory analysis within Iggesund Paperboard

- **Production control**
  Iggesunds Bruk
  Ströms Bruk
  Workington

- **Technical service**
  Internal investigations
  (External investigations)
  Customer related investigations/projects

- **Research and Development**
  Development projects
  Method development coordinated with Universities and Institutes
Comparison two FBB board qualities, Storage Evaluation

CHS GC (23) Hexanal

Relation composition – sensory properties
Relation
composition – sensory properties

FBB A - Storage evaluation
CHGC (23C) Hexanal + Robinson

NG/L
0
0,5
1
1,5
2

Robinson, DIN-scale

2004-02-09
2004-03-10
2004-04-08
2004-05-08
2004-06-08
2004-07-08
2004-08-07
2004-09-06
2004-10-06
2004-11-05
2004-12-05
2005-01-04
2005-02-03

FBB-A
Robinson

FBB-A
CHGC
Odour Interaction varnish - board

Fishy smell

Varnish containing an amine

Board

No smell

Board type A

Fishy smell

Board type B
Calibsensory

Calibration of sensory testing of food contact materials
- paper and board

[Logos of various organizations]
Calibsensory

Calibration samples were prepared

- Spiking compounds were applied (added to paper or food simulant)
- These substances introduced sensory impressions to be matched

<table>
<thead>
<tr>
<th>Odour</th>
<th>Taint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base paper</td>
<td><strong>Fatty food</strong></td>
</tr>
<tr>
<td>Hexanal</td>
<td><strong>Dry food</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Coconut oil</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Icing sugar</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Benzaldehyde</strong></td>
</tr>
</tbody>
</table>
### Calibsensory

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Odour Hexanal $\mu$g/g sample</th>
<th>Fatty food Bensaldehyde $\mu$g/g coc.oil</th>
<th>Dry food Bensaldehyde $\mu$g/g sugar</th>
<th>Criterium</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0,04</td>
<td>10</td>
<td>3,2</td>
<td>2 x detection threshold</td>
</tr>
<tr>
<td>2</td>
<td>0,8</td>
<td>40</td>
<td>6,4</td>
<td>Matching</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>160</td>
<td>15</td>
<td>Matching</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>660</td>
<td>30</td>
<td>Matching</td>
</tr>
</tbody>
</table>

- Calibration samples are prepared according to written procedures
- These samples are presented to the assessors
- The intensity of these samples are trained
- Real samples are judged based on these intensity matchings
Detection threshold, benzaldehyde

![Graph showing relative number of assessors related to the total group for sugar + water and coconut oil](image)

Packaging Off-flavour Detection Ability of Two Food Simulants
Forsgren, del Mar Lorente Lamas, José, Sanchez Climent
Packaging Technology and Science, 2011, (24), 7 pp. 401-417
Documentation

Technical reports CEN/TR 15645
Paper and board intended to come into contact with foodstuffs.
*Calibration of the off-flavour test*

*Part 1: Odour*
*Part 2: Fatty food*
*Part 3: Dry food*