1. roadmap on food loss 2020
2. impact of cosmetic quality standards on food losses in the fruit and vegetable sector

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Department of Agriculture and Fisheries
Flemish government
Prevention of food losses in FLANDERS

Desk research and interdepartmental working group 2011-2012

Declaration of commitment (2014) (ambition, vision, priorities)

Roadmap to 2020 (2015)

Monitoring food loss (2016)

The impact of cosmetic quality standards on food losses in the Flemish fruit and vegetable sector (2017)
Food losses coalition

- Flemish government, supply chain, farmers union, food industry, catering industry, retail, hospitality sector, consumers, NGOs, social and welfare organisations, food banks

overview + subscription: www.vlaanderen.be/landbouw/voedselverlies
roadmap main principles

→ Public-private partnership
→ Commitment of efforts
→ Chain perspective approach: from field to fork
→ 9 action programmes, 57 actions, 60 partial actions

Goals roadmap
→ 30% reduction of food losses in Flanders 2025
→ 15% reduction of food losses in Flanders 2020
→ call on all actors to help achieve goals
definitions?

FOOD COMMODITIES AND PRODUCTS

edible biomass: FOOD

food is consumed: FOOD CONSUMPTION

food is not consumed: FOOD LOSS

inedible biomass: RESIDUES

FOOD WASTE
Example of apples

- Apples are grown for human consumption
- When ripe → harvested
- Edible fraction (flesh and skin)
- Inedible fraction (core with pips, crown and stalk)
- If apple during growing suffers from disease or rot → does not enter food supply chain → no food waste
- If apple is ripe but is not harvested because of market crisis → food loss + residue fraction = waste
- If apple is eaten there is only an unavoidable residue
- If apple is not (wholly) eaten → food loss in addition to residue
After prevention ➔ valorisation according to the cascade of value retention
Action programmes

1. Supporting companies in the supply chain
   • free consultation and company scan for food losses
2. Cooperation within the supply chain reduces food losses
   • focus on the phases between the different links of the chain
3. Sensitization of companies, inspire and engage them
   • good practice restaurants/ canteens of government
4. Training staff to prevent food losses
   • integration of food losses in schooling and training
5. Inspiring and engaging consumers
6. New cooperation models in the regular and social economy
   • implementing business plans with retailers/ producer organisations and social organisations
7. Promote and facilitate donations of food surpluses
   • interactive web applications for food donations
8. Research supporting the supply chain and the government
   • improve technology and introduce innovation
9. Measuring is knowing
   • monitoring

Vlaanderen
verbeelding werkt
## Food losses + inedible unavoidable residues

<table>
<thead>
<tr>
<th>sector</th>
<th>Food waste</th>
<th>tonnes</th>
<th>Proportion in the total chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fisheries</td>
<td></td>
<td>10,402</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Agriculture</td>
<td></td>
<td>449,352</td>
<td>13%</td>
</tr>
<tr>
<td>Auctions f&amp;v</td>
<td></td>
<td>25,277</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Food industry</td>
<td></td>
<td>2,349,445</td>
<td>67%</td>
</tr>
<tr>
<td>Retail</td>
<td></td>
<td>64,828</td>
<td>2%</td>
</tr>
<tr>
<td>Hospitality sector</td>
<td></td>
<td>67,450</td>
<td>2%</td>
</tr>
<tr>
<td>Catering</td>
<td></td>
<td>60,098</td>
<td>2%</td>
</tr>
<tr>
<td>Households</td>
<td></td>
<td>468,305</td>
<td>13%</td>
</tr>
<tr>
<td>Total chain</td>
<td></td>
<td>3,485,157</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Flemish agriculture and food industry is increasingly export oriented*
## Destinations of food waste in % to sector total, Flanders, 2015

<table>
<thead>
<tr>
<th>sector</th>
<th>Animal feed</th>
<th>Biobased materials</th>
<th>soil</th>
<th>Anaerobic digestion</th>
<th>composting</th>
<th>energy</th>
<th>recovery</th>
<th>Incineration with energy</th>
<th>Landfill/discharge</th>
<th>Incineration</th>
<th>unknown destination</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>fisheries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>agriculture</td>
<td>11%</td>
<td>-</td>
<td>70%</td>
<td>4%</td>
<td>4%</td>
<td>1%</td>
<td>-</td>
<td>4%</td>
<td>6%</td>
<td>100%</td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>Producer organisations f&amp;v</td>
<td>36%</td>
<td>28%</td>
<td>11%</td>
<td>17%</td>
<td></td>
<td>7%</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8%</td>
</tr>
<tr>
<td>Food industry</td>
<td>55%</td>
<td>0%</td>
<td>11%</td>
<td>26%</td>
<td>7%</td>
<td>0%</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>retail</td>
<td>3%</td>
<td>2%</td>
<td></td>
<td>49%</td>
<td>16%</td>
<td></td>
<td>29%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>hospitality sector</td>
<td></td>
<td></td>
<td></td>
<td>31%</td>
<td></td>
<td></td>
<td>69%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>catering</td>
<td>-</td>
<td>-</td>
<td></td>
<td>24%</td>
<td></td>
<td></td>
<td>76%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td>households</td>
<td>28%</td>
<td>-</td>
<td></td>
<td>6%</td>
<td>40%</td>
<td></td>
<td>24%</td>
<td>3%</td>
<td>0%</td>
<td></td>
<td></td>
<td>100%</td>
</tr>
<tr>
<td><strong>Total chain</strong></td>
<td>43%</td>
<td>0%</td>
<td>17%</td>
<td>21%</td>
<td>6%</td>
<td>5%</td>
<td>6%</td>
<td>1%</td>
<td>1%</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Cascade index per link of food chain

<table>
<thead>
<tr>
<th>sector</th>
<th>Value cascade index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fisheries</td>
<td>0</td>
</tr>
<tr>
<td>Agriculture</td>
<td>7,9</td>
</tr>
<tr>
<td>Auctions fruits &amp; vegetables</td>
<td>8,8</td>
</tr>
<tr>
<td>Food industry</td>
<td>8,8</td>
</tr>
<tr>
<td>Retail</td>
<td>6,3</td>
</tr>
<tr>
<td>Hospitality sector</td>
<td>3,9</td>
</tr>
<tr>
<td>Catering</td>
<td>3,4</td>
</tr>
<tr>
<td>households</td>
<td>6,9</td>
</tr>
<tr>
<td>Total chain</td>
<td>8,2</td>
</tr>
</tbody>
</table>

*The cascade index (a variant of Dutch Moerman ladder), based on the valorisation of food waste index = 10 for 100% valorisation index = 0 for 0% valorisation*
# Food losses and residues

<table>
<thead>
<tr>
<th>Flow →</th>
<th><strong>Food losses (= edible food waste)</strong></th>
<th><strong>Residues (= inedible food waste)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absolute quantity (tonnes)</td>
<td>Proportion in chain (%)</td>
</tr>
<tr>
<td>Link ↓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fisheries</strong></td>
<td>5,201</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Agriculture</strong></td>
<td>330,319</td>
<td>36%</td>
</tr>
<tr>
<td><strong>Auctions f&amp;v</strong></td>
<td>14,629</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Food industry</strong></td>
<td>225,481</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Retail</strong></td>
<td>43,391</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Hospitality sector</strong></td>
<td>19,108</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Catering</strong></td>
<td>57,070</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Households</strong></td>
<td>211,858</td>
<td>23%</td>
</tr>
<tr>
<td><strong>Total chain</strong></td>
<td>907,077</td>
<td>100%</td>
</tr>
</tbody>
</table>
Conclusions of zero measurement

- Prevention is priority (only donations are measurable)
- Flemish agri-food supply chain is strong in valorisation (92%)
- 3/4 of food waste are residues, just 1/4 is food loss
- Cascade index shows problematic areas of valorisation
- Agriculture, industry and households create large volumes of food loss
- High production volumes and dependence on natural production circumstance invoke large volumes at risk
- Food losses are relatively low
Impact of cosmetic standards on food losses

<table>
<thead>
<tr>
<th>Shape</th>
<th>Apple</th>
<th>Carrot</th>
<th>Eggplant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td><img src="image" alt="Apple" /></td>
<td><img src="image" alt="Carrot" /></td>
<td><img src="image" alt="Eggplant" /></td>
</tr>
<tr>
<td>Moderate</td>
<td><img src="image" alt="Apple" /></td>
<td><img src="image" alt="Carrot" /></td>
<td><img src="image" alt="Eggplant" /></td>
</tr>
<tr>
<td>Abnormal</td>
<td><img src="image" alt="Apple" /></td>
<td><img src="image" alt="Carrot" /></td>
<td><img src="image" alt="Eggplant" /></td>
</tr>
<tr>
<td>Extreme</td>
<td><img src="image" alt="Apple" /></td>
<td><img src="image" alt="Carrot" /></td>
<td><img src="image" alt="Eggplant" /></td>
</tr>
<tr>
<td>Abnormal</td>
<td><img src="image" alt="Apple" /></td>
<td><img src="image" alt="Carrot" /></td>
<td><img src="image" alt="Eggplant" /></td>
</tr>
</tbody>
</table>
Impact of cosmetic standards on food losses

- Cosmetic standards are blamed to cause food losses
- But little evidence available: numerical justification is lacking
  - Develop insight in fruit and vegetable sector in Flanders
    - Literature study, interview, stakeholder workshops
    - Quantification of loss of sales, food losses and valorisation
    - Perspectives for policy and the supply chain
- Research: University of Ghent for the department of agriculture
Loss of sales or food loss?

- When food products are not used for human consumption
  → = food loss
- If part of sales is used for human consumption via lower class, processing of via donations to social organisations
  → this is not food loss
  → loss of sales
  - Part of sales loss is still valorised as food
  - EU withdrawals of fruit and vegetables (intervention) and free distribution to charity
    → Only 30 à 40% of production costs is compensated
    → Products have to respect class II requirements
Average sales loss (%) on farm

- Potato: 10.6%
- Strawberries: 6.5%
- Endives: 18.9%
- Apples: 11.1%
- Berries: 22.3%
- Cauliflower: 15.6%
- Beans: 13.8%
- Broccoli: 11.5%
- Zucchini: 12.6%
- Celeriac: 7.3%
- Cucumber: 4.6%
- Bell pepper: 1.4%
- Pears: 9.3%
- Parsley: 7.1%
- Leek: 5.0%
- Celery: 9.1%
- Lettuce: 13.2%
- Cabbage: 10.5%
- Spinach: 5.6%
- Sprouts: 13.3%
- Tomato: 2.5%
- Fennel: 10.5%
- Belgian endive: 13.3%

Average sales loss
Important differences per product

→ Vegetables:
  × high loss rates for cauliflower, zucchini, celeriac and carrots
  × lower rates for leek, tomato cabbage, beans, celery

→ Fruits
  × High rates of drop out for apples
  × Lesser drop-out for pears
  × Average for strawberry
Main reasons for “cosmetic defects”

- Climate: 80.5%
- Pests and diseases: 37.1%
- Seeds and varieties: 10.4%
- Harvesting: 10.4%
- Birds, rodents: 1.8%
- Polination: 1.4%
- Grading, storage: 1.4%
- Other: 3.2%
Destination of produce that failed to the standards

- Sold at a lower price: 57.6%
- Not harvested: 35.1%
- Back to the field: 25.1%
- Processing: 13.9%
- Farmgate direct sales: 11.7%
- Composted: 11.3%
- Animal feed: 10.8%
- Digestion: 4.3%
- Social donation: 3.9%
- Other: 1.7%
When loss of sales becomes food loss…

Loss of sales <> food loss

- For vegetables max. 25% of sales loss is valorised in human consumption
- For fruits 50% of sales loss is still valorised in human consumption
- For apples and pears > 70%
Some findings

- **Arguments in favour of regular shaped f&v**
  - Efficiencies in logistic process
  - Higher price → relation to profitability of farming
  - Demand from retail
  - Although a lot of sympathy for the concept, there is relative low consumer acceptance of cosmetically imperfect produce

- Retail ran several campaigns with “ugly” fruits and vegetables

- ‘Ugly’ produce limited availability
  - Price raised at first at production level
  - But un-elastic readiness of consumer to pay more for “ugly” produce
  - If ugly food becomes too expensive → less sales
  - Retailers use it to show off, and show their nice intentions
  - But if they loose money → not very sustainable
Some findings (2)

- Standards are related to price level
- Private standards barriers not legal standards barriers
  - BRC global standards for food safety
  - IFS international food standard
  - QS Qualität und Sicherheit

- Other standards apply for primary production
  - Use of fertilizer, crop protection, hygiene, use of water, waste handling
  - Global GAP
  - Vegaplan

- Quality labels of producer organisations related to brands or private brands of retail
  - Differentiation from competition (example Flandria)
Findings (3)

- Not all losses are related to cosmetic requirements!
  - market situation can cause surpluses and price drops
  - in periods of over-supply retail has the possibility to become more “picky”
  - in periods of low supply retail can become more flexible on their demands and tolerances

- 2/3 of producers not able to sell some part of their products
- on average 10% sales loss reported
- 1/3 of sales loss still valorised for human consumption

- 43% of farmers believe requirements should be relaxed, 57% feel no need to relax the requirements
Findings concerning use of quality classes

- Extra class is used rarely
  - Low tolerance of defects
  - To avoid de-classification
- Mainly class I and class II used in practice
  - Class I subdivided:
    - higher class I (quality label or branded products)
    - lower class I
  - Class 2 not subdivided
- Most retailers do not buy class II
- Part of class II ends up in processing or goes to charity donations
Tackling some of the problems

- Quality starts with seeds and plants and is a whole farm to fork and is so much more than just marketing standards.
- On farm support
  - Choice of varieties → market oriented varieties
  - Crop diversification
  - Investments on farm in proper equipment
- Training
  - Training in handling fruit during harvest
  - Training in grading fruit and vegetables according to standards
- Crisis prevention
  - Hailnets
- Organising better transport and logistics
Tackling some of the problems (2)

- management and investment in storage and cooling
  → professional management and follow up of cooling and storage
  → less risk for failure
  → lower cost and more state of the art
- packaging products
  → protect the produce
  → prolong the shelf life
  → introduce reusable packaging
- Research
  → New varieties
  → Improve growing techniques
  → Storage conditions
  → Shelf life
  → New packaging materials
  → Soil and tissue analysis
Future perspectives

- Processing into new products and for new social destinations (aid of government)
  - Innovative start ups already created for processing
    - Into high value products
    - Longer expiration date → to tackle food poverty

- Producer organisations coordinating to collect flows from farmers and distribute them for human purposes but also collect residues

- Initiatives to prevent non-harvesting

- Elaborate the analysis: tailor made solutions for every product

- Debate on visual characteristics and intrinsic quality
  - Remove the fuse from the gunpowder
Governance and monitoring

Governance

- coordination and follow up by department of agriculture
- more external partners can be involved → coalition
- Enlarge engagement: call to subscribe
- Yearly stakeholders meeting & consultation
- Interdepartmental Working Group government
- contact with other regions, federal government, Europe

Monitoring

- Yearly reports and monitoring
- Zero measurement of food residues and food losses
  - results for the whole supply chain + data for every link
  - structural data collection
  - monitoring in accordance with EU FUSIONS manual
- Disclaimer: these are the first measurements of their kind, permanent improvement
More information

- **Contact:**
  Interdepartmental Working group food losses
  voedselverlies@v.vlaanderen.be

- Webpage Flemish Government on food losses:
  http://www.vlaanderen.be/landbouw/voedselverlies

- E-zine food losses (3 x year):
  subscribe voedselverlies@v.vlaanderen.be

- Information for consumers:
  http://www.lne.be/voedselverlies