Monitoring and preventing food waste at the Finnish food chain

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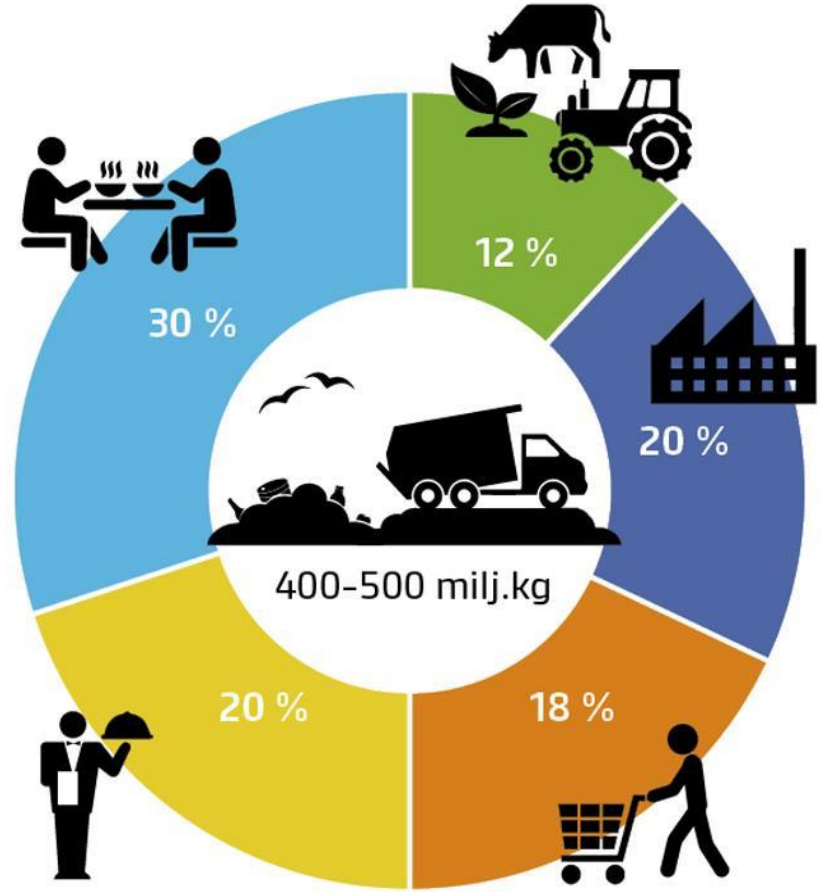
Food waste quantification in Finland

- First food waste quantifications already in 2008 (Luke)
- In Luke we have had several projects on food waste
- In Finland there is 400 - 500 million kilos food waste
  - Rough estimate, based on various quantification methods



Picture: Jouni Hyvärinen, Luke

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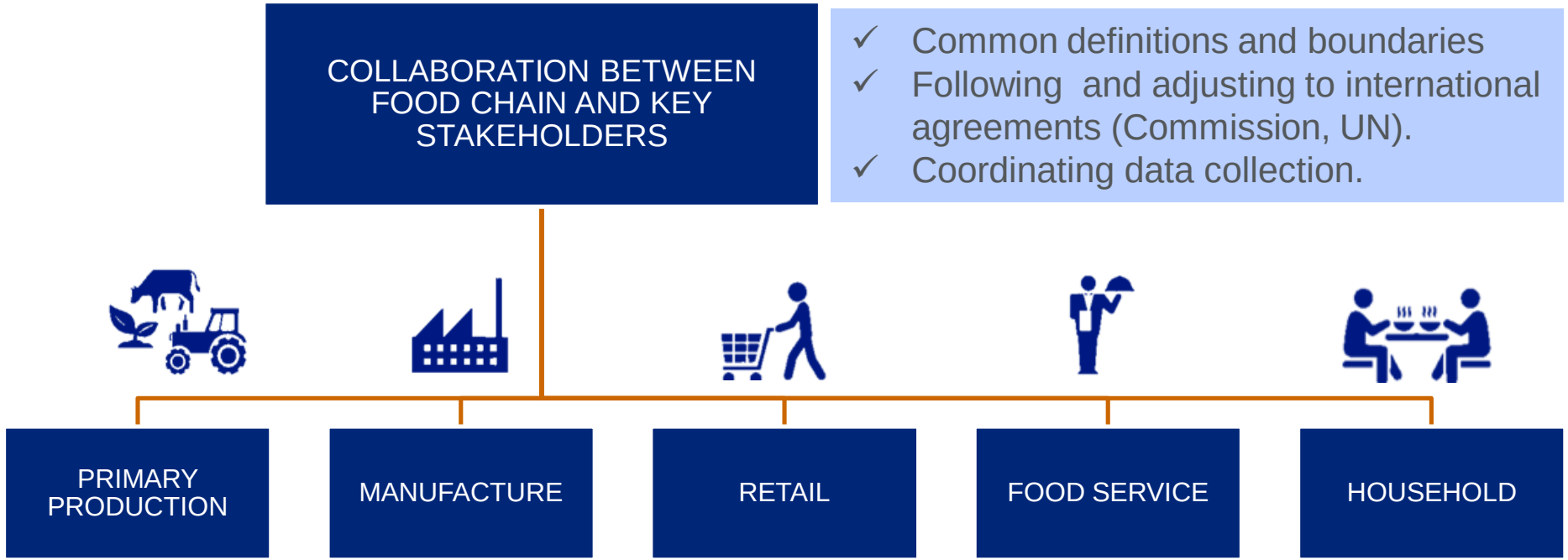
Project: Monitoring and reducing food waste in Finland

- Aim:
  - To build a permanent food waste quantification system in Finland by 2020.

- A national project 2018-2020: Building the system to quantify food waste
  - Covers primary production, food industry, retail, catering sector and households
  - Funding:
    - 3 ministries: Agriculture and Forestry, Environment, Economic affairs and Employment
    - Associations of: food industry (ETL), retail (PTY) and catering services (MaRa)
  - Project webpage: https://www.luke.fi/ruokahavikkiseuranta/en/



Picture: Hartikainen (2019)

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	METHODS	PLANNED SAMPLE SIZE	RESULT	NEW 2020-
	✓Questionnaires ✓Statistical data: e.g. beef, pork ✓Interviews: supplementary	Q: 30 % volume S: 100 % 15 indicator products	Q: 30 % S: 100 % (5 indicator products)	Q: 7: cereals, vegetables S: 3: meat (10 indicator products)
	✓Questionnaire ✓Interviews: supplementary	Q: 30 % volume	Over 40 %	Medium scale companies
	✓Data collected by retail groups	90 % volume (3 big chains)	Over 90 %	Over 90 %
	✓Food waste diary (D) ✓Questionnaire (Q): supplementary	D: over 140 food serving places Q: 500 food serving places	D: 78 Q: 900	??
	✓Online-questionnaire (Q): supplementary ✓Waste composition analysis (W) ✓Food waste diary (online) (D)	Q: 1,000 households W: 5,000 households D: 200 households	Q: over 1,000 W: over 5,000 D: around 300	Q: 2000 D: 500 households

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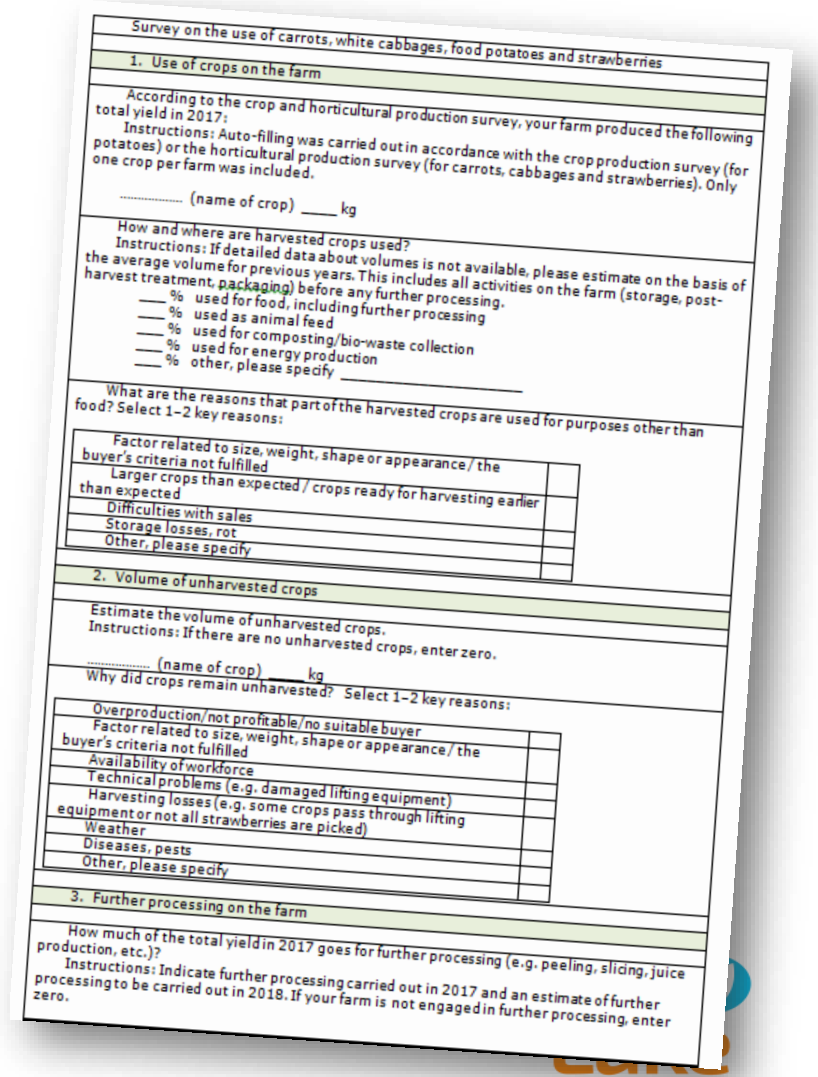
Food waste quantification in primary production

- Around 15 indicator products (the products haven been selected based on production volume)
- Methods: Questionnaire, statistical data (interviews and literature references were used to supplement data gaps)
- Data is collected from farmers (volume 30 % cultivation area)
- Sample size: questionnaires 30 % and statistical data 100 %
- Harvested and ready to be harvested yield + slaughter-ready animals and non-slaughter-ready animals
- Challenge of the research method:
  - Questionnaire: the waste estimates are somewhat under-representative



Survey on the use of carrots, white cabbages, food potatoes and strawberries

1. Use of crops on the farm

According to the crop and horticultural production survey, your farm produced the following total yield in 2017:
Instructions: Auto-filling was carried out in accordance with the crop production survey (for potatoes) or the horticultural production survey (for carrots, cabbages and strawberries). Only one crop per farm was included.

..... (name of crop) ____ kg

How and where are harvested crops used?
Instructions: If detailed data about volumes is not available, please estimate on the basis of the average volume for previous years. This includes all activities on the farm (storage, post-harvest treatment, packaging) before any further processing.
____ % used for food, including further processing
____ % used as animal feed
____ % used for composting/bio-waste collection
____ % used for energy production
____ % other, please specify _____

What are the reasons that part of the harvested crops are used for purposes other than food? Select 1–2 key reasons:

Factor related to size, weight, shape or appearance/ the buyer's criteria not fulfilled	
Larger crops than expected / crops ready for harvesting earlier than expected	
Difficulties with sales	
Storage losses, rot	
Other, please specify	

2. Volume of unharvested crops

Estimate the volume of unharvested crops.
Instructions: If there are no unharvested crops, enter zero.

..... (name of crop) ____ kg

Why did crops remain unharvested? Select 1–2 key reasons:

Overproduction/not profitable/no suitable buyer	
Factor related to size, weight, shape or appearance/ the buyer's criteria not fulfilled	
Availability of workforce	
Technical problems (e.g. damaged lifting equipment)	
Harvesting losses (e.g. some crops pass through lifting equipment or not all strawberries are picked)	
Weather	
Diseases, pests	
Other, please specify	

3. Further processing on the farm

How much of the total yield in 2017 goes for further processing (e.g. peeling, slicing, juice production, etc.)?
Instructions: Indicate further processing carried out in 2017 and an estimate of further processing to be carried out in 2018. If your farm is not engaged in further processing, enter zero.

Food waste quantification in food industry

- The data has been collected mainly from big food industry companies (from different subsectors: meat industry, bakery industry, vegetable product industry etc.).
- Methods: Questionnaires, interviews (supplementary)
- Questionnaire:
  - how much of raw materials and food products (end products) are not sold (kg, dry matter content, causes for food waste and where does food waste end up),
  - how much inedible material flows/side flows are caused in the production process of a company
- Sample size: over 40 % of sales volume (new data collection)
- Challenges:
  - It is especially challenging to interpret what is included to food waste in this step of the food chain (many side flows that could be interpreted either way).
  - In order to increase reliability of the data, also medium size companies should report the amount of food waste.

Food waste quantification in retail sector

- Data has been collected from retail companies (three biggest retail chains), 90 % of retail volume (sector sales)
- Methods: Questionnaire, interviews (supplementary)
- Categories in questionnaire:
    1. Fresh vegetables, root vegetables, potato, fruits, berries,
    2. Fresh bred and fresh bakery products
    3. Meat, meat products, fish and fish products
    4. Milk and milk products, cheese products, fat, eggs
    5. Other products (including convenience food)
- Questions: How much food products of each group (categories) is not sold: kg and % of sales (in relation to sales kilograms)?
- Where does the unsold food end up? % distributions (data can based on an estimation)
    a) Charities
    b) Feed
    c) Raw material for biofuel or gas
    d) Waste disposal
    e) Other

Food waste quantification in food serving sector

- The data has been collected from food service companies (from different type of subsectors)
- Methods: Food waste diary (weighing study) + questionnaire
- Sample size: Diary 78 outlets (duration: two weeks), questionnaire 900 food serving places
- Food waste was divided into categories by origin: kitchen, serving, and leftovers (edible and non-edible parts)
- Scaling based on food portions sold in different food service subsectors in Finland
- In the questionnaire have been enquired: do the serving places follow food waste regularly, how they measure and monitor food waste, how they are register food waste (manual or online), what is causing food waste, what kind of actions they have taken to reduce food waste
- In order to improve the reliability the sample size should be largely increased: amount of outlets must increase and more types of subsector outlets to be included (especially fast food, hospitals, hotels etc)

Food waste quantification in households

- Methods: Questionnaire, online-diary, waste composition analysis
- Sample sizes: Questionnaire 1154 households, diary 284 households, waste composition analysis covering 5000 inhabitants
- Q: Questions related to eating habits, how often different kind of food products is thrown to bin/biowaste/sewer, reasons for food waste, how is it possible to reduce food waste in households + sociodemographic data of households (different kind of households from all over the Finland)
- D: Duration of diary study 2 weeks, online-diary (different kind of households from all over the Finland)
- W: Waste composition analysis (Municipality waste) including mixed and separately collected bio waste, sample of households in Helsinki (2018) and Tampere city (2016) regions.
- Challenges of the methods:
  - Diary and questionnaire: respondents often underestimate the amount of food waste.
  - Composition analysis cover only certain regions. Methodology does not cover liquid food waste (sewer) or home composting.

Date when waste occurred

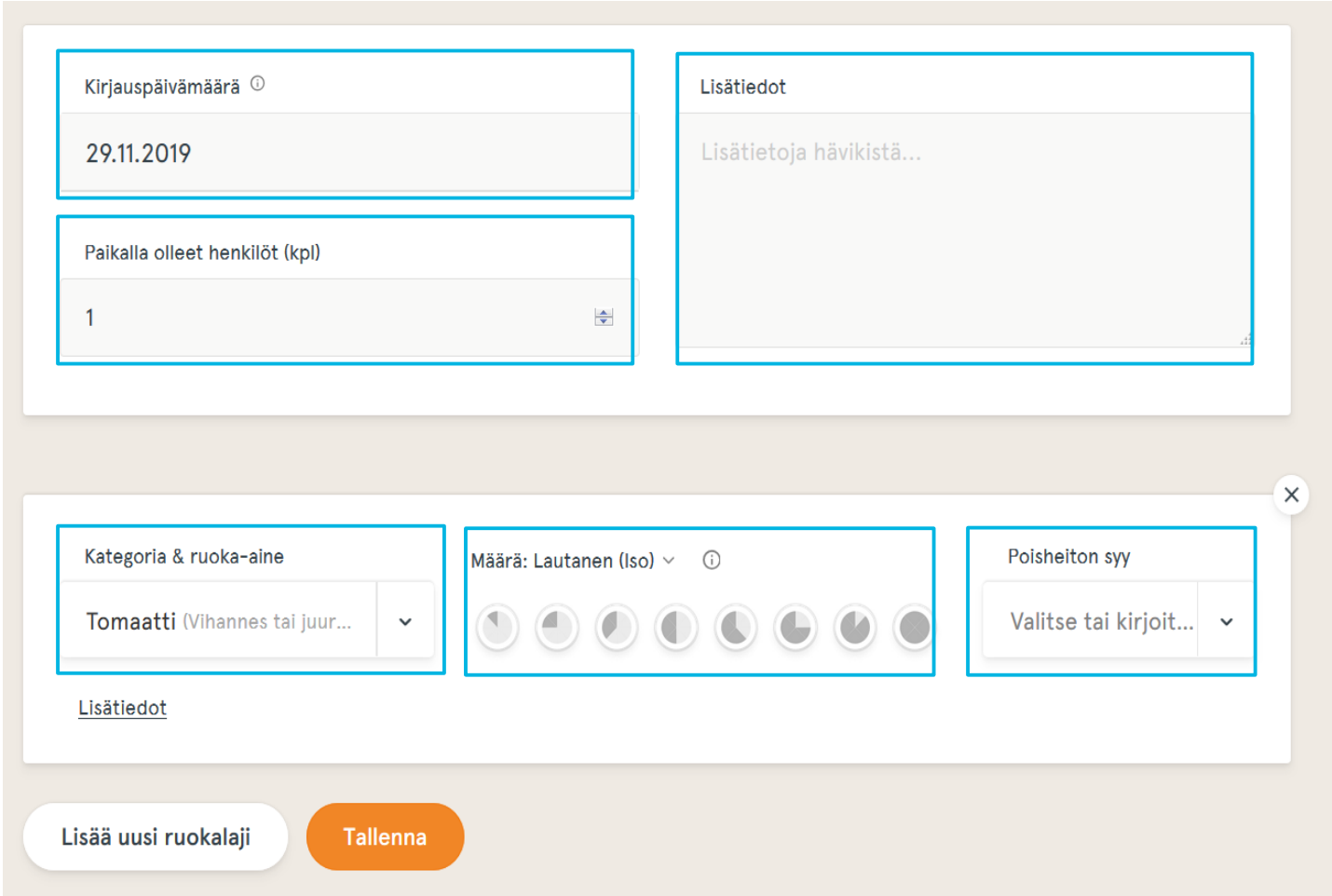
Number of people attended

Special notes

Type of food waste

Amount estimate:
gram, pcs, dl, plate, spoon

Reason for waste



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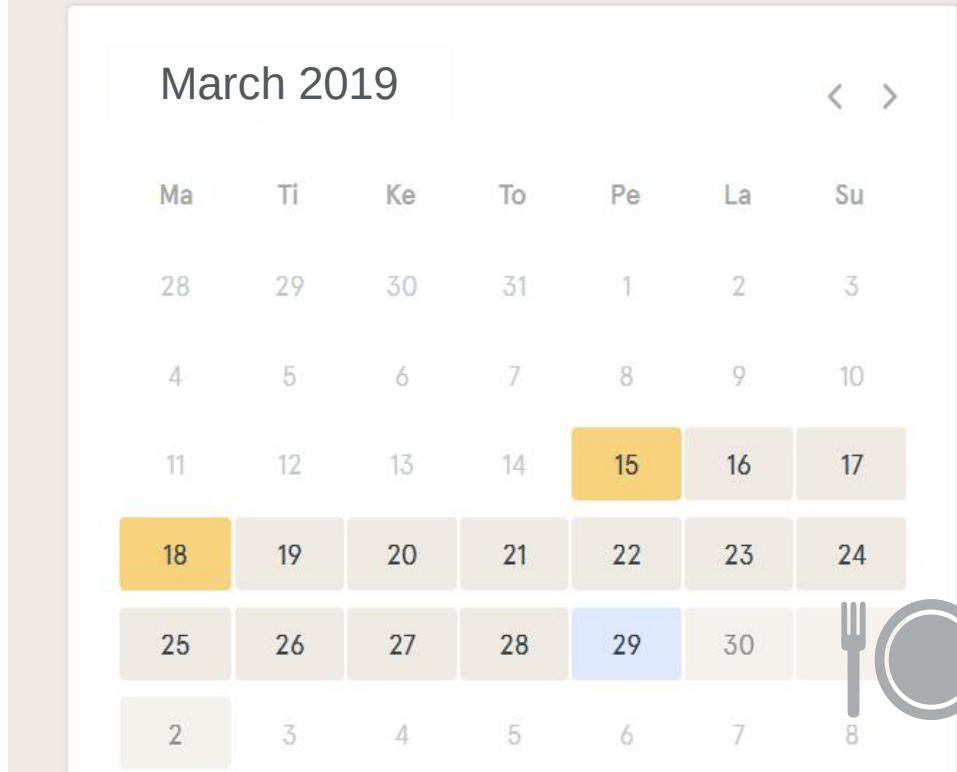

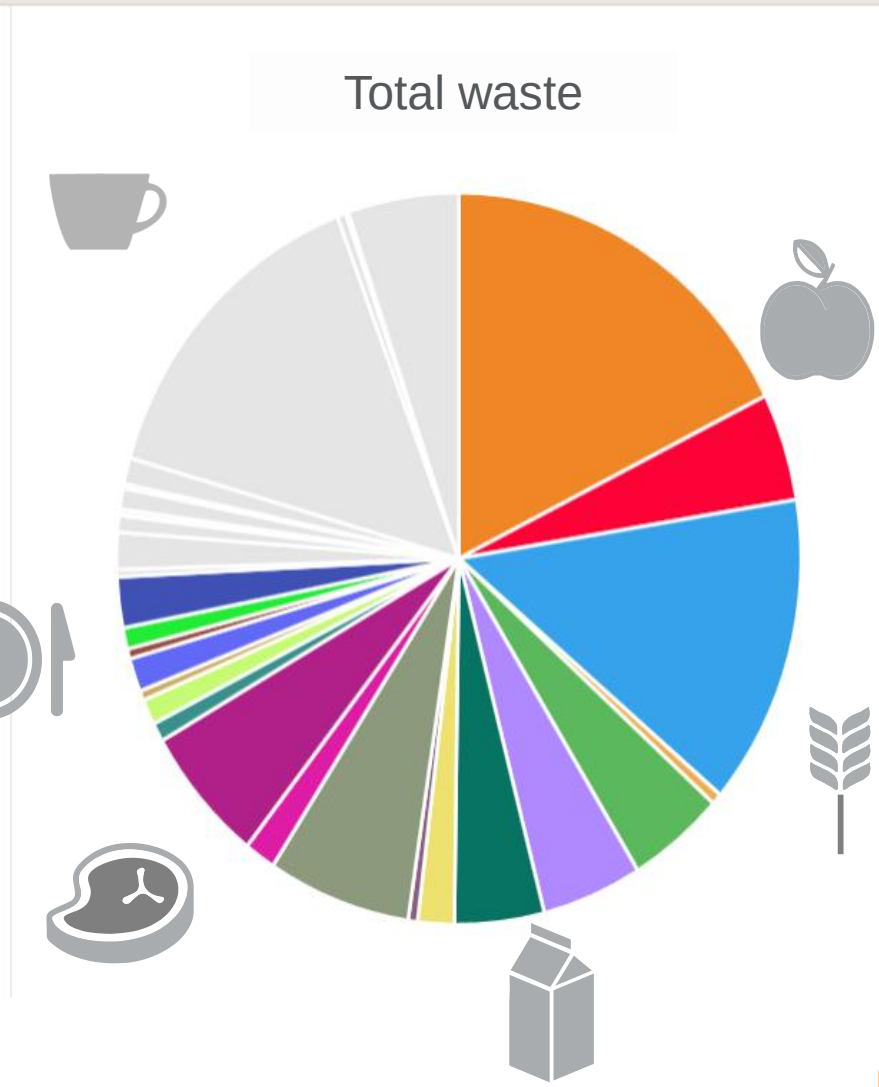

Challenges of the quantification

- Methodologies are not perfect:
  - Diary and questionnaire methodologies: respondents often underestimate the amount of food waste
  - Waste composition analysis does not include waste going to sewer or compost
- Some research tools need improvement
- There is variation in food waste figures → it is explained by yearly variation and several other circumstantial factors.
  - We propose that all waste figures would allow to be reported using a 3-4-year average (if more frequent data regarding 4-year period is available) → this would lead to much more reliable food waste figures.
- Also attention should be paid on representativeness of sample sizes

Continuation of the work

- Evaluation of food waste continues in 2021
  - Sample sizes will be increased
  - Methods/tools will be developed

- The final plan regarding how to organise food waste reporting in Finland in the future will be done over the next few years. The decision will be done based on the report of Natural Resources Institute Finland as well as the evaluation of the costs and requirements of Commission

Finland’s national food waste road map

- Efficient regulation
- Nudging towards sustainability
- Strength from education, new beginnings
- Intelligence from technology, new products & business models
- Evolving research and facilitating its integration
- More together

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Thank you!

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