



# Food waste characterisation

Jukka Rintala

MTT Agrofood Research Finland



# Food waste – compositional analyses and characterisation

## WHY

- Waste prevention
  - Avoidable
  - Non avoidable
  - Potentially avoidable
- Waste treatment
  - Waste system optimisation, including collection system
  - Design and operation of waste treatment process
  - Products from waste

## HOW

- Waste composition analyses
- Kitchen diaries
- Estimation from food supply data
- Questionnaire surveys

# Food waste characterisation – Composition analyses

- Categorisation
  - Primary and sub-categories
- Degradation
  - In waste container, during transport
  - Effects identification
- Food packing
- Pre-treatment
  - Sieving, removal of contaminants
- Limitations
  - Variation
    - daily, seasonal, regional
  - Other routes for food waste
    - Residual waste, home composting, animal feed

# Sorting



# Sorting



# Source segregated food waste, Finland

Item	23.8.2011		16.3.2011	
	mass (g)	proportion (%)	mass (g)	proportion (%)
Fruit and vegetable waste	43500	20,97 %	22600	25,20 %
Fruit and vegetables (whole)	10900	5,26 %	5698	6,35 %
Pasta / rice / flour / cereals	1011	0,49 %	230	0,26 %
Bread and bakery	5299	2,55 %	2428	2,71 %
Meat and fish	3409	1,64 %	2421	2,70 %
Bones	1977	0,95 %	327	0,36 %
Dairy	233	0,11 %	362	0,40 %
Egg shells	1612	0,78 %	890	0,99 %
Drinks	56700	27,34 %	17489	19,50 %
Confectionery and snacks	0	0,00 %	185	0,21 %
Desserts	923	0,45 %	1857	2,07 %
Condiments	230	0,11 %	0	0,00 %
Mixed meals	11804	5,69 %	3985	4,44 %
Other food	773	0,37 %	75	0,08 %
<i>Other food waste, identified but no</i>	4009	1,93 %	4992	5,57 %
Biodegradable bags	9200	4,44 %	1453	1,62 %
Contaminants	1369	0,66 %	1211	1,35 %
Plastic containers	206	0,10 %	29	0,03 %
<i>Plastic bags</i>	1627	0,78 %	153	0,17 %
Paper and card	40200	19,38 %	15700	17,51 %
Metals	43	0,02 %	3	0,00 %
Glass	0	0,00 %	268	0,30 %
Garden waste	9600	4,63 %	6475	7,22 %
Miscellaneous	2776	1,34 %	843	0,94 %
<b>Total</b>	<b>207401</b>	<b>100,00 %</b>	<b>89674</b>	<b>100,00 %</b>

# Food waste composition

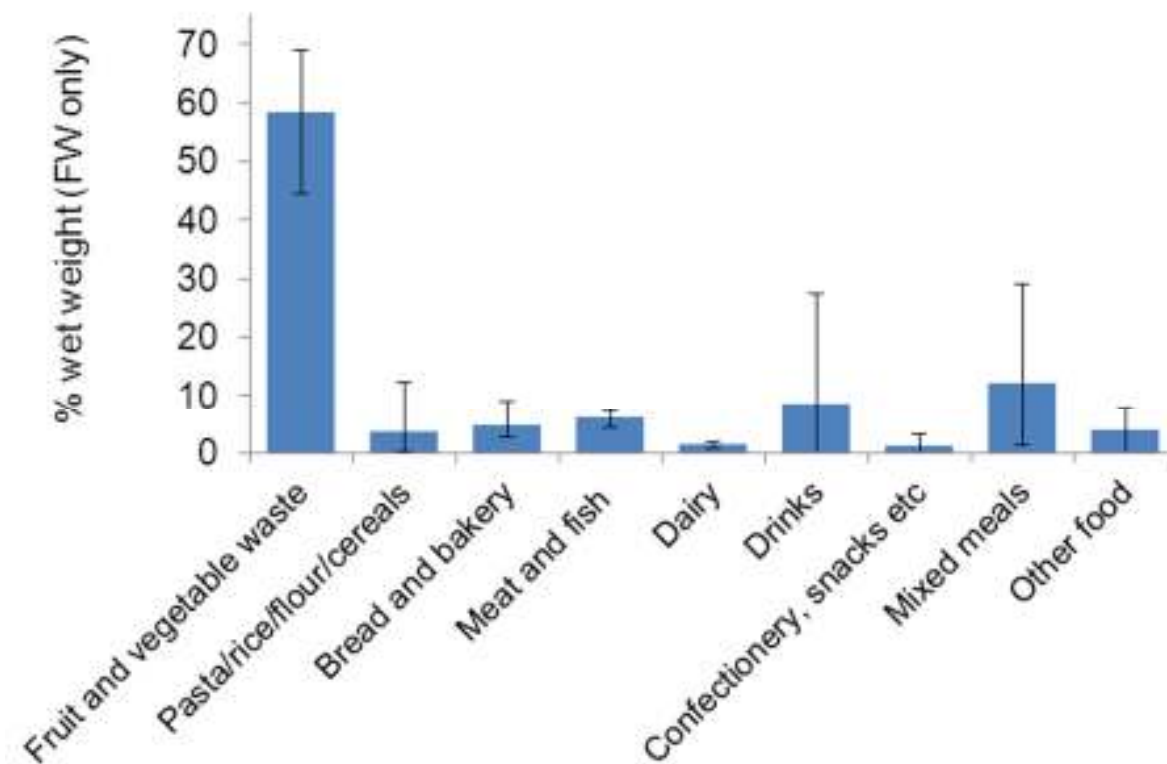
% wet weight	UK <sup>a</sup>	Finland	Portugal	Italy	Ave	WRAP <sup>b</sup>
Fruit and vegetable waste	60.9	44.5	59.2	69.0	58.4	46.6
Pasta/rice/flour/cereals	1.5	0.4	0.2	12.4	3.6	2.5
Bread and bakery	9.0	3.8	3.1	2.8	4.7	13.4
Meat and fish	6.7	4.3	7.3	6.2	6.1	8.4
Dairy	1.7	2.0	0.7	1.4	1.4	3.5
Drinks (tea, coffee))	7.1	27.5	0.2	0.0	8.7	8.0
Confectionery, snacks etc	0.7	3.2	0.3	0.0	1.0	1.7
Mixed meals	12.3	6.3	29.0	1.4	12.2	12.9
Other food	0.2	8.0	0.0	6.9	3.8	3.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

a

Data from 8 sites using all food waste categories

b

Based on WRAP



Comparison of results of food waste compositional analysis for samples from UK, Finland, Portugal and Italy. (Error bars show range).



# Physico-chemical Characterisation of Food Waste

	Eastleigh, UK	Forssa, FI	Treviso, IT
pH	5.7	5.34	6.16
TS, %WW	28.62±0.07	27.02±0.12	27.47±0.03
VS, %WW	26.83±0.16	24.91±0.05	23.60±0.09
VS, %TS	94.18±0.42	92.26±0.26	86.60±0.40
TKN, % TS	2.74±0.05	2.39±0.04	2.55±0.03
TKN, g Kg <sup>-1</sup> WW	7.84±0.16	6.45±0.1	7.02±0.1
CV, KJ g <sup>-1</sup> TS	21.32±0.08	21.39±0.11	20.50±0.11
Lipids, gkg <sup>-1</sup> VS	152.2±2	156±0.5	202±0.5
Crude protein, gkg <sup>-1</sup> VS	183±4	162±0.4	186±3
TKN, gkg <sup>-1</sup> TS	27.4±0.5	23.9±0.4	25.5±0.3
TP, gkg <sup>-1</sup> TS	2.94±0.01	2.73±0.05	3.47±0.06
TK, gkg <sup>-1</sup> TS	11.2±0.2	10.0±0.2	10.0±0.1

**[www.valorgas.soton.ac.uk](http://www.valorgas.soton.ac.uk)**

**Valorisation of food waste to biogas  
Project 241334**

Sponsored by FP7 ENERGY.2009.3.2.2  
Biowaste as feedstock for 2nd generation

