MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE

REDUCE

DIPARTIMENTO DI SCIENZE E TECNOLOGIE
AGRO-ALIMENTARI

REDUCE Project

Research, Education and Communication

An integrated approach for the prevention of food waste

Funding body	Ministry of the Environment, Land and Sea of Italy
Project Leader	Department of Agriculture and Food Sciences (DISTAL) University of Bologna

Introduction to the project

Aim	Research, Education and Communication on food waste in Italy
Scope	Quantification of food waste in Italy as foreseen by the EU Waste directive and the SDG 12.3
Period	2016 - 2018
Activities	Quantification and analysis of food waste at retail, canteens and household stage through diary and waste compositional analysis at waste treatment plant. Harmonization of normative about food donation and support to local authorities. Communication in schools.
Quantification Methods	DIRECT MEASUREMENT: Waste compositional analysis, food diaries, scanning, interviews and focus groups

Introduction to the project

Website	http://www.sprecozero.it/cose-il-progetto-reduce/
Partners	University of Bologna University of Tuscia Politecnico di Milano University of Udine ULSS 9 Verona (public healthcare service)

Research task 1 - Households

Aim

Food waste quantification and identification of drivers at **households**

- **Sample size**: 388 units all over Italy
- **Pilot**: 2014-2015 (questionnaire + diary + waste sorting)
- **Main survey**: 2017 (weekly food diary + CAWI questionnaire)
- **Link**: http://www.sprecozero.it/2017/03/16/the-food-waste-diary-experiment-in-Italy/

Research task 1 - Households

Results

Quantitative results on household food waste
(Giordano et al., IJCS, 2018; Giordano et al., SUSTAINABILITY, 2019)

- **27.5 kg** edible food waste **per person per year**
- **1.6 million tons** in Italy per year
- **Vegetables**: 7 kg per person per year
- **Milk**: 4.8 kg per person per year
- **Fruit**: 4.5 kg per person per year
- **Bakery**: 3.2 kg per person per year

Research task 1 - Households

Results

Qualitative results on reasons for food waste
(Giordano et al., IJCS, 2018)

- **Stated reasons**
  - Spoiled (46%)
  - Personal preferences (26%)
- **Main meal**: dinner
- **Attitude and motivation**: different values of stated motivation to reduce food waste show no difference with actual FW values

Research task 1 - Households

Results

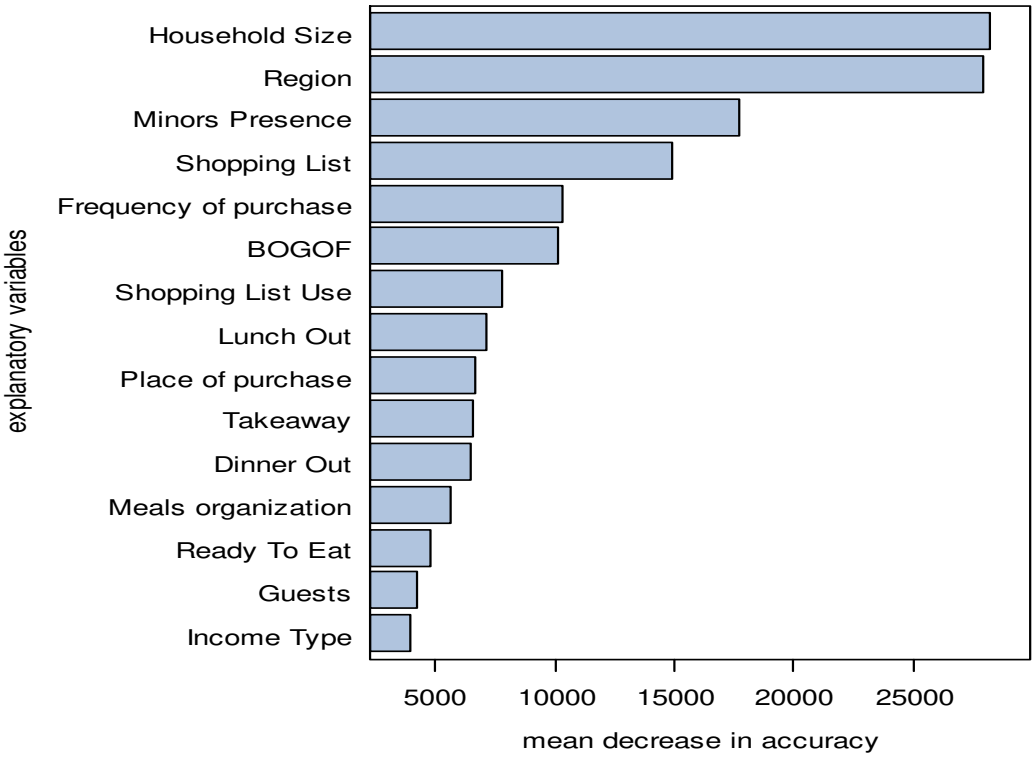
Variables influencing the production of food waste
(Giordano et al., SUSTAINABILITY, 2019)

Variables analyzed	Impact on food waste production, per capita (Yes/NO)
Demographics – number of components of the household	Y
Demographics – having children	Y
Demographics – location (North, Center, South of Italy)	Y
Shopping habits – frequency of shopping (see Giordano et al. 2018)	Y
Consumption habits and diets - eating healthy	Y
Disposal of wasted food – separate collection system	Y
Shopping habits – buying discounted food products	N
Shopping habits – place of shopping (see Giordano et al. 2018)	N
Shopping habits – preparing a list(see Giordano et al. 2018)	N
Motivations	N
Consumption habits and diets- eating out	N

Research task 1 - Households

Results

Variables influencing the production of food waste
(Giordano et al., SUSTAINABILITY, 2019)



One-third of the variance in food waste quantities could be explained by the selected variables.

Research task 1 - Households

Results

Awareness of food waste and attitude-behavior gap
(Giordano et al., SUSTAINABILITY, 2019)

Table 4: Answer to the question «After the experiment, how much do you think your family waste per week?». Average.

Provided Options	Number of families that selected the option	Average FW of group of respondents
0-200 g	141	1010.9
201- 500g	167	1301.7
501-800 g	59	1484.9
801-1000 g	16	1235.4
More than 1000 g	5	1551.8
Total	388	1224.4

Research task 1 - Households

Results

Awareness of food waste and attitude-behavior gap
(Giordano et al., SUSTAINABILITY, 2019)

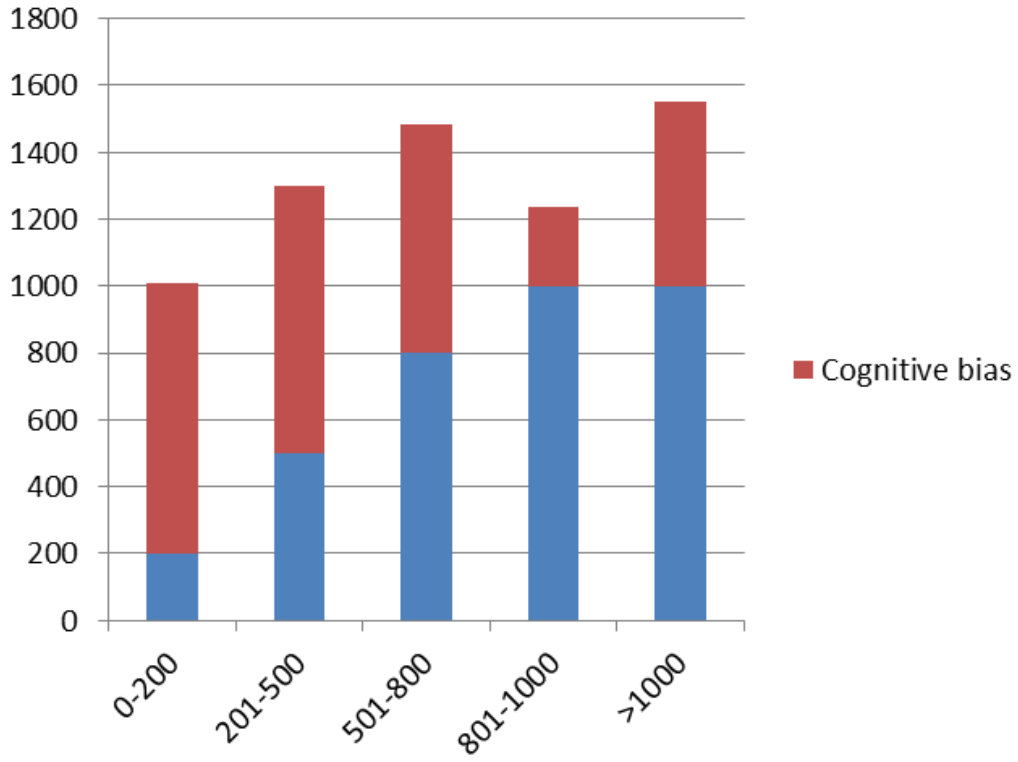


Figure 5: Difference between response provided and actual FW quantity from diary. Average.

Research task 2 – Treatment plants

Aim

Detailed composition analysis of food waste delivered at treatment plants

- **Sample** : 8 analyses of residual waste + 4 analyses of source separated food waste delivered at different plants in two regions (North of Italy)
- **Pilot and main survey**: 2016
- **Methodology**: waste compositional analysis
- **Link**: http://www.sprecozero.it/2017/03/16/food-waste-lets-put-our-hands-in/

Research task 2 – Treatment plants

Results Quantity of food waste at treatment plants

- In the **residual waste**, avoidable food waste accounts for 5% in mass
- In the **source-separated food waste, 22% is avoidable**
- **89-111** (average 97) **kg per person per year** of total food waste
- **14-38** (average 27) **kg per person per year** of avoidable food waste
- **Main wasted products**: vegetables, bread and fruit

Research task 2 – Impact assessment

Aim

Analysis of the environmental impacts of avoidable food waste, applying the Life Cycle Assessment (LCA) methodology

Results

Impacts per person per year of the avoidable food waste in Italy

→ 62 kg of CO_2eq (1% of total emissions of greenhouse gases)

→ 73 m^2 of agricultural soil (3.6% of the total surface)

→ 2.5 m^3 of water (1.5% of the total consumption for irrigation)

→ Meat and dairies account for the majority of the impacts

Research task 3 – Foodservice

Aim

Quantification and identification of food waste in school canteens

- **Sample** : 78 primary schools in 3 regions of Italy (11,518 people involved; 109,656 meals)
- **Pilot:** 2016
- **Main survey**: 2017
- **Methodology**: structured interviews + waste compositional analysis
- **Link**: https://bit.ly/2mMT22y

Research task 3 – Foodservice

Results Quantity of food waste at school canteens

- Out of **534 g** of prepared meal, **120 g** are wasted:
  - 90 g are plate leftovers
  - 30 g are kitchen leftovers
  - 21% from the first dish (pasta, legumes, rice)
  - 27% from the second dish (meat or fish)
  - 30% of side dish (vegetables)

Research task 3 – Foodservice

Results Qualitative findings on the causes of food waste

- Kitchen inside the school: less waste
- Kitchen outside the school: positive relation between distance and waste
- Half morning meal: less waste when provided by the food service
- Winter menu: more waste

Research task 4 – Retail

Aim Quantification and identification of food waste at retail stage

- **Sample** : 16 stores (from 650 to 4500 m^2 of sales area), located in 11 municipalities in Central Italy
- **Pilot:** 2016
- **Main survey**: 2016-2017
- **Methodology:** two years data on in-store food waste + 9 focus groups with food category managers
- **Link**: http://www.sprecozero.it/2017/05/30/dentro-i-supermercati-per-capirci-di-piu/

Research task 4 – Retail

Results

Quantity of food waste at retail stores
(Cicatiello et al., JRCS, 2017)

- **Food waste at retail stores**: 18.7 kg per m^2 per year
- **National estimate of food waste in retailing**: 220,000 ton/year → 2.89 kg per person per year
- **35%** of this food is perfectly edible when wasted
- Most wasted **food categories**: fruits and vegetables, bread and bakery products, dairy products

Research task 4 – Retail

Results Qualitative results from focus groups

- **67 food category managers** joined focus groups
- **Causes** of in-store food waste identified:

  - **Consumer preferences**: fashions, turnout, presence of competitors
  - Management of **orders** and promotions: over-stocking, difficulty in predicting sales
  - **Technical issues**: temperature of stores and fridges, breakage
  - Incorrect **handling** of products
  - **Expiration dates**: product rotation, time of withdrawal, product display

Education – School kit

Aim

Developing and testing a school kit for education against food waste

- **School kit** for primary school, diversified per age of children, with games, tales, etc…

- **Link**: https://bit.ly/2YRu0Rp

- **Tested and validated** in a primary school in Bologna

The school kit illustrations have been created by Giorgia Arcella

Communication campaign

Aim

Developing a campaign to raise awareness on the food waste issue

- Run by **Last Minute Market**, through the campaign titled "**SPRECO ZERO**"

- Broadcasted through the main radio and tv channels, format and events
- **Link**: http://www.sprecozero.it/

Support to policy

Aim

Supporting local authorities to empower practices against food waste

- Harmonization of **food donation** hygiene practices at national level
- Guideline for Good Hygiene Practice about surplus food donation and redistribution, including an educational chapter for donors
- A systematic review of food waste fighting laws and literature
- **More info on**: https://sian.aulss9.veneto.it/index.cfm?action=mys.page&content_id=955

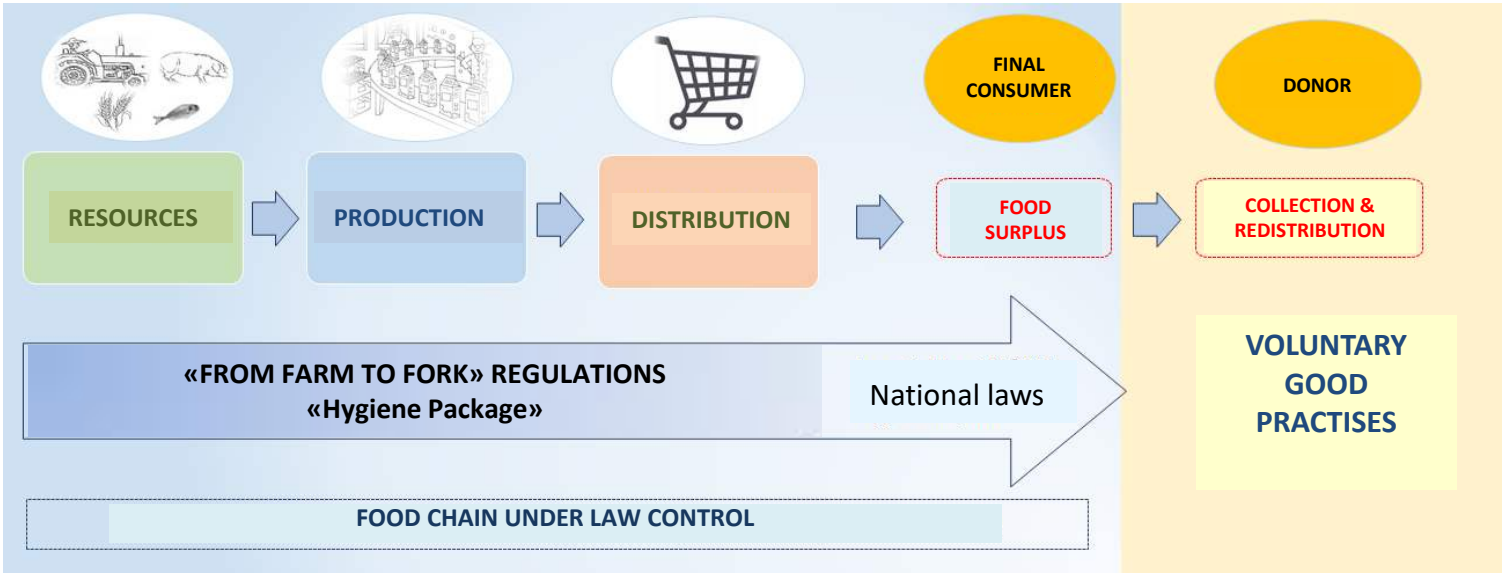
Support to policy

Results

Guideline for Good Hygiene Practice in food donation and redistribution

- From collection, through transport, storage and conservation to distribution

Food safety and food security

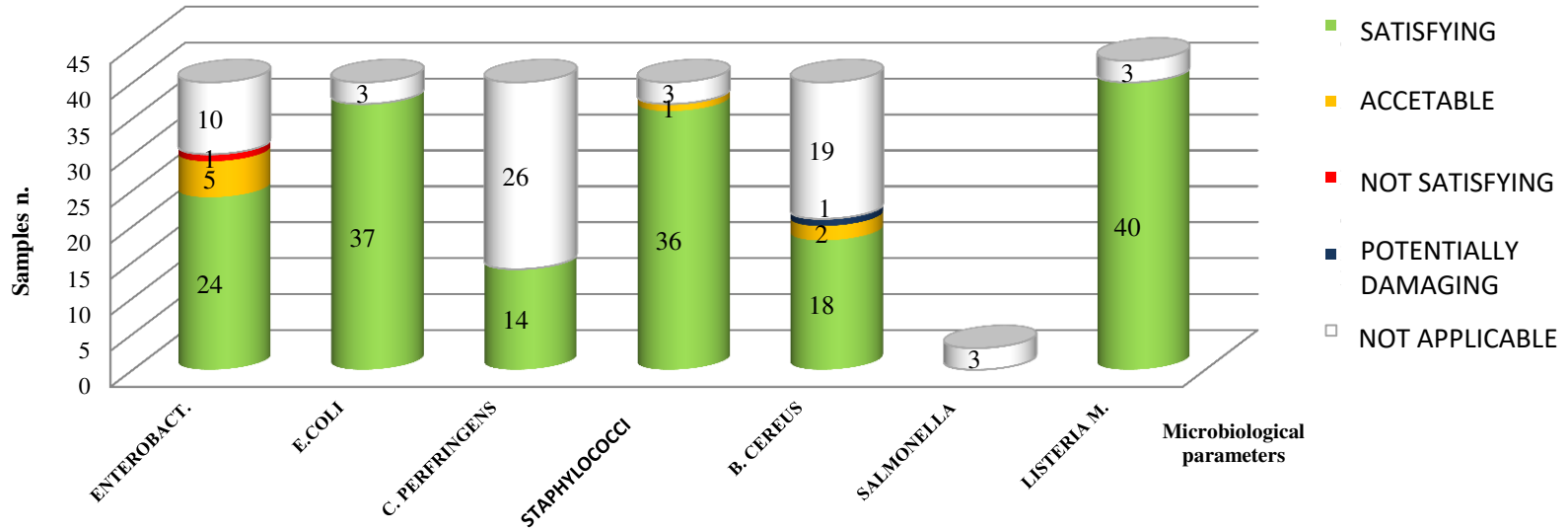


Communication – Policy

Results Microbiological analysis on donated food

- **Survey** to test hygienic and safety standards on donated food:

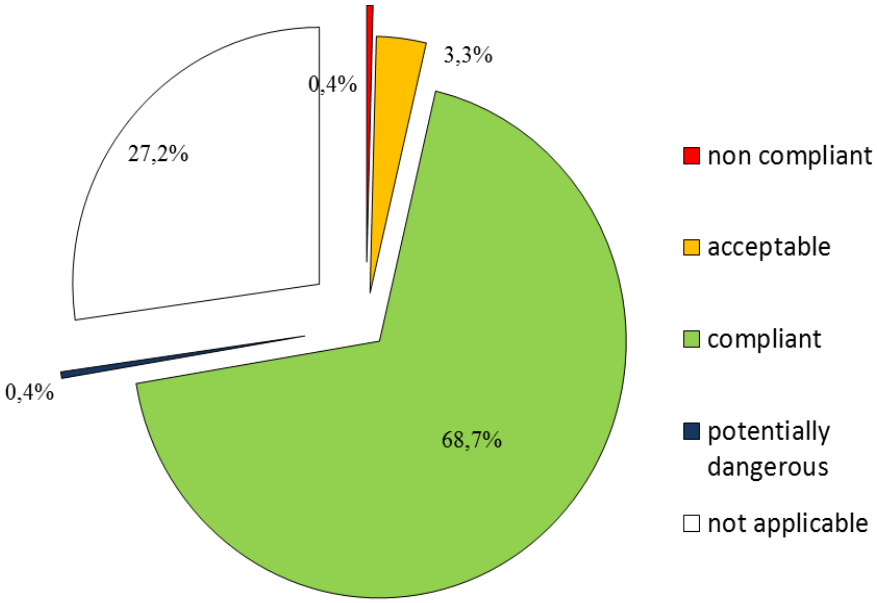
246 analysis on 43 samples from production, distribution e redistribution



Communication – Policy

Results Microbiological analysis on donated food surplus

- Taking out not applicable values (food matrix parameters not provided by law), 98,9% of samples are satisfying/accetable



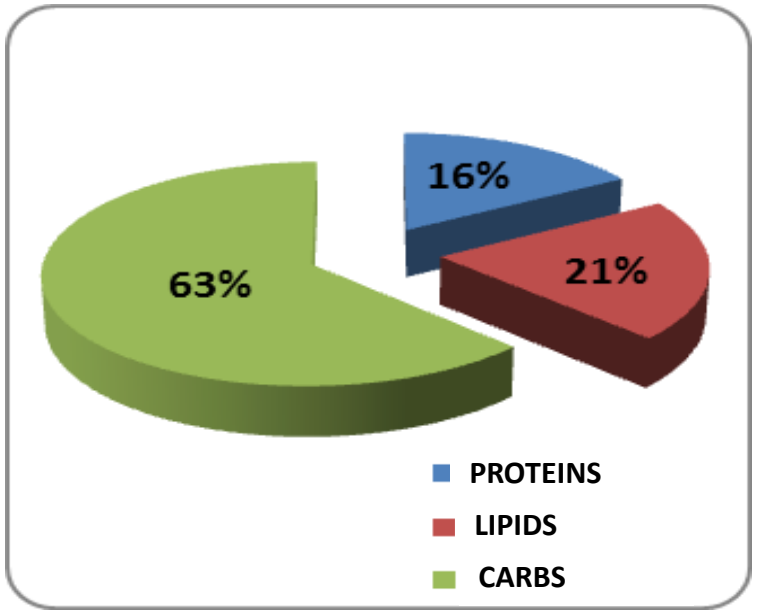
Communication – Policy

Results

Analysis on nutritional intake of surplus food donated by collective catering

- 35% of daily energy average needs (2400 kcal)

Estimation of nutrients supplied by surplus food donated by collective catering in 2015-2016



Publications

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2. Matteo Boschini, Luca Falasconi, Claudia Giordano, Alexandre Meybeck, **Preliminary assessment of a methodology for determining food waste in primary school canteens**, Programme on Sustainable Food Systems FAO/UNEP, 8-9th June 2016.
3. Matteo Boschini, Luca Falasconi, Claudia Giordano, Silvio Franco, Clara Cicatiello, Francesco Marangon, Stefania Troiano **. Preliminary results of a methodology for determining food waste in primary school canteens**, presented at the conference "The future of agriculture between globalization and local markets", National Society of Agricultural Economy, September 2016. "REA- Rivista di Economia Agraria".
4. Claudia Giordano, Luca Falasconi, Fabrizio Alboni, Matteo Boschini, Andrea Segrè **Do retilers' special offers increase Household Food Waste**?, presented at the conference "Strategie cooperative e creazione del valore in una filiera alimentare sostenibile", National Society of Agricultural Economy, September 2017. Proceedings
5. Camilla Tua, Mario Grosso, Simone Nessi **The "REDUCE" project: definition of a methodology for quantifying food waste by means of targeted waste composition analysis** Rivista di Economia Agraria, Anno LXXII, n. 3, 2017: 289-301
6. Grosso, Mario; Falasconi, Luca, **Addressing food wastage in the framework of the UN Sustainable Development Goals**, «WASTE MANAGEMENT & RESEARCH», 2018, 36, pp. 97 – 98
7. Cicatiello, Clara; Franco, Silvio; Pancino, Barbara; Blasi, Emanuele; Falasconi, Luca, **The dark side of retail food waste: Evidences from in-store data**, «RESOURCES CONSERVATION AND RECYCLING», 2017, 125, pp. 273 – 281
8. Matteo Boschini, Luca Falasconi, Claudia Giordano, Fabrizio Alboni **Food waste in school canteens: a reference methodology for large-scale studies**. Journal of Cleaner Production Volume 182, 1 May 2018, Pages 1024-1032, 2018 https://doi.org/10.1016/j.jclepro.2018.02.040
9. Claudia Giordano, Luca Falasconi, Simone Piras, Matteo Boschini **Are questionnaire a reliable method to detect food waste quantities?** British Food Journal, Vol. 120 Issue: 12, pp.2885-2897, https://doi.org/10.1108/BFJ-02-2018-0081
10. Claudia Giordano, Fabrizio Alboni, Luca Falasconi, Clara Cicatiello**, Do discounted food products end up in the bin? An investigation into the link between deal-prone shopping behaviour and quantities of household food waste**. International Journal of Consumer studies 2018;00:1–11, https://doi.org/10.1111/ijcs.12499
11. Cicatiello, C. and Giordano, C**. Measuring household food waste at national level: a literature review on methods and results**, CAB reviews 2018, 13, 056, pp 1-8.
12. Claudia Giordano, Fabrizio Alboni, Luca Falasconi **Quantities, Determinants and Awareness of households' food waste in Italy: a comparison between diary and questionnaires**. Sustainability, 2019, 11(12), 3381; https://doi.org/10.3390/su11123381

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Link: http://www.sprecozero.it/i-partner-del-progetto-reduce/