

Sustainability assessment of food waste reduction measures

Case study in the food processing and manufacturing sector

Dr. Yanne Goossens , Dr. Friederike Lehn, Dr. Thomas Schmidt, Dr. Felicitas Schneider

Thünen Institute of Market Analysis
Braunschweig, Germany

Meeting of the Sub-group on Action and Implementation
EU Platform on Food Losses and Food Waste
04.10.22



Federal Research Institute for Rural Areas, Forestry and Fisheries

- Established in 2008
- Under the auspices of the German Federal Ministry of Food and Agriculture
- Tasks: Research and provision of policy advice
- Headquarter in Braunschweig, Germany
- Interdisciplinary profile, 15 Institutes covering in total 19 thematic issues

<https://www.thuenen.de/en/>

Institutes

Research section Rural areas

Rural Studies
Prof. Dr. Peter Weingarten

Rural Economics
Prof. Dr. Christian Hundt

Research section Agriculture

Farm Economics
Dr. Hiltrud Nieberg

Market Analysis
PD Dr. Martin Banse

Agricultural Technology
Prof. Dr. Christina Umstätter

Biodiversity
Prof. Dr. Jens Dauber

Climate-Smart Agriculture
Prof. Dr. Heinz Flessa

Organic Farming
Prof. Dr. Gerold Rahmann

Research section Forestry

Wood Research
Prof. Dr. Andreas Krause

Forestry
Prof. Dr. Matthias Dieter

Forest Ecosystems
Prof. Dr. Andreas Bolte

Forest Genetics
Dr. habil. Bernd Degen

Research section Fisheries

Sea Fisheries
Dr. Gerd Kraus

Fisheries Ecology
Prof. Dr. Reinhold Hanel

Baltic Sea Fisheries
Dr. Christopher Zimmermann

Team of 10 project coordinators
& researchers

Focus on food losses and waste
Focus on sustainable food and diets

Our experience in sustainability assessment of food waste reduction measures



GENERAL

Review on sustainability assessments of food waste reduction measures
(Goossens et al., 2019)

Project Brief for general public, summarising our methodology
(Goossens et al., 2021)

12 case studies, ongoing (report in preparation)
Case study in bakeries (Wegner et al., 2020)

2 case studies (Lehn et al.,
2 papers under review)



PRIMARY PRODUCTION



PROCESSING



RETAIL



FOOD SERVICES



HOUSEHOLDS

10 case studies, ongoing (report in preparation)
Project on alternative storage options for grain bulk material (upcoming project AVOID)
Case study on berries
(Wegner et al., 2020)

Case study on fish convenience grades: purchase of whole salmon, filets, portions (Goossens et al., 2020)
Case study on use of waste-tracking tools (Goossens et al., 2022; Leverenz et al., 2020)
Case study in schools (Wegner et al., 2020)
Competence center for food services, ongoing

METHODOLOGY



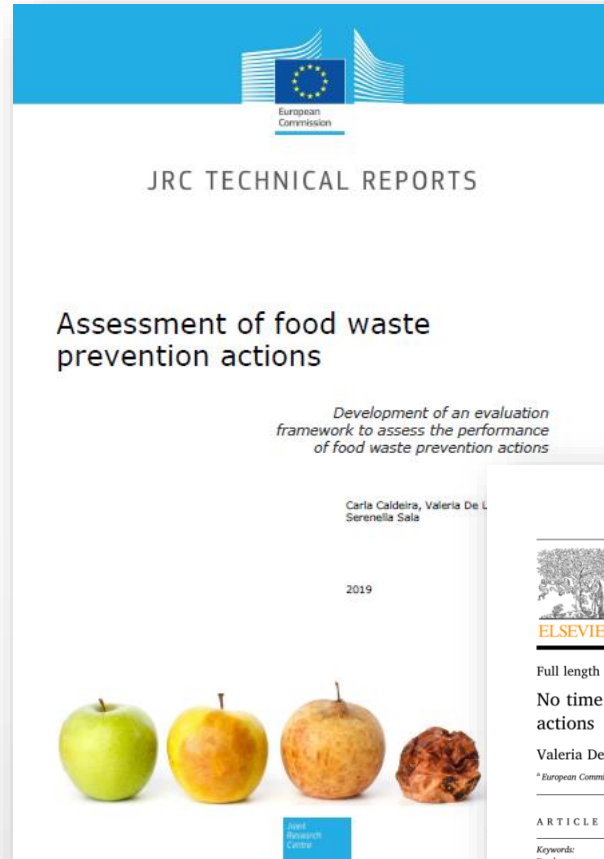
Methodology

Based on JRC methodology

Sustainability assessment

quantitative assessment

qualitative assessment





Quantitative assessment

Beyond the reduction of food loss and waste



EFFECTIVENESS

Aim of our measure

Reduce Food Loss and Waste (FLW)



RESOURCE EFFICIENCY

Ensure sustainability

Business Case

along the 3 dimensions of sustainability



Environment, Economy, Society



Benefit-Cost analysis

Net benefits

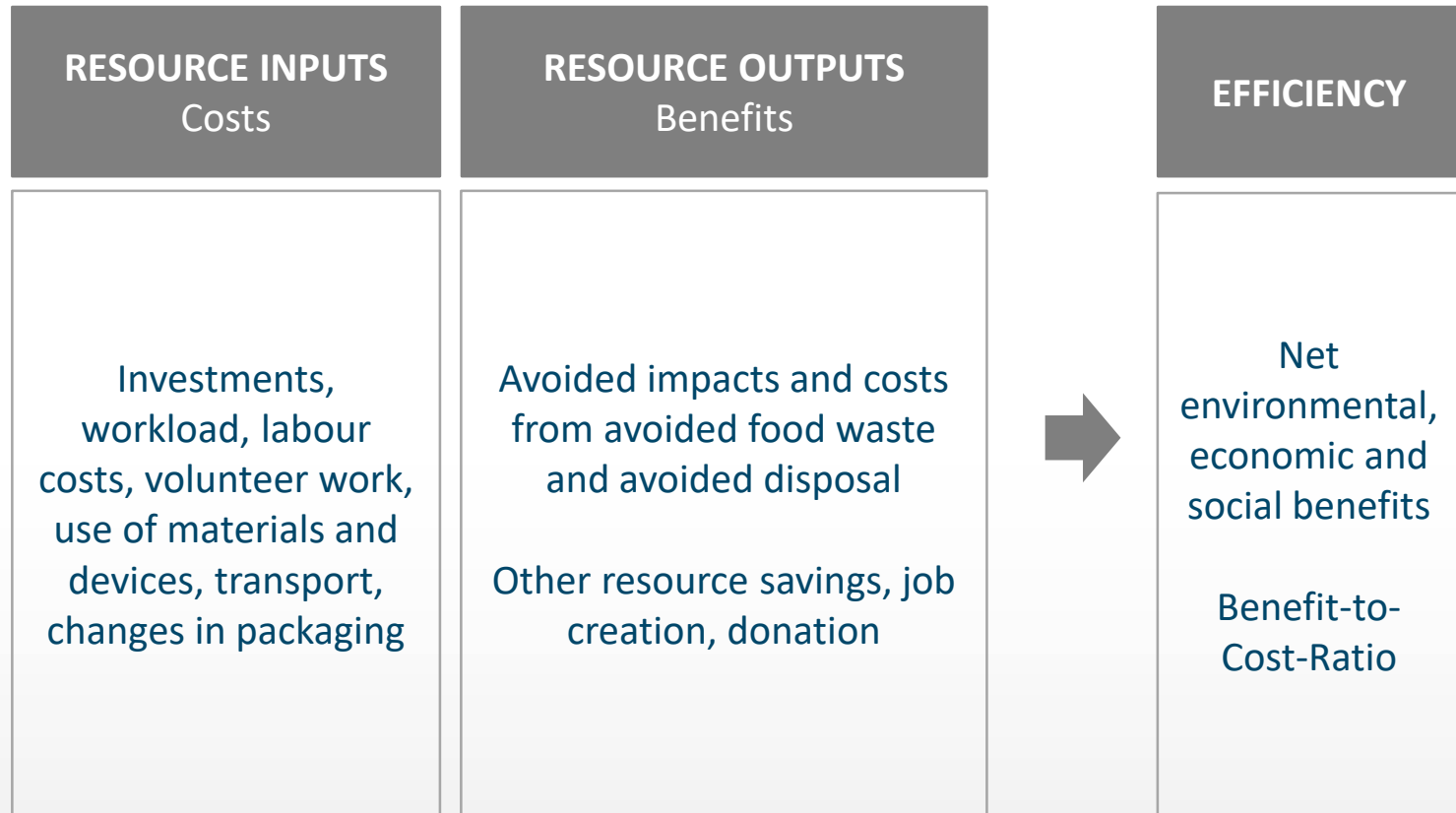
Key Performance Indicator (KPI)

Benefit-to-cost ratio (BCR)



Quantitative assessment

Resource efficiency





Qualitative assessment

Qualitative aspects and viability of our measure



Qualitative aspects

Outreach and behavioural change
Effect on working environment
Implementation effort and willingness to implement the measure
Business image



Taking the measure into the future

Long-term character and durability over time
Transferability and scalability
Inter-sectorial cooperation
Key success factors and barriers

CASE STUDY

Processing & manufacturing sector

„Best practice projects“



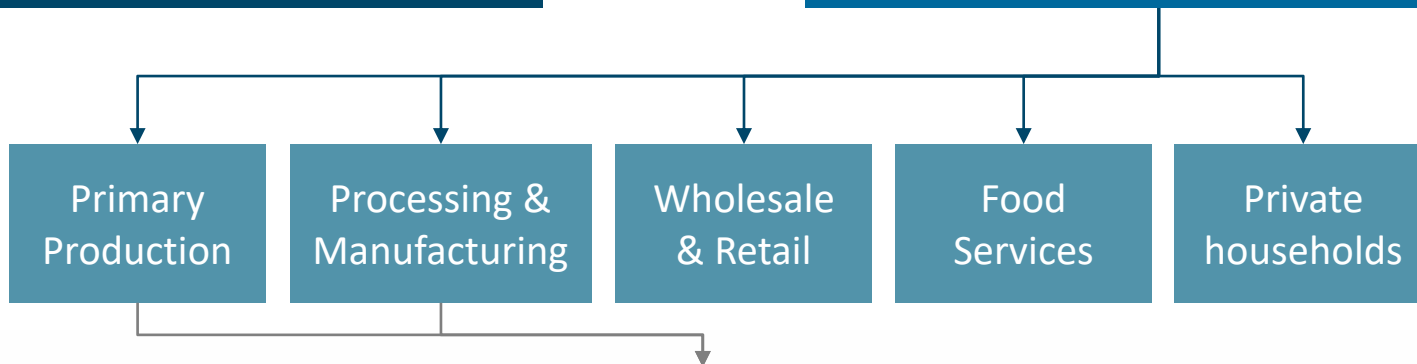
Demonstration projects

Discussion Forum for reducing FLW in food processing sector

2019 - National Strategy for Food Waste Reduction



Sectoral Discussion Forums („Dialogforen“)



Coordinated by DLG* & Thünen Institute

- ❖ Monitor food waste
- ❖ Motivate companies to implement measures to reduce food waste; offer companies a **sustainability assessment** (voluntary)
- ❖ Move towards a voluntary agreement

Best practice projects



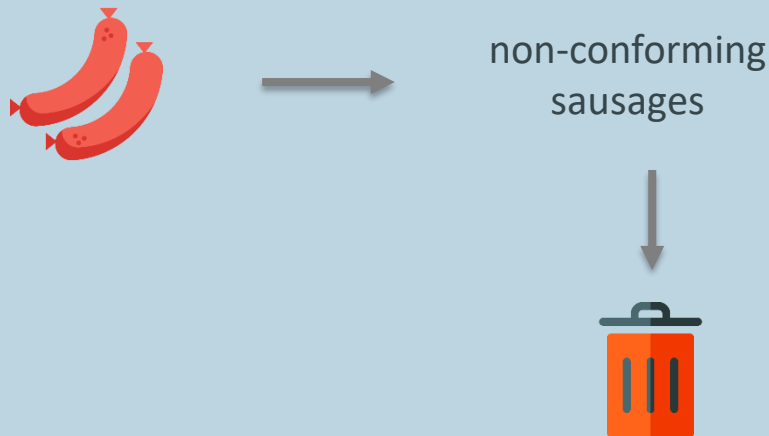
Potential for rework

Meat processing sector



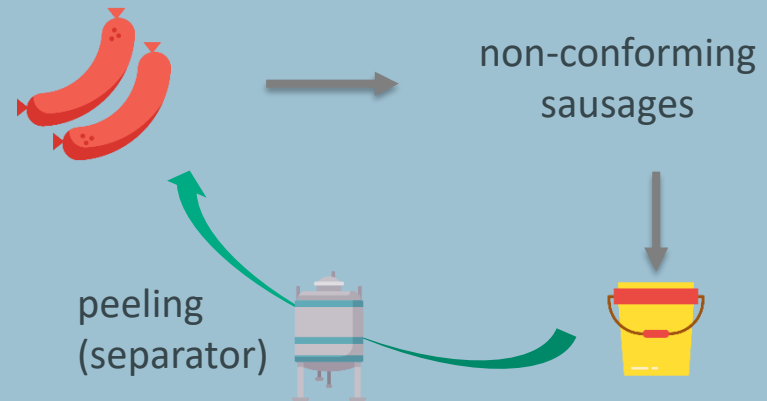
Production of parboiled sausages (Wiener sausages and Bockwurst):
reprocessing of non-conforming sausages (experimental design)

BEFORE



All non-conforming Wiener and Bockwurst sausages are disposed of.

AFTER



Casings of non-conforming sausages are removed; sausages are reprocessed into a next batch of sausages.



Quantitative assessment

Effectiveness and resource efficiency



Experimental data for 2021
(Period: 1 year)

	Mass	Nutrition	CO ₂ -Footprint	Product Environmental Footprint	Costs	Social
	KG		CO ₂			
Net benefits	97	264	3,945	473	136,451	n.q.
	tonnes	million kcal	tonnes CO ₂ Eq.	Pt PEF	EUR	
Benefit-Cost-Ratio (for each EUR invested)	10.8	29,292.7	437.2	0.1	16.1	n.q.
	kg/EUR	kcal/EUR	kg CO ₂ /EUR	Pt PEF/EUR	EUR/EUR	
	EFFECTIVENESS		ENVIRONMENT		ECONOMY	SOCIETY

> 1,200 pigs

Preliminary findings; final report to be published soon.

Consideration of costs & benefits

Costs

- Purchase of separator to peel sausages
- Energie- & water use separator (incl. cleaning)
- Labour time for peeling

Benefits

- Fewer raw materials to be procured
- Fewer FLW to dispose of



Quantitative assessment

Effectiveness and resource efficiency



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	EFFECTIVENESS		ENVIRONMENT		ECONOMY	SOCIETY

> 1,200 pigs

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Even greater FW savings (and envir. & econ. net benefits) could be achieved if the technique to remove sausage casings would be improved

CASE STUDY

Food services



Contents lists available at ScienceDirect

Resources, Conservation & Recycling Advances

journal homepage: [www.sciencedirect.com/journal/ Resources-Conservation-and-Recycling-Advances](http://www.sciencedirect.com/journal/Resources-Conservation-and-Recycling-Advances)



Provides for an all-encompassing sustainability assessment, including both a quantitative and a qualitative evaluation.

Waste-tracking tools: A business case for more sustainable and resource efficient food services

Yanne Goossens^{a,*}, Dominik Leverenz^b, Manuela Kuntscher^a

^a Thünen Institute of Market Analysis, Bundesallee 63, 38116 Braunschweig, Germany
^b Institute for Sanitary Engineering, Water Quality and Solid Waste Management, University of Braunschweig, Germany

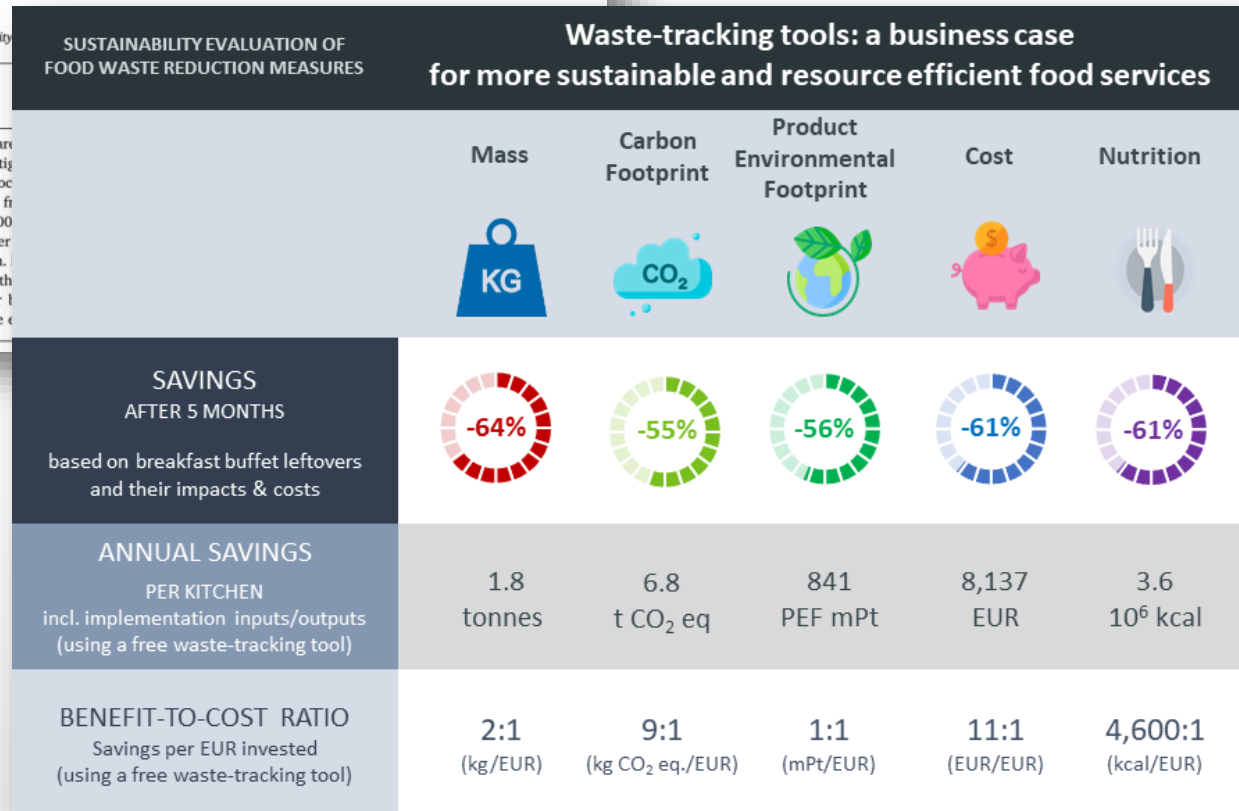
ARTICLE INFO

Keywords:
 Food waste
 Sustainability assessment
 Business case
 Resource efficiency
 Waste-tracking device
 Self-service buffet

ABSTRACT

Waste-tracking devices are used to reduce food waste. The present study investigated the mental, economic and social aspects of using such devices. By tracking leftovers from a breakfast buffet, the amount of food waste was reduced by approx. 1,800 kg per kitchen per year. The kitchens further reduced their environmental footprint by 841 PEF mPt per kitchen. The investment in the device was of 8,317 EUR, meaning that the device is profitable. Thus, our results show that waste-tracking tools are a sustainable and resource efficient food service measure.

All results are presented in a Factsheet (Annex B), complementing the main results discussed in the paper.



Wrapping up & Outlook

Ongoing and upcoming projects

Expected reports and papers



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Case study in schools (Wegner et al., 2020)
Competence center for food services, ongoing

Published reports and papers

▷ Evaluation of FLW measures – Methodology

Goossens Y, Kuntscher M, Lehn F, Schmidt TG, 2021. **Sustainability Assessment of Food Waste Prevention Measures: Thünen Project Brief 2021/22a.** Thünen Institute, Braunschweig, Germany. https://literatur.thuenen.de/digbib_extern/dn063783.pdf

Goossens, Y., Wegner, A., Schmidt, T., 2019. **Sustainability Assessment of Food Waste Prevention Measures: Review of Existing Evaluation Practices.** Front. Sustain. Food Syst. 3, 90, 90:1-90:18. <https://doi.org/10.3389/fsufs.2019.00090>.

▷ Evaluation of FLW measures – Case studies by Thünen Institute

Goossens Y, Leverenz D, Kuntscher M, 2022. **Waste-tracking tools: A business case for more sustainable and resource efficient food services.** Resources, Conservation & Recycling Advances, 15. <https://doi.org/10.1016/j.rcradv.2022.200112>

Goossens, Y., Schmidt, T.G., Kuntscher, M., 2020. **Evaluation of Food Waste Prevention Measures—The Use of Fish Products in the Food Service Sector.** Sustainability 12 (16), 6613. <https://doi.org/10.3390/su12166613>

Leverenz D, Hafner G, Moussawel S, Kranert M, Goossens Y, Schmidt T (2020) **Reducing food waste in hotel kitchens based on self-reported data.** In: Industrial Marketing Management. <https://doi.org/10.1016/j.indmarman.2020.08.008>

Wegner A, Goossens Y, Schmidt T G (2020) **Nachhaltigkeitsbewertung von Maßnahmen zur Vermeidung von Lebensmittelabfällen.** Braunschweig: Johann Heinrich von Thünen-Institut, 73 p, Thünen Working Paper 158, DOI:10.3220/WP1603713219000.

TO BE EXPECTED SOON:

Lehn, F., Schmidt, T. (under review). **Sustainability Assessment of Food Waste Reduction Measures – Converting Surplus Food into High-Quality End-Products.**

Lehn, F., Goossens, Y., Schmidt, T. (under review). **Sustainability Assessment of Food Waste Reduction Measures – Trialing a time-temperature indicator on salmon in HelloFresh meal boxes.**

▷ **More information on our ongoing/past projects on FLW:** <https://www.thuenen.de/en/topics/global-food-and-resources/less-is-more-reducing-food-losses-and-waste>

Our experience in sustainability assessments BEYOND food waste

Next to assessing food that is being thrown, we also assess the sustainability of food that is (to be) consumed.

COPLANT

COhort study on PLANT based diets.

Sustainability assessment of dietary patterns in Germany: environment, economy, society and health.

KLIMA-label

Look at the climate relevance of food production, complemented with economic and social impacts.

Look for solutions on how these findings can be communicated via labeling.

Thünen Institute of Market Analysis
Braunschweig, Germany

www.thuenen.de



Dr. Yanne Goossens

✉ yanne.goossens@thuenen.de