

Project *brief*

Thünen Institute of Market Analysis

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Food waste and losses in the processing sector

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- **In the processing sector, 5% of what is produced accumulates as food waste. Further 12% leaves the food supply chain as food losses and is reused outside the food supply chain.**
- **Quality assurance and process losses in particular lead to food waste and losses in the processing sector.**
- **Various reduction measures were implemented in demonstration projects and their sustainability was evaluated.**

Background and aims

The primary production of food involves the use of land, water, seeds, machinery, fertilizers and pesticides. In addition, the production, processing and preparation of food generates greenhouse gases along the entire value chain. Food is therefore produced using many resources and at great effort, thereby polluting the environment. Accordingly, food is a valuable commodity and its waste and losses should be reduced.

Reducing food waste is therefore an important goal at global, European and national level. In 2019, the German Federal Ministry of Food and Agriculture (BMEL) published the National Strategy of Food Waste Reduction. As part of this, so-called Dialogue Forums were established in each sector of the food chain (primary production, processing, wholesale and retail trade, food services, private households) to advance the reduction of food waste.

The German Agricultural Society (DLG) coordinated Dialogue Forum on Processing and worked on it together with the Thünen Institute.

Definitions

We only speak of “food” after it has been harvested, milked or slaughtered. Furthermore, we understand food in its entirety, so including non-edible parts. “Food waste” is defined as all food that is disposed of, e.g. as organic waste in the waste bin. “Food losses” on the other hand refers to foods used outside the food chain, which are no longer available for human consumption. This includes, for example, the use of food originally produced for human consumption as animal feed.

Methodological approach

In order to get into a constructive exchange, the DLG set up so-called round tables. At these round tables, people from agriculture, science, politics and associations came together to discuss food waste and losses.

The Thünen Institute developed an online survey to collect data on food waste and losses in the processing sector. We used the round tables and the extensive network from the DLG to disseminate the online survey.

The DLG also utilized its network to win over companies of the processing sector for our demonstration projects. In these projects, companies implemented measures to reduce food waste or to get a higher-value use of food (see table). The companies provided data to the Thünen Institute, which then carried out a sustainability assessment. To evaluate the environmental impact, we calculated the CO₂ footprint and the product environmental footprint (PEF) which aggregates 13 environmental indicators into a single score. For the economic evaluation, we considered financial savings and costs for each company. For the social evaluation we looked at for example donations to charities, and to a wide range of qualitative aspects.

Results

The online survey showed that in the processing sector 5% of the food (referred to the quantity of raw materials used) ends up as food waste. Another 12% is used outside the food supply chain and counts as food losses. In particular, quality assurance, process losses, technological factors, returns and overproduction lead to food waste and losses. It was also shown that the companies are already implementing and planning reduction measures in various areas, e.g. staff training. In addition, the respondents would like, among other things, that politicians educate consumers about the value of food and food waste reduction as well as the consideration and relaxation of quality criteria. We published the results as a Thünen Working Paper (Athai et al. 2023).

The demonstration projects either reduced food waste or increased the value grade of food, e.g. use of leftover bread for beer production. From a financial point of view, all measures have paid off. All measures reduced the CO₂ footprint and the

PEF of the products. To compare the several measures, we calculated the benefit-to-cost ratio, indicating the effect per euro invested, e.g. how much food waste was reduced by the measure for each euro invested. We published the detailed results as a Thünen Working Paper (Lehn et al. 2023).

These new results are incorporated into the BMEL's decision on the further development of the National Strategy mentioned above to reduce food waste.

References

Athai J, Kuntscher M, Schmidt T (2023) Lebensmittelabfälle und -verluste in der Primärproduktion und in der Verarbeitung. Thünen Working Paper 209. Braunschweig: Thünen-Institut. DOI:10.3220/WP1678867614000.

Federal Ministry of Food and Agriculture (2019) National Strategy for Food Waste Reduction. Berlin: BMEL, Referat 216.

EC (European Community): EC Directive 2008/98; EC Regulation 178/2002.

EU (European Union): EU Delegated Decision 2019/1597; EU Directive 2018/851.

Lehn F, Goossens Y, Kuntscher M (2023) Nachhaltigkeitsbewertung von Demonstrationsprojekten zur Reduzierung von Lebensmittelverlusten und -abfällen in den Sektoren Primärproduktion und Verarbeitung. Braunschweig: Johann Heinrich von Thünen-Institut, 104 p, Thünen Working Paper 211, DOI:10.3220/WP1682325526000.

Further information

<https://www.thuenen.de/en/institutes/market-analysis/projects/efficient-reduction-of-food-waste-in-the-processing-sector>

<https://www.dlg.org/de/lebensmittel/themen/dialogforen-primarproduktion-und-verarbeitung>

Table: Overview of the demonstration projects

Branch of production	Measures	Short description
Bakery and pasta products	Upcycling of leftover bakery products	Use of bakery leftovers to produce insect protein
Bakery and pasta products	Order centralization and use of optimization software (AI)	Centralization of orders and use of optimization software for quantity and delivery planning
Meat processing	Rework 1	Rework of (Vienna) sausages
Meat processing	Rework 2	Rework of cooked (cured) sausages
Dairy products	Task force	Establishment of a task force at commercial level
Dairy products	Questionnaire	Raising awareness among students of an educational center for training in the field of the dairy industry as part of a project to reduce food waste
Fruit and vegetable processing and beverages	Circular economy Network	Establishment of a regional circular economy network for surplus fruits and vegetables
Fruit and vegetable processing and beverages	Mobile pressing station	Mobile pressing station for juicing of non-marketable fruits and vegetables
Fruit and vegetable processing and beverages	Upcycling of bread scraps	Upcycling of leftover bread into beer
Frozen food, delicatessen, fish and sweets	Upcycling of fish scraps	Upcycling of fish scraps into food-grade fish oil
Frozen food, delicatessen, fish and sweets	Rework 3	Rework of cream cheese filling in the production of stuffed peppers
Overarching	Digital exchange platform for surplus food	Digital exchange platform as "online marketplace" for surpluses and raw materials (case study for one supplier)

Source: Lehn et al. (2023).

Further Information

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