

Project *brief*

Thünen Institute of Market Analysis

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Food waste and losses in the primary production

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- **In primary production, only 2% of what is produced accumulates as food waste. Further 22% leaves the food supply chain as food losses and is reused outside the food supply chain.**
- **The high-quality criteria of the retail sector in particular lead to food waste and losses in primary production.**
- **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 Primary Production and worked on it together with the Thünen Institute.

Definitions

Besides plant products like fruits, vegetables and cereals, primary production also produces animal products like milk and eggs. In addition, it includes the keeping and rearing of animals as well as hunting, fishing and beekeeping. The slaughtering of animals is however already part of the processing sector. We only speak of “food” after it has been harvested, milked and 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 primary production. 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 farms for our demonstration projects. In these projects, farmers implemented measures to reduce food waste or to get a higher-value use of food (see table). The farmers 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 primary production only 2% of the food (that is produced after harvesting, milking, slaughtering) ends up as food waste. Another 22% is used outside the food supply chain and counts as food losses. In particular, the high-quality requirements within the retail sector, which go beyond the legal ones, lead to food waste and losses as well as to pre-harvest and harvest losses. It was also shown that the farmers 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 apples as fresh fruit instead of for juice production. From a financial point of view, almost all measures have paid off. All measures reduced the CO₂ footprint of the products. The PEF score could also be reduced in almost all demonstration projects. However, in two case studies (production of strawberry crisps and marketing of B-goods) the measures negatively affected the PEF score despite the reduction of food waste. 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-primary-production>

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

Table: Overview of the demonstration projects

Branch of production	Measures	Short description
Fruits	Apple sorting	Analysis of sorting losses in organic apples due to increasing optical quality requirements
Fruits	Apple storage	Reduction of storage losses for apples through alternative treatment
Fruits	Production of strawberry chips	Upgrading of no longer marketable strawberries into strawberry chips
Vegetables	Production of insect protein	Upgrading of non-marketable vegetables into protein-rich feed with the help of insect breeding
Vegetables	Change in quality standards	Relaxing of quality standards in retail
Vegetables	Marketing of B-goods	Development of alternative marketing channels for vegetables in B-quality
Cereals	Storage companies - interviews	-
Cereals	Storage companies – storage tests	Effect of different grain storage treatments (ventilation and drying) on substance losses
Animal products	Vaccination of trout	Reduction of rearing losses in trout production through vaccination
Animal products	Alternative treatment of udder diseases for dairy cows	Reduction of milk with antibiotics residues through an alternative treatment of mastitis

Source: Lehn et al. (2023).

Further Information

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