

Intermediate report

## Food Waste: From Excess to Enough

Main project insights and instruments for a transformation of the food system



Intermediate report  
FETE project

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## Preface

How will we consume food in the future? Although we cannot predict the future, a transition in our consumption patterns and production systems is undoubtedly needed. Our current food system is grounded in assumptions of the need for excess and elaborate choice. This comes at considerable societal costs of inefficient resource use and tremendous levels of food loss and waste. Instead of increasing efficiency within the current food system by optimizing planning and logistics, the FETE project aims to support a transition towards a different system that can cope better with inherently unpredictable dynamics in demand and supply.

To gain insight into what such a future food system could look like, and which potential directions are available, we used a Vision in Product design approach to develop attractive possible directions for the food system. One key approach centres around adaptability.

In the FETE project, we started with groundwork to develop the vision and to establish basic measurement methods for food waste. Additionally, in three research lines – related to design, demand, and supply – we develop insights and instruments that may spark and support a transition in the food system. This intermediate report describes the steps taken, as input for the final stretch of the project.

We hope that the report will be an inspiration for you!

## Insights based on the groundwork

In the groundwork, driving forces were uncovered through in-depth interviews with relevant stakeholders in collaboration with Reframing Studio. These driving forces influence the way people will make decisions, shop, store, prepare, and consume food in the intermediate future. They can be visualized in a framework based on two main dimensions:

- 1) The level of felt responsibility
- 2) The coping strategy that is used in the face of complexity

This led to the design of four transformative food systems, to serve as promising directions for the food system to move into. In the Design research line, these were integrated into one future vision (see page 5).

Moving forward in the project, the concept of **Adaptability** has become our focus of attention. How can we help people cope with the uncertainties and complexities that are inherent in the food system?

A second objective in the groundwork was to establish a measurement instrument to examine the effectiveness of interventions to reduce household food waste. We conducted a waste audit in collaboration with ACV (waste collector) as well as two experiments using self-reported food waste. From these studies, several relevant insights were uncovered:

1. We tested the **tool package** developed by the Netherlands Nutrition Centre as an intervention. Insights were gained about consumers' use and evaluation of various tools (see Appendix A), to determine their effectiveness. The full tool package was able to diminish self-reported household food waste by 39.2% (first study) and 23.0% (second study). We also discovered that effects on waste-preventing behaviours are stronger when **social norm elements are added** in the intervention.
2. We explored the use of self-reported food waste to test intervention effectiveness in an experiment with a Solomon four group design. Results indicate that the effects of self-reported measurement itself are minimal, which provides **initial support for their use in intervention testing**.
3. In the waste audit, we compared collected waste with self-reported waste. Results indicate that **social desirability** influences underreporting of self-reported food waste.
4. In the waste audit, we measured four motivations for consumers to reduce food waste (environment, financial, moral, and social). **Moral motivations** are – surprisingly – the primary driver of reduced household food waste.

The waste audit was also used for insights in the Demand research line, reported on page 6.

### References

- van Herpen, E., Wijnen, T., Quested, T., Reynolds, C., & Sharda, N. (2023). Convenient tools and social norms: Measuring the effectiveness of an intervention to reduce household food waste. *Journal of Cleaner Production*, 139604.
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## Insights based on Design research line

Our work explores how to design **innovations that foster the transition** towards less food waste. In study 1, we developed a unified future vision to align the collective efforts of FETE. The vision presents a new food system that caters to enough food for everyone with minimal waste. A 3-minute video of the vision can be watched [here](#). The vision is based on four key system principles:

1. Putting vitality first and governing the prevention of illness properly;
2. Embracing flexibility and highlighting the benefits that come with this;
3. Celebrating and valuing the food journey;
4. Using technology to learn about ourselves as individuals and as a society.

In study 2, we engaged FETE partners in workshops to develop joint innovations to take steps toward the vision. 'Embracing Flexibility' emerged as a vital pathway, with the food system needing to realign safety, quality, and sustainability. **We designed a new practice called 'Adaptable Consumption'**, which encourages waste-free and flexible behaviours in daily life while also driving wider systemic changes. This involves embracing the seasonal and harvest-dependent variability of food products, considering meals in terms of categories rather than fixed ingredients, and fostering food literacy to increase self-confidence in adapting meals.

**Seven concepts were developed and evaluated** with FETE partners. One concept is an ingredient-less recipe book. Instead of providing consumers with step-by-step ingredient-based recipes, we can offer meal-level recipes like curry, encouraging individuals to mix and match ingredients. This enhances their food literacy and empowers them to adapt meals based on what's available. It also reduces unnecessary purchases and enables consumers to be resilient to supply fluctuations while promoting sourcing flexibility. Appendix B provides a narrative of a consumer engaging with the new practice and an overview of the innovations.

To reach the concepts, we iteratively developed and tested a tool called the Transition Readiness Profiles (TRPs) over five experiments, including the workshops with FETE partners. The TRPs consist of three themes that helps us understand what system dynamics are at play in the transition:

1. *Position*, which explains the actor's position in the current system and its relationship to the daily life of people;
2. *Direction*, which explains to what extent the actor's activities align with the vision and whether their current innovations are moving in the transition direction, explaining how distant the vision is perceived by the actor;
3. *Adaptability*, which explains the actor's relationships with others and what resources and processes would need to change for them to remain relevant.

### References

- Goss, H., Tromp, N., & Schifferstein, H. N. J. (2021, November 2021). *Mapping Transition Readiness: A model for identifying how and where design can intervene in system transitions*. Relating Systems Thinking and Design (RSD10) 2021 Symposium, Delft. <https://rdsymposium.org/mapping-transition-readiness/>
- Goss, H., Tromp, N., & Schifferstein, H. N. J. (2023, 9-13 October). *Designing adaptable consumption: a new practice to foster food system transitions*. IASDR 2023: Life-Changing Design, Milan, Italy.
- Goss, H., Tromp, N., & Schifferstein, H. N. J. (in review). Design capability when visioning for transitions: a case study of a new food system. *Design Studies*.

## Insights based on Demand research line

Generally, consumers feel bad about wasting food and try to avoid it as much as possible. Yet, this volition often does not translate into action because consumers also express motives in food choice and provisioning that clash with the efforts and decisions required avoiding food waste. In this research we focus on the conflict between trying to avoid food waste *versus* being a good food provider for the family—providing all members with an abundance of food. The **good provider identity** emerges as an important motive that counteracts food waste avoidance behaviors in both qualitative and quantitative research.

Aims of our study:

1. Uncover the **underlying behavioral mechanisms** that drive the relationship between the good provider identity and household food waste in order to broaden our theoretical understanding of what drives consumer food waste.
2. Develop potential **interventions** at the point-of-sale that dissuade good providers from purchasing too much, therewith reducing food waste.

In two studies—an online study with self-reported food waste and a field study with curb side food waste—we find that the good provider identity is an important motivational driver of **excessive purchasing** that subsequently results in household food waste. So consumers who perceive themselves as good providers buy more food than their family needs, contributing to increased food waste.

Efforts to reduce household food waste should thus focus on the **quantity of food purchased** and its significant determinants, such as the good provider identity, that drives its excessiveness. Therefore, in the last study, we address this behavior and investigate whether an intervention in the form of a **package size swap** (see Appendix C) could help reduce purchase quantities among good providers.

Results indicate that package size swaps are an effective way to **reduce food purchasing quantities**. Two different messages related to quantity were tested, and both messages (‘sufficient amount for household’ and ‘food waste reduction’) increased the number of switches to smaller package sizes, reducing the total amount of food in the shopping basket by 8% on average. Notably, for the food waste reduction message, the increase in smaller package sizes was stronger among consumers with a relatively low (vs. high) good provider identity, reducing the total amount of food in the shopping basket by 10% (vs. 6%). From this we conclude that the intervention yielded greater effectiveness among consumers with a relatively low (vs. high) good provider identity, making the good provider identity a persistent and thus difficult trait to change.

### References

Werkman, A., van Doorn, J., van Ittersum, K., & Kok, A. No waste like home: How the good provider identity boosts household food waste. *Working paper*.

## Insights based on Supply research line

In this perspective, we examine consumers adaptability to retailer initiatives involving near-expired and surplus food, focusing on purchasing, consumption, and sharing behaviours.

The first paper examines how retailers can stimulate consumers to be [adaptable in their purchases](#), using messages about food waste avoidance. Using such messages, supermarkets can [stimulate the purchase of near-expired food](#), without resorting to discounts. The message used was “Save near-expired food! Join the fight against food waste!” (see Appendix D). In four experiments with 1196 participants in total, we find that this message increases consumers’ willingness to purchase near-expired food, because it makes them feel good about themselves for helping save food from being wasted. We also find that consumers treat near-expired food differently at home than other food, to prevent waste.

A second paper explores a novel retail concept aimed at [surplus food](#) – surprise bags. In this concept, retailers put surplus food into bags and sell them with high discounts (e.g. in the TooGoodToGo app). What food items are included in the bags is a surprise and not disclosed until consumers pick up the bags. In collaboration with TooGoodToGo, we employed two surveys with 346 participants in the United Kingdom to examine what consumers do with the food items in the bags. We find that [most food is not wasted](#), and that food liking is a key influential factor in how consumers treat the food products at home – generally, liked food is eaten, neutral items are stored, and disliked items are given away or discarded.

In a third paper, we design an [intervention to encourage food sharing](#) as a way to increase consumers’ [adaptability to near-expired food](#). In collaboration with HAK Fresh, Hello Fresh, Iglo, and Unilever, we provided 199 participants with nine near-expired food items. As the intervention, half of the participants additionally received a guideline on food sharing. Their food items also had stickers on the packaging saying “Eat me today or give me away” (see Appendix D). Through six follow-up surveys over a period of two weeks, we found that this [intervention successfully increased food sharing](#) and decreased food storage.

Finally, we delve into food-sharing and examine [when and why individuals are hesitant to share food with suboptimal attributes](#) that do not influence intrinsic quality. Through four experiments containing 1283 participants in total, we find a general reluctance to share such food, regardless of whether sharing is direct or indirect, such as through food-sharing organizations. This occurs because givers anticipate that recipients will respond negatively to suboptimal food. However, recipients are more positive than givers anticipate. This suggests that anticipated recipient responses should not be a barrier to sharing suboptimal food and altering such anticipations could facilitate food sharing.

### References

- Zhang, Y., van Herpen, E., Van Loo, E. J., Pandelaere, M., & Geuens, M. (2022). Save near-expired food: Does a message to avoid food waste affect food purchase and household waste prevention behaviors? *Journal of Cleaner Production*, 384, 135555.
- Zhang, Y., van Herpen, E., Van Loo, E. (July 2023). How do consumers handle food in surprise bags at home? The impact of food liking and a food-sharing intervention. *Sustainable Consumption and Production Conference*, Wageningen, the Netherlands.
- Zhang, Y., van Herpen, E., Pandelaere, M., & Geuens, M. (July 2023). Hesitance to share suboptimal products due to anticipated negative social perceptions? *European Association of Consumer Research Conference*, Amsterdam, the Netherlands.

## Appendices: Instruments related to adaptability

### Appendix A: Groundwork - Effectiveness of existing tools



<b>Tool</b>	<b>Use (% of participants)</b>	<b>Mean tool evaluation (SD)</b>
“Eetmaatje” measuring cup	66.7 %	5.67 (0.89)
Shopping list note pad	64.7 %	5.70 (0.71)
Fridge and freezer sticker	47.3 %	5.62 (0.75)
Leaflets about fridge use and expiration dates	35.3 %	5.55 (0.81)
Recipe cards	12.7 %	5.63 (0.73)
“Bewaarwijzer” app	4.0 %	5.67 (0.88)
Cooking app	2.0 %	5.11 (0.98)

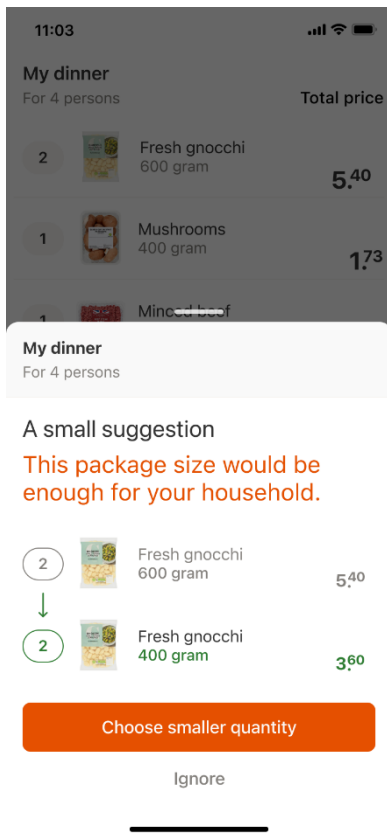
*Note:* Tool evaluation on 7-point scale with higher numbers indicating a more positive evaluation. Tools were evaluated by participants who used these.



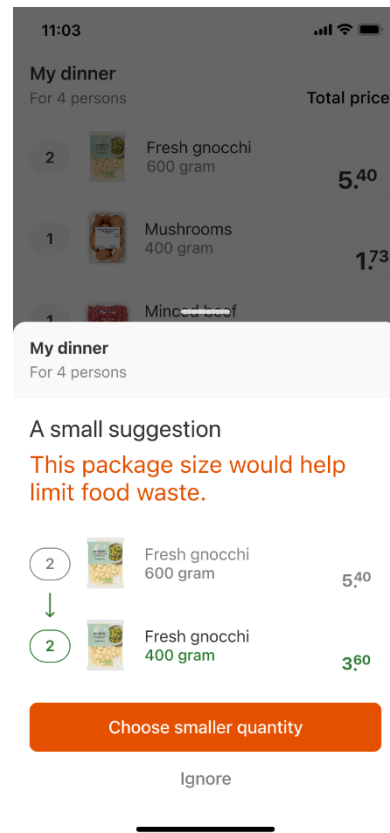


## Appendix C: Demand research line

### Package size swap with different messages



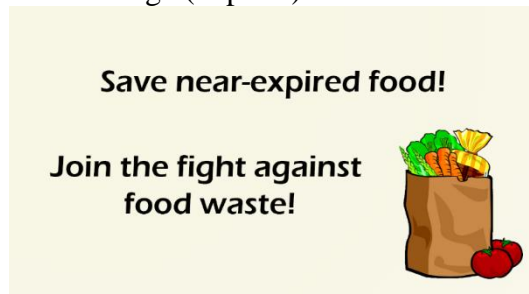
Sufficient amount for household message



Food waste reduction message

## Appendix D: Supply research line

### The message (Paper 1)



### The sticker (Paper 3)



### The guideline (Paper 3)



**Etenswaren die over de houdbaarheidsdatum lopen worden weggegooid.** Dat is natuurlijk zonde. Wat je binnenkort toch niet gaat eten kun je ook aan iemand anders geven. Bijvoorbeeld aan burens, vrienden of vreemden. Eten delen maakt anderen blij, maakt jou blij en maakt de planeet blij.

### HOE DEEL JE ETEN MET MENSEN IN DE BUURT?

- 1 Denk aan de mensen in de buurt zoals burens, vrienden en familie.



- 2 Deel levensmiddelen met Olio. Download de app eenvoudig bij Apple Store of Google Play.



Eten delen maakt blij!

- 3 Zoek naar groepen en pagina's over voedsel delen op Facebook en andere sociale media. Bijvoorbeeld de Facebook pagina's: Foodsharing Wageningen en Stop Voedselverspilling Ede.

Klik op de onderstreepte woorden



- 4 Klik hier voor Voedselbanken en Community Fridges bij jou in de buurt.



- 5 Alle voedsel deel initiatieven op de kaart. Klik hier en ontdek alles over voedsel delen bij jou in de buurt.

