CONSUMER FOOD WASTE IN DENMARK

VIOLETA STANCU AND LIISA LÄHTEENMÄKI

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DCA - DANISH CENTRE FOR FOOD AND AGRICULTURE

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Violeta Stancu and Liisa Lähteenmäki

Aarhus University
Business and Social Sciences
MAPP Centre – Research on Value Creation in the Food Sector
Department of Business Administration
Bartholins Allé 10
Bygning 1323-321
DK-8000 Aarhus C

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Scientific report
The reports contain mainly the final reportings of research projects, scientific reviews, knowledge syntheses, commissioned work for authorities, technical assessments, guidelines, etc.

Preface

A large amount of food is lost or wasted along the food supply chain. Household food waste is known to be one of the main contributors to food waste, and the Danish Veterinary and Food Administration would like to gain more knowledge about the food waste taking place at consumer level in order to identify ways to reduce household food waste.

Therefore, the Danish Veterinary and Food Administration has requested a study from the Danish Centre of Food and Agriculture at Aarhus University, as part of the agreement between Aarhus University and the Ministry of Environment and Food of Denmark on the provision of research-based policy support, 2017-2020. The MAPP Centre at Aarhus University has conducted the requested study and written this report.

Niels Halberg,

Director DCA – Danish Centre for Food and Agriculture

Contents

Summary

Background and aim

Across the food supply chain, a large fraction of the food produced for human consumption is lost or wasted. The vast amounts of food waste have significant monetary, environmental and social impacts. The food waste generated by households is one of the main contributors to the high levels of food waste across the food supply chain. Thus, it is relevant to try and tackle the food waste at the household level. There is, however, a need to gain a better understanding of consumers' perceptions and behaviours related to food waste in order to inform potential attempts to limit consumer food waste. The present project aimed to study consumer food waste with an emphasis on consumer perceptions and practices related to food waste.

Methods

This report is based on data from an online questionnaire conducted in Denmark. The questionnaire was completed by 508 respondents. The measures included in the questionnaire referred to consumer self-reported food waste behaviour, perceptions and understanding of food waste, perceptions regarding food edibility, food-related practices and skills, as well as individual characteristics and socio-demographics. Consumers' perceptions and behaviours are described based on descriptive statistics. Moreover, logistic regression was used to investigate the associations between individual characteristics and self-reported food waste.

Results

In general, participants were well aware of the issue of food waste, yet, some respondents did not have a clear understanding of the whole concept of food waste. Most respondents reported that in their household little food is discarded. Respondents varied in their perceptions of the edibility of certain foods or parts of foods. There were also some differences in how people deal with food products when they have doubts about food safety or when the products have passed their expiration date. At large, respondents reported that they engage often in food waste preventing practices at the different stages in the household food provisioning. On the other hand, the food waste promoting practices were less frequent. In terms of individual characteristics, respondents were highly motivated to reduce food waste. One of the most important incentives to motivate people to reduce food waste was saving money. Consumers' motivation to reduce food waste and their thrifty consumer identity have the potential to help limit food waste. On the other hand, consumers' impulsive buying tendency and their disgust sensitivity can be seen as barriers towards reducing food waste.

1. Introduction

A large amount of the food intended for human consumption is lost or wasted along the food supply chain. At the global level it has been recently estimated that about a quarter of the food that is produced, assessed as calories, is lost or wasted (Kummu et al., 2012). Food waste represents "any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed (including composted, crops ploughed in/not harvested, anaerobic digestion, bio-energy production, co-generation, incineration, disposal to sewer, landfill or discarded to sea)" (Fusions, 2014, p.6).

In the European Union member countries, one of the main contributors to the food waste amounts is the household food waste (Kummu et al., 2012; Priefer, Jörissen, & Bräutigam, 2016). In 2011, estimates of food waste using the FAOSTAT-data for Denmark showed that the consumption level accounts for 40% of the total food waste (Priefer et al., 2016). In another study, residual household waste was collected from a sample of households in Denmark and sorted to identify the amounts of food waste (Edjabou, Petersen, Scheutz, & Astrup, 2016). This study found that the household level food waste amounts to 183 ± 10 kg per household per year. Most of this waste, 103 ± 9 kg per household per year, represents avoidable food waste, namely "edible food that could have been eaten but instead is disposed of regardless of the reason" (Edjabou et al., 2016). The food categories that contributed most to total food waste in the Danish households were the "fresh vegetables and salads", "fresh fruit", "bakery" products and "drinks, confectionery and desserts" (Edjabou et al., 2016).

Studies by the Danish Environmental Protection Agency showed that 24% of the waste that households produce represents food that could have been eaten[1]. In monetary terms, this means that a family ends up discarding food that costs about 3200 DKK per year[1]. The estimated monetary consequences of food waste in Denmark are somewhat lower than those in the UK, where the cost of avoidable food and drink waste is about £470 per year for the average household (WRAP, 2013). The food waste does not have only monetary consequences for the households, but it also has important negative consequences for the environment and society at large (Aschemann-Witzel, de Hooge, Amani, Bech-Larsen, & Oostindjer, 2015). Food waste impacts the environment due to, for instance, greenhouse gas emissions as well as waste of resources that are used to produce food that ends up being discarded (Priefer et al., 2016; WRAP, 2013). Moreover, when food is wasted at the consumption level, the environmental impacts are even higher as they accumulate throughout the stages of the supply chain (Priefer et al., 2016). Finally, reducing food waste would mean that more people could be fed, and thus, higher food security could be achieved globally (Kummu et al., 2012).

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[1] http://mfvm.dk/ministeriet/ministeren/debatindlaeg/debatindlaeg/nyhed/madpoliti-nej-tak/ - retrieved 29 March 2017

Given that the food waste amounts are rather large and that food waste has serious consequences, it is worth to try and tackle the issue of food waste at the household level. In order to inform attempts to reduce consumer food waste, there is a need for more knowledge about consumer perceptions and practices related to food waste. Currently, the published academic literature (for reviews see: Aschemann-Witzel et al., 2015; Canali et al., 2017) and reports from Danish authorities in the area of consumer food waste related behaviour are still limited. The previous studies on consumer food waste show that there are a variety of drivers of food waste, however, many of the studies are qualitative. Moreover, the few existing quantitative studies measure only a limited amount of factors and their relation to food waste. Thus, there is a need to deepen the knowledge regarding consumers' perceptions and behaviours related to food waste.

The current project **aimed** to study consumer food waste with a focus on consumer perceptions and practices related to food waste. The insights related to consumer food waste can contribute to identify ways to reduce food waste at the consumption level. More specifically, the **aims** of this project were to study:

- how consumers understand food waste,
- practices and skills related to the household food provisioning promoting or preventing food waste,
- characteristics of the individuals (e.g. socio-demographics, individual tendencies or values) and households (e.g. household stability) associated with food waste.

There are expert definitions of food waste but, it is still not clear what consumers understand by food waste and to what extent they are aware of food waste related issues. Moreover, some definitions of food waste make a reference to food that was edible prior to disposal (e.g. WRAP, 2009). Thus, the concept of food waste is closely linked to the edibility of food. Yet, from the consumer perspective, there are some differences between people regarding what foods or parts of foods they perceive as edible and how they assess whether foods are edible (Blichfeldt, Mikkelsen, & Gram, 2015; Miljøstyrelsen, 2016; Van Boxstael, Devlieghere, Berkvens, Vermeulen, & Uyttendaele, 2014). These different views can reflect in consumers' perceptions and understanding of food waste. Therefore, consumer understanding of food waste and perceptions related to food waste were considered in this study.

At the household level, food waste represents the last step of the household food provisioning system. This means that food waste will be influenced by other food-related behaviours in previous steps of the system (e.g. planning, shopping, storing, cooking). Previous studies show that people's food-related practices at home are some of the main drivers of food waste (Farr-Wharton, Foth, & Choi, 2014; Miljøstyrelsen, 2016; Stancu, Haugaard, & Lähteenmäki, 2016). Yet, only few quantitative studies have linked such behaviours to food waste and these

looked only at some of the steps in the food provisioning system. There is a need to investigate more in depth the types of food-related practices that can prevent or promote food waste. Closely linked to the food-related practices at home are people's food-related skills. The extent to which people are skilled in dealing with the food-related activities at home can in turn play a role in food waste. Indeed, people's lack of skills to cook with what they have is seen as a barrier to reduction of food waste (Miljøstyrelsen, 2016). In addition, having the skills to assess the edibility of foods is important when making the decisions of using or throwing away foods (Miljøstyrelsen, 2016). Furthermore, in some cases lack of coordination between the household members in relation to the food practices can lead to food waste (Miljøstyrelsen, 2016). Therefore, food-related practices and skills to deal with them were considered in this study.

Another set of factors that can have an impact on consumer food waste are related to characteristics of the individuals and households (Aschemann-Witzel et al., 2015). One of the closest indicators of consumers' behaviour is their motivation to engage in the behaviour. The extent to which people are motivated to reduce food waste in their household can explain their food waste in part. Moreover, people may be motivated to reduce their food waste due to various incentives, like saving money or feelings of satisfaction with self (Miljøstyrelsen, 2016). In addition, people's values and other individual tendencies (e.g. impulsive buying, identities) can be linked to food waste (Visschers, Wickli, & Siegrist, 2016). Regarding household characteristics, the household size is consistently found to play a role in how much food people waste (Koivupuro et al., 2012). However, the stability of the household size (i.e. is there always the same number of household members living at home) or the distribution of labour (e.g. is one person responsible for food-related activities or is the responsibility shared) may also play a role in food waste. Furthermore, it seems that households that rely a lot on convenience food, waste more food (Mallinson, Russell, & Barker, 2016). Yet, it is less clear if cooking from scratch would be linked to less food waste. Finally, people's buying behaviour is one of the main causes of food waste (Brook Lyndhurst, 2007), thus, the frequency of grocery shopping in households may be linked to food waste. Such factors, related to the individual and household characteristics, were considered in this study.

Self-reported measures of consumer food waste were used in the present study. Such measures are feasible for large surveys and they are frequently used in prior literature on consumer food waste (Neff, Spiker, & Truant, 2015; Stancu et al., 2016; Visschers et al., 2016). Self-reported measures do have some weaknesses though, as they are vulnerable to social desirability and under-reporting. The purpose of the present study was not to estimate the amounts of consumer food waste, thus, we used self-reported measures to get a relative indication of consumer food waste and whether respondents are at the high or low end of it. A recent study compared different measures of consumer food waste and found that self-reported measures are correlated with food waste amounts measured using diaries or actual collection of waste (van Herpen et al., 2016). The latter types of methods though are not feasible for large studies among representative samples as they require a lot of effort from the participants.

In the following, the conceptual framework of the study will be described. This will be followed by a section regarding the methods used in the present study. Then the results will be detailed and, finally, there will be a section for discussion and conclusions.

2. Conceptual framework of consumer food waste

Understanding the factors that play a role in consumers' food waste behaviour is of critical importance to support attempts to tackle consumer food waste. Prior literature in the area of consumer food waste has identified several factors as relevant antecedents of food waste.

First, several **psychographic factors** (i.e. attitudes, interests or lifestyle) related to the individual consumers have been shown to influence food waste (Aschemann-Witzel et al., 2015; Stancu et al., 2016; Visschers et al., 2016). The main psychographic factors are related to consumers' motivation to reduce food waste. The important role of *motivational factors* as close drivers of behaviour is supported by the Theory of Planned Behaviour (Ajzen, 1991). This theory suggests that the main determinant of consumer behaviour is the intention to engage in the behaviour, namely the motivation or willingness to perform the behaviour. Higher motivation to reduce food waste is linked to lower self-reported food waste. However, other motivational factors play a role as well. Consumer self-identities, namely how people see themselves, give people motivation to act in line with their perception of who they are (van der Werff, Steg, & Keizer, 2013; Visschers et al., 2016). Moreover, people's values are related to their self-identities which in turn give people motivation to engage in behaviours that are in line with their values (van der Werff et al., 2013).

In addition to motivational factors, *consumers' perceived ability* to engage in a certain behaviour determines the likelihood that people will engage in that behaviour (Ajzen, 1991; Bandura, 1977). In the consumer food waste research, prior studies find that people's perceived ability to reduce food waste plays an important role above and beyond motivational factors (Stancu et al., 2016; Visschers et al., 2016).

Finally, some psychographic factors can act as *barriers to reduction of food waste*. Two individual tendencies have been included in the conceptual framework, as they were deemed relevant in the study of consumer food waste. First, purchasing too much food is strongly linked to food waste (Stancu et al., 2016) and individuals' impulsive buying tendency can explain why some people are more prone to engage in impulse buying (Verplanken & Herabadi, 2001). Therefore, impulsive buying tendency can act as a barrier towards avoidance of food waste. Moreover, avoidance of food waste is in part related to people's willingness to eat leftovers or products that start to show signs of decay. For example, a recent study shows that reuse of leftovers is important in avoiding food waste (Stancu et al., 2016). People differ in their perceptions of which foods are edible. The way people make judgements about edibility is ultimately linked to feelings of disgust (Blichfeldt et al., 2015). Individuals' disgust sensitivity is an individual trait in which people differ. It captures people's tendency to be more or less easily disgusted by specific food-related cues like signs of decay, and may contribute to unwillingness to eat foods that

are perceived as having quality flaws (Hartmann & Siegrist, 2018). Therefore, this individual tendency may act as a barrier towards avoidance of food waste for some consumers.

In addition to individual-related psychographics, the **household food-related practices and skills in food provisioning** are found to explain the self-reported food waste behaviour (Aschemann-Witzel et al., 2015; Stancu et al., 2016). Food waste is interlinked with other food-related behaviours in the household food provisioning, like shopping or cooking. Therefore, the practices and skills that households have around food can promote or prevent food waste (Aschemann-Witzel et al., 2015; Stancu et al., 2016).

Finally, socio-demographic factors and household characteristics can help explain consumer food waste (Aschemann-Witzel et al., 2015). Some of the main socio-demographics with a role in food waste are the age and household size (Aschemann-Witzel et al., 2015; Koivupuro et al., 2012; Visschers et al., 2016). Younger consumers and larger households produce more waste. Moreover, the types of foods consumed by households can impact their food waste (Mallinson et al., 2016). A strong preference for fresh food may lead to higher stocks of perishable foods, while reliance on convenience foods can lead to food waste.

The conceptual framework of consumer food waste for the present study covers these three sets of factors that play a role in food waste (See Figure 1).

Psychographic factors

Motivational factors to avoid food waste
- Motivation *(the drive to engage in a certain behaviour)*
- Universalism value *(understanding, appreciating and protecting the welfare of all people and the nature/environment)*
- Self-identities *(the label that an individual uses to describe himself/herself)*

Perceived ability to avoid food waste
(belief in one's capability to engage in a certain behaviour)

Barriers to avoidance of food waste
- Impulsive buying tendency *(individual trait that leads people to make spontaneous purchases)*
- Disgust sensitivity *(susceptibility to be more or less easily disgusted by specific food-related cues)*

Food-related practices and skills in household food provisioning
- Food waste preventing practices *(food behaviours that can help minimize food waste)*
- Food waste promoting practices *(food behaviours that can contribute to higher food waste)*
- Food-related skills *(abilities to engage in certain food-related behaviours like cooking)*

Socio-demographics & household characteristics

Self-reported food waste

Figure 1. Conceptual framework of consumer food waste

3. Method

3.1 Study design

The data for this study was collected by an online questionnaire in Denmark in September 2017. The sample of respondents was provided by the market agency YouGov, from their panel. The median time for completing the survey was 26 minutes.

3.2 Participants

The online questionnaire was targeted towards a representative sample (on gender, age, and region) of people above 18 years old from Denmark. Overall, a total of 508 participants completed the survey.

The respondents were aged between 18 and 86 years old, with a mean age of 49 years old. There was almost equal distribution on gender, with 51% of respondents being males. The vast majority of our respondents came from households that have a stable number of household members. Only 11% of participants came from households where the number of people living in the household changes over a typical two-weeks period (for example, due to shared custody of kids, frequent travelling in relation to work).

In stable households, most respondents come from households with two members. Furthermore, most of the respondents who come from households with a stable size, have no children under 16 years old living in their household (see Table 1). Among the respondents coming from flexible size households, 56% reported having at least one child under 16 years old living in the household at least sometimes. Overall, the average number of members living at home most of the time in flexible size households was similar to that of the stable size households (see Table 2).

Table 1. Household size in households with a stable number of members

	0	1	2	3	4 or more
Household size		31%	45%	11%	13%
Children under 16 years old	82%	9%	8%	1%	0%

Table 2. Average household size for stable and flexible size households

	Mean	N
Flexible size households		**54**
Lowest number of people who live in the household	1.8	
How many of them are children (under 16 years old)	0.4	
Highest number of people in total who live in the household	3.2	
How many of them are children (under 16 years old)	1.1	
Number of people in total who live in the household for the most part of the time	**2.3**	
How many of them are children (under 16 years old)	0.6	
Stable size households		**454**
Number of people in total who live in the household	**2.1**	
How many of them are children (under 16 years old)	0.3	

In the whole sample, about 22% of respondents came from households with at least one child under 16 years old. In Denmark, the proportion of households who have at least one child is at about 29%, while the percentage of families who have at least one child is 26%[2]. Yet, the definition of children in the household/family is different than the one in this study. In the Statistics Denmark data, children living at home are individuals under 25 years old who live at the same address with at least one of the parents, who have never been married or in a registered partnership and who have no children of their own (children under 18 years old not living with parents will be considered as a separate family if they meet certain criteria)[3]. Given that there are some differences between the definitions of children living in the household, the difference in percentages of households with children between our sample and the general population can be considered quite small.

Household characteristics

We asked the respondents some questions about the characteristics of their household that can play a role in food waste (for details see Appendix 1). First, prior studies show that relying heavily on convenience food is associated with higher food waste (Mallinson et al., 2016). Therefore, the types of foods/meals that people eat at home were included in this study. In addition, having a strong preference for fresh food implies that more perishable foods may be available at home, some of which may not be used before they spoil. Furthermore, households where shopping is done frequently can end up buying more food due to in-store cues, thus, the frequency of grocery shopping is relevant. Finally, the distribution of labour at home in relation to food-related activities is important, as when people share the responsibility there is a need for coordination in order to avoid food waste promoting behaviours like double purchases.

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[2] http://www.statbank.dk/10012 (computed based on data in Tables FAM55N and FAM44N, 2017 data)
[3] http://www.dst.dk/en/Statistik/dokumentation/documentationofstatistics/households--families-and-children

Home-prepared meals made mostly from raw ingredients are the most frequent types of meals that people eat at home (see Figure 2). On the other hand, the frequency of eating ready-made meals, convenience foods or take-away meals is low.

How often, if at all, do you eat the following types of food in your household?

Home-prepared meals, mostly from raw ingredients	4% 3% 8%	25%	60%	
Ready-made meals that just need heated but require no further preparation	61%	23%	11% 4%	1%
Convenience foods that require some preparation	50%	24%	15% 9%	2%
Take-away meals that are ready to eat as they come	55%	32%	10% 3%	0%

■ Less than once a month ■ 1-3 times a month ■ Once a week ■ 2-4 times a week ■ 5 times a week or more often

No. Respondents = 508

Figure 2. Frequency of eating certain types of food/meals in the household

Overall, the respondents showed a strong preference for fresh products (see Figure 3). In the case of products that are not pre-packed rather than pre-packed most people did not have a clear preference. This could be due to the fact that in the supermarkets sometimes people do not have a choice in Denmark between pre-packed or not pre-packed products.

Thinking about your household, please rate your disagreement or agreement with the following statements

	Strong disagreement	Neither nor	Strong agreement
We prefer fresh products to canned or frozen products	6%	39%	55%
It is important to us that food products are fresh	3%	35%	62%
We prefer to buy meat and vegetables that are not pre-packed rather than pre-packed	25%	55%	20%

■ Strong disagreement ■ Neither nor ■ Strong agreement
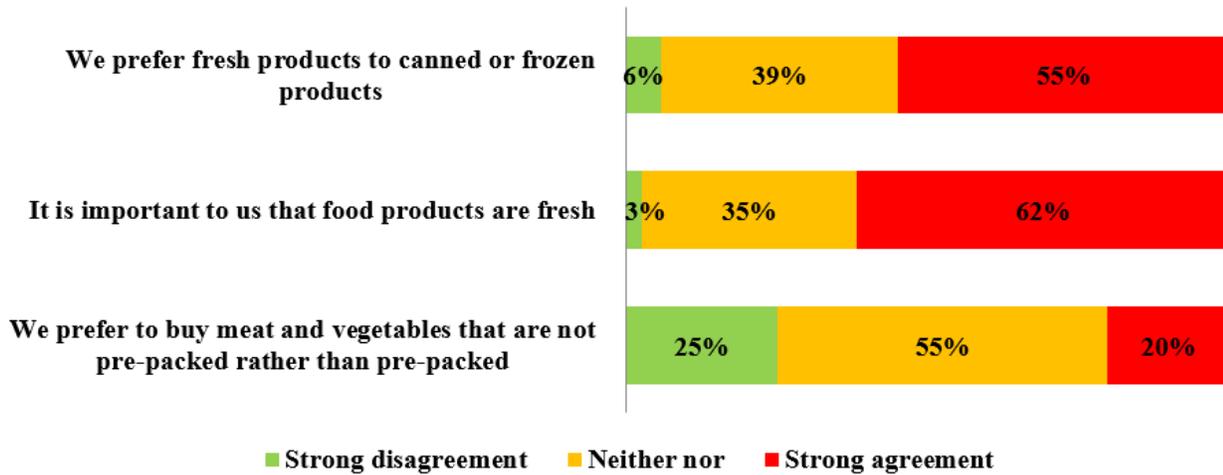
No. Respondents = 508

Figure 3. Preference for fresh food products in the household

Most respondents stated that grocery shopping is done in their household 1-2 times a week or 3-4 times a week (see Figure 4).

In your household, how often do you (or another household member) go grocery shopping?

Less often than once a week	1-2 times a week	3-4 times a week	5-6 times a week	Every day
3%	44%	39%	12%	2%
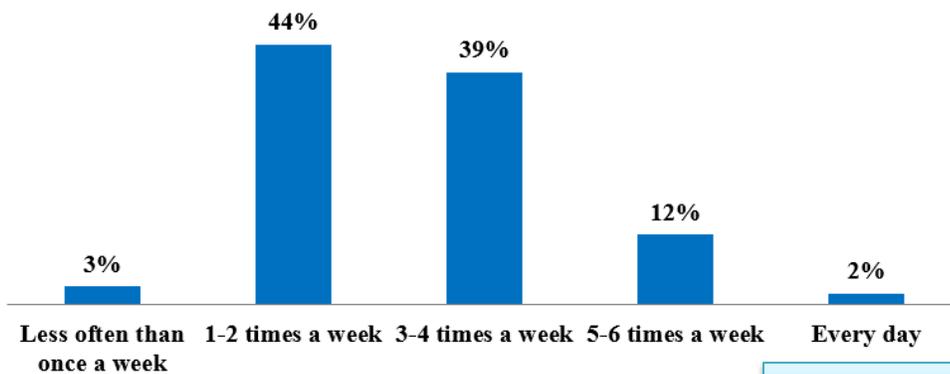
No. Respondents = 508

Figure 4. Frequency of household grocery shopping

For each of a variety of food-related tasks, more than half of the respondents said that they are the ones who do all or most of the respective activity (see Figure 5). These results show that most of the respondents in the present survey are involved in food-related activities in their household to a significant extent.

When it comes to the following activities in your household, how much would you say that you do?

Activity	You do all or most of it	You do about half of it	Someone else does all or most of it
Deciding what food to buy and how much	55%	36%	9%
Food shopping	55%	36%	9%
Storing food after shopping	54%	38%	8%
Deciding what food to cook/prepare for the household meals	52%	39%	9%
Cooking and preparation of food	55%	29%	16%
Cleaning up after dinner	51%	41%	8%
Organizing and checking the refrigerator, cupboards and freezer	60%	31%	9%

■ You do all or most of it   ■ You do about half of it   ■ Someone else does all or most of it

No. Respondents = 508

Figure 5. Responsibility for household food-related tasks

The study included some additional demographics (e.g. education, household income). These are presented in Appendix 2.

3.3 Questionnaire measures

The survey contained a series of questions regarding consumers' self-reported food waste behaviour, their understanding of food waste, their perceptions regarding edibility of food, their food-related practices and skills as well as individual characteristics and socio-demographics. The flow of the online questionnaire can be seen in Figure 6. The measures included in the survey were adapted from prior literature when appropriate. The entire questionnaire can be seen in Appendix 3 (in Danish).

In the following, the main sections of the survey will be briefly described together with the reasoning for their inclusion in the study. The measures related to these sections are described in Appendix 1.

Introduction
• Introduction & Informed consent

Background questions
• Responsibility for household activities
• Household size & Gender

1. Consumer understanding and awareness of food waste
• Open-ended question on understanding
• Awareness of food waste
• Awareness of consequences

2. Self-reported food waste behaviour
• Overall waste and types of food
• Food waste scenarios

3. Consumer perceptions of food edibility and assessment of edibility
• Perceptions of food edibility
• How is edibility assessed

4. Food-related practices in the households
• Planning & Shopping, Storage, Cooking, Eating, Coordination

5. Food-related skills in the households
• Skills in line with practices

6. Individual characteristics
• Motivation to reduce food waste & Incentives for motivation
• Self-identities, Values (Universalism), Impulsive buying tendency, Disgust sensitivity, Perceived ability to reduce food waste

Household characteristics
• Types of food consumed, Preference for freshness

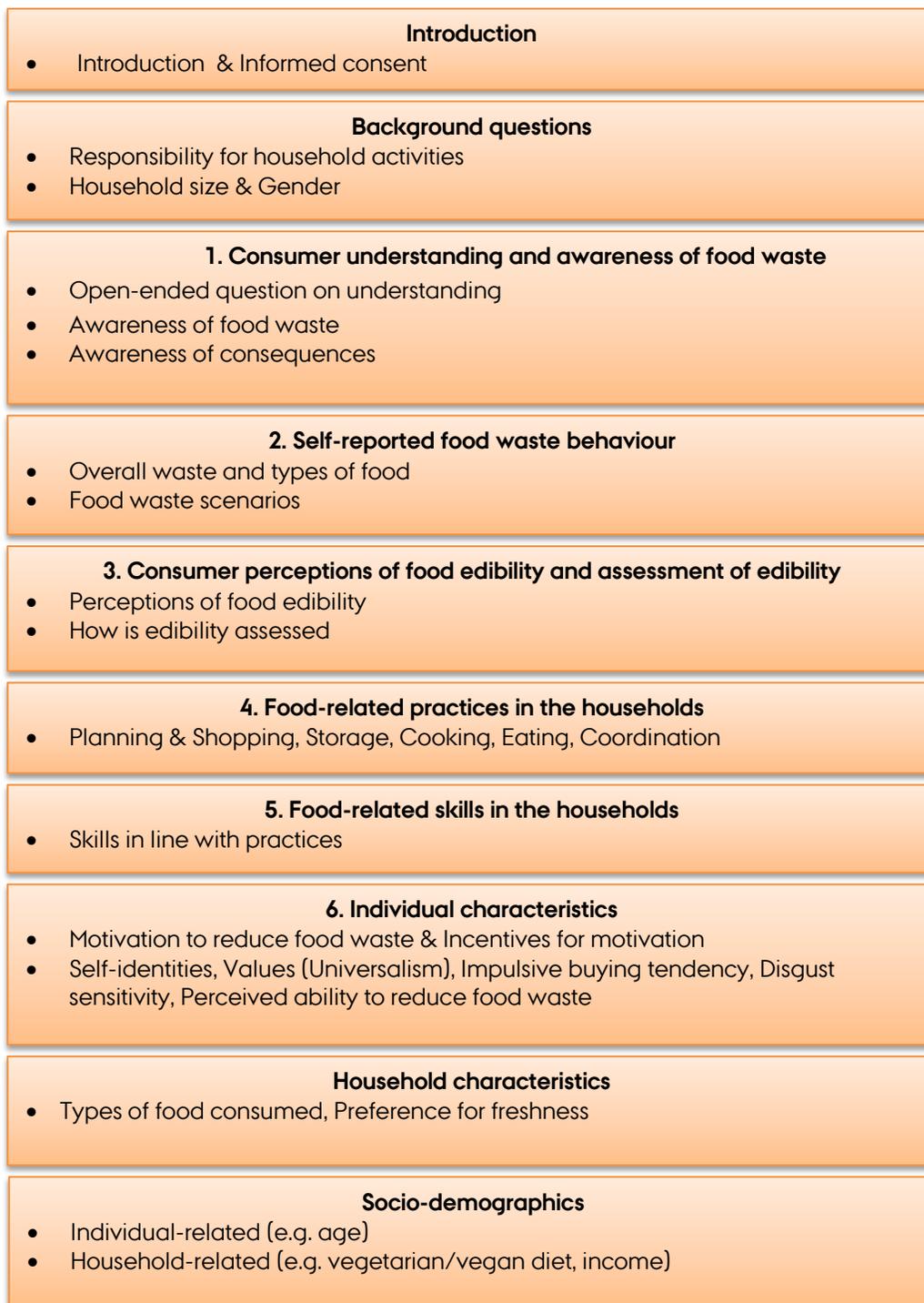| **Socio-demographics** |
| :--- |
| • Individual-related (e.g. age) |
| • Household-related (e.g. vegetarian/vegan diet, income) |

Figure 6. Overview of food waste questionnaire

Note! The flow of the survey is as shown in the figure (the sections that are described in the Results are numbered). The constructs listed under the second bullet point in the *Individual characteristics* block were displayed in a random order.

Consumer understanding and awareness of food waste

Prior literature provides some expert definitions of food waste (Edjabou et al., 2016), however, we know very little about what consumers understand by food waste. Moreover, it is unclear to what extent are consumers aware of the issue of food waste and its consequences. Consumer understanding of food waste and perceptions related to food waste can inform attempts to tackle consumer food waste by showing whether there is need for more information. Therefore, these were measured in the present study. The measures were adapted from prior literature (Grunert, Scholderer, & Rogeaux, 2011; Neff, Spiker, & Truant, 2015; Stancu et al., 2016) (for details see Appendix 1, Section 1).

Self-reported food waste behaviour

As food waste is at the core of this study, household food waste was assessed with self-reported measures. Three different measures of self-reported household food waste were used in order to gain a deeper understanding of the food waste behaviour. More precisely, consumers were asked to estimate how much food is discarded in their household in certain categories or were asked to state what they would do in certain situations (scenarios) which may lead to food waste. The use of scenarios allows providing a concrete context, which can facilitate the ability of consumers to report what they would do in such a situation. Self-reported measures of food waste are common in the consumer research area and have been used in prior studies of food waste (Neff et al., 2015; Stancu et al., 2016; Visschers et al., 2016). The measures were adapted from prior literature (Miljøstyrelsen, 2016; Neff et al., 2015; Stancu et al., 2016) (for details see Appendix 1, Section 2).

Consumer perceptions of food edibility and assessment of edibility

The concept of food edibility is closely linked to food waste with some expert definitions of food waste making a reference to the edibility of food (WRAP, 2009). However, we know very little about consumers' perceptions of edibility. In some cases, food waste may occur because people do not perceive certain foods or parts of foods (e.g. broccoli stalks) as something that they could eat. Similarly, when cooked food turns out to be disappointing in taste or appearance, some people may throw it away because they do not see it as edible. At the same time, how people deal with products when they are unsure if certain products are still fit for consumption may result in food waste. Some people may choose to throw away such products without even trying to assess their edibility, while others may try to check if the product is still edible. Thus, consumers' perceptions of edibility for certain foods or parts of foods were assessed as well as the strategies that people use to assess edibility. The measures were adapted from prior literature (Glanz-Chanos, Friis, & Lähteenmäki, 2016; Miljøstyrelsen, 2016; Van Boxstael et al., 2014) (for details see Appendix 1, Section 3).

In order to investigate whether people differentiate between the "best before" and "use by" date labelling we have used a between-subjects design. This means that half of the respondents answered the "best before" question for smoked salmon and ready-made meals as well as the "use by" question for liver pate and meat cold-cuts. The other half of the respondents answered the "use by" question for smoked salmon and ready-made meals

as well as the "best before" questions for liver pate and meat cold-cuts. By comparing the group of people who saw a certain product with "best before" date to the group who saw the same product with "use by" date, we can find out if people react differently to the same product when it has a "best before" date as opposed to a "use by" date.

Food-related practices in the households

There is increasing evidence in prior literature that people's food-related practices at home are some of the main drivers of food waste (Farr-Wharton et al., 2014; Miljøstyrelsen, 2016; Neff et al., 2015; Stancu et al., 2016). Some of the practices are associated with higher food waste, like excessive buying. Thus, these can be seen as *food waste promoting practices*. On the other hand, other food-related practices are associated with lower food waste, like reusing leftovers. Such practices can, thus, be seen as *food waste preventing practices*. In this study several food-related practices (food waste preventing or food waste promoting) at different stages of the household food provisioning system were investigated. The stages in the household food provisioning system covered are: *Planning & Shopping, Storage, Cooking and Eating*. In addition, the level of *coordination related to the food practices* in households with more than one member can impact food waste. Lack of coordination may impact purchases or lead to forgetting foods that other members bring in the household (Miljøstyrelsen, 2016). Thus, the level of coordination was investigated in this study. The measures of food-related practices and coordination between household members were adapted from prior literature (Miljøstyrelsen, 2016; Neff et al., 2015; Schmidt, 2016; Stancu et al., 2016; Visschers et al., 2016) (for details see Appendix 1, Section 4).

Food-related skills in the households

Good food-related skills may allow consumers to avoid some food waste. Being able to cook with the food available at home or knowing how to make new dishes using leftovers from previous meals can result in lower waste. Therefore, several food-related skills referring to the different stages in the household food provisioning were included in this study. The measures were adapted from prior literature (Hartmann, Dohle, & Siegrist, 2013; Miljøstyrelsen, 2016) (for details see Appendix 1, Section 5).

Individual characteristics and food waste

Many food-related decisions are ultimately made by individuals. A set of individual characteristics have been included in the present study due to their potential to help explain people's food waste behaviour (for details see Appendix 1, Section 6).

Motivation to reduce food waste

Consumers' motivation to reduce food waste was assessed as motivation is a close predictor of behaviour. People who are highly motivated to reduce food waste would be more willing to reduce the food waste in their household. Furthermore, people may be motivated to reduce their food waste due to various motivations like saving money or keeping order in the kitchen (Miljøstyrelsen, 2016). Identifying the incentives that motivate people to reduce

their food waste can provide critical input for designing attempts to reduce food waste at the household level. These measures were adapted from prior literature (Brook Lyndhurst, 2007; Miljøstyrelsen, 2016; Neff et al., 2015).

Consumer self-identities

Self-identity refers to the label that consumers use to describe themselves, namely it relates to how people see themselves (van der Werff et al., 2013). People may have several self-identities and these identities can show how people relate to food. People's identities can contribute to explain their food waste behaviour (Visschers et al., 2016).

Five types of self-identities were assessed in this study as they are expected to be associated with people's food waste behaviour. The thrifty consumer identity refers to seeing oneself as the type of person who is thrifty when it comes to food. The good homemaker identity refers to those people who see themselves as the type of person who is good at managing the household. These two identities may result in better management of the food at home and, thus, lower food waste. The environmental friendly identity refers to being the type of person who is environmentally friendly. People who are environmentally friendly may be more likely to avoid being wasteful as waste harms the environment. The hedonic identity refers to being the type of person who enjoys eating. Such people may place a high importance on the quality of food, meaning that they may throw food away more easily. On the other hand, for these people food may have more value, which means that they may be less likely to throw food out. Finally, the healthy eater identity refers to those consumers who see themselves as the type of person who eats healthy food. These people may end up using more fresh foods (e.g. fresh fruits and vegetables) which are perishable and that could mean more waste if such foods are not used in time. However, such people may also be more concerned with the food they eat and, thus, have better management of their food. These measures were adapted from prior literature (van der Werff et al., 2013).

Consumer values

Values are basic individual orientations that underlie consumer behaviour or attitudes (Schwartz, 2001). For the study of consumer food waste, the universalism value was considered relevant as it relates to understanding, appreciating and protecting the welfare of all people and the nature/environment (Schwartz, 2001). This value was selected as it is expected to relate to people's self-identities and it may be linked with lower food waste, especially when people perceive food waste as an environmental or social problem. The measure of universalism value was adapted from prior literature (Schwartz, 2001).

Consumer perceived ability to reduce food waste

Consumers' perceived ability to engage in a certain behaviour has an impact on the likelihood that they will take up the behaviour (Bandura, 1977). In the case of food waste, the extent to which people believe that they can reduce the amount of food waste discarded by their household is expected to impact the level of food waste.

Impulsive buying tendency

Shopping practices are important in consumer food waste. People's impulsive buying tendency can impact people's shopping behaviour which can result in more food waste. Impulsive buying tendency is an individual trait that leads people to make spontaneous purchases (Rook & Fisher, 1995). People who have high impulsive buying tendency are more sensitive to external cues in the shopping environment and that may lead to more unplanned or impulsive purchases. The impulsive buying tendency is not a trait that people either have or do not have. It is a trait of every consumer, however, each person is situated at a certain point in the impulsive buying tendency continuum, meaning that some people will be low in impulsive buying tendency while others will score higher on this tendency (Rook & Fisher, 1995). The measure of impulsive buying tendency was adopted from prior literature (Park & Dhandra, 2017; Rook & Fisher, 1995; Thompson & Prendergast, 2015; Verplanken & Herabadi, 2001).

Disgust sensitivity

Disgust sensitivity refers to a person's susceptibility to be more or less easily disgusted by specific food-related cues (Haidt, McCauley, & Rozin, 1994; Hartmann & Siegrist, 2018; Rozin, Fallon, & Mandell, 1984). People's disgust sensitivity can impact their food waste due to unwillingness to eat certain foods that cause disgust. We expect that foods triggering disgust will not be eaten, and thus, will be likely discarded. The measure was partly adapted from prior literature (Hartmann & Siegrist, 2018).

3.4 Data analyses

The data analyses were conducted in the IBM SPSS Statistics 24 software. Descriptive statistics, mainly frequencies and means, were used to describe respondents' perceptions and behaviours.

Furthermore, cluster analysis was used in order to identify if there is any meaningful grouping of respondents according to their reported food waste in certain food categories. Twostep cluster analysis was selected for these analyses as it allows using variables that are not continuous. Pearson's correlation coefficient was used to identify the associations between individual characteristics. Additionally, the Chi-square test was used to identify associations between the food waste behaviour clusters and household characteristics as well as socio-demographics, as these measures were not continuous. Furthermore, ANOVA analyses were used to assess whether there were differences in perceptions and food-related practices by socio-demographics. Finally, logistic regression was used to assess the relative importance of individual characteristics in explaining people's self-reported food waste behaviour.

4. Results

4.1 Consumer understanding and awareness of food waste

Consumers' understanding of food waste together with insights into consumer awareness of food waste can help us to understand whether consumers need more information about food waste.

Consumer understanding of food waste

Respondents were asked an open-ended question on their understanding of food waste at the beginning of the survey. The use of an open-ended question allowed consumers to give any answer that they found relevant. Respondents were asked to write what would they say to a friend if they had to explain to him/her what food waste is. The answers that people gave were content analysed to identify the overarching themes (the identified themes can be seen in Appendix 4). When an answer mentioned several themes it was counted towards the frequency of each of the themes it mentioned.

The most frequent types of answers were that food waste is mainly about **excessive buying** (see Table 3). In this case, some respondents went on to explain that excessive purchasing leads to food that is left unused or gets old or is thrown away or other such aspects. The second most frequent type of answer was that food waste is about **throwing away leftover food or products**. Moreover, many people mentioned that food waste is about **throwing away food that is edible** or **food that is not used.** Then there were those respondents who gave a broad answer of the type that food waste is food that is thrown away or is about **throwing away food**. For some people, food waste is about **cooking too much** and few of them went on to explain that because too much is cooked, some of the food is thrown away or not all the food is eaten. Several other aspects, like food waste at the distribution level (e.g. in supermarkets or restaurants) or food that is thrown away due to date labelling concerns were mentioned less frequently. There were also some people who did not answer the question or said that they did not know what to answer.

Table 3. Consumer understanding of food waste

Themes	Frequency	% of respondents
Excessive purchasing (buying too much, buying on discount, buying packages too big)	109	21%
Leftover food/products that are thrown away (Throwing away leftover food/products)	100	20%
Food that is edible (usable) but is thrown away (Throwing away food that is edible (usable))	94	19%
Food that is not used but thrown away (Throwing away food that is not used)	85	17%
Food that is thrown away (Throwing away food)	56	11%
Cooking more than can be eaten	53	10%
No answer / Don't know	38	7%
Waste at the distribution level (e.g. supermarket or restaurants)	27	5%
Food that gets old is thrown away (Throwing away food that gets old)	26	5%
Food that is thrown away due to date labelling concerns (Throwing away food due to date labelling concerns)	20	4%
Excessive consumption	5	1%
Waste of resources	5	1%
Bad management of food	4	1%
Other	4	1%

Note! *The answer of each respondent was coded at all applicable themes, thus, some consumers mentioned more of these themes and they are counted towards the frequency of each of the codes.*

Consumer awareness of food waste

The awareness of food waste among consumers is very high, with 85% of respondents saying that they have seen or heard something about food waste in the past year. Only 6% of the respondents have not seen or heard anything related to the issue of food waste in the past year, and 9% were unsure.

Of those respondents who have seen or heard something about food waste in the past year, most individuals had seen or heard information about the amounts of food waste and/or ways to avoid food waste (see Figure 7). Additionally, more than half of the participants who had seen or heard something about food waste in the past year, were aware of information regarding expiration date labelling. The awareness about composting or other ways to dispose of food waste was low. Finally, few respondents stated other types of information that they had seen or heard in the past year, such as information about people who forage for food.

What did you see or hear about these issues? (select all that apply)

- 72% — Information about how much food is thrown out
- 69% — Information about how to avoid throwing out food
- 57% — Information about food expiration date labels
- 21% — Information about composting or ways to dispose of food that is thrown out
- 5% — Something else
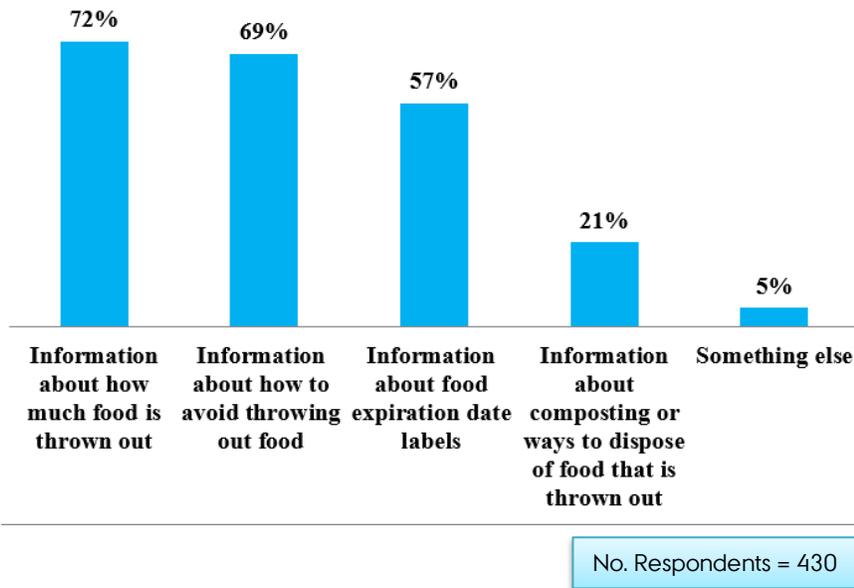
No. Respondents = 430

Figure 7. Types of information that consumers are aware of

Consumer awareness of food waste consequences

Respondents were relatively well aware of the environmental and economic consequences of food waste, but agreed less with the statement that food waste in Denmark has consequences for the undernourished people in the world (See Figure 8).

Awareness of food waste consequences
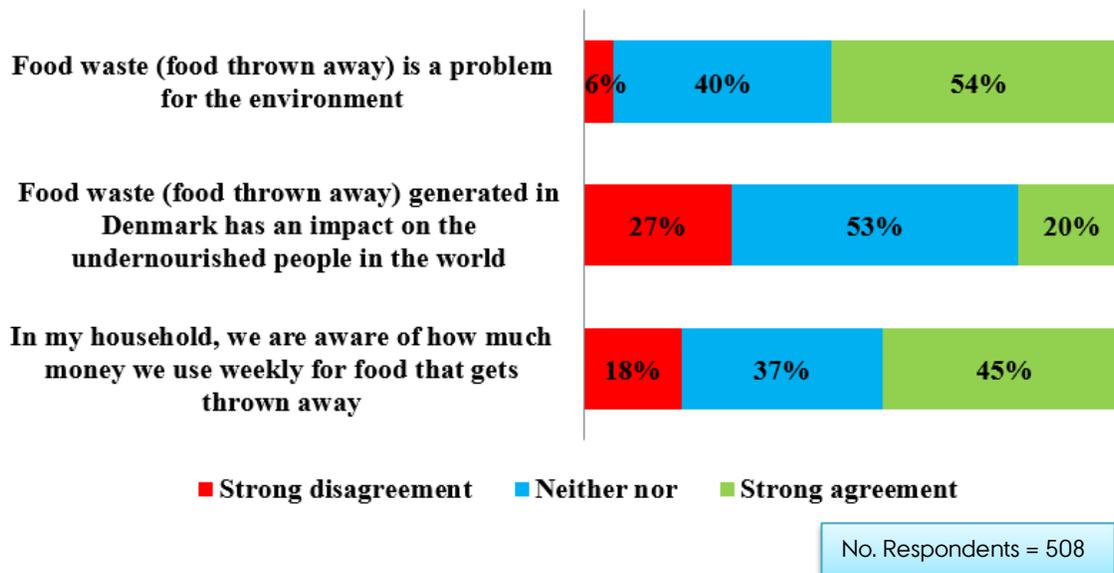
	Strong disagreement	Neither nor	Strong agreement
Food waste (food thrown away) is a problem for the environment	6%	40%	54%
Food waste (food thrown away) generated in Denmark has an impact on the undernourished people in the world	27%	53%	20%
In my household, we are aware of how much money we use weekly for food that gets thrown away	18%	37%	45%

■ Strong disagreement ■ Neither nor ■ Strong agreement

No. Respondents = 508

Figure 8. Awareness of food waste consequences

28

Slightly more than half of the respondents stated that in their household leftover food fed to pets or other animals is not seen as food waste (see Figure 9). It can be debated whether food fed to pets or animals should be seen as food waste (WRAP, 2009), yet, some definitions include food used to feed animals under food waste (Aschemann-Witzel et al., 2015).

In my household, we consider leftover food fed to pets/animals as food waste
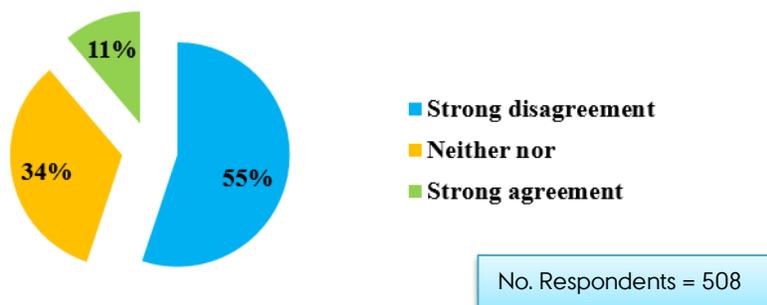
Figure 9. Consumer perception of food fed to pets or other animals

Section summary - Consumer understanding and awareness of food waste

The awareness of food waste is high among the participants. Concerning certain aspects, like information about date labelling or social consequences of food waste, there is room for improvements in consumer awareness.

Although consumers referred to several aspects related to food waste, many respondents covered only specific aspects (like excessive buying) which shows a fragmented understanding of food waste.

4.2 Self-reported food waste behaviour

Consumers' self-reported food waste was assessed in several ways in order to get a deeper understanding of waste-related behaviours.

Food waste by food categories

For each food category, the majority of the respondents reported "low waste" (waste less than a tenth of what they buy or produce themselves) in their household (Figure 10). As expected based on prior studies, higher waste occurs in the fresh fruits and vegetables category as opposed to other categories (Edjabou et al., 2016; WRAP, 2009). On the other hand, reported waste in the meat and fish category is very low. This is in line with the idea that food with higher value, like meat and fish, is less likely to be wasted (Miljøstyrelsen, 2016).

The results presented so far relate to each food category taken separately. In order to find out if the respondents can be grouped according to their answers to the food waste categories, a cluster analysis was conducted. Two clusters or groups of consumers could be distinguished based on their food waste behaviour across the five food categories. The first group was called the **"low waste cluster"**, these were respondents who reported "low waste" (i.e. less than a tenth of what they buy or produce) in all of the five food categories. The second group was called **"high waste cluster"** and included those respondents who reported "high waste" (i.e. more than a tenth of what they buy or produce) in at least one of the five food categories. As Figure 11 shows, most respondents belong to the **"low waste cluster"**, namely they waste less than a tenth of what they buy or produce in all of the five food categories in their household. On the other hand, almost a third of participants belong to the **"high waste cluster"**, meaning that in their household they waste more than a tenth of what they buy or produce in at least one of the studied food categories.

Food waste by food categories

Category	Low waste	High waste
All food	79%	21%
Milk and dairy products	88%	12%
Fresh fruits and vegetables	76%	24%
Meat and fish	95%	5%
Bread and other bakery products	79%	21%

No. Respondents = 508
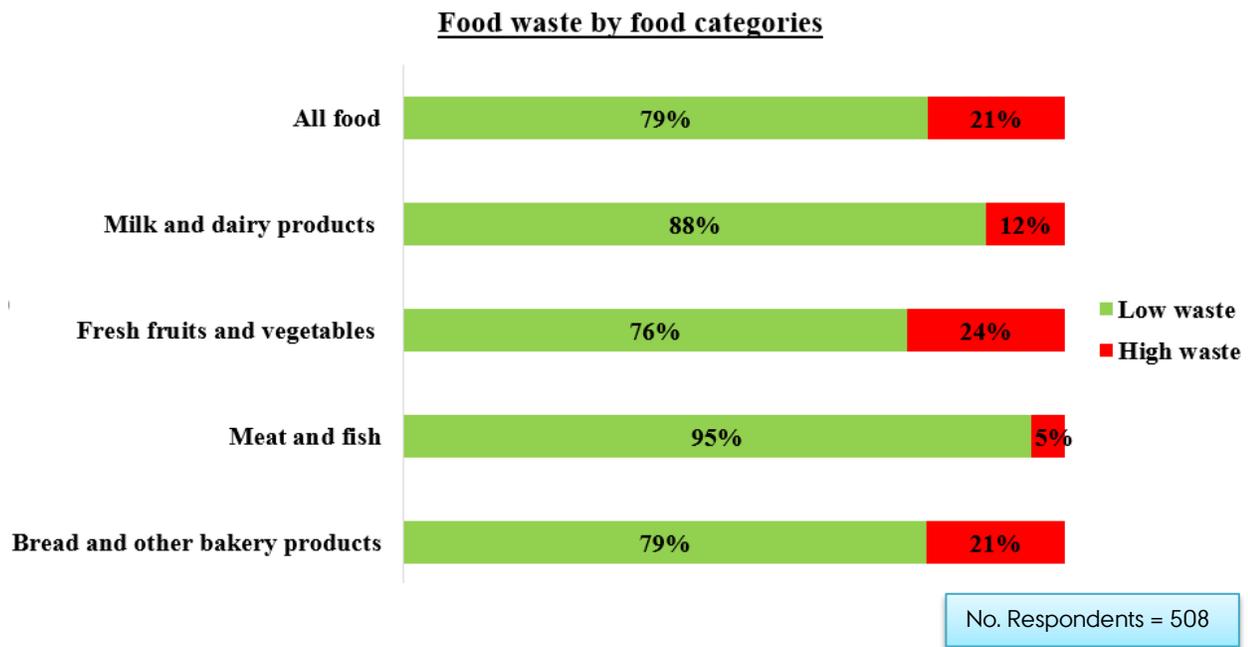
Figure 10. Food waste by food categories

Food waste clusters (on food categories)

- Low waste cluster
- High waste cluster

39%

61%

No. Respondents = 508
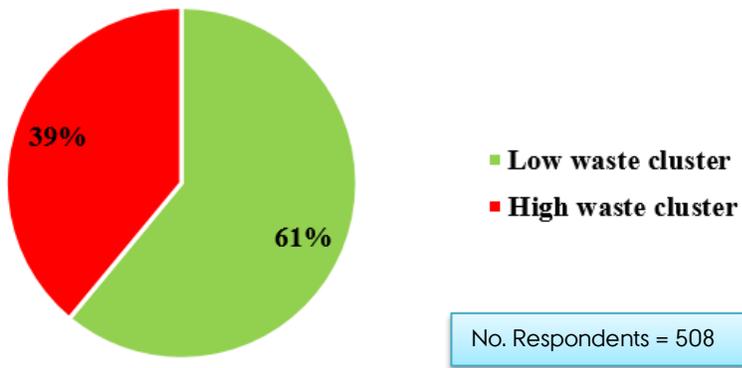
Figure 11. Food waste clusters on food categories

Note! The high waste cluster had a majority of consumers who reported high waste per each food category, except Milk & Dairy products and Meat & Fish.

Food waste by functional categories

In terms of functional food categories, most participants reported "low waste" (*none* or *hardly any* waste) per each category in their household (see Figure 12). Waste in the processed products stored outside of the fridge was the lowest. This is not surprising as it could be expected that processed products which are not stored in the fridge often have a long shelf life.

Food waste by functional categories

	Low waste	High waste
Raw ingredients	78%	22%
Processed products stored in the fridge	75%	25%
Processed foods stored outside the fridge	90%	10%
Cooked food	78%	22%

No. Respondents = 508

Figure 12. Food waste by functional food categories

Further, the association between this measure of food waste and the food waste clusters was explored. The aim was to identify how those respondents categorised in the "low waste cluster" or the "high waste cluster" groups answered this measure of food waste. The results show that there is a significant association between the two measures. Most of the respondents who reported "low waste" in the functional category belong to the "low waste cluster", while most of the consumers who reported "high waste" in the functional category belonged to the "high waste cluster" in the food waste clusters (Table 4). The close association between these two measures of food waste implies that the measures used in this study are reliable.

Table 4. Food waste clusters by food waste in functional categories

		Raw ingredients		Processed products stored in the fridge		Processed foods stored outside the fridge		Cooked food	
		low waste	high waste	low waste	high waste	low waste	high waste	low waste	high waste
low waste cluster[1]	Count	291_a	19_b	286_a	24_b	296_a	14_b	277_a	33_b
	% within Functional category	**73%**	17%	**75%**	19%	**65%**	27%	**70%**	30%
high waste cluster[2]	Count	107_a	91_b	97_a	101_b	161_a	37_b	121_a	77_b
	% within Functional category	27%	**83%**	25%	**81%**	35%	**73%**	30%	**70%**
Total	Count	398	110	383	125	457	51	398	110
	% within Functional category	100%	100%	100%	100%	100%	100%	100%	100%

Pearson Chi-Square>26, df=1, significant at p<.01, different subscript letters show that the column proportions are significantly different per functional category
(1) Respondents who reported household food waste of less than a tenth of what is bought or produced in all food categories
(2) Respondents who reported household food waste of more than a tenth of what is bought or produced in at least one food category

Food waste scenarios

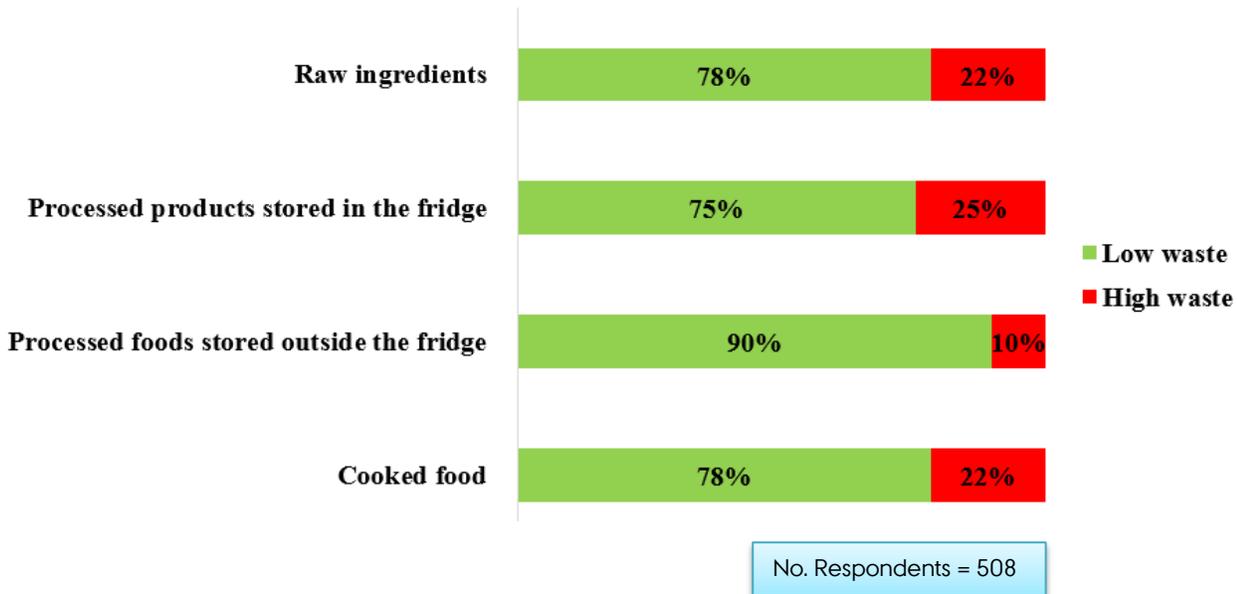Five scenarios that described certain situations when food waste may occur were used to understand more in-depth people's behaviour. The use of scenarios allows providing a concrete context, which can facilitate the ability of consumers to report what they would do in such a situation.

Lasagne leftovers scenario

This first scenario aimed to measure people's food waste behaviour in relation to meat-based lasagne leftovers. Respondents were asked to imagine that they had just finished eating dinner at home which consisted of meat lasagne (vegetarians were asked to imagine a vegetarian option) and salad. Further, the scenario specified that there was still a good portion of lasagne left in the tray (not served on the plates) after dinner. People were then asked what they would do with the leftover lasagne when cleaning up after dinner.

The vast majority of respondents stated that they would keep the leftovers (see Figure 13). Most of these respondents would keep the leftovers in the fridge, while some would keep them in the freezer. Those respondents stating that they would keep the lasagne leftovers (either in the fridge or the freezer) and those who selected "other", were asked how likely it would be that they would eat the kept leftovers. Most respondents reported that in their household it would be very likely to eat the kept leftovers (see Figure 14).

Lasagne leftovers - scenario

- ■ **Would keep the leftovers and store them in the fridge**
- ■ **Would keep the leftovers and store them in the freezer**
- ■ **Would throw away the leftovers**
- ■ **Would feed the leftovers to pets or animals**
- ■ **Other (please specify)**

No. Respondents = 508
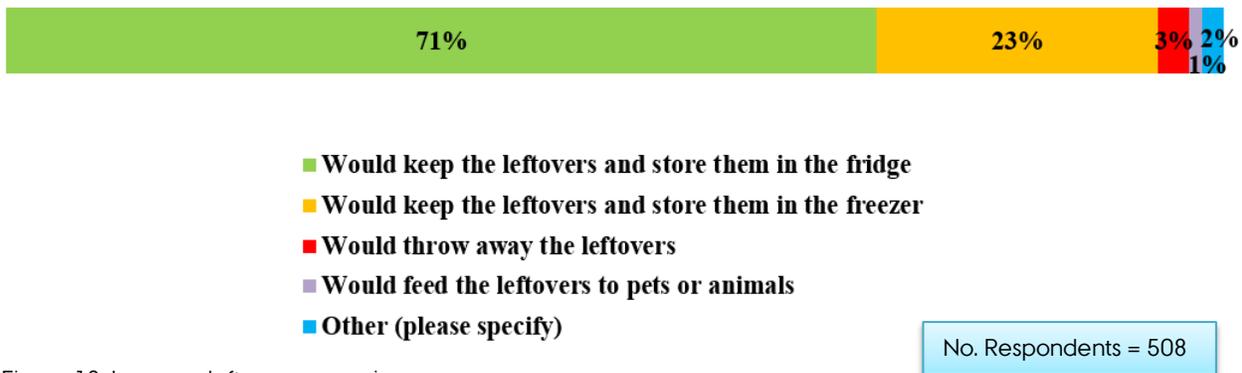
Figure 13. Lasagne leftovers scenario

Likelihood to use the lasagne leftovers

- ■ **Not likely**   ■ **Quite likely**   ■ **Very likely**   ■ **Not applicable**
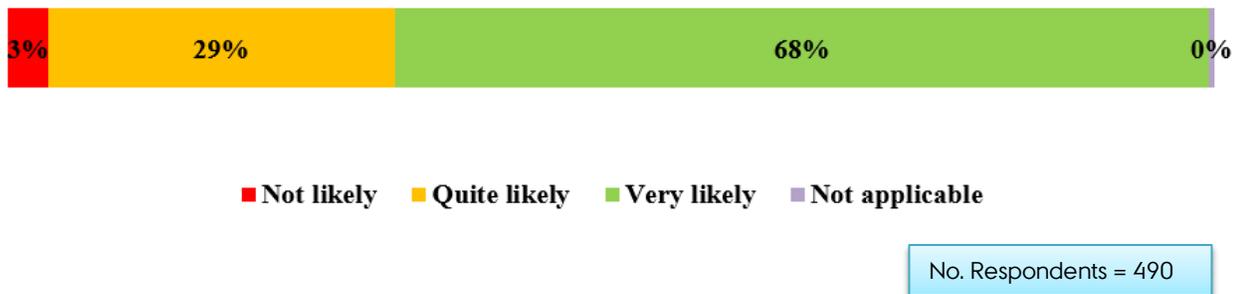
No. Respondents = 490

Figure 14. Likelihood to use leftovers from lasagne meal

Composite meal leftovers scenario

In this scenario, the aim was to find out how people deal with leftovers from a meal consisting of several components. Respondents were instructed to imagine that they had just finished eating dinner at home, that was made from raw ingredients and consisted of meat (or a vegetarian option instead of meat if they were vegetarians), potatoes, cooked vegetables, fresh green salad, and sauce. Further, the scenario specified that there is still some food left of each meal component after dinner which had not been served on their plates. Then people were asked what they would do with each meal component when cleaning up after dinner.

In general, people would save the food, especially if there is enough for at least one person to eat again (see Figure 15). There are some differences between meal components. The sauce is the least likely to be kept compared to the other components. Among those respondents who selected "other" for the sauce, most stated that they do not eat sauce.

However, respondents who saved the leftover food (or selected "other") are not sure if they will use the food later (see Figure 16). Many of these participants said that it is not likely or it is only quite likely that the kept leftovers will be eaten in their household. This is of course worrisome from the food waste perspective.

Composite meal leftovers - scenario

Cooked meat	54%	38%	3%	4% / 1%	
Cooked potatoes	58%	26%	11%	3% / 2%	
Sauce	21%	40%	30%	3%	6%
Cooked vegetables	45%	27%	23%	3% / 2%	
Fresh green salad	43%	36%	16%	3% / 2%	

- Would keep the leftovers indifferent of the amount left
- Would keep the leftovers only if the amount is enough for at least one person to eat again
- Would throw away the leftovers
- Would feed the leftovers to pets or animals
- Other (please specify)

No. Respondents = 508

Figure 15. Composite meal leftovers scenario
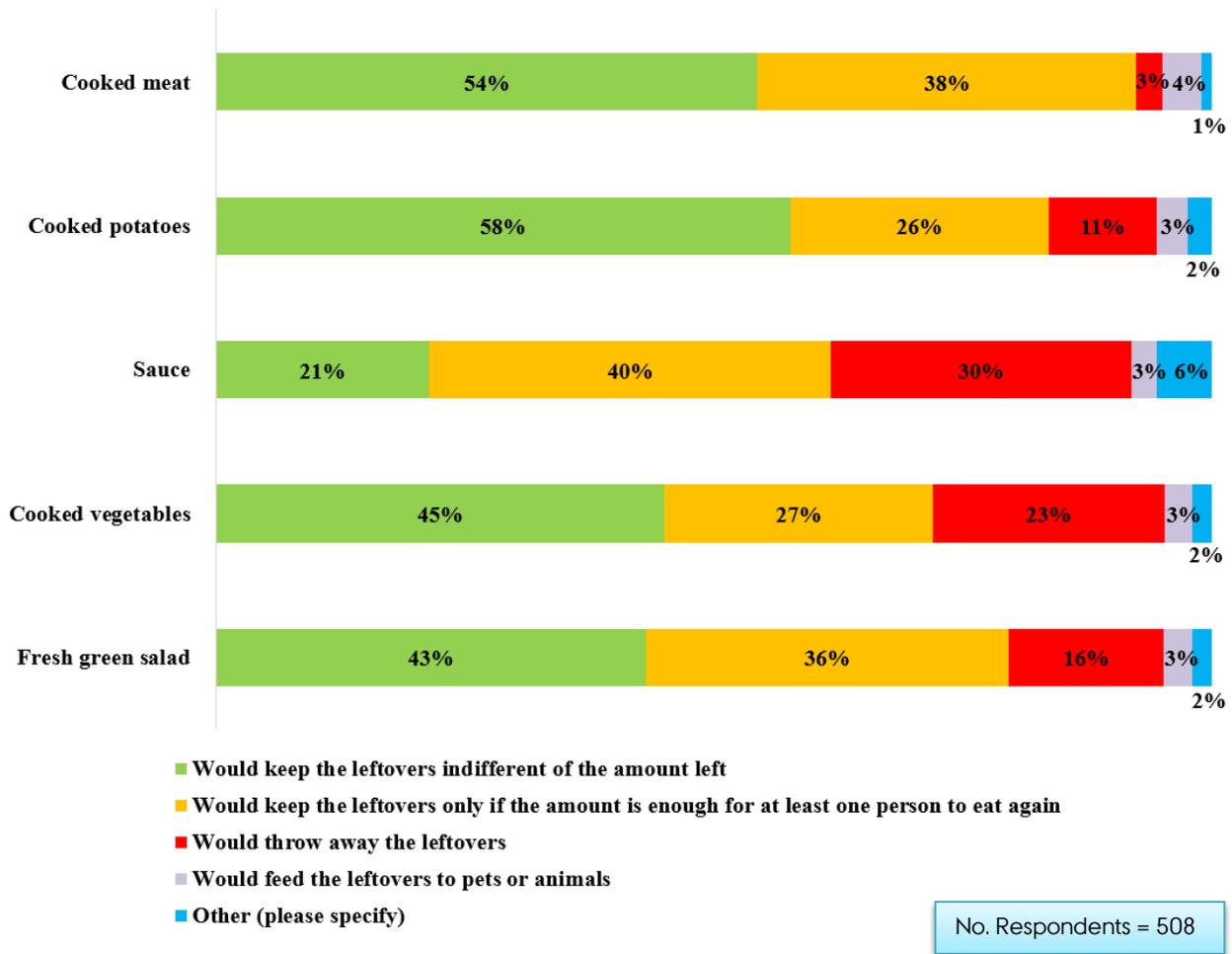
Likelihood to use the leftovers from composite meal
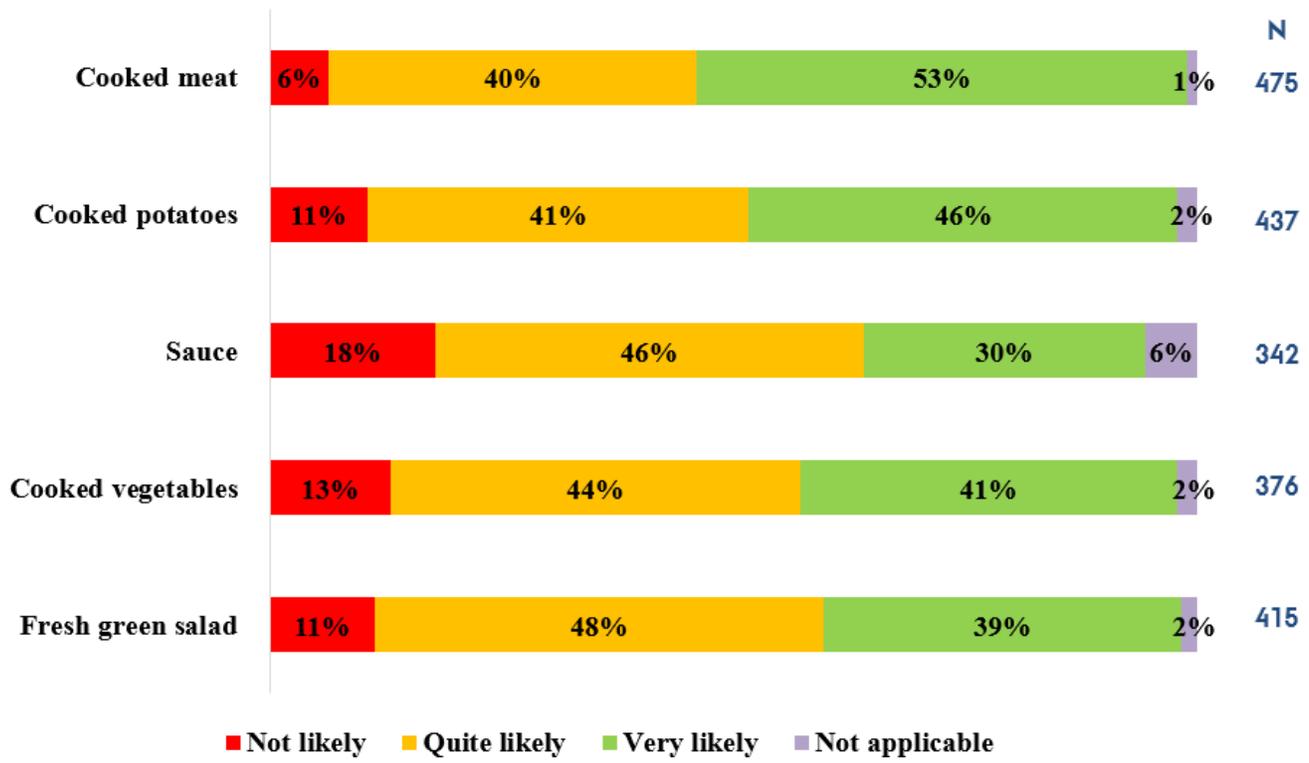
Figure 16. Likelihood to use leftovers from composite meal

Raw ingredients scenario

The third scenario aimed to find out how people deal with partly used raw ingredients after preparing a meal. People were asked to imagine that they are preparing a meal and they do not use some ingredients entirely for the meal. Then respondents were asked what they would do with the remaining ingredients.

The leftover raw ingredients are most frequently saved, especially in the case of cheese and meat-based ingredients (see Figure 17). There were some differences between ingredients though, with leftover onion or canned chopped tomatoes being kept least frequently.

However, many of those respondents who kept the leftover raw ingredients are not likely or are only quite likely to use the kept ingredient later (see Figure 18).

Raw ingredients not used entirely - scenario

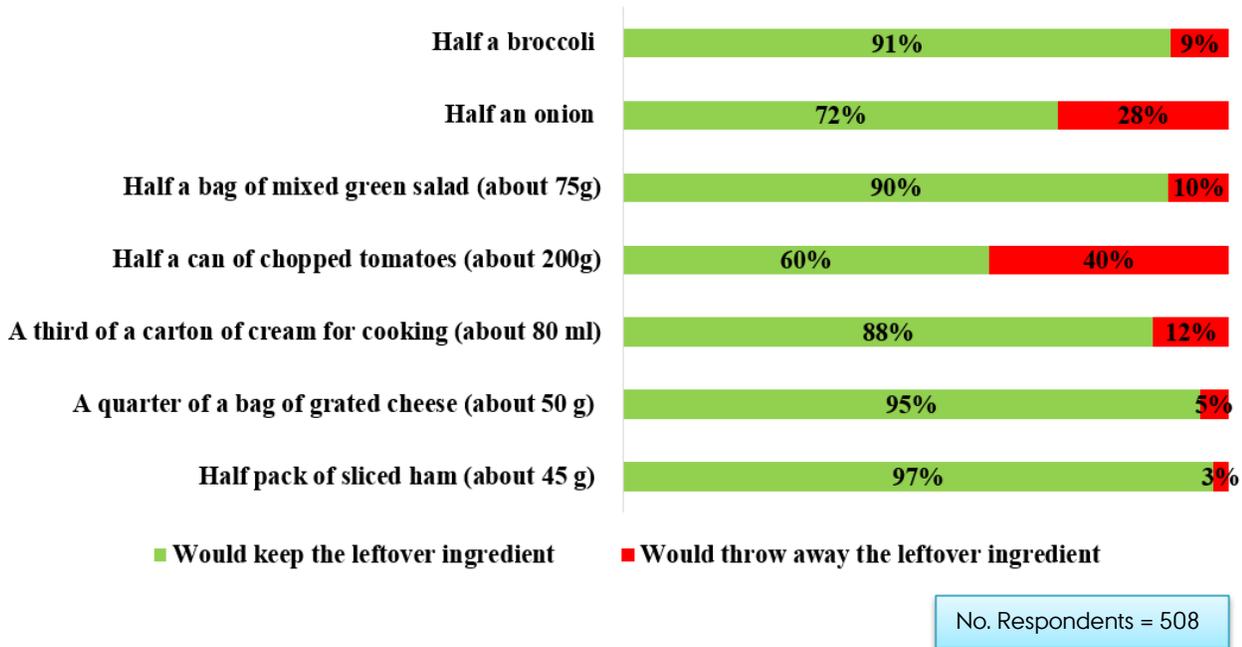|	Would keep the leftover ingredient	Would throw away the leftover ingredient
Half a broccoli	91%	9%
Half an onion	72%	28%
Half a bag of mixed green salad (about 75g)	90%	10%
Half a can of chopped tomatoes (about 200g)	60%	40%
A third of a carton of cream for cooking (about 80 ml)	88%	12%
A quarter of a bag of grated cheese (about 50 g)	95%	5%
Half pack of sliced ham (about 45 g)	97%	3%

■ Would keep the leftover ingredient   ■ Would throw away the leftover ingredient

No. Respondents = 508

Figure 17. Raw ingredients not used in their entirety scenario

Likelihood to use raw ingredients leftovers

	Not likely	Quite likely	Very likely	N
Half a broccoli	10%	42%	48%	460
Half an onion	7%	40%	53%	365
Half a bag of mixed green salad (about 75g)	9%	49%	42%	458
Half a can of chopped tomatoes (about 200g)	8%	47%	45%	307
A third of a carton of cream for cooking (about 80 ml)	13%	44%	43%	445
A quarter of a bag of grated cheese (about 50 g)	7%	42%	51%	484
Half pack of sliced ham (about 45 g)	9%	42%	49%	495

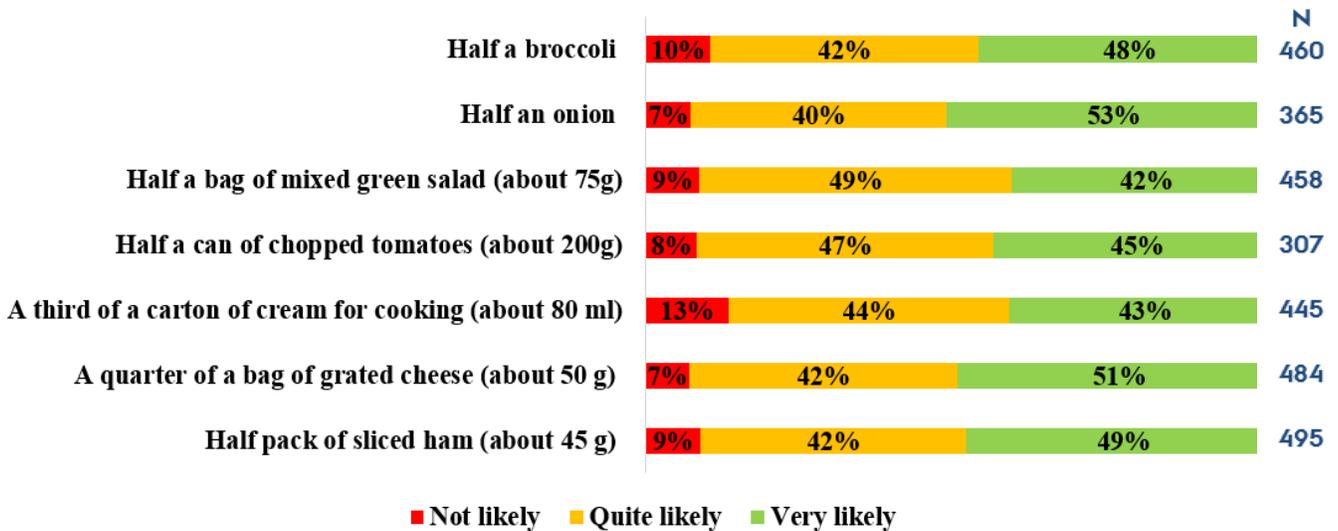■ Not likely   ■ Quite likely   ■ Very likely

Figure 18. Likelihood to use raw ingredients leftovers

Minced meat about to expire scenario

The fourth scenario was looking to identify whether people prioritize food close to expiry when cooking. People were asked to imagine that they are about to prepare dinner for which they had bought fresh fish fillet. The

scenario then specified that while looking through the fridge for the other ingredients for dinner one finds a minced meat pack that expires on the same day. People were asked what they would do with the minced meat in this case.

There are several strategies that people use when coming across a product about to expire when they are preparing a meal (see Table 5). Most frequently, respondents stated that they would put the minced meat in the freezer for future use. This is also one of the options which involved little effort from the part of the consumer.

Table 5. Strategies to deal with minced meat about to expire

Minced meat about to expire strategies	%
I would put the minced meat to the freezer for later use	**39%**
I would prepare the minced meat now and store the prepared dish for later use	**24%**
I would use the minced meat in the dinner now and store the fish for later use	14%
I would make plans to use the minced meat the next day even though it would have passed its expiration date	12%
I would include the minced meat as a part of the meal that I was starting to prepare	4%
I would keep it, even if I am not sure what to do with it	3%
I would throw the minced meat out	3%
Other (please specify)	1%

No. Respondents = 508

Decaying fruit scenario
The fifth and last scenario was looking to identify people's strategies when dealing with old or decaying fresh fruits. People were asked to imagine that they notice 4-5 apples in their fruit bowl that have gotten old (e.g. wrinkled, bruised, decaying) and report what they would do with the apples.

Most frequently, participants reported that they would throw away the old apples (see Table 6). About a tenth of respondents have selected "other". Most of these respondents specified that they would give the apples to birds or animals.

Table 6. Strategies to deal with decaying fresh fruit (apples)

Decaying apples strategies	%
I would throw them out	**31%**
I would include them in my cooking plans somehow	**20%**
I would eat some of them as soon as possible and throw out the leftover ones	**20%**
I would make a dessert out of them	12%
I would make juice out of them	6%
Other (please specify)	11%

No. Respondents = 508

Most participants report that in their household they waste little food. They reported lowest waste in the "meat and fish" category and in the "processed foods stored outside the fridge" category. The majority of participants reported that they would keep leftovers from meals or raw ingredients from food preparation, but they were not sure that these kept leftovers will be eaten in their household. Most participants would try to save a product about to expire; however, decaying fruits are most likely to be discarded.

4.3 Food waste and household characteristics

The associations between household characteristics and the food waste clusters were studied ("low waste cluster" – reported household food waste of less than a tenth of what is bought or produced in all food categories; "high waste cluster" - reported household food waste of more than a tenth of what is bought or produced in at least one food category).

Households with flexible size may face higher challenges when managing the food-related activities and needs due to the varying number of people living in the household. This could translate into higher waste in such households. However, in the present study there was no significant association between the food waste clusters and the stability of the household size. Though, the number of households with flexible size was small in our random sample. Thus, future studies interested in the behaviour of these households should target them more directly.

Similarly, when some members of the household do not always eat at home there can be higher uncertainty around the food-related needs and activities which may lead to food waste. There was a significant association between the food waste clusters and having some household members that do not always eat at home (the analysis included only households with more than one member). Of those respondents who disagreed with not everyone eating at home, about 69% were categorised in the "low waste cluster". This was significantly more compared to those respondents who neither agreed nor disagreed (of which 52% were categorised in the "low waste cluster") and to those who agreed (of which 51% were categorised in the "low waste cluster") that some people in their household do not always eat at home and were categorized in the "low waste cluster". Thus, overall a higher proportion of those people who disagreed with not everyone eating at home was categorised in the "low waste cluster" compared to those who agreed or gave a neutral response. The reverse holds for categorisation in the "high waste cluster".

Finally, households where grocery shopping is done frequently may be at risk to buy more food than necessary due to in-store cues which may lead to more food waste. There was a significant association between the

frequency of going grocery shopping and the food waste clusters. Higher frequency of grocery shopping was associated with higher waste (see Table 7).

Table 7. Frequency of grocery shopping and food waste clusters

		Frequency of grocery shopping		Total
		1-2 times a week or less	3-4 times a week or more	
low waste cluster[1]	Count	163a	147b	310
	% within Frequency of grocery shopping	68%	55%	61%
high waste cluster[2]	Count	76a	122b	198
	% within Frequency of grocery shopping	32%	45%	39%
Total	Count	239	269	508
	% within Frequency of grocery shopping	100%	100%	100%

Pearson Chi-Square 9.8, df=1, significant at p<.05, different subscript letters show that the column proportions are significantly different
(1) Respondents who reported household food waste of less than a tenth of what is bought or produced in all food categories
(2) Respondents who reported household food waste of more than a tenth of what is bought or produced in at least one food category

Section summary - Food waste and household characteristics
Overall, knowing how many people will eat at home is associated with lower food waste. Furthermore, participants who stated that in their household grocery shopping is done "1-2 times a week or less often" reported lower waste.
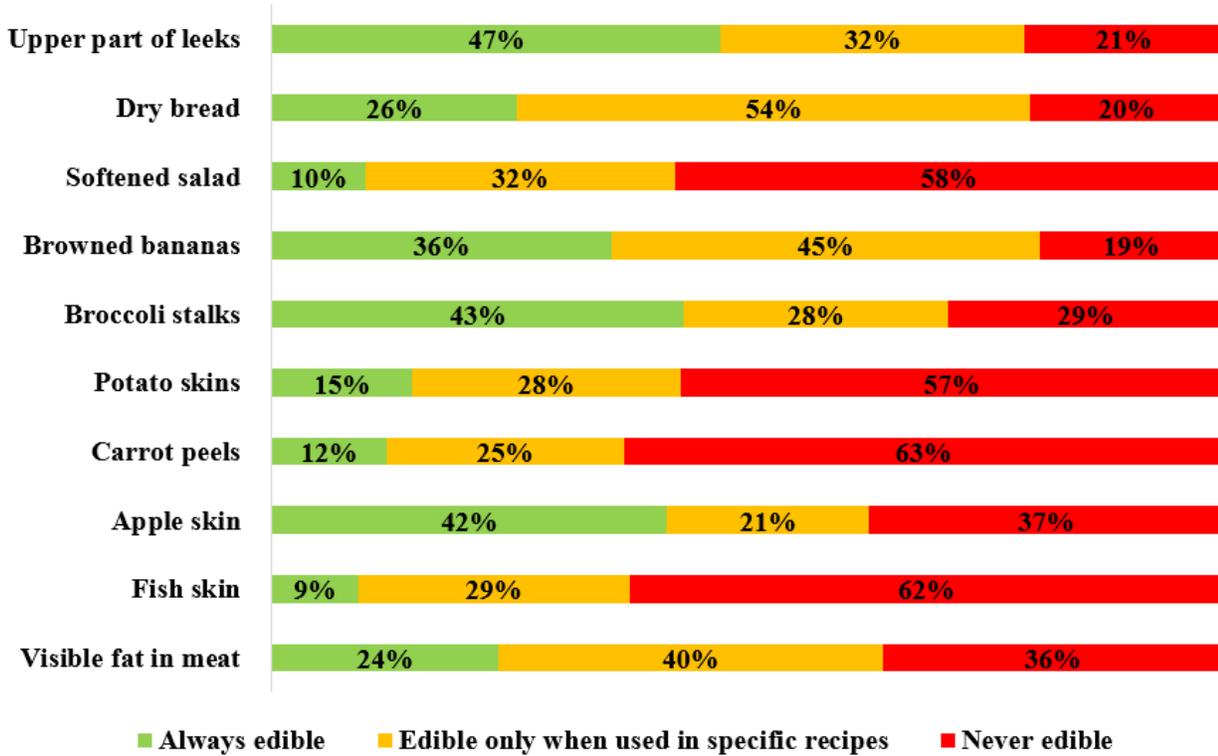
4.4 Consumer perceptions of food edibility and assessment of edibility

Certain foods or parts of foods (e.g. broccoli stalks) may end up being discarded because people simply do not regard them as edible. Similarly, when faced with a situation where they are unsure if a food product is still edible, some people may choose to discard the product immediately while others may choose to look at the product and try to assess if they can still eat it.

Consumer perceptions of food edibility
Consumers' perceptions regarding the edibility of the foods/parts of foods included in the study varied to a large extent (see Figure 19). The green part of the leek, the broccoli stalks and the apple peels were most frequently considered as something that is always edible by the respondents. On the other hand, the softened salad, potato peels, carrot peels and fish skin were most frequently seen as never edible. The high percentage of people who consider carrot or potato peels as never edible may be due in part to possible misunderstanding of the question. It may be that some of the people considered that the question only refers to eating the peels separately and not for example potatoes that are not peeled. Finally, the dry bread, browned bananas and visible fat in meat were seen most frequently as edible only if they were used in a specific recipe.

Perceptions of foods/parts of foods edibility

	Always edible	Edible only when used in specific recipes	Never edible
Upper part of leeks	47%	32%	21%
Dry bread	26%	54%	20%
Softened salad	10%	32%	58%
Browned bananas	36%	45%	19%
Broccoli stalks	43%	28%	29%
Potato skins	15%	28%	57%
Carrot peels	12%	25%	63%
Apple skin	42%	21%	37%
Fish skin	9%	29%	62%
Visible fat in meat	24%	40%	36%

■ Always edible   ■ Edible only when used in specific recipes   ■ Never edible

No. Respondents = 508

Figure 19. Consumer perceptions of edibility for certain foods/parts of foods

Differences were found as well in people's perceptions of edibility in relation to leftover food or cooked food. Leftover food from which one has eaten twice in the same week was most frequently seen as always edible, while food that starts to look unappealing even if it still can be eaten is least frequently seen as always edible (see Figure 20).

Perceptions of leftovers and cooked food edibility

Food that starts to look unappealing even if it still can be eaten	22%	39%	39%
Food that is leftover and you have been eating from it twice before in the same week	57%	22%	21%
Cooked dish that turns out to have a disappointing taste (e.g. bland, too spicy)	32%	44%	24%
Meat dish that looks dry or is overcooked	37%	44%	19%

■ **Always edible** ■ **Edible only when made into another dish** ■ **Never edible**
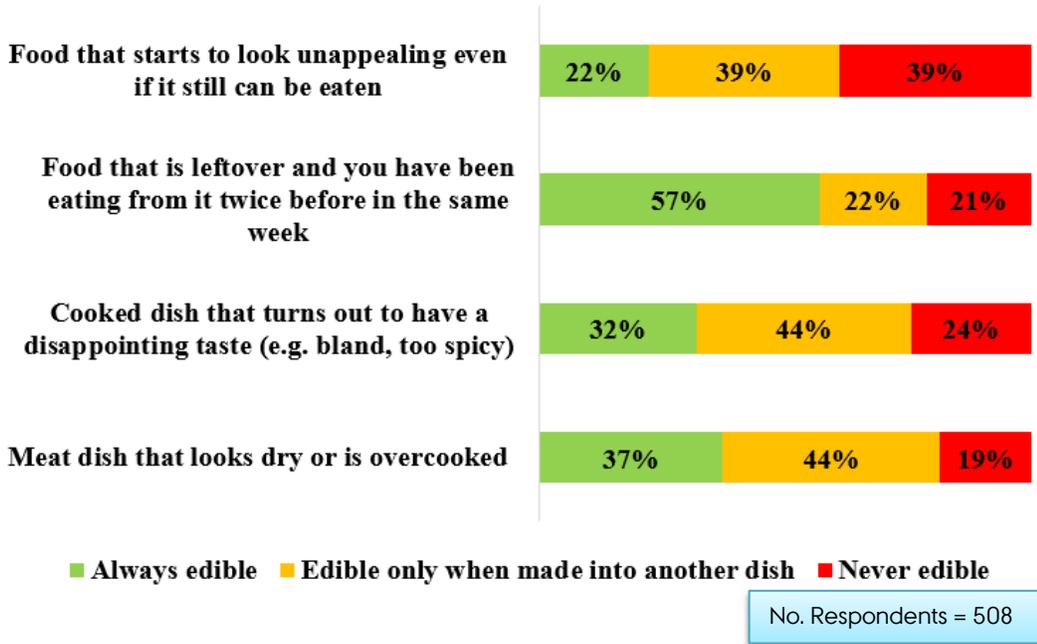
No. Respondents = 508

Figure 20. Consumer perceptions of edibility for cooked food and leftovers

Consumer strategies for assessing the edibility of food

When people are unsure whether a product (ham or strawberries) is still safe to eat, the most frequent strategy is to assess the eating quality and eat the product if they think that the quality is good enough (see Figure 21). The second most frequent strategy is to throw the product out.

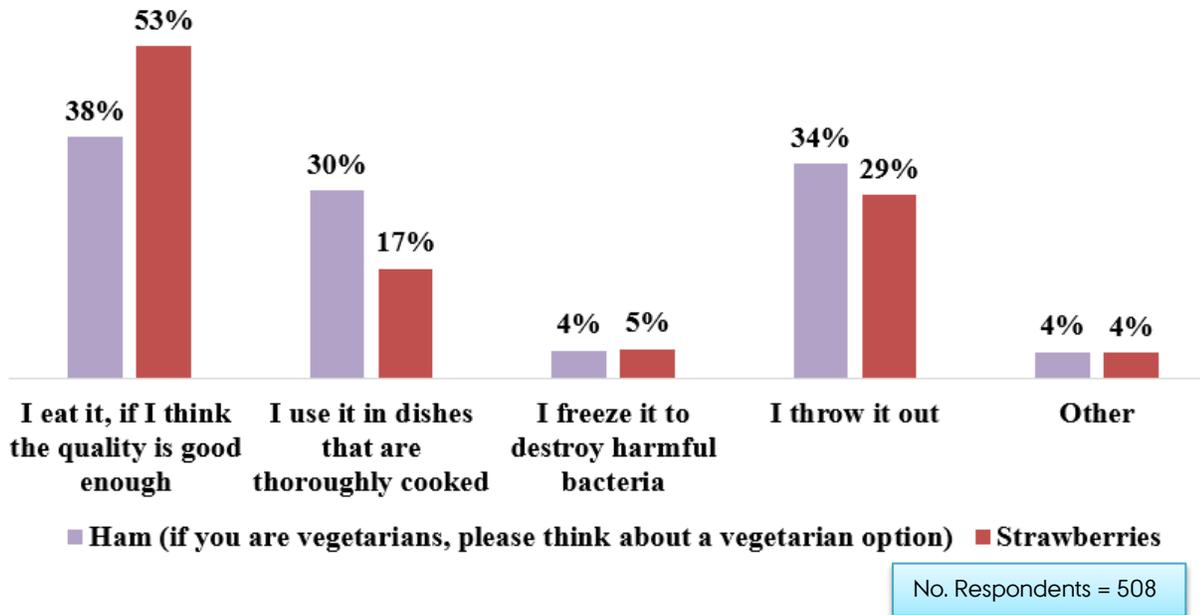**Strategies when in doubt about product safety (select all that apply)**

	I eat it, if I think the quality is good enough	I use it in dishes that are thoroughly cooked	I freeze it to destroy harmful bacteria	I throw it out	Other
Ham	38%	30%	4%	34%	4%
Strawberries	53%	17%	5%	29%	4%

■ Ham (if you are vegetarians, please think about a vegetarian option) ■ Strawberries

No. Respondents = 508

Figure 21. Strategies used by consumers when in doubt about a food product's safety

Sometimes it happens that people find products in their fridge that have passed their expiration date. We asked people what they would do if they find an unopened product in their fridge that had passed its "best before" date by 3-4 days. Most frequently, in the case of cheese, yoghurt and eggs, respondents would look at the product and smell it to check if it is fit for consumption (see Figure 22). For cookies, most respondents would taste them to check if they are fit for consumption, if they smell normal and look fine.

## Assessment of edibility for products over the "best before" date

Eggs	23%	53%	21%	3%
Yoghurt	21%	44%	28%	7%
Cookies	6%	42%	44%	8%
Cheese	9%	53%	33%	5%

■ I always throw the food product away

■ I look at the food product and smell it to check if it is fit for consumption

■ I taste the food product to check if it is fit for consumption, if it smells normal and looks fine

■ We never eat this food

No. Respondents = 508
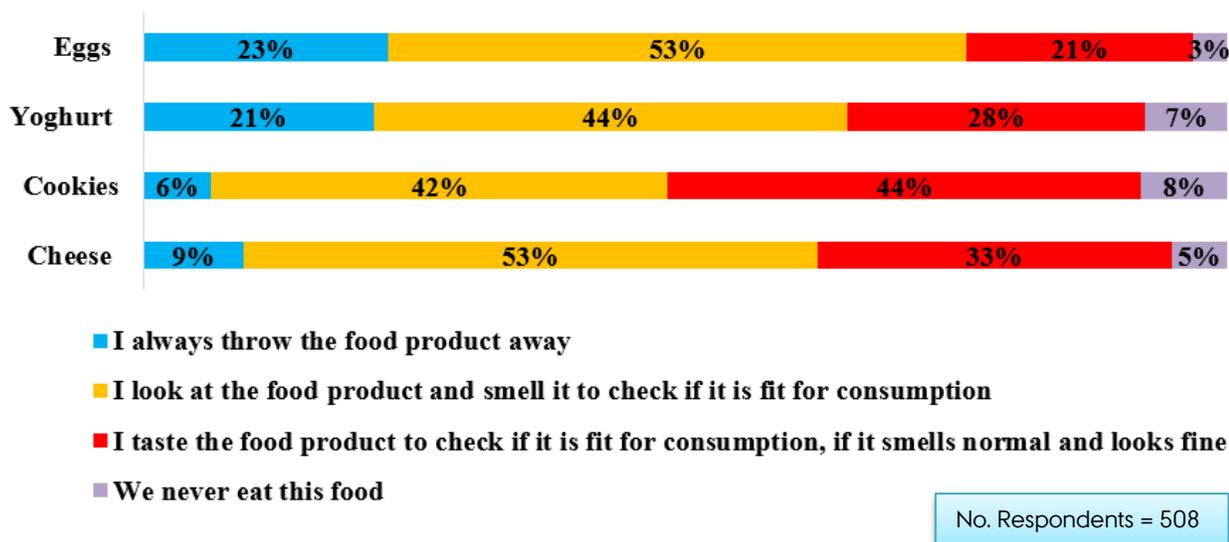
Figure 22. Strategies to assess edibility when a product has passed the "best before" date

The same question as before was asked for an unopened product that has passed its "use by" date with 3-4 days. Most participants reported that they would look at the product and smell it to check if it is fit for consumption (see Figure 23). Moreover, a tenth of respondents said that they would taste the minced meat to check if it is fit for consumption, if it smells normal and looks fine.

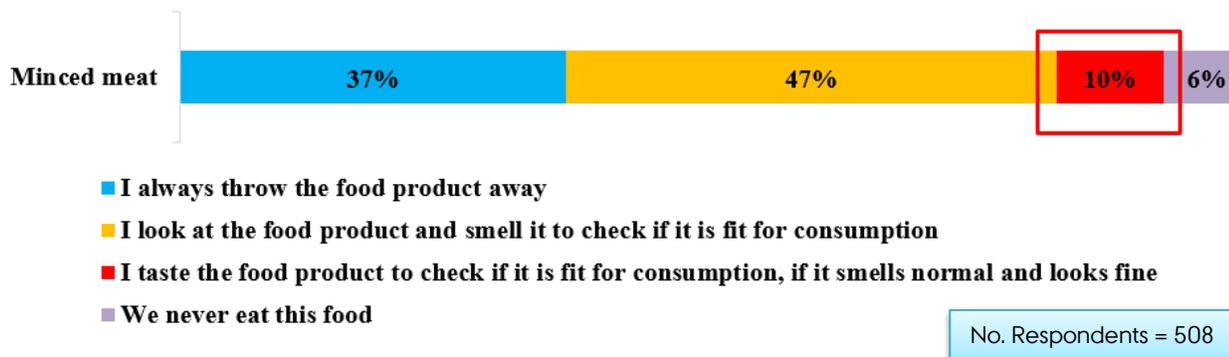## Assessment of edibility for products over the "use by" date

Minced meat	37%	47%	10%	6%

■ I always throw the food product away

■ I look at the food product and smell it to check if it is fit for consumption

■ I taste the food product to check if it is fit for consumption, if it smells normal and looks fine

■ We never eat this food

No. Respondents = 508

Figure 23. Strategies to assess edibility when a product has passed the "use by" date

Strategies to assess edibility of products passed the "best before" versus the "use by" dates
In order to find out whether people make a difference between the "best before" and "use by" date labelling when deciding how to deal with an expired product, we used a between-subjects design (see the Methods section). In

general, we find that there are no significant differences between how people deal with products that have passed the "best before" date or the "use by" date. There was a small statistically significant difference only for ready-made meals (see Table 8). Of those respondents who saw the ready-made meal with "best before" date, a higher proportion said that they would taste the food product to check if it is fit for consumption if it smells normal and looks fine, compared to those who saw the "use by" date.

Table 8. Strategies to deal with ready-made meals passed the "best before" versus the "use by" date

		Date labelling		Total
		"best before"	"use by"	
I always throw the food product away	Count	41$_a$	58$_a$	99
	% within Date labelling	16%	23%	20%
I look at the food product and smell it to check if it is fit for consumption	Count	104$_a$	115$_a$	219
	% within Date labelling	41%	45%	43%
I taste the food product to check if it is fit for consumption, if it smells normal and looks fine	Count	**58$_a$**	**34$_b$**	92
	% within Date labelling	**23%**	**13%**	18%
We never eat this food	Count	50$_a$	48$_a$	98
	% within Date labelling	20%	19%	19%
Total	Count	253	255	508
	% within Date labelling	100%	100%	100%

Pearson Chi-Square=9.8, df=3, significant at p<.05, different subscript letters show that the column proportions are significantly different

Section summary - Consumer perceptions of food edibility and assessment of edibility
Consumers vary in their perceptions of edibility in relation to certain foods or parts of foods, such as the upper part of leeks, fish skin or food that starts to look unappealing.

Participants reported using a variety of strategies when they deal with products that have passed their expiration date or when they have doubts about food safety. For products passed their expiration date, many participants try to judge edibility by looking at the product and smelling it.

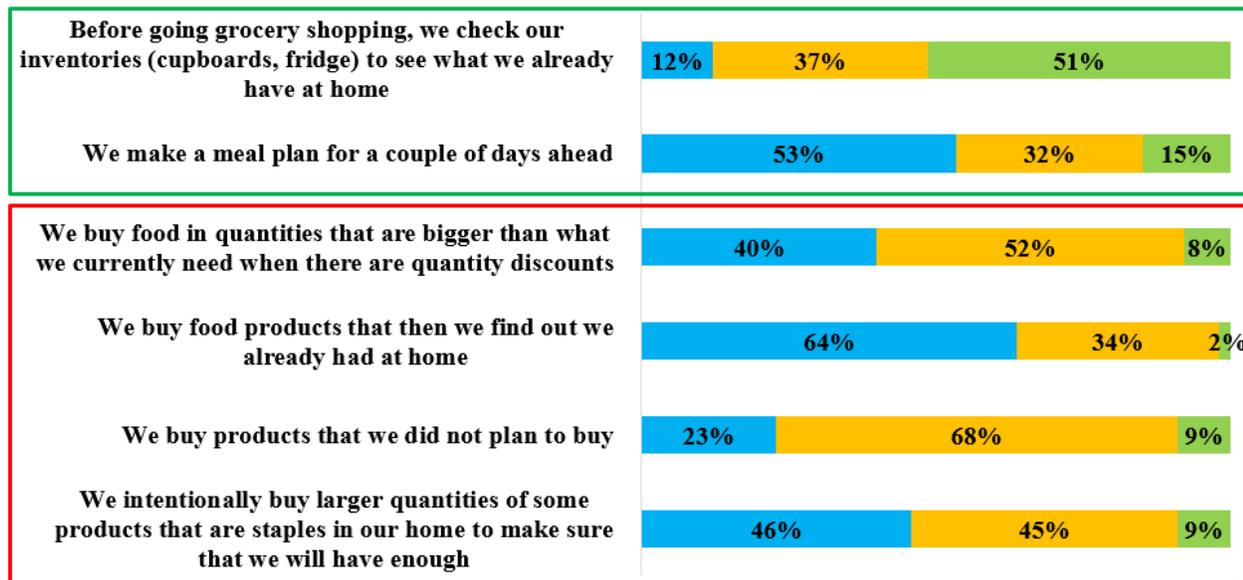## 4.5 Food-related practices in the households

Food waste is the last step in the household food provisioning, thus, it is closely linked to food-related practices in previous steps. Some of these food-related practices can be seen as food waste preventing as they help minimize food waste, while others can be seen as food waste promoting as they may result in food waste.

The practices of planning the shopping trips or planning the meals in advance can be seen as food waste preventing (the first two practices in Figure 24). On the other hand, the practices related to making unplanned purchases or buying more than necessary can be considered food waste promoting practices (the remaining practices in Figure 24).

The majority of people often check their food inventories at home before going grocery shopping. On the other hand, making meal plans is not such a common practice. In terms of food waste promoting practices, the most frequent one relates to buying products that were not planned, while the least common one refers to buying food products that people already have at home (see Figure 24).

Planning and shopping practices

Practice	Almost never	Often	Almost always
Before going grocery shopping, we check our inventories (cupboards, fridge) to see what we already have at home	12%	37%	51%
We make a meal plan for a couple of days ahead	53%	32%	15%
We buy food in quantities that are bigger than what we currently need when there are quantity discounts	40%	52%	8%
We buy food products that then we find out we already had at home	64%	34%	2%
We buy products that we did not plan to buy	23%	68%	9%
We intentionally buy larger quantities of some products that are staples in our home to make sure that we will have enough	46%	45%	9%

■ Almost never   ■ Often   ■ Almost always

No. Respondents = 508

Figure 24. Frequency of planning and shopping practices (food waste preventing in green margins and food waste promoting in red margins)

In the storage stage, practices such as having a good overview of the food that people have at home, knowing for how long food has been in the fridge, storing food as seen in the supermarket (storage in fridge or not), storing meal leftovers in the fridge in transparent or clearly visible containers, and storing leftovers in the freezer (the first five practices in Figure 25), can be considered as food waste preventing practices. On the other hand, forgetting

food in the fridge until it is too old to eat or forgetting to use the food from the freezer are practices that promote food waste (the remaining practices in Figure 25).

A vast majority of respondents engage often or almost always in food waste preventing practices in relation to storage. While most respondents report that in their household they almost never forget about the food in the fridge or the freezer, more than a third of respondents say they often do so (see Figure 25).

Storage related practices

Practice	Almost never	Often	Almost always
We have a good overview of the food that we have in the fridge and cupboards	6%	43%	51%
We know for how long the foods that we have stored in the fridge have been in there	9%	40%	51%
We store foods as we see in the supermarket	9%	47%	44%
We keep meal leftovers in transparent or clearly visible containers in the fridge	15%	46%	39%
We store leftover food in the freezer	19%	54%	27%
We forget about food in the fridge until it is too old to eat	61%	32%	7%
We forget to use the food from the freezer	58%	39%	3%

■ Almost never ■ Often ■ Almost always

No. Respondents = 508

Figure 25. Frequency of storage practices (food waste preventing in green margins and food waste promoting in red margins)

Food-related practices in the Cooking and preparing food stage

At the cooking and food preparing stage, there are several practices that can result in more or less food waste in the households. Practices like checking what food products are available at home before starting to cook, prioritizing leftovers and products close to expiry when cooking, using the leftovers in the lunch pack for the coming day or following a set meal plan when cooking can prevent food waste (the first four practices in Figure 26). On the contrary, when households intentionally cook more food than needed in order to ensure that there will be enough or when households do not eat all the food prepared for a meal, they can end up discarding more food (the remaining practices in Figure 26).

Most of the respondents engage in food waste preventing practices frequently, except for following a meal plan when cooking. This is not surprising as in the planning stage we found that many people do not make a meal plan

for the coming days. When it comes to practices that promote food waste, most respondents report that these practices are frequent in their household (see Figure 26).
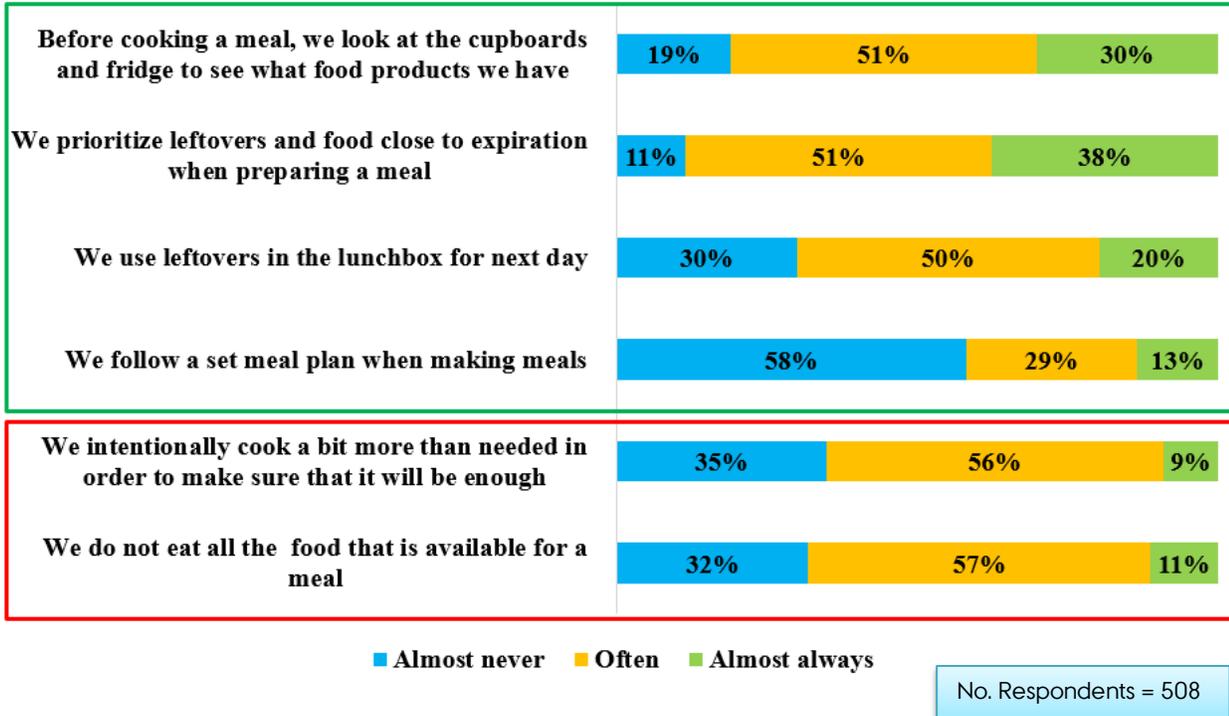
Cooking practices

Figure 26. Frequency of cooking practices (food waste preventing in green margins and food waste promoting in red margins)

Food-related practices and norms in the Eating stage

In the eating stage people's beliefs about what is proper behaviour when eating, the variety of foods served for a meal or variations in the number of people who eat at home, can result in food waste as these aspects can add complexity to the management of food at home.

In general everyone in the household is reported to eat the same food for dinner. When it comes to proper eating behaviour, half of the respondents strongly believe that one should always eat what is on one's plate when eating at home. On the other hand, the food waste promoting practices do not seem to be largely widespread among the participants (see Figure 27).

Eating practices and norms
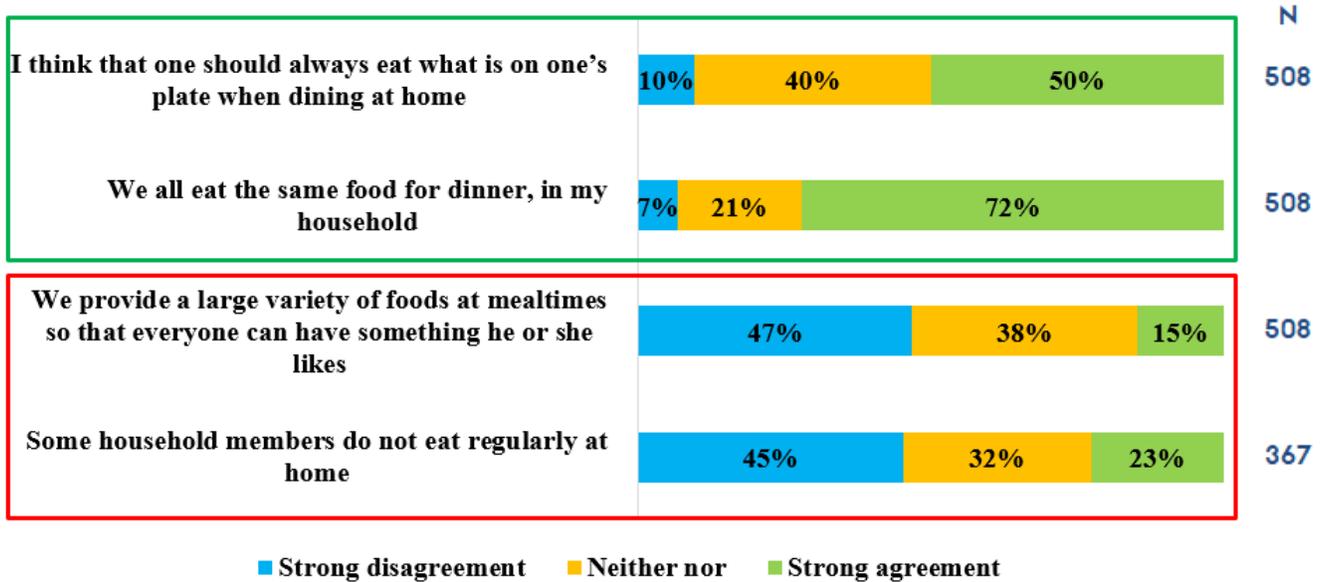
Figure 27. Eating related practices and norms (food waste preventing in green margins and food waste promoting in red margins)

Coordination of household food-related practices

The lack of coordination between household members in relation to food-related activities may result in food waste. Yet, in this study most participants stated that they almost never experience lack of coordination regarding specific practices in their household (see Figure 28).

Coordination between household members

	Almost never	Often	Almost always
We don't know how many people will be at home for a meal	71%	15%	14%
We have a misunderstanding about who is responsible for shopping or cooking	90%	10%	0%
Different members of the household buy the same food product separately without knowing that the other one had bought it	82%	17%	1%
When preparing food the person who makes the food forgets about food brought home by other household members	81%	17%	2%

■ Almost never ■ Often ■ Almost always

No. Respondents = 367

Figure 28. Extent of coordination between members of the household regarding food-related activities

Section summary - Food-related practices in the households

Overall, the participants engage frequently in food waste preventing practices (those behaviours that may result in lower food waste). There were also some exceptions. In particular, making a meal plan or following a meal plan when cooking were not very common.

On the other hand, the respondents reported that in their household food waste promoting practices (those behaviours that may contribute to higher food waste) are less frequent. However, some practices, such as making unplanned purchases, intentionally cooking more than needed to make sure that there will be enough and having leftovers after a meal, are quite common.

4.6 Food-related skills in the households

The extent to which people are skilled in dealing with food is closely linked to food waste. It could be easier for example for people with better cooking skills to include leftovers from a meal into a new dish or to prepare meals from ingredients that are available at home. In this study, the most common value of the food-related skills composite was 7 (on a scale from 1 to 7), which shows that most people strongly believe that their household food-related skills are sufficient. Similarly, the mean value of 5.66 shows that on average people believe their household skills to be sufficient.

4.7 Individual characteristics and food waste

Food waste is the result of food-related decisions in the household and such decisions are mainly made by individuals. As individual characteristics relate to the decisions that people make, these can be associated to food waste. In this study we included a number of these individual factors to study their associations with food waste.

People's motivation to reduce food waste may result in lower waste. Furthermore, consumers' self-identities can show how people relate to food and, thus, can impact their food-related behaviours. Individuals' values in terms of appreciation for the welfare of other people and the environment can help explain food waste, especially if people believe that food waste has environmental or social consequences. The extent to which people perceive that they are able to perform a behaviour is known to explain the likelihood that people will take up the behaviour. Thus, the perceived ability to reduce food waste may be linked to food waste behaviour. People who have high impulsive buying tendency are more sensitive to external cues in the shopping environment and that may lead to more unplanned or impulsive purchases. Finally, people's disgust sensitivity (i.e. their susceptibility to be more or less easily disgusted by specific food-related cues) can impact their food waste due to unwillingness to eat certain foods that cause disgust.

Motivation to reduce food waste
The most common value of the motivation to reduce food waste was 7 (on a scale from 1 to 7) which shows that most of the respondents are highly motivated to reduce food waste in their household. Similarly, the mean value of 5.7 shows that on average people are motivated to minimize their food waste.

The most important incentive that would motivate respondents to reduce their food waste was thinking about the possibility of saving money. Furthermore, people's values and helping the environment were amongst the most important incentives. On the other hand, wanting to feel competent in the kitchen was the least important incentive (see Figure 29).
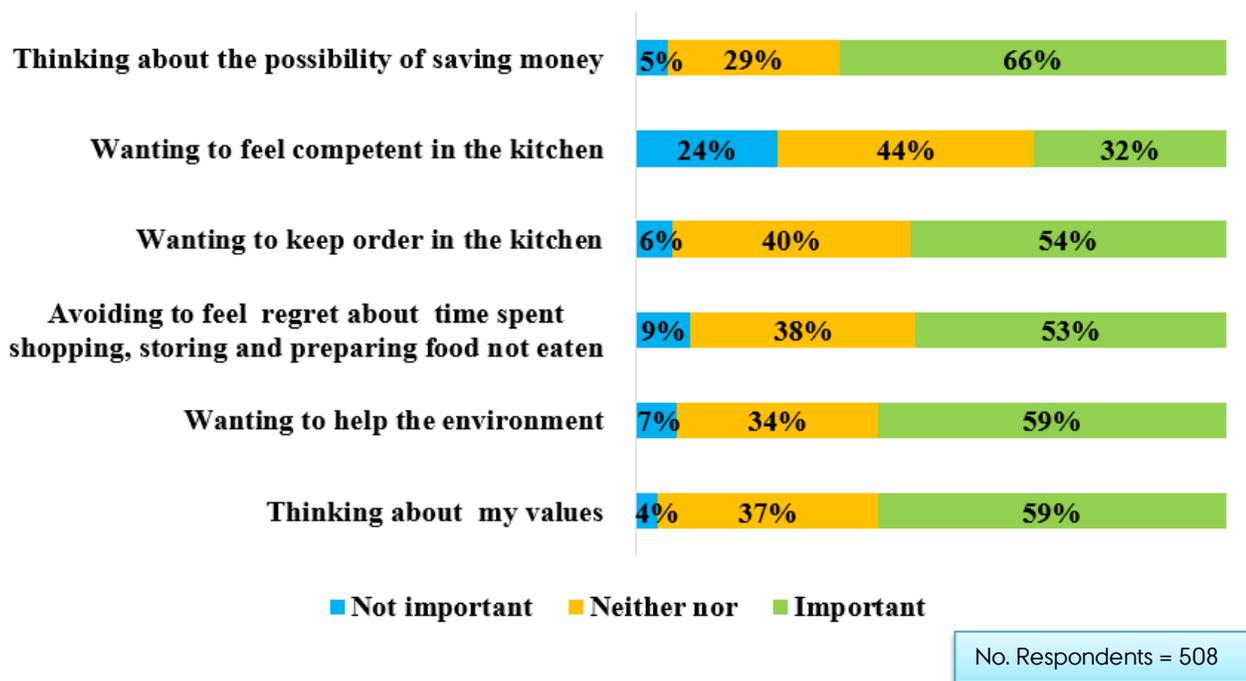
Incentives to reduce food waste

Figure 29. Importance of incentives to motivate reduction of food waste

Table 9. Motivation to reduce food waste and individual characteristics descriptives

	Minimum	Maximum	Mean	Std. Deviation	N
Thrifty consumer identity	1.3	7	**5.1**	1.28	508
Environmental friendly identity	1.0	7	4.8	1.43	508
Hedonic identity	1.0	7	**5.4**	1.28	508
Good homemaker identity	1.0	7	4.9	1.37	508
Healthy eater identity	1.0	7	4.9	1.28	508
Impulsive buying tendency	1.0	7	**3.4**	1.15	508
Disgust sensitivity	1.0	7	**2.9**	1.33	508
Universalism value	1.7	6	4.0	0.98	508
Perceived ability to reduce food waste	1.0	7	4.8	1.69	508
Motivation to reduce food waste	1.0	7	**5.7**	1.26	508

Regarding the remaining individual characteristics, we find that our respondents vary in terms of their self-identities, universalism orientation, perceived ability to reduce food waste, impulsive buying tendency and disgust sensitivity (see Table 9).

On average, respondents scored quite highly on the **hedonic identity** and the **thrifty consumer identity**, which were closely followed by the **good homemaker, healthy eater** and **environmental friendly** identities. We further find that the respondents, on average, scored high on the **universalism value** which means that they value the protection of the welfare for all people and the nature. Similarly, on average, people **believe that they are able to reduce the food waste** in their household. On the other hand, on average, people score low on **impulsive buying tendency** and **disgust sensitivity** (perceiving eating certain foods to be disgusting) (see Table 9).

Relationships between individual characteristics and the food waste clusters

The relationships between the individual characteristics and people's motivation to reduce food waste or their self-reported food waste behaviour are important as they can show which characteristics play an important role in food waste.

First, the associations between motivation to reduce food waste and the other individual characteristics were investigated. The associations between individual characteristics and motivation are important as they can show which characteristics need to be considered when trying to develop attempts to increase motivation to reduce food waste.

Overall, people's self-identities, universalism and perceived ability to reduce food waste are positively linked to motivation to reduce food waste, while impulsive buying tendency and disgust sensitivity are negatively associated with the motivation to reduce food waste (see Table 10). Therefore, the impulsive buying tendency and the disgust sensitivity could be seen as barriers to people's motivation to reduce their food waste.

Table 10. Correlations between individual characteristics and motivation to reduce food waste

	Motivation to reduce food waste
Thrifty consumer identity	.473**
Environmental friendly identity	.453**
Hedonic identity	.307**
Good homemaker identity	.351**
Healthy eater identity	.428**
Impulsive buying tendency	**-.303****
Disgust sensitivity	**-.226****
Universalism value	.338**
Perceived ability to reduce food waste	.198**

*Pearson's correlation coefficient is used to assess the associations (** shows statistically significant associations at p<.01)*

As all the individual characteristics were associated with people's motivation to reduce food waste and they were also associated with each other, we have conducted a logistic regression to investigate the relative importance of each individual characteristic in explaining consumers' food waste behaviour. The measure of food waste that we used in this analysis was the food waste clusters (**"low waste cluster"** - the respondents who reported household

food waste of less than a tenth of what is bought or produced in all food categories; **"high waste cluster"** - respondents who reported household food waste of more than a tenth of what is bought or produced in at least one food category).

We find that respondents with stronger thrifty consumer identity and higher motivation to reduce food waste were less likely to belong to the "high waste cluster". On the other hand, people with higher impulsive buying tendency, higher disgust sensitivity and higher perceived ability to reduce food waste in their household were more likely to be categorised in the "high waste cluster" (see Table 11).

Table 11. Regression of individual characteristics on food waste clusters to predict categorization in the "high waste cluster"[2] versus the "low waste cluster"[1]

	B	Sig.
Thrifty consumer identity	**-.29**	**.005**
Environmental friendly identity	-.04	.737
Hedonic identity	.12	.239
Good homemaker identity	-.02	.850
Healthy eater identity	-.01	.907
Impulsive buying tendency	**.40**	**.000**
Disgust sensitivity	**.20**	**.015**
Universalism value	-.17	.227
Perceived ability to reduce food waste	**.14**	**.045**
Motivation to reduce food waste	**-.28**	**.006**
Constant	.25	.791

Logistic regression was conducted (Sig. <.05 shows a statistically significant effect; Nagelkerke R^2 = .26). For statistically significant effects, a negative B value means that higher scores on the individual characteristic are associated with lower likelihood to be categorized in the "high waste cluster"; while a positive B value means that higher scores on the individual characteristic are associated with higher likelihood to be categorized in the "high waste cluster".
(1) Respondents who reported household food waste of less than a tenth of what is bought or produced in all food categories
(2) Respondents who reported household food waste of more than a tenth of what is bought or produced in at least one food category

Section summary - Individual characteristics and food waste
Participants are highly motivated to reduce food waste in their household. Respondents reported that several incentives would be important in motivating them to reduce their household food waste. Saving money was considered an important incentive by most respondents. On the other hand, wanting to feel competent in the kitchen was considered the least important.

Consumers' self-identities and values were positively associated to their motivation to reduce food waste. On the other hand, their impulsive buying tendency and disgust sensitivity were negatively associated with their motivation to reduce food waste.

The motivation to reduce food waste and the thrifty consumer self-identity were associated with lower reported food waste, while impulsive buying tendency and disgust sensitivity were associated with higher food waste.

4.8 Socio-demographic characteristics and food waste

The associations between socio-demographics and the food waste clusters were studied ("low waste cluster" - the respondents who reported household food waste of less than a tenth of what is bought or produced in all food categories; "high waste cluster" - respondents who reported household food waste of more than a tenth of what is bought or produced in at least one food category).

First, the associations between each socio-demographic and the food waste clusters were tested separately using cross-tabs. In the "high waste cluster" there was a higher proportion of respondents aged 18 to 34 years old or in full-time jobs, a higher proportion of households with 3 or more members or households with children and a higher proportion of respondents with a household income of 600.000 dkk or more, compared to the "low waste cluster". On the other hand, there was no statistically significant association between gender or education groups ("erhvervsfaglig uddannelse or lower"; "kort or mellemlang videregående uddannelse"; "lang videregående uddannelse or PhD") and the food waste clusters. The statistically significant associations are detailed in the following (for more details see Appendix 5).

There was a statistically significant association between the age groups ("18 to 34 years old"; "35 to 49 years old"; "50 to 64 years old"; "65 years old or above") and the food waste clusters. In particular, a larger proportion of those respondents in the "high waste cluster" were aged between 18-34 years old compared to the "low waste cluster". On the other hand, a smaller proportion of those respondents in the "high waste cluster" were aged 65 years old or above compared to the "low waste cluster".

There was a statistically significant association between the occupation groups ("full-time job"; "retired"; "other" (e.g. part-time job, unemployed)) and the food waste clusters. A higher proportion of the "high waste cluster" consisted of respondents with a full-time job as opposed to the "low waste cluster". On the other hand, a lower proportion of the "high waste cluster" consisted of respondents that were retired as opposed to the "low waste cluster".

The household size ("1 member", "2 members", "3 or more members") was associated to the food waste clusters. The food waste clusters are not a per capita measure of food waste. In particular, the proportion of households with 3 or more members was higher in the "high waste cluster" compared to the "low waste cluster". About 73% of the households with 3 or more members had children in the household. The presence of children in the household was associated with higher waste.

There was a significant association between household income groups ("under 299.999 dkk"; "300.000 to 599.999 dkk"; "above 600.000 dkk") and the food waste clusters. A lower proportion of the "high waste cluster" consisted of

respondents from households with income of under 299.999 dkk as opposed to the "low waste cluster". On the other hand, a higher proportion of the "high waste cluster" consisted of respondents from households with income above 600.000 dkk as opposed to the "low waste cluster".

As these demographics were associated with each other, a logistic regression was conducted to assess their relative importance in explaining the categorization of the respondents in the "high waste cluster" (reported waste of more than 10% of what is bought or produced in at least one of the food categories). The household income was not included in this analysis because 104 respondents did not provide their income in the survey. Logistic regression allows us to predict whether a respondent is likely to belong to the "high waste cluster" given his/her demographic characteristics. As the demographic characteristics have several groups, a reference (or comparison) group is set for each demographic in the analysis. The reference group for age, occupation and household size was selected based on the findings presented above, namely the group with the highest proportion in the "high waste cluster" (18 to 34 years old for age; full-time job for occupation and households with 3 or more members for household size). The logistic regression results will show which of the socio-demographic groups (compared to the reference groups) impact the likelihood that people will be categorized in the "high waste cluster", when all the demographics are in the same model.

The results (Table 12) show that when all socio-demographic variables were included in the analysis only age and occupation had a significant association with the food waste clusters. The respondents who were in the age groups "35 to 49"; "50 to 64" and "65 years old or over" were less likely to be in the "high waste cluster" compared to those in the age group "18 to 34" years old. Thus, the 18 to 34 age group was associated with higher food waste. When it comes to occupation, the respondents who reported being in a part-time job or being unemployed (i.e. "other" occupation) were less likely to be categorized in the "high waste cluster" compared to those respondents who reported having a "full-time job". However, being "retired" as opposed to having a "full-time job" had no significant effect on the categorization in the "high waste cluster".

Table 12. Demographic characteristics that predict the categorization of respondents in the "high waste cluster"[2]

	B	Sig.
Gender	.16	.430
Age groups		**.002**
35 to 49 (versus 18 to 34)	**-.58**	**.037**
50 to 64 (versus 18 to 34)	**-.81**	**.005**
65 or over (versus 18 to 34)	**-1.47**	**.000**
Education groups		.571
Erhvervsfaglig uddannelse or lower (versus Lang videregående uddannelse or PhD)	-.20	.488
Kort or Mellemlang videregående uddannelse (versus Lang videregående uddannelse or PhD)	.03	.919
Occupation groups		**.036**
Retired (versus Full-time job)	-.56	.096
Other (e.g. part time, unemployed) (versus Full-time job)	**-.58**	**.018**
Household size		.726
1 member (versus 3+ members)	-.24	.535
2 members (versus 3+ members)	-.08	.834
Presence of children	.09	.824

Logistic regression was conducted (Sig. <.05 shows a statistically significant effect; Nagelkerke R^2 = .14); N=504; For statistically significant effects, a negative B value means that the demographics group is less likely to be in the "high waste cluster" as opposed to the reference group (noted after "versus").
(2) Respondents who reported household food waste of more than a tenth of what is bought or produced in at least one food category

Overall, even though there were some significant effects of some of the demographic characteristics, the effects were rather small, which should be kept in mind when interpreting the results regarding demographics.

Section summary - Socio-demographic characteristics and food waste

Several demographic characteristics were weakly associated with the food waste clusters, but when considering their relative importance only the age and the occupation groups remained significant.

5. Discussion and Conclusions

This study aimed to investigate consumer understanding and perceptions of food waste as well as behavioural and psychological factors associated to food waste. The results of this study can contribute to inform the development of attempts to reduce food waste at the household level. In the following, the key contributions and implications of this study are discussed.

5.1 Consumer understanding and awareness of food waste

There is high awareness about food waste among consumers in Denmark. However, there is still potential for improvement in awareness levels regarding the consequences of food waste and specific aspects related to food waste like food expiration date labels.

People's understanding of food waste is to some extent fragmented, as people mention certain aspects which do not always cover the whole food waste concept. Moreover, consumers in general do not perceive leftover food fed to animals as food waste. Thus, there is a need to provide people with further information to increase their knowledge about food waste.

5.2 Self-reported food waste behaviour

Most people reported that they discard little food. Similarly, when confronted with specific scenarios in which food waste can happen, most consumers reported that they would not engage in food waste. However, many people who save leftovers are unsure whether these will be eaten later. This shows that even though people report not wasting too much food, when probed more in depth we can identify that waste still occurs. The self-reported measures of food waste may be biased estimates of actual behaviour and, thus, we expect that there is some extent of under-reporting in this study.

5.3 Food waste and household characteristics

Food waste was associated with the uncertainty around how many people eat at home and the frequency of going grocery shopping. Frequency of grocery shopping was linked to higher food waste, but we do not know what the drivers of shopping frequency are; these can be related to poor planning practices or practical issues related to the household provisioning system in general. Making consumers aware of the drawbacks of frequent shopping could be a first step towards tackling this issue.

5.4 Consumer perceptions of food edibility and assessment of edibility

Consumers vary in their perceptions of food edibility when it comes to certain foods or parts of foods. The differences in perceptions of food edibility are important from the perspective of food waste. People may not consider that certain foods or parts of foods that they discard are food waste because for them those are not edible. In order to avoid the food waste caused by people's perceptions of edibility, information about which parts of foods are edible could be provided to consumers. For some people it may be hard to break the habit or tradition of not using certain parts of foods, yet, some people may just be unaware that certain foods or parts of foods are safe to eat. Moreover, advice on how to use certain foods or parts of foods (e.g. dry bread) in specific recipes or how to reuse certain leftovers or disappointing meals in preparing a new dish could help consumers avoid food waste.

People use different strategies when they have doubts about food safety or when products have expired. When attempting to reduce consumer food waste, one should be careful that there is no risk that the information provided can encourage consumers to eat products which are unsafe to consume.

5.5 Food-related practices in the households

Food-related practices along the household food provisioning system have been included in this study. Overall, consumers engage often in food waste preventing practices. On the other hand, the food waste promoting practices are generally rare. There is, however, some potential for improvements.

In the planning and shopping stage, attempts to help consumers plan their meals in advance would be beneficial in relation to food waste. In terms of food waste promoting practices, more than half of consumers often buy more than they need when there are quantity discounts or just to ensure that they will have enough of certain foods. Educating consumers in dealing with the larger amounts of food that they buy on discount, for example by immediately freezing part of the food, could prevent some food waste. Moreover, trying to convince consumers that it is acceptable to run out of certain foods sometimes, could lead to changes in the current social norms where consumers think they should always have enough of specific foods. Finally, very often people end up buying something that they had not planned to buy when going shopping, therefore, helping consumers to plan their shopping trips better and stick to their plans could lead to lower food waste.

In the storage stage, consumers engage very frequently in food waste preventing practices. However, some people forget about food in the fridge or the freezer. There is potential in this case to provide people with better tools to avoid that food is forgotten. These could be some storage system tips or maybe development of apps for inventory keeping.

In the cooking stage, most consumers engage often in food waste preventing practices. However, people rarely use meal plans when cooking. Therefore, encouraging people to use meal plans could help prevent some food waste. Moreover, the use of leftovers in the lunch box for the coming day could be encouraged in attempts to limit food waste. People frequently have leftovers after meals, thus, trying to persuade consumers that it is acceptable to have only enough food for a meal is one way to try and tackle the issue. Otherwise, consumers can be provided with tools to better estimate portion sizes. Additionally, the provision of information about how to deal with leftovers and of recipes using leftovers from previous meals could be useful to avoid that leftovers are discarded.

In the eating stage, trying to advise people that they would still be good providers if only enough food in a reasonable variety is provided at mealtimes could help prevent some food waste. Those households where some members do not always eat at home may have difficulties in planning their food-related activities. For such households, advice on how to deal with leftovers could be useful, as when people unexpectedly do not come home for a meal there would be more leftovers.

Changing consumers' food-related practices can be challenging as people have certain routines to deal with their everyday life. However, food-related practices are closely linked to food waste and small changes may result in significant benefits. Attempts to reduce food waste could be focused on few practices at the time. As the planning activities are least practiced activities, new solutions to make these activities easier and even fun would also support the reduction of food waste. Applications that can turn menus into shopping lists and estimate required amounts of raw materials could help consumers, but these applications need to be sophisticated enough to account for different household sizes and personalised preferences.

5.6 Individual characteristics and food waste

Consumers are highly motivated to reduce the food waste in their household. Several incentives are important in motivating people to reduce their food waste, of which saving money is the most important. These incentives can be used when communicating to consumers about food waste in attempts to motivate them to change their behaviour or perceptions. Appeals to consumers' self-identities and values can also result in higher motivation to reduce food waste.

When it comes to reduction of food waste, attempts to increase even more consumers' motivation to reduce food waste or to appeal to consumers' thrifty identity can make a positive contribution. On the other hand, dealing with the barriers to food waste (impulsive buying tendency and disgust sensitivity), can be more challenging. As impulsive buying tendency is an individual trait, some people have higher impulsive buying tendency whereas others have lower impulsive buying tendency. While it can be difficult to change such tendencies, making people aware that this can be an issue when it comes to food waste, may be a good first step. People may be able to

identify how prone they are to buy impulsively and be more mindful of their behaviour when going shopping. Certain strategies to cope with impulsive buying tendency could be suggested, like making a shopping list or not going shopping when hungry as it could be much harder to control one's impulses. Impulse buying and food waste can also be tackled at retailer level by avoiding multiple offers which promise large quantities at lower unit price.

5.7 Future research

The present study has provided insights into consumer food waste in Denmark. We have investigated consumers' understanding and perceptions regarding food waste, their practices and skills as well as household and individual characteristics.

We have measured food waste with self-reported measures. We do find some confirmation of results from the different methods, yet, future research could investigate which methods are most reliable to use in assessing food waste behaviour. Moreover, using actual measures of food waste to establish relationships between food waste and the potential influencing factors identified in this report would be relevant as self-reports can be biased to some extent.

We find that consumer perceptions of edibility of food vary, however, we still lack information about how these perceptions were developed over time. Thus, future research could study how did these perceptions form and how do people with different perceptions about the edibility of certain foods deal with those foods.

Food-related practices are important in the study of food waste. In order to find ways to change people's practices, future studies could investigate how practices are formed. Furthermore, studying potential barriers that consumers face when trying to change their behaviour with regard to certain practices may help make future attempts to reduce food waste more successful.

When it comes to food-related skills, we find that most people believe such skills to be sufficient in their household. More objective measures of people's knowledge with regard to the stages of the food provisioning system (e.g. how should certain foods be correctly stored or handled) may help identify specific areas where consumers may lack knowledge.

We have identified a number of incentives that can be used to motivate people to reduce their food waste. Future research could study what are the thresholds above which these incentives would motivate people. For example, saving money is an important incentive for consumers, yet, it is unclear how much money saved would be enough to result in motivation.

Finally, we find that a number of individual characteristics are related to food waste. Since it is quite challenging to change the individual characteristics, future research could investigate what types of messages would appeal to people's thrifty identity or what types of strategies can impulsive buyers use to control their impulses.

5.8 Summary of main implications

The main implications of our study for attempts to reduce consumer food waste are summarized in the table below. The statistically significant effects of socio-demographics relevant for the specified implications are included in the table.

Table 13. Main implications for attempts to reduce consumer food waste

Section	Main implications	Target group implications (Socio-demographics)[1]
1. Consumer understanding and awareness of food waste	There is a need to provide more information about food waste to consumers, especially: • consequences of food waste • date labels • the definition of food waste (which includes food fed to pets or animals)	• respondents aged *50 years old or above (50+)* and *retired* respondents reported higher awareness of economic consequences of food waste compared to 18 to 34 years old and respectively to those with a full-time job • consumers aged *65 years old or above (65+)* and *retired* respondents believe to a higher extent that leftover food fed to pets is food waste compared to those aged 18 to 34 and respectively to those with a full-time job
2. Self-reported food waste behaviour	Attempts to reduce food waste could be directed mainly at those people who are more likely to be categorized in the "high waste cluster" (i.e. reported household food waste of more than a tenth of what is bought or produced in at least one food category)	• respondents aged *35 years old or over* and those in part-time job or unemployed (i.e. "*other*" occupation group) are less likely to be in the "high waste cluster" compared to 18 to 34 years old and respectively those in full-time job. *Thus, 18 to 34 years old consumers and those in full-time jobs could be targeted.*
3. Food waste and household characteristics	There is a need to make consumers aware that frequent shopping trips can be detrimental if they try to reduce their food waste	

4. **Consumer perceptions of food edibility and assessment of edibility**	There is a need to provide consumers with: • information about which foods/parts of foods can be eaten (e.g. broccoli stalks) • advice on how to use certain foods / parts of foods (e.g. dry bread) in specific recipes • advice on how to reuse certain leftovers or disappointing meals in preparing a new dish *Care should be taken so that the information provided does not encourage consumers to eat products which are unsafe to eat*	• a lower proportion of the respondents aged *18 to 34 years old* perceived the upper part of leeks, dry bread and browned bananas as "always edible" as opposed to the 35+ years old group • a lower proportion of the respondents aged *18 to 34 years old* perceived the peels from potatoes, carrots and apples as "never edible" as opposed to the 35+ years old group • a higher proportion of the respondents aged *18 to 34 years old* perceive food that starts to look unappealing even though it can still be eaten or leftovers that they have been eating from twice before in the same week as "always edible", as opposed to those 35+ years old • a lower percentage of those respondents in a *full-time job* perceived food that starts to look unappealing even though it can still be eaten as "always edible" compared to those respondents who are retired or have other occupation, yet, a higher percentage of those in a full-time job would eat such food if it is made into another dish
5. **Food-related practices in the households**	Initiatives to address some of the practices with potential to reduce food waste could be: • attempts to increase the frequency of planning practices among consumers, for example, by making these activities easier and even fun (e.g. finding/ developing applications that can turn menus into shopping lists and estimate required amounts of raw materials, but these applications need to be sophisticated enough to account for different household sizes and personalised preferences)	• respondents aged *18 to 34 years old* and those in *full-time jobs* report higher frequency of using meal plans compared to those 50+ years old and respectively those who are retired (yet, respondents aged *18 to 34 years old* and those in a *full-time job* check their inventories at home less frequently than those in the 65+ years old group and respectively those who are retired

	• provide advice about dealing with the larger amounts of food that people buy on discount (e.g. immediately freezing part of the food) • campaigns trying to change the social norms around buying/cooking more to be sure there is enough • provide people with better tools to avoid that food is forgotten (e.g. storage system tips; development of applications for inventory keeping) • encourage the use of leftovers in the lunch box for the coming day • provide consumers with tools to better estimate portion sizes • provision of information about how to deal with leftovers and of recipes using leftovers from previous meals	• respondents in *full-time jobs* make unplanned purchases more frequently than those who are retired • respondents aged *18 to 34 years old* cook more than needed to be sure that there will be enough more frequently compared to those 50+ years old • respondents aged *18 to 34 years old* and those in *full-time jobs* forget about foods in their fridge or freezer more frequently compared to those 50+ years old and respectively those retired • not surprisingly, respondents aged *18 to 34 years old* and those in *full-time jobs* use leftovers in their lunch box the next day more often compared to those 65+ years old and respectively those retired
6. Individual characteristics and food waste	• messages aimed to motivate consumers to reduce their food waste can highlight that reducing food waste leads to saving money • messages that appeal to consumers' thrifty identity can be useful when communicating about food waste reduction • raising people's awareness that impulsive buying is a barrier to reducing food waste (strategies to cope with impulsive buying tendency could be suggested, like making a shopping list or not going shopping when hungry) • impulse buying and food waste can also be tackled at the retailer level by avoiding multiple offers which promise large quantities at lower unit price	

(1)   This column contains information about differences in terms of socio-demographics, when the effect was statistically significant - see Appendix 6 for detailed results.

5.9 Conclusion

Household food waste is a complex issue as it is the result of different food-related activities and individual decisions. Most people report throwing away only little amounts of food. Consumers hold various perceptions regarding food edibility and they use various strategies to assess the edibility of food. In general, people engage often in food waste preventing practices and rarely in food waste promoting practices, however, there is potential for improvements. Motivation to reduce food waste and the thrifty consumer identity are related to lower food waste, while impulsive buying tendency and disgust sensitivity are related to higher food waste.

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Appendices

Appendix 1

Summary of questionnaire measures

The exact items and instructions used in the measures can be found in Appendix 3 (in Danish). The section name from this table corresponds with the sections in Appendix 3.

Sub-section	Measures	Response scale	Source
1. Consumer understanding and awareness of food waste			
Consumer understanding of food waste	Respondents were asked to write what would they say to a friend if they had to explain to him/her what food waste is.	Open-ended question	Inspired from Grunert, Scholderer, & Rogeaux, 2011
Consumer awareness of food waste	Respondents were asked whether in the past year they had seen or heard anything about the issue of food waste.	o "yes" (1), o "no" (2), o "not sure" (3)	Adapted from Neff, Spiker, & Truant, 2015
Consumer awareness of food waste aspects	Respondents who answered "yes" in the question about consumer awareness of food waste, were asked to state what kind of information were they aware of.	Check all that apply: o how much food is thrown out (1) o how to avoid throwing out food (2) o food expiration date labels (3) o composting or ways to dispose of food that is thrown out (4) o other (please specify) (5)	Adapted from Neff, Spiker, & Truant, 2015
Consumer awareness of food waste consequences	Respondents rated three statements regarding their awareness of the consequences of food waste (monetary, environmental and social consequences).	"strongly disagree" (1) to "strongly agree" (7) Collapsed into three categories for analyses: o (1) and (2) became "strong disagreement"; o (3) to (5) became "neither nor" o (6) and (7) became "strong agreement"	Adapted from Stancu et al., 2016
Consumer perception of food fed to pets/animals	Respondents were asked whether, in their household, leftover food fed to pets or other animals is seen as food waste.	"strongly disagree" (1) to "strongly agree" (7) Collapsed into three categories for analyses: o (1) and (2) became "strong disagreement";	

		o (3) to (5) became "neither nor" o (6) and (7) became "strong agreement"	
2. Self-reported food waste behaviour			
Food waste by food categories	Respondents were asked to estimate how much of all the food; milk and dairy products; fresh fruits and vegetables; meat and fish; bread and other bakery products that they buy and/or grow is thrown away in a regular week in their household.	o hardly any (1), o less than a tenth (less than 10%) (2), o more than a tenth but less than a quarter (between 10% and 25%) (3), o more than a quarter but less than a half (between 25% and 50%) (4), o more than a half (more than 50%) (5) Collapsed into two categories for analyses o (1) and (2) became "low waste" o (3) to (5) became "high waste"	Adapted from Stancu et al., 2016
Food waste by functional categories	Respondents were asked to estimate how much food they throw away in their household in a typical week in four functional categories: raw ingredients, processed products stored in the fridge, processed foods stored outside the fridge, and cooked food.	none (1), hardly any (2), some (3), a fair amount (4), a lot (5) Collapsed into two categories for analyses o (1) and (2) became "low waste" o (3) to (5) became "high waste"	Partly adapted from Neff, Spiker, & Truant, 2015
Food waste scenarios	Five scenarios that described certain situations when food waste may occur were shown in turn to the respondents. They were asked to state what they would do in each situation. The scenarios dealt with leftovers after a meal (two scenarios), raw ingredient leftovers while cooking (one scenario), products close to expire (one scenario) and decaying fresh fruits (one scenario). In the three scenarios involving leftovers, those people who reported that they would keep the leftovers (or selected "other" in	Several options suitable for each scenario were provided (see Appendix 3, Section: Self-reported food waste behaviour). For the likelihood that the leftovers will be eaten later, the answer options were: o "not likely" (1), o "quite likely" (2), o "very likely" (3) o "not applicable" (4) (in leftovers after a meal scenarios)	Inspired from Miljøstyrelsen, 2016

	leftovers after a meal scenarios) were asked about the likelihood that the leftovers would be eaten in their household.		
3. Consumer perceptions of food edibility and assessment of edibility			
Consumer perceptions of food edibility (foods and parts of foods)	Respondents were asked if they consider certain foods/parts of foods as edible (something that they would eat or would consider eating). In total, ten foods or part of foods were included in this question (e.g. upper part of the leek, broccoli stalks, fish skin).	o "always edible", o "edible only when used in specific recipes" o "never edible"	Inspired from Miljøstyrelsen, 2016
Consumer perceptions of food edibility (leftovers and cooked foods)	Respondents were asked if they consider leftovers or certain cooked dishes as edible (something that they would eat or would consider eating).	o "always edible", o "edible only when made into another dish" o "never edible"	Inspired from Miljøstyrelsen, 2016
Consumer strategies for assessing the edibility of food (uncertainty around safety)	Respondents were asked what they would do with a product if they were unsure if it is still safe to eat that product. This was asked in relation to ham (if people were vegetarians they were told to think of a vegetarian alternative), and strawberries.	Check all that apply: o "I eat it, if I think the quality is good enough" o "I use it in dishes that are thoroughly cooked" o "I freeze it to destroy harmful bacteria" o "I throw it out" o "Other"	Adapted from Glanz-Chanos, Friis, & Lähteenmäki, 2016; Van Boxstael et al., 2014
Consumer strategies for assessing the edibility of food (products passed the date labelling)	Respondents were asked what they would do if they find an unopened product in their fridge that had passed its "best before" date by 3-4 days. The products investigated were: cheese, cookies, yoghurt, eggs, smoked salmon, ready-made meals, liver pate and meat based cold cuts. The same question was asked for an unopened product that has passed its "use by" date with 3-4 days. The products were minced meat, smoked salmon, ready-made meals, liver pate and meat based cold cuts.	o "I always throw the food product away" o "I look at the food product and smell it to check if it is fit for consumption" o "I taste the food product to check if it is fit for consumption, if it smells normal and looks fine" o "We never eat this food"	Adapted from Glanz-Chanos, Friis, & Lähteenmäki, 2016;

4.	Food-related practices in the households		
Food-related practices in the Planning & Shopping stage	Respondents were asked to report how frequently they engage in two practices related to planning (e.g. checking inventories before shopping trips) and four practices related to shopping (e.g. making unplanned purchases).	"never" (1) to "always" (7) (there were labels for each answer option) Collapsed into three categories for analyses: o "never" (1), "almost never" (2) and "rarely" (3) were categorised as *"almost never"* o "sometimes" (4) and "often" (5) were categorised as *"often"* o "almost always" (6) and "always" (7) were categorised as *"almost always"*	Adapted from Miljøstyrelsen, 2016; Neff et al., 2015; Schmidt, 2016; Stancu et al., 2016; Visschers et al., 2016
Food-related practices in the Storage stage	Respondents were asked to report how frequently they engage in practices related to storing food, e.g. having a good overview of what they have at home, storing food appropriately.	"never" (1) to "always" (7) (there were labels for each answer option) Collapsed into three categories for analyses (as for Planning & Shopping).	Adapted from Miljøstyrelsen, 2016; Neff et al., 2015; Schmidt, 2016; Stancu et al., 2016; Visschers et al., 2016
Food-related practices in the Cooking and preparing food stage	Respondents were asked to report how frequently they engage in practices related to cooking, e.g. checking what food is available before cooking, prioritizing leftovers and food about to expire when cooking.	"never" (1) to "always" (7) (there were labels for each answer option) Collapsed into three categories for analyses (as for Planning & Shopping)	Adapted from Miljøstyrelsen, 2016; Neff et al., 2015; Schmidt, 2016; Stancu et al., 2016; Visschers et al., 2016
Food-related practices and norms in the Eating stage	Respondents were asked to rate four statements related to eating practices and norms, e.g. believing that one should always eat what is on one's plate when dinning at home, providing a large variety of foods at mealtimes so that everyone can have something that he or she likes.	"strongly disagree" (1) to "strongly agree" (7) Collapsed into three categories for analyses: o (1) and (2) became *"strong disagreement"* o (3) to (5) became *"neither nor"* o (6) and (7) became *"strong agreement"*	Adapted from Miljøstyrelsen, 2016; Neff et al., 2015; Schmidt, 2016; Stancu et al., 2016; Visschers et al., 2016
Coordination of household food-related practices	Respondents were asked to report how frequent is there lack of coordination in their household, e.g. different members of the household buy the same food product separately without	"never" (1) to "always" (7) (there were labels for each answer option) Collapsed into three categories for analyses (as for Planning & Shopping).	Adapted from Miljøstyrelsen, 2016

	knowing that the other one had bought it.		
5. Food-related skills in the households			
	Respondents were asked to think about their household and report the extent to which they believe that their household's food-related skills (e.g. planning the meals and shopping) are sufficient. One composite measure was computed for the analyses as the average of the scores of the six skills items.	"strongly disagree" (1) to "strongly agree" (7)	Adapted from Hartmann, Dohle, & Siegrist, 2013; Miljøstyrelsen, 2016
6. Individual characteristics			
Motivation to reduce food waste	People rated how much effort they currently make to reduce food waste in their household, how much effort they will make in the near future to reduce food waste in their household as well as the extent to which they look for ways to reduce food waste in their household. Finally, respondents rated their level of interest in reducing the amount of food discarded in their household on a separate rating scale. One composite measure was computed for the analyses as the average of the scores of the four motivation items.	"not at all" (1) to "as much as possible" (7) "not at all" (1) to "extremely" (7)	Adapted from Brook Lyndhurst, 2007; Miljøstyrelsen, 2016; Neff et al., 2015
Incentives to reduce food waste	Respondents were asked how important, if at all, were a number of incentives (e.g. saving money; feeling competent in the kitchen) in motivating them to reduce the amount of food discarded by their household in the near future.	"not at all important" (1) to "extremely important" (7) Collapsed into three categories for analyses: o (1) and (2) became "not important"; o (3) to (5) became "neither nor" o (6) and (7) became "important"	Adapted from Brook Lyndhurst, 2007; Miljøstyrelsen, 2016; Neff et al., 2015
Consumer self-identities	Five self-identities were assessed: thrifty consumer identity, good homemaker identity, environmental friendly identity,	"strongly disagree" (1) to "strongly agree" (7)	Adapted from van der Werff, Steg, & Keizer, 2013

	hedonic identity, healthy eater identity. Each self-identity was measured with three items (e.g. Acting environmentally-friendly **is an important part of who I am**; **I am the type of person who** acts environmentally-friendly; **I see myself as** an environmentally-friendly **person**). For each of the five types of self-identities one composite measure was computed as the average of the scores on the three items measuring it, for the analyses.		
Consumer value	Respondents were shown statements briefly describing a person and they had to rate how much that person is or is not like themselves. The statements reflected the universalism value (appreciation for the welfare of all people and the environment). For the analyses, a composite measure was computed as the average of the scores on the three items measuring it.	"not like me at all" (1) to "very much like me" (6) (there were labels for each answer option)	Adopted from Schwartz, 2001
Consumer perceived ability to reduce food waste	Respondents were asked to rate three statements referring to their perceived ability to reduce food waste in their household (e.g. "If I want to, I can minimize the amount of food waste generated in our household"). For the analyses, a composite measure was computed as the average of the scores of two of the items (the third item was highly correlated with the composite variable, however, it was not used because only respondents who came from flexible size household or households with more than one member answered this question).	"strongly disagree" (1) to "strongly agree" (7)	

Impulsive buying tendency	People were asked to think about buying in general and rate six statements. Four statements referred to carefully planning before buying or only buying things that one intended to buy (these were reversed for the analyses). Two statements referred to buying things without thinking or spontaneously. One composite measure was computed as the average of the six items measuring it.	"strongly disagree" (1) to "strongly agree" (7)	Adopted from Park & Dhandra, 2017; Rook & Fisher, 1995; Thompson & Prendergast, 2015; Verplanken & Herabadi, 2001
Disgust sensitivity	Respondents were asked to indicate how disgusting they perceive eating certain foods to be. Two items referred to leftovers. The remaining four items referred to specific foods, e.g. potatoes that had a black spot removed, cheese that had a moulded spot removed. For the analyses, a composite measure was computed as the average of the scores on the six items measuring it.	"not disgusting at all" (1) to "extremely disgusting" (7)	Adapted from Hartmann & Siegrist, 2018
Household characteristics			
Types of food consumed in households	Respondents were asked to report the frequency of eating certain types of food/meals in their household.	never (1), less than once a month (2), 1-3 times a month (3); once a week (4), 2-4 times a week (5); 5-6 times a week (6) and every day (7) Collapsed categories for analyses: (1) and (2) became "less than once a month"; (6) and (7) became "5 times a week or more often"	
Preference for freshness	The respondents rated three statements regarding their household's preference for fresh foods.	"strongly disagree" (1) to "strongly agree" (7)	Adopted from O'Sullivan, Scholderer, & Cowan, 2005

		Collapsed into three categories for analyses: o (1) and (2) became "strong disagreement"; o (3) to (5) became "neither nor" o (6) and (7) became "strong agreement"	
Frequency of grocery shopping	Respondents were asked to report the frequency of grocery shopping in their household.	o "less often than once a week" o "1-2 times a week" o "3-4 times a week" o "5-6 times a week" o "every day"	
Responsibility for household food-related tasks	Respondents were asked to report the extent to which they are responsible for seven household food-related tasks from different steps/decisions in the household food provisioning.	o "you do all or most of it" (1) o "you do about half of it" (2) o "someone else does all or most of it" (3)	Adapted from Farr-Wharton et al., 2014; Neff, Spiker, & Truant, 2015
Socio-demographics			
	Individuals' demographics: gender, age, education and occupation. Households' demographics: household size and stability (i.e. does the number of people who live at home fluctuate over a typical two-week period), household income and presence of vegetarians.		

Appendix 2

Characteristics of respondents

Frequency of types of education

Education	Frequency	%
Grund-/folkeskole	45	8.9
Almengymnasial uddannelse (studentereksamen/HF)	38	7.5
Erhvervsgymnasial uddannelse (HH/HTX/HHX)	20	3.9
Erhvervsfaglig uddannelse	91	17.9
Kort videregående uddannelse under 3 år	46	9.1
Mellemlang videregående uddannelse 3-4 år	175	34.4
Lang videregående uddannelse 5 år eller mere	83	16.3
Forskeruddannelse (f.eks. PHD)	6	1.2
Ønsker ikke at oplyse	4	0.8

Frequency of types of occupation

Occupation	Frequency	%
Fuldtidsarbejde (+30 timer/ugen)	220	43.3
Deltid (8-29 timer/ugen)	24	4.7
Deltid (under 8 timer/ugen)	10	2.0
Pensioneret/ førtidspensioneret/ på efterløn	148	29.1
Går i skole	25	4.9
Følger fuldtidsstudium på længerevarende uddannelse	29	5.7
Arbejdsløs (jobsøgende)	28	5.5
Arbejdsløs (ikke jobsøgende)	7	1.4
Hjemmegående	9	1.8
Andet	8	1.6

Frequency of household incomes

Houseold income	Frequency	%
Mindre end 100.000 kr.	21	4.1
100.000 til 199.999 kr.	53	10.4
200.000 til 299.999 kr.	55	10.8
300.000 til 399.999 kr.	62	12.2
400.000 til 499.999 kr.	59	11.6
500.000 til 599.999 kr.	33	6.5
600.000 til 699.999 kr.	31	6.1
700.000 til 799.999 kr.	28	5.5
800.000 til 899.999 kr.	26	5.1
900.000 til 999.999 kr.	10	2.0
1.000.000 kr. eller mere	26	5.1
Ved ikke	17	3.3
Ønsker ikke at oplyse	87	17.1

Distribution of respondents according to the region in Denmark that they come from
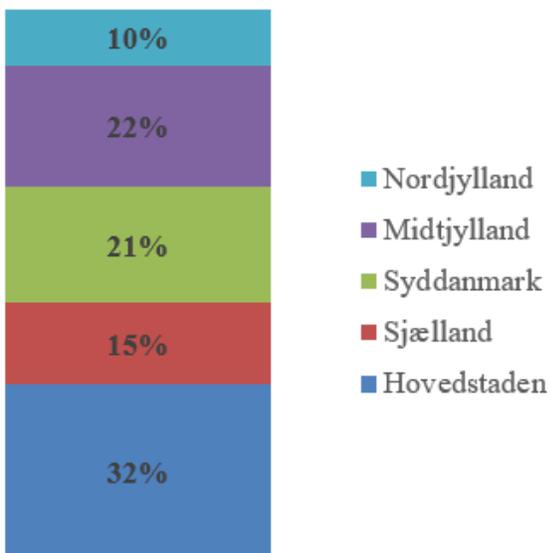
Frequency of people following a vegetarian diet

Does anyone in your household follow a vegetarian/vegan diet?

No one	95%
I follow a vegetarian/vegan diet myself	2%
Someone else or others in my household follows a vegetarian/vegan diet	3%
Everyone in my household follows a vegetarian/vegan diet	0%
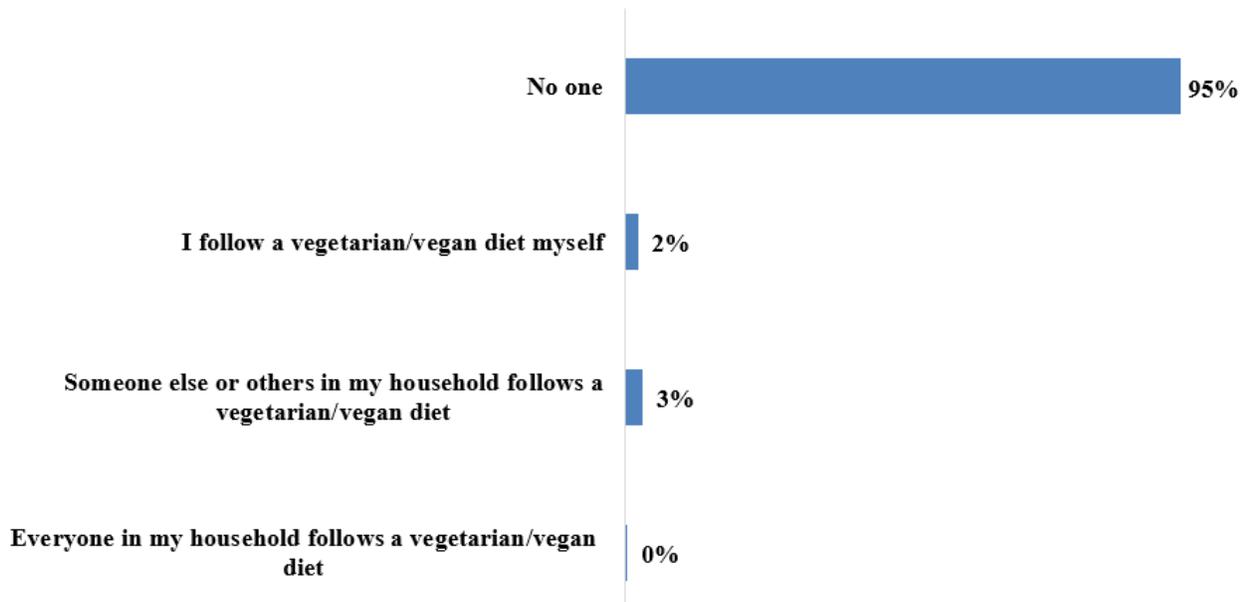
Appendix 3

Consumer Food Waste Survey (DK)

Q1. Kære deltager

Velkommen til denne undersøgelse, som udføres af MAPP Centret ved Aarhus Universitet.

I undersøgelsen er vi interesserede i din mening om mad og måltidsrelaterede aktiviteter i din husholdning. Dine meninger er særdeles værdifulde for os og vil hjælpe os til at forstå, hvordan folk agerer i forhold til mad og måltider i hjemmet.

Der er ingen rigtige eller forkerte svar; vi er udelukkende interesserede i din mening om mad og måltidsrelaterede aktiviteter hjemme hos dig selv.

Det tager omkring 20 minutter at udfylde spørgeskemaet.

Læg venligst mærke til, at nogle af spørgsmålene i skemaet handler om din husstand, dvs. at når vi skriver "I" i spørgsmålet, dækker det husstanden uanset dens størrelse.

Hvis du har spørgsmål eller kommentarer, bedes du kontakte ... på e-mail ...@mgmt.au.dk.

På forhånd mange tak for hjælpen!

Venlig hilsen
Aarhus Universitet
MAPP Research Centre

Q2. Det er helt frivilligt at deltage, og du har ingen pligt til at deltage. Du kan til enhver tid trække dig fra undersøgelsen. Vi behandler naturligvis dine svar med den allerstørste fortrolighed. Dataene fra dette spørgeskema lagres og behandles elektronisk og anonymt.

Jeg bekræfter at:
- ☐ **Jeg har læst og forstået ovenstående information og er indforstået med at deltage i undersøgelsen (1)**
- ☐ **Jeg giver Aarhus Universitet tilladelse til at bruge mine data i forskningsøjemed (2)**

Q3. Hvor stor en del af følgende opgaver i hjemmet tager du dig af?

	Skala
Beslutter, hvilke fødevarer der skal købes og hvor meget (Q3_1)	o Jeg tager mig af det hele eller det meste (1)
Indkøb (Q3_2)	o Jeg tager mig af cirka halvdelen (2)
Sætter på plads efter indkøb (Q3_3)	o En anden tager sig af det hele eller det meste (3)
Beslutter, hvad der skal laves til måltiderne (Q3_4)	
Laver mad (Q3_5)	
Rydder op efter aftensmaden (Q3_6)	
Holder orden i og tjekker køleskab, køkkenskabe og dybfryser (Q3_7)	

Q82. Hvad er dit køn?
- o   Mand (0)
- o   Kvinde (1)

Q4. Skifter antallet af personer i husstanden over en typisk to-ugers periode (fx pga. delt forældremyndighed, hyppige arbejdsrelaterede rejser)?
- o   Ja (1)
- o   Nej (2)

<If Ja, ask Q5 to Q10; If Nej ask Q11 and Q12>

Q5. Hvad er det **laveste** antal personer, der bor i husstanden (**iberegnet dig selv**)?

▼ 1 (1) ... 10 eller flere (10)

Q6. Hvor mange af dem er børn (under 16 år)?

▼ 0 (0) ... 10 eller flere (10)

Q7. Hvad er det **højeste** antal personer, der bor i din husstand (**iberegnet dig selv**)?

▼ 1 (1) ... 10 eller flere (10)

Q8 Hvor mange af dem er børn (under 16 år)?

▼ 0 (0) ... 10 eller flere (10)

Q9. Hvad er antallet af personer, der bor i husstanden det **meste af tiden** (**iberegnet dig selv**)?

▼ 1 (1) ... 10 eller flere (10)

Q10. Hvor mange af dem er børn (under 16 år)?

▼ 0 (0) ... 10 eller flere (10)

Q11. Hvor mange personer bor der i alt i din husstand (**dig selv iberegnet**)?

▼ 1 (1) ... 10 eller flere (10)

Q12. Hvor mange af dem, der bor i din husstand, er børn under 16 år?

▼ 0 (0) ... 10 eller flere (10)

1. Consumer understanding and awareness of food waste

Q14. Hvis du skulle forklare en ven, hvad madspild er, hvad ville du så sige?

_____

_____

_____

Q15. Har du inden for det seneste år set eller hørt noget i nyhederne, på de sociale medier eller andre steder, om mad, der bliver kasseret eller på anden måde ikke bliver spist af mennesker? (sommetider kaldet "madspild")
- o   Ja (1); Nej (2); Er ikke sikker (3)

<If Ja, ask Q16 >

Q16. Hvad drejede informationen sig om (<u>vælg alle der er relevante</u>)?
- □   Information om, hvor meget mad der bliver kasseret (1)
- □   Information om, hvordan man kan undgå at smide mad ud (2)
- □   Information om mærkning med sidste holdbarhedsdato (3)
- □   Information om kompostering og andre måder at komme af med mad, der er kasseret (4)
- □   Andre (angiv venligst) (5) _____

Q17. Angiv venligst, hvor uenig eller enig, du er i følgende udsagn

	Skala
Madspild (mad der bliver kasseret) er et problem for miljøet (Q17_1)	o Meget uenig 1 (1)
Madspild (mad der bliver kasseret) i Danmark påvirker verdens underernærede (Q17_2)	o 2 (2) o 3 (3)
Hjemme hos os er vi bevidste om, hvor mange penge vi bruger ugentlig på mad, der bliver smidt ud (Q17_3)	o 4 (4) o 5 (5) o 6 (6) o Meget enig 7 (7)

Q88. Når du tænker på din husholdning, angiv venligst, hvor uenig eller enig, du er i følgende udsagn.

I min husstand synes vi at det er madspild at fodre kæledyr eller andre dyr med madrester.

| Meget uenig 1 (1) | 2 (2) | 3 (3) | 4 (4) | 5 (5) | 6 (6) | Meget enig 7 (7) |

<This question was asked after the food waste scenarios in the online survey>

2. Self-reported food waste behaviour

Q18. Det sker i alle husholdninger, at man sommetider må kassere mad. Prøv at tænke **på din egen husholdning** og vurder så, hvor meget der bliver smidt ud **i løbet af en typisk uge**.

Medtag alle mad- og drikkevarer, som du havde derhjemme, og som kunne have været spist i stedet for at blive kasseret uanset grunden til, at det blev smidt ud (fx brødskiver, æbler, tilberedt mad)

	Skala
Hvor stor en andel af alle de fødevarer og den mad, du køber og/eller dyrker, bliver kasseret på en typisk uge? (Q18_1)	o Næsten intet (1)
Hvor stor en andel af den mælk og de mejeriprodukter, du køber og/eller producerer, bliver kasseret på en typisk uge? (Q18_2)	o Mindre end en tiendedel (mindre end 10%) (2)
Hvor stor en andel af den friske frugt og de grøntsager, du køber og/eller producerer, bliver kasseret på en typisk uge? (Q18_3)	o Mere end en tiendedel men mindre end en fjerdedel (mellem 10% og 25%) (3)
Hvor stor en andel af det kød og den fisk, du køber og/eller producerer, bliver kasseret på en typisk uge? (Q18_4)	o Mere end en fjerdedel men mindre end halvdelen (mellem 25% og 50%) (4)
Hvor stor en andel af det brød og andre bagerprodukter, du køber og/eller producerer, bliver kasseret på en typisk uge? (Q18_5)	o Mere end halvdelen (mere end 50%) (5)

Q19. Tænk **på din egen husholdning**, og vurder så, hvor meget af følgende, I kasserer **på en typisk uge**.

	Skala
Rå ingredienser (fx grøntsager, kød, fisk, mælk, etc.) (Q19_1)	o Intet (1)
Forarbejdede produkter, som ligger i køleskabet (fx pølse, leverpostej, ost, etc.) (Q19_2)	o Næsten intet (2)
Forarbejdede produkter, som ikke ligger i køleskabet (fx morgenmadsprodukter, småkager, dåsemad, etc.) (Q19_3)	o Noget (3)
	o En hel del (4)
Tilberedt mad (fx rester fra boller i karry, grøntsagsretter; retter der ikke bliver spist; etc.) (Q19_4)	o Meget (5)

Q20. Sommetider er der enten rå eller tilberedte rester efter madlavningen eller et måltid. Det sker, at madvarer bliver glemt, og vi finder dem, efter at holdbarheden er overskredet. Folk har forskellige strategier med hensyn til sådanne fødevarer, og i de følgende spørgsmål vil vi gerne vide, hvad du ville gøre i disse situationer.

Q21. Forestil dig, at I lige har spist aftensmad derhjemme. Middagen, der var lavet af råvarer, bestod af kød (hvis I er vegetarer, tænk på et vegetarisk alternativ i stedet for kød), kartofler, kogte grøntsager, en grøn salat og sovs. Der er noget tilbage af alle elementerne i middagen, <u>som ikke er blevet serveret på tallerkenerne</u>. Når du skal rydde op efter aftensmaden, hvad gør du så ved hvert element?

	Skala
Q22. Tilberedt kød (hvis I er vegetarer, tænk på et vegetarisk alternativ i stedet for kød) *<If (1), (2) or (5) ask Q38>*	o Gemmer resterne, uanset hvor meget der er tilbage (1) o Gemmer kun resterne, hvis der er nok til mindst én person en anden gang (2) o Smider resterne ud (3)
Q34. Kogte kartofler *<If (1), (2) or (5) ask Q39>*	o Giver resterne til kæledyr eller andre dyr (4) o Andet (angiv venligst) (5)_____
Q35. Sovs *<If (1), (2) or (5) ask Q40>*	
Q36. Kogte grøntsager *<If (1), (2) or (5) ask Q41>*	
Q37. Grøn salat *<If (1), (2) or (5) ask Q42>*	

- -

Q23. Nogle gemmer rester, men af forskellige grunde får de dem ikke spist i de følgende dage. Hvad er sandsynligheden for, at <u>de rester, I har gemt</u>, bliver spist hjemme hos jer?

	Skala
Q38. Tilberedt kød (hvis I er vegetarer, tænk på et vegetarisk alternativ i stedet for kød)	o Ikke sandsynligt (1) o Ret sandsynligt (2)
Q39. Kogte kartofler	o Meget sandsynligt (3)
Q40. Sovs	o Ikke relevant (4) *<displayed only if (5) was selected in Q21>*
Q41. Kogte grøntsager	
Q42. Grøn salat	

- -

Q24. Forestil dig, at I lige har spist aftensmad derhjemme. Måltidet bestod af kød-lasagne (hvis I er vegetarer, tænk på et vegetarisk alternativ) og salat. Der er en god portion lasagne tilbage <u>i fadet</u>. Når du skal rydde op bagefter, hvad gør du så med lasagneresterne?
- o Gemmer resterne i køleskabet (1)
- o Gemmer resterne i dybfryseren (2)
- o Smider dem ud (3)
- o Giver resterne til kæledyr eller andre dyr (4)
- o Andet (angiv venligst) (5) _____

<If (1), (2) or (5) ask Q25>

- -

Q25. Nogle gemmer rester, men af forskellige grunde får de dem ikke spist i de følgende dage. Hvad er sandsynligheden for, at <u>de lasagnerester, I har gemt</u>, bliver spist hjemme hos jer?
- o Ikke sandsynligt (1)
- o Ret sandsynligt (2)
- o Meget sandsynligt (3)
- o Ikke relevant (4) *<displayed only if (5) was selected in Q24>*

Q26. Forestil dig, at du er ved at lave aftensmad derhjemme, og at der er nogle rå ingredienser, som du ikke bruger det hele af til måltidet. Forestil dig, at du har følgende i overskud – hvad gør du med hver af dem?

	Skala
En halv broccoli (Q26_1)	o Gemmer resten (1)
Et halvt løg (Q26_2)	o Kasserer resten (2)
En halv pose blandet grøn salat (ca. 75 g) (Q26_3)	
En halv dåse hakkede, flåede tomater (ca. 200 g) (Q26_4)	*<If (1) then ask about the*
En tredjedel karton madlavningsfløde (ca. 80 ml) (Q26_5)	*ingredient in Q27>*
En kvart pose revet ost (ca. 50 g) (Q26_6)	
En halv pakke skiveskåret skinke (ca. 45 g) (Q26_7)	

Q27. Nogle gemmer rester, men af forskellige grunde får de dem ikke spist i de følgende dage. Hvad er sandsynligheden for, at de ingrediensrester, I har gemt, bliver spist hjemme hos jer?

	Skala
En halv broccoli (Q27_1)	o Ikke sandsynligt (1)
Et halvt løg (Q27_2)	o Ret sandsynligt (2)
En halv pose blandet grøn salat (ca. 75 g) (Q27_3)	o Meget sandsynligt (3)
En halv dåse hakkede, flåede tomater (ca. 200 g) (Q27_4)	
En tredjedel karton madlavningsfløde (ca. 80 ml) (Q27_5)	
En kvart pose revet ost (ca. 50 g) (Q27_6)	
En halv pakke skiveskåret skinke (ca. 45 g) (Q27_7)	

Q29. Forestil dig, at du skal til at lave aftensmad, og du har købt frisk fiskefilet til formålet. Da du går køleskabet igennem for at finde de andre ingredienser, finder du en pakke hakket kød (hvis I er vegetarer, tænk på et vegetarisk alternativ i stedet for kød), som udløber samme dag. Hvad gør du med det hakkede kød?
- o Jeg bruger det hakkede kød som en del af det måltid, jeg skulle i gang med at lave (1)
- o Jeg tilbereder det hakkede kød og gemmer den tilberedte ret til senere brug (2)
- o Jeg putter det hakkede kød i fryseren til senere brug (3)
- o Jeg bruger det hakkede kød til måltidet nu og gemmer fisken til senere brug (4)
- o Jeg kasserer det hakkede kød (5)
- o Jeg planlægger at bruge det hakkede kød dagen efter, selv om det har overskredet sidste holdbarhed (6)
- o Jeg gemmer det, selv om jeg ikke er sikker på, hvad jeg skal bruge det til (7)
- o Andet (angiv venligst) (8) _____

Q28. Forestil dig, at du i frugtskålen har spottet 4-5 æbler, der er blevet lidt gamle (fx runkne, plettede, smårådne). Hvad ville du gøre med æblerne?
- o Jeg ville lave en dessert af dem (1)
- o Jeg ville lave saft af dem (2)
- o Jeg ville på en eller anden måde bruge dem i madlavningen (3)
- o Jeg ville spise nogen så hurtigt som muligt og smide resten ud (4)
- o Jeg ville kassere dem (5)
- o Andet (angiv venligst) (6) _____

3. Consumer perceptions of food edibility and assessment of edibility

Q32. Det kan være forskelligt, hvilken mad og hvilke dele af fødevarer folk betragter som spiselige. Vi er interesserede i at vide, hvilke af følgende <u>I betragter som spiselige (noget I ville spise eller overveje at spise)</u>.

	Skala
Den grønne del af porren (Q32_1)	o Altid spiselig (1)
Tørt brød (Q32_2)	o Kun spiselig i
Slatten salat (Q32_3)	særlige retter (2)
Brune bananer (Q32_4)	o Aldrig spiselig (3)
Broccolistilke (Q32_5)	
Kartoffelskræl (Q32_6)	
Gulerodsskræl (Q32_7)	
Æbleskræl (Q32_8)	
Fiskeskind (Q32_9)	
Synligt fedt i kød (Q32_10)	

Q43. Vi vil også gerne vide, hvilke af følgende fødevarer I betragter som spiselige (noget I ville spise eller overveje at spise).

	Skala
Mad, der begynder at se uappetitlig ud, selv om den stadig kan spises (Q43_1)	o Altid spiselig (1)
Rester, som man har spist af to gange inden for samme uge (Q43_2)	o Kun spiselig hvis de indgår i andre retter (2)
Retter, som viste sig at være en skuffelse smagsmæssigt (fx fad i smagen, for krydret) (Q43_3)	o Aldrig spiselig (3)
En kødret, der ser tør ud eller er kogt/stegt for meget (Q43_4)	

Q44. Når du har de følgende fødevarer, og du er i tvivl om det stadig er sikkert at spise dem, hvordan håndterer du det så? (vælg alle relevante)

	Jeg spiser det, hvis jeg tror at kvaliteten er god nok (1)	Jeg bruger det i retter, hvor det bliver gennemkogt (2)	Jeg fryser det ned for at slå farlige bakterier ihjel (3)	Jeg smider det ud (4)	Andet (5)
Skinke (hvis I er vegetarer, tænk på et vegetarisk alternativ) (Q44_1)	☐	☐	☐	☐	☐
Jordbær (Q44_2)	☐	☐	☐	☐	☐

<Respondents either saw Q45 and Q46 or Q47 and Q48 >

Q45. Hvad gør du, når du finder et uåbnet produkt i køleskabet, som har passeret "**bedst før**" med 3-4 dage?

	Skala
Æg (Q45_1)	o Jeg smider det altid ud (1)
Yoghurt (Q45_2)	o Jeg kigger på det og lugter til det for at se, om det er spiseligt (2)
Småkager (Q45_3)	o Jeg smager på det for at tjekke, om det er spiseligt, hvis det lugter og ser
Ost (Q45_4)	normalt ud (3)
Røget laks (Q45_5)	o Vi spiser aldrig denne fødevare (4)
Færdigretter (Q45_6)	

Q46. Hvad gør du, når du finder et uåbnet produkt i køleskabet, som har passeret "**sidste anvendelsesdato**" med 3-4 dage?

	Skala
Hakket kød (Q46_1)	o Jeg smider det altid ud (1)
	o Jeg kigger på det og lugter til det for at se, om det er spiseligt (2)
Leverpostej (Q46_2)	o Jeg smager på det for at tjekke, om det er spiseligt, hvis det lugter og ser normalt ud (3)
Kødpålæg (Q46_3)	o Vi spiser aldrig denne fødevare (4)

Q47. Hvad gør du, når du finder et uåbnet produkt i køleskabet, som har passeret "**bedst før**" med 3-4 dage?

	Skala
Æg (Q47_1)	o Jeg smider det altid ud (1)
Yoghurt (Q47_2)	o Jeg kigger på det og lugter til det for at se, om det er spiseligt (2)
Småkager (Q47_3)	o Jeg smager på det for at tjekke, om det er spiseligt, hvis det lugter og ser normalt ud (3)
Ost (Q47_4)	
Leverpostej (Q47_5)	o Vi spiser aldrig denne fødevare (4)
Kødpålæg (Q47_6)	

Q48. Hvad gør du, når du finder et uåbnet produkt i køleskabet, som har passeret "**sidste anvendelsesdato**" med 3-4 dage?

	Skala
Hakket kød (Q48_1)	o Jeg smider det altid ud (1)
Røget laks (Q48_2)	o Jeg kigger på det og lugter til det for at se, om det er spiseligt (2)
Færdigretter (Q48_3)	o Jeg smager på det for at tjekke, om det er spiseligt, hvis det lugter og ser normalt ud (3)
	o Vi spiser aldrig denne fødevare (4)

4. Food-related practices in the households

Q49. Der er mange forskellige ting relateret til mad, som husholdninger skal forholde sig til. I det følgende er vi interesserede i at vide noget om hvilke fødevare-relaterede opgaver, der er i jeres husstand.

Q50. I din husholdning, hvor ofte køber du (eller et andet medlem af husstanden) ind?
- o Mindre end en gang om ugen (1)
- o 1-2 gange om ugen (2)
- o 3-4 gange om ugen (3)
- o 5-6 gange om ugen (4)
- o Hver dag (5)

<This question was reported under Household characteristics>

Q52. Hvor ofte sker følgende i din husholdning i forbindelse med planlægning og indkøb af mad?

	Skala
Før vi tager på indkøb, tjekker vi, hvad vi har på lager (køkkenskabe, køleskab) (Q52_1)	o Aldrig (1) o Næsten aldrig (2)
Vi laver madplan for et par dage ad gangen (Q52_2)	o Sjældent (3) o Sommetider (4)
Vi køber mere, end vi har brug for aktuelt, når der er mængderabatter (Q52_3)	o Ofte (5)

	Skala
Vi køber fødevarer, som det viser sig, at vi allerede har derhjemme (Q52_4)	o Næsten altid (6)
Vi køber noget, som vi ikke havde planlagt at købe (Q52_5)	o Altid (7)
Vi køber bevidst store mængder af varer, som vi altid bruger, for at være sikre på at have nok (Q52_6)	

Q53. Hvor ofte er de følgende udsagn sande for din husholdning, når det drejer sig om opbevaring af fødevarer?

	Skala
Vi har et godt overblik over, hvad vi har i køkkenskabene og i køleskabet (Q53_1)	o Aldrig (1)
Vi har styr på, hvor længe det, vi har i køleskabet, har været der (Q53_2)	o Næsten aldrig (2)
	o Sjældent (3)
Vi glemmer fødevarer i køleskabet, indtil de er for gamle til at spise (Q53_3)	o Sommetider (4)
Vi opbevarer fødevarer, som vi ser det i supermarkedet (fx hvis et produkt er på køl i supermarkedet, så lægger vi det i køleskabet derhjemme, og hvis det ikke er på køl i supermarkedet, så lægger vi det heller ikke på køl derhjemme) (Q53_4)	o Ofte (5)
	o Næsten altid (6)
	o Altid (7)
Vi gemmer måltidsrester i gennemsigtige bokse eller så vi tydeligt kan se dem i køleskabet (Q53_6)	
Vi opbevarer rester i fryseren (Q53_8)	
Vi glemmer at bruge det, vi har i fryseren (Q53_9)	

Q57. Hvor ofte sker følgende i din husholdning i forbindelse med madlavning og tilberedning af mad?

	Skala
Før vi begynder at lave mad, kigger vi i køkkenskabe og i køleskabet for at se, hvad vi har (Q57_1)	o Aldrig (1)
	o Næsten aldrig (2)
Vi prioriterer at bruge rester og fødevarer, der er tæt på udløb, når vi laver mad (Q57_2)	o Sjældent (3)
	o Sommetider (4)
Vi bruger rester til madpakken næste dag (Q57_3)	o Ofte (5)
Vi laver med vilje lidt mere end nødvendigt for at være sikre på, at der er nok (Q57_4)	o Næsten altid (6)
	o Altid (7)
Vi har en madplan, vi går efter, når vi laver mad (Q57_5)	
Vi spiser ikke det hele op (Q57_6)	

Q58. Når du tænker på at spise og måltider, angiv venligst, hvor uenig eller enig, du er i følgende udsagn

	Skala
Jeg synes, at man altid skal spise det, der er på ens tallerken, når man spiser derhjemme (Q58_1)	o Meget uenig 1 (1)
	o 2 (2)
Hjemme hos os spiser vi alle det samme til aften (Q58_3)	o 3 (3)
Vi serverer mange forskellige ting til måltiderne, så alle kan få noget, de kan lide (Q58_4)	o 4 (4)
	o 5 (5)
Nogle medlemmer af husstanden spiser ikke altid hjemme (Q58_5)	o 6 (6)
	o Meget enig 7 (7)

<Q58_5 was asked only for households with more than one member and flexible size households>

Q60. Hvor ofte sker følgende hjemme hos jer?

	Skala
Når en skal lave mad, glemmer han eller hun, hvad andre i husholdningen har købt ind (Q60_1)	o Aldrig (1)
Medlemmer af husholdningen køber noget, uden at vide, at en af de andre har købt det samme (Q60_3)	o Næsten aldrig (2) o Sjældent (3) o Sommetider (4)
Der sker, at vi misforstår hinanden vedrørende, hvem der står for indkøb og madlavning (Q60_4)	o Ofte (5) o Næsten altid (6)
Vi ved ikke, hvor mange der spiser med til måltiderne (Q60_5)	o Altid (7)

<Q60 was asked only for households with more than one member and flexible size households>

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5. Food-related skills in the households

Q62. Når du tænker <u>på din husholdning</u>, angiv venligst, hvor uenig eller enig, du er i følgende udsagn

	Skala
Jeg anser vores færdigheder i at planlægge måltider og indkøb (fx lave indkøbslister, tjekke hvad vi har på lager) som tilstrækkelige (Q62_1)	o Meget uenig 1 (1)
Jeg anser vores færdigheder i at købe de rigtige varer i de rigtige mængder til måltiderne og husholdningen i det hele taget som tilstrækkelige (Q62_2)	o 2 (2) o 3 (3)
Jeg anser vores madlavningsfærdigheder som tilstrækkelige (Q62_3)	o 4 (4) o 5 (5)
Jeg anser vores færdigheder i at vurdere om fødevarer stadig kan spises eller ej som tilstrækkelige (Q62_4)	o 6 (6) o Meget enig 7 (7)
Jeg anser vores færdigheder i at opbevare fødevarer korrekt (fx om noget skal opbevares i køleskab eller ej, hvilken temperatur der er passende for forskellige madvarer) som tilstrækkelige (Q62_5)	
Jeg anser vores evner til at vurdere, hvor meget der bliver spist til et måltid derhjemme som tilstrækkelige (Q62_6)	

6. Individual characteristics

Q64. Hvor stor en indsats lægger du aktuelt i at minimere mængden af mad, der bliver kasseret hjemme hos jer?

Ingen 1 (1)   2 (2)   3 (3)   4 (4)   5 (5)   6 (6)   Så meget som muligt 7 (7)

Q65. Hvor interesseret er du aktuelt i at minimere mængden af mad, der bliver kasseret hjemme hos jer?

Slet ikke 1 (1)   2 (2)   3 (3)   4 (4)   5 (5)   6 (6)   Meget 7 (7)

Q66. I hvilken grad prøver du at finde måder til at minimere mængden af mad, der bliver kasseret hjemme hos jer?

Slet ikke 1 (1)   2 (2)   3 (3)   4 (4)   5 (5)   6 (6)   Så meget som muligt 7 (7)

Q67. Hvor stor en indsats vil du gøre i den nærmeste fremtid for at minimere mængden af mad, der bliver kasseret hjemme hos jer?

Ingen 1 (1)   2 (2)   3 (3)   4 (4)   5 (5)   6 (6)   Så stor som muligt 7 (7)

Q68. Hvor vigtigt, hvis overhovedet, er følgende for at motivere dig til at reducere den mængde mad, som I kasserer i den nærmeste fremtid?

	Skala
Tanken om at spare penge (Q68_1)	o Slet ikke vigtigt 1 (1)
Ønsket om at føle mig som en dygtig husmor/far (Q68_2)	o 2 (2)
Mine værdier (Q68_3)	o 3 (3)
Ønsket om at holde orden i køkkenet (Q68_4)	o 4 (4)
Ønsket om at hjælpe miljøet (Q68_5)	o 5 (5)
Ønsket om at undgå ærgrelsen over den tid der er gået med at købe ind, opbevare og lave mad, der ikke blive spist (Q68_6)	o 6 (6) o Meget vigtigt 7 (7)

Q69. Angiv venligst, hvor uenig eller enig, du er i følgende udsagn

	Skala
At bruge de fødevarer vi har derhjemme op, er en vigtig del af hvem jeg er (Q69_1)	o Meget uenig 1 (1) o 2 (2)
Jeg ser mig selv som en sparsommelig person, hvad angår mad (Q69_3)	o 3 (3)
At være miljøvenlig er en vigtig del af, hvem jeg er (Q69_4)	o 4 (4)
Jeg er sådan en person, der nyder mad (Q69_8)	o 5 (5)
At være en god husmor/far er en vigtig del af hvem jeg er (Q69_10)	o 6 (6)
Jeg er den type, der er en god husmor/far (Q69_11)	o Meget enig 7 (7)
Jeg er den type, der spiser sundt (Q69_14)	

Q94. Angiv venligst, hvor uenig eller enig, du er i følgende udsagn

	Skala
Jeg er den økonomiske type, hvad angår mad (Q94_2)	o Meget uenig 1 (1)
Jeg er sådan en type, der handler miljøbevidst (Q94_5)	o 2 (2)
Jeg ser mig selv som en miljøvenlig person (Q94_6)	o 3 (3)
Nydelsen ved at spise er en stor del af, hvem jeg er (Q94_7)	o 4 (4)
Jeg ser mig selv som en person, der stræber efter nydelse og gode oplevelser, når jeg spiser et måltid (Q94_9)	o 5 (5) o 6 (6)
Jeg ser mig selv som en person, som er god til at køre en husholdning (Q94_12)	o Meget enig 7 (7)
At vælge fødevarer, der er gode for mit helbred, er en vigtig del af, hvem jeg er (Q94_13)	
Jeg ser mig selv som en person, der bekymrer sig om sit helbred (Q94_15)	

Q75. Tænk på det at købe generelt, og angiv venligst, hvor uenig eller enig du er i følgende udsagn

	Skala
Normalt planlægger jeg mine indkøb nøje (Q75_1)	o Meget uenig 1 (1)
Normalt køber jeg kun ting, jeg havde planlagt at købe (Q75_2)	o 2 (2)
Før jeg køber noget, overvejer jeg altid nøje, om det er noget, jeg har behov for (Q75_3)	o 3 (3) o 4 (4)
Jeg overvejer det normalt grundigt, før jeg køber noget (Q75_4)	o 5 (5)
Jeg køber ofte noget uden at tænke mig om (Q75_5)	o 6 (6)
Jeg køber ofte noget spontant (Q75_6)	o Meget enig 7 (7)

Q76. Angiv venligst, **hvor frastødende du synes, det vil være at spise følgende fødevarer.**

	Skala
Rester efter de har været på bordet (Q76_1)	o Ikke frastødende overhovedet 1 (1)
En ret, der delvis er lavet af rester fra et tidligere måltid (Q76_2)	
Kartofler, hvor sorte pletter er blevet fjernet (Q76_3)	o 2 (2)
Æblebåde, der er blevet brune af at have været udsat for ilt (Q76_4)	o 3 (3) o 4 (4)
Ost, hvor en mugplet er blevet fjernet (Q76_5)	o 5 (5)
Salat, hvor der var en lille snegl i, som er blevet fjernet (Q76_6)	o 6 (6) o Særdeles frastødende 7 (7)

Q92. Nedenfor beskriver vi kort en person. Marker ud for hvert udsagn, **hvor meget denne person ligner eller ikke ligner dig**.

	Skala
Han mener, det er vigtigt, at alle mennesker i verden bliver behandlet lige. Han ønsker retfærdighed for alle, selv for mennesker han ikke kender (Q92_3)	o Ligner mig slet ikke (1) o Ligner mig ret dårligt (2) o Ligner mig lidt (3)

	Skala
Det er vigtigt for ham at lytte til mennesker, der er anderledes end ham selv. Selv når han er uenig med dem, vil han alligevel gerne forstå dem (Q92_8)	o Ligner mig ret godt (4) o Ligner mig virkelig godt (5)
Det ligger ham meget på sinde, at man skal beskytte naturen. Det er vigtigt for ham at passe på miljøet (Q92_19)	o Ligner mig helt præcist (6)

Q93. Nedenfor beskriver vi kort en person. Marker ud for hvert udsagn, **hvor meget denne person ligner eller ikke ligner dig**.

	Skala
Hun mener, det er vigtigt, at alle mennesker i verden bliver behandlet lige. Hun ønsker retfærdighed for alle, selv for mennesker hun ikke kender (Q93_3)	o Ligner mig slet ikke (1) o Ligner mig ret dårligt (2) o Ligner mig lidt (3)
Det er vigtigt for hende at lytte til mennesker, der er anderledes end hende selv. Selv når hun er uenig med dem, vil hun alligevel gerne forstå dem (Q93_8)	o Ligner mig ret godt (4) o Ligner mig virkelig godt (5)
Det ligger hende meget på sinde, at man skal beskytte naturen. Det er vigtigt for hende at passe på miljøet (Q93_19)	o Ligner mig helt præcist (6)

Q77. Angiv venligst, hvor uenig eller enig, du er i følgende udsagn

	Skala
Hvis jeg vil, kan jeg mindske madspildet hjemme hos os (Q77_1)	o Meget uenig 1 (1)
Jeg er overbevist om, at jeg kan mindske madspildet hjemme hos os, selv om jeg er den eneste, der gør en indsats (Q77_2)	o 2 (2) o 3 (3)
Jeg er overbevist om, at jeg kan få de andre i husstanden til at mindske madspildet hjemme hos os (Q77_3)	o 4 (4) o 5 (5) o 6 (6) o Meget enig 7 (7)

Household characteristics

Q78. Hvor ofte, hvis overhovedet, spiser I følgende typer mad hjemme hos jer?

	Skala
Hjemmelavede måltider hovedsageligt lavet af råvarer (Q78_1)	o Aldrig (1)
	o Mindre end en gang om måneden (2)
Færdigretter, der bare skal varmes og ikke kræver yderligere tilberedning (Q78_2)	o 1-3 gange om måneden (3)
Convenience-produkter, der kræver nogen tilberedning (Q78_3)	o En gang om ugen (4)
	o 2-4 gange om ugen (5)
Take-away måltider, som er klar til at spise, som de er (Q78_4)	o 5-6 gange om ugen (6)
	o Hver dag (7)

Q79. Hvor ofte, hvis overhovedet, spiser I følgende typer mad hjemme hos jer?

	Skala
Mælk og mejeriprodukter (Q79_1)	o Aldrig (1)
Frisk frugt og grønt (Q79_2)	o Mindre end en gang om måneden (2)
Kød og fisk (Q79_3)	o 1-3 gange om måneden (3)
Brød og andre bagerprodukter (Q79_4)	o En gang om ugen (4)
	o 2-4 gange om ugen (5)
	o 5-6 gange om ugen (6)
	o Hver dag (7)

Q80. Når du tænker på din husholdning, angiv venligst, hvor uenig eller enig, du er i følgende udsagn

	Meget uenig 1 (1)
Vi foretrækker friske produkter frem for dåsemad eller frosne produkter (Q80_1)	o Meget uenig 1 (1)
	o 2 (2)
Det er vigtigt for os, at fødevarer er friske (Q80_2)	o 3 (3)
Vi foretrækker at købe kød og grøntsager, som ikke er emballeret frem for emballeret (Q80_3)	o 4 (4)
	o 5 (5)
	o 6 (6)
	o Meget enig 7 (7)

Q81. Hvad er din alder? (brug tal)

_____

Q83. Angiv venligst din højeste gennemførte uddannelse
- o   Grund-/folkeskole (1)
- o   Almengymnasial uddannelse (studentereksamen/HF) (2)
- o   Erhvervsgymnasial uddannelse (HH/HTX/HHX) (3)
- o   Erhvervsfaglig uddannelse (4)
- o   Kort videregående uddannelse under 3 år   (5)
- o   Mellemlang videregående uddannelse 3-4 år (6)
- o   Lang videregående uddannelse 5 år eller mere (7)
- o   Forskeruddannelse (f.eks. PHD) (8)
- o   Ønsker ikke at oplyse (9)

Q84. Hvad er din nuværende arbejdsmæssige status?
- o   Fuldtidsarbejde (+30 timer/ugen) (1)
- o   Deltid (8-29 timer/ugen) (2)
- o   Deltid (under 8 timer/ugen) (3)
- o   Pensioneret/ førtidspensioneret/ på efterløn (4)
- o   Går i skole (5)
- o   Følger fuldtidsstudium på længerevarende uddannelse (6)
- o   Arbejdsløs (jobsøgende) (7)
- o   Arbejdsløs (ikke jobsøgende) (8)
- o   Hjemmegående (9)
- o   Andet (10)

Q90. Følger nogen i din husstand en vegetarisk/vegansk diæt?
- o   Ingen (1)
- o   Jeg følger **selv** en vegetarisk/vegansk diæt (2)
- o   **En anden eller andre** i min husstand følger en vegetarisk/vegansk diæt (3)
- o   **Alle** i min husstand følger en vegetarisk/vegansk diæt (4)

< (3) and (4) shown only to households with more than one member and flexible size households>

Q85. Hvad er din husstands årlige indkomst før skat?
- o   Mindre end 100.000 kr. (1)
- o   100.000 til 199.999 kr. (2)
- o   200.000 til 299.999 kr. (3)
- o   300.000 til 399.999 kr. (4)
- o   400.000 til 499.999 kr. (5)

- o   500.000 til 599.999 kr. (6)
- o   600.000 til 699.999 kr. (7)
- o   700.000 til 799.999 kr. (8)
- o   800.000 til 899.999 kr. (9)
- o   900.000 til 999.999 kr. (10)
- o   1.000.000 kr. kr. eller mere (11)
- o   Ved ikke (12)
- o   Ønsker ikke at oplyse (13)

Closing

Q91. Hvis du har spørgsmål eller kommentarer, bedes du kontakte ... på e-mail ...@mgmt.au.dk.

På forhånd mange tak for hjælpen!

Venlig hilsen
Aarhus Universitet
MAPP Research Centre

Appendix 4

Themes identified when coding the answers to the open-ended question on consumer understanding of food waste

Code name	Description	Example answers
Food that is thrown away (Throwing away food)	Short answers saying that food waste means: food being discarded or the action of discarding food	*At, smide mad ud er madspild.; Mad der ryger i skraldespanden*
Excessive purchasing	Answers emphasizing that food waste: is about buying too much or buying more than is used, some go on to say that the food is not used before it goes bad because so much is bought. Also covers those who say they buy too much because packages are too big or there are discounts	*køber for stor mængde ind og smider det der ikke bliver brugt ud; Du køber mere end du ædet!; Indkøb af for store mængder mad; Køb af alt for store mængder fødevarer især i supermarkederne, især enlige og pensionister burde kunne købe mindre portioner af fødevarer*
Cooking more than can be eaten	Answers emphasizing that food waste: is about cooking too much or cooking more than can be eaten, some go on to say that the extra food is not used and so is discarded	*Laver for meget mad og smider resterne ud; Madspild er når man tilbereder mere mad end det der bliver spist.; At man laver for meget mad og ikke fryser ned fx*
Leftover food/products that are thrown away (Throwing away leftover food/products)	Answers emphasizing that food waste: is about discarding the leftovers from cooked food or leftover products instead of using them, or is about not reusing leftovers	*rester fra måltider der kan anvendes som menneske føde, men som smides væk; har for stort oveskud, der herefter kasseres; Mad der ikke kan spises op til måltider og derefter kasseres.; at det er hvis de ikke bruger resterne næste dag hvis der er rester*
Food that is edible (usable) but is thrown away (Throwing away food that is edible (usable))	Answers emphasizing that food waste: refers to throwing away food that can be eaten, food that is still good, etc.	*det er mad som er brugbart som bliver smidt ud; det er når noget bliver smidt ud selvom det muligvis kunne holde en dag eller to mere; At kassere spiseligt mad*
Food that is not used but thrown away (Throwing away food that is not used)	Answers emphasizing that food waste: refers to food that is not eaten and thus discarded, or food that is bought and not used (e.g. before expires or goes bad)	*Det er alt det som i ikke spiser, og smider direkte i skraldespanden; indkøbte/tilberedte fødevarer, der ikke bliver spist, men ender som affald.; Alt det mad vi køber men ikke får brugt.; Overskud smides ud*
Food that gets old is thrown away (Throwing away food that gets old)	Answers emphasizing that food waste: is about throwing away food that becomes or is old/bad	*at smide madvarer ud der har ligget for længe i køleskab / fryser; Mad som bliver for dårligt og ikke bliver brugt, og som derfor smides ud*

Food that is thrown away due to date labelling concerns (Throwing away food due to date labelling concerns)	Answers emphasizing that food waste: is about throwing away food that has passed the expiration date or is food that is discarded because people are worried about the date labelling	*det er at smide mad væk, fordi slutdatoen er overskredet med en dag; At smide uåbnet madvarer ud pga dato*
Excessive consumption	Answers emphasizing that food waste: refers to over consumption	*overforbrug, ubegrundet udsmidning af mad; Overforbrug af råvarer*
Bad management of food	Answers emphasizing that food waste: is about bad management of food including lack of planning	*dårlig planlægning. hvs du har noget til overs, så genbrug det*
Waste of resources	Answers emphasizing that food waste: is a waste of resources	*spild af resurcer; Unødvendig brug af råstoffer*
Waste at the distribution level (e.g. supermarket or restaurants)	Answers which refer to food waste at the other levels than the consumer (e.g. food waste in stores, restaurants, at the producers, etc.)	*At det er overskridelse af dato på fødevarer i forretningerne;*
Other	Answers that could not be coded elsewhere	
No answer / Don't know	Answers of the type "do not know" or where nothing was written	

Appendix 5

Associations between demographic characteristics and the food waste clusters

			Food waste clusters		Total
			Low waste cluster[1]	High waste cluster[2]	
Age groups	18 to 34	Count	64[a]	76[b]	140
		%	**20.6%**	**38.4%**	27.6%
	35 to 49	Count	68[a]	58[a]	126
		%	21.9%	29.3%	24.8%
	50 to 64	Count	78[a]	42[a]	120
		%	25.2%	21.2%	23.6%
	65 or over	Count	100[a]	22[b]	122
		%	**32.3%**	**11.1%**	24.0%
Total		Count	310	198	508
		%	100.0%	100.0%	100.0%

Occupation groups	Full-time job	Count	107[a]	113[b]	220
		%	**34.5%**	**57.1%**	43.3%
	Retired	Count	116[a]	32[b]	148
		%	**37.4%**	**16.2%**	29.1%
	Other (e.g. part-time, unemployed)	Count	87[a]	53[a]	140
		%	28.1%	26.8%	27.6%
Total		Count	310	198	508
		%	100.0%	100.0%	100.0%

Household size[3]	1 member	Count	103[a]	55[a]	158
		%	33.2%	27.8%	31.1%
	2 members	Count	142[a]	76[a]	218
		%	45.8%	38.4%	42.9%
	3+ members	Count	65[a]	67[b]	132
		%	**21.0%**	**33.8%**	26.0%
Total		Count	310	198	508
		%	100.0%	100.0%	100.0%

Presence of children[4]	no children	Count	264a	144b	408
		%	**85.2%**	**72.7%**	80.3%
	with children	Count	46a	54b	100
		%	**14.8%**	**27.3%**	19.7%
Total		Count	310	198	508
		%	100.0%	100.0%	100.0%
Household income groups	under 299.999 dkk	Count	86a	43b	129
		%	**35.8%**	**26.2%**	31.9%
	300.000 to 599.999 dkk	Count	99a	55a	154
		%	41.3%	33.5%	38.1%
	600.000 dkk or more	Count	55a	66b	121
		%	**22.9%**	**40.2%**	30.0%
Total		Count	240	164	404
		%	100.0%	100.0%	100.0%

Pearson Chi-Square >=10; all significant at p<.05. For each of the demographics, different subscript letters show that the column proportions are significantly different.
(1) Respondents who reported household food waste of less than a tenth of what is bought or produced in all food categories
(2) Respondents who reported household food waste of more than a tenth of what is bought or produced in at least one food category
(3) The household size for flexible households is the number of people who live in the household most of the time
(4) The presence of children for flexible households refers to having children in the household most of the time
(5) "%" refers to percentage within the Food waste cluster

Appendix 6

Associations between demographic characteristics and consumer perceptions, practices, incentives for motivation and awareness of food waste consequences.

The associations between demographics (age and occupation groups) and consumer perceptions, food-related practices, incentives for motivation and awareness of food waste consequences were explored. The results are presented in the tables below. Only age and occupation groups were included in these analyses as these were the demographics that had a significant effect on the food waste clusters in the logistic regression (when considering the relative importance of all demographics, see Section 4.8.). In relation to age, the *18 to 34 years old* group was associated with higher food waste, thus, only the results related to the comparison between the 18 to 34 years old group and the other age groups are presented in the table below. Similarly, for occupation the *"full-time job" group* was associated with higher food waste as opposed to the "other" occupation group (e.g. part-time job, unemployed), thus, only the results related to the comparison between the "full-time job" group and the occupation groups "other" or "retired", are presented in the table below.

Table. Associations between Perceptions of edibility of certain foods and parts of food and Demographics

			Age groups	
			35+	**18 to 34**
Upper part of leeks	Always edible	Count	185_a	56_b
		% within Age groups	**50.3%**	**40.0%**
	Edible only when used in specific recipes	Count	118_a	45_a
		% within Age groups	32.1%	32.1%
	Never edible	Count	65_a	39_b
		% within Age groups	**17.7%**	**27.9%**
Dry bread	Always edible	Count	106_a	25_b
		% within Age groups	**28.8%**	**17.9%**
	Edible only when used in specific recipes	Count	185_a	89_b
		% within Age groups	**50.3%**	**63.6%**
	Never edible	Count	77_a	26_a
		% within Age groups	20.9%	18.6%
Browned bananas	Always edible	Count	142_a	39_b
		% within Age groups	**38.6%**	**27.9%**
		Count	149_a	80_b

	Edible only when used in specific recipes	% within Age groups	**40.5%**	**57.1%**
	Never edible	Count	77ₐ	21ₐ
		% within Age groups	20.9%	15.0%
Potato skins	Always edible	Count	49ₐ	26ₐ
		% within Age groups	13.3%	18.6%
	Edible only when used in specific recipes	Count	95ₐ	48ₐ
		% within Age groups	25.8%	34.3%
	Never edible	Count	224ₐ	66ᵦ
		% within Age groups	**60.9%**	**47.1%**
Carrot peels	Always edible	Count	36ₐ	25ᵦ
		% within Age groups	**9.8%**	**17.9%**
	Edible only when used in specific recipes	Count	77ₐ	50ᵦ
		% within Age groups	**20.9%**	**35.7%**
	Never edible	Count	255ₐ	65ᵦ
		% within Age groups	**69.3%**	**46.4%**
Apple skin	Always edible	Count	133ₐ	78ᵦ
		% within Age groups	**36.1%**	**55.7%**
	Edible only when used in specific recipes	Count	74ₐ	34ₐ
		% within Age groups	20.1%	24.3%
	Never edible	Count	161ₐ	28ᵦ
		% within Age groups	**43.8%**	**20.0%**

Cross-tabs were conducted separately for each food. Pearson Chi-Square >=7; all significant at p<.05. Only foods where there were statistically significant associations are presented. For each food, different subscript letters show that the column proportions are significantly different; N=508

Table. Associations between Perceptions of edibility of certain foods and Demographics

			Age groups		Occupation		
			35+	18 to 34		Retired or Other	Full-time job
Food that starts to look unappealing even if it still can be eaten	Always edible	Count	63$_a$	51$_b$	Count	75$_a$	39$_b$
		% within Age groups	**17.1%**	**36.4%**	% within Occupation	**26.0%**	**17.7%**
	Edible only when made into another dish	Count	135$_a$	61$_a$	Count	99$_a$	97$_b$
		% within Age groups	36.7%	43.6%	% within Occupation	**34.4%**	**44.1%**
	Never edible	Count	170$_a$	28$_b$	Count	114$_a$	84$_a$
		% within Age groups	**46.2%**	**20.0%**	% within Occupation	39.6%	38.2%
Food that is leftover and you have been eating from it twice before in the same week	Always edible	Count	198$_a$	92$_b$			
		% within Age groups	**53.8%**	**65.7%**			
	Edible only when made into another dish	Count	80$_a$	30$_a$			
		% within Age groups	21.7%	21.4%			
	Never edible	Count	90$_a$	18$_b$			
		% within Age groups	**24.5%**	**12.9%**			

Cross-tabs were conducted separately for each food. Pearson Chi-Square >=6; all significant at p<.05. Only foods where there were statistically significant associations are presented. For each food, different subscript letters show that the column proportions are significantly different; N=508

Table. Associations between age groups and food-related practices, incentives for motivation to reduce food waste, perceptions of food waste and awareness of food waste consequences

	Age					
	18 to 34 vs. 35 to 49 years old		18 to 34 vs. 50 to 64 years old		18 to 34 vs. 65+ years old	
	Mean difference	Sig.	Mean difference	Sig.	Mean difference	Sig.
	• positive values: mean in the 18 to 34 group > mean in the 35 to 49 group; • negative values mean in the 18 to 34 group < mean in the 35 to 49 group)		• positive values: mean in the 18 to 34 group > mean in the 50 to 64 group; • negative values: mean in the 18 to 34 group < mean in the 50 to 64 group)		• positive values: mean in the 18 to 34 group > mean in the 65+ group; • negative values: mean in the 18 to 34 group < mean in the 65+ group)	
Planning and Shopping Practices						
Before going grocery shopping, we check our inventories (cupboards, fridge) to see what we already have at home		NS		NS	-.614	.003
We make a meal plan for a couple of days ahead		NS		NS	.708	.014
We buy food in quantities that are bigger than what we currently need when there are quantity discounts		NS		NS		NS
We buy food products that then we find out we already had at home		NS		NS		NS
We buy products that we did not plan to buy		NS		NS		NS
We intentionally buy larger quantities of some products that are staples in our home to make sure that we will have enough		NS		NS		NS

	Age					
	18 to 34 vs. 35 to 49 years old		18 to 34 vs. 50 to 64 years old		18 to 34 vs. 65+ years old	
	Mean difference	Sig.	Mean difference	Sig.	Mean difference	Sig.
Storing Practices						
We have a good overview of the food that we have in the fridge and cupboards		NS		NS	-.792	.000
We know for how long the foods that we have stored in the fridge have been in there		NS	-.517	.004	-.789	.000
We forget about food in the fridge until it is too old to eat		NS	.490	.032	.910	.000
We store foods as we see in the supermarket		NS		NS	-.487	.015
We keep meal leftovers in transparent or clearly visible containers in the fridge		NS		NS	-.802	.000
We store leftover food in the freezer		NS		NS	-.642	.002
We forget to use the food from the freezer		NS	.592	.001	.680	.000
Cooking and Preparing food Practices						
Before cooking a meal, we look at the cupboards and fridge to see what food products we have		NS		NS		NS
We prioritize leftovers and food close to expiration when preparing a meal		NS		NS		NS
We use leftovers in the lunchbox for next day		NS		NS	.778	.004
We intentionally cook a bit more than needed in order to make sure that it will be enough		NS	.435	.050	.767	.000

	Age					
	18 to 34 vs. 35 to 49 years old		18 to 34 vs. 50 to 64 years old		18 to 34 vs. 65+ years old	
	Mean difference	Sig.	Mean difference	Sig.	Mean difference	Sig.
We follow a set meal plan when making meals		NS	.681	.018	.809	.002
We do not eat all the food that is available for a meal		NS		NS		NS
Eating and Serving Practices						
I think that one should always eat what is on one's plate when dining at home		NS		NS	-.763	.002
We all eat the same food for dinner, in my household		NS		NS		NS
We provide a large variety of foods at mealtimes so that everyone can have something he or she likes		NS		NS		NS
Some household members do not eat regularly at home [1]		NS		NS	1.933	.000
Incentives for motivation to reduce food waste						
Thinking about the possibility of saving money		NS		NS		NS
Wanting to feel competent in the kitchen		NS		NS		NS
Thinking about my values		NS	-.475	.038	-.668	.001
Wanting to keep order in the kitchen		NS		NS	-.686	.001
Wanting to help the environment		NS		NS		NS
Avoiding to feel regret about time spent shopping, storing and preparing food not eaten		NS		NS		NS

	Age					
	18 to 34 vs. 35 to 49 years old		18 to 34 vs. 50 to 64 years old		18 to 34 vs. 65+ years old	
	Mean difference	Sig.	Mean difference	Sig.	Mean difference	Sig.
Perception of leftover food fed to animals						
In my household, we consider leftover food fed to pets/animals as food waste		NS		NS	-.633	.047
Awareness of food waste consequences						
Food waste (food thrown away) is a problem for the environment		NS		NS		NS
Food waste (food thrown away) generated in Denmark has an impact on the undernourished people in the world		NS		NS		NS
In my household, we are aware of how much money we use weekly for food that gets thrown away		NS	-.831	.003	-1.191	.000

ANOVA analyses (with Bonferroni adjustment in the comparison of age groups; or with Games-Howell adjustment for those analyses where homogeneity of variance was an issue) were conducted per each practice, incentive, perception or awareness measure; NS=not statistically significant;

(1) N=367; for all other measures N=508

(2) All measures had answer options from (1) to (7) and all 7 points were used for these analyses. The higher values represent higher frequency (for Planning and Shopping, Storing, and Cooking and preparing food practices), higher agreement (Eating and serving practices, Perception of leftover food fed to animals and Awareness of food waste consequences) or higher importance (Incentives for motivation)

Table. Associations between occupation groups and food-related practices, incentives for motivation to reduce food waste, perceptions of food waste and awareness of food waste consequences

		Occupation			
		Full-time job vs. Retired		Full-time job vs. Other	
		Mean difference	Sig.	Mean difference	Sig.
		• **positive values:** mean in the Full-time job group > mean in the Retired group; • **negative values:** mean in the Full-time job group < mean in the Retired group)		• **positive values:** mean in the Full-time job group > mean in the Other group; • **negative values:** mean in the Full-time job group < mean in the Other group)	
Planning and Shopping Practices					
Before going grocery shopping, we check our inventories (cupboards, fridge) to see what we already have at home		-.418	.017		NS
We make a meal plan for a couple of days ahead			NS		NS
We buy food in quantities that are bigger than what we currently need when there are quantity discounts			NS		NS
We buy food products that then we find out we already had at home			NS	.371	.006
We buy products that we did not plan to buy		.390	.003		NS
We intentionally buy larger quantities of some products that are staples in our home to make sure that we will have enough			NS		NS
Storing Practices					
We have a good overview of the food that we have in the fridge and cupboards		-.548	.000		NS
We know for how long the foods that we have stored in the fridge have been in there		-.479	.000		NS
We forget about food in the fridge until it is too old to eat		.657	.000		NS
We store foods as we see in the supermarket			NS		NS
We keep meal leftovers in transparent or clearly visible containers in the fridge		-.371	.034		NS

	Occupation			
	Full-time job vs. Retired		Full-time job vs. Other	
	Mean difference	Sig.	Mean difference	Sig.
We store leftover food in the freezer	-.444	.011		NS
We forget to use the food from the freezer	.422	.007		NS
Cooking and Preparing food Practices				
Before cooking a meal, we look at the cupboards and fridge to see what food products we have		NS		NS
We prioritize leftovers and food close to expiration when preparing a meal		NS		NS
We use leftovers in the lunchbox for next day	.528	.027		NS
We intentionally cook a bit more than needed in order to make sure that it will be enough		NS		NS
We follow a set meal plan when making meals	.491	.038		NS
We do not eat all the food that is available for a meal		NS		NS
Eating and Serving Practices				
I think that one should always eat what is on one's plate when dining at home	-.644	.001		NS
We all eat the same food for dinner, in my household		NS		NS
We provide a large variety of foods at mealtimes so that everyone can have something he or she likes		NS		NS
Some household members do not eat regularly at home [1]	1.055	.000		NS
Incentives for motivation				
Thinking about the possibility of saving money		NS		NS
Wanting to feel competent in the kitchen	-.514	.047		NS
Thinking about my values		NS		NS
Wanting to keep order in the kitchen	-.687	.000	-.392	.047

	Occupation				
	Full-time job vs. Retired			**Full-time job vs. Other**	
	Mean difference	**Sig.**		**Mean difference**	**Sig.**
Wanting to help the environment		NS			NS
Avoiding to feel regret about time spent shopping, storing and preparing food not eaten		NS			NS
Perception of leftover food fed to animals					
In my household, we consider leftover food fed to pets/animals as food waste	-.504	.038			NS
Awareness of food waste consequences					
Food waste (food thrown away) is a problem for the environment		NS			NS
Food waste (food thrown away) generated in Denmark has an impact on the undernourished people in the world		NS			NS
In my household, we are aware of how much money we use weekly for food that gets thrown away	-1.186	.000			NS

ANOVA analyses (with Bonferroni adjustment in the comparison of occupation groups; or with Games-Howell adjustment for those analyses where homogeneity of variance was an issue) were conducted per each practice, incentive, perception or awareness measure; NS=not statistically significant;

(1) N=367; for all other measures N=508

(2) All measures had answer options from (1) to (7) and all 7 points were used for these analyses. The higher values represent higher frequency (for Planning and Shopping, Storing, and Cooking and preparing food practices), higher agreement (Eating and serving practices, Perception of leftover food fed to animals and Awareness of food waste consequences) or higher importance (Incentives for motivation)

DCA - National Centre for Food and Agriculture is the entrance to research in food and agriculture at Aarhus University (AU). The main tasks of the centre are knowledge exchange, advisory service and interaction with authorities, organisations and businesses.

The centre coordinates knowledge exchange and advice with regard to the departments that are heavily involved in food and agricultural science. They are:

Department of Animal Science
Department of Food Science
Department of Agroecology
Department of Engineering
Department of Molecular Biology and Genetics

DCA can also involve other units at AU that carry out research in the relevant areas.

SUMMARY

Household food waste is one of the main contributors to the food waste amounts across the food supply chain. This report is based on a study conducted in September 2017 by MAPP Research Centre – Research on Value Creation in the Food Sector. The study aimed to examine consumer food waste, with a focus on consumer perceptions and practices related to food waste. A survey was completed by 508 respondents in Denmark to provide insights into self-reported consumer food waste, consumer understanding and perceptions of food waste, household food-related practices as well as individual and household characteristics with a role in food waste.