

# Meal ingredient portioning behaviour at the dinner preparation stage and the effect on leftovers and food waste in Dutch single-person households

## Master Thesis



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## Preface and acknowledgement

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The topic food waste has been one of my greater interests since I started my Bachelor study and got involved with the concept of sustainability. I grew up being taught food waste is *bad*, however, never questioned the reasons behind it. Today I know better. The way we harm our beautiful planet is unacceptable, but luckily there seems to be hope through increasing awareness.

Therefore, from the first moment I saw the thesis topic list, it was clear to me that this was the topic I had to choose and when I met my first supervisor, Dieuwerke, I knew it was the right choice. I thought I already knew a lot about the topic, however, she was the expert; she was the one who introduced me into the complex world of food waste and to other experts, such as my second supervisor Bea.

Dieuwerke and Bea have both been of great support; Dieuwerke through her constant advice and frequent guidance, and Bea through her rich feedback. Therefore, I am thanking you two for all the input and ideas that helped me to finish this project.

Last but not least, I really want to thank my parents for all their support and particularly patience. I know it has been some interesting years and surely having me constantly on the go and being abroad can sometimes be nerve-racking. Therefore, I would like to dedicate this thesis to you to show my deepest thanks for all your support!

To all readers: I hope you can learn from this work and if you don't already do so, apply at least a bit of it to your personal lifestyle!

*Nicole Jansen*

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## Concepts and definitions

<b>Cookware</b>	For this study, cookware includes pots, pans, oven dishes and all dishes in which food can be prepared.
<b>Leftovers</b>	A leftover is food remaining after a meal. In this study, leftovers do not include drinks or food ingredients not used for the evening meal preparation. Leftovers for the purpose of this study refer to the food that is left intendedly or unintendedly after meal preparation and consumption in the cook- and/or bakeware and on the plate.
<b>Eetmaatje</b>	The <i>Eetmaatje</i> is a measuring cup to help portioning rice, pasta, and couscous. It was developed by the Dutch Voedingscentrum with the aim to reduce food waste by helping the consumer to portion more precisely.
<b>Evening meal/ Dinner</b>	The Dutch are accustomed to regularly eat 3 main times a day: Breakfast, lunch and dinner. The main dish/warm meal of the day is usually served in the evening, also called dinner. For this study a meal is defined as the food served and eaten for dinner. According to the Voedingscentrum the criteria for a meal are a combination of 2 or more ingredients of different product groups of the Schijf van vijf (Voedingscentrum, 2016). For the purpose of this study, much freedom shall be given as to the minimum amount of ingredients and the type of ingredients in a meal, as natural behavior shall be investigated. A meal can consist of one or more servings. For the preparation of a meal, all main ingredients needed are considered. Herbs and spices are not considered as ingredients for the purpose of this study. Neither are ready-to-eat meals.
<b>Healthy/ Balanced diet</b>	A <i>balanced diet</i> refers to the combination of consuming the right amount and types of food. According to the Voedingscentrum the portions per day of fruits and vegetables should be the largest, followed by carbohydrates, proteins, and finally fats.
<b>Portion size</b>	Portion size is defined as the total amount of food that an individual chooses to eat during a single eating occasion (English, Lasschuijt, & Keller, 2015). This can include one or more servings of the prepared food on the plate. It is not the total amount of food prepared as the remaining can be defined as leftovers.
<b>Portioning</b>	Portioning refers to the activity of selecting a quantity of an ingredient used to prepare a meal.
<b>Schijf van vijf</b>	The Schijf van vijf (lit.: Disc of five) was developed in 1953 by the Voedingscentrum to serve as a tool that helps consumers to an optimized nutritional intake <sup>1</sup> . It was last revised in 2016
<b>Voedings – centrum</b>	The Netherlands Nutrition Center
<b>WRAP</b>	Waste and Resource Action Programme, United Kingdom

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<sup>1</sup> [Http://schijf-van-vijf.nl/](http://schijf-van-vijf.nl/)

## Executive summary

One third of the food produced worldwide is wasted, leaving a heavy social, environmental, and financial impact. The biggest contributors throughout the supply chain are households (53%), of which the constellation of single-person households wastes most per person. One major reason of food waste was found to be mal-estimations of ingredients, however, existing literature mainly focused on serving portions on plates or bowls. Additionally, it became evident that mal-estimations of meal ingredient portioning has a major influence on leftovers and on the food wasted in households. Therefore, the aim of the study was to investigate the motives of meal ingredient portioning behaviour at the preparation stage of dinner and to understand how these motives were affecting leftovers and food waste in Dutch single-person households.

A qualitative approach of exploratory nature was chosen for this purpose. The methods used in the present study were food diaries and interviews. In total, seven Dutch men and nine Dutch women, aged between 25 to 64, preparing dinner for themselves at least three to four times a week, were selected for the study. First, the participants had to conduct a ten-day food diary in form of a questionnaire, which had to be filled in daily. Mainly picture uploads were used to get a better insight into the preparation, leftover, and disposal behaviour. Based on the food diaries, individual interviews that mainly took place in the participant's home, were conducted. The interviews aimed to understand the underlying motives behind the behaviour identified in the food diaries. Each interview was recorded and transcribed. Code development was used through the data analysis software, ATLAS.ti, to analyse the transcribed interviews.

Based on the findings, a distinction was made between soft and hard portioning methods, of which soft methods are based on feelings, and hard methods involve tools or references to portion. Both methods are used among consumers, however, also packaging was identified as a determinant for portion sizes. Motives to use hard methods were simplification, diet, and the social environment that provides references. The main motive of using soft methods was experience, which is gained by living alone, rather than being passed on by parents or role models. It was observed that soft methods tend to lead to more ingredient, plate, and cookware leftovers, whereas consumers who used hard methods struggled less in portioning and have less leftovers and food waste. Leftovers were generally not seen as a bother, and often intended. They were also influenced by gender, age, parents, routine, and hunger. Ingredient leftovers were generally reused, whereas plate leftovers were mostly caused by female participants and in all cases disposed. Generally, however, they occurred rather rarely. Intentional as well as unintentional cookware leftovers occurred very often in Dutch single-person households, whereby female participants tended to intentionally prepare more. Intentional as well as unintentional cookware leftovers were usually kept and reused. Other important influences on food waste were age, parents and role models, taste, and priorities.

Concluding, portioning behaviour has a strong impact on leftovers, as the method used determines the amount of particularly cookware leftovers. However, the extent on which portioning behaviour has an impact on food waste in Dutch single-households is rather limited. Food that is disposed during dinner preparation and consumption rather depends on serving, taste, and satiation. This is because mostly plate leftovers, which do not occur often, are disposed, whereas ingredient and cookware leftovers are generally stored. Finally, packaging has a major influence on leftovers and food waste in single-person households, as often large packages at a relatively lower price are chosen, which are too big to be consumed. Nevertheless, only relative low amounts of actual food waste were observed.

## 1. Introduction to the research

### 1.1. Background on food waste

In the EU, yearly 90 million tonnes – or in other words, one third - of all food produced is wasted throughout the supply chain (European Commission, 2010).

Food waste has an enormous and negative impact on the environment as well as on economy and society. From an environmental perspective, every ton of food waste is responsible for 4.5 tonnes of CO<sub>2</sub> emissions. This equals 20 million tonnes of CO<sub>2</sub> annually in only the UK, according to the Waste and Resources Action Programme (WRAP, 2009). Those numbers arise mainly from the large emissions of greenhouse gases through the production of food, involving energy, resources, harvest, transport, processing, selling food, and emissions associated with storage at home and cooking (Quested, Marsh, Stunell, & Parry, 2013). Additionally, the waste ends up in landfills where it produces methane accelerating the problem of global warming (European Commission & ENV, 2010; Graham-Rowe, Jessop, & Sparks, 2014). The associated financial cost that the annual food waste in Europe causes is estimated to be around 143 billion euros – for food that is disposed (Stenmarck, Jensen, Quested, & Moates, 2016). Clearly, this also has an impact on society; as population is expected to increase up to 9.8 billion people by 2050 (United Nations, 2017), the reduction of food waste is crucial to assure everyone can be fed. However, valuable resources such as water and land are treated in wasteful manners (Buchner et al., 2012; Lipinski, O'Connor, & Hanson, 2016; Stancu, Haugaard, & Lähteenmäki, 2016; Williams, Wikström, Otterbring, Löfgren, & Gustafsson, 2012). Therefore, the United Nations Development Programme (UNDP) initiated the Sustainable Development Goals (SDGs) of which two focus on zero hunger and responsible consumption (UNPD, 2017), underlining the importance of researching food waste, as still 815 million people worldwide go to sleep hungry (FAO, 2017).

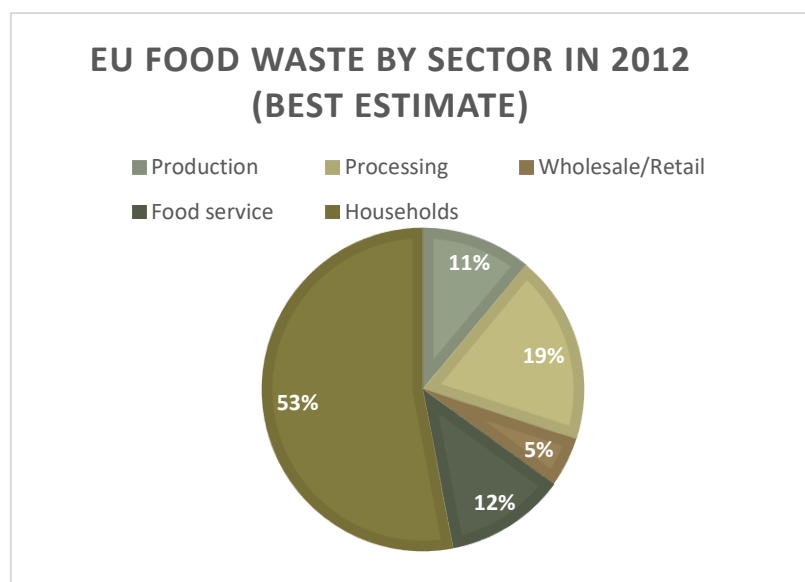


Figure 1 Split of EU food waste by sector (Stenmarck et al., 2016)

Food waste in the EU occurs on many different levels and for different reasons. As shown in Figure 1, primary producers and processing companies are responsible for 30%. The food wasted or lost during production and processing on the farm as well as in food processing facilities, occurs mainly due to technical malfunctions or inefficiencies (Buchner et al., 2012). Food services and retail organisations account for a rather small percentage (17%) of all food wasted in Europe. However, the biggest wasters



in the EU are households, with an amount of 53%. From the perspective of the European countries, the UK is the leader in wasting food with a total of >14 million tons annually, followed by Germany (>10 million tons) and the Netherlands (>9 million tons) (European Commission, 2010). As the Netherlands by far have the smallest population compared to UK and Germany, it is in relation even the biggest food waste producing country per capita.

#### 1.1.1. Household food waste

Households are the biggest food wasters in the EU (European Commission, 2010), which were further investigated by the Waste and Resources Action Programme (WRAP) through several studies. The studies showed that single-person households were identified to waste most per person among household constellations. They are associated to relatively waste four times the average food as of a four-person household per person (Koivupuro et al., 2012; Quested & Johnson, 2012; WRAP, 2009). This makes single-person households one of the biggest contributors to food waste in the EU (European Commission & ENV), 2010; Halloran, Clement, Kornum, Bucatariu, & Magid, 2014).

Particularly in households where women were responsible for meal preparation, food waste was considerably higher than in household where men, or men and women were responsible (Koivupuro et al., 2012). Single women even relatively wasted more (Richter, 2017). The reasons for that are associated with the good provider or also called mother theory, as well as to personal dietary goals, minimising inconvenience, and lack of priority (Graham-Rowe et al., 2014; Hebrok & Boks, 2017). However, other studies suggested that there are several inconsistencies and weak associations of the claim that women generally waste the highest amounts (Buchner et al., 2012; Secondi, Principato, & Laureti, 2015). Moreover, other studies suggested that elderly people generally waste less, due to post-war experiences (Secondi et al., 2015).

#### 1.1.2. Motives of food waste

Food waste is not necessarily dominated by a certain type of food but rather diverse. However, the five types of most food wasted in households were (1) fresh fruits and vegetables, (2) bakery products, (3) homemade meals, (4) meat and fish, and (5) dairy (Stancu et al., 2016; WRAP, 2009).

However, the reasons and motives for food wasted at the end of the supply chain are very complex. Among many, the key causes of food waste produced in households are lack of awareness, preferences, planning and labelling issues, storage, routines, and socio-economic reasons. Furthermore, purchasing activities, which are related to price, routine, and packaging, also play an important role. Jörissen, Priefer, & Bräutigam (2015) concluded that households stating that the price is important waste less than households stating that price is less important. According to Williams et al. (2012), 25% of food wasted in households can be accounted to packaging, due to their large sizes and difficultness to be emptied. However, also a lack of information and clarity, such as about best before and expiry date play a role. Nevertheless, one of the main causes of wasteful behaviour in households of food was identified as mal-estimation of portion sizes, as consumers often “over-generously” prepare meals (Buchner et al., 2012; Chandon & Wansink, 2006; European Commission, 2010; FAO, 2011; FAO, IFAD, UNICEF, WFP, & WHO, 2017; Stenmarck et al., 2016).

### 1.2. Portioning behaviour of consumers

#### 1.2.1. The portion size effect

Up until now, consumer behaviour studies regarding portioning mainly focused on served portions on plates or bowls. In total, 92% of all food eaten, is served by the consumers themselves (Wansink, van Ittersum, & Painter, 2006) and many studies conducted (cf. Brand & Wansink, 2016; Quested &

Johnson, 2012; Williams et al., 2012), looked at the amount of food consumers serve themselves under several conditions. The results showed that dietary restraints, liking, expected satiation, and to some extent BMI are important factors that can have an influence on the estimation of a portion (David Labbe, Rytz, Brunstrom, Forde, & Martin, 2017). The findings also suggested that meal portioning is a driver of overconsumption and due to large portions, there is more obesity. In UK and Ireland, two thirds of the population are obese. Studies have also shown an association between the increase of portion sizes and obesity (Wansink & Payne, 2009). This underlines the importance of the topic since obesity increases, according to the World Health Organization (WHO, 2016). Many scientific studies have analysed this so-called portion size effect, the effect of eating more, if portions are larger. The motives for larger portions are mainly related to packaging and visual cues, such as the size of plates, packages, and serving utensils (English et al., 2015). An example is that consumers unconsciously serve themselves a larger portion if the plate size increases.

Therefore, many diet programs use for instance special plates with indications of how much is the right amount to consume (cf. Hieke, Palascha, Jola, Wills, & Raats, 2016; Petit, Spence, Velasco, Woods, & Cheok, 2017; Rolls, 2014; Versluis, Papies, & Marchiori, 2015; Wansink, van Ittersum, & Painter, 2006). Researchers are going as far as calling the problem a “distorted perception of appropriate portion sizes” (Faulkner et al., 2017).

#### 1.2.2. Tools, measures, and references supporting ingredient portioning behaviour

According to Brown et al. (2013), it is challenging to get an understanding of the motives of ingredient portioning behaviour among consumers, as there are many methods available. Among the most common ones are household measures such as cups, spoons, grams, packages, or pieces.

Furthermore, due to the underlying problem of distorted perceptions of appropriate portion sizes, several tools and guidelines evolved in the past years, aiming to help to consumers in more precise portioning. However, the problem with those tools and guidelines, such as the Food Pyramid, Healthy Eating Guidelines etc. are that there are a variety of them, giving inconsistent and conflicting advice (Faulkner et al., 2012). Faulkner et al. (2012) concluded that no common governmental guideline exists, which could be standardized and used by all industries.

Faulkner et al. (2017) also suggested the use of Portion Size Estimation Aids (PSEA). In their study the researchers investigated consumer’s opinions on the usefulness of different PSEA, whereby a distinction was made between (1) quantities and measures, (2) reference objects (such as a match box or the palm of a hand), (3) household measures and utensils, and (4) indicators on food packages. Quantities and measures were perceived as rather laborious and would be only used when following a recipe. Reference objects were generally evaluated as smaller than what the consumer would actually eat. Household measures and utensils were stated to be useful but must be cleaned. However, consumers indicated that for amorphous foods (e.g. rice), a cup included in the package would be useful. Finally, having indicators on food packages was also evaluated as rather useful. Education is also seen as important in portion size behaviour. Participants of the PSEA study suggested early learning adapted to gender, age, and activity level (Faulkner et al., 2017).

In turn, Hogbin & Hess (1999) explained that portioning ingredients is rather related to gut feeling. The researchers concluded that consumers usually estimate rather than measure portions, which is based on feelings. Hieke et al. (2016) concluded that gender also plays a role in portioning behaviour. Studies showed that the portion behaviour of women is based on more appropriate estimations than the portion behaviour of men (Hieke et al., 2016).

### 1.2.3. The influence of ingredient portioning on leftovers and food waste

Buchner et al. (2012) described that consumers have severe difficulties to estimate the right quantity of ingredients that they prepare for a meal. The consequences of mal-estimation of ingredients are most often leftovers, which result from an excessive amount of food prepared and left in the cookware after consumption (Buchner et al., 2012; Hebrok & Boks, 2017; Secondi et al., 2015). Hebrok & Boks (2017) explained that the excessive foods are often small amounts of leftovers, characterised by their low value such as rice and pasta. Furthermore, the scholars explained that those types of foods are not seen as worthy to reuse in a next meal.

In turn, those leftovers are often kept and placed in the back of the fridge or the freezer, where they are forgotten and finally disposed (Halloran et al., 2014; Hebrok & Boks, 2017; Janssen, Vries, Boer, & Kremer, 2017), which makes portioning behaviour a main driver of food waste. It leads to poorly reused and most often disposed leftovers or home made meals, which are the third most common foods to be disposed (Buchner et al., 2012; Graham-Rowe et al., 2014; Koivupuro et al., 2012; Morgan, 2009; Quested & Johnson, 2012; Richter, 2017; Stancu et al., 2016). Hebrok & Boks (2017) even pointed out that some people manipulate food in order to make it easier to throw it away. Often, consumers let leftovers go bad consciously, to have an eligible reason to throw them out. Furthermore, the findings of Williams et al. (2012) also showed that more than half of the food waste happened due to not using food on time or due to having leftovers and not reusing them, which often is a matter of attitude.

Nevertheless, it must also be pointed out that in contrast, more than half of the EU citizens (58.45%) claim to actually re-use leftovers resulting from their cooked meals (Secondi et al., 2015), indicating that they actually do not waste leftovers.

### 1.2.4. Motives of leftovers

Ingredient, plate, and cookware leftovers, as they are defined for this study, result from a whole range of activities. This involves not checking the available food at home before buying new food, planning, storing, and preparation behaviour, as well as purchasing behaviour (Quested & Johnson, 2012). According to a household survey of WRAP (2007), 14% of households do not check what they need to buy. Single-person households, however, tend to check what they need based on what they have available. Although shopping lists are quite common, many don't stick to them. Regarding meal planning, one fourth just eat what they like in the moment or what is available.

## 1.3. Theoretical framework

Based on existing literature that was found previously, a theoretical framework, summarizing the most important findings regarding portion behaviour, leftovers, and food waste, was developed. As can be seen in Figure 2, the main process shows that portioning behaviour has a direct influence on leftovers and either leads to reusing leftovers or food waste (Buchner et al., 2012; Hebrok & Boks, 2017; Secondi et al., 2015).

As described previously, there are several factors that play a role when portioning ingredients. Scholars pointed out that household measures such as cups and spoons are the most common ones (Brown et al., 2013), however, also common objects, packaging, references, or even gut feeling have an influence on how consumers portion ingredients (Brown et al., 2013; Faulkner et al., 2017; Hieke et al., 2016; Hogbin & Hess, 1999). Generally, however, portioning was identified as rather difficult, which is why portioning is directly linked to ingredient, plate, and cookware leftovers.

Underlining the complexity of the topic, ingredient, plate, and cookware leftovers are not only influenced by portioning behaviour, the main focus of this study, but also by several other factors. Plate leftovers however, are also related to serving portions, which was described as the portion size effect (cf. Brand & Wansink, 2016; Tom Quested & Johnson, 2009; Williams et al., 2012). A serving size can be influenced by dietary restraints, liking, and satiation and furthermore be related to BMI (Labbe, Rytz, Godinot, Ferrage, & Martin, 2017). Regarding all types of leftovers, also purchasing behaviour was identified as relatively important (Jörissen et al., 2015) and studies furthermore showed that also forgetfulness, planning, storing, and checking the availability of food at home can have an influence on leftovers (Halloran et al., 2014; Janssen et al., 2017; Quested & Johnson, 2012). Furthermore, the latter can also have an influence on food waste, through the created leftovers.

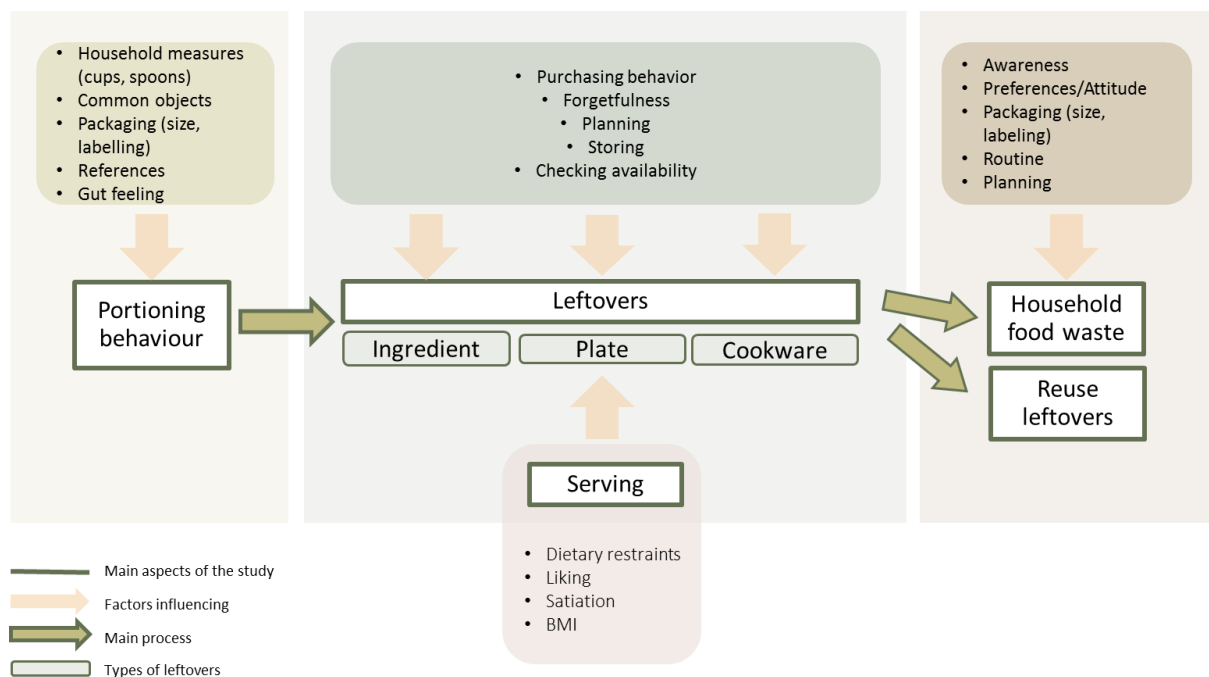


Figure 2 Theoretical framework

However, it became evident that food waste does not necessarily need to be a consequence of leftovers, as consumers claim to reuse leftovers (Secondi et al., 2015). What is also important is that not only portioning behaviour, which leads to leftovers, influences food waste (cf. Buchner et al., 2012; Hebrok & Boks, 2017; Secondi et al., 2015), but that there are also other factors involved. Actual awareness of the environment and the impact of food waste was described as an influencing factor. However, also preferences and attitude towards leftovers can result in food waste. Finally, there are also important behavioural factors such as use of packages, routine, and planning that can influence whether leftovers are disposed or reused (Jörissen et al., 2015).

#### 1.4. Research gap in meal ingredient portioning behaviour

Through the previous chapters it became evident that mal-estimations of meal ingredient portioning have a major influence on leftovers and therefore on the food wasted in households, as mostly leftovers are not reused but disposed.

Nevertheless, what is missing in research is an understanding about how individuals portion meal ingredients to prepare a meal, as the behaviours and motives for portioning meal ingredients remain unidentified. Furthermore, the relation between a prepared meal and serving size, as well as the

influence of serving sizes on leftovers, is unclear. There are neither associations between the disposal of leftovers due to the overestimation of served portions on dishware such as plates, which can have an influence on consumers serving behaviour (Labbe, Rytz, Brunstrom, Forde, & Martin, 2017).

Furthermore, it is also not clear if and how consumers use certain measuring tools such as scales, spoons, photographs, or cups (Brown et al., 2013; Rolls, 2014) or whether portion behaviour is rather related to feeling the right amount or to the behaviour passed on by a role model or traditions, as Hogbin & Hess (1999) explained it. They showed that people usually estimate rather than measure portions. Moreover, they underpinned that each person has their own perception of the standard portion size. The estimating size is a relative judgement, and more research is needed to understand the drivers of portioning ingredients for the preparation of a meal. Through this study, insights about individuals of single-person households and their behaviour regarding the reasons and motives of portioning ingredients for a meal are investigated, as there is little to no scientific research done.

### 1.5. Research question

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What are the motives of meal ingredient portioning behaviour at the preparation stage of dinner and how are these motives affecting leftovers and food waste in Dutch single-person households?

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#### Sub Questions

- How are food ingredients at the dinner preparation stage portioned in Dutch single-person households?
- What are the motives and reasons to choose a specific method for the portioning of food ingredients at the preparation stage of a meal in Dutch single-person households?
- How does meal ingredient portioning influence ingredient, plate, and cookware leftovers?
- How are leftovers managed in Dutch single-person households?
- To what extent do leftovers lead to food waste in Dutch single-person households?

### 1.6. Research aim

The aim of this study is to investigate the motives of meal ingredient portioning behaviour at the preparation stage of dinner and to understand how these motives are affecting leftovers and food waste in Dutch single-person households.

## 2. Methodology

### 2.1. Research approach

Qualitative research aims to clarify, understand, and discover feelings and behaviours, as well as values and attitudes (Kothari, Kumar, & Uusitalo, 2014). It is generally low in precision and structural depth and rather characterised as flexible and emergent. As this study provides insights into the motives that drive individuals to portion food ingredients to prepare a meal, a qualitative research approach of exploratory nature, based on the principle of grounded theory and thematic analysis, is most suitable. As limited knowledge exists on this topic (Hieke, Palascha, Jola, Wills, & Raats, 2016; Hebrok & Boks, 2017), grounded theory helped to explore the drivers through flexible guidelines and textual data analysis. Particularly the interplay between inductive (raised by the participant) and deductive (based on literature) strategies to analyze the data, helped to make a link between ingredient portioning behaviour to prepare a meal and generating leftovers and food waste.

### 2.2. Design of the study

#### 2.2.1. Overall design of the empirical study

The design chosen for the research were food diaries followed by interviews. Food diaries have gained high popularity in recent years among researchers and have been used to report the quantities of food waste, and to analyze behavior (Stenmarck et al., 2016; Williams et al., 2012; Wrap, 2009). Additionally to the food diaries, interviews were chosen to explore the motives and the reasons behind the answers to the food diaries. Clearly, the quality of the data retrieved from interviews depends highly on the researcher and the developed interview schedule (Kothari et al., 2014). Therefore, a pilot study was conducted to correct any flaws of the interview. As this is a behavioral study, interviews were chosen as they are very appropriate for complex situations (Kothari et al., 2014).

As this study was very similar to a research about the influence of the degree of processed vegetables and their package size on vegetable waste in single-person households, the methodology was developed together with the researcher Lotte Demmink (BLT student). Therefore, one part of the food diaries and the interviews were related to vegetable packages. The cooperation with Lotte was very valuable to understand the influence of packaging and portioning on leftovers and food waste.

#### 2.2.2. Study population

For this research, seven Dutch men and nine Dutch women aged between 25 and 64 formed the study population. The age was spread evenly among the participants. Other important requirements were that they live in single-person households and that they cook dinner for themselves at least three to four times a week. The BMI of the study population should not be lower than 18.5 kg/m<sup>2</sup> and not exceed 30 kg/m<sup>2</sup>. For communication purposes, it was also necessary to feel confident when speaking English and to be able to express themselves.

#### 2.2.3. Recruitment of participants

The sample population was selected via non-random, judgemental sampling. This strategy was chosen as it aims to find participants who can provide the best possible answers to achieve the objectives of the study. Furthermore, it is often used in studies about which nothing or just little is known (Kothari, Kumar, & Uusitalo, 2014).

Ede, Bennekom, Renkum and its surrounding in the central Netherlands was selected to recruit Dutch participants mainly for purposes of convenience, as the University is located close by. Furthermore, it

was tried to avoid participants from Wageningen itself, as it is a very sustainable and environmentally conscious city, which could have an influence on the study results.

To recruit participants, a flyer (Appendix A) was developed to create awareness of the study and was mostly published and shared through social media, particularly in different Facebook groups that relate to the city of Ede. Additionally, flyers were printed and hung in supermarkets, doctor's offices, and other local community places. The flyer itself showed the requirements for the participants, the timeframe, reimbursement, and the contact details. Furthermore, the electronic version included a link to a selection questionnaire on which potential candidates could simply click, and then fill out online.

The selection questionnaire (Appendix B) was developed with the software Qualtrics. The first questions asked were mainly related to the personal details and characteristics, which are the name, date of birth, highest educational level, and the height and weight to calculate the BMI. Additionally, the potential participants were asked whether they feel confident to answer questions in English, to not jeopardize the study due to language barriers. Furthermore, it was asked whether they work or study at Wageningen University and Research Center (Wageningen UR), if they live alone, how many times a week they cook for themselves, and whether they are committed to keep the diary for ten days and to have an additional interview. Finally, at the end of the questionnaire, the potential candidates had to fill in their contact details and BSN number for an eventual reimbursement and they were asked if they are interested to receive information regarding future studies of the Food Quality and Design Group of Wageningen UR.

Finally, 16 participants were selected and 25 did not meet the inclusion criteria and were excluded. An overview of the selected participants can be seen in Table 1.

*Table 1 Overview of characteristics of selected participants according to age (N.a.=not applicable; f.=female; m.=male; yrs.=years; mth.=months; MBO=middle level applied education; HAVO=medium secondary education; VWO=higher secondary education; HBO=higher professional education; WO=University)*

Code	Age	Gender	Education	BMI	Living alone	Occupation	Hours	Days	Cooking rate	Grocery rate	Location interview
P6	25	m.	MBO	29	6 mth.	Student/side job	Flex	Fixed	4 to 5	Daily	Home
P12	26	m.	WO	21	1 yr.	GP	Flex	Flex	3 to 4	Unknown	WUR
P11	28	f.	WO	24	2 yrs.	PhD candidate	Flex	Fixed	4 to 5	2 to 3	Home
P10	29	m.	WO	21	10 yrs.	Manager Zoo	Flex	Flex	4 to 5	1 to 2	Skype
P13	29	m.	WO	25	6 mth.	PhD candidate	Flex	Fixed	3 to 4	3 to 4	Home
P9	30	f.	WO	30	12 yrs.	Teacher	Flex	Fixed	4 to 5	1 to 2	Work
P1	35	f.	MBO	27	6 yrs.	Elderly care	Flex	Flex	Depends	3 to 4	Home
P3	42	f.	VWO	29	9 yrs.	Unemployed	N.a.	N.a.	Daily	1 to 2	Home
P15	45	f.	HBO	25	4 yrs.	Unknown	Flex	Flex	3 to 4	3 to 4	WUR
P4	49	m.	MBO	26	2 yrs.	Unemployed	N.a.	N.a.	5 to 6	2 to 3	Home
P7	51	f.	HBO	23	1 yr.	Online ED.	Flex	Fixed	3 to 4	1 to 2	Home
P14	57	f.	HBO	27	10 yrs.	Unemployed	N.a.	N.a.	Daily	3 to 4	Home
P2	59	f.	MBO	24	4 yrs.	Cleaning, Pedicure	Flex	Flex	5 to 6	1 to 2	Home
P8	59	m.	HBO	23	7 yrs.	Entrepreneur	Flex	Flex	3 to 4	Daily	Home
P5	62	f.	HAVO	25	5 yrs.	Taste panellist	Flex	Flex	5 to 6	1 to 2	Home
P16	64	m.	MBO	22	2.5	Unemployed	N.a.	N.a.	Daily	Daily	Skype

The two main exclusion criteria were (1) not living in a single-household and (2) working at Wageningen UR. Less strict criteria were location and level of English, as interviews could be done by Skype and as one researcher is native Dutch. The participants who did not meet the criteria were informed via email. Most of the participants came from Ede and surroundings, namely Wageningen, Bennekom, Renkum, Rhenen, Heelsum, and Arnhem. However, two of the participants lived in Amersfoort and Den Helder, respectively.

After the participants were selected, an email (Appendix C) was sent to welcome them to the study, and to give further information about the research and the upcoming steps. In this email, the possibility to select a starting date for the food diary was given as well. After this, a consent form (Appendix D), an information brochure (Appendix E), and an information leaflet (Appendix F) on how to fill in the food diary questionnaire, were sent by post and email. In that way, the participants could choose either way to send the consent form back. The postal package therefore also included another stamped envelope to send the consent form to Wageningen University and Research Center.

#### 2.2.4. Food diaries

Each of the participants had to keep the food diary for ten days, starting on a Friday of their choice in November. Friday was chosen in order to have two weekends and one work week included in the study, to see whether there are differences in behaviour. On each of the ten days the participants received an email including the food diary in form of a questionnaire (Appendix G). Qualtrics, the program which was used to develop the questionnaire, allowed the participants to choose between a smartphone, laptop, or tablet to fill in the questionnaire. Daily reminders (Appendix H) were sent to prevent forgetfulness, which is one of the drawbacks of food diaries highlighted by Zorpas & Lasaridi (2013).

##### 2.2.4.1. *Structure of the food diary*

The structure of the food diary can be seen in Appendix G. The participants were first asked to write their name, after which they had to indicate whether they cook dinner that night or not. If they did not, the questionnaire was branched to ask for their alternative dinner plans, after which the questionnaire was ended. If they indicated they would prepare dinner for themselves, the questionnaire would continue by asking for how many days the participants intended to cook. After describing what meal they are preparing, they had to upload a clear picture of all ingredients that they used for the meal. Afterwards, also the package size had to be indicated in a separate question, for the case that the picture was not sufficiently visible. After the preparation of the meal, the participants had to, if applicable, upload another picture indicating all ingredients that they had left and did not use for the preparation of the dinner. At this point it was important that the food could show, if the product was for instance in a non-transparent package. For all ingredients that were not used, the participants had to furthermore indicate in a separate question how they handled each of the ingredients. In the food diary leaflet, they received at the beginning of the study, examples indicated that the ingredients could be refrigerated, frozen, disposed, or otherwise stored. This was followed by the upload of a clear picture of all food the participant prepared. Another picture had to show what the participant served on their plate. They were also given the option to upload a second picture in case they served food on their plate a second time. Then, the participants had to upload a picture of their plate after eating, to identify eventual plate leftovers. If there were leftovers, the questionnaire was branched so that the participants could fill in how they handled the leftovers. The last picture that the participants had to upload was of their cookware to see, whether there were any leftovers or not. Finally, if they did have cookware leftovers, they had to indicate in a comment box how they handled



them. At the end of the questionnaire, the participants always had the chance to add comments. An example for a comment given in the food diary leaflet was, *"I did sports before eating, so I was very hungry"*.

#### 2.2.5. Interviews

After the participants completed the food diary, fourteen of them had the interviews with both researchers, whereas two of the participants were interviewed individually (P12 & P8). On day five of the food diaries, the reminder email (Appendix H) included the request to make an appointment for the interview.

##### 2.2.5.1. *Setting of the interviews*

The interviews took place on a random day during the week, which was set in accordance with the participant. Most interviews were held at the participants' homes, attended by both researchers. Conducting interviews at home has several advantages, such as that the participant feels confident and in their comfort zone (Hennink, Hutter, & Bailey, 2011). In the homes itself, the researchers tried to avoid sitting opposite the interviewee to not create a forced, but rather a conversational and friendly environment. Through those initiatives, participants all gave the impression of feeling comfortable and talked freely. Although the interviews were recorded, actions and gestures were seen by both interviewers, which helped to better interpret the answers and compare data. Five interviews could not be held at the participants' home. P9 preferred to be interviewed at her working place due to convenience, P10 & P16 were interviewed via Skype due to geographical distance, and P12 & P15 came to the Wageningen UR, also due to convenience for them.

##### 2.2.5.2. *Structure of the interviews*

The interviews were semi-structured which had several advantages. Whereas structured interviews are bound to a fixed content, structure, and wording, semi-structured interviews are more flexible. The benefit of this method is that it allows to change the sequence and wording in the spur of the moment, to explain questions, and to raise new issues that come up in the course of the interview (Kothari et al., 2014). On the other hand, having a predetermined set of fixed question in form of an interview schedule, helped to receive uniform information and therefore easily test for reliability. Moreover, each interview was adjusted to the answers that were received through the food diary.

At the beginning of each interview, the researchers introduced themselves and reminded the participant that the interview was recorded. Those introductory points were not included in the interview schedule. During the interview, the interview schedule was followed, however, often additional questions were asked, whereas others were left out, or reformulated.

The interview schedule (Appendix J), was developed before the pilot study and contained a total of 34 questions, which were divided into 3 different main sections.

#### **Section 1**

According to Hennink, Hutter, & Bailey (2011), the first section of the interview aims at generating background information and to build rapport. However, as those information were already received during the selection questionnaire, the interview schedule started directly with the opening questions. Opening questions are broadly related to the main topic and have the purpose to build rapport with the interviewee (Hennink, Hutter, & Bailey, 2011). The questions asked in this section concerned topics such as the frequency of cooking in a regular week (Q.1) or the type of food they prepare (Q.2).

## ***Section 2***

This section was the central part of the interview schedule, in which key questions were asked. It is designed to collect core information and allows for essential questions to be asked.

Within Section 2, the key questions were further divided into six parts. To create the most logic interview schedule for the consumer, the key questions were asked in the same order as the cooking process takes place. Therefore, the first set of key questions related to purchasing ingredients. Questions such as how the participant determines what ingredients to buy for the dinner (Q.7) or what form and size of vegetable package is normally bought (Q.8), were asked in this part.

The second part was concerned with the preparation of the dinner. At this point, questions were concerned with whether it is important for the participants to cook the right amount of food for themselves (Q.11) and whether they have the feeling they do prepare the right amount of food for themselves (Q.12), were asked.

The third part aimed to get insights into portioning behaviour. Therefore, one question was related to the determination of the amount of ingredients needed for the preparation of the dinner (Q.13). Additionally, Question 14 inquired the reason behind choosing a certain amount of ingredients for the dinner.

The final three parts of the key questions related to leftovers. They were divided into ingredient leftovers, plate leftovers, and cookware leftovers and were mostly concerned with how the participants handled leftovers (Q.16, Q.20, & Q.24). Furthermore, the questions concerning plate leftovers also related to serving the food on the plate.

## ***Section 3***

The final part of an in-depth interview are the closing questions, which are of great importance to minimise rapport through another set of broad questions before closing the interview. Closing questions of this research were concerned with the actual knowledge of the participants on food waste (Q.28) and how much they estimated to dispose by themselves (Q.29). Additionally, they were also asked about suggestions or ideas on how to portion ingredients better to avoid leftovers (Q.32), to reduce leftovers in general (Q.33), and to reduce food waste in single- and multi-person households (Q.34).

### ***2.2.6. Pilot study***

Many researchers agreed (i.a. Kothari, Kumar, & Uusitalo, 2014; Benson & Filippaios, 2016) that pilot studies are of crucial importance for an appropriate study design. They increase the likelihood of a successful study and help to erase any potential errors. Therefore, several pilot studies were conducted for this research. The food diary was tested twice with an independent person in order to discover flaws in the food diary questionnaire. Furthermore, the interview was tested twice, too. However, the interview pilot studies were done among the researchers, as it was aimed to identify missing questions crucial to the study. After testing the research instrument, it was improved before the start of the actual study.

### 2.3. Ethical approval

Ethical approval to conduct the study was received by the Social Sciences Ethics Committee of Wageningen UR, which concluded that the proposal dealt with ethical issues in a satisfactory way and that it complied with the Netherlands Code of Conduct for Scientific Practice. Furthermore, the participants signed an informed consent prior to participation. The ethical approval can be found in Appendix I.

### 2.4. Data analysis

The approach used for qualitative data analysis in this research is grounded theory and thematic analysis, as they aim to understand “human behaviour” and “social processes and cultural norms” (Hennink, Hutter, & Bailey, 2011). Therefore, it was well suited to develop empirical theory by interpreting complex qualitative data, which is circular in nature as it may be repeated, overlap, or conducted simultaneously. Although grounded theory is originally a rather inductive approach, deductive and inductive strategies were used both to analyse data. According to the principles of grounded theory, several steps were conducted:

#### 2.4.1. Data preparation

The first step of data preparation was to transcript the interviews based on the recording. This task was shared between the researchers, whereby Demmink transcribed the recordings of Participant (P) 1, P2, P3, P5, P8, P10, P13, and P15, and Jansen of P4, P6, P7, P9, P11, P12, P14, and P16. This was done directly after completion of each interview, as it helped to (1) recognize new issues to be explored in the following interviews, and (2) to identify the point of saturation. During transcription, not only the content was written down, but also noticeable characteristics such as long pauses, and verbal and physical gestures. The transcripts, which can be found in a separate document, were labelled and included the identification of the speakers, whereby R1=Researcher 1 (Jansen), R2=Researcher 2 (Demmink), and P=Participant. Since the interview of P8 was conducted in Dutch, it was translated to English during transcription. Finally, to anonymize data, all identifiers were removed from the data and participants received the codes P1 to P16.

#### 2.4.2. Codebook development

Codes are defined as tags or labels and their development refers to the initial step of analyzing qualitative data (DeCuir-Gunby, Marshall, & McCulloch, 2011). The development of the codes included both, inductive (raised by the participants) as well as deductive codes (derived from theory and literature), which helped to develop the codebook (Appendix K). Also, coding was a shared task among the researchers, whereby Demmink coded the transcripts of P4, P5, P6, P9, P10, P11, P13, and P16, and Jansen coded the transcripts of P1, P2, P3, P7, P8, P12, P14, and P15. Also, the quotations in the text refer to the number of the participant, as well as indicator for the location of the quotation (e.g. P6, 56:67). Coding was advantageous to index the data, which simplified locating specific issues discussed. For the purpose of simplification in coding, the participants were divided into four age categories, being (1) 25 to 35, (2) 36 to 45, (3) 46 to 55, and (4) 56 to 65. Seven diverse interviews were picked to start with the development of the codebook, as it was recommended by Hennink, Hutter, & Bailey (2011). After coding the seven transcripts, the codebook was developed with the input of both researchers for most of its part. This was followed by a revision of the remaining transcripts, which added fewer codes until saturation was reached. Coding itself was done by using ATLAS.ti, a qualitative data analysis software aiming to reveal meanings and relationships. The strategies used to code were (1) noticing repetition, (2) analytic reading, and (3) exploring underlying concepts. Throughout this process, codes were changed and adjusted to make an optimum fit with the issues, topics, ideas, or

opinions. In order to assure consistency in coding between researchers, an inter-coder agreement was set. This consisted of a joined development of the codebook, which involved the comparison of all codes among the researchers.

#### 2.4.3. Analysis of the food diaries and interviews

The data received through the food diaries was analysed through Excel. For each of the participants a separate Excel file was created, in which the results of each of the ten-day food diary were displayed. The answers to each question were indicated and the uploaded pictures were simply described. By comparing the data of the individual participants throughout the ten-day period of the food diaries, it was possible to identify patterns and behaviours. Those were then compared among all different participants.

The data of the interviews was analysed through ATLAS.ti. The programme offered different tools for data analysis, of which the so-called Query Tool was used predominantly. It allowed to retrieve quotations by searching within the codes. A query is referred to a search expression composed of a descriptor and operators, which define the condition for the retrieval of codes. Descriptors can be codes or code families, whereas operators specified the relationship between the descriptors. The basic types of operators offered by the query tool are Boolean, semantic, and proximity operators. By adding different codes or a code family to the query tool and choosing an operator, the quotations meeting the criteria, which were specified by the selected elements, were shown in a results list.

The findings of the interviews were then compared to the data received from the food diaries. The outcomes were analysed and are discussed in the following chapter.

### 3. Results and discussion

#### 3.1. Portioning of food ingredients at the dinner preparation stage

This section focuses on the results and analysis of the first sub research question, which aimed to explore how food ingredients at the dinner preparation stage are portioned in Dutch single-person households. Based on the results, a division was made between *soft* and *hard* methods to portion ingredients. *Soft* hereby refers to portioning based on gut feeling, visual interpretation, and feeling of hunger. *Hard* on the other hand refers to quantities or references, tools, and household objects.

##### 3.1.1. Soft methods to portion food ingredients

It became evident that most of the participants portion ingredients based on their feeling and visual interpretation. Almost half of the participants stated the two portioning methods concurrently and explained that they mostly portion by “just looking”, “thinking that’s what I need” (P15, 57:30), and “just feel[ing] like it” (P1, 53:46). A fair number of participants also indicated that they “adapt the rest of the ingredients” (P13, 51:33) based on one fixed ingredient, while cooking, implying that they still make decisions on portioning while they are in the preparation process: “I just have the feeling that there has to go one more potato in there” (P8, 54:86). This could also be observed through the food diaries, as sometimes ingredients would appear on a picture of the final dish that were not there in the initial picture of the ingredients, which were intended to be used. An example is Day 5 of P4; the picture of the food served on his plate included an egg, even though the egg was not displayed in the picture of the ingredients. This is to be explained that he decided during the preparation process to add other ingredients.

Regarding the decision process, for others it already started in the store where they just “pick the one (broccoli) that [they were] hungry enough for, bought it and then cooked [it all]” (P11, 47:26), which is further discussed in the following sub-chapter.

##### 3.1.2. Hard methods to portion food ingredients

Also brought up by the participants were *hard methods*, such as quantities or references, tools, and household objects. In the present study more than half of the participants indicated that they weigh their ingredients for portioning. Furthermore, of those that weigh ingredients, most of them weigh “everything” (P9, 48:27), such as “vegetables” (P6, 42:42), “meat” (P9, 46:28), and “potatoes” (P4, 46:34). In contrast, quantities and measures were evaluated by consumers of the study of Faulkner et al. (2017) as “too laborious”. Other participants of the present study also indicated that often “when you are in the shop, when you buy vegetables, you have to measure it” (P5, 43:30), indicating that there is sometimes no way around measuring. Furthermore, almost half of all participants also explicitly indicated that they weigh “pasta, rice, [and] couscous” (P7, 52:89), referred to as grains and pasta, which strongly stands in contrast with the findings of Faulkner et al. (2017). She found that participants only weigh, when following a recipe. In the present study, however, no association between recipes and weighing or measuring were found. Neither did any of the participants indicate reference objects, such as match boxes or the palm of the hand, but rather other references such as guidelines. Particularly outstanding was that almost all participants used references when portioning. *Reference* was defined as a source that is taken into consideration when preparing dinner. So did many participants indicate that they follow “recommendations from the Voedingscentrum” (P11, 47:23) on the amount of grams of which food group should be consumed per day. Others, however, referred to “the directions, [the Schijf van vijf] gives for the food you need” (p15, 57:32), which is recommended through the Voedingscentrum.

Furthermore, almost half of the participants indicated that they use “a cup” (P1, 53:48) or “a glass” (P12, 51:43) to portion grains and pasta or other foods without a definite shape (i.e. “quinoa, beans”; P14, 56:93). Also, literature concluded that consumers favour cups as ingredient portioning tools, particularly for the product group of grains and pasta (Faulkner et al. 2017). While all previously mentioned methods to portion ingredients are of deductive nature, a fair number of participants also induced the so called *Eetmaatje*, which is a measuring tool introduced by the Voedingscentrum. The *Eetmaatje* is a special measuring beaker which allows to measure different types of grains and pasta for different amounts of portions. Many of the participants use the *Eetmaatje*, but also indicated during the interview that they received it for free in Albert Heijn during a campaign of the Voedingscentrum against food waste<sup>2</sup>. Therefore, it became evident that it is used mainly to help portioning and not to reduce waste.

Moreover, whereas literature mentioned that consumers found it rather useful to have indicators on food packages (Faulkner et al., 2017), none of the participants actually spoke about information on portioning sizes per person on packages. They rather complained about insufficient information on the package regarding the content.

#### 3.1.3. Simultaneous use of soft and hard methods

Finally, there was another point that was not stated in literature. A fair number of participants explained during the interview within the same quotation that they use both soft and hard methods. Quotations such as “I just look into the package (of vegetables) and then I decide from looking [...] [and] weighing” (P15, 57:59), show clearly that there is no fixed method or preference of portioning ingredients. When taking the complete section about the explanation of portioning of each participant into consideration, it becomes evident that even more than half of the participants portion in both ways: based on “intuition” (P5, 43:25) as well as by “using some tools” (P14, 56:85). Also interesting is that all female candidates use one of the hard methods, such as tools or cups, whereas only more than half measures based on their feeling, including visual portioning and feeling hungry. In contrast, almost all male participants portion based on soft as well as hard methods. Whether there is an association with what is already known from literature regarding females portioning more precisely, is discussed later in this chapter.

#### 3.1.4. Additional findings of portioning food ingredients related to purchasing and planning behaviour

In this sub-section, additional findings in relation to portioning of ingredients that were found during data collection, are discussed. Those findings mainly relate to the step before dinner preparation, namely, purchasing behaviour, which appeared to influence the way food ingredients are portioned in Dutch single-person households at the dinner preparation stage.

##### 3.1.4.1. Product choice based on convenience

It was found that all participants valued convenience and mentioned statements related to convenience at least several times during the interview. It became evident that product choice is strongly depended on convenience but also on price. Even almost half of the participants referred to convenience and price concurrently as motivation of their food choice, which can be identified through quotations such as “the reasons why I would buy the fresh one (pre-packaged vegetables) is because they are bigger and cheaper and you can just cook for more days” (P12, 51:23) or “because it’s (canned

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<sup>2</sup> Het Voedingscentrum en Albert Heijn lanceren het *Eetmaatje* <https://www.ah.nl/over-ah/pers/persberichten/bericht?id=1220976>

vegetables) cheap and easy to store” (P9, 48:83). Another indicator of the price consciousness of all participants was that more than half determined what they want to buy based on “what’s on sale” (P2, 55:13). As it was previously described that portions are often already determined the store due to package types and sizes, it becomes evident that the determinants to purchase a certain product are directly related to convenience and price.

#### *3.1.4.2. Product choice based on liking and impulse buying*

Another strong determinant for buying foods was liking. In literature, also Jörissen, Priefer, & Bräutigam (2015) stated that consumers buy what they like in the moment, although considering the price. This is similar to the present study, as the participants stated that they decided what they like best “at the moment” (P5, 43:10), which also led to decisions being made right in the supermarket, indicated by half of the participants. To determine what to buy right in the supermarket is also an indicator of weak (meal) planning and not checking the available food at home. On the other hand, many more than half of the participants indicated during the interview that in fact they do plan what they will buy and many plan for several days or for the whole week: “I decide on Saturday what I want to eat for the whole week” (P9, 48:5) or “I make a list and I go shopping for the entire week” (P7, 52:13). Those rather contradictory results show clearly, how complex the topic is, as many of the participants oppose their statements about their activities, although having regular behaviours to some extent. For instance, they would determine what to buy in the store but also check the storage at home and plan their meals. Regular purchasing behaviour is also strongly associated with routine, whereby most of the participants show a rather routinized behaviour. Furthermore, as predicted due to literature findings, only a few participants indicated that they check what food they “have left” (P15, 47:9), or “what is in [...] [their] home already” (P3, 50:11), although one participant also admitted that he only checks the fridge when he does not forget (P12, 51:14).

#### *Summary:*

Soft portioning methods include those ones based on feelings, visual interpretation, and can be influenced by hunger. Hard methods in turn, are those that measure a predetermined amount through tools such as the Eetmaatje, a cup, references, or a scale. Against expectations from literature, participants did not find hard methods as too laborious, but rather used them in combination with soft methods to portion ingredients. The study also explored that portioning ingredients already starts during the purchasing process, as product choice often is a determinant for portion sizes.

### *3.2. Motives behind specific methods to portion food ingredients at the dinner preparation stage*

This chapter provides the results and analysis of the second sub research question, which aimed to explore the motives behind the portioning behaviour of ingredients at the dinner preparation stage.

#### *3.2.1. Motives behind hard methods*

##### *3.2.1.1. Simplifying ingredient portioning*

As described in Chapter 3.1., participants mostly portioned ingredients for their dinner with soft methods, such as based on feelings or visual interpretation, as well as on hard methods, referring to tools such as scales, cups, or the Eetmaatje. Thereby it became evident that more than half of the participants explicitly stated to struggle with portioning ingredients, as “sometimes it’s too less and sometimes it’s too much” (P4, 46:25), or they admitted that they “cannot really estimate it” (P4, 48:99). Others, however, rather struggled with certain foods, as one participant explained: “If we talk about this food, I don’t know how much I need or how much...it was a lot” (P6, 42:35). In this case P6 was

referring to rice and it was observed that more participants had difficulties to “understand how much rice [they] had to cook and how much macaroni” (P2, 55:94). Interestingly, of all participants who indicated that they struggled to portion ingredients, almost none used a cup or a tool to portion. Additionally, the participants who did not indicate to struggle when portioning ingredients, all used a cup or a tool to measure their portions. This shows that there is a direct link between using hard methods like tools, scales, and cups and not struggling to portion.

#### 3.2.1.2. *Diets*

Another motive to use hard methods to portion ingredients for the dinner preparation are diets. Approximately one fourth of the participants is doing a diet “to lose weight” (P6, 42:105) or “to avoid [certain] ingredients” (P11, 47:4) that would influence their health condition. All participants who aimed to lose weight (P6 & P9), strictly followed the concept of weighing ingredients as they really “try to keep in [...] mind how much food [they are] eating” (P6, 42:106). P11 who is on a “specific diet” (47:4) on the other hand, is rather forced to measure all ingredients precisely to avoid health issues.

#### 3.2.1.3. *Social environment*

Reasons for weighing ingredients as well as for taking references for specific amounts of foods for dinner preparation into consideration, are seemingly of social nature. So did more than half of the participants take what they have heard from others, into consideration when portioning. *Others* hereby can refer to the news, magazines, TV shows, or friends. Therefore, when inquiring the reasons for certain behaviours during portioning, the respondents always answered “I have heard” (P2, 55:46) and then specified their reply further into “I have heard we don’t need to eat meat every day” (P2, 55:46), “I think for pasta they often say [...] 100 grams is for one person” (P15, 57:28), or “my colleague went to a dietician and she heard 50 to 60 grams” (P7, 52:38). In turn, only less than half of the participants actually refer to scientific sources such as “research in Wageningen” (P7, 52:80) or “recommendations from the Voedingscentrum” (P11, 47:23). Hereby, participants did not make a distinction between scientific or non-scientific sources. A direct association between gender, age, and level of education, could not be made.

#### 3.2.2. *Motives behind soft methods*

The motives behind using soft methods such as listening to the gut or the feeling of hunger, are mostly related to experience. More than half of the participants explained that “after a while you know how much you eat or how much is too much or what is too little” (P15, 57:29). Even after specifically inquiring about why for instance a participant uses a cup or another specific way of portioning, “I already do it all my life” (P1, 53:49) or “I do it for 4 years, so I know what [...] I need” (P8, 49:67), was answered. Although experience might often be associated with age, all participants who indicated that they portion based on their experience, are in the age range of 25 to 65 years old. Rather than age, it was observed that experience related to the time the participant already lived alone. P9 for instance is in the youngest age category (25 to 35) and has been living alone for 12 years. She indicated that she needed to learn how to portion when she moved out and now feels very confident (48:28). In contrast, P16 from the oldest age category (56 to 65), has been living alone for seven years and explained that he has learned how much food his body needs (49:67). Finally, P6 who is also in the youngest age category and just moved out 4 months ago, seemingly has great struggles to portion ingredients (42:35). Clearly, there is a direct link between the time that a participant has been living alone, and the level of experience of portioning ingredients.



### 3.2.3. The influence of parents and role models on ingredient portioning behaviour

Although assumed based on literature, participants of the present study did not relate the portioning method to their parents, role models, or traditions. Hogbin & Hess (1999) explained that motives of portioning can also be related to behaviour passed on by a role model or traditions. Many participants, with a slight tendency towards more female participants, indicated that they have certain behaviours, because of their “parents” (P13, 45:56). However, this was mostly related to leftover management, which is discussed in Chapter 3.4. In fact, some participants stated the opposite, mentioning that when they moved out from home, they “did not know anything about cooking and portion size” (P9, 48:28). This result is in great contrast to the findings of Hogbin & Hess (1999), who concluded portioning is dependent on behaviour that is passed on. The reasons why behaviours are not passed on anymore by parents or role models could be due to a change in consumer and lifestyle behaviour. In a study in 2013, Slater explained that there is a clear reduction in nutrition skills, referred to as *cooking*, which, due to its decreasing role in society, has led to “culinary de-skilling”, as she called it. Reasons for this phenomenon are the lack of home economics courses taught in schools (Smith & de Zwart, 2010), as well as less occurrence of home-based food mentoring (Fulkerson et al., 2011).

### 3.2.4. The influence of packaging on ingredient portioning behaviour

It became evident that motives of using a specific method to portion ingredients also depend on the type and size of packaging of food products. More than half of the participants actually stated to use big packages (approximately 500 grams) for instance for vegetables, which they can then use for several days. In order to cook for more days, they choose “a package size [that] is bigger [...] to split over two meals” (P10, 44:74). Therefore, a motive for portioning can simply be the package size, as participants “just take half” (P8, 54:53). Actual reasons for choosing a bigger package are mostly convenience and price, as “they are [...] cheaper and you can just cook for more days” (P12, 51:24). Few participants also use medium sized vegetable packages (approximately 350 grams), which can be a determinant for portioning. As explained, the packages are simply split in half to prepare a meal for two days, which could be explained due to the many different existing guidelines, as almost all participants take references into consideration.

For other packaging types, similar reasoning could be observed. More than half of the participants indicated that they use cans due to reasons of convenience and price, “because it is cheap and easy to store” (P9, 48:62). Another reason identified was shelf life and interestingly cans were often associated with a feeling of security, as a fair number of participants stated that they buy them to “have something in the house when [they] get sick” (P2, 55:22) to be prepared for “emergency days” (P11, 47:47). Nevertheless, most of the time participants sounded rather negative when talking about cans, indicating that they “prefer fresh” (P6, 42:17) products. It also became evident that participants use all of the can due to health concerns: “I prepare everything [...] because [...] you don’t want to put it back in the fridge, because you have already entering bacteria and fungi” (P13, 45:93). Using the whole package of a food product to prevent deterioration clearly is another motive of how ingredients are portioned.

Very similar reasons of usage were found for frozen vegetables. Half of the participants use frozen food but do prefer fresh food. Nevertheless, there is not as much negativity involved with frozen food as there is with canned food and participants even described them as “healthy” (P11, 47:99). For frozen food, there seems to be a tendency to “just take a little bit” (P5, 43:78) of the package, as it needs to be “immediately put [...] back to the freezer (P14, 56:94). Therefore, participants rather use soft methods to portion their ingredients.

Nevertheless, it appeared that participants are not necessarily loyal to one package type as “it could be a large one, could be a small one” (P15, 57:13), which therefore also changes their motives of portioning ingredients in a certain way. What all participants had in common was that they “prefer fresh” (P10, 44:12) products. Loose vegetables, not packed but sold as a whole, were mostly associated as being fresh and, as mentioned before, often already weighed by consumers in the store, which leads to further pre-preparation motives of portioning ingredients.

Many participants already think about portioning while still being in the store and not necessarily during preparation: “Usually I buy the small size for one-time use” (P9, 48:11) or “potatoes I buy mostly 200 grams; that’s a little package and vegetables mostly are half of a package. I split that in half” (P4, 46:17). Due to their purchasing behaviour, the way of portioning ingredients is therefore often already pre-determined by either forcefully weighing it in the store (P5, 43:30) or by comparing the content of fixed package sizes: “I read how many grams are inside and then I decide if I eat the whole or half or if I have to buy two” (P9, 48:94).

#### Summary:

Apparently, participants who used hard methods struggled less with the portioning of ingredients than participants who did not use hard methods. Simplification, diet, and social environment all appeared to be important motives of portioning ingredients. Against expectations from literature, portioning is not learned by role models or parents, but rather while living alone, through experience. The study also explored that package size and type are an important motive of portioning, indicating that the portioning process already starts at the purchasing stage.

### 3.3. The influence of ingredient portioning on leftovers

This section of the results and analysis focusses on the discussion of the influence of portioning ingredients on leftovers.

#### 3.3.1. The influence of soft and hard methods on leftovers

Looking at the hard methods to portion, it already became evident previously that less participants struggled with portioning when they used tools such as scales, measure beakers, or household objects such as cups. So did P11 use weighing as portioning method and nevertheless, she has ingredient leftovers. Furthermore, P9 indicated that she weighs her ingredients and also she, occasionally, has ingredient or plate leftovers. Although mostly female participants weighed their ingredients, both male and female participants used soft and hard methods. Hieke et al. (2016) found in their study that the portion behaviour of women is more precise than the portion behaviour of men, which was to some extent in line with the present study. However, it appears that all participants did at least have one ingredient leftover, most of the participants had cookware leftovers, and only few participants had plate leftovers throughout their 10-day food diary (Table 3). Finally, it became evident through the comparison of the food diaries and the interviews that participants, who mostly portion ingredients with soft methods, have more often ingredient, plate, and cookware leftovers.

#### 3.3.2. Intended and unintended leftovers

As can be seen in Table 2, leftovers do not seem to be interpreted as a bother or something negative, as almost all participants indicated that they intentionally prepared more food to have leftovers for another meal. This was also considered during the food diaries, where the participants were given the option to choose whether they intend to cook for one meal, for two meals, or for more than two meals. In the table it can be seen that the amount of leftovers was divided into low, medium, or high, which

refers to the relative occurrence of unintended and intended cookware leftovers during the ten-day food diary. Half of the participants prepared more food intentionally due to convenience reasons. They “make bigger portions so [...] [they] can put extra in the freezer” (P7, 52:16) or “store it for the day after” (P14, 56:58). However, it also became evident that almost three quarters of the participants also unintentionally prepared too much food. This implies that the same participants who intentionally cooked more, also unintentionally cooked more food. However, when referring to having prepared too much unintentionally, it was often related to the struggle participants had with portioning: “Sometimes it’s too much [because] there are some potatoes that are little and some that are big” (P4, 46:25). In turn, there are other participants who referred again to adapting their meal during the preparation process, as one participant indicated that she “was trying to cook for one day and then [...] [she] just had too much sauce and [...] threw in a bit more pasta” (P3, 50:30). This phenomenon was also observed through the food diaries, although only among a few participants. For instance, P5 decided during the preparation process to prepare a few more portions of rice in order to store them in the freezer for convenience, which she later explained during the interviews.

*Table 2 Overview of relative occurrence of intended and unintended cookware leftovers according to gender, based on the results of the food diary; - = no leftovers*

	Participant	Intended cookware leftovers	Unintended cookware leftovers
<b>Female</b>	P1	low	low
	P2	medium	-
	P3	high	low
	P5	low	-
	P7	high	-
	P9	-	-
	P11	low	-
	P14	medium	medium
	P15	-	medium
<b>Male</b>	P4	-	low
	P6	low	low
	P8	high	-
	P10	-	-
	P12	low	medium
	P13	low	medium
	P16	-	low

As it became evident, intended leftovers are quite common, however, as they are wanted and purposely prepared, rather than being a result of mal-portioning, the following chapters focus mainly on unintended cookware leftovers.

### 3.3.3. The influence of gender on portioning behaviour and leftovers

Through the food diary and interviews, some observations regarding gender could be made. Table 3 shows participants’ ingredient, plate, and unintended cookware leftovers, depending on gender and their portioning methods. The amount of leftovers was divided into low, medium, or high, which refers to the relative occurrence of the type of leftover during the ten-day food diary.

*Table 3 Overview of relative occurrence of ingredient, plate, and cookware leftovers according to gender and portioning method, based on the results of the food diary; - = no leftovers*

	Participant	Portioning method	Ingredient leftovers	Plate leftovers	Intended cookware leftovers	Unintended cookware leftovers
Female	P1	Both + packaging	low	low	low	low
	P2	Both + packaging	medium	low	medium	-
	P3	Both + packaging	low	-	high	low
	P5	Both + packaging	medium	low	low	-
	P7	Hard methods + packaging	medium	medium	high	-
	P9	Hard methods + packaging	medium	medium	-	-
	P11	Both + packaging	low	-	low	-
	P14	Both + packaging	low	-	medium	medium
	P15	Both + packaging	medium	-	-	medium
Male	P4	Both + packaging	medium	-	-	low
	P6	Both + packaging	low	medium	low	low
	P8	Soft methods + packaging	medium		high	-
	P10	Both + packaging	low	-	-	-
	P12	Both + packaging	medium	-	low	medium
	P13	Soft methods + packaging	medium	-	low	medium
	P16	Both + packaging	low	-	-	low

It can be seen that all participants throughout the period they filled in the food diary had ingredient leftovers. With respect to plate leftovers, only one male participant left food on his plate. However, more than half of the female participant had plate leftovers, which was often explained due to preferences, taste, or satiation: “With the couscous [...] I just got full and I prefer the vegetables over the couscous, so that’s what’s left” (P7, 52:64). Both female participants, who indicated that they portion their food ingredients based on hard methods and packaging, had a medium occurrence in plate leftovers. This might be related to the references that they base their measurements on. If they are used to measure e.g. grains based on a recommendation, which results in more food than they can consume, it can lead to frequent leftovers. It also became evident that packaging is an essential determinant of portioning ingredients, as all participants base portioning based on the size or type of packaging. Furthermore, although there does not seem to be a direct distinction between males and females having cookware leftovers, the cookware leftovers of the male participants were as well intended as unintended.



*Figure 3 Unintended cookware leftovers of male participant*



*Figure 4 Intended cookware leftovers of female participant*

Male participants also tend to rather use soft methods and have relatively more unintended cookware leftovers than female participants. Table 3 also shows that the cookware leftovers of the female participants are rather intended and planned, as compared to the leftover male participants had left. The comparison between the two can be seen in Figure 3 and Figure 4.

#### 3.3.4. The influence of age on portioning behaviour and leftovers

Additionally to gender, also a distinction between age categories could be made, which can be seen in Table 4. Participants in the age group from 25-35 had only very few unintended cookware leftovers, however, they used all types of portioning methods. In turn, they rather prepare more food on purpose, which can be related to reasons of convenience.

*Table 4 Overview of relative occurrence of ingredient, plate, and cookware leftovers according to age and portioning method, based on the results of the food diary; - = no leftovers*

Participant	Age group	Portioning method	Ingredient leftovers	Plate leftovers	Intended cookware leftovers	Unintended cookware leftovers
P13 (m.)	25-35	Soft methods + packaging	medium	-	low	low
P1 (f.)	25-35	Both + packaging	low	low	medium	-
P9 (f.)	25-35	Hard methods + packaging	medium	medium	high	low
P11 (f.)	25-35	Both + packaging	low	-	low	-
P6 (m.)	25-35	Both + packaging	low	medium	high	-
P10 (m.)	25-35	Both + packaging	low	-	-	-
P12 (m.)	25-35	Both + packaging	medium	-	low	-
P3 (f.)	36-45	Both + packaging	low	-	medium	medium
P15 (f.)	36-45	Both + packaging	medium	-	-	medium
P7 (f.)	46-55	Hard methods + packaging	medium	medium	-	low
P4 (m.)	46-55	Both + packaging	medium	-	low	low
P8 (m.)	56-65	Soft methods + packaging	medium		high	-
P2 (f.)	56-65	Both + packaging	medium	low	-	-
P5 (f.)	56-65	Both + packaging	medium	low	low	medium
P14 (f.)	56-65	Both + packaging	low	-	low	medium
P16 (m.)	56-65	Both + packaging	low	-	-	low

It can also be seen in Table 4 that male participants tend to have relatively more often unintended cookware leftovers, which again can be related to a struggle of estimating portion sizes. Of the participants in medium age range, almost nobody had any plate leftovers.

Looking at the oldest age group (56-65), females mostly do have plate leftovers, although plate leftovers do occur rather rarely. For male participants the results regarding intended and unintended cookware leftovers are rather diverse and no clear associations can be made.

#### 3.3.5. The influence of education on portioning behaviour and leftovers

The level of education of the participants in this study ranged from a rather low level (MBO), up to university level (WO). However, in regard to portioning behaviour and leftovers no associations were found.

### 3.3.6. The influence of parents and role models on portioning behaviour and leftovers

Another observation regarding leftovers due to portioning behaviour, was related to the influence of role models and parents was made. More than half of the participants mentioned their parents in relation to leftovers and even to some extent to food waste. This became evident through statements such as “I never kept rice, my parents also didn’t” (P6, 42:76). In contrast, other participants related their parents to not having plate leftovers, as they for instance “also needed to [empty the plate] when [they] [...] were younger” (P8, 54:78), “hear a little voice of [their] [...] mom saying *you have to finish your plate*” (P3, 50:56), or are “raised by eating what you have on your plate” (P2, 55:67). As previously described, Hogbin & Hess (1999) concluded that portion behaviour can be based on role models’ or parents’ portion behaviour. However, it became evident that there is rather a direct link between parents and not having plate leftovers, and not between parents passing on knowledge about portioning ingredients.

### 3.3.7. The influence of routine on portioning behaviour and leftovers

Although routine is a very important aspect of portioning behaviour, there is no direct link to leftovers, at least not to unintended leftovers. Participants that do have experience and routine, “know how much” (P16, 49:67) they need and “just [portion] out of habit” (P3, 50:20). Nevertheless, when comparing the interviews with the food diaries, it also appeared that the same participant can have an established routine and still have unintentional leftovers, which can be explained through adaption or spontaneous decision-making regarding portioning ingredients while already being in the meal preparation.

### 3.3.8. The influence of satiation and serving on portioning behaviour and leftovers

It also became evident that portioning strongly depends on other variables such as participants’ feelings of hunger and satiation, but also on spontaneous decisions that are taken during the meal preparation. P7 indicated: “I think I have the right amount, it tastes good and I keep eating. In the occasion that I am not hungry anymore I stop and I have a [...] leftover” (52:65). What P7 explained can actually be associated with most of the participants that had plate leftovers. Another distinction that was observed was that leftovers can result from too much food prepared, as discussed above, but also from having served too much food. P10 indicated that when he prepared “a little bit too much [...] [he] mostly eat[s] it” (44:20). P8 even said: “I will always eat, also when I think I have had enough but there are just 3 more bites then I will just finish” (54:55). Interestingly, both quotations were mentioned by male participants, whereas female participants, when having served too much, would leave food on their plate, because they “just got full” (P7, 52:64) or because they “did not like it” (P1, 53:70). This also explains, why female participants generally had more plate leftovers than male participants. Furthermore, it can happen that if participants did not prepare enough food they would “end up eating something completely different; a piece of bread or something like that” (P15, 57:75). Another participant stated that “if it happens that [...] [he] is still hungry, then well, tomorrow is another day” (P16, 49:43).

Finally, it also became evident that regarding serving that almost all the participants only served themselves food on their plate one time. Thereby, no distinction between age, gender, and other attributes were observed. The participants themselves did not really have an explanation for this behaviour, other than “because the pots and pans are empty” (P6, 42:62) or because “that’s enough for [...] [them]” (P16, 49:40). Therefore, it might be assumed that it is related to Dutch traditional eating habits.

### 3.3.9. Other influences on leftovers

#### 3.3.9.1. *The influence of planning on ingredient portioning behaviour and leftovers*

There were also several other factors observed to have an influence on leftovers. In literature, it was described that leftovers can result from a range of activities such as not checking the available food at home before buying new food as well as planning, storing, preparation, and purchasing behaviour (Quested & Johnson, 2012; WRAP 2007). In the present study only very few participants described that they check their storage of food products, before they go to the store. Those participants were mostly female and in the upper age categories. It became evident that they “look what [is] [...] left” (P15, 57:9), as they like to have certain products in stock, as described in in Chapter 3.1. Because more than half of the participants plan what they want to buy before going to the store, it was expected that participants would check the storage in the fridge as well as shelves before going to the store. This, however, was not the case

#### 3.3.9.2. *The influence of packaging on ingredient portioning behaviour and leftovers*

As packaging is rather often brought into relation with leftovers and food waste in literature (Faulkner et al., 2017; Jörissen et al., 2015), it is not very surprising that the type and form of packaging also played an important role on leftovers in the present study. Almost half of the participants indicated that they prepared more when they bought a bigger package, mostly resulting in cookware leftovers. This is the so-called *Package Size Effect*, which was studied by many scholars already in the last century (c.f. Aerts & Smits, 2017; Wansink, 1996). Similar to the portion size effect, it states that package size has an influence on the amount of food prepared or consumed (Chandon & Wansink, 2006). For the purpose of this study, the package size effect can be divided into (1) a package influencing the amount that is prepared, which influences (2) the amount served, and finally influences (3) the amount of leftovers. The behaviour observed from the participants food diaries and through the interviews, strongly related to the package size effect, and beyond that, even to the form of the package, as P16 described: “Normally I try to make 250 grams of vegetables [...] and when [it is in a can, the amount differs]; then I take a little bit less vegetables” (49:63). This accounted also vice versa, as P7 indicated that “when the package [...] would be bigger, the amount of vegetables would be bigger” (52:50). Almost half of the participants indicated that they serve themselves food depending on the amount that was in the package, so “what the size of the package is, would then be the size [...] on the plate (P10, 44:27). Finally, also almost half of the participants related the effect of package size to the amount of leftovers. Those participants were the same who either indicated that packaging influences the amount to be prepared or the amount served. Participants simply explained that “if you buy too much, you have too many leftovers” (P6, 42:72), or “when I get a bigger package [...] I can eat for 4 days [...], so I have left for 3 days in my pots” (P3, 50:65). The reasons behind this effect are also explained by the participants and in fact related to persons living in a single-household, who “cannot finish it in one time [and] have to make plans to eat more days of a package” (P10, 44:40). P11 indicated: “When it’s too much for one person then I will split it and then I will eat from it 2 days” (P3, 50:21), also referring that packages are often too large for single-person households.

#### 3.3.9.1. *The relation between the package size effect and the portion size effect and its influence on ingredient portioning and leftovers*

It was also observed how the package size effect has an influence on the portion size effect, the effect of eating more if portions are larger. English, Lasschuijt, & Keller (2015) explained that packaging, among other cues such as the size of plates and other utensils, can all be a motive for the portion size effect. This became particularly evident through some participants who used a fixed package size that



resulted in a certain amount of a meal, which was “split it in two but then [...] [they] ate 2 times a little bit too much” (P11, 47:61). Furthermore, one participant even explained that she “previously had bigger plates and [...] always had leftovers, because [she put too much food on them]” (P7, 52:52). The examples given clearly show how packaging has an influence on how consumers in single-person households portion their ingredients, as well as how they serve their plates, which does not only lead to plate, but also to unintended cookware leftovers.

Nevertheless, as previously mentioned, also at this point it became evident that participants actually “like to prepare more” (P13, 45:19) and to have leftovers in the cookware in order to store remaining portions in the freezer. Additionally, almost all participants prefer to use all of a package as they find “packaging leftovers [...] annoying” (P12, 51:106).

### Summary

Soft methods tend to lead to more ingredient, plate, and cookware leftovers, which generally are not seen as a bother. Nevertheless, Dutch living in single-person households struggle with portioning ingredients, which results in intended and unintended leftovers. Also gender, age, parents, routine, and hunger play an important role regarding portioning behaviour and leftovers. Although many participants indicated to plan what to buy, generally storage is not checked beforehand. Finally, also packaging has an influence on portioning behaviour and leftovers.

## 3.4. Leftover handling and its influence on food waste

This section focuses on the results and analysis of the fourth and fifth sub research questions, which aimed to explore how leftovers are managed in Dutch single-person households and to what extent leftovers lead to food waste.

### 3.4.9. Ingredient leftover handling and its influence on food waste

As was displayed in Table 3 and Table 4 in the previous chapter, it could be seen that all the participants had ingredient leftovers during the ten days of the food diary. This was also confirmed by the interviewees as none of them stated that they do not have ingredient leftovers.

#### 3.4.9.1. Attitude towards ingredient leftovers

As was already indicated in the previous chapters, it became evident that the participants actually do not mind leftover ingredients at all. Throughout the food diaries, ingredients that were left during the first days kept on reoccurring in the diaries in the later days as ingredients. To the questions, whether participants mind leftover ingredients, it was mostly answered that they “do not [mind them]” (P3, 50:84). Although this was only explicitly mentioned during the interviews by less than half of the participants, the food diaries showed that participants do not mind, as can be seen in Figure 3 and Figure 4.



Figure 3 Leftover ingredients of P4 on Day 5 of the food diaries



Figure 4 Ingredients of P4 on Day 8 of the food diaries



Regarding Figure 3 and Figure 4, P4 explained that he ate several “times from the leak” and that he later saw he missed one champion, which he just added to the box of champions he bought the next day (46:20). This behaviour can be applied to all participants, as all of them explained that they generally reused their ingredients. They mostly “store them” (in the fridge or freezer) “and use them another day” (P1, 53:55).

#### *3.4.9.2. Disposing ingredient leftovers*

In the food diaries it became evident that mostly leftover ingredients are reused, however, during the interview some exceptions were identified and not always all ingredients were reused. Reasons for this were either related to preferences or to health and safety issues. So did P12 indicate that he “does not eat [potatoes with sprouts] anymore” (51:97) as well as that he does not “like to [re]use [an open package of ready to prepare foods]” (51:41), such as boiled potatoes that just need to be fried. He also explained that the reason why the potatoes grows sprouts is simply, because the packages are too large for a single-person household. This phenomenon was also already pointed out by multiple scholars (Halloran et al., 2014; Hebrok & Boks, 2017; Janssen et al., 2017), who found that often leftovers are stored somewhere in the back, where they are often forgotten. In fact, more than half of the participants indicated that they store products and then do not eat them. However, this is not only explained through forgetfulness or carelessness (P12, 51:83), but also due to work related issues (P9, 48:63), time constraints (P2, 55:85), or sudden change of plans (P12, 51:60). If such cases occurred and the food turned bad, participants also admitted (after persistently asking about it) that “if it is not good anymore, [...] [they] will throw it away” (P13, 45:47). Nevertheless, it became evident that ingredient leftovers in single-person households are almost always inevitable, which is mainly related to packaging and the relative price of bigger versus single-person packages.

#### *3.4.10. Plate leftover handling and its influence on food waste*

As displayed previously in Table 3, it became evident through the food diaries that women more frequently leave food on their plate. When asking about food leftovers on the plate during the interviews, mostly male participants indicated that they generally do not have plate leftovers. Besides stating that they “hardly have plate leftovers” (P6, 43:48), others also mentioned that they “did not, never [have plate leftovers]” (P4, 46:27), which in comparison with the food diaries was held true.

##### *3.4.10.1. Attitude towards plate leftovers*

Compared to ingredient leftovers, it was observed that more participants did not mind plate leftovers. The attitude towards plate leftovers, however, was quite controversy. Whereas P12 indicated that he either “leave[s] them (leftovers) on the plate and eat[s] them during the evening” (51:72) or he would “shovel it back in the pan” (51:69), other participants would just “eat it all” (P14, 56:65). Furthermore, the motives to leave food on the plate or not, were quite diverse and often depended on the type of food: “If it is vegetables it’s often just easier to eat them anyway” (P12, 51:70) and “with bread I save it or other times I throw it away” (P5, 43:43). Other participants in contrast related plate leftovers with hygiene and explained that they would not put the leftovers back in the cookware (P7, 52:101).

It further became evident how serving food on the plate plays an important role in regard to plate leftovers. A few number of participants indicated that they struggled to serve food on their plates. Most of the participants, however, explained that they just serve until the plate is full or until their cookware is empty, which could also clearly be observed in the food diary, as depicted in Table 3.

### 3.4.10.2. *Disposing plate leftovers*

Almost half of the participants of the present study indicated that they at least once disposed plate leftovers. Table 5 shows that mainly female participants had plate leftovers during the ten-day food diary. Additionally, it becomes very clear that female participants more often wasted food than male participants during the study. This result was to be expected as several scholars described that women, and particularly women living in single-person households, waste the highest amounts of food (c.f. Koivupuro et al., 2012; Richter, 2017). This was explained due to the good provider or mother-theory. In the present study, however, the disposal of plate leftovers was mainly related to preferences and the degree of satiation. Other reasons for disposing plate leftovers are mainly related to taste, as participants “did not like it (the food) so much” (P1, 53:67). Only a few participants indicated that it can be due to being satiated. As previously mentioned, plate leftovers and waste might also occur due to mal-portioning based on wrong references as the participants who had a medium occurrence of plate leftovers and waste used hard methods for portioning ingredients. Nevertheless, it can still be seen that most of the participants generally did not have and waste plate leftovers, as it was observed throughout the ten-day period of the food diaries. In this time frame, participants did have minor plate leftovers, but rather rarely. Finally, a very interesting result is that plate leftovers almost always are disposed, and usually not stored or reused.

*Table 5 Overview of relative occurrence of plate leftovers and waste according to gender and portioning method, based on the results of the food diary*

	Participant	Portioning method	Plate leftovers	Plate waste
<b>Female</b>	P1	Both + packaging	low	low
	P2	Both + packaging	low	low
	P3	Both + packaging	-	-
	P5	Both + packaging	low	-
	P7	Hard methods + packaging	medium	medium
	P9	Hard methods + packaging	medium	medium
	P11	Both + packaging	-	-
	P14	Both + packaging	-	-
	P15	Both + packaging	-	-
<b>Male</b>	P4	Both + packaging	-	-
	P6	Both + packaging	medium	medium
	P8	Soft methods + packaging	-	-
	P10	Both + packaging	-	-
	P12	Both + packaging	-	-
	P13	Soft methods + packaging	-	-
	P16	Both + packaging	-	-

### 3.4.11. Cookware leftover handling and its influence on food waste

As previously described, male and female participants both tend to have cookware leftovers, although women’s cookware leftovers are rather intended. Based on the question whether participants generally have cookware leftovers, a few indicated that “it doesn’t happen” (P16, 49:42) or that they “never” (P4, 46:27) have any cookware leftovers. Indeed, the participants that claimed to not have cookware leftovers are also the ones that cook for one day and serve one time only, leaving no

leftovers. More than half of the participants indicated that they reuse cookware leftovers, which was already described in previous chapters.

#### *3.4.11.1. Attitude towards cookware leftovers*

Most of the participants “don’t mind if [...] [they] cook too much” as they can “just eat it (cookware leftovers) the next day” (P15, 57:55), or put them in “the freezer” (P7, 52:70). In fact it turned out to be the opposite as participants intentionally portioned ingredients to have cookware leftovers. To the question if they want to prevent them, the answer often was “no” (P12, 51:86).

However, a fair amount of participants also indicated that they do not like cookware leftovers that come out of the fridge or the freezer, which is why they mostly intended to cook for one meal. They indicated that they do not freeze leftovers, because they “don’t like the [...] [taste] from the freezer” (P6, 42:26). Others seemed to struggle finding a reason why they would not eat freezer leftovers and indicated that they “don’t know” (P13, 45:46). Others had difficulties to explain, as there is “something about it (freezer leftovers)” and they “don’t know actually how old it is” (P1, 53:39). Interestingly, the ones who stated that they do not mind leftovers, are the same ones that indicated that they don’t like the cookware leftovers from the fridge or the freezer. An explanation for this is the type of food, as the participants made a distinction between the foods they do not mind to reuse and the ones that they prefer to avoid having.

Salad for instance was indicated as “annoying” (P12, 51:77) to have as cookware leftover due to the difficulty of storing it. However, also foods from the product group grains and pasta were doubted to still being tasty and participants were wondering how to reheat them (P7, 52:59). This particular behaviour in regard to grains and pasta was also observed by Hebrok & Boks (2017). They explained in their study that low value foods such as rice and pasta are often left in small amounts. They also concluded that those foods are often not seen as worthy, which did not become evident in the present study. It was rather observed that not keeping leftovers is mainly related to taste.

#### *3.4.11.2. Disposing cookware leftovers*

Most of the participants in the present study stated that they do not like to dispose cookware leftovers. This also became evident through the food diaries as only a few participants, with a tendency towards more female participants, wasted cookware leftovers. As can be seen in Table 6, only low amounts of cookware leftovers were wasted. The main reasons of cookware leftovers were as well related to taste, and, when not liking a dish, the participants would “just eat what [...] [they] want and [...] throw [the rest away]” (P11, 47:92). Some, however, indicated that they actually don’t know why they threw a certain food, such as the remaining broccoli (P1, 53:77), away. P1 also indicated that she finds it difficult to reuse just a part of a meal and rather keeps leftovers if it is a whole meal, consisting of not only one food group (53:105). It appeared that several participants shared this attitude as often no explanation could be given why sometimes a small amount of a cookware leftover was kept, and sometimes it was disposed (P14, 56:72).

Another interesting result is that most of the participants on the other hand had rather frequently at least low, or even medium to high amounts of cookware leftovers. As can be seen in Table 6, those leftovers were mainly intentionally prepared. It also became evident that cookware leftovers resulted from mal-portioning behaviour that led to unintentional cookware leftovers. Unintended cookware leftovers, were rather low or medium frequent. In any case, what can also clearly be observed is that the participants mostly tend to store their intended as well as unintended cookware leftovers instead of disposing them. Finally, it also became evident that the portioning method does not have a direct influence on cookware waste.

Table 6 Overview of relative occurrence of unintended and intended cookware leftovers and waste according to gender, based on the results of the food diaries

	Participant	Portioning method	Unintended cookware leftovers	Intended cookware leftovers	Cookware waste
Female	P1	Both + packaging	low	low	low
	P2	Both + packaging	-	medium	low
	P3	Both + packaging	low	high	-
	P5	Both + packaging	-	low	-
	P7	Hard methods + packaging	-	high	-
	P9	Hard methods + packaging	-	-	-
	P11	Both + packaging	-	low	-
	P14	Both + packaging	medium	medium	-
	P15	Both + packaging	medium	-	-
Male	P4	Both + packaging	low	-	-
	P6	Both + packaging	low	low	low
	P8	Soft methods + packaging	-	high	-
	P10	Both + packaging	-	-	-
	P12	Both + packaging	medium	low	-
	P13	Soft methods + packaging	medium	low	-
	P16	Both + packaging	low	-	-

### 3.4.12. Alternative ways to handle leftovers

Besides reusing or disposing cookware leftovers, it also appeared that participants handled them in other ways. A fair number of participants indicated that they feed cookware leftovers “to the chickens” (P8, 54:60), the “hamster” (P9, 48:95), or to “the dog” (P15, 57:45). Reasons for this are either satiation, expiration, or tastefulness, as the participants explained during the interview. Furthermore, a small number also indicated to give leftovers away. P4 indicated that he brings cookware leftovers often to his father (46:29), whereas the other participants give it to their neighbors. A small number of participants even indicated that they are part of social media groups that are aiming to share food leftovers. In those groups, all members can give away or get food leftovers from the other members.

### 3.4.13. Other influences on food waste

#### 3.4.13.1. *The influence of age on food waste*

As it can be seen in Table 7, there was also a direct link between age groups and food waste. Out of the young age category from 25 to 35 years, for almost half of the participants, food waste was recorded during the food diaries. In comparison, the elderly people in age category 56 to 65 recorded almost no case of food waste, just by one female participant. The results regarding age categories also are in one line with the existing literature. Reasons for elderly people to waste less are mostly related to post-war traumas and suffering famines during times of war (Quested et al., 2013).

#### 3.4.13.2. *The influence of education on food waste*

Although all educational levels were represented in the present study, there were no direct associations between the level of education and food waste observed in the present study.

#### 3.4.13.3. *The influence of parents and role models on food waste*

It previously became evident that parents are not associated with the portioning behaviour of the participants. However, there is a direct link between parents and role models on food waste. This

particularly became evident through statements such as “I never kept rice, my parents also didn’t” (P6, 42:76) or “from experience from my parents [...] [who] throw a lot of food away which is left from one day” (P13, 45:63). In turn, many participants also associated their parents with not disposing food, as they were taught to “finish [...] [their] plate” (P2, 55:68), which simply did not result in plate leftovers and therefore not in food waste. This shows how diverse the influence of the parents on the participants was, which is why it can only be said that parents generally have a great impact on the behaviour of their children in regard to disposing versus not disposing leftovers.

*Table 7 Overview of relative occurrence of food waste according to age, based on the food diaries*

<b>Participant</b>	<b>Age group</b>	<b>Ingredient waste</b>	<b>Plate waste</b>	<b>Cookware waste</b>
P13 (m.)	<b>25-35</b>	-	-	-
P1 (f.)	<b>25-35</b>	low	low	low
P9 (f.)	<b>25-35</b>	-	medium	-
P11 (f.)	<b>25-35</b>	-	-	-
P6 (m.)	<b>25-35</b>	-	medium	low
P10 (m.)	<b>25-35</b>	-	-	-
P12 (m.)	<b>25-35</b>	-	-	-
P3 (f.)	<b>36-45</b>	-	-	-
P15 (f.)	<b>36-45</b>	-	-	-
P7 (f.)	<b>46-55</b>	-	medium	-
P4 (m.)	<b>46-55</b>	-	-	-
P8 (m.)	<b>56-65</b>	-	-	-
P2 (f.)	<b>56-65</b>	-	low	low
P5 (f.)	<b>56-65</b>	-	-	-
P14 (f.)	<b>56-65</b>	-	-	-
P16 (m.)	<b>56-65</b>	-	-	-

#### *3.4.13.4. Other reasons to dispose leftovers*

It already became evident throughout the present study that taste is an important player regarding leftovers. Additionally, taste also has an influence on food waste, as the leftovers that were not eaten due to preferences are mostly disposed: “If I don’t like it, I throw it away” (P9, 48:45). This attitude was mostly observed by female participants rather than male participants.

Other reasons for food waste can be priorities, such as a sudden change of plans or getting sick. P12 explained: “you planned to eat something but then you eat with friends [...] and what you had in the fridge is outdated” (51:60). Others also clearly stated that depending on their state, they have to “think about [...] [themselves] first and then about the environment or about food waste” (P2, 55:80), which clearly indicates that although being aware of food waste, often there are more important priorities that can lead to disposing food.

#### *Summary*

All participants have ingredient leftovers, which are mostly not minded and reused. Plate leftovers were mostly caused by female participants and in all cases disposed. Generally, however, they occur rather rarely. Intentional as well as unintentional cookware leftovers occur very often in Dutch single-person households, whereby female participants tend to intentionally prepare more. Intentional as well as unintentional cookware leftovers are usually kept and reused. Other important influences on food waste were age, parents and role models, taste, and priorities.

#### 4. Conclusions, limitations, and recommendations

##### 4.3. Conclusions of the explorative research

Based on the results and discussion, a new framework (Table 7) that projects the most relevant findings of the present study, was developed. Those findings, as well as other important points, helped to give an answer to the research question:

**What are the motives of meal ingredient portioning behaviour at the preparation stage of dinner and how are these motives affecting leftovers and food waste in Dutch single-person households?**

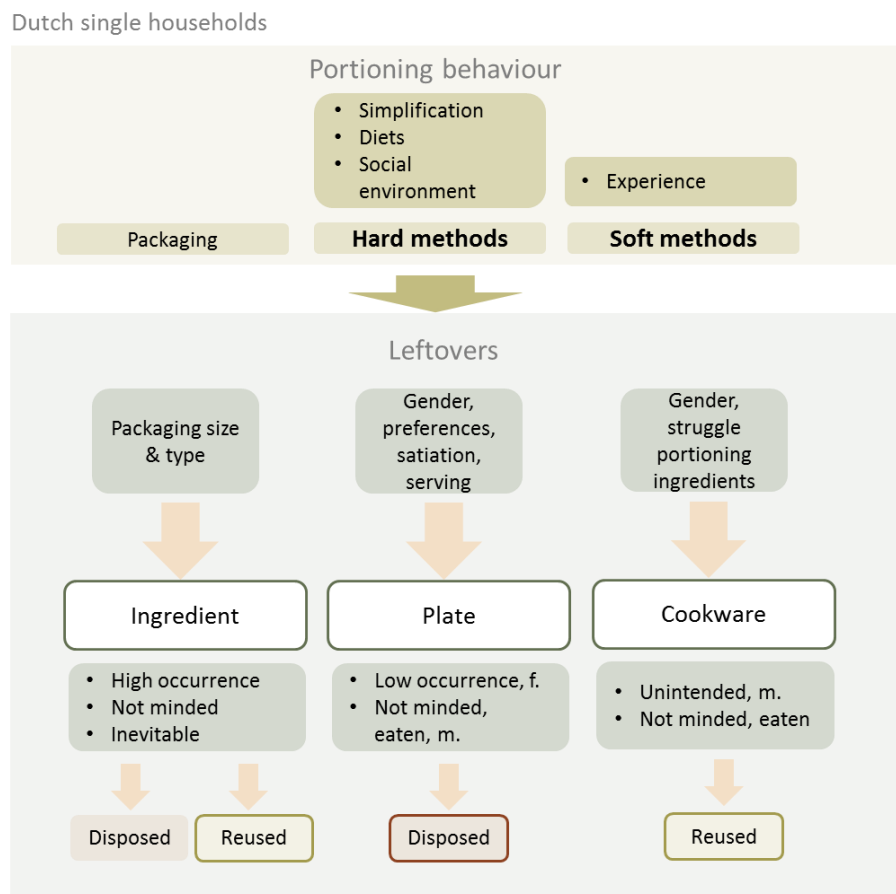


Figure 5 Final framework based on findings

The motives to use hard methods, such as tools, scales, and references, for meal ingredient portioning in Dutch single-person households are mainly related to simplification, diets, and references received through the social environment. It became evident that people generally struggle less to portion ingredients, when using hard methods. Soft methods on the other hand are rather based on feelings and generally increase ingredient, plate, and cookware leftovers. It also became clear that the package size and type are important indicators of portion behaviours, as they are fixed and often predetermine portioning for people.

Generally, it can be concluded that individuals of Dutch single-person households do not mind leftovers. Ingredient leftovers are mostly stored, unless there are rare cases in which they are forgotten. Sometimes only specific ingredient leftovers are disposed, which strongly depend on the person's preference itself. Furthermore, ingredient leftovers are often inevitable for single-person households, as only big packages are available, or big packages are preferred due to the cost-benefit ratio.

Plate leftovers are mainly caused by females and their preferences, level of satiation, and struggle of serving food on the plate. They are in all cases disposed, although, there is not a high frequency of plate leftovers. In comparison, Dutch men mostly finish their plate, which can be explained due to routinized behaviour and not wanting to dispose the plate leftovers.

Nevertheless, all participants frequently have cookware leftovers. Male participants usually do not intend to have cookware leftovers, whereas female participants tend to portion their ingredients in a way to have meals for several days. Cookware leftovers are mostly not minded and reused.

It also became evident that there are several other important aspects that have an influence on leftovers and food waste. The upbringing by parents has a major impact on people's behaviour. However, whether people dispose, or reuse leftovers is quite diverse, due to different styles of upbringing. Another important point is the type and size of packaging which has a direct impact on (1) the amount prepared, (2) the amount served, and (3) leftovers. Finally, taste and preferences have a major impact on leftovers and food waste.

In conclusion it can be said that portioning behaviour does have a strong impact on leftovers, as the method used determines the amount of particularly cookware leftovers. However, the extent on which portioning behaviour has an impact on food waste in Dutch single-households is rather limited. Food that is disposed during dinner preparation and consumption does rather depend on serving, taste, and satiation. This is because mostly plate leftovers, which do not occur often, are disposed, whereas ingredient and cookware leftovers are generally stored. However, the reason why in literature single-households are described to waste relatively most food per person, can be directly linked to packaging, as often bigger packages that are difficult to be consumed by a single-person household, are preferred over smaller, but more expensive products. Nevertheless, in the present study only relative low amounts of actual food waste were observed.

#### 4.4. Limitations of the explorative research

The present study has expressed its usefulness in getting an understanding of portioning behaviour at the dinner preparation stage in Dutch single-person households. Furthermore, it offered the possibility to understand the complex relation between portioning behaviour, leftovers, and food waste. Although the study has reached its aim, there are several, inevitable limitations, which occurred during the conduction of the present study.

Twelve out of 16 participants live in Wageningen and its surroundings. Due to the reputation of high environmental awareness of this city, it is likely that the behaviours and answers of the participants were to some extent stirred by bias. Behaviours and answers from other areas of the Netherlands might be different, which is why a careful assessment of the present study should be made, before transferring its outcomes countrywide.

Furthermore, the study was conducted in English, which was clearly stated on the flyers to recruit participants. Nevertheless, the flyers itself were written in Dutch, to attract a higher number of participants. It became evident that several participants had problems to express themselves due to the language barrier. In some cases, participants stated certain sentences or words in Dutch, which were then translated to English. Due to translation, the essence of the statement can lose its meaning (Hennink, Hutter, & Bailey, 2011), which can limit the research to some extent.

Since food waste is a rather delicate topic, it is possible that participants gave socially acceptable answers on leftovers and the food waste they produce. As highlighted by Zorpas & Lasaridi (2013), truthfulness can be a drawback of the food diaries as well as of the interviews.

Finally, at some points throughout the interview it became evident that participants apparently had different ideas about the definition of leftovers. P11 for instance indicated that she did not want to have leftovers and therefore splits the meal in two, in order to consume the second portion on another day (47:61). According to this study, her second portion for another day are defined as cookware leftovers. Although the difference was clearly indicated, this confusion might have an effect on the results, although no other occurrences were noticed.

#### 4.5. Recommendations

Although data saturation was reached, it is recommended to conduct the current study again. For a future study, participants from all over the Netherlands should be recruited to guarantee a high external validity. Through a repetition of the study, differences in behaviours and attitudes regarding food waste between participants from the environmentally friendly area of Wageningen and the rest of the Netherlands could be assessed.

For a future study, it is also highly recommended to track the leftovers until final consumption or disposal, if leftovers were kept and stored. Although some participants indicated how they ultimately handled their leftovers, more focus should be given to the handling of leftovers, such as whether the ingredient leftovers stored in the fridge, or the cookware leftovers stored in the freezer, were ultimately consumed or disposed. For that reason, the study would also need a greater amount of time to be conducted.

Finally, it is also recommended to offer personal guidance and explanations of how to conduct the food diaries. Although the participants received a detailed explanation through email and by post, it still became evident that the method was rather complex. This was observed through the results of the food diary, in which participants in some cases would leave out information or upload twice the same picture. Although all misunderstandings were settled during the interview, it is recommended to avoid those mistakes from the beginning by personally explaining the method beforehand. Additionally, it is recommended to combine several research methods to assure reliability of the data.

#### 4.6. Implications

A direct link between the use of hard methods and not struggling with portioning ingredients at the dinner preparation stage, was found. Many participants used the Eetmaatje to measure their grains and pasta, which is why it is highly recommended for governmental as well as non-governmental (NGOs), to develop further tools that aim to support portioning of other product groups. Ideally, those tools should be handed out by stores or during campaigns for free. Although a further assessment would be needed to find a direct association, most participants indicated that they received the Eetmaatje at no cost and it is not known if they would be willing to buy tools that simplify portioning of ingredients.

Another recommendation for governmental as well as NGOs is to develop and establish a standardized guideline on portioning ingredients and nutritional intake on a national level. As it was concluded in literature by Faulkner et al. (2012), no common governmental guideline exists. It became apparent that consumers do search for advice from reliable sources. However, this advice increases confusion and causes conflicting advice, as can be seen in the different amounts of grains and pasta, participants believed were recommended: “For a portion [of rice and pasta] 40gr” (P5, 43:28), “maybe it could be 60gr” (P7, 52:90), and “rice when it is cooked 75gr and pasta I think 65gr when it is uncooked” (P2, 55:51). This confusion arises unsurprisingly; the Voedingscentrum advises consumers on its webpage to measure 100gr of rice per person for meal preparation, which equals a small coffee cup<sup>3</sup>. On the same webpage, one can get to the Schijf van vijf to get overall daily nutritional recommendations. In

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<sup>3</sup> <http://www.voedingscentrum.nl/encyclopedie/rijst.aspx>



conflict, it is stated that per day a person should eat 50gr of grains or pasta<sup>4</sup>. A standardized guideline could look very similar to the Schijf van vijf, which also considers age and gender. Additionally, also level of activity could be considered. The most important aspect of a standardized guideline, however, is that it should be established in society as one recognized standard of how to portion different types of ingredients.

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<sup>4</sup> <http://www.voedingscentrum.nl/nl/gezond-eten-met-de-schijf-van-vijf/hoeveel-en-wat-kan-ik-per-dag-eten-.aspx>

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**WAGENINGEN**  
UNIVERSITY & RESEARCH



## Dinner-for-one study

### Je...

- Bent Nederlands en werkt/studeert niet aan de WUR
- Spreekt goed Engels
- Woont alleen
- Bent tussen de 25 en 65 jaar oud
- Kookt 3 tot 4 keer per week voor jezelf
- Hebt een BMI tussen 18.5 en 30
- Wilt deelnemen aan de wetenschap

### Wat...

- Beantwoord vragen en voegt foto's toe van je avondmaal bereiding via een online vragenlijst (via smartphone/tablet/computer)
- Een interview van max. 60 minuten

### Wanneer...

- Startend op een vrijdag in november
- 10 dagen (Eén werkweek + twee weekenden)

### Interesse?

- Voor deelname, klik op onderstaande link  
[https://wur.es1.qualtrics.com/jfe/form/SV\\_eWKC3RfOGAYeX3](https://wur.es1.qualtrics.com/jfe/form/SV_eWKC3RfOGAYeX3)
- Voor vragen, mail: [consumentenonderzoek.fqd@wur.nl](mailto:consumentenonderzoek.fqd@wur.nl)



## Krijg €45 + kleine goodie

Figure 6 Flyer electronic version



## Dinner-for-one study

## Je...

- Bent Nederlands en werkt/studeert niet aan de WUR
- Spreekt goed Engels
- Woont alleen
- Bent tussen de 25 en 65 jaar oud
- Kookt 3 tot 4 keer per week voor jezelf
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## Wat...

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- Een interview van max. 60 minuten

Krijg €45 +  
kleine goodie

## Wanneer...

- Startend op een vrijdag in november
- 10 dagen (Eén werkweek + twee weekenden)

### Interesse?



- Voor vragen, mail:  
consumentenonderzoek.fqd@wur.nl  
Wij sturen u dan een selectie vragenlijst

[illegible]

Figure 7 Flyer printed version

## Appendix B | Selection questionnaire



### Selection questions

Welcome to the questionnaire, thank you for your interest in the dinner-for-one study. In this questionnaire you will answer some general questions about your background and contact details. On the basis of your answers it will be decided if you meet the criteria for participation in this study.

What is your name?

What is your gender?

- ☐ Female
- ☐ Male

What is your date of birth?

DD-MM-YYYY

Please enter your height and weight.

Height in centimeters:

Weight in kilos:

What is your highest completed education?

- ☐ MBO
- ☐ HBO
- ☐ WO
- ☐ Other, namely

Do you feel confident about answering questions in English?

- ☐ Yes
- ☐ No

Are you a student, employee or researcher at the Wageningen University?

- ☐ Yes, I'm a ...

- ☐ No



Do you live alone?

- ☐ Yes  
☐ No

How many times per week do you cook for yourself?

- ☐ 1-2 times per week  
☐ 3-4 times per week  
☐ 5-6 times per week  
☐ Every day

Are you committed to keep a food diary for ten days and willing to be interviewed afterwards for 60 minutes?

- ☐ Yes  
☐ No

Please indicate your address and contact details to send your welcome package to.

E-mail address	<input type="text"/>
Phone number	<input type="text"/>
Street and housenumber	<input type="text"/>
City	<input type="text"/>
Postal code	<input type="text"/>
Country	<input type="text"/>
BSN number	<input type="text"/>

Are you interested in receiving information about future research regarding consumer studies from the Food Quality and Design Group of Wageningen University?

- ☐ Yes  
☐ No

This was the end of the questionnaire. Soon you will be contacted if you meet the criteria for participation in the dinner-for-one study.

Figure 8 Selection questionnaire

## Appendix C | Welcome email



Consumentenonderzoek FQD

To:

Dear \_\_\_\_\_,

Thank you for your interest in the Dinner-for-one study. We are very happy to inform you that you are eligible to participate in the Dinner-for-one study!

*What is the study about?*

As mentioned shortly on the flyer, the study is about getting an insight into the purchasing, preparation, and consumption behaviour of Dutch consumers in single households during the evening meal.

*Would you like to participate?*

Please let us know **by answering to this email** whether you would like to participate or not. If you wish to be part of our study please indicate if you prefer to start Friday the 10th or 17th of November with the food diary.

*What happens next?*

After we receive your confirmation via email, we will send you a little welcome package to your address and also via email. This contains of three different documents:

1. **Consent form:** Please read the consent form carefully and sign it. Then put it to the envelope we sent to you and send it back **before the 8<sup>th</sup> of November**. Don't worry, no stamp is needed – the letter already has one. You may also sign and scan the form and send it back to us ([consumentonderzoek.fqd@wur.nl](mailto:consumentonderzoek.fqd@wur.nl))
2. **Information brochure:** In this information brochure you will find all information regarding the study in detail.
3. **Example food diary:** You can have a look at this example food diary to see what you can expect from the food diary that you have to keep. It comes with all questions and several examples. We hope that you are as excited as we are and that you look forward to participating in the Dinner-for-one study.  
If you have any questions or doubts, please let us know.

Best regards,  
The Research Team

Figure 9 Welcome email for the participants in the first week of the food diaries



### Consent Form for Participation in a Research Study Wageningen University

#### **Dinner-for-one**

Consumentonderzoek.fqd@wur.nl

You are invited to participate in the dinner-for-one study. Before we can start, it is important that you understand why this research is being done and what it involves. Please take time to read the following information. If you have any questions or doubts, feel free to contact Lotte or Nicole any time and we provide you with more information.

#### **1. What is the purpose of the study?**

To get insights about your preparation and consumption behavior of food during dinner time.

#### **2. Do I have to take part in the study?**

Your participation is absolutely voluntary. You may choose not to participate, and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study.

#### **3. What do I have to do?**

If you agree to participate in this study, you will need to keep a food diary for 10 days, which you need to fill in during dinner time. During those 10 days, you will need to prepare at least 4 times a meal for yourself. After you have completed the food diary, we would like to ask you some questions about your experience during the study.

#### **4. Do I get a compensation?**

Yes, upon completion of the study, you will receive a VVV voucher with a value of €45,-. Additionally, we would like to give you a small goodie after the interview.

#### **5. Will my taking part in the study be kept confidential?**

The interview will be audiotaped, however, your personal details and data of the diaries and the interview will be kept strictly confidential. They will only be used for the purpose of this research. Identifiers will be totally removed, and a randomized code will be given to each participant prior publishing of this research.

#### **6. By signing this contest form:**

- I confirm that I have read and understood the information provided for the above study. I have had the opportunity to consider the information and resolve any queries.
- I understand that my participation is voluntary and that I am free to withdraw at any time, warning, justification or penalty, and that this will not affect my legal rights.
- I understand that any personal information collected during the interview remain confidential
- I understand that the interview will be audio recorded and I am happy to proceed
- I understand that parts of our conversation may be used verbatim in future publications or presentations but that such quotes will be anonymized
- I agree to take part in this study

Name of Participant

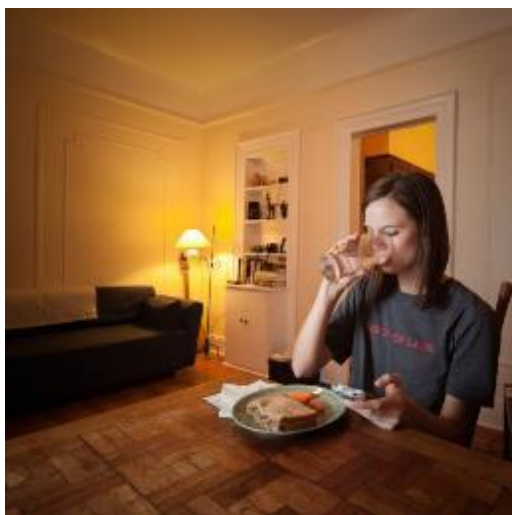
Date

Signature

Name of Researcher

Date

Signature



## Welcome to the Dinner-for-one study

November 2017 – December 2017



INFORMATION  
ABOUT

**Hello!** Thanks for your interest the dinner-for-one study. To help you decide whether you want to participate, the most important information was outlined in this brochure. Please read it carefully and contact us in case you have any questions.

*In behalf of the whole research team,*  
Nicole Jansen, Lotte Demmink and Supervisor:  
Dieuwerke Bolhuis

### General information

This study is being carried out by a bachelor and a master thesis student of the Food Quality and Design chair-group of Wageningen University.

### Aim of the study

The aim of this study is to find out more about the food shopping, preparation and consumption behaviour of consumers in single-person households.

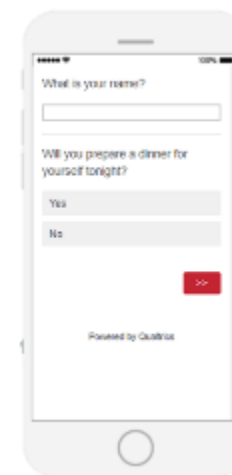
### What participation involves

When participating in this study you will need to keep track of your dinner preparation and consumption for 10 days by means of a food diary, which is followed by an interview of a maximum of 60 minutes.

### Food diary

In the food diary you will keep track of your dinner preparation and consumption behaviour for 10 days. You don't have to prepare dinner for yourself on each of the 10 evenings, but it is expected that you prepare dinner for yourself at least on 3-4 days.

To do so, you need to fill in a daily questionnaire during the preparation and after consumption of your meal, which also includes to take some pictures.



This is how it will look. We send you the food diary questionnaire digitally and you can simply fill it in via your smartphone.

### Interview

On the basis of the findings in your food diary, an interview will be conducted to get an insight into the reasons behind your choices and behaviour during dinner preparation. This interview can take place in location of your choice (preferably at your home) and will last a maximum of 60 minutes.



<p><b>Possible, undesirable effects or discomforts</b></p> <p>This study is approved by the Social Sciences Ethics Committee of Wageningen University. Therefore, we do not expect any risks or major discomfort from your participation in the research.</p> <p><b>Advantages and disadvantages</b></p> <p>Your participation will lead to a significant contribution in the scientific field of consumer behaviour. You will be reimbursed after completion of the study for the effort and time you spend in fill in the diaries and interview.</p> <p><b>Stopping or cancelling the participation in the study</b></p> <p>It is up to you to decide whether or not to participate in the study. Participation is voluntary. If you do participate in the study, you can always change your mind. You may withdraw participation at any time during the study. You do not have to say why you are stopping, but you do need to tell the researcher immediately if you want to stop. If there is any new information about the study that is important for you, the researcher will let you know.</p> <p><b>End of the study</b></p> <p>Your participation in the study stops when</p> <ul style="list-style-type: none"> <li>• You have completed the food diary and the interview as described under point 3.</li> <li>• You choose to stop.</li> <li>• The researcher considers it best for you to stop</li> </ul>	<p><b>Compensation</b></p> <p>When participating in the entire study (both food diary and interview) you will receive a financial compensation of €45,- in VVV cheques. In the selection questionnaire your BSN number was asked as it is needed for the reimbursement.</p> <div data-bbox="898 464 1335 711" data-label="Image"> </div> <p>Additionally, you will receive a small gift from us, as a token of great appreciation.</p> <p><b>Questions</b></p> <p>If you have any questions or doubts, please contact the research team:  <a href="mailto:consumentonderzoek.fgd@wur.nl">consumentonderzoek.fgd@wur.nl</a></p>	<p><b>What is expected from you</b></p> <p><i>You are eligible to participate in this study if you:</i></p> <ul style="list-style-type: none"> <li>• Live on your own in the Netherlands.</li> <li>• Have a good general health.</li> <li>• Have a BMI of 18.5-30 kg/m<sup>2</sup>.</li> <li>• Speak English fluently</li> <li>• You are used to cook at least 3 times for yourself a week</li> <li>• Are not pregnant or have the intention to become pregnant or are currently breastfeeding.</li> <li>• Are not an employee or student at the Wageningen University.</li> </ul> <p><i>The study instructions require that you:</i></p> <ul style="list-style-type: none"> <li>• Keep appointments</li> <li>• Are willing to invest time to fill in the food diary complete, honest and clear.</li> </ul> <p><i>It is important that you contact the researcher any time:</i></p> <ul style="list-style-type: none"> <li>• If you no longer wish to participate in the study.</li> <li>• If your contact details change.</li> <li>• If you have any questions or doubts regarding the study</li> </ul>
---	--	--

## Appendix F | Leaflet food diary template for participants

### The food diary



For your convenience, we created an example that shows how to fill in the food diary. The green boxes shall help to clarify additional doubts that may arise during the process.

Below you can see how the food diary questionnaire will look like and how you are desired to answer the questions. Every day for 10 days the same questionnaire will be sent to you via e-mail. This example will also be very helpful when you have to fill in the diary, so please keep this for your reference.

### Food diary questions and example answers

Q1 What is your name?

*Lotte Demmink*

Q2 Will you prepare dinner for only yourself tonight?

*Yes (Continue with Q3)*

No (Continue with Q2.1)

Q2.1 What are your dinner plans for tonight?

- ☐ I will eat a ready-to-eat meal
- ☐ I will eat out in a restaurant or snack bar
- ☐ I will eat at a friend's place
- ☐ I will cook and eat with/for friends or family
- ☐ I will eat only or partly leftovers \_\_\_\_\_
- ☐ Other \_\_\_\_\_

If you eat only leftovers, please indicate what type of leftovers, from when the leftovers are and how you persevered them (e.g. in the fridge). In case you have *other* plans, let us know what your dinner plans are for tonight.

➤ After answering Q2.1, you will be done for today! Thanks a lot for your time!

Q3 Are you intending to cook your meal for one or more days?

- ☐ *For 1 day*
- ☐ For 2 days
- ☐ For more than 2 days

Q4 Which meal are you preparing for dinner?

*Pesto rice with meat and a salad. For the main dish: brown rice, minced beef, frozen roerbakmix Italian, pesto, carrots, onion, and garlic. For the salad: rucola, pesto, olives, feta cheese, seeds*

**Please carefully select all ingredients that you will use for dinner and put them together.**

Q5 Please add a clear picture of all the ingredients used for the preparation of your dinner.



Make sure you take a picture of all ingredients you use. If applicable, please make sure that the package size is visible. If you use leftovers from the past day (e.g. rice) and just make a sauce, please also show the rice that you will heat up. Oil, pepper and salt, herbs, or spices do not need to be indicated.

Figure 1: Example of an uploaded picture of all ingredients that will be used for meal preparation.

Q6 Please indicate for all ingredients which package size they have.

*Rucola 80gr*  
*Rice 500gr*  
*Roerbakmix Italian 600gr*  
*Minced beef 300gr*  
*Olives 235gr*  
*Pesto 190gr*  
*Seeds 175gr*  
*Carrots 1kg*  
*Feta cheese 200gr*

If you have food that is not packaged (e.g. onion) you don't need to indicate the weight

**You can now start with the preparation of your meal. Once you have finished cooking, but before serving, we will ask you to take the next pictures. So please click next when you finished cooking**

Q7 Do you have any leftover ingredients that you did not use for the preparation of your meal?

- ☐ Yes (Continue with Q7.1 + Q 7.2)
- ☐ No (Continue with Q8)

**Please carefully select all leftover ingredients that you did not use for dinner and put them together, you may have to get your ingredients from the refrigerator or storage closet again.**



Q7.1 Please add a clear picture of the leftover ingredients which you did not use for the preparation of your dinner.



Make sure all leftover ingredients show clearly. If you have non-transparent packages, make sure they are open, so we can see the food inside.

Figure 2: Example of an uploaded picture of all remaining ingredients that were not used for the preparation of the dinner.

Q7.2 Please indicate for all leftover ingredients how you handled them and how much approximately you had left.

*Fridge: 1/4 rucola, carrots (I just took 1 out of the package),*

*3/4 olives, pesto, 2/3 feta*

*Freezer: 2/3 Minced beef, almost all roerbak vegetables*

*Shelf: From the seeds I only took one table spoon.*

*The seeds and the rice are back in my shelf*

*Disposed: half onion*

*Other: (e.g. to feed pets)*

Indicate clearly whether you threw, stored, refrigerated, froze, gave away etc. your remaining ingredients. List for each individual ingredient.

Q8 Please add a clear picture of all the food in the pans/pots/oven-dish etc. that you prepared.



Figure 3: Example of an uploaded picture of all food prepared in the pans/pots/oven-dish etc.



**You can now serve the food you prepared on a plate/bowl**

- Q9 Add a clear picture of your food on the plate/bowl. When you serve yourself multiple times, you have to take pictures again in the next step.



*Figure 4: Example of an uploaded picture of the food on the plate.*

- Q10 Did you serve yourself food a second time?
- ☐ Yes (Continue with Q10.1)
  - ☐ No (Continue with Q11)

Q10.1 Please add a picture of the second serving on your plate/bowl.



*Figure 5: Example of an uploaded picture of the second serving.*

- Q11 After you are done eating; add a clear picture of your plate/bowl. In case you did not finish your meal, please leave the food on the plate for the picture.



Figure 6: Example of an uploaded picture after eating of the plate.

- Q12 Did you have food left on your plate after eating?

- Yes (Continue with Q12.1)
- No (Continue with Q13)

Q12.1 What did you do with the remaining leftovers on Your plate/bowl?

*I have disposed the leftovers on my plate.*

Indicate clearly whether you threw, stored, refrigerated, froze, gave away etc. your plate leftovers. Please explain why.

**Before cleaning up the dishes...**

- Q13 Please add a clear picture of the pots/pans/oven-dish etc. Make sure it is possible to see whether they are empty or there is still food inside.



Figure 7: Example of an uploaded picture of the pots/pans/oven dishes after eating.

Q14 Did you have any leftovers in your pots, pans, or oven-dishware?

- Yes (Continue with Q14.1)
- No (Continue with Q14)

Q14.1 Please indicate what did you do with the leftovers in your pots, pans, or oven dishware?

*I threw out the vegetables, meat and salad. The vegetables and meat because it's not enough to store and the salad because I think it won't be nice to eat anymore tomorrow. The rice I will keep in the fridge.*


Q15 Do you have any comments?

*The seeds were mainly to decorate my salad a bit. I was quite Hungry before the preparation and I think I made far more Rice than I intended.*

Here you can include any comment that you may find of relevance. Have you done sports? Did you have little time? Did you not feel like cooking? All those are comments we are interested in!

## Appendix G | Food diary

### Option 1: Participant will not prepare dinner

**WAGENINGENUR**  
*For quality of life*

What is your name?

Will you prepare dinner for only yourself tonight?

☐ Yes

☒ No

>>

What are your dinner plans for tonight?

☐ I will eat a ready-to-eat meal

☒ I will eat out in a restaurant or snack bar

☐ I will eat at a friend's place

☐ I will cook and eat with/for friends or family


☐ I will eat eat only or partly leftovers

☐ Other

>>

We thank you for your time spent taking this survey.  
Your response has been recorded.

### Option 2: Participant will prepare dinner

**WAGENINGENUR**  
*For quality of life*

What is your name?

Will you prepare dinner for only yourself tonight?

☒ Yes

☐ No

>>

Are you intending to cook your meal for one or more days?

- ☐ For 1 day
- ☐ For 2 days
- ☐ For more than 2 days

Which meal are you preparing for dinner?

*Please be as specific as possible.*

**Please carefully select all ingredients that you will use for dinner and put them together.**

Please add a clear picture of all the ingredients used for the preparation of your dinner.

*Make sure you include all ingredients you are going to use.*

Drop files or click here to upload

Please indicate for all ingredients which package size they have.

**You can now start with the preparation of your meal. Once you have finished cooking, before serving, we will ask you to take the next pictures. So please click next when you finish cooking.**

>>

*Start branch 1: Option A*

Do you have any leftover ingredients that you did not use for the preparation of your meal?

- ☒ Yes
- ☐ No

>>

Please carefully select all leftover ingredients that you did not use for dinner and put them together, you may have to get your ingredients from the refrigerator or storage closet again.

Please add a clear picture of the remaining ingredients which you did not use for the preparation of your meal.  
*Make sure all remaining ingredients show clearly. If you have packages make sure they are open, so you can see the food inside.*

Drop files or click here to upload

Please indicate for **all leftover** ingredients how you handled them and how much approximately you had left.  
*Please be as specific as possible.*

>>

#### Branch 1: Option B

Do you have any leftover ingredients that you did not use for the preparation of your meal?

- ☐ Yes  
☒ No

>>

#### End of branch 1

Please add a clear picture of all the food in the pots, pans, or oven-dish etc. that you prepared.

Drop files or click here to upload

**You can now serve the food you prepared on a plate or bowl.**

Add a clear picture of your food on the plate or bowl. When you serve yourself multiple times, you have to take pictures again in the next step.

Drop files or click here to upload

>>

### *Start branch 2: Option A*

Did you serve yourself food for a second time?

- ☒ Yes  
☐ No

>>

Please add a picture of the second serving on your plate or bowl.

Drop files or click here to upload

>>

### *Branch 2: Option B*

Did you serve yourself food for a second time?

- ☐ Yes  
☒ No

>>

### *End of branch 2*

After you are done eating; add a clear picture of your plate or bowl. In case you did not finish your meal, please leave the food on the plate for the picture.

Drop files or click here to upload

>>

### *Start branch 3: Option A*

Did you have food left on your plate or bowl after eating?

- ☒ Yes  
☐ No

>>

What did you do with the remaining leftovers on your plate or bowl?  
*Please be as specific as possible.*

>>

### Branch 3: Option B

Did you have food left on your plate or bowl after eating?

☐ Yes

☒ No

>>

### End of branch 3

**Before cleaning up the dishes...**

Please add a clear picture of the pots, pans, or oven-dish etc. Make sure it is possible to see whether they are empty or there is still food inside.

Drop files or click here to upload

>>

### Start branch 4: Option A

Did you have any leftovers in your pots, pans, or oven-dish?

☒ Yes

☐ No

>>

Please indicate what did you do with the leftovers in your pots, pans, or oven-dish?  
*Please be as specific as possible.*

>>



*Branch 4: Option B*

Did you have any leftovers in your pots, pans, or oven-dish?

☐ Yes

☒ No

>>

*End of branch 4*

Do you have any comments?

>>

We thank you for your time spent taking this survey.  
Your response has been recorded.

## Appendix H | Daily reminder emails

### Day 1

Hello \_\_\_\_\_

Welcome to your first day of the food diaries! Hereby we send you the link to the food dairy:  
[https://wur.az1.qualtrics.com/jfe/form/SV\\_9trgtwOmpVLsNaR](https://wur.az1.qualtrics.com/jfe/form/SV_9trgtwOmpVLsNaR). You can use this link every day for filling in the food dairy.

You can always contact us during the study if you have questions or doubts.

Good luck and enjoy your dinner!

Best regards,  
The research team

### Day 2

Hi \_\_\_\_\_

Today is Day 2 of the dinner-for-one study. This is just a friendly reminder to fill in the food diaries for your dinner tonight. (Link to the food dairy:  
[https://wur.az1.qualtrics.com/jfe/form/SV\\_9trgtwOmpVLsNaR](https://wur.az1.qualtrics.com/jfe/form/SV_9trgtwOmpVLsNaR))

In case of questions, feel free to just answer to this email!

Cheers,  
The research team

### Day 3

Hi \_\_\_\_\_

Another day of the food diaries! We just wanted to kindly remind you to not forget to fill in the questionnaire tonight. (Link to the food dairy:  
[https://wur.az1.qualtrics.com/jfe/form/SV\\_9trgtwOmpVLsNaR](https://wur.az1.qualtrics.com/jfe/form/SV_9trgtwOmpVLsNaR))

As always; if you have questions, let us know!

Best regards,  
The research team

### Day 4

Hello \_\_\_\_\_

We hope you are doing fine! It's already Day 4 of the food diaries and we just wanted to send you a friendly reminder to fill in the diary tonight for your dinner. (Link to the food dairy:  
[https://wur.az1.qualtrics.com/jfe/form/SV\\_9trgtwOmpVLsNaR](https://wur.az1.qualtrics.com/jfe/form/SV_9trgtwOmpVLsNaR))

It would be nice if you could let us know whether you know anybody of your friends or family members who could also be interested or suitable for the study.

Enjoy your meal!

Cheers,  
The research team

### **Day 5**

Hi\_\_\_\_\_

Halfway through! Just another five days until the food diary will be completed. Please don't forget to fill in your diary tonight. (Link to the food dairy: [https://wur.az1.qualtrics.com/jfe/form/SV\\_9trgtwOmpVLsNaR](https://wur.az1.qualtrics.com/jfe/form/SV_9trgtwOmpVLsNaR))

If you have questions, feel free to simply answer to this email.

Best regards,  
The research team

### **Day 6**

Hello\_\_\_\_\_

We hope you are looking forward for Day 6 of the food diaries! Please fill in the questionnaire during and after dinner preparation as you did in the past days. (Link to the food dairy: [https://wur.az1.qualtrics.com/jfe/form/SV\\_9trgtwOmpVLsNaR](https://wur.az1.qualtrics.com/jfe/form/SV_9trgtwOmpVLsNaR))

### **Important: Appointment Interview**

We would also like to make an appointment for the interview with you. Could you tell us which days and times are suitable for you in week 47 (20-11 – 24-11).

For questions or doubts, you can contact us anytime!

Enjoy your dinner!

Best regards,  
The research team

### **Day 7**

Hi\_\_\_\_\_

Only three days left for the food diaries! This is just a friendly reminder to fill in the food diaries for your dinner tonight. (Link to the food dairy: [https://wur.az1.qualtrics.com/jfe/form/SV\\_9trgtwOmpVLsNaR](https://wur.az1.qualtrics.com/jfe/form/SV_9trgtwOmpVLsNaR))

### **Important: Appointment Interview**

We would also like to make an appointment for the interview with you. Could you tell us which days and times are suitable for you in week 47 (20-11 – 24-11).

In case of questions, feel free to just answer to this email!

Cheers,  
The research team

**Day 8**

Hello \_\_\_\_\_

We hope you are still staying strong with the food diaries! Please fill in the questionnaire as usual during and after dinner time. (Link to the food dairy:

[https://wur.az1.qualtrics.com/jfe/form/SV\\_9trgtwOmpVLsNaR](https://wur.az1.qualtrics.com/jfe/form/SV_9trgtwOmpVLsNaR))

In case of questions, let us know.

Very best regards,

The research team

**Day 9**

Hi \_\_\_\_\_

We hope you are doing fine! Please fill in the questionnaire the same way as you have done in the past nine days. We really appreciate your efforts to support our study. (Link to the food dairy:

[https://wur.az1.qualtrics.com/jfe/form/SV\\_9trgtwOmpVLsNaR](https://wur.az1.qualtrics.com/jfe/form/SV_9trgtwOmpVLsNaR))

As usual, if you have any questions, please contact us so we can help you.

Best regards,

The research team

**Day 10**

Hello \_\_\_\_\_

Congrats!! This is your final day of the food diaries. Thank you very much for staying with us. This is our last email to friendly remind you to fill in the food diary tonight. (Link to the food dairy:

[https://wur.az1.qualtrics.com/jfe/form/SV\\_9trgtwOmpVLsNaR](https://wur.az1.qualtrics.com/jfe/form/SV_9trgtwOmpVLsNaR))

Please let us know if meanwhile you have any questions or doubts.

Enjoy your dinner!

Warm regards,

The research team

**Day 11**

Hello \_\_\_\_\_

Thank you for filling in the food dairy for ten days! We will now start analyzing the pictures and data of your dairy. On the basis of the findings, you will be interviewed. The interview will last approximately 60 minutes and you can indicate a place for the interview, preferably at your home. When you click on the link beneath you can select a date and time when the interview will suit you. For any further questions, you can always contact us.

Kind regards,

The research team

## Appendix I | Ethical approval

 <b>WAGENINGEN</b> UNIVERSITY & RESEARCH	<p>DATE October 18, 2017</p> <p>SUBJECT Ethical approval of research project</p> <p>POSTAL ADDRESS 6705 kn Hollandsseweg 1 Wageningen The Netherlands</p> <p>VISITOR'S ADDRESS Building 201</p> <p>INTERNET <a href="http://www.wur.nl/university">www.wur.nl/university</a></p> <p>DOCUMENT NUMBER D9215846</p> <p>HANDLED BY Prof. Dr. Marcel Verweij</p> <p>TELEPHONE +31(0)317484334</p> <p>EMAIL <a href="mailto:esther.roquas@wur.nl">esther.roquas@wur.nl</a></p>
<p>6706 ks Hollandsseweg   Wageningen   The Netherlands</p>	
<p>To whom it may concern</p>	
<p>The following project proposal has been reviewed by the Social Sciences Ethics Committee (SEC):</p>	
<p>Title: Portioning of food in meal preparations and their effect on food waste in single households Project team: Dieuwertje Bolhuis, Nicole Jansen, Lotte Demmink, Bea Steenbekkers Funding: Food Quality and Design Group Period: November 2017 – November 2018 Location: Wageningen University &amp; Research</p>	
<p>The Committee has concluded that the proposal deals with ethical issues in a satisfactory way and that it complies with the Netherlands Code of Conduct for Scientific Practice.</p>	
<p>With kind regards,</p>	
	
<p>Professor Dr Marcel Verweij Chair Social Sciences Ethics Committee</p>	
<p>Wageningen University &amp; Research is specialised in the domain of healthy food and living environment.</p>	

Figure 10 Ethical approval

## Appendix J | Interview schedule

### Section 1: Opening questions

1. How often do you cook for yourself in a regular week?

*Probe: 3-4 times, 5-6 times, every day*

2. What kind of meals do you usually cook when you cook for yourself?

*Probe: ready to eat, something quick, regular Dutch meals*

- 2.1. What do you do in exceptional situations?

*Probe: no difference, take more time, go out, eat different*

3. Where/with whom do you eat if you do not cook for yourself?

*Probe: friends, eating out, family*

4. How do you determine what to eat for your dinner?

*Probe: week schedule, take it day by day, check sales promotions*

5. How often do you buy groceries for the dinner?

*Probe: Once a week, every day, some days a week, order online*

6. How much do you like preparing and cooking meals?

*Probe: relation with time, enjoy cooking/exploring recipes*

### Section 2: Key questions

#### Purchasing ingredients

7. How do you determine what ingredients to buy for your dinner?

*Probe: recipe, feeling, packaging, routine*

8. What form of and package size vegetables do you purchase usually (for instance, whole, pre-cut or canned)? And what preference do you have? Why?

*Probe: processed/unprocessed, preservation form, vegetable shape, fresh, frozen, recipe AND health, convenience, knowledge, price AND single-person or family size AND costs, environment, portion, recipe*

9. Does the form and package size of vegetables you purchase depend on a certain day/event of the week? What determines the form you choose?

*Probe: during working week, weekends, kind of meal, limited time, during working week, weekends, make more portions at once.*

#### Preparation

10. Does the form and package size of vegetable influence the amount of food you prepare?

*Probe: used whole package/can, hard to estimate portion AND small, big bag, can, just use the whole can*

11. Is it important to you to prepare the amount of food for yourself? Why?

*Probe: important, not important, cook more to be sure not to have too few*

12. Do you have the feeling that you prepare the amount of food for yourself?

*Probe: right amount, too much, too little*

#### Portioning

13. How do you determine the amount of the ingredients you need for the preparation of the meal? (E.g. Day \_ you indicated "pasta" and you had a lot left. How did you determine the amount of "pasta"? Why do you measure like that?)

*Probe: measuring tools, scales, feeling, routine, household tools*

14. Why do you choose a certain amount of ingredients for the preparation of your meal?  
Do you take references into consideration to measure your ingredients? Why?

*Probe: Food Pyramid, confusion, caloric intake, other references*

#### **Ingredient leftovers**

15. What did you do with the leftover ingredients and vegetables which were not used for preparing the meal? Why?

*Probe: disposing, fridge, froze them, gave them away, use them AND routine, no use, too little to store, prevent food waste*

16. Does the form and package size of vegetable/food influence the amount of vegetable/food waste you dispose during preparation? Why? (E.g. "We saw when you use \_\_ you dispose \_\_")

*Probe: raw vegetables; unavoidable waste, use whole package/bag/can AND big bag, dispose which is not need, just use the whole bag/can/package*

#### **Plate leftovers**

17. Does the form and package size of vegetable/food influence the amount of vegetables/food you serve yourself? Why? (E.g. "We saw when you use \_\_ you serve yourself \_\_")

*Probe: whole vegetable, less food; package/bag/can, more food AND used whole bag, more vegetables; used small bag/can/package, less vegetables*

18. Why do you serve yourself food several times/only one time?

*Probe: hungry, satiation, wanted to finish, wanted to eat half so other half is for tomorrow, like to eat*

19. How do you determine the amount you are going to serve/eat?

*Probe: always same amount, based on hunger, liking, feeling*

20. What did you do with the leftovers on your plate? Why?

*Probe: stored (consumed?), disposed*

21. What do you think about plate leftovers?

*Probe: don't mind, eat them, dispose them, too little to store*

22. Why did you have leftovers on your plate? Do you think you could prevent leftovers on your plate? Why? OR Why did you finish all the food on your plate?

*Probe: measuring ingredients better, serve less food*

23. Does the form and package size of vegetable/food influence the amount of vegetable/food leftovers on your plate? Why? (E.g. "We saw when you use \_\_ you dispose \_\_")

*Probe: whole vegetable, less food; package/bag/can, more food AND used whole bag, more vegetables; used small bag/can/package, less vegetables*

#### **Dishware leftovers**

24. What did you do with the leftovers in your dishware? Why?

*Probe: store, dispose AND why, did you consume them*

25. What do you think about leftovers in the dishware?

*Probe: don't mind, eat them, dispose them, too little to store*

26. Why did you have leftovers in your dishware? Do you think you could prevent leftovers in your dishware? OR Why did you finish all the food in your dishware?

*Probe: hungry, right amount, wanted to finish so there is nothing left, too little to keep for next day*

27. Does the form and package size of vegetable/food influence the amount of vegetable/food leftovers in your dishware? Why? (E.g. "We saw when you use \_\_ you dispose \_\_")

*Probe: whole vegetable, less food; package/bag/can, more food AND used whole bag, more vegetables; used small bag/can/package, less vegetables*

### Section 3: Closing questions

28. Can you tell me something about food waste in consumer households?

*Probe: knowledge and information source*

29. What do you think about the food waste you generate by yourself?

*Probe: amount, not very aware, highly aware; try to reduce much as possible*

30. Do you think that the size of vegetable/food packages influences leftovers? Why?

*Probe: smaller/ fitted packages*

31. Do you think that the form of vegetables influences leftovers? Why?

*Probe: spoil faster, use all of the package*

32. How do you think you need to portion ingredients in a way to avoid leftovers?

*Probe: difficult, convenient, no time, meal planning, use references, weigh, cups etc.*

33. What could you do to prevent ingredient, plate and dishware leftovers?

*Probe: measure better, cook according to recipes, do not fall for marketing actions, do not buy much, no experiments*

34. What do you think can be done more to reduce food waste in single-person households?

*Probe: educate consumers, self-awareness, frozen/canned, smaller packages*



## Appendix K | Codebook

### General questions

Code	Type	Description	Example from data
Convenience	Inductive	Easy, limited time	<i>It's easy to cook and it's fast</i>
Routine	Deductive	A sequence of actions regularly followed	<i>I cook for myself always at the same time because I do that always, that's usual</i>
Parents	Deductive	Routine from parents, take parents as reference and role model	<i>From experience from my parents that they throw a lot of food away which is left from one day</i>
Health	Deductive	Eating or wanting to eat what is perceived as being good for you	<i>I think it's healthier. More vitamins</i>
Balanced diet	Inductive	Variation in different types of food and provide enough nutrients for good health	<i>I try to eat different things during the week, like pasta or rice</i>
Diet	Inductive	On specific diet because of allergy, health or weight	<i>Because I am also doing a diet</i>
Different behaviour	Deductive	Different eating behaviour for instance in weekends or exceptional situations	<i>When I have more time, I'll spend more time, also because I worked as a cook</i>
No different behaviour	Deductive	No different eating behaviour in weekends or exceptional situations	<i>No, mostly it's just making our own dinners</i>
Flexible working days	Inductive	Job with flexible working days, which influences time of dinner and planning	<i>My work days are so different</i>
Flexible working hours	Inductive	Job with flexible working hours, which influences time of dinner and planning	<i>They [working hours] are flexible</i>
Friends	Inductive	Sometimes eat at or with friends	<i>So if I cook for friends I always cook more</i>
Like to cook	Deductive	Enjoys cooking, motivated to cook	<i>I like to prepare food</i>
Culture	Inductive	Likes to prepare dishes from other cultures	<i>I like dishes from other parts of the world, Mexican dishes or Indian, Asian [...] and those dishes are I think most of the time, one pot dishes, one pan.</i>
Don't like to cook	Deductive	Doesn't enjoy cooking	<i>I don't like to cook for myself, because eating by yourself is not nice, but I have to eat so I think it is nice to prepare a good meal</i>

*Purchasing ingredients, planning, preferences, and determinants*

Code	Type	Description	Example from data
Food in storage	Inductive	Always want to have some food in storage or freezer in case of illness or working late	<i>So, when I don't like to cook or have less time, then I always have food</i>
Check storage	Deductive	Check storage before buying new ingredients in supermarket	<i>I look what I've left</i>
Planning	Deductive	Thinking ahead of how to cook, what to buy and store, to plan meals	<i>Well actually I decide on Saturday what I want to eat for the whole week and then I do my grocery shopping</i>
No planning	Deductive	Not thinking ahead of how to cook, what to buy and store, to plan meals	<i>I never really plan my week ahead of what I'm going to cook, I'm going to make food for myself, I depend in the moment this is it</i>
Spontaneity	Deductive	Sudden change of dinner plans (appointments, friends, radio)	<i>And I don't know if I want to eat it then</i>
Don't like shopping	Inductive	Don't like to go grocery shopping	<i>I don't like shopping</i>
Order groceries	Inductive	Order groceries online from company (fixed groceries, no choice)	<i>Yes I did, well I actually tried it last week for the first time</i>
Market	Inductive	Buys ingredients/vegetables fresh from the market	<i>I want to have fresh ingredients most of the time [...] I buy my vegetables from the market on Saturday or Friday</i>
Choice availability	Inductive	No availability of products/package sizes after peak hours or in the evening in supermarkets	<i>When I go to the Jumbo, they often don't sell the fresh organic spinach so then I just buy the one from the freezer</i>
Prefer: big	Deductive	Prefers to buy big package	<i>I like to have it in a big pack</i>
Prefer: fresh	Deductive	Prefers fresh vegetables/ingredients. This includes vegetables which are pre-cut, pre-washed, and packaged but can also be loose.	<i>I prefer fresh</i>
Prefer: small package	Deductive	Prefers to buy small package size	<i>I prefer the small packages</i>
Determine: Food Bank	Inductive	Determines what to eat/buy based on what was received by the food bank	<i>I'm depending on the Food Bank and what they give</i>
Determine: supermarket	Inductive	Determines what to eat/buy right in the supermarket	<i>Then I'm in the shop, oh that's nice, I like that</i>
Determine: location in supermarket	Inductive	Determines what to eat/buy based on the location of ingredients in the supermarket (e.g. fresh ingredients at the entrance are bought instead of frozen ingredients)	<i>When I got a meal in my head and you see the fresh vegetables first, so I already take the fresh broccoli before I go to the frozen vegetables department</i>
Determine: others	Inductive	Determines what to eat/buy based on what others were eating or talking about during the day	<i>It can be something that I hear on the radio, or something I see someone else is eating during lunch break and then I decide I want to prepare that</i>

Determine: recipe	Inductive	Determines what to eat/buy based on a recipe	<i>In weekends I like to spend more time in the kitchen and try recipes that I have never done before, and on holidays yeah I like to cook for friends and really, full course, meals and so</i>
Determine: sale	Inductive	Determines what to eat/buy based on sales	<i>I usually look if I can find a discount or something that is for the same day that otherwise would be thrown away</i>
Determine: shelf life	Inductive	Determines what to eat/buy based on the shelf life, which is the length of time for which an item remains usable and fit for consumption	<i>Because, green beans can be stored for a couple of days</i>
Determine: season	Inductive	Determines what to eat/buy based on the season	<i>Yeah, yeah I take a lot of seasonal</i>
Price	Deductive	Being conscious about how much is being paid for food products	<i>Because it's cheap</i>
Vegetables	Inductive	Likes/purchases/uses a lot of vegetables	<i>I always start choosing vegetable</i>
Don't like ready to eat	Inductive	Don't like foods that are already mostly prepared, such as ready to eat, steam meal etc.	<i>I don't like to eat everyday pizza</i>
Bigger package	Deductive	Bigger package when eating with more people or preparing more	<i>When those are for sale then I take a big bag and I eat it for myself or when a friend comes, three or 4 times of the big</i>
Fixed size	Inductive	Strong feeling about pre-packaged food that come in fixed sizes	<i>And if you have a prepacked you just have to deal with it basically</i>
Insufficient information	Deductive	Lack of facts on package (calories etc.)	<i>With meat it's hard to know what's really in it, because it's hard to find on the package</i>

#### *Actual use of ingredients, portioning of ingredients, and dinner preparation*

Code	Type	Description	Example from data
Estimate: cup	Deductive	Cup used to portion ingredients	<i>For rice I use a cup</i>
Estimate: eye	Deductive	Estimate portioning of ingredients or servings by eye	<i>Vegetables [I measure] usually by eye</i>
Estimate: feeling	Deductive	Portions ingredients based on feeling	<i>I just eat when I am hungry and when I feel like it</i>
Estimate: hands	Deductive	Hands used to portion ingredients	<i>I pick like a handful</i>
Estimate: hunger	Deductive	Hunger as an indicator of how much food to prepare	<i>I just eat when I am hungry</i>
Estimate: tools	Deductive	Eetmaatje, spoon etc. used to portion ingredients	<i>I have an...uhm...such a measure beaker</i>
Estimate: weight	Deductive	Weigh ingredients for estimation/weight on the package	<i>Yes I then weigh it myself</i>
Estimate: weight 2	Deductive	Weigh only rice and pasta etc.	<i>I weigh my pasta, rice, couscous and things</i>
Struggle portioning ingredients	Inductive	Difficulties to portion ingredients	<i>[Rice] is really hard to cook for me. So if we talk about this food I don't know how much I need or how much</i>
Use all 1	Inductive	Prepares all of an ingredient/package	<i>I used the entire package</i>

Use all 2	Inductive	Prepares all of an ingredient/package i.o.t. avoid waste of ingredient	<i>I just want to finish it, sometimes I already have it for a couple of days and when I wait longer I'll not can eat it any longer. Or I think then I just use it.</i>
Use: bigger package	Inductive	Uses bigger package	<i>As I told already I was a cook, so I was taught to cook in bulk, so big portions so I still have the tendency to buy big packages</i>
Use: cans 1	Inductive	Buys cans because of convenience	<i>Because it's cheap and easy to store</i>
Use: cans 2	Inductive	Buys cans because of shelf life	<i>I only buy so I have something in the house for when I'm really sick</i>
Use: fresh	Inductive	Buys (mainly) fresh	<i>When I buy it myself it is always fresh</i>
Use: frozen	Inductive	Buys frozen vegetables	<i>The frozen spinach and little green beans, and peas, so I have that so I can...I like that its easy</i>
Use: loose ingredients	Inductive	Loose ingredients, which you can estimate by yourself in the store, no fixed package sizes	<i>Often I buy the loose version, that I can decide myself, how much</i>
Use: medium package	Inductive	Uses medium package	<i>Uhm mostly its 300 or 500 [grams]</i>
Use: part of the package	Inductive	Uses part of a product and stores the remaining	<i>I am really determined on how much I cook, well then I use whole paprika or store half paprika</i>
Use: pre-cut	Inductive	Buys pre-cut vegetables because of convenience	<i>I will buy a pre-cut mixed package</i>
Use: small package	Inductive	Uses small package	<i>Usually I buy the small size for one time use</i>
Use: transparent package	Inductive	Uses only transparent packages to determine freshness vegetables	<i>I want to see the product and if it's in a can or in the freezer I can't actually see what it looks like</i>
Adaption	Inductive	Adopt meal while preparation i.o.t. create balance between ingredients	<i>I Just decided to put in the entire eggplant and just adapt the rest of the ingredients</i>
Right amount 1	Deductive	Prepared right amount to not feel hungry or too full after eating	<i>I mostly try to prepare enough for myself</i>
Right amount 2	Deductive	Prepared right amount to not feel hungry or too full after eating and to not waste food	<i>So that's why I try most of the times just to cook enough for me and to not throw it away</i>
Same amount	Deductive	States they always uses the same amount no matter how much food prepared and which packaging/form	<i>Most of the time I eat the same amount</i>
Too much prepared intentionally	Inductive	Cooked more than enough food intentionally	<i>If I make food for 2 days then it's obviously stored for another day so</i>
Too much prepared unintentionally	Deductive	Cooked more than enough food unintentionally	<i>Most of the times I have enough, this was a bit too much, this one was two parts of meat and the last one was too much</i>
Package size effect 1	Inductive	Bigger package -> more prepared	<i>If you buy less you prepare less</i>

Heard somewhere	Inductive	Information that was received from non-scientific sources (friends, TV, Social Media)	<i>I've heard we don't need to eat meat every day and we don't need to eat as much meat as we were used to</i>
Reference	Deductive	Source that is taken into consideration when preparing the evening meal. Can be a number (such as calories or grams of ingredients), a tool (such as the Schijf van vijf) or an information provider (such as the food pyramid of the Voedingcentrum)	<i>Lots of things I think are healthy according to the voedingswijzer (=nutritional guide)</i>

### Stage 1: ingredient leftovers

Code	Type	Description	Example from data
Don't mind ingredient leftovers	Inductive	Don't mind ingredients leftovers	<i>When I have [ingredient] leftovers, I put in the freezer or I eat it the next day</i>
State: don't have ingredient leftovers	Inductive	States that they don't have (hardly) leftover ingredients	<i>Even like with pastry dough you can make nice snacks</i>
Want to avoid ingredient leftovers	Inductive	Don't want to have ingredient leftovers	<i>When I open it I put a date on it and when its three weeks later, yeah I don't like it anymore and I don't trust it and have to throw it out</i>
Don't eat ingredient leftovers	Inductive	Don't want to eat ingredients leftovers	<i>You end up with half a kilo left potatoes and then they grow the little green things and I don't eat them anymore</i>
Dispose ingredient leftovers	Inductive	Throw away ingredient leftovers, not use or eat it again	<i>And then if it's not good anymore I'll throw it away</i>
Reuse ingredient leftovers	Inductive	Leftover ingredients; store, use in another meal, consume later	<i>The onion I used last Sunday</i>

### Stage 2: serving, eating, and plate leftovers

Code	Type	Description	Example from data
Don't mind plate leftovers	Inductive	Don't mind plate leftovers	<i>Yeah I don't know. I just, I think I have the right amount, it tastes good and I keep eating and in the occasion that I'm not hungry anymore I stop and I have couscous leftover</i>
State: don't have plate leftovers	Inductive	States that they don't (hardly) have plate leftovers	<i>I almost never have food left on my plate</i>
Want to avoid plate leftovers	Inductive	Don't want to have plate leftovers	<i>Well just as I said I don't like plate leftovers so I'm kind of like you need to finish your plate</i>

Don't eat plate leftovers	Deductive	Don't want to eat plate leftovers	<i>If I leave it on my plate I'll throw it away. I won't put it back in the pan, I don't know why. So I just eat it</i>
Dispose plate leftovers	Deductive	Throw away plate leftovers, not use or eat it again	<i>I pick the vegetables out and I leave (throw) the pasta and the rice</i>
Reuse plate leftovers	Inductive	Plate leftovers; store, use in another meal, consumer later	<i>When I don't like it anymore I'll just save it for another day, so I'll never throw it away</i>
Struggle serving	Inductive	Find it hard to serve food and estimate whether it's the right amount	<i>It's not really easy to determine is it the right amount.</i>
Too much served: disposed	Inductive	Served more than enough food which resulted in plate leftovers and was thrown	<i>But in this event I didn't throw any meat away, but normally I do</i>
Too much served: eaten	Inductive	Served more than enough food which was eaten anyways	<i>I still eat everything, even when I'm stuffed</i>
Satiation	Inductive	Eating until feeling full, reaching satiation	<i>I'm not hungry anymore I stop and I have couscous leftover.</i>
Portion size effect	Deductive	Eating more when more food is available	<i>Well I think if it's already prepared, I will prepare it all at once, then I would, uhm, maybe more easily eat it because it's already prepared because otherwise I need to think of something to do with this little amount</i>
Package size effect 2	Deductive	Bigger package -> more prepared -> more served	<i>Well vegetables, I can eat a lot, it is healthy, I like it and when I like it, I can cook more. It is okay and so when the packages are smaller, okay I have less to eat but if there are bigger and I know I won't eat it soon enough again. Then I prepare it all for one night, then I'll eat 500gr witlof (chicory) cooked because I like it.</i>
Serve plate	Inductive	Serves till plate is full	<i>I put my plate full, really full,</i>
Serve prepared	Inductive	Serves till pots/pans are empty	<i>When it's for 2 days, I do the half when it's for just one portion then I guess this is the amount I want to eat so I prepare also this amount</i>
Finish plate	Inductive	Always finishes/cleans food on the plate	<i>I hardly have plate leftovers</i>
Taste	Inductive	Liking, flavour	<i>I doubt if it tastes good and how do I reheat it</i>

### Stage 3: pot leftovers

Code	Type	Description	Example from data
Don't mind pot leftovers	Inductive	Don't mind pot leftovers	<i>Yes uhm, sometimes I cook for two days and then I take on half on my plate and the other half I put in boxes or so and put it in the fridge.</i>

State: don't have pot leftovers	Inductive	States that they don't have (hardly) pot leftovers	<i>If I cook for 1 day I don't have leftovers in the pots</i>
Want to avoid pot leftovers	Inductive	Don't want to have pot leftovers	<i>I try not to have [pot] leftovers</i>
Don't eat pot leftovers	Deductive	Don't want to eat pot leftovers	<i>P: Because I did not like it so much. It was enough, it was too much. And I did not really like it, so it was the 2 of them. R2: Okay, so you did not want to keep it? P: No [laughs]</i>
Don't eat fridge leftovers	Deductive	Don't want to eat leftovers from fridge	<i>Little potatoes in your fridge I don't like to use it anymore</i>
Don't eat freezer leftovers	Deductive	Don't want to eat leftovers from freezer	<i>I don't like that from the freezer</i>
Don't eat specific leftovers	Deductive	Don't want to eat specific leftovers (for instance rice or potatoes)	<i>I never kept rice</i>
Dispose pot leftovers	Deductive	Throw away pot leftovers, not use or eat it again	<i>If I don't like it, I throw it away.</i>
Reuse pot leftovers	Deductive	Pot leftovers; store, use in another meal, consumer later	<i>I ended up with a big, big bowl of couscous salad and just stored it</i>
Package size effect 3	Deductive	Bigger package -> more prepared -> more pot leftovers	<i>I prepare what I bought, I never save half of the package, I prepare what I buy</i>
Give away leftovers	Inductive	Gives away leftovers to friends/family	<i>Well I store them for later use. And sometimes, if I think the potatoes, I can't use them any longer I give them to my neighbours or my mom and she can use it.</i>
Finish: pot	Inductive	Finishes food in the pots	<i>Yeah I don't like to throw away food so I always try to adjust that I won't have that</i>

#### *Leftovers in general*

Code	Type	Description	Example from data
Feed leftovers	Inductive	Give leftovers to pets/animals	<i>When there is something left I'll just feed it to the chickens</i>
Package size effect 4	Deductive	Bigger package -> more prepared/left -> more pot/ingredient leftovers -> food waste	<i>I think many people throw things away because the package sizes are too big for their needs</i>
Too less	Deductive	Insufficient ingredient/food to keep, not worth storing it	<i>If it is little I think I throw it away</i>

### Knowledge on food waste and actual behaviour

Code	Type	Description	Example from data
Don't like food waste	Inductive	Strong feeling about food waste due to different reasons (environmental, social, financial)	<i>I really hate to waste food</i>
Don't like packaging material	Inductive	Don't likes products packaged in plastic etc. because of environment	<i>That they used all those plastic package... well I don't like that</i>
No awareness food waste	Deductive	No real understanding/interest of food waste and its influences	<i>I actually don't know much of it [food waste]</i>
Not comfortable with amount food waste	Inductive	Wish they would waste less food	<i>I would love to throw less food away than I do</i>
Observe food waste	Inductive	See others waste food when visiting or working	<i>I see it happening around me</i>
State: don't waste food	Inductive	States that they don't (hardly) waste food	<i>I eat always all that I make, I never, never throw away</i>
Stores but forgets	Deductive	Stores vegetables but then they go bad because they are forgotten and cannot be eaten anymore	<i>Then I would probably forget it and throw it away after 3 days</i>
Think: more waste multiple	Inductive	Thinks multiple households waste more food than single-person households	<i>I think that the bigger families have a lot of leftovers</i>
Awareness environment	Deductive	Being aware of the environment, not related to food waste	<i>How much energy, land, and everything it cost to make good food</i>
Awareness food waste	Deductive	Have some understanding/interest of food waste and its influences	<i>I became just aware with food waste and the environment and food print and everything just with my studies</i>
Comfortable with amount food waste	Inductive	Content with the current level of food they waste	<i>I think its ok, it's not a lot what I produce by myself....</i>
Dispose food	Deductive	Throw away other food products like bread/yoghurt when it's spoiled/above expiry date	<i>I throw that away sometimes</i>
Don't want to waste food	Inductive	Don't want to waste food	<i>I really try to prevent it</i>
Don't want to waste meat	Inductive	Don't want to waste meat because it's a pity for the animals	<i>I do not want to waste it and I want to make sure that the meat I eat is well</i>
Imagine: can leftovers disposed	Inductive	Food waste related to packaging: imagines leftovers in cans are disposed	<i>Yeah with the pots I can imagine if you have too much you are throwing it away</i>
Imagine: greater connection=less waste	Inductive	Imagines that if vegetables are prepared fresh there can be a greater connection with food which makes waste less likely (e.g. person who	<i>I have a special connection with the food and water also, so I don't spoil water, or food</i>



		prepares vegetables is bond to them and doesn't want to throw them away)	
Imagine: little left disposed	Inductive	Food waste related to packaging: imagines little leftovers in big packages are disposed	<i>Maybe when you have a package of a certain amount then I understand when there is a little bit too much then people throw it away</i>
Imagine: people struggle to eat right amount	Inductive	Imagines that people have problems to estimate what is the right amount to eat for them	<i>But maybe it's already a problem for people to eat the right amount per day</i>
State: disposed if spoiled	Inductive	States (only) disposes food when it's spoiled	<i>So there is a bigger risk that it will end up getting older and then I could be in the end that I'm like hmm is it still good to eat or not? [...] And then I throw it</i>
Priorities	Inductive	Something is more important than food/waste/leftovers	<i>When I'm too busy, too tired or get sick. Sometimes it is too much for me, then I have to think about me first and then the environment or about the waste</i>

### *Suggestions to reduce leftovers*

<b>Code</b>	<b>Type</b>	<b>Description</b>	<b>Example from data</b>
Reduce leftovers: planning	Inductive	Suggestion to reduce leftovers by planning	<i>Try to cook the right portions</i>
Reduce leftovers: buy fresh	Inductive	Suggestion to reduce leftovers by buying fresh products	<i>To avoid leftovers, I think you should buy fresh</i>
Reduce leftovers: buy less	Inductive	Suggestion to reduce leftovers by buying less food in the store	<i>Uh yeah what can I do, [pause] buy less food</i>
Reduce leftovers: sell more sizes	Inductive	Suggestion to reduce leftovers by pre-portioned packages and more available sizes in the supermarkets	<i>Like maybe packages which indicate this is a package for one person, this is a package for a whole family or, and then already have the certain amount of food</i>
Reduce leftovers: weigh	Inductive	Suggestion to reduce leftovers by weighing in the store as well as at home before the meal preparation	<i>I could start weighing them as well</i>
Reduce leftovers: improve portioning	Deductive	Suggestion to reduce leftovers by better portioning ingredients	<i>I like the concept of the Eetmaatje (measure beaker) uhm how much you would have to use for 1, 2, 3 or 4 persons and also how that differs between different kinds of pastas and it's a, I think it is a healthy amount of pasta that you then eat</i>

Reduce leftovers: no ideas	Inductive	No improvement suggestion on how to reduce leftovers	<i>But further I don't know... I think it's okay the way I do it</i>
Reduce leftovers: no need	Inductive	No actual need to reduce the amount of leftovers.	<i>Honestly I don't think a lot because I actually quite good estimate it all</i>
Reduce leftovers: impossible	Inductive	Not possible to not have any leftovers	<i>No, I cannot do anything more than I do, I do everything to avoid that and its good, really good</i>

### *Suggestions to reduce food waste*

Code	Type	Description	Example from data
Suggestion: buy less food	Inductive	Suggestion to reduce food waste: buy less food	<i>I think in general people should be more conscious about what do I want to eat, how much do I want to eat, what is needed, make a list</i>
Suggestion: socialize	Inductive	Suggestion to reduce food waste: eat with other people	<i>Well there are lot of single people here at school and maybe we can discuss this here at times, yeah talk about the profits and benefits and everything from reusing stuff and giving things away. I have one colleague who gives away things often so maybe we can talk about it</i>
Suggestion: education cooking	Inductive	Suggestion to reduce food waste: educate consumers on cooking	<i>I think it's important that people learn how to cook or learn to cook for themselves</i>
Suggestion: education expiry	Inductive	Suggestion to reduce food waste: clarify the meaning of expiry dates	<i>I think many people are still really strict on the date and are throwing it away when it could actually still be used</i>
Suggestion: education food waste	Inductive	Suggestion to reduce food waste: educate consumers about food waste	<i>You can already start teaching kids at school. So uhm what you can do with food and why it's terrible to waste food</i>
Suggestion: education portioning	Inductive	Suggestion to reduce food waste: educate consumer on how to portion	<i>How do you do it I always have leftovers, so I explain it, use this use that, a cup, a cup like this with rice like this, solution.</i>
Suggestion: feed your animal	Inductive	Suggestion to reduce food waste: feed your animal your leftovers	<i>Just get a pig and give it to the pig, so it's not really a waste because you can feed an animal with it. So if I had a rabbit I would also give the lettuce and maybe some leftover carrots</i>
Suggestion: increase awareness	Inductive	Suggestion to reduce food waste: increase awareness of consumers	<i>I think the first thing is really more awareness of people</i>

Suggestion: increase price	Inductive	Suggestion to reduce food waste: Increase price, introduce a leftover-tax	<i>Well a good way on how to influence behavior is by putting a price</i>
Suggestion: increase shelf life	Inductive	Suggestion to reduce food waste: increase shelf life of fresh vegetables	<i>Maybe increase the shelf life of certain fresh ingredients in a way</i>
Suggestion: planning	Inductive	Suggestion to reduce food waste: plan meals and make shopping list	<i>Make a list and you go to the store once a week, and you determine I want to make this and I need that, you have another amount of food in your closet and in your fridge</i>
Suggestion: greater offer	Inductive	Suggestion to reduce food waste: Already pre-packages of ingredients, which can be bought	<i>To package certain ingredients per portion, so smaller packages for instance. So that people could eat it in one or two times.</i>
Suggestion: reuse leftovers	Inductive	Suggestion to reduce food waste: reuse leftovers (store in fridge or freezer)	<i>When you have cooked and you are not hungry at all then you can save it in the fridge for next day</i>
Suggestion: use frozen	Inductive	Suggestion to reduce food waste: buying frozen vegetables	<i>Yeah I think so, if you have frozen packages, you might just defrost a part of it and keep the rest frozen</i>
Suggestion: use loose ingredients	Inductive	Suggestion to reduce food waste: loose ingredients, which you can estimate by yourself in the store, no fixed package sizes	<i>It would be nice if the industry also a few more freedom in buying your own portion just like you can grab it for yourself instead of the prepacked thing</i>
Suggestion: use small package	Inductive	Suggestion to reduce food waste: use smaller packages	<i>Buy little packages</i>
Suggestion: use tools portioning	Inductive	Suggestion to reduce food waste: use tools for portioning	<i>The eetmaatje is a good idea</i>
Suggestion: weigh ingredients	Inductive	Suggestion to reduce food waste: weigh ingredients	<i>I think I can put it on a scale</i>

### Methodology

Code	Type	Description	Example from data
Question difficult	Inductive	Don't understand the question due to level of English	<i>That's too many difficult words</i>