The creation of food waste

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Summary

The relationship between food waste and food safety practices is an area of interest for the FSA. Food that is past its use-by date should be discarded as could be unsafe to eat. However, opportunities to use this food may have been missed during the period it was safe to eat – such as by planning meals, freezing foods and batch cooking.

Behaviours that enable the creation of food waste were not an original focus of the Kitchen Life 2 (KL2) study or the accompanying literature review. In 2022 the FSA expanded their strategy to include a focus on food being 'healthier and more sustainable'. This provided a new opportunity for KL2 data to be reanalysed, from a perspective of food waste (a key aspect of sustainability). For the purposes of KL2, food waste is considered as food that is not consumed and thrown away including inedible and edible peel. A food waste behaviour could occur at any time during the observed footage (such as during meal preparation or when disposing of leftovers) and would be coded as a single food waste behaviour each time this was observed.

Video footage from 42 households and 27 food business operators (FBOs) (footnote 1) was recoded to explore the topic of food waste because a kitchen bin was clearly visible in the footage from these kitchens. As food waste analysis was commissioned in November 2022 (ahead of wave 5) food waste behaviours were only explicitly discussed in 20 household and 4 FBO interviews. As food waste was not explored across the whole KL2 sample, additional desk research was also conducted to supplement KL2 data.

Behaviours were categorised according to when they occur, from purchasing and meal planning to leftovers. Behaviours that occur upstream of meal occasions and that can influence the creation of food waste - for example meal planning, what food is purchased and how it is stored - were predominantly explored in the desk research, though also discussed in some interviews. Behaviours which occur during meal occasions - for example, food waste created when preparing food, portion sizing, and how leftovers are used - were explored using KL2 observations, surveys and interviews, as well as desk research. The frequency, stage in the meal process and type of food waste created (where visible) was also analysed using KL2 observations.

The 42 households in the KL2 food waste sample were observed to dispose of food on 1473 occasions – averaging just over 10 occasions per household per day. Two-thirds (67%) of observed food waste occasions related to preparing a meal, with post-meal food waste accounting for around a fifth (18%). Where the disposed food item could be clearly identified (footnote 2), the most wasted foods in households were vegetables or potatoes (14%), which included peelings from these foods (footnote 3). Red (1%) and white meats (1%) were among the least wasted food groups.

The 27 food business operators (FBOs) in the KL2 food waste sample were observed to dispose of food on 802 occasions (averaging just under 10 occasions of food waste per FBO per day). All observed food waste occasions in FBOs related to preparing a meal, as post-meal food waste was not captured during the study as this typically occurred off-camera and was difficult to track (for example, in takeaways post-meal food waste would take place in the customer's home). Where the disposed food items could be clearly identified, just under a fifth of food waste in FBOs (18%) were vegetables and potatoes, followed by fresh carbohydrates, such as bread (5%) and red meat (4%).

Overall, the main factors influencing the creation of food waste in households were:

- a **lack of skills to plan meals and judge portion** size, which enabled food waste (Psychological capability).
- a **lack of time to plan** meals, which enabled food waste, together with the **lack of space to store foods** which while reducing over-purchasing also made it difficult for participants to see what foods they had stored (Physical opportunity).
- needing to accommodate different and changing **meal preferences of family members**, especially children, which enabled food waste (Social opportunity).

These were reinforced by the following contextual factors (footnote 4):

- **values around the importance of preventing food waste**, which discouraged the creation of food waste (Reflective motivation).
- the extent to which **weekly meal routines** were established in the households, which discouraged the creation of food waste (Automatic motivation).

The main factors affecting whether FBOs created food waste were:

- **skills for food planning and cost management**, which discouraged the creation of food waste (Psychological capability).
- **the space to store or display foods** which both discouraged and enabled the creation of food waste, together with **the processes in place to plan inventories**, which discouraged the creation of food waste (Physical opportunity).
- the **culture of the business in relation to food waste**, which generally discouraged the creation of food waste (Social opportunity).

These were reinforced by:

- **values around the importance of preventing food waste**, which generally discouraged the creation of food waste (Reflective motivation).
- **consistent menus and associated routines** to prepare similar foods, helped to minimise the creation of food waste (Automatic motivation).

Behaviours to target for potential interventions

In both households and FBOs, the desired outcome was to reduce food waste, without increasing food safety risks.

For households, participants were generally keen to reduce food waste, and interventions tailored to groups of individuals (for example segmented groups, with different motivations) may be particularly effective for future behavioural intervention design. Upstream behaviours, especially meal planning, are an important stage where food waste could be prevented and should be a key target for behavioural intervention design - for example, supporting people to better plan for meals that are routinely cooked each week in the home. Additionally, motivating consumers to batch cook and/or freeze foods before they spoil is a potential target behaviour. However, any future intervention needs to allow for flexibility in the meal plan to account for people with busy social schedules and unexpected events.

FBOs generally had a strong focus on the management of food for cost purposes, which reduced the amount of food waste produced during meal preparation. Practices already adopted by some FBOs, such as keeping food waste inventories and making food waste visible to staff (such as having a food waste bin), are behaviours that could potentially be enabled in other businesses. Another intervention area could be behaviours that enable the repurposing of food or prevent food waste during preparation – for example the production of 'skin on' fries.

While not covered in KL2, reducing post-meal food waste could also be a focus for future behavioural interventions research. This would require the consideration of several different factors including portion and plate sizing (in FBOs and in domestic kitchens), whether customers take leftovers home (from restaurants) and how these leftovers are handled and consumed at home. Whilst further research in this area would be required, this may be a worthwhile area to explore as the desk research indicates over a third of all food waste in the hospitality food service sector is wasted by customers post-meal (footnote 5).

Background

The FSA is interested in the relationship between food waste and food safety practices. FSA guidance states; "Never eat food after the use-by date, even if it looks and smells ok, as it could make you very ill" (footnote 6). However, opportunities to use that food may have been missed when it was safe to eat – such as by planning meals, freezing foods and batch cooking. This chapter discusses the influences on food waste behaviours, including how attitudes towards food safety and people's desire to reduce food waste affect these.

Food waste was not an initial focus of KL2. However, in 2022 the FSA expanded their strategy to include a focus on food being 'healthier and more sustainable'. This provided a new opportunity for KL2 data to be reanalysed, from a perspective of food waste (a key aspect of sustainability). In November 2022, this secondary analysis work was commissioned. Due to time and budget constraints, food waste behaviours were explored through secondary analysis of data from only 42 household kitchens and 27 FBOs from the main sample KL2 sample. These kitchens were chosen as their film footage clearly captured the kitchen bin. For the purposes of KL2, food waste is considered as food that is not consumed and thrown away including inedible and edible peel. A food waste behaviour could occur at any time during the observed footage (such as during meal preparation or when disposing of leftovers) and would be coded as a single food waste behaviour each time this was observed. Secondary analysis involved recoding the film footage of these kitchens to quantify points at which food is thrown away, as well as reviewing relevant survey and interview transcript data from waves 1 – 4 to understand the factors influencing food waste behaviours where these topics fell out of conversations naturally, for example in relation to discussing use-by dates. As the majority of interviews had already been completed at the time of commissioning, food waste was only explicitly discussed and included in the topic guide in the final wave of interviews and involved 20 households and 4 FBOs.

The literature review conducted as part of the KL2 project only peripherally examined the subject of food waste, mainly in the context of adherence to use-by dates. Given the limited coverage of food waste in the KL2 literature review and primary data collection, additional desk research was conducted as part of the secondary analysis. This desk research (footnote 7) was used to gain a broader understanding of when and why food waste occurs. The desk research does not provide a comprehensive analysis of the literature on this subject.

The following behaviours were explored using the reanalysis of KL2 observations, surveys and interviews in addition to the desk research:

- food preparation (including methods used by participants to check if food is safe to eat)
- portion sizing and leftovers

- disposal of food (where visible), including frequency and type of food waste created and the types of bins used

Behaviours that occur upstream of meal occasions and that can influence the creation of food waste - for example meal planning, what food is purchased and how it is stored - were predominantly explored in the desk research, though also discussed in some interviews.

This chapter uses the KL2 data and desk research to understand the creation of food waste, the factors affecting this and identify behaviours that could be the focus of future interventions research.

FSA guidance on reducing food waste

Currently there is limited FSA guidance available on reducing food waste, included as part of consumer advice on best-before and use-by dates. The guidance states that the following methods can be used to reduce the amount of food waste:

- following storage instructions on the packet
- using up, cooking or freezing foods that are approaching their use-by date first
- keeping your fridge below 5°C
- planning meals ahead

At the time of writing, there is no specific advice available for businesses on food waste. In a blog post the FSA notes the need to combat food waste while ensuring food safety and highlights its work with WRAP and other government departments to ensure targeted messaging, guidelines and measures are followed to create a sustainable food safety culture. Examples of this work includes helping consumers to understand:

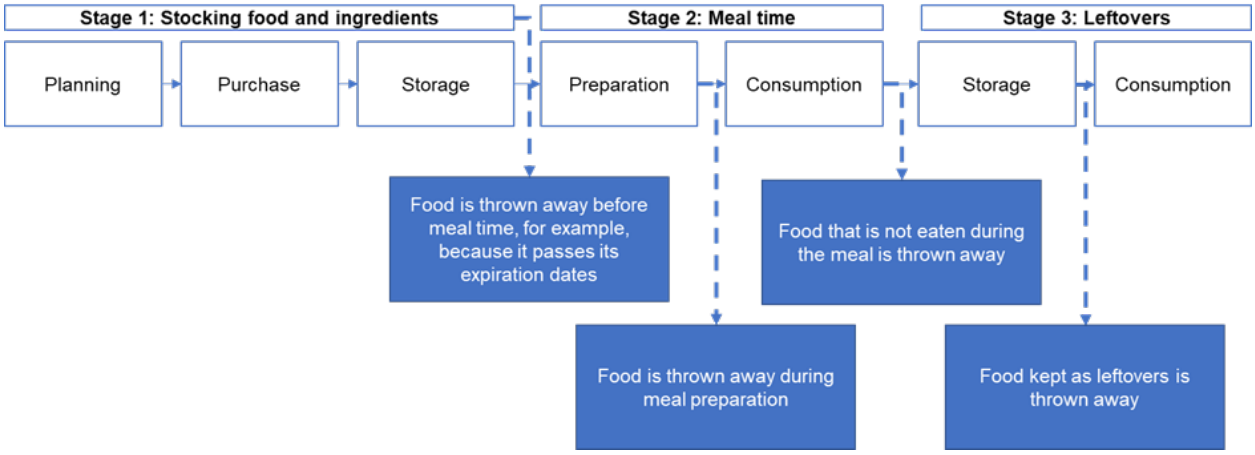
- the difference between use-by and best-before dates
- how to ensure food is kept at the correct temperature
- when food is safe to freeze
- how to safely defrost food
- planning meals and how to use leftover food

Food waste journey mapping in households - findings from desk research

Food waste behaviours are multifaceted. Waste may occur at different points along a journey that begins with stocking food and ingredients and includes mealtimes and whether leftovers are reused. Furthermore, waste occurring at these points may be caused by multiple factors that influence behaviour at different stages in the meal-making journey (footnote 8).

Figure 1 provides an overview of the meal-making journey. This includes the main stages, potential activities at these stages, and when along the journey food waste may occur (footnote 9).

Figure 1: Stages in the purchase, storage, preparation and consumption of food where food waste can occur



Stage 1: Stocking food and ingredients

The first stage in the journey is stocking the food and ingredients needed to prepare a meal. Activities which may be involved at this stage include meal planning, food and ingredient purchasing and storage of purchased items. Food waste can occur at the end of this stage, prior to being prepared and eaten as a meal, for example, because it has passed its use-by date. Previous research conducted by WRAP found that food not being used in time accounted for 41% of discarded food by weight for households (footnote 10). This was the largest proportion of household food waste by weight measured in the WRAP study, suggesting that food wastage following the stocking of food and ingredients stage contributes significantly to the overall volume of food waste.

Stage 2: Mealtime

The second stage is mealtime, during which meals are prepared (for example, by chopping, peeling, and cooking) and consumed.

Food waste may occur during the preparation of a meal, for example, when unwanted parts of a food item, such as peelings, are thrown away. Food waste may also occur after the meal is consumed, for example, when food that is left over from the meal is thrown away.

Data from WRAP indicates that food and drink that has been cooked, prepared or served in the home and subsequently discarded accounts for 25% of household food waste by weight (footnote 11). Additionally, discarding food that did not fit with personal meal preferences accounted for a further 28% of household food waste by weight.

Stage 3: Leftovers

The third stage consists of the storage and consumption of leftovers from the meal. Food waste occurs if leftovers are stored but not consumed, for example, when they are left in the fridge too long and eventually thrown away rather than eaten. The desk review uncovered no evidence quantifying the proportion or volume of wasted food that has been stored as leftovers but not eaten.

Kitchen Life 2: Findings for households

Quantitative observations from filming

For the purposes of KL2, food waste is considered as food that is not consumed and thrown away including inedible and edible peel. A food waste behaviour could occur at any time during the observed footage (such as during meal preparation or when disposing of leftovers) and would be

coded as a single food waste behaviour each time this was observed. The findings below report on the frequency and type of food waste according to quantitative analysis of film footage recorded in the 42 participating households' kitchens.

- the 42 households in the KL2 food waste sample were observed to dispose of food on 1473 occasions – averaging just over 10 occasions per household per day.
- of those occasions, 994 (67%) occurred during meal preparation and 271 (18%) occurred after eating a meal.
- it was not possible to distinguish whether food disposed of from the fridge was leftover food that had been previously cooked, or uncooked food that had spoiled.
- of foods observed to be disposed of in households (footnote 12), the most common were vegetables and potatoes (14%), followed by fruit (5%), leftovers (3%), eggs (2%), fresh carbohydrates (e.g. bread, cake) (2%), red meat (1%) and white meat (1%) (footnote 13).
- instances of food waste were most commonly observed occurring from 6pm-8pm and on Wednesdays to Saturdays, reflecting evening meal preparations.

Claimed behaviours on food waste in the context of use-by dates

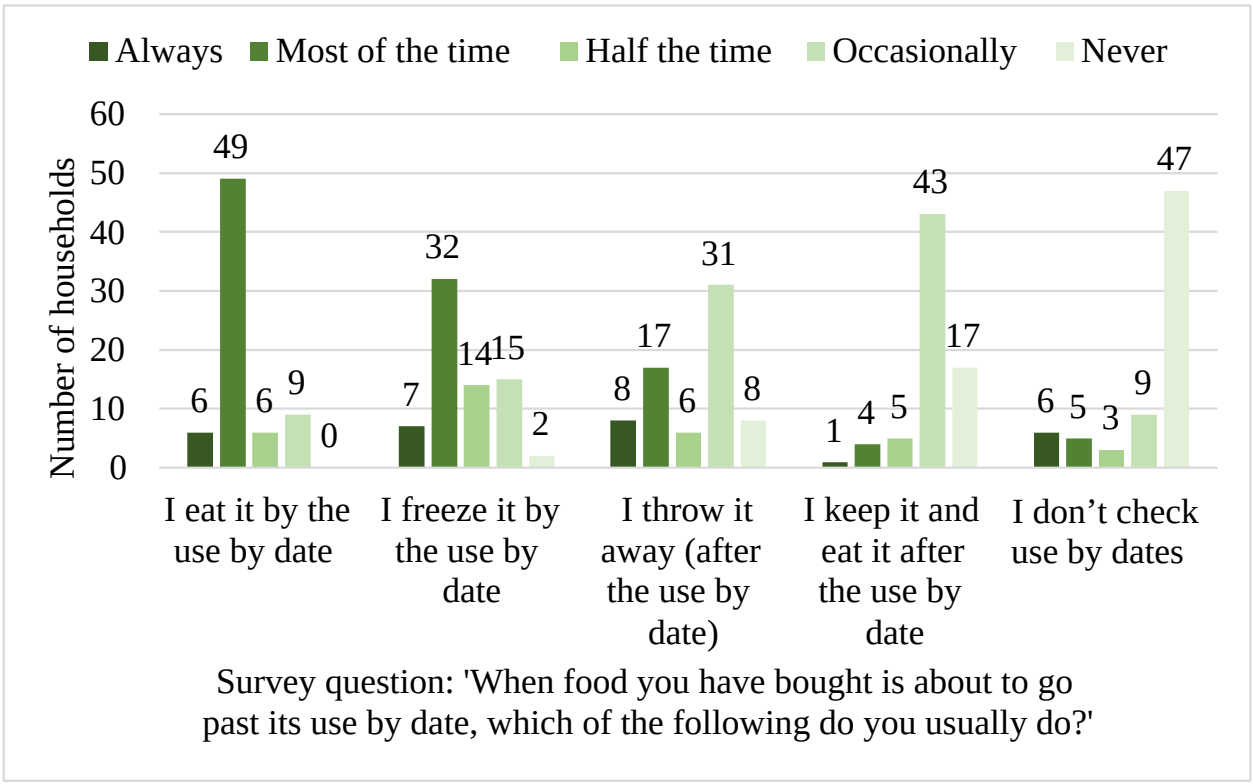
In addition to observed KL2 data, in the survey, all household participants were asked about claimed food waste behaviours in relation to adherence to use-by dates (footnote 14). Households were asked:

'When food you have bought is about to go past its use-by date, which of the following do you usually do?'. Results are shown in Figure 2.

- 78% of household participants (55) said they 'always' or 'most of the time' eat food by (on or before) the use-by date.
- 55% of household participants (39) said they 'always' or 'most of the time' freeze food by (on or before) the use-by date.
- 35% of household participants (25) said they 'always' or 'most of the time' throw food away after the use-by date, with only 10% (8) saying they never did this.
- 7% of household participants (5) said they 'always' or 'most of the time' keep it and eat the food past the use-by date, with 61% (43) saying they occasionally did this.

These claimed behaviours suggest while these households mostly consume foods before the use-by date, it is common to dispose of food, and occasionally eat food past its use-by date.

Figure 2: Reported behaviours in households on food that is about to go past its use-by date (base = 70) **(footnote 15)**



Survey question: 'When food you have bought is about to go past its use by date, which of the following do you usually do?'

Factors influencing creation of food waste

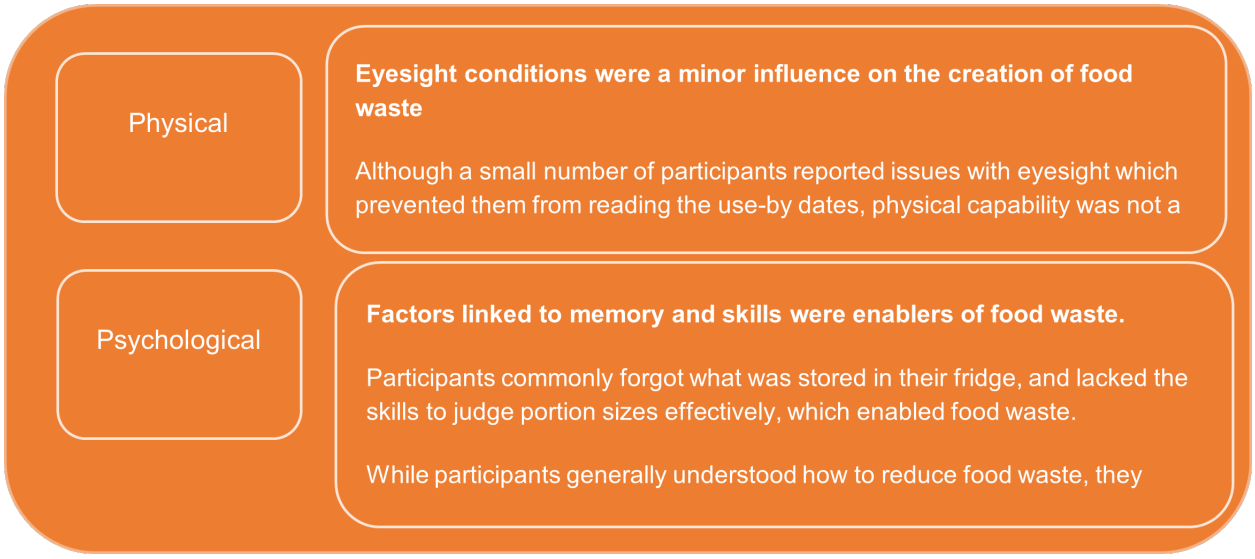
Summary

This section explores the factors that influence the creation of food waste through the secondary analysis of KL2 data and desk research. In households, factors included a lack of time to plan meals, difficulties judging portion size (which enabled the creation of food waste), and a lack of physical space to store foods. While small spaces can discourage over buying, it also increased the chances of overcrowding, hindering stock-checking, and enabling the creation of waste. Children and other household members who were ‘fussy eaters’ also enabled the creation of food waste.

Food waste was also influenced by social factors and values concerning food waste (which generally discouraged the creation of food waste) and habits and routines around meals (which could act to both discourage or enable food waste). A summary of COM-B factors is shown in Figure 3.

Figure 3: Summary of COM-B factors influencing the creation of food waste in households from KL2 findings and desk research

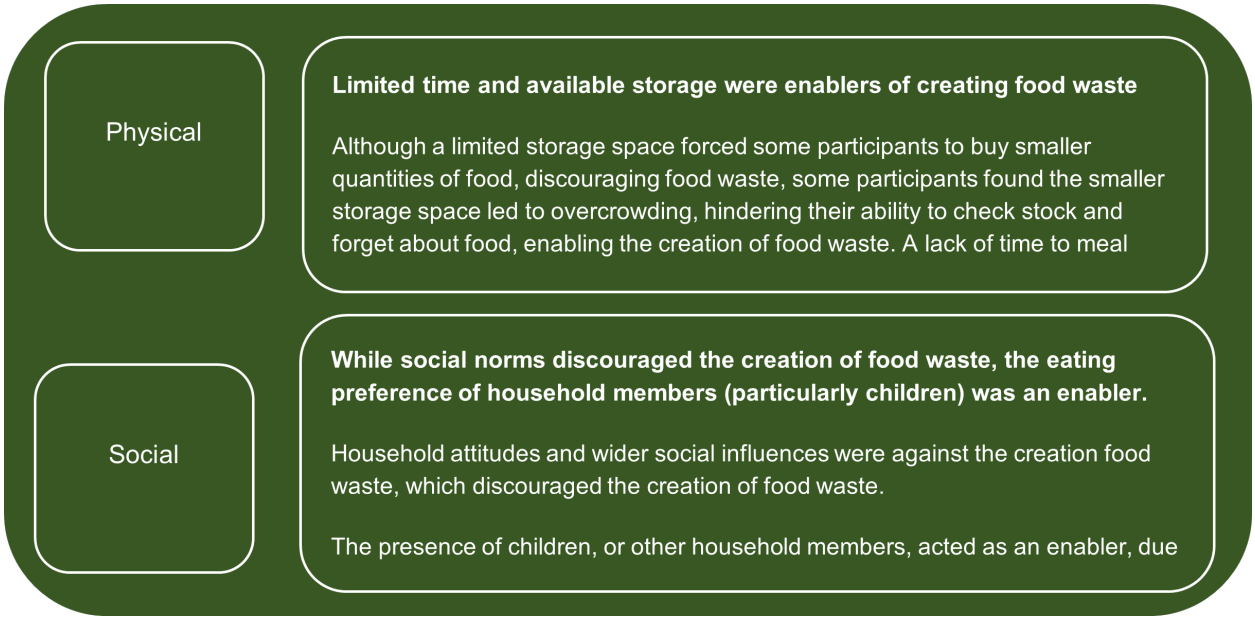
Capability



Physical: Eyesight conditions were a minor influence on the creation of food waste. Although a small number of participants reported issues with eyesight which prevented them from reading the use-by dates, physical capability was not a factor for most participants.

Psychological: Factors linked to memory and skills were enablers of food waste. Participants commonly forgot what was stored in their fridge, and lacked the skills to judge portion sizes effectively, which enabled food waste. While participants generally understood how to reduce food waste, they struggled to put knowledge into practice, which also enabled food waste.

Opportunity



Physical: Limited time and available storage were enablers of creating food waste. Although a limited storage space forced some participants to buy smaller quantities of food, discouraging food waste, some participants found the smaller storage space led to overcrowding, hindering their ability to check stock and forget about food, enabling the creation of food waste. A lack of time to meal plan or cook the planned meal also enabled the creation of food waste.

Social: While social norms discouraged the creation of food waste, the eating preference of household members (particularly children) was an enabler. Household attitudes and wider social influences were against the creation food waste, which discouraged the creation of food waste.

The presence of children, or other household members, acted as an enabler, due to ‘fussy eating’ and parents’ concerns around the safety of feeding leftover foods to children.

Motivation

Reflective: Beliefs about consequences, concerns about diet and individual identity variously acted as barriers and enablers to creating food waste. Beliefs about the consequences of creating food waste, such as wasting money and impacts on the environment, discouraged food waste. Beliefs about healthy diets and the need to purchase lots of fresh foods enabled food waste. Identity, such as being a good provider or good parent, can lead to too much food being cooked, which enabled food waste.

Automatic: Cooking routines discouraged food waste, whilst impulse purchasing enabled the creation of food waste. Routinely cooking the same meal discouraged the creation of food waste as participants could plan and manage ingredients effectively. Impulse buying for example, takeaways enabled the creation of food waste as participants disposed of the leftover takeaways and spoilt ingredients from the originally planned meals.

Detailed findings

Physical capability

There were a small number of instances where participants reported struggling to read use-by dates due to eye conditions, which potentially could lead to food exceeding the use-by date and enabled the creation of food waste.

Psychological capability

The desk review provided evidence of three main psychological capability factors that contribute to food waste. These included:

- cognitive skills related to meal planning (footnote 16)
- knowledge about what use-by-dates mean in practice for food safety, including when it is or is no longer safe to freeze a product (footnote 17)

- cooking skills to turn leftovers and food that is past its optimal freshness into appetising meals (footnote 18).

Interviews with household participants indicate that, while people may know what is required to reduce food waste, it can be difficult to apply this knowledge in practice. For example, meal planning, only buying what you need, and accurate portion sizing were all (correctly) identified as effective ways to reduce waste. However, participants reported sometimes forgetting what ingredients they had bought, which led to them being wasted as they passed the use-by-date before they were used. They also described difficulties in portion sizing when using set recipes, because of the complexity of scaling ingredient amounts up or down to reflect the number of meals required. Some participants found portioning aids such as pasta measures and cups to be useful for portion sizing.

> If I'm following a recipe, I can't do conversions [for portion sizing] in my head. They've called for a large amount [of an ingredient]. I'm not going to scale it down. I'm just going to make the same amount.
> Female, 26–40, White, socio-economic group ABC1, lives with friends

Not checking use-by dates and consuming foods past use-by dates is the subject of another chapter, and not extensively discussed here. However, freezing foods in advance of use-by dates was observed in filming and in the survey was claimed to be done 'all' or 'most of the time' by 39 households (out of 70 households). This indicates that participants do consider planning in advance to prevent food waste, whilst also considering food safety.

Participants did not mention a lack of cooking skills as an enabler of food waste in interviews.

Physical opportunity

The desk review provided evidence of several physical opportunity factors that contribute to food waste. These included:

- small storage areas, which can quickly become full up and result in older food being pushed to the back and forgotten about
- lack of time to adequately plan meals or to prepare meals that were planned, leading to over-buying or food passing its use-by date before it is cooked/eaten (footnote 19) (footnote 20)
- retailers packaging food in volumes that are surplus to the customer's requirements, resulting in leftover food that gets thrown away (footnote 21)
- retailers using packaging that is difficult to empty fully, resulting in leftover food that gets thrown away (footnote 22)

Most of these factors were also identified in KL2 interviews. For example, participants acknowledged how the storage areas of their kitchens influenced the amount of food that was wasted. Smaller amounts of storage space could reduce waste by forcing participants to buy smaller quantities of food, making it easier to use all the items before their use-by-date. However, small storage space was also described as leading to overcrowding, hindering people's ability to check stock and increasing the likelihood that food was forgotten. Interviews also suggested that the placement of items in storage could affect whether they were forgotten about or not. For example, one participant tended to forget items placed in the door of the fridge.

> Some things get forgotten about, mainly the ones … in the door because I never really look at the door because … milk, juice and sauces are the only thing that's in the door.
> Male, 18–25, White, socio-economic group ABC1, lives with partner.

Participants mentioned a lack of time to plan meals, or alternatively cook what was planned, as a contributing factor to the creation of food waste. For example, plans changing resulted in

participants not having time to cook the planned meal could lead to the ingredients for a meal spoiling. This was especially true in families with children.

Finally, participants noted the pack size of the food purchased could influence the amount that was wasted and that food retailers do not cater well for people cooking and eating for one.

> It's difficult to buy the ingredients and make a lasagne for one person… it's easier to make a large lasagne… the smallest pack of mince is too big for a small lasagne… but I do throw away more lasagne than I actually eat.
> Male, 41–60, White, socio-economic group C2DE, lives alone

Social opportunity

The desk research indicated that social norms may influence:

- how much food people buy, for example, because it is socially desirable to maintain a well-stocked fridge (footnote 23)
- how much food people serve, for example, because serving an abundance of food signifies a good host and provider (footnote 24)
- the contexts within which it is considered appropriate to serve leftovers, for example, because it is socially undesirable to serve guests leftovers (footnote 25)

These factors were less dominant in the KL2 interviews. Rather, social opportunity was expressed in terms of the interpersonal dynamics of the home, which in turn was factor in the amount of food people wasted. Children, in particular, played a key role as an enabler of food waste. This was through:

- children not finishing their meals or being fussy eaters
- parents wanting to provide variety for their children by not feeding them leftovers of previous meals, or not wanting to feed their children something that might be close to spoiling

Participants' upbringing was also cited as a major factor which discouraged them from creating food waste. For some participants, it was 'drilled into them' as children that creating food waste was bad, which had ingrained a social norm not to waste food.

> We don't like to waste food. I think it's something that I got even though I'm the oldest out of my 2 brothers, my family, some of my family drilled into me and my wife's family drilled into them. We try not to waste food when we can.
> Male, 26–40, White, socio-economic group C2DE, lives with partner

An active social life was also mentioned in interviews as impeding meal plans and was an enabler of food waste through ingredients not being used.

> I probably overbuy and overspend when I shop because I might have all these great food ideas that we could do. And then our social calendar or work calendar doesn't support that, so then things go to waste.
> Female, 26–40, White, socio-economic group C2DE, lives with family, including children

Finally, catering for the needs of different family members was also a key factor enabling the creation of food waste.

> So, although I'll kind of have a rough idea of what I want to cook in the week, it might be that I've got ingredients for one meal on this day, but we don't end up having it on that day because [my husband] doesn't fancy that sort of thing. My kids are quite fussy as well, so it does make meal planning hard.

Female, 41–60, White, socio-economic group C2DE, lives with family

Reflective motivation

The desk review provided evidence of a variety of reflective motivation factors that affect the creation of food waste. These included:

- beliefs about the consequences of food waste, such as damage to the environment and wasting money, which discouraged creating food waste (footnote 26) (footnote 27)
- beliefs about the importance of fresh and perishable ingredients (fruit, vegetables) for good dietary health, which can, for example, lead people to over-purchase such ingredients and also to dislike eating food which is perceived as no longer fresh (footnote 28). This enabled the creation of food waste.
- an individual's identity, for example, people believing that to be a good parent means to provide your child with lots of fruit and vegetables (even if they do not like these), or people believing that to be a good provider or host means to serve an abundance of food (footnote 29). This enabled the creation of food waste.

In the KL2 interviews, participants' beliefs about the consequences of food waste, especially in terms of costs, but also the moral injustice of wasting food, and impacts on the environment, were commonly expressed and acted to discourage food waste.

> You finish what's on your plate. Don't be ungrateful. Eat the food that's in front of you. I paid for it. Don't waste it. Along those lines, really. Or the classic some people in this world don't have food, so you need to eat your food.
> Male, 25–40, White, socio-economic group C2DE, lives with partner.

The cost of food waste was a very significant issue and there was tension expressed between not creating waste, for cost reasons, and a desire to avoid foodborne illness from food past it's use-by date.

> I think the way that food has become more and more expensive and you don't really want to be nipping into supermarkets just for the sheer hell of it
> Male, 41–60, White, socio-economic group C2DE, lives with family

> Just to be careful, you don't want to take too many chances. There's no point in eating rotten food. But throwing food away, well you might as well put £5 in the waste basket.
> Male, 60+, White, socio-economic group ABC1, lives alone

A minority were less concerned about food waste, believing it would make minimal impact on the environment or due to a lack of personal consequences as they could simply replace the food that was thrown away.

> I'm not entirely sure food waste is gonna make a huge difference in this world.
> Male, 41–60, White, socio-economic group ABC1, lives with family, including children

Automatic motivation

The desk research provided evidence of a variety of factors related to automatic motivation that contribute to food waste. These included:

- sense of taste and smell leading people (for example, children) to dislike, and not consume the food that is prepared during meal-times (footnote 30)
- boredom eating the same meal twice, for example when reheating leftover foods (footnote 31)

A preference for variety in diet was mentioned in interviews, with some participants saying that not wanting to eat the same food repeatedly could lead to impulse purchases (such as purchasing ingredients for unplanned meals, or purchasing a takeaway), which in turn could increase food waste. Participants perceived this behaviour to enable food waste because leftover takeaway foods were disposed of and supermarket bought food would spoil (as it was not eaten as planned). However, desk research has shown that impulse buying does not necessarily create more waste, particularly when it's frozen and/or stored appropriately (footnote 32).

Despite participants mentioning impulse buying, routines around meals were common in KL2 households and discouraged the creation of food waste, as participants could plan more effectively the ingredients needed for the dish and the amounts to cook. Interviews and food diaries showed most households had a repertoire of 5–6 dishes that were cooked week in, week out.

> I know what the kids like to eat. I think it's like everybody who has their set meals that they usually have. So, my kids can live on spaghetti bolognaise. I'll buy the things that I know will be easy to cook and less time consuming Monday to Friday, so I don't necessarily have to think too much about it.
> Female, 26-40, White, socio-economic group ABC1, lives with children.

Case study

Creating food waste

Name: Sarah
Age group: 26–40 years
Household composition: Lives with sister

Sarah is 29 and lives with her sister, Ruth, in rural Devon. Sarah describes food as being ‘very important’ to her. She is conscious of her weight and mindful of what she eats. She also exercises regularly to keep fit.

Sarah and Ruth ‘hardly eat meat anymore’ and as far as possible adopt a vegan diet. She describes the food they ate growing up as ‘unadventurous’ and since leaving home Sarah likes to experiment with cooking new dishes and focuses on eating fresh rather than frozen foods for health reasons.

Sarah is very relaxed about food safety. She isn’t particularly concerned about washing hands when preparing foods and is happy to reheat leftovers more than once. She believes people worry too much about getting food poisoning and that she has a ‘strong constitution’ as a result of eating what she likes.

Sarah ‘absolutely hates food waste’ and says she would ‘never throw food away after a use-by date’ unless she was ‘absolutely sure’ it was no longer safe to eat. She mainly uses the smell of food to check freshness, followed by how it looks.

Sarah’s motives for not creating food waste are mainly about the environmental impact of food rather than costs (though this is a factor). She describes herself as ‘very sustainable’ and highlights that ‘food waste is a bigger concern to me than getting sick’ from eating out-of-date foods.

Analysis of Sarah’s behaviour

Overall, the influences on Sarah’s behaviour mainly relate to reflective motivation. Sarah has strong views and values about not creating food waste, and these form part of Sarah’s identity. Also, Sarah’s beliefs about the consequences of creating food waste, in terms of impact on the

environment, override any concerns she has about making herself ill. Food safety risks are shaped by her belief that she has a ‘strong constitution’ and has not previously had food poisoning from eating foods past their use-by date. Sarah has not considered batch cooking or freezing foods before the use-by-date in order to keep food safe (preferring food to be fresh rather than frozen).

Identifying behaviours for interventions (households)

In reviewing the KL2 findings, a wide range of behaviours influenced the creation of food waste across meal planning, food shopping, food storage, preparation, cooking and using leftovers, all of which present potential target areas for behavioural interventions for the FSA. A notable enabler of reducing food waste was the motivation participants had to do this. Making it easier to perform a desired target behaviour is therefore key to developing any future behavioural interventions.

After KL2 fieldwork was completed, a workshop was held with experts in food safety and the behavioural sciences to discuss the COM-B influences on each of the KL2 priority behaviours, including the creation of food waste. In the workshop, experts discussed the findings from KL2 to explore the ‘problem behaviours’ that occurred in kitchens and then considered the ‘desired outcome’. Time was spent in the workshop discussing potential behaviours to focus on to achieve the desired outcome. The overall desired outcome for the FSA was to reduce food waste, without increasing food safety risks.

In the workshop, while the combination of practices shaping food waste in each individual household was seen to vary, it was hypothesised that clusters of behaviours amongst specific groups of consumers was likely. Consequently, it was felt that undertaking research to segment the general public would be a useful step to identify consumer groups to target for food waste reduction strategies. Similar work has been done by WRAP to understand audience segments, and further research could build on this. Meal planning was identified in the workshop as an important stage where food waste could be prevented and a key target for behavioural interventions. For example, supporting people to better plan for meals routinely cooked each week in the home was seen to be potentially effective. Additionally, motivating consumers to batch cook and/or freeze foods before they spoil was also seen as a potential target behaviour. Beliefs about healthy diets and the need to purchase lots of fresh foods can enable food waste. Therefore helping to persuade people around the role frozen or tinned foods can play as part of a healthy diet could also be a behavioural focus. However, any intervention needs to allow for flexibility in the meal plan to account for people with busy social schedules and the unexpected events life throws at them.

Kitchen Life 2 observed data on food waste occasions in FBOs

The findings below on frequency and type of food waste, are based on quantitative analysis of film footage recorded in the 27 participating FBO kitchens that were recoded and re-analysed from the perspective of food waste. The factors affecting food waste behaviours in FBOs were not explored in the desk research, and so this section of the report focusses solely on the findings from KL2. Unlike households, filming in FBOs focused solely on food waste during meal preparation, meaning post-meal food waste including from the consumers plate was not captured (footnote 33).

- the 27 FBOs in the KL2 food waste sample were observed to dispose of food on 802 occasions during meal preparation – averaging 30 occasions per FBO.
- of foods observed to be disposed of by FBOs, the most common were vegetables and potatoes (18%), followed by fresh carbohydrates (for example, bread, cake) (5%), red meat

(4%), eggs (3%), fruit (2%), leftovers (2%), dairy and dairy alternatives (1%) and white meat (1%).
- occasions of food waste were most commonly observed from 2–8pm, which is a period when food is commonly prepared for evening meals.

Factors influencing the creation of food waste in FBOs

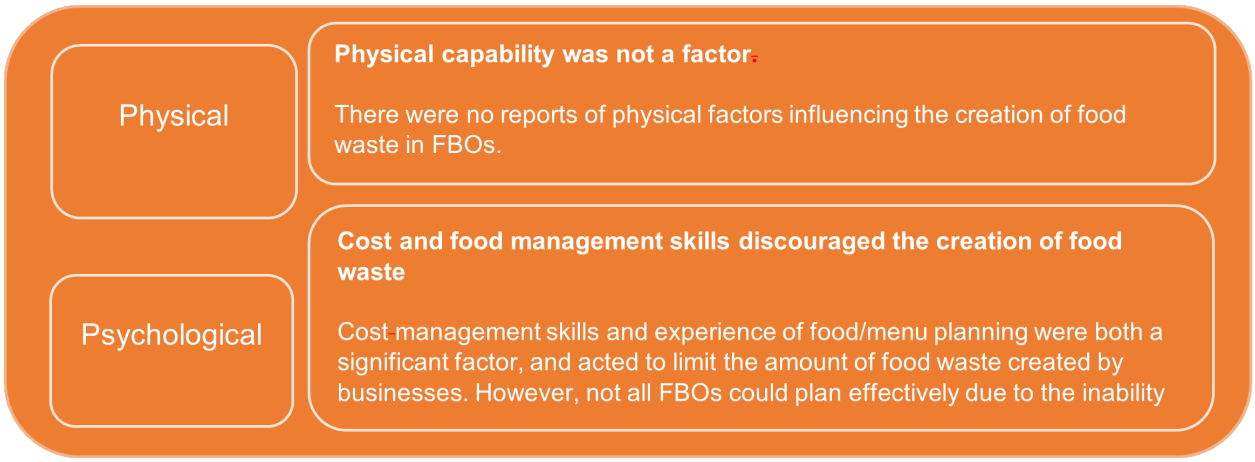
Summary

Overall, the factors affecting the creation of food waste in FBOs concerned food planning and cost-management skills and the availability of storage space. This was enabled by: a strong culture around the need to prevent food waste, which was framed as a cost to the business and; infrequently changing menus, which supported planning. In contrast, the inability to predict demand enabled the creation of food waste.

These factors predominantly acted to discourage the creation of food waste. A summary of COM-B factors is given in figure 3.

Figure 3. Summary of COM-B factors influencing the creation of food waste in FBOs

Capability



Physical: Physical capability was not a factor. There were no reports of physical factors influencing the creation of food waste in FBOs.

Psychological: Cost and food management skills discouraged the creation of food waste. Cost management skills and experience of food/menu planning were both a significant factor, and acted to limit the amount of food waste created by businesses. However, not all FBOs could plan effectively due to the inability to predict demand, increasing the creation of food waste.

Opportunity

Physical: Physical environment and established practices discouraged food waste. Space to store food, especially in freezers, plus management of food and inventories generally limited the creation of food waste. Food kept at ambient temperatures to display to customers needed to be thrown away, enabling food waste.

Social: The culture of an FBO discouraged the creation of food waste. The strong culture of cost management in food businesses discouraged the creation of food waste. Although uncommon, some FBOs had socially focused initiatives in place that discouraged food waste (for example, a no waste policy and being nominated for a climate award programme).

Motivation

Reflective: Beliefs about consequences discouraged the creation of food waste. FBOs disliked to waste food and had the desire to reduce it, this was mostly due to the monetary consequence of food waste and the beliefs about the consequences of it on the environment and society. Some FBOs also reflected on the tension between food waste and food hygiene, relying on sensorial checks to ensure food was safe to eat and not wasted.

Automatic: Routines mitigated the creation of food waste. Menus did not change often, and associated habits and routines around meal preparation helped to minimise the creation of waste.

Detailed findings

Physical capability

Physical capability was not identified as a factor influencing the creation of food waste in FBOs.

Psychological capability

Overall, psychological capability discouraged the creation of food waste in FBOs. Interviews with FBOs indicated that the amount of food wasted is linked to their ability to judge changes in demand, which relies on staff experience, and knowledge of customers the local area. The ability to accurately anticipate demand reduced food waste as it allows businesses to prepare only what they need. For example, one participant mentioned being close to an area where there are frequently public events and the type of event dictates what they are likely to sell.

> We can even tell what kind of event it is, if it's something like quite a left-leaning political thing… we're going to sell an awful lot of vegan foods that day, so we prep accordingly.
> Café, fewer than 5 staff, FHRS rating 4–5

Another FBO mentioned anticipating demand based on the day of the week and the season.

> Just knowing looking at patterns and stuff. I mean, I know what my busy periods are. I know what my quiet periods are. We just had obviously over Easter we have Passover, which is like our busiest period of the whole year. And then after that, people have got a lot of foods left over so it tends to be quieter.
> Italian restaurant, fewer than 5 staff, FHRS rating 4–5

Two participants said that planning their menu helped to reduce waste along with repurposing ingredients into other meals that customers order.

> That's the key to our menu is we use a lot of products. So if it doesn't get used here, it will be used somewhere else. And if it doesn't get used there, then we'll adapt it and make it into something that we can use at a later date. Our wastage control is quite high.
> Restaurant, British Cuisine, 5–10 staff, FHRS rating 4–5

> You keep the menu simple as you can. So at one point we had 11 cheeses in for all different pizzas and all different things. We reconciled and we go down to 5, especially after the pandemic we looked at the whole menu. So there's a lot of crossover ingredients in there.
> Italian restaurant, fewer than 5 staff, FHRS rating 4–5

This notwithstanding, one FBO mentioned that COVID-19 had changed customer eating habits and patterns, with times that were previously busy less so, which in turn made demand harder to predict. This had led to an increase in food waste in their business.

> I would have said I had it absolutely nailed [an ability to predict demand] up until about 2 years ago, 3 years ago. Patterns have changed, habits have changed. Yes, I would say it's increased our food waste.
> Café, fewer than 5 staff, FHRS rating 4–5

Physical opportunity

Generally, physical opportunity discouraged the creation of food waste.

There were processes in place to prevent food waste behaviours in FBOs, including stock inventories and rotation, preventing food from being forgotten about. FBOs also tended to have large freezer spaces which enabled foods to be frozen, especially meats which prevented food waste as fresh food was frozen before the use-by date. FBOs that do not have large amounts of storage space were forced to buy fewer ingredients at a time, reducing the chances ingredients would spoil and need to be thrown away. One FBO also had a separate food waste bin to track the amount of food wasted, which acted as a conscious reminder of the waste being created and

allowed for monitoring and cost management.

However, leaving food out on display acted as an enabler of food waste. In interviews, ambient temperature was cited as challenging to control, especially in summertime, meaning foods left out needed to be thrown away occasionally.

Social opportunity

While there was limited explicit mention of culture in the context of food waste, the strong focus of cost management (see Reflection Motivation for discussion) and the subsequent culture that this created in FBOs acted discouraged the creation of food waste. One FBO mentioned that environmental issues were important for their brand, and they had been nominated for a ‘Food for climate change’ award programme, which included measures to reduce food waste. Another FBO mentioned an explicit ‘no waste policy’ in the restaurant, enabled by a pre-ordering system from a set menu that meant they could cook to order on any given day (also linked to physical opportunity). Cooking to order prevented food waste by reducing the amount of food that would be prepared and cooked and subsequently thrown away if not used.

Reflective motivation

Across the FBOs there was a widespread dislike of food waste and a desire to reduce it. FBO motivations were similar to households (including social justice and the impact on the environment), but there was a much stronger emphasis on cost management in terms of wasting food. In short, food waste was framed as a financial loss, which is something all businesses try to avoid.

> I log food waste from a point of view of financial loss, and I log it because my accountants say log it. […] You can see at the end of the day if you’ve got, like, a dozen prepared paninis left. That’s the best part of 70 quid down the drain.
> Café, fewer than 5 staff, FHRS rating 4–5

There was recognition of the tension between food waste and food hygiene, and most businesses said they would also rely on sensorial checks to ensure food was safe to eat (to serve to customers), rather than solely using use-by dates (for details, see Not checking use-by dates and consuming foods past use-by dates). Even businesses stringently following use-by dates, would sometimes reuse food past the use-by date rather than waste it. For example, one business stated that while they would never serve anything that was past the use-by date to a customer, they were happy to eat it at home.

> Yeah, if its good I use it at home but never here in the kitchen. No, it's better to throw it because even if it's good, I throw it. I prefer to do not risk anything because if something happened to a customer, and they start an investigation, I'm in trouble.
> Café, fewer than 5 staff, FHRS rating 4–5

Automatic motivation

While automatic motivation was not cited as a factor promoting food waste by FBOs, it was noted that generally menus did not change often. It is likely that habits and routines around meal preparation helped to minimise the production of food waste.

Case Study

Creating food waste

Name: Senna
Role: Owner
Type of business: Deli
Number of staff: Fewer than 5
FHRS rating: 4–5

Senna runs a deli in the north of England. The business serves sandwiches, deli meats, cheese, cakes and coffee, together with a range of confectionery. The business is about a decade old and, while the business survived the COVID-19 pandemic, the current cost-of-living crisis has significantly impacted their business.

The deli is relatively small, and Senna likes to keep on top of cleaning and hygiene. Each morning she will check the fridges and make sure worktops are clean. She will generally make a large batch of sandwiches first thing in the morning and then display them with cakes and pastries.

The kitchen is small, and galley shaped, and there is limited fridge space for foods in the kitchen. Food is delivered every other day and the amount of ingredients needed is adjusted before delivery depending on what is selling, though the flow of customers can be quite hard to predict. The business has a separate food waste bin, which provides a visual cue to show how much food has been thrown away that's not been sold.

Senna states that food waste is very important to the business and she likes to think the business is quite good at managing waste, but there are always circumstances when food needs to be thrown away – especially on hot days when food is left out on display. Given the financial pressures on the business, overestimating the amount of food required can make a big difference to whether the deli runs at a profit or loss that week. Senna likes to keep track of what food is wasted, and so keeps daily records. Despite the financial pressure, Senna says she would not take risks with food sold to customers and would not sell food that's out of date or has been on display for more than 4 hours.

Analysis of Senna's behaviour

Overall, the influences on Senna's behaviour mainly relate to physical opportunity and reflective motivation. She limits the creation of food waste through careful stock control and arranging frequent deliveries of fresh food to stop it spoiling (reflective motivation). Senna also uses a food bin to provide a visual cue to the food that is wasted (physical opportunity). Despite this, the relatively small size of the kitchen and limited space in the fridge to store foods, plus the need to display foods on a counter, is an enabler of food waste (physical opportunity). Food waste is a cost to the business and, given commercial headwinds, producing more food than is sold makes the business unprofitable (reflective motivation). This motivation, helps to prevent the creation of food waste. However, beliefs about the consequences of serving out-of-date foods in terms of food safety risks to customers acts as an enabler of the creation of food waste (reflective motivation).

Identifying behaviours for interventions (FBOs)

In reviewing the KL2 findings, overall, the 42 FBOs in the sample were very conscious about food waste created during food preparation and took steps to actively reduce this waste. Behaviours were predominantly driven by beliefs about the commercial consequences of food waste and managed through stock control. However, predicting demand of food was an issue for FBO, and could lead to food waste.

After KL2 fieldwork was completed, a workshop was held with experts in food safety and the behavioural sciences to discuss the COM-B influences on each of the KL2 priority behaviours, including food waste. In the workshop, experts discussed the findings from KL2 to explore the 'problem behaviours' that occurred in kitchens and then considered the 'desired outcome'. Time

was spent in the workshop discussing potential behaviours to focus on to achieve the desired outcome. The overall desired outcome was to reduce food waste, without increasing food safety risks. The creation of food waste in FBOs is not a single behaviour but rather the outcome of many behaviours. Evidence from the KL2 study was limited to food preparation in FBOs, and one area not covered by the study is the significant amount food that is wasted by customers after food is served which accounts for over a third of all food waste in the hospitality food service sector (footnote 34).

Considering the behaviours to target in terms of food preparation in FBOs; food left out for display could end up being wasted, and there may be scope for the FSA to develop interventions to support the safe storage of such foods. Businesses that managed waste effectively were seen to keep food waste inventories and made food waste visible (for example, using food waste bins) - ideas which could be scaled to other FBOs. Another intervention area could be behaviours that encourage the repurposing of food that is wasted during food preparation, for example through the production of ‘skin on’ fries.

While not covered in KL2, other behaviours to target for interventions concerned the quantity of food served to customers, with portion sizing being a key aspect of this (footnote 35). There could be various choice architecture way of influencing this, such as serving plate size used in FBOs, reducing the chance food being wasted due to a smaller portion served or allowing customers to take food home. Overall, greater research is recommended on the factors affecting customer food waste post the meal being served.

Whilst not specific to changing FBO behaviours, a further recommendation would be for the FSA to consider additional guidance to FBOs on food waste. Currently, the FSA does not offer any specific guidance in this area for businesses, and although guidance alone is unlikely to result in behaviour change, guidance may be helpful to support businesses balance the issues of food waste with food safety (particularly, the adherence to use-by dates) as this was a tension for businesses during the KL2 study.

Conclusion

This chapter provided in-depth analysis on the creation of food waste and the factors that influence this behaviour, including illustrative case studies of these factors in practice. The findings presented in this report allow the FSA to better understand this behaviour, and the risks involved.

Understanding the specific influences on these behaviours enables future work on designing effective interventions to enable behaviour change. Future research should focus on designing interventions which can enable the positive target behaviours outlined in this report. Following on from the use of COM-B to understand behaviours, The Behaviour Change Wheel (footnote 36) can be used to identify effective interventions and behaviour change techniques.

1. Further details on why a reduced sample was used are provided in the background section and technical report.

2. The food groups could not be clearly identified in approximately 7 in 10 food waste occasions in households and FBOs.

3. It was not possible to distinguish between inedible and edible peelings that were being discarded.

4. These factors are not in an order of hierarchy of importance.

5. WRAP. Overview of Waste in the UK Hospitality and Food Service Sector. 2013

6. FSA. Best before and use-by dates. 2021

7. Desk research involved the review of 20 research papers and reports, including two reports that are not in the public domain. It did not involve a systemic review of the literature. It also did not cover food waste practices in FBOs.

8. WRAP. Household food and drink waste: A people focus, 2014.

9. WRAP. Household food waste: restated data for 2007-2015. 2018.

10. WRAP. Household food waste: restated data for 2007-2015. 2018.

11. WRAP. Household food waste: restated data for 2007-2015. 2018.

12. It was not possible to clearly identify the food group in 75% of food waste occasions. Drinks disposed of were also not recorded.

13. WRAP data corresponds to food group wasted by weight rather than frequency, so direct comparison is not possible. In terms of weight, WRAP data shows the top food groups wasted are potatoes and bread, followed by 'composite meals' – see WRAP. Household food waste: restated data for 2007-2015. 2018.

14. As use-by date adherence was an original focus of the KL2 study, all households (70) were asked this survey question. This question was originally designed to understand adherence to use-by date, but it also helpful to understand consumer food waste practices.

15. Full base size is used here as this survey question was included for all waves.

16. Romani, S., Grappi, S., Bagozzi R.P. and Barone, A.M. Domestic food practices: A study of food management behaviors and the role of food preparation planning in reducing waste, Appetite, Volume 121, 2018, Pages 215-227

17. WRAP. Household food and drink waste: A people focus, 2014.

18. WRAP. Household food and drink waste: A people focus, 2014.

19. Southerton, D. and Yates, L. Exploring Food Waste Through the Lens of Social Practice Theories: some reflections on eating as a compound practice. 2015. In: Waste Management and Sustainable Consumption: Reflections on consumer waste.

20. WRAP. Household food and drink waste: A people focus, 2014.

21. Herzberg, R., Schmidt, T. G., & Schneider, F. Characteristics and determinants of domestic food waste: A representative diary study across Germany. 2020. Sustainability, 12(11), 4702.

22. WRAP. Household food waste reduction. 2021.

23. Southerton, D. and Yates, L. Exploring Food Waste Through the Lens of Social Practice Theories: some reflections on eating as a compound practice. 2015. In: Waste Management and Sustainable Consumption: Reflections on consumer waste.

24. Graham-Rowe, E., Jessop, D. C. and Sparks, P. Identifying motivations and barriers to minimising household food waste. Resources, Conservation and Recycling, Volume 84, 2014, Pages 15-23.

25. Southerton, D. and Yates, L. Exploring Food Waste Through the Lens of Social Practice Theories: some reflections on eating as a compound practice. 2015. In: Waste Management and Sustainable Consumption: Reflections on consumer waste.

26. Schanes, K., Dobernig, K. and Gözet, B. Food waste matters - A systematic review of household food waste practices and their policy implications, Journal of Cleaner Production, Volume 182, 2018, Pages 978-991.

27. Southerton, D. and Yates, L. Exploring Food Waste Through the Lens of Social Practice Theories: some reflections on eating as a compound practice. 2015. In: Waste Management and Sustainable Consumption: Reflections on consumer waste

28. Evans, D. Food Waste: Home Consumption, Material Culture and Everyday Life. 2014.

29. WRAP. Household food and drink waste: A people focus, 2014.

30. WRAP. Household food and drink waste: A people focus, 2014.

31. WRAP. Household food waste reduction. 2021.

32. van Lin, A., Aydinli, A., Bertini, M., van Herpen, E. and von Schuckmann, J. Does Cash Really Mean Trash? An Empirical Investigation into the Effect of Retailer Price Promotions on Household Food Waste, Journal of Consumer Research, 2023.

33. According to WRAP, on average 21% of food waste in the hospitality and food service sector arises from spoilage; with 45% from food preparation and 34% from consumers' plates.

34. WRAP. Overview of Waste in the UK Hospitality and Food Service Sector. 2013

35. WRAP. Overview of Waste in the UK Hospitality and Food Service Sector. 2013

36. Michie, S., van Stralen, M.M. & West, R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. Implementation Sci 6, 42 (2011). https://doi.org/10.1186/1748-5908-6-42