Where food waste arises within the UK hospitality and food service sector: spoilage, preparation and plate waste

This research explores where food waste arises within different types of commercial kitchens.

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We work with businesses, individuals and communities to help them reap the benefits of reducing waste, developing sustainable products and using resources in an efficient way.

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Executive summary

Background

This research aims to understand the point at which food is being wasted from spoilage, food preparation and from customer plates in different types of commercial kitchens, and identify the actions that would most significantly reduce food being wasted.

For this research a literature review was carried out as well as 19 site reviews of food waste arisings across England, Scotland and Wales. The different kitchen types were characterised as follows:

- Basic dining: these restaurants do not provide a table service. The vast majority of food is pre-prepared with minimal preparation on-site.
- Casual dining: these restaurants provide a table service and serve moderately priced food. Food preparation is both on and off site.
- Fine dining: these are full service restaurants. Food preparation is mainly on-site.
- Contract catering (business and industry): covers the provision of food to people at work. Food preparation contains elements of both on-site preparation and pre-prepared food. This category was investigated separately as it traditionally falls into the cost sector but is most similar to profit sector styles of food provision.

The sample size for this research is broken down as in Table 1.

Table 1: Breakdown of study sample

Nation	Total number of establishments	Basic dining	Casual dining	Fine dining	Contract catering
England	8	3	1	3	1
Scotland	8	3	2	3	0
Wales	3	0	1	0	2
Total	**19**	**6**	**4**	**6**	**3**

The findings are indicative of the kitchen types observed and are only estimates due to the sample size.

Findings from this research

This research shows that, on average:

- 21% of food waste arises from spoilage;
- 45% of food waste arises from food preparation; and
- 34% of food waste is generated from customer plates.

Table 2 shows where food waste arises in different kitchen types. The ratios of food waste arising are consistent across three of the commercial kitchen types, namely, contract catering, casual and fine dining. In the basic dining category, however, food waste from customer plates (46%) is higher than waste from preparation (32%); this may be due to a number of reasons including less food preparation on site.

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Table 2: Food waste arises by kitchen type (average)

Food waste arising point	Basic dining	Casual dining	Fine dining	Contract catering	Mean across kitchen types
Spoilage waste (%)	22%	21%	16%	26%	21%
Preparation waste (%)	32%	50%	61%	38%	45%
Plate waste (%)	46%	29%	23%	36%	34%
Waste per cover (kg)	0.17	0.38	0.31	0.15	0.22

Identifying the volume of food waste arising per cover can help to estimate the amount generated by a venue each day over a year. This can then be used to measure the impact from making changes to business practice.

Recommendations

This study indicates that food waste arises differently in different type of commercial kitchen.

WRAP's Online Resource Centre and the Unilever Food Solutions United Against Waste toolkit provides advice for businesses on how to measure and reduce food waste, and further work could support businesses in engaging staff to identify why food waste arises within their own kitchens and take appropriate actions to address the issues.

From a plate waste perspective WRAP has published research and a resource pack to help establishments to reduce customer plate waste. This can be found at the following link: http://www.wrap.org.uk/content/less-food-waste-saves-money.

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Glossary

Definitions of terminology used throughout this report	
Anaerobic Digestion	Anaerobic digestion (AD) is a well established process for the treatment of organic waste and the generation of renewable energy.
Avoidable food waste	Food thrown away that was, at some point prior to disposal, edible (e.g. slices of bread, apples, meat) and could have been eaten if it had been better portioned, managed, stored and/or prepared. 'Avoidable' food waste also includes some otherwise acceptable food items that have not been eaten because of consumer preference, such as bread crusts and jacket potato skins.
Unavoidable food waste	Waste arising from food preparation that is not, and has not been, edible under normal circumstances (e.g. meat bones, egg shells, pineapple skin, tea bags).
Hospitality and Food Service sector	HaFS: this includes within its scope hospitality and food service businesses operating within private and public sectors, and contract caterers. The sector can be classified in different ways; this report uses nine subsectors characterised in Horizons (2012): healthcare, education, staff catering, services, restaurants, quick service restaurants, hotels, pubs and leisure.
Hospitality and Food Service Agreement (HaFSA)	The Hospitality and Food Service Agreement is a voluntary agreement to support the HaFS sector in reducing waste and recycling more. It has two targets focusing on waste prevention and waste management. The targets are owned WRAP and collectively delivered by signatories. WRAP is delivering this Agreement across the UK through its national programmes, including Zero Waste Scotland.
Quick Service Restaurant	Outlets which may have take away or eat-in, or both, and where the customer generally pays when purchasing food or drink.

Acknowledgements

The report was developed for WRAP by LRS Consultancy in partnership with The Sustainable Restaurant Association, who carried out the food waste reviews across England, Scotland and Wales.

Without the participation and active engagement of the on-site staff teams, however, the reviews which served as evidence base for this report would have not been possible. WRAP would like to thank the managers and staff of the establishments for their commitment to the project.

1.0   Introduction and Objectives

This research aimed to understand the point at which food is being wasted from spoilage, food preparation and from customer plates in different types of commercial kitchens and identify the actions that would most significantly reduce food being wasted.

For this research literature review was carried out as well as site reviews of food waste arisings across England, Scotland and Wales. The different kitchen types were characterised as follows:

- Basic dining: these restaurants do not provide a table service. The vast majority of food is pre-prepared with minimal preparation on-site.
- Casual dining: these restaurants provide a table service and serve moderately priced food. Food preparation is both on and off site.
- Fine dining: these are full service restaurants. Food preparation is mainly on-site.
- Contract catering (business and industry): covers the provision of food to people at work. Food preparation contains elements of both on-site preparation and pre-prepared food. This category was investigated separately as it traditionally falls into the cost sector but is most similar to profit sector styles of food provision.

2.0   Methodology

The project draws its conclusions from selected research undertaken into commercial food waste across England, Scotland and Wales and data as well as observations made during 19 site reviews in the hospitality and food service sector.

2.1   Literature Review

A review of existing information relating to existing hospitality and food service review data and compositional analysis was undertaken. The following list of literature was consulted:

- "Compositional Analysis for BRASS Study: Brains/Castell Howell Supply Chain Waste Production", Nov.-Dec. 2012, WRAP Cymru. The aim of the "Compositional Analysis for BRASS Study" was to understand the different waste streams generated in the three pubs that were reviewed. The caterers taking part in this study were signatories to the Hospitality and Food Service Agreement.
- "Too Good to Waste – Restaurant Food Waste Survey Report (2010)", Version V001, 16/09/2010, Sustainable Restaurant Association. "Too Good to Waste" was a pilot study that looked at the food waste generated at London based restaurants. The study aimed to understand how much food waste arises for an 'average' restaurant and where from, by auditing a variety of caterers.
- Audit data of UK-based restaurant chain, Dec 2011, Sustainable Restaurant Association. The Audit data of a UK-based restaurant chain was collected in order to help the participating caterers to understand how much food waste they generate, where (spoilage, preparation, customer plates) and when (breakfast, lunch, dinner) it arises. It also distinguished between food waste that could have been eaten and food waste which was unavoidable.

The findings of the literature review are summarised in section 3.1.

2.2 Site reviews

Food waste arising data and supporting observational information about kitchen and food management processes was gathered from 19 sites across England, Scotland and Wales. Sites were characterised as basic, casual, fine dining and contract catering and are detailed in table 1 below. The categories of the participating restaurants are established by looking at the amount of food preparation done on site:

- Basic dining: < 25% food preparation done on site; these restaurants do not provide a table service.
- Casual dining: 25%-75% food preparation done on site; these restaurants provide a table service and serve moderately priced food.
- Fine dining: > 75% food preparation done on site; these are full service restaurants.
- Contract catering – for business and industry: from < 25% to > 75% food preparation on site; this covers the provision of food to people at work which traditionally falls into the cost sector but has similarities to profit sector styles of food provision.

Table 1: Number of participating establishments per commercial kitchen type in each region of the UK.

Nation	Total number of establishments	Basic dining	Casual dining	Fine dining	Contract catering
England	8	3	1	3	1
Scotland	8	3	2	3	0
Wales	3	0	1	0	2
Total	**19**	**6**	**4**	**6**	**3**

At the start of each one day review, a food waste segregation system was put in place. Three separate bins were made available for kitchen staff to collect food waste from spoilage, preparation and customer plates. This segregation enabled the auditor to measure the contents throughout the day and identify what type of waste was generated. A snapshot of the business was gained through observation as well as through dialogue with staff. This was also documented with the help of pictures and notes.

The following information from each site was used in the analysis:

- The weight (kg) of food waste relating to spoilage, preparation and plate waste (weighing carried out on site).
- The percentage of food preparation carried out on site (estimation from the participating company).
- The current waste management practices in place (observation).
- The number of covers for the day of the review (count).
- The kitchen operation times, including peak times (observation).
- The chefs' skills and number of chefs (information from the participating company).
- A summary of the auditor's observations on the day.

The findings of the reviews are summarised in section 3.0.

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2.3   Assumptions and limitations

- <u>Data collection</u>: The auditor was inside the kitchen from the start of the service until closing time which may have impacted on practice despite staff being asked to operate on a business as usual manner.
- <u>Review duration and opportunity</u>: Reviews were carried out for one day at each establishment. Food waste arising may vary depending upon the day of the week or in periods of higher or lower trade. The data should therefore be seen as an indicator for the rest of the year rather an accurate representation.
- <u>Sample size</u>: The sample of sites used for this data collection is considered small in relation to the size of the sector and data obtained through this review should be considered indicative rather than representative with regards to creating a benchmark.

3.0   Key Findings

This section provides the key findings from the literature review and the data collected from the onsite reviews conducted. The analysis is broken down into the four kitchen types: basic dining, casual dining, fine dining and contract catering within a business and industry setting.

3.1   Literature Review

Three reports have been reviewed as part of this project to understand the research that has already been undertaken and identify any comparisons that can be made. Table 2 provides a summary of the three reports.

Table 2: A summary of three hospitality and food service reports analysed for this project

Criteria	Brass study for SA Brains 2012	SRA 2010	SRA 2011
Number of Audits	3	10	4
Length of Audit	3 days at each site	1 day at each site	3 days at each site
Geographic Location	Wales	England	England
Time period	November 2012	July to August 2010	December 2011
Restaurant categories	Pub: 1 x high end 1 x mid-range 1 x low-end	a la carte bistros, fine dining, casual dining	Pub (no differentiation made)
Spoilage waste	Lowest	5%	14%
Preparation waste	Medium	65%	13%
Plate waste	Highest	30%	73%
Limitations in relation to providing a benchmark	Conducted in one type of kitchen environment	Conducted over one day	Conducted across one restaurant chain and only in one kitchen environment

- The BRASS study[1] for SA Brains analysed three pubs categorised as high-end, mid-range and low-end. The categorisation is not clearly defined but loosely based on the amount of food prepared on site going from low preparation rates for the low-end pub to higher rates for the high-end pub. The report identified plate waste as the highest food waste stream, with preparation waste considered medium, and spoilage waste considered the lowest. It was also found that the low-end pub producing pre-prepared food generated the highest amount of food waste, the high-end pub generated the least amount of food waste and the mid-range pub, carrying out a combination of on site preparation and pre-prepared food, came in between.

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[1] This report is not in the public domain but highlights have been provided to support this research.

- The SRA produced a report in 2010 titled *Too Good to Waste – Restaurant Food Waste Survey Report*[2] on food waste surveys conducted with 10 volunteer member restaurants across London. These surveys were undertaken from July to August 2010 across three restaurant categories: a la carte bistros, fine dining and casual dining. They demonstrated that 65% of food waste was generated from preparation, 30% from customer plates and only 5% from spoilage. 0.48 kg of food waste was produced per cover on average across the 10 participating restaurants.
- The SRA produced a report in December 2011 based on audit data of a UK-based pub-restaurant chain[3], including food waste arising (kg). All restaurants were in the casual dining category. The report found that plate waste was the highest food waste stream, followed by spoilage and then preparation. This report is not in the public domain but highlights have been provided to support this research.

3.2 19 Site reviews

3.2.1 Benchmark data for where waste is arising

As part of this project, the food waste generated from spoilage, preparation and customer plates was reviewed at 19 commercial kitchens across England, Scotland and Wales. The research shows that as a mean average, 21% from spoilage, 45% of food waste arose from food preparation, 34% was generated from customer plates.

The following data can be derived from the data collected during the food waste reviews carried out as part of this project. The shaded cells indicate the higher area of food waste for each type of establishment. Not every kitchen within each type indicated the same trend.

Table 3: Food waste arises by kitchen type (mean averages)

Food waste arising point	Basic dining	Casual dining	Fine dining	Contract catering	Mean across kitchen types
Spoilage waste (%)	22%	21%	16%	26%	21%
Preparation waste (%)	32%	50%	61%	38%	45%
Plate waste (%)	46%	29%	23%	36%	34%
Waste per cover (kg)	0.17	0.38	0.31	0.15	0.22

Identifying the volume of food waste arising per cover can help to estimate the amount generated by a venue each day over a year. This can then be used to measure the impact from making changes to business practice.

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[2] http://www.thesra.org/wp-content/uploads/2012/02/SRA002-SRA-Food-Waste-Survey-Full-Report.pdf
[3] This report is not in the public domain but highlights have been provided to support this research

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3.2.2 Site Observations

In basic dining most of the restaurants reviewed demonstrated less understanding of food waste arising and prevention than the commercial kitchens in other categories. In many cases, food waste was not segregated into separate waste streams but disposed of in a general waste bin. Most of the fine dining sites reviewed had a good level of knowledge and commitment to sustainable practices in comparison to the other commercial kitchen types; this was often achieved by maximising the use of any one food item through the implementation of "nose-to-tail" cooking; however the high level of preparation on site leads to preparation waste taking the highest share in this style of commercial kitchen.

3.2.3 Insights and Opportunities

The most food waste is generated during preparation. This is across all kitchen types with the exception of basic dining.

In casual and fine dining, the food waste generated from preparation represented over 50% of the total food being wasted. This may be due to a number of reasons which include the greater levels of preparation on site which could lead to a higher level of waste. Key types of food in this category were vegetable peelings, bread, toppings and fruit.

There is an opportunity here for restaurants to aim for a more integrated approach when trying to reduce food waste, such as careful ordering and reducing the number of ingredients used across their menu by maximising the use of any one food item, for example using chicken in a pie and for sandwiches. Food can also be used in staff meals.

Basic dining was the only category that presented higher food waste from customer plates than from preparation; in particular bread and chips were left in nearly all establishments. There is an opportunity to look at what is being offered to the customer and which items are commonly returned to help them to leave less food on the plate. In June 2013, WRAP published research[4] and a resource pack to help establishments to reduce customer plate waste. This research found that over half of meal leavers linked leaving food to various aspects of portion sizes and that customers often consider the amount of food they get is out of their control and many people won't ask for anything different. Almost two fifths of respondents stated that a potential solution to reducing plate waste was by addressing portion sizes in terms of choice, size and price.

In contract catering, preparation and plate waste are at a similar level so the opportunities are two fold – both to look at what is being pre-ordered versus prepared on site and also consider the choice being offered to the customer. Sometimes changing the type of product being ordered in may help to avoid waste in preparation, for example, ordering chips ready cut rather than potatoes. This however may just move the waste further along the supply chain rather than preventing it, so working with suppliers will help to find the most appropriate solution.

This research has not explored in depth how much of the food wasted is avoidable but assuming that the majority of the food actually served to a customer is edible, in other words excluding bones and fruit skins, indicates that most plate waste is avoidable. Food waste arising from spoilage could be avoided if food is ordered, managed and stored appropriately to make sure that the ingredients are used before their used-by date. Considering expiry dates when planning menus is also an option for fine dining style

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[4] http://www.wrap.org.uk/content/less-food-waste-saves-money

kitchens. Creating daily specials may help you to use remaining ingredients before they expire.

Kitchen staff are not likely to be aware of the amount of food waste generated if these data is not recorded on a regular basis and made available to the teams involved. In addition, staff may not be aware of what can be done to reduce waste in the first place let alone the impact it has on the wider business in terms of cost. The overarching opportunity across all kitchens is to engage staff in the efficient use of food at all stages to drive food waste prevention. A short activity to look at how much of the food wasted could have been eaten should help staff to consider some actions to prevent it.

Appendix 1 details recommendations provided to the sites taking part in this study to assist them in tackling food waste where it arises. These recommendations can be provided more widely to help businesses focus actions where relevant for their own kitchens.

4.0   Conclusions and next steps

The sample size for this research is relatively small. As a result, it is difficult to identify a trend and a reliable benchmark. However the current study does indicate that food waste arises differently in different type of commercial kitchen.

Preparation waste represents the highest share of food waste arising in casual dining (50%), fine dining (61%) and contract catering (38%) so this is an area where strong staff engagement and monitoring of food waste arising could lead to cost savings from food waste prevented.

Offering a range of portion sizes and appropriate prices, to cater for different customer appetites is an opportunity which WRAP research suggests will deliver the greatest reduction in plate waste, accounting for the second highest share of waste arisings across all categories except basic dining; in this category, often tailored around a value proposition, there is even greater potential to reduce plate waste.

Spoilage waste can be targeted by reviewing stock rotation and ordering procedures and training staff to use food in line with use by dates.

The focus for further work should support businesses in engaging staff to identify why food waste arises within their own kitchens and take appropriate actions to address the issues.

Appendix 1: Participant Recommendations

Summary of the recommendations for the reduction and prevention of food waste given to the participating companies

General

- For sites based in Scotland - ensure your compliance with new Scottish waste regulations: The new regulations aim to support Scotland's 70% recycling target for all waste by 2025. Businesses producing over 50kg of food waste per week need to present it for separate collection from 1st January 2014 and businesses producing over 5kg from 1st January 2016. For more information, see the link to "Waste (Scotland) Regulations" in the "Additional Information" section.
- Measure and monitor: Carry out a food waste review on a regular basis to measure the waste following the steps outlined in the WRAP HAFS online resource centre (http://hafsva.wrap.org.uk/home). This first review shows where and how much waste arises as well as what type of food is thrown out. It will help you to identify how much waste you are producing and what the impact of new processes are that you may have implemented in order to reduce food waste. Use this as your baseline data and identify actions. After having implemented those actions measure your waste again to quantify the impact of the changes you have made.
- Separate waste streams and implement a collection service: This will help to single out different waste streams for recycling or composting. Find out about your local waste contracting services through the WRAP Online Resources Centre in order to recycle more.[5]
- Engage your staff: Staff should be made aware of and trained in recognising where food waste arises, what the costs to your business are and what they can do to reduce it. Develop a waste policy with your staff, appoint a staff waste champion or include the team in monitoring food waste arising. Their contribution will increase when they understand the benefits of the change and are made a part of it.
- Consider donating surplus food: Where appropriate, redistribute surplus food. As an example, the following are a few links to food donation initiatives and charities across the UK including: http://www.planzheroes.org/, http://www.trusselltrust.org/how-it-works, http://www.foodcycle.org.uk/, http://www.fareshare.org.uk/ . Donating food needs to follow food safety and quality guidelines.

Reduce waste from spoilage

- Apply careful ordering and menu planning: First identify what you sell when and what ingredients you use for these meals. As a second step, order accordingly to make sure that the ingredients are used before their used-by date. In addition, take into account the useful feedback you may gain from customers on the availability of different portion sizes or consistently returned food items (see recommendations in section "Reduce waste from customer plates" below).
- Monitor used-by-date and storage conditions: Make sure you store the products and ingredients appropriately and take their expiry date into account when planning your menu. Creating daily specials may help you to use remaining ingredients before they expire.

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[5] Or go directly to http://www.wastedirectory.org.uk/ for England and Wales and http://www.zerowastescotland.org.uk/BusinessResourceCentre for Scotland to search for a waste contractor in your area.

Reduce waste from preparation

- <u>Maximise the use of any one food item on the menu</u>: An ingredient might be waste for the preparation of one dish but a useful resource for another. Meat cuts or vegetable trimmings, for example, can be used to make broth for soup or other meals. In addition, by using the same ingredient in more than one dish you can flexibly adapt if a given meal is not sold as much as you had initially estimated.
- <u>Maximise the use of a food item for staff meals</u>: Utilise excess preparation, and make it available for staff meals.
- <u>Specify your orders</u>: Order fish and meat cuts to specification in order not to generate food waste from off cuts.

Reduce waste from customer plates

- <u>Include seasonal variations into the menu</u>: Understand seasonal variations and sell according to customer demand, i.e. salad in summer and vegetable sides in winter.
- <u>Adapt portion sizes</u>: Consider offering different portion sizes to choose from in order to reduce the waste from customer plates.
- <u>Offer doggy bags</u>: Where appropriate, customers may agree to take portions of their meal with them. This will help you reducing waste from customer plates.
- <u>Identify consistently returned food items</u>: If certain food items are consistently returned uneaten from the customer (i.e. salad, condiments) you may want to consider taking them out of the meal or even off the menu.

Additional information

Further advice on how to reduce food waste can be found on the following websites.

- WRAP Hospitality and Food Service Online Resource Centre: http://hafsva.wrap.org.uk/home
- Hospitality and Food Service, WRAP's work: http://www.wrap.org.uk/content/hospitality-and-food-service-wraps-work-0
- The Composition of Waste Disposed of by the UK Hospitality Industry, WRAP Final report, July 2011, http://www.wrap.org.uk/sites/files/wrap/The_Composition_of_Waste_Disposed_of_by_the_UK_Hospitality_Industry_FINAL_JULY_2011_GP_EDIT.54efe0c9.11675.pdf
- Waste (Scotland) Regulations: http://www.zerowastescotland.org.uk/category/subject/waste-scotland-regulations
- WRAP Good practice case studies: http://www.wrap.org.uk/content/good-practice-case-studies
- WRAP Love Food Hate Waste campaign: http://england.lovefoodhatewaste.com/content/about-food-waste-1
- Unilever Food Solutions: United Against Waste toolkit, WRAP HAFS, 2011, http://www.wrap.org.uk/content/unilever-food-solutions-united-against-waste-toolkit

www.wrap.org.uk/hospitality