
Final report – Updated June 2009

Evaluation of the WRAP Separate Food Waste Collection Trials



Between 2007 and 2009 WRAP provided funding and technical support to 21 local authorities to carry out trials of separate food waste collections. This report evaluates the performance of the trials and draws out key practical lessons for local authorities for the collection of food waste from householders.

WRAP helps individuals, businesses and local authorities to reduce waste and recycle more, making better use of resources and helping to tackle climate change.

This report updates and replaces the report published in September 2008

Written by: Eric Bridgwater and Dr Julian Parfitt, Resource Futures Ltd



Front cover photography: WRAP supported food waste trial collection in Waveney

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Executive summary

Between January 2007 and March 2009 WRAP provided funding and technical support to 19 local authorities in England and 2 local authorities in Northern Ireland to carry out trials of collecting food waste separate to refuse (residual waste) and to garden waste for centralised treatment.

The WRAP supported trials all had the following key characteristics:

- food waste was collected weekly;
- food waste was collected in a separate container to both residual waste and to garden waste (where a kerbside garden waste service was provided);
- small dedicated collection vehicles were used;
- kerbside containers and/or kitchen caddies were provided to householders in the trial areas; and
- liners were provided for kitchen caddies and/or collection containers (with the exception of one small area in Surrey).

The 21 trials considered in this report were carried out in local authority areas with a broad range of socio-demographics, particularly in terms of levels of deprivation and average size of households. The trial areas had a mix of waste and recycling collection systems, in particular with a good representation of authorities with weekly and fortnightly refuse collections. Three of the trial areas collected food waste from multi-occupancy properties, including one trial using a 'bring' system to collect food waste.

Collected food waste was sent for processing at in-vessel composting and anaerobic digestion facilities and in most cases these facilities were located in reasonable proximity to the trial areas.

A wide range of data was collected in order to monitor and evaluate the performance of the trials, including:

- tonnages of food waste collected;
- vehicle pick and pass rates¹;
- householder participation;
- householder attitudes and satisfaction (via surveys) and in-depth views (via focus groups);
- waste composition and assessment of capture rates;
- feedback from processors; and
- feedback from local authority officers and collection crews.

Key Findings

Collectively the trials provided a service to 135,540 households and during the trials (up to the end of 2008) a total of 10,200 tonnes of food waste was diverted from landfill avoiding the emission of the equivalent of 4,600 tonnes of CO₂ (assuming that all the food waste went to in-vessel composting). Average food waste yields per household served per week ranged from 0.32 kg (bring scheme) to 2.1 kg (kerbside); this is equivalent to each household avoiding the equivalent of between 0.11 kg and 0.94 kg of CO₂ each week.

As of May 2009, three of the local authorities that participated in the trials have rolled out food waste collections district wide – Mid Bedfordshire (now part of Central Bedfordshire), Oldham and Kingston upon Thames. The food waste yields achieved by the district-wide collections are similar to those achieved by the trials. This indicates that the results from the trials can be replicated on a district-wide basis and can be used for planning purposes.

Frequency of Collection

Refuse collection frequency was found to be a statistically significant factor in the performance of the trials. The average food waste yields achieved by trial areas with fortnightly refuse collections were generally higher in comparison to trial areas with weekly refuse collections. Schemes with weekly refuse collections, particularly those where refuse was collected in wheeled bins, also experienced a dropping off in yields and participation over a period of several months. In schemes where refuse collection was fortnightly yields and participation rates

¹ Pass rate = number of properties passed by a vehicle over a given period of time (i.e. per day).

Pick rate = number of containers serviced (or picked up) over a given period of time.

generally were maintained at roughly the same level for the duration of the trials. This finding has important implications, since areas with weekly refuse collections will need to spend more on communications in order to prevent participation from falling.

For trials running alongside weekly refuse collections, those trial areas using sacks for refuse tended to achieve higher food waste yields in comparison to trials using wheeled bins for refuse. Levels of deprivation were also found to be significant in affecting the food waste yields achieved in the trials, with trials in more affluent areas tending to achieve higher yields in comparison to trials operating in less affluent areas.

The differences in performance are significant. Experience from the trials suggests that – once deprivation is taken into account – separate food waste collections from areas with fortnightly refuse collections generally achieve higher food waste yields in comparison to collections from areas with weekly refuse collections using wheeled bins, of approximately 20%. However it must be borne in mind that actual yields will also be affected by other socio-demographic factors and the communications strategies adopted.

Flats and Multi-Occupancy Dwellings

Trials involving door-to-door collections of food waste from flats achieved average food waste yields of around 0.5 kg per household served per week. These relatively low yields reflect the challenges of collecting food waste from multi-occupancy properties and suggest a need to develop additional strategies for collecting food waste from these properties.

Participation and Set out

Participation monitoring was carried out in 20 trial areas. Ten of these achieved participation rates of 70% or more during the first phase of monitoring. Average participation rates across all phases of monitoring ranged from 21% (for a flats collection trial) to 76%. Participation rates for some trials were measured more than once and for these trials it was found that some experienced a drop-off in participation. In some ways this is to be expected when introducing a new scheme, but it does emphasise the importance of engaging with householders in order to maintain participation levels. Set out rates were found to be, on average, around 15 percentage points lower than participation rates.

Composition

In six of the trial areas the food waste and residual waste from a sample of participating households was audited to assess composition. In total the residual waste and food waste of over 500 participating households was studied. The waste audits found that 'unavoidable' food waste, such as peelings, cores and bones, accounted for the highest proportion of separately collected food waste (53% of total food waste set out). The capture rate for food waste (food waste presented for separate collection as a proportion of the total food waste put out at the kerbside) across the waste audits ranged from 43% to 77%, with an average of 59% across the six trials audited.

Public Attitudes

Attitudinal surveys were carried out in five trial areas, with a total sample of around 2,500 households. High levels of satisfaction were recorded for the containers, caddies and liners, as well as for the publicity materials which were produced using WRAP designed templates.

The most common reasons given by respondents for not participating in the food waste collections were related to concerns about potential hygiene, odour or vermin issues (24% of non-participants combined). However these issues were considered less important by residents who actually participated in the collections (6% of participants), indicating that these are often perceived issues rather than problems experienced in reality.

The single main reason stated for non-participation was not producing enough food waste (21% of non-participants). For most households this is also likely to be an issue of perception rather than reality; WRAP has shown in *The Food We Waste* study that even households that claim to generate no food waste at all produce on average 2.9kg per week (p.209).

A further stated reason for non-participation was the use of home composting (9% of non-participants), although most households are also likely to produce a quantity of food waste that cannot be composted at home.

The responses to the attitudinal surveys indicated that some of the participating households (4 to 8%) claimed to have changed their attitudes or habits relating to food purchasing and consumption as a result of taking part in the food waste collection service. 24% of respondents reported that they compost at home and of these, around one quarter stated that they now compost less food waste as a result of having a food waste collection service.

Practical advice and good practice

An overview of the key practical lessons and good practice learned from the trials is provided in Section 5 of this report, this covers the following:

- collection vehicles;
- collection crews;
- collection rounds;
- processing and quality of collected food waste;
- containers and liners;
- initial roll-out of collections; and
- communicating with residents.

Lessons from individual trials are explored in greater detail in several case studies:

- food waste collection trials operating alongside fortnightly refuse collections;
- food waste collection trials in areas with high density housing;
- food waste collection trials in areas with low to medium density housing;
- food waste collection trials from multi-occupancy properties;
- liners for food waste collections; and
- communications and promoting food waste collections.

These case studies can be viewed and downloaded at: www.wrap.org.uk/fwct.

Appendix 1 signposts readers to other resources and guidance on introducing food waste collections.

Acknowledgements

WRAP gratefully acknowledges the contributions made by the following organisations in monitoring and evaluating the collection trials:

The local authorities undertaking the trials, namely:

- Belfast City Council;
- Broadland District Council;
- Calderdale Council;
- East Devon District Council;
- Elmbridge Borough Council;
- Guildford Borough Council;
- London Borough of Hackney;
- Luton Borough Council;
- Mid Bedfordshire District Council and Bedfordshire County Council;
- Mole Valley District Council;
- Newcastle upon Tyne City Council;
- Newtownabbey Borough Council;
- Oldham Council;
- Preston City Council;
- South London Waste Partnership – the London Boroughs of Croydon, Merton, Kingston and Sutton
- South Shropshire District Council and Shropshire Waste Partnership and;
- Waveney District Council; and
- West Devon Borough Council,

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1. Introduction to the Food Waste Collection Trials

Between 2007 and 2009 WRAP provided funding and technical support to 21 local authorities to carry out separate food waste collection trials. In this section we describe the context of the collection trials and why a particular approach to collecting food waste has been piloted by WRAP. We also define the content and scope of this report.

The diversion of food waste from disposal is becoming an increasingly urgent priority for local authorities across the country. 31% of kerbside residual waste is estimated to be food waste², making this material an obvious target for separate collection and treatment. The *Waste Strategy 2007 for England* identifies food waste as a key priority for reducing the quantity of residual waste requiring disposal performance. Equally, there is a growing interest in separate food waste collections across the UK as an important option in diverting biodegradable waste from landfill. The Landfill Allowances schemes and the new national waste indicators for England are also focussing the attention of local authorities on the importance of collecting food waste.

These and other drivers are encouraging local authorities to implement food waste collections – at the time of writing, over 120 local authorities in the UK are providing a food waste collection service to their residents in one form or another, ranging from small trials to collections across a whole county. This number can be expected to grow rapidly in the near future as local authorities face more challenging recycling and landfill diversion targets.

This report draws key lessons from the food waste collection trials which local authorities might consider useful in deciding upon and introducing successful food collections schemes.

1.1 The WRAP trials in the context of recent research

In 2007 WRAP published a report prepared by Eunomia Research and Consulting that looked at the comparative costs and benefits, including monetised environmental costs and benefits, of different approaches to managing household biowastes (garden and food waste). The study looked at different collection and treatment systems including schemes in which food and garden wastes were collected separately from one another and schemes in which they were collected mixed. Different levels of home composting uptake and promotion were also considered in the various options examined.

The main finding was that the design of the collection system and the way in which the waste is collected will influence the amount of material captured and will have implications for how it is treated, which in turn will impact on overall costs and the diversion of material from the residual waste stream. In particular, the report concluded that collecting food waste separately at kerbside and weekly could increase the capture of food, would help keep processing costs for food waste to a minimum and was overall the more financially and environmentally attractive option.

The research suggested that there would be significant additional costs associated with adding food waste to an existing garden waste collection due to low captures of food waste and very high captures and quantities of garden waste (particularly for fortnightly collections) and the requirement to treat all the organic waste at facilities compliant with the requirements of the Animal By-Products Regulations³.

Many of the operational assumptions used for the food-only collection options in the Eunomia study were based on wider European experience, in particular from northern Italy. It was recognised however that if collecting and processing food waste separately from garden waste was – as it appeared to be – a preferable solution to managing food waste, then it needed testing in a UK context. Therefore, Defra's support was sought for

² From a recent analysis of household refuse composition carried out by WRAP.

³ For further guidance on complying with the Animal By-Products Regulations, visit: http://www.netregs.gov.uk/netregs/275207/587394/?lang=_e

undertaking a number of monitored trials in conjunction with local authorities. *Waste Strategy 2007 for England* recognises there are strong arguments for encouraging more separate collections of food waste and recognises the value of the WRAP trials in providing more informed guidance to local authorities.

As a result, the WRAP trials of kerbside collections focused on a particular approach to collecting food waste, with the following defining features:

- food waste was collected separately from residual waste and separately from garden waste;
- food waste was collected weekly;
- small dedicated food waste collection vehicles were used;
- kerbside containers and kitchen caddies were provided to all householders; and
- liners for kitchen caddies were provided in the vast majority of trial rounds.

The rationale for trialling this approach to collecting food waste is summarised in Table 1 below. In addition, three of the WRAP supported trials collected food waste from flats, with one of these trialling a “bring” type collection system.

Table 1: Rationale for food waste collection configuration piloted in WRAP supported trials

Food waste collection configuration piloted in WRAP supported trials	Summary of rationale
Collection of food waste separate from garden waste	Avoids paying high treatment costs for garden waste and allows optimum mix to be achieved for processing organics through the treatment system. Since catering waste must be treated/composted under Animal By-Products Regulations requirements (i.e. in-vessel composting), processing large quantities of garden waste at higher cost treatment facilities will raise disposal costs. Separate collection of food waste means that garden waste can be collected and composted separately at a lower cost per tonne (i.e. in open windrows). Combined collections typically deliver very high proportions of garden waste which may not be the optimum feedstock for certain treatment facilities.
Weekly collections of food waste	Higher yields of food waste anticipated in comparison to fortnightly mixed food and garden waste collections, where residents tend to dispose of food waste in residual waste in weeks when garden waste is not collected. Greater participation and higher levels of householder satisfaction particularly where weekly food waste collections are provided alongside fortnightly refuse collections.
Dedicated food waste collection vehicle	This vehicle type is successfully used for food waste collection schemes in other parts of Europe. A key aim of the trials has been to test whether these vehicles are appropriate to UK circumstances and to understand the pros & cons of using such vehicles to collect food waste in various local authority settings.
Kerbside containers and kitchen caddies with liners	Maximise participation and householder satisfaction through making service as user friendly as possible and easy for residents to take part.
Collections from multi-occupancy properties	Pilot approaches to collecting food waste separately. Three of the trials collected food waste from multi-occupancy properties, two from the doorstep and one via a “bring” system.

As well as collecting food waste separately, the other principal method adopted by local authorities for collecting food waste is combined with garden waste where typically collections are provided fortnightly. However, there are a number of variations in the way these two main approaches to collecting food waste are being employed across the UK. These include:

- weekly or fortnightly collection of food waste combined with garden waste;
- provision or not of kitchen caddies and/or kerbside containers;

- free provision of caddy liners, no provision of liners or establishment of local supply networks to enable residents to purchase liners;
- different types of collection vehicles being used;
- food waste co-collected with other material/waste streams, for example dry recyclables or refuse, on multi-compartment or split collection vehicles; and
- collecting food waste against a backdrop of different types of refuse containment and frequency.

The WRAP-supported food waste collection trials represent a significant opportunity to learn more about the performance of separate food waste collections and the implementation and operational issues that local authorities need to know about if considering such collections.

1.2 Content and scope of this report

This report provides an evaluation of the trials, their performance and the lessons that can be drawn from them, as follows:

- Section 2: An overview of the individual trials, summarising the salient aspects of each trial.
- Section 3: A brief summary of the various methodologies used to evaluate the trials and extract meaningful lessons from them.
- Section 4: An assessment of the relative performance of the different trials, in particular examining the yields and capture rates achieved, assessing the factors affecting trial performance and comparing trial performance against known data from other types of collection system.
- Section 5: A summary of the key practical lessons learned from the trials.

More detail on individual trials is presented in case studies which are published separately to this report and can be downloaded at: www.wrap.org.uk/fwct. Other useful research and guidance available on food waste collections is summarised in Appendix 1.

In this report we are able to offer some comparisons of the trialled food waste collection systems against other systems, but only where relevant reference data is available. A systematic comparison of different food waste collection systems is beyond the scope of this report. Further work is being carried out by WRAP which addresses these challenges more directly, as detailed in Appendix 1.

The trials provide a range of useful lessons on how best to implement food waste collections, regardless of how a particular food waste collection system is configured. For further assistance in planning and introducing food waste collection services, local authorities should contact WRAP ROTATE by email at lgs@wrap.org.uk or by telephone on 01295 819661.

Image 1: Food waste collection crew in the Royal Borough of Kingston upon Thames trial (courtesy of Hyder Consulting Ltd)



2. Overview of the trials

This section provides an overview of the WRAP supported trials, their context and how they were configured.

2.1 Introduction to the trials

The 21 local authorities provided with support from WRAP to carry out separate food waste collection trials are listed in Table 2.

Table 2: Local authorities which carried out food waste collection trials with support from WRAP

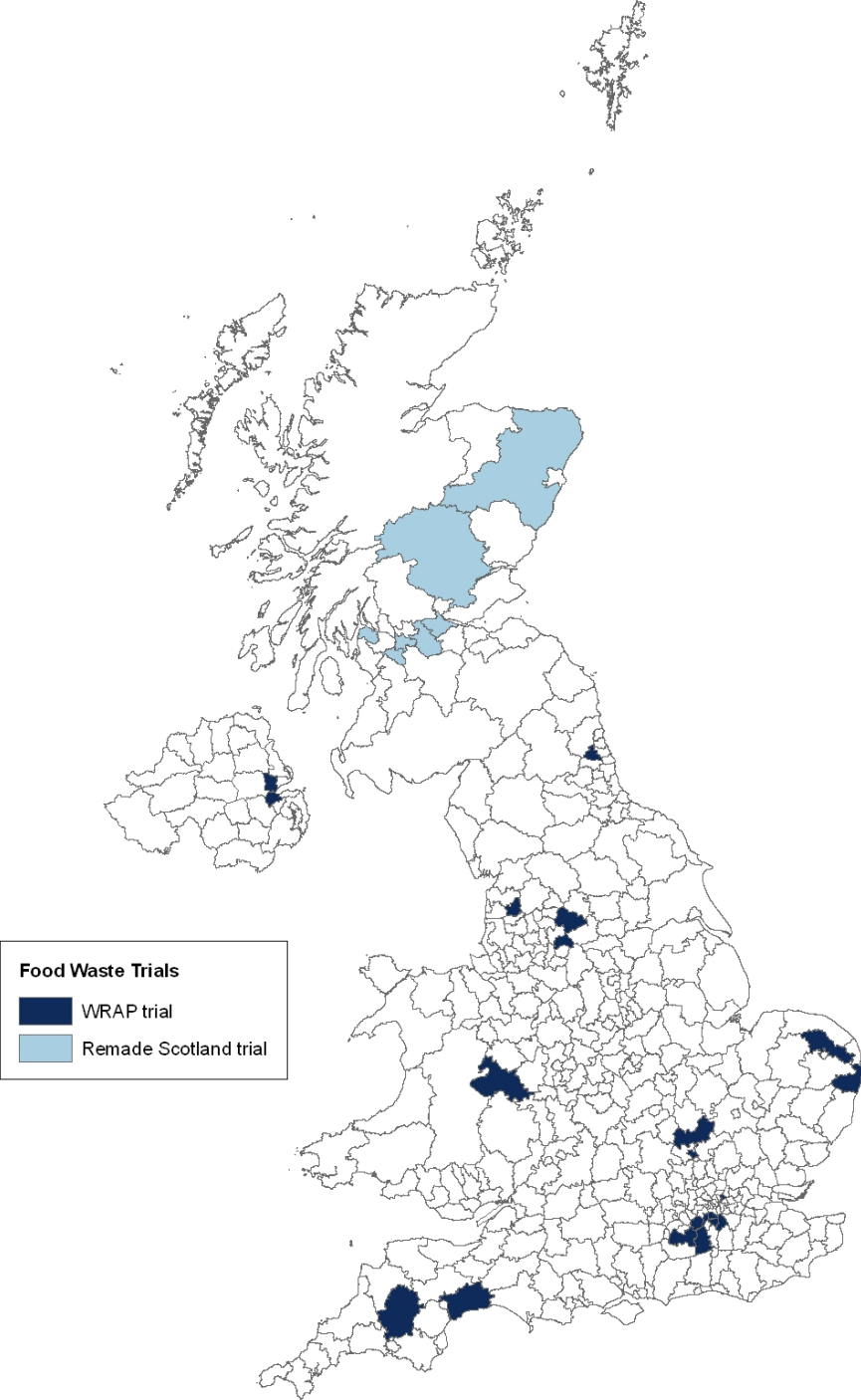
Belfast	Broadland
Calderdale	East Devon
LB Hackney (multi-occupancy, bring scheme)	Luton
Mid-Bedfordshire (trial also supported by Bedfordshire County Council)	Newcastle upon Tyne
Newtownabbey (Northern Ireland, multi-occupancy)	Oldham
Preston	South Shropshire
South London Waste Partnership: Croydon, Merton, Sutton; RB Kingston-upon-Thames (multi-occupancy)	Surrey: Elmbridge, Guildford, Mole Valley
Waveney	West Devon

The local authority areas in which the trials were carried out represent a good geographic spread across England, with two authorities also situated in Northern Ireland, as illustrated in Figure 1. Additionally Remade Scotland is supporting a number of local authorities in Scotland to carry out food waste collection trials funded by the Scottish Government. Similar to the WRAP supported trials, the aim of the Scottish trials is to develop a better understanding of the effectiveness and economics of different food waste collection systems. Unlike the WRAP trials, the Scottish trials include both food only and mixed food and garden waste collections. Four of the Scottish trials focus on collecting food waste only (in Aberdeenshire, East Renfrewshire, Glasgow, Inverclyde) and three of the trials (in Falkirk, North Lanarkshire and Perth and Kinross) add to existing infrastructure by collecting food waste with the garden te. With the exception of Falkirk all the trials are now underway, having started between February and December 2008. Preliminary results for the trials are being collated by Remade Scotland, for further information contact remade@gcal.ac.uk.

Image 2: WRAP food waste collection trial in Newcastle City



Figure 1: Local authorities recently or currently engaged in separate food waste collection trials in the UK, supported by WRAP or Remade Scotland



The number of households served by trial collections in each of these local authority areas ranges from about 1,500 to 16,500 households (see Table 3 below). Therefore the shaded area in the map should not be taken as implying the trials were undertaken across the local authority as a whole.

2.2 Overview and context of the trials

The following pages provide an overview of the trials and the context in which they are taking place:

- **Figure 2** shows some basic socio-demographic information about the trial areas. The average level of deprivation for each trial is illustrated with the dark blue bars, measured in terms of Indices of Multiple Deprivation⁴. These indices combine a number of indicators, chosen to cover a range of economic, social and housing issues (including income, employment, health, education, housing and access to services), into a single score for each small area to arrive at an overall measure of deprivation. The higher the number, the higher the level of deprivation. The average level of deprivation in England is around 23. The blue bars in Figure 2 show that the trials took place in areas displaying a wide range of deprivation, with a small bias towards more affluent areas. The Indices of Multiple Deprivation for Belfast and Newtownabbey (in Northern Ireland) are indicated with shaded bars, since indices of deprivation for England and Northern Ireland are not directly comparable.
- **Table 3** provides a summary of the basic set-up of the trials, indicating the start date of the trials, how many households were served with trial collections, a brief description of the trial area (in terms of area or housing type), the collection vehicle(s) used to collect food waste and the type of treatment used to process the collected food waste. Additionally, it should be noted that all trials collected food waste weekly; and that householders were provided with kitchen caddies, kerbside buckets and liners.
- **Table 4** summarises the context of each trial in terms of other collection systems in place in each area. Any food waste collections in place prior to the WRAP trials are briefly described. Collection regimes for residual waste (refuse), dry recycling and garden waste are described in terms of frequency of collection and containment method. Additionally it is noted whether garden waste collections are charged or free.

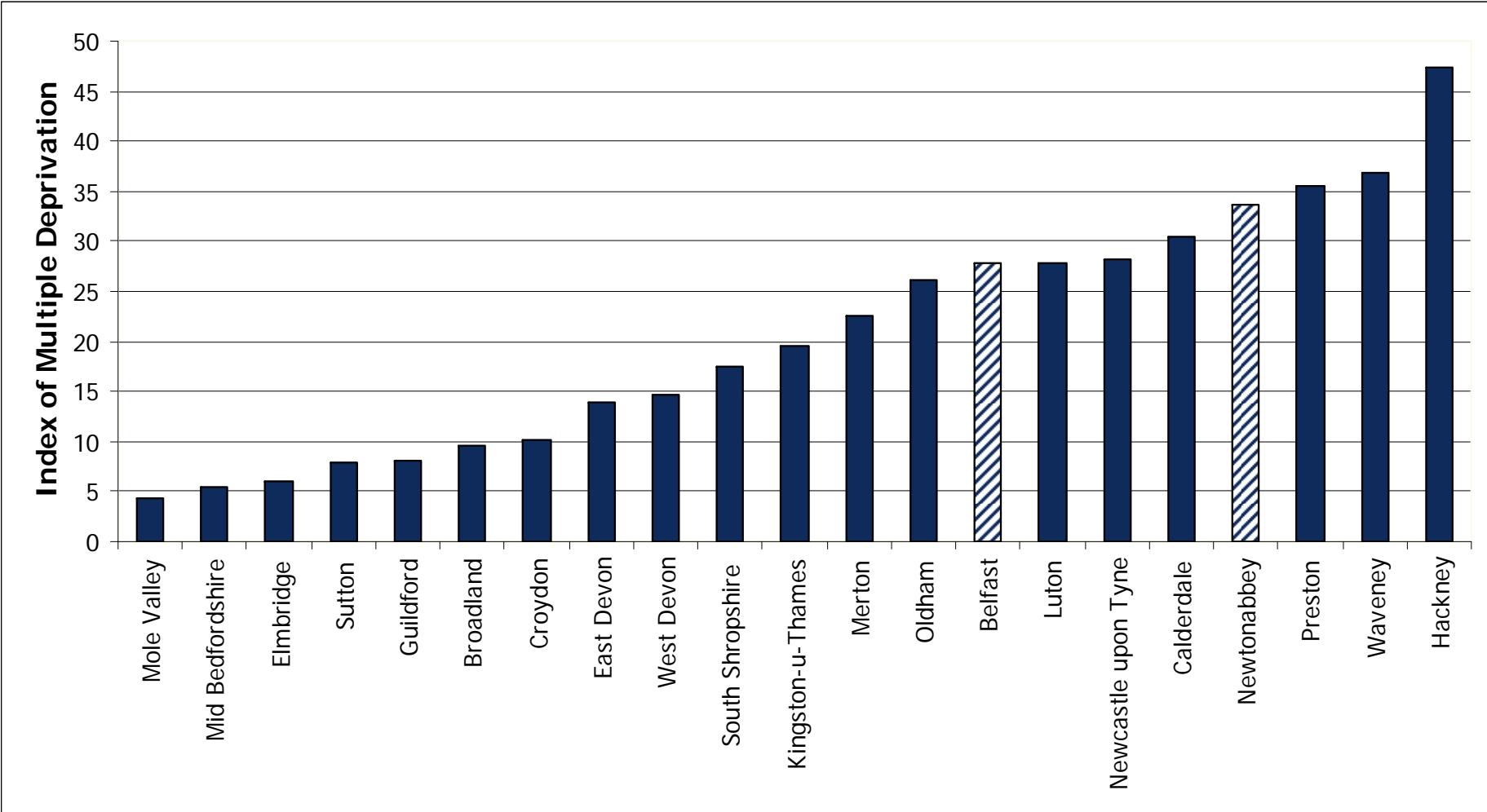
The previous evaluation of the WRAP food waste trials (published in 2008) showed a reasonable degree of variation amongst the trial areas in terms of average household sizes (i.e. number of people per household). Due to changes in many of the trial rounds since the previous evaluation was carried out, it has not been possible to calculate average household sizes for the trial areas. An analysis of household sizes in the trial areas from the previous evaluation of the trials is included in Appendix 2.

Image 3: Collecting food waste in Kingston-upon-Thames (courtesy of Hyder Consulting)



⁴ *Communities and Local Government, Indices of Deprivation 2007*

Figure 2: Average levels of deprivation in WRAP trial areas



Note: Indices of Multiple Deprivation in Northern Ireland are not directly comparable with Indices of Multiple Deprivation in England. Therefore the Indices of Multiple Deprivation for Belfast and Newtownabbey (in Northern Ireland) are marked with shaded bars.

Table 3: Summary of basic set-up of the WRAP supported food waste collection trials

Local authority	Month trial commenced	No. h/holds served	Description of trial area	Collection vehicle type	Treatment process
Belfast	July 2008	6,938	Urban inner city areas	2t box van	Rendering
Broadland	March 2008	5,746	Urban fringes of Norwich, predominantly suburban low density with a range of household types and socio-economic status.	Faun Minimatic, 7.5t	In-vessel composting
Calderdale	May 2007	6,878	Urban and suburban areas.	Farrid body on Iveco chassis, 7.5t, partial compaction	In-vessel composting
East Devon	August 2008	12,917	Mix of urban and rural areas.	Stillage vehicle.	Biogas
London Borough of Hackney	October 2007	4,597	Inner city high rise properties.	7.5t, 5 m3 body	In-vessel composting
Luton	June 2007	8368, expanded to 10,502	Urban areas, semi-detached, detached, terraced houses and council houses.	7.5t truck	Anaerobic Digestion
Mid-Bedfordshire	July 2007	5633, expanded district-wide after trial	Five towns, relatively low density housing in semi rural locations, with a range of housing stock.	Eurocargo Chassis Cab / Terberg toploader	Anaerobic Digestion
Newcastle upon Tyne	July 2007	6,220	Urban areas, terraced, semi-detached, detached housing.	3.5t transit, enclosed body, sliding side doors, (max payload 700kg)	In-vessel composting
Newtownabbey	October 2007	1,552	Mostly urban areas with high- and low-rise multi-occupancy housing, and a few rural locations.	Minimac 7.5t	Heat treated & sterilized for bio-fuel
Oldham	October 2007	9397, expanded district-wide after trial	Predominately urban area, range of housing stock including terrace and hard-to-access properties.	RCV, 10t	In-vessel composting
Preston	April 2007	7565, expanded to 16,495	Urban areas, primarily terraced, few gardens, diverse population.	Bespoke vehicle, 7.5t	In-vessel composting
South London Waste Partnership: Croydon, Merton, Sutton	May 2007	7,731	Three boroughs with a range of demographics (no multi-occupancy housing).	7+ tonne vehicle	In-vessel composting
South London Waste Partnership: Royal Borough of Kingston-upon-Thames	September 2007	4538, expanded district-wide after trial	High- and low-rise multi-occupancy housing, council and privately owned.	Split compartment vehicle, 3.5t, (collects food waste, commingled recycling and glass separately)	In-vessel composting
South Shropshire	May 2007	5547, expanded to 8,591	Rural market town with mixed low density housing.	Electric vehicle.	Anaerobic Digestion
Surrey: Elmbridge	June 2007	2844, expanded to 6,199	Low and medium density residential commuter belt suburb.	Farid Minimatic, Isuzu chassis, 7.5t	In-vessel composting
Surrey: Guildford		2,966	Low and medium density residential area.		
Surrey: Mole Valley		3930, expanded to 5,482	Low and medium density residential commuter belt suburb.		
Waveney	May 2007	5,649	Mostly urban terraces, though one round in a rural market town.	Stillage vehicles with roll off stillages.	In-vessel composting
West Devon	April 2007	4512, expanded to 7,509	Low and medium density housing in Tavistock.	Farid Minimatic with Barlift, 7.5t	In-vessel composting

Notes: (1) All trials collected food waste weekly, provided householders with kitchen caddies, kerbside buckets, and liners. (2) From March 2008 West Devon switched to using an anaerobic digestion facility for reprocessing of collected food waste.

Table 4: Collection system context for each of the WRAP food waste trials

Local authority	Food waste collections prior to WRAP trials	Refuse collection		Kerbside dry recycling collections		Kerbside garden waste collections		
		Frequency	Containment	Frequency	Containment	Frequency	Charging	Containment
Belfast	None	Fortnightly	Bin	Fortnightly	Box	None		
Broadland	None	Fortnightly	Bin	Fortnightly	Bin	Fortnightly	Charged	Bin
Calderdale	None	Weekly	Sack	Fortnightly	Box	None		
East Devon	None	Fortnightly	Bin	Weekly / fortnightly	Box	None		
London Borough of Hackney	Collections from 51,000 low-rise and 5,000 high-rise properties	Weekly (more frequently for properties with limited storage)	Paladin / Eurobin (for estates)	Weekly	Box / sack	Fortnightly	Free	Bin
Luton	None	Weekly	Bin	Fortnightly	Bin	Fortnightly	Free	Bin / sack
Mid-Bedfordshire	None	Fortnightly	Bin	Fortnightly	Bin / sack	Fortnightly	Free	Sack
Newcastle upon Tyne	None	Weekly	Bin	Fortnightly	Box	Fortnightly	Free	Bin
Newtownabbey	None	Weekly	Bin	Fortnightly (paper every 6 weeks)	Box (paper in bin)	Fortnightly	Free	Bin
Oldham	None	Fortnightly	Bin	Fortnightly	Box / sack (bin in separate trial area)	Fortnightly	Free	Bin
Preston	Collections started in the trial area in May 2005	Fortnightly	Bin	Fortnightly	Box	Fortnightly	Free	Bin
South London Waste Partnership: Croydon	None	Weekly	Bin	Fortnightly	Box	Fortnightly	Free	Sack
South London Waste Partnership: Merton	None	Weekly	Sack	Weekly	Box	At householder request	Free	Sack
South London Waste Partnership: Sutton	None	Weekly	Bin	Fortnightly	Bin	Fortnightly	Free	Sack
South London Waste Partnership: RB Kingston-upon-Thames	Collections from 2,400 households in separate trial	Weekly	Bin / sack / Eurobin	Fortnightly (weekly for some flats)	Box (sack / bin / box for some flats)	Weekly	Charged	Sack
South Shropshire	Comingled garden and food waste collected	Fortnightly	Bin	Fortnightly	Box	Fortnightly	Free	Bin
Surrey: Elmbridge	None	Weekly	Bin	Fortnightly	Bin / box	Fortnightly	Charged	Bin / sack
Belfast	None	Fortnightly	Bin	Fortnightly	Box	None		
Broadland	None	Fortnightly	Bin	Fortnightly	Bin	Fortnightly	Charged	Bin
Calderdale	None	Weekly	Sack	Fortnightly	Box	None		

Note: Belfast City Council provides garden waste collections for many of its residents outside the food waste trial areas.

3. Evaluating the trials: summary of methods

This section provides an overview of the methods used to monitor and evaluate the performance of the food waste collections trials.

In order to monitor and evaluate the performance of each trial a wide range of data was collected. An outline of the types of data and a concise description of the methodology used is provided in Table 5.

Table 5: Monitoring data collected during the WRAP trials

Type of data collected	Trial areas where data was collected	Summary of methodology
Tonnages of food waste collected	All trials (21 local authorities)	Local authorities were requested to record separate weighbridge tonnages for each round using a standardised template format.
Vehicle pass and pick rates	8 local authorities provided data	Local authorities were requested to provide collection vehicle "down time", i.e. travel time to and from depot / tipping. This was compared against round lists and participation data to determine average pass and pick rates.
Feedback from local authority officers	All trials launched before July 2008 (19) Two workshops (October 2007 and July 2008)	(1) Workshops for all local authority partners, to share experiences, and discuss good practice for the collection of food waste in context of the trials. (2) Interactive website, with access restricted to trial authorities, for exchanging data, information and ideas on good practice for food waste collections. (3) Telephone contact with partner authorities to discuss particular aspects of the trials.
Participation and set out rates	All trials except Hackney and Preston (19). 8 authorities: 1 phase of monitoring 5 authorities: 2 phases 5 authorities: 3 phases 1 authority: 4 phases	Most properties served by the food waste scheme in each area were monitored. Whether the food waste container was set out was recorded for each individual property over three successive weeks for each phase of monitoring. A household that set out food waste for collection at least once during the three weeks of monitoring was considered as participating. Different phases of monitoring were carried out for the various trials. Participation rates were calculated by collection round and ACORN ⁵ category.
Householder views	Mid-Bedfordshire, Newcastle, South Shropshire, Waveney, West Devon (5)	Doorstep questionnaire, with 600-650 responses obtained per trial area surveyed. Attitudinal survey investigating a range of issues relating to the trials and food waste in the household. The questionnaire was standardised across the trials. Further details provided below this table.
In depth views of householders via focus groups	Hackney, Preston (2)	3 focus group meetings held in each authority with the aim of achieving a reasonable range of socio-demographic and cultural backgrounds from the respective trial areas. The attitudes and opinions of the attendees were canvassed and recorded on a similar range of issues as those addressed in the attitudinal questionnaires.
Waste composition and capture rates	Belfast, Calderdale, Elmbridge, Newcastle, Preston, South Shropshire (6)	Waste analysis of residual waste and food waste of 100 participating households per trial area monitored (500 households in total). Data was recorded for each individual household monitored. All kerbside streams, including recycling where operationally feasible, were weighed and analysed, with food waste subjected to detailed sort and categorisation ⁶ .
Feedback from processors	All trials launched before July 2008 (19)	Telephone survey of all treatment facilities accepting food waste from the trials. Feedback from local authority officers on any rejected loads or other issues raised by reprocessors.

⁵ ACORN is a system for categorising areas according to various socio-demographic factors.

⁶ Waste audits were carried out by WastesWork, which also carried out the waste analysis for WRAP's report, The Food We Waste (see Appendix 1 for further information). A similar methodology for waste auditing was applied to the trials as used in WRAP's The Food We Waste study which meant that a more detailed breakdown of food by type and origin was possible than in standard waste auditing.

The householder surveys investigated the following issues in relation to the collection service provided and food waste in the home:

- attitude to recycling;
- nature of participation in the food waste collection trials and barriers for non-participants;
- disposal behaviour for different types of food waste;
- home composting activity and whether this has been affected by receiving a food waste collection service;
- caddies, liners and buckets: nature of usage and any problems encountered;
- feedback on communications activities and materials;
- any changes in food purchasing activities; and
- socio-demographic background information.

The following consultants were contracted to carry out data collection for the WRAP trials:

- Participation monitoring and household surveys: Enviros, Hyder Consulting, M·E·L Research and Resource Futures;
- Waste auditing: WastesWork; and
- Focus groups: Resource Futures.

In addition, Elaine Kerrell of Elaine Kerrell Environmental Consultancy was contracted to design a standard householder questionnaire for use in the trial areas, and to oversee the monitoring contractors' use of the questionnaire.

The consultants produced separate monitoring and evaluation reports for each data collection exercise, which provide analysis of particular aspects of the performance of individual trials in a greater level of detail than presented here.

All of the other data collection listed in Table 5 was carried out by the participating local authorities, by WRAP staff or by Resource Futures.

4.3 Data analysis

Resource Futures and WRAP collated the various types of data summarised in Table 5 above. Collated data was reviewed in order to assess:

- data completeness;
- data consistency;
- data quality; and
- any requirements for additional data, in particular qualitative contextual data.

Where necessary, the relevant parties were contacted in order to address queries arising from data supplied and request missing data, interrogate anomalies or request a greater level of detail.

The collation and analysis of diverse datasets from a large number of trials presented some challenges and a few datasets were incomplete or had various data consistency or quality issues associated with them. Nonetheless sufficient robust data was available for the purposes of assessing the performance of the collection trials. The key areas of analysis were:

- weekly food waste yields at trial and round level;
- participation rates at trial and round level and, where possible, by socio-demographic group (ACORN category);
- attitudinal survey findings at trial level;
- food waste capture analysis at trial and round level;
- socio-demographics (levels of deprivation and household size) at multiple levels;
- operational set-up and context of each trial; and
- feedback from local authority officers on trial performance and issues.

A summary of the key datasets used for evaluating the performance of the trials is provided in Table 6 below. Several statistical tests were carried on the data generated by the trials and details of some of these tests are included in Appendix 2.

Table 6: Summary of available data for analysing the performance of the WRAP supported food waste trials

Local Authority	Number of weeks with valid weight data	Number of rounds on trial	Participation data		Compositional analysis
			Number of phases	Number of rounds on survey	
Belfast	30	4	1	4	Yes
Broadland	45	5	1	5	No
Calderdale	88	5	4	1/3*	Yes
Croydon	94	1	1	1	No
East Devon	28	1	1	1	No
Elmbridge	77	3/5**	3	1/5***	Yes
Guildford	73	3	3	2	No
Hackney	69	na	na	na	No
Kingston-u-Thames	35	5	1	1	No
Luton	70	5	2	5	No
Merton	87	1	1	1	No
Mid Bedfordshire	40	5	3	3	No
Mole Valley	74	4	2	3	No
Newcastle upon Tyne	38	5	2	5	Yes
Newtownabbey	48	4	2	3	No
Oldham	21	2	1	2	No
Preston	81	5	pre-trial data only		Yes
South Shropshire	60	5	3	3	Yes
Sutton	93	1	1	1	No
Waveney	80	4	2	4	No
West Devon	78	5	3	3	No

* Calderdale: 3 phases 3 rounds, 1 phase 1 round

** Elmbridge: expanded to 5 rounds for 30 weeks of trial period

*** Elmbridge: 2 phases 1 round, 1 phase 5 rounds

4. Performance of the trials

This section reviews the key performance measures from the trials.

The trials covered a total of 135,540 households. During the period to the end of March 2008 the trials collected a total of 10,200 tonnes of food waste for reprocessing. There are many interesting features of the performance of the trials which are explored in this section. In the first instance it should be noted that the quality of collected food waste was generally high; material quality is dealt with separately in section 5.4. In this part of the report we focus chiefly on food waste yields, participation rates and other important measures of the performance of the trials.

4.1 Food waste yields achieved by the trials

The average weights of food waste collected per household served with a food waste collection service during the trials are summarised in Table 7 below. These figures are based on all households included in the WRAP trial collection rounds (including non-participating households).

Table 7: Average food waste collected per household served per week in the WRAP supported trials

Local authority	Average yield, kg/hh/wk	Local authority	Average yield, kg/hh/wk
Belfast	1.09	Mid Bedfordshire	1.89
Broadland	1.84	Mole Valley	1.75
Calderdale	1.28	Newcastle upon Tyne	1.14
Croydon	1.64	Newtownabbey (flats)	0.53
East Devon	1.79	Oldham	1.22
Elmbridge	1.46	Preston	1.04
Guildford	1.70	South Shropshire	2.10
Kingston-u-Thames (flats)	0.45	Sutton	1.38
Luton	1.12	Waveney	1.17
Merton	1.19	West Devon	1.48

From Table 7 it can be seen that the trials involving door-to-door collections from flats in Kingston-upon-Thames and Newtownabbey (Northern Ireland) collected considerably less waste than the kerbside food waste trials. Additionally, the 'bring' scheme in Hackney achieved an average yield of 0.32 kg per household served per week. Hackney's 'bring' scheme is discussed in section 4.1.4.

4.1.1 Food waste yields: comparing trials with fortnightly and weekly refuse collections

Further trends are apparent in Figure 3 below. This chart shows average yields per household served per week:

- during the first half of the trial in each respective area (dark blue bars); and
- during the second half of the trial in each respective area (light blue bars); see Appendix 2 for further explanation of how this analysis was carried out⁷.

The trials have also been grouped in terms of refuse collection frequency (fortnightly and weekly) and collections from multi-occupancy properties.

Key finding: trials taking place alongside fortnightly refuse collections generally have achieved higher weekly yields per household served of collected food waste (average of 1.5 kg/hh/wk), in comparison with trials taking place alongside weekly refuse collections (average of 1.3 kg/hh/wk).

⁷ (i) The periods over which each of the trials operated varied. Refer to Table 3 in Section 2.2 for details on the start dates of the various trials. (ii) Multiple analyses of participation were also taken over the course of the trials to examine how they performed over time; see section 4.2.

This difference was found to be statistically significant, implying that food waste collections operating in the context of fortnightly refuse collections achieve higher yields in comparison to those operating alongside weekly refuse collections, all other factors being equal. Of course, in reality all factors rarely are equal between local authorities and there are many factors that can be expected to affect food waste yields, including socio-demographics, quality of the collection service and communications strategy employed to encourage householders to use the service.

In Figure 3 we can see that other factors must be at play, apart from the frequency of residual waste collections, since some trials with weekly refuse collections achieved higher weekly food waste yields per household in comparison to some trials with fortnightly refuse collections. The effects of factors affecting food waste yields in the various trials are discussed further in Section 4.1.2 below.

Figure 4 shows average yields per participating household for each of the trials. A similar general distinction between food waste yields is apparent for trials with, respectively, fortnightly or weekly refuse collections. Interestingly, the multi-occupancy collection trials achieved yields comparable to some of the kerbside trials, in terms of kg per participating household per week. This means that participation rates were lower in the multi-occupancy trials and that the main challenge to be faced in these areas is increasing participation levels. Participation rates for the trials are discussed further in Section 4.2.

Key finding: average yield of collected food waste per participating household across all the trials was 2.3 kg/wk. Trials taking place alongside fortnightly refuse collections generally have achieved higher weekly yields per participating household (average of 2.5 kg/wk) in comparison with trials taking place alongside weekly refuse collections (average of 2.3 kg/wk). Collections from multi-occupancy properties achieved average yields per participating household of 1.7 kg/wk.

Figure 4a below illustrates average yields per household setting out food waste for each of the trials. It is important to distinguish clearly between participating households and households setting out:

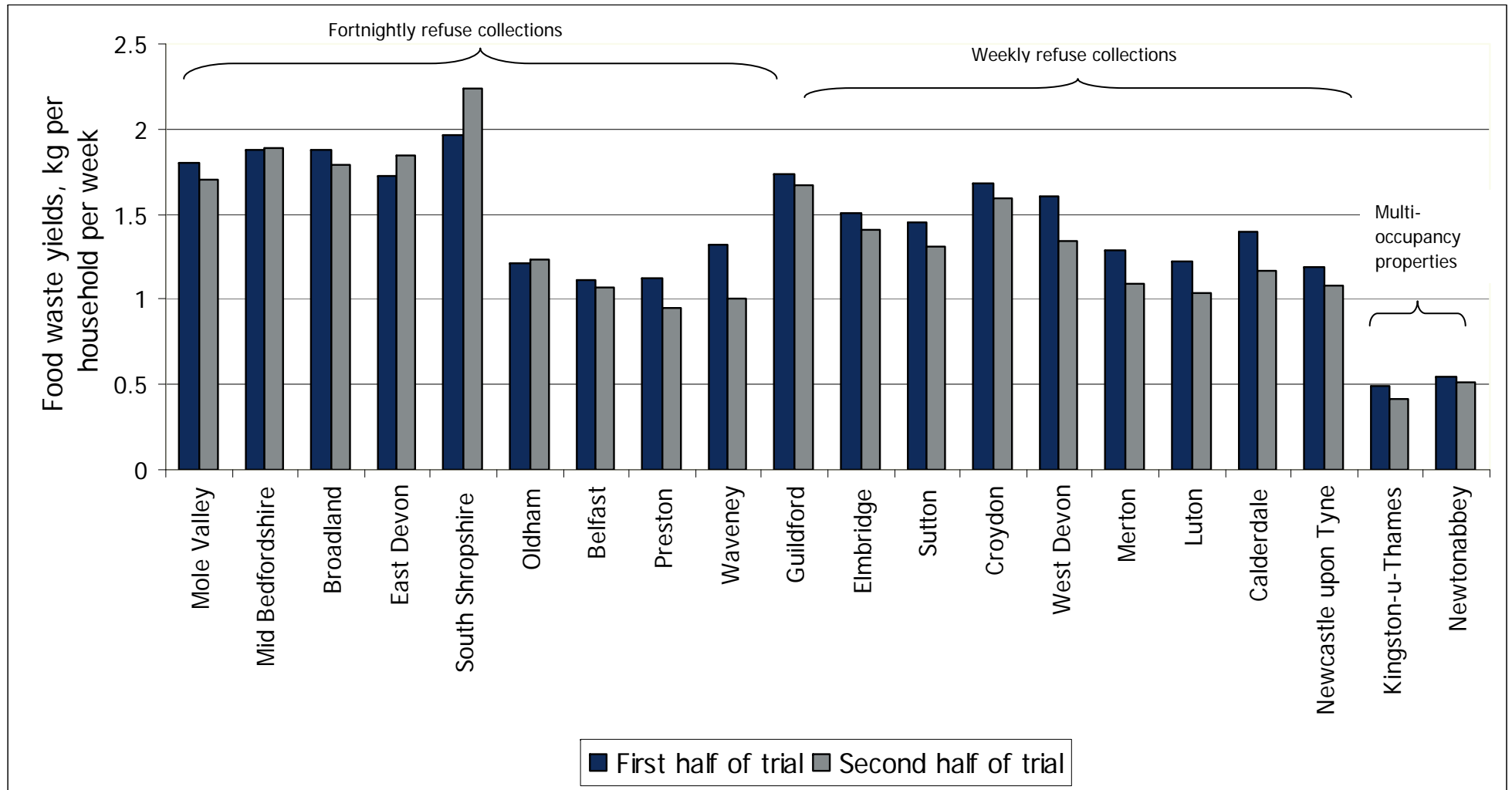
- participating households are those households that set out food waste at least once during a consecutive period of three weeks;
- households setting out are those households that set out food waste on a particular week.

For the purposes of this analysis, the number of households setting out food waste has been calculated as the average of the number of households setting out food waste in a particular week across three weeks. The period of three weeks relates to the period over which the relevant trial rounds were monitored, in order to ascertain participation rates.

Again, a similar distinction is discernable in Figure 4a for food waste yields per household setting out for trials with, respectively fortnightly or weekly refuse collections, with the former generally achieving higher yields.

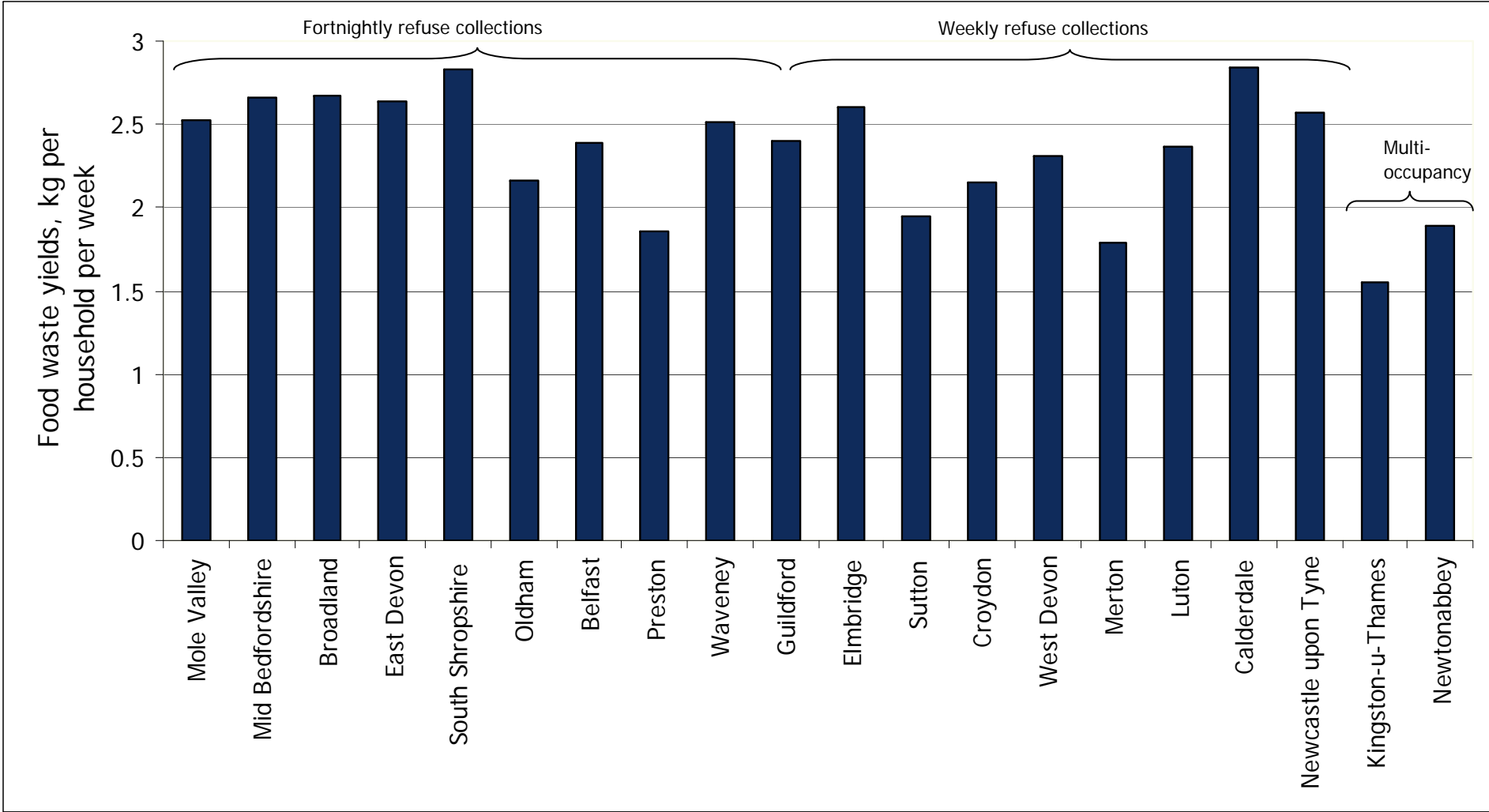
Key finding: the average yield of collected food waste per household setting out across all the trials was 3.2 kg/wk. Trials taking place alongside fortnightly refuse collections generally achieved higher weekly yields per household setting out (average of 3.4 kg/wk), in comparison with trials taking place alongside weekly refuse collections (average of 3.2 kg/wk). Collections from multi-occupancy properties achieved on average yields per household setting out of 2.2 kg/wk.

Figure 3: Average food waste yields per household served per week for WRAP supported trials



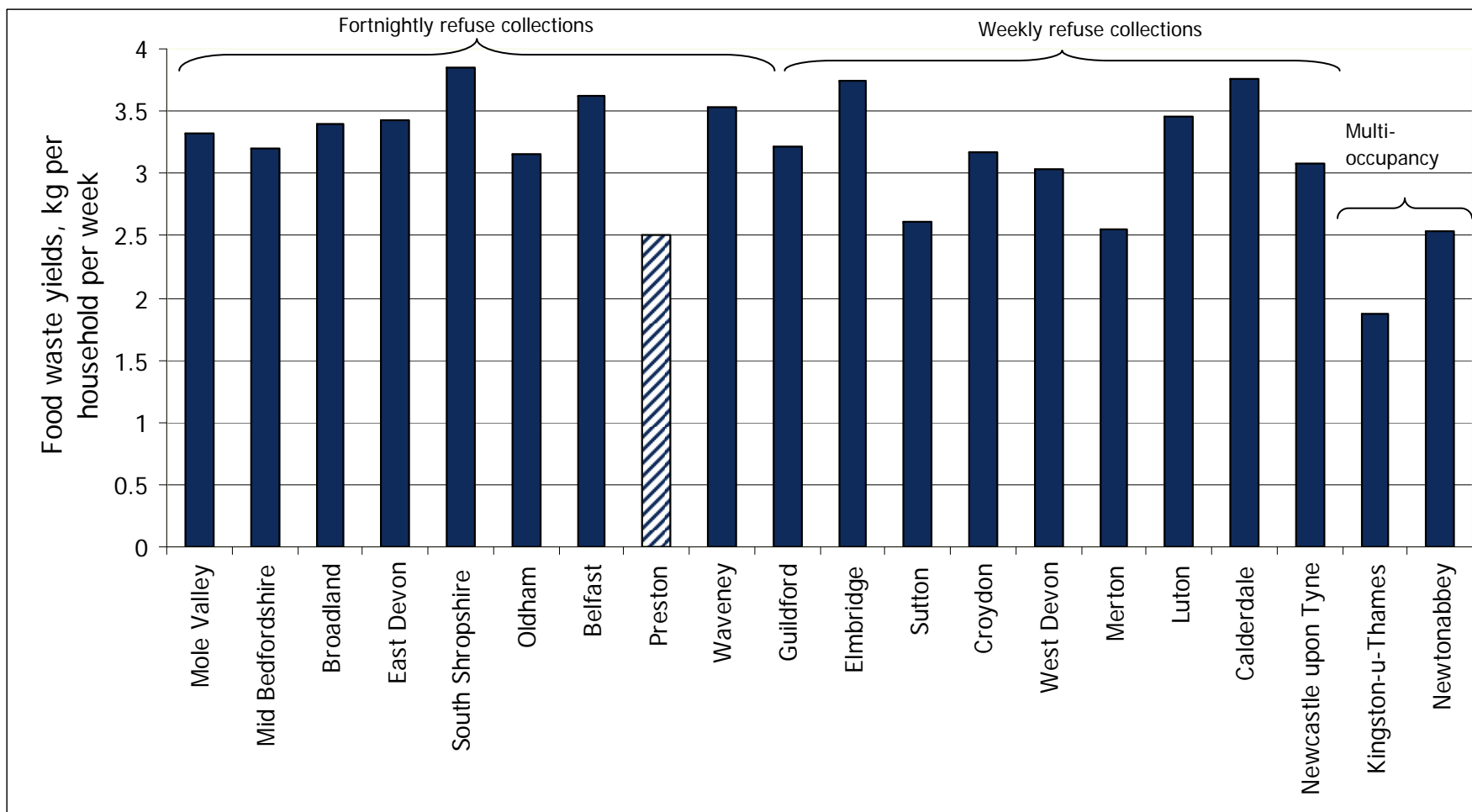
Note: Guildford had three trial rounds, all initially running alongside weekly refuse collections. However part of the way through the trials refuse collections for two of the rounds switched to fortnightly collections.

Figure 4: Average food waste yields per participating household per week for WRAP supported trials



Notes: (1) Estimated average yields per participating household over whole trial for each respective trial area. (2) Two of Guildford's three trial rounds switched from weekly to fortnightly collections part of the way through the trial.

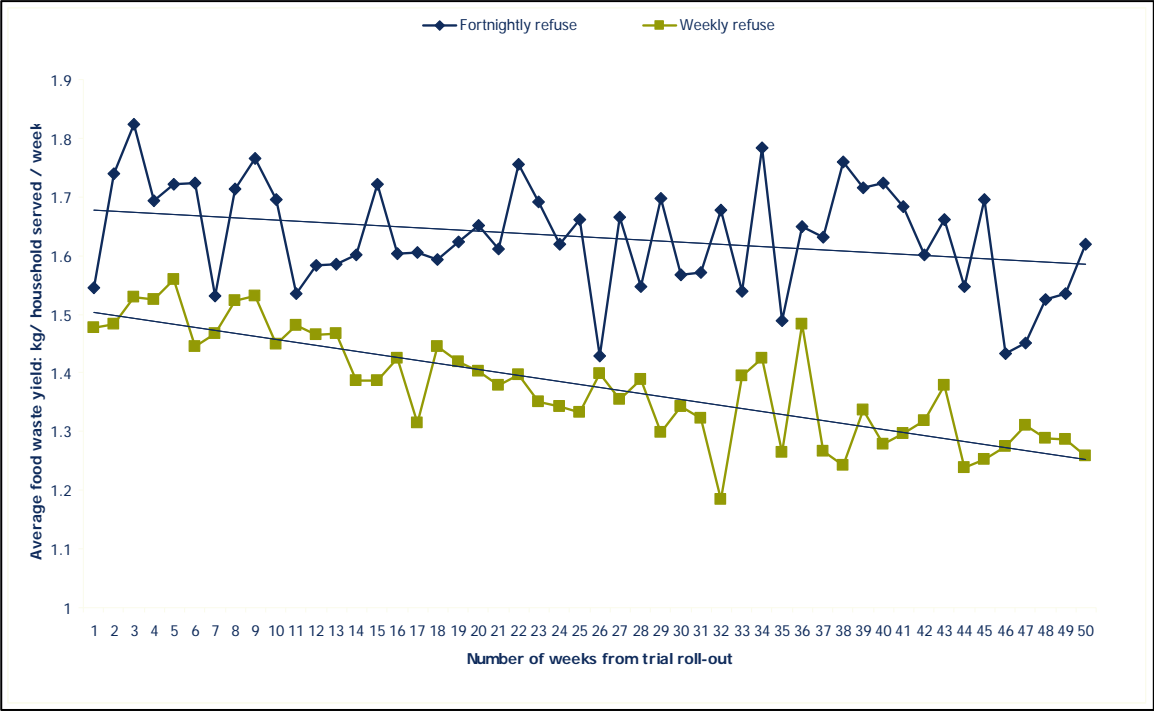
Figure 4a: Average food waste yields per household setting out per week for WRAP supported trials



Notes: (1) Data on set out rates were not available for Preston. The set out rate for Preston was estimated on the basis of the average difference between participation and set out rates for the other trial areas. This estimate was applied to arrive at an approximate yield per household setting out per week for Preston. (2) Two of Guildford's three trial rounds switched from weekly to fortnightly collections part of the way through the trial.

Another interesting and significant finding is that food waste yields for trials running alongside fortnightly collections have sometimes achieved higher yields during the second part of the trial period, whereas the reverse tended to be the case for trials with weekly refuse collections. Whilst this pattern does not apply to all the trials, it is again statistically significant. The general trend in food waste yields over a standard 50 week period for areas with, respectively, fortnightly and weekly refuse collections are illustrated in Figure 5.

Figure 5: Trends in food waste yields (per household served) achieved during the WRAP supported trials – comparison of trials with fortnightly and weekly refuse collections



Note: Mean food waste yields across 34 rounds with fortnightly refuse collections and 27 rounds with weekly refuse collections, standardised across 50 weeks from roll-out of each respective trial included in analysis.

In fact, the most affluent trial areas with fortnightly refuse collections showed stability or, in some cases, a marginal improvement in yields during the period of the trials, whereas those with weekly refuse collections generally experienced a steady decline in yields as the trials progressed. Figure 5 shows that yields from all trials appear to be declining, though the decline for trials running alongside weekly refuse collections is significantly steeper. The marginal decline in yields for trials running alongside fortnightly refuse collections may be due to “noise” in the data for an extended period of time, since (as mentioned above), many individual rounds running alongside fortnightly refuse collections experience stable – and, in a few cases, increasing – yields.

A major contributing factor for this effect is likely to be the preference of householders to use the additional capacity associated with weekly refuse collections, particularly weekly wheeled bin collections, to dispose of food waste in the refuse bin, in comparison to householders with fortnightly collections. Interestingly, however authorities with weekly black sack refuse collections found that refuse sacks in the trial areas were lighter and less prone to damage/splitting, presumably due to the diversion of food waste from the residual waste. Several of these authorities also provided anecdotal reports of residents being very keen on the food waste collection service on the basis that they had been provided with a solid container for food waste and as result the incidences of black sacks being damaged or splitting and resulting spillages had been reduced.

In order to examine whether or not socio-economic differences between fortnightly and weekly refuse rounds might explain the yield differences, statistical tests were carried out on average deprivation scores for, respectively, trials with fortnightly and weekly refuse collections (see Appendix 2). There are no statistically significant differences in deprivation scores between those served by weekly food waste collections with weekly refuse collections compared with those trials where food waste is collected weekly and refuse is collected fortnightly. This means that refuse collection frequency is a statistically significant factor in affecting the declining yields experienced by most trials with weekly refuse collections.

This overall finding has important implications for the planning of food waste collections. Authorities with weekly refuse collections will need to allocate additional resources to communications interventions in order to avoid declining yields and participation (i.e. declining diversion of food waste from refuse) over time; and these additional resources will need to be considered when assessing options for collecting food waste.

Key finding: Weekly food waste collections running alongside fortnightly refuse collections generally achieved fairly stable yields across the duration of the trials. By contrast, most weekly food waste trials running alongside weekly refuse collections experienced a decline in yields over the duration of the trials, suggesting higher levels of communications support will be required to maintain effectiveness.

4.1.2 Factors affecting food waste yields

Figure 6 shows the effects of each of these factors on the food waste yields achieved. Average food waste yields per household served per week are plotted against the average Index of Multiple Deprivation⁸ for each round. The rounds shown in Figure 6 are plotted separately according to how refuse was collected in each round:

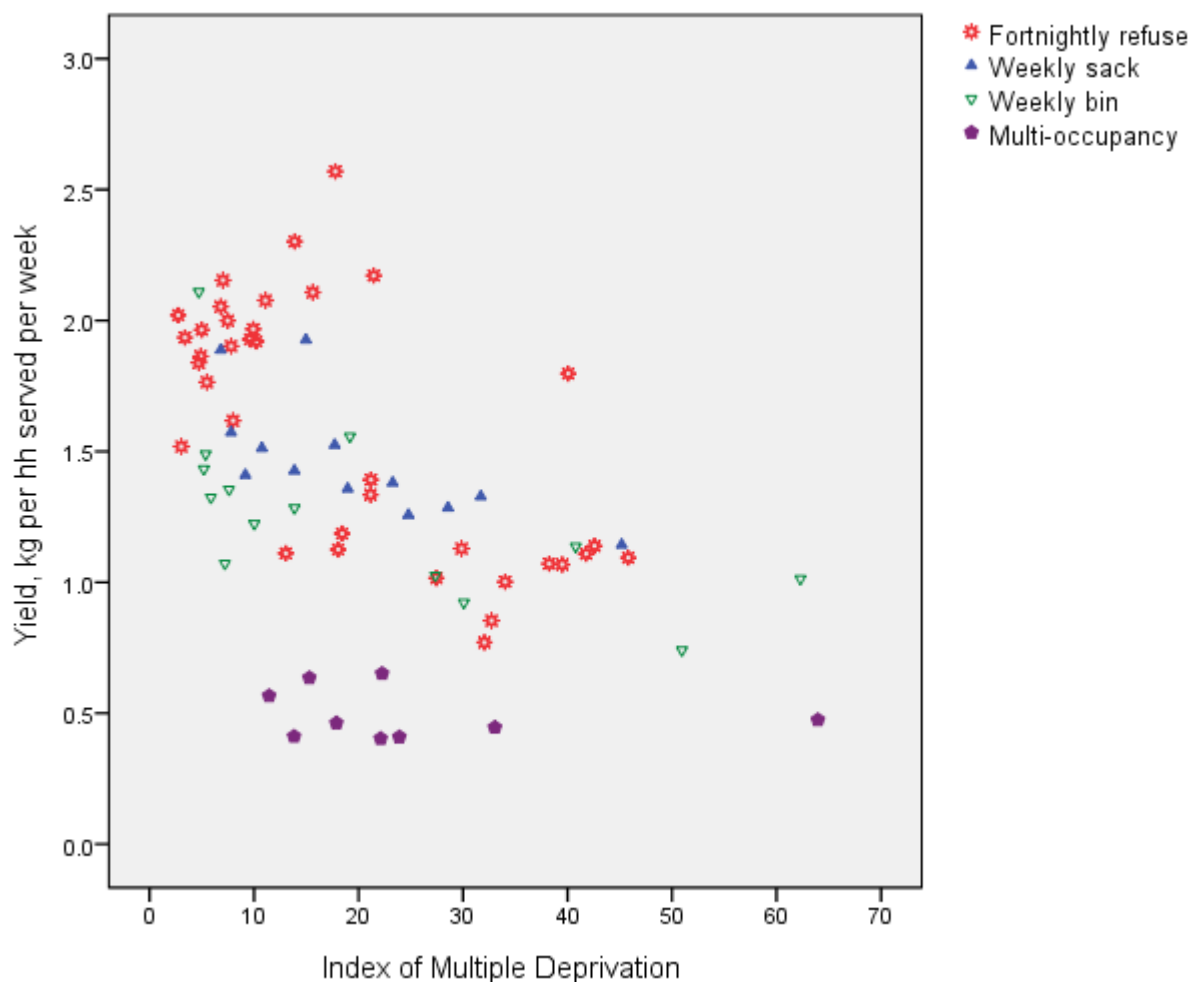
- fortnightly refuse;
- weekly refuse with wheeled bins; and
- weekly refuse with sacks.

Collections from multi-occupancy properties are illustrated separately since these trials generally collected considerably less food waste per household served in comparison with the kerbside collections.

Figure 6 shows that the food waste yields achieved by the trial collections were affected by both levels of deprivation and the frequency of refuse collection.

⁸ See section 2 for an explanation of these indices.

Figure 6: Weekly food waste yields per household served plotted against levels of deprivation for trial rounds



Note: data from 72 rounds.

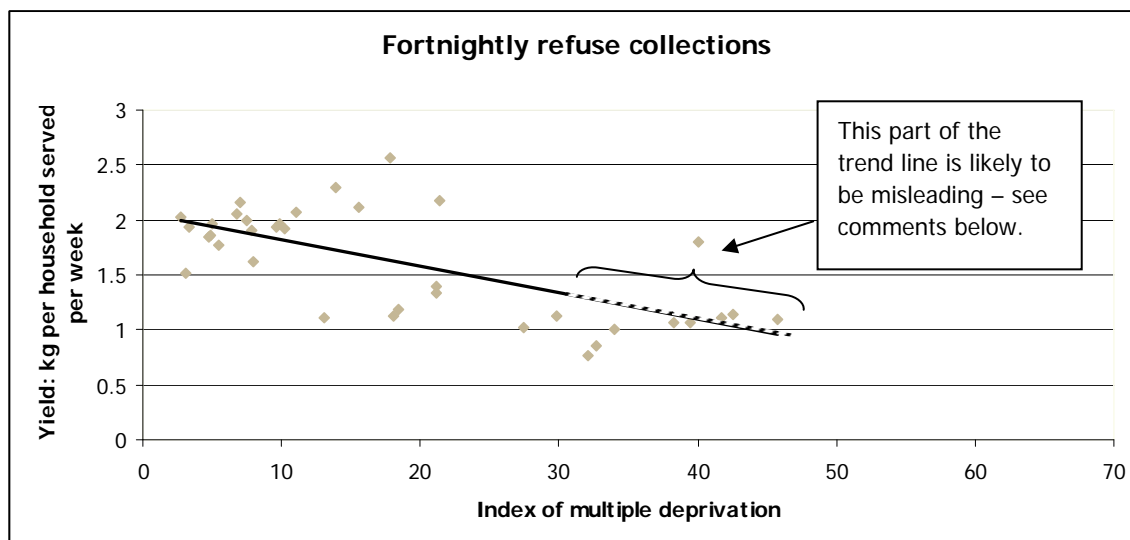
The relationship between deprivation score and food waste yield is clearer when the results for the trial rounds for different refuse collections are illustrated separately:

- fortnightly refuse, Figure 7;
- weekly refuse with sacks, Figure 8; and
- weekly refuse with wheeled bins, Figure 9.

Moreover Figure 10 plots yield per household served per week against deprivation score for collection rounds serving multi-occupancy properties.

These charts show there is a reasonably good correlation between deprivation levels and food waste yields per household per week, so long as refuse collection frequency is also taken into account. The food waste yields shown in these charts are average kilogrammes per household served for individual food waste collection rounds. The trend lines in these charts are used as the basis for a simple predictive model presented in Section 4.1.3.

Figure 7: Food waste trial rounds with fortnightly refuse collections – average weekly food waste yields plotted against deprivation levels



Note: the trend line in this chart indicates that for higher levels of deprivation, food waste collections running alongside fortnightly refuse collections would achieve lower food waste yields in comparison to collections running alongside weekly refuse collections. This is highly unlikely to be the case and is due to assuming a simple linear relationship between food waste yields and deprivation. In reality we would expect a levelling off in the trend line. The part of the trend line in Figure 7 which is likely to be misleading - corresponding to higher levels of deprivation - is marked with a dotted line. Average food waste yields for areas with higher levels of deprivation are likely to be higher than those indicated by the dotted part of the trend line.

Figure 8: Food waste trial rounds with weekly refuse collections using sacks – average weekly food waste yields plotted against deprivation levels

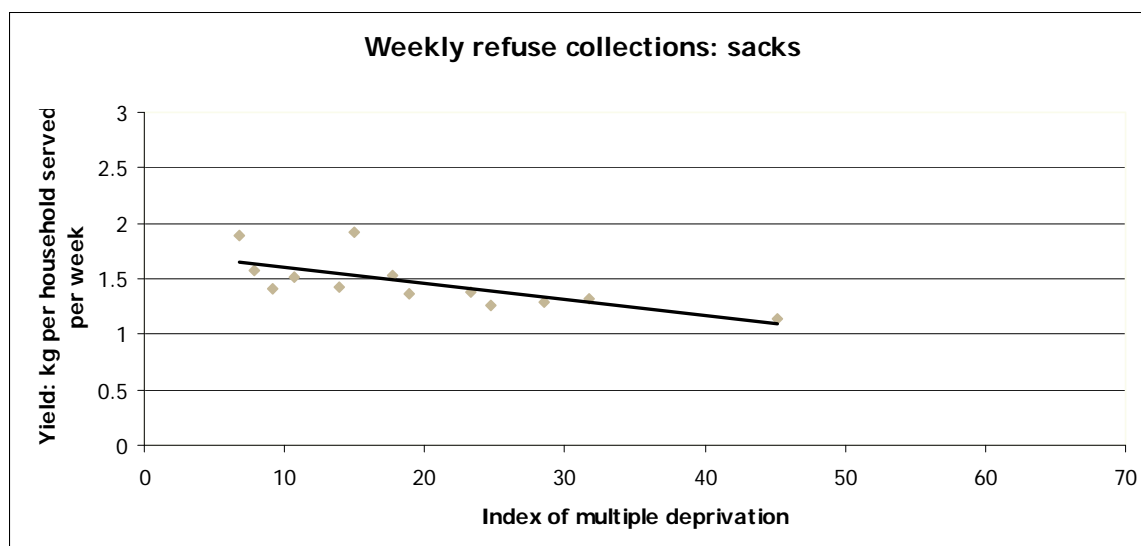


Figure 9: Food waste trial rounds with weekly refuse collections using wheeled bins – average weekly food waste yields plotted against deprivation levels

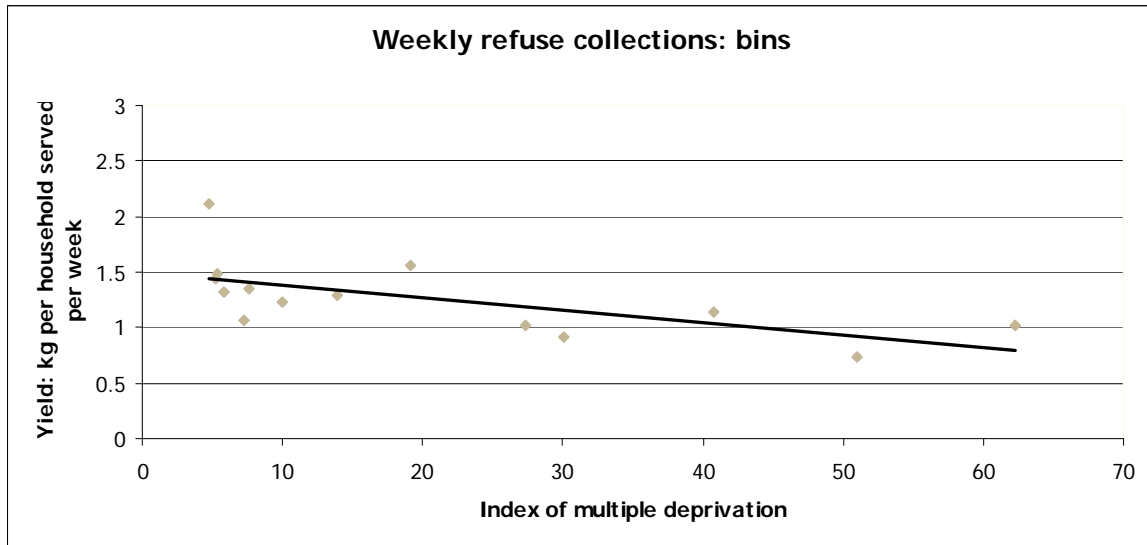
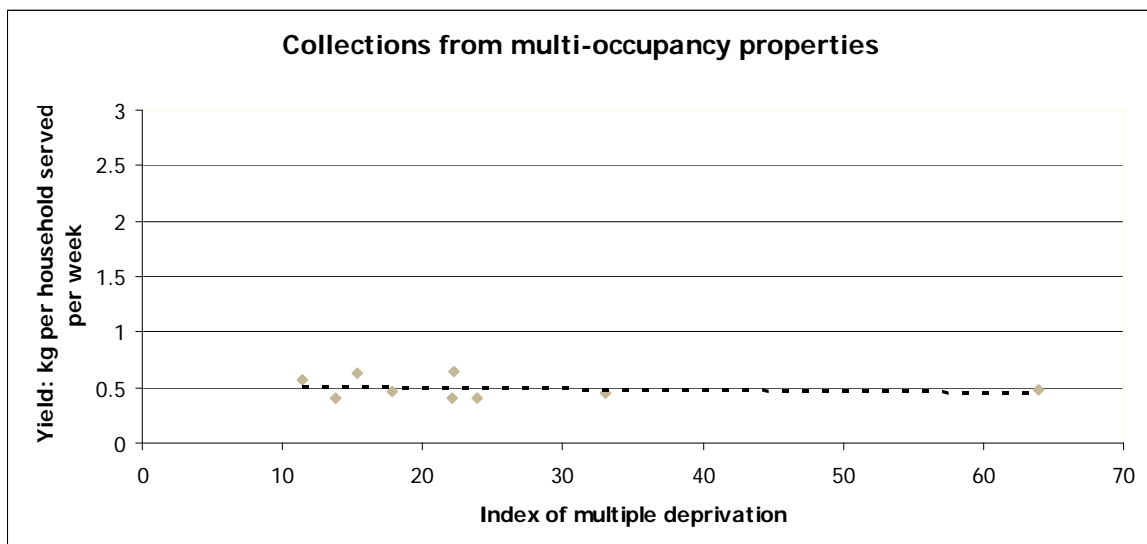


Figure 10: Trials collecting from multi-occupancy properties – average weekly food waste yields plotted against deprivation levels



Note: trend line shown for illustrative purposes only – see comments below.

Key finding: the food waste yields achieved by WRAP supported trials were found to be strongly affected by three factors:

- (1) refuse collection frequency, with weekly food waste collections running alongside fortnightly refuse collections generally achieving relatively higher yields in comparison to trials running alongside weekly refuse collections;
- (2) for trials with weekly refuse collections, those trials where refuse is collected in sacks achieved higher yields than trials where refuse is collected in wheeled bins; and
- (3) level of deprivation, with trials in more affluent areas achieving higher yields in comparison to trials in less affluent areas.

A similar analysis (Figure 10) for the limited number of trials serving multi-occupancy properties did not show a strong correlation between deprivation and food waste yields. Therefore the trend line in Figure 10 is marked with a dotted line. However the yields achieved per round appear to be reasonably consistent - regardless of deprivation levels - at around 0.5 kg (plus or minus about 0.1 kg) per household served per week.

Degree of correlation between levels of deprivation and food waste yields

The degree to which the trend lines in the charts above correlate with the actual data obtained from the trials can be assessed by calculating the correlation coefficient, often denoted as R^2 . In this context the correlation coefficient is a measure of the degree to which the trend line corresponds to the actual data plotted. In crude terms a coefficient of 0.45 suggests that the trend line accounts for 45% of the variability in food waste yields.

Figure 7, trial rounds with fortnightly refuse collections, $R^2 = 0.45$

Figure 8, trial rounds with weekly refuse collections using sacks, $R^2 = 0.49$

Figure 9, trial rounds with weekly refuse collections using bins, $R^2 = 0.41$

Figure 10, trial rounds collecting from multi-occupancy properties, $R^2 = 0.04$

Although a clear relationship is shown between food waste yields and deprivation in Figures 7, 8 and 9, the actual data is fairly well scattered either side of the trend lines. This is because many other factors will have influenced the food waste yields achieved by the trials, which we have not been able to account for, such as:

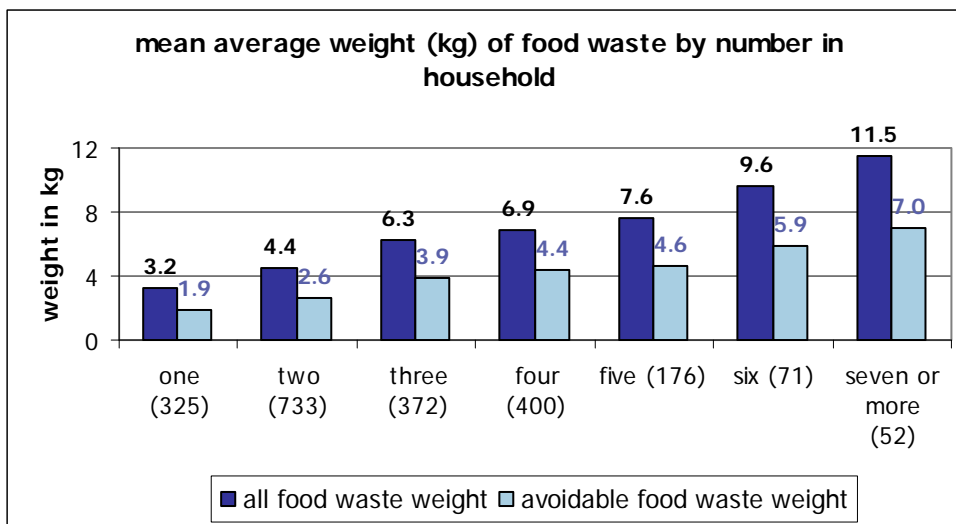
- Household size (average number of persons per household).
- Lifestyle and cultural factors affecting food purchasing, preparation and consumption habits. Suitable data on these factors was not available for these trials.
- Communications strategy – although the trials used similar publicity materials, designed by WRAP, they employed different approaches to communicating with their residents, as described in section 5.7 and the case study on communications, www.wrap.org.uk/fwct. It is difficult to attribute the effects of different approaches to communication to differing food waste yields achieved by the various trials.

In terms of household size, WRAP's *The Food We Waste* project found that households with more people produce greater amounts of food waste, as illustrated in Figure 11 below. Curiously there was little evidence from the WRAP supported trials to show that trial areas with larger average household sizes produced more food waste (see Appendix 2). However this may be because the data on household size available for the food waste collection trials was not sufficiently detailed for any effects on food waste yields to be detected. Additionally, it is possible that the effects of household size were detected after all, but via another factor which was found to significantly affect food waste yields, namely deprivation; the effects of deprivation on yields are discussed below. See Appendix 2 for further discussion of the effects of household sizes on food waste yields.

Key finding: although the food waste yields achieved by the WRAP supported trials were found to be strongly affected by levels of deprivation and type of refuse collection, it is likely that other factors will also be influencing food waste yields. Although these have not been investigated as part of this research, they may include:

- household size (although little evidence for this was found in the evaluation of the trials other major projects have established that this *is* an important factor);
- food purchasing, preparation and consumption habits; and
- amount and quality of communications – local authorities carrying out communications interventions can expect to achieve increased food waste yields.

Figure 11: The weight (kg per household per week) of food waste produced by household size (from WRAP's The Food We Waste Report)



Source: WRAP, *The Food We Waste*, 2008, p70. Note: 'avoidable' food waste is food that could have been eaten had it been planned and managed better; it excludes unavoidable waste such as bones, cores, peelings and stones.

4.1.3 Ready reckoner for predicting food waste yields

The yields achieved through the WRAP food waste trials have been shown to correlate to some degree with the frequency and method of refuse collection and level of deprivation. The data analysis presented in Section 4.1.2 has been used to produce a ready reckoner to enable rough predictions of food waste yields in different areas to be made, this is provided in the box below. It is important to note that these predictions apply to the type of food waste collection service piloted in the WRAP supported trials, i.e. separate weekly collections of food waste where householders are provided with kerbside containers, kitchen caddies and liners. To use this model it is necessary to know the Index of Multiple Deprivation (IMD) of the area for which food waste yields are to be predicted (see Section 2.0 for a description of IMDs).

Clearly this ready reckoner is simplistic and does not account for other factors likely to affect food waste yields, such as communications strategies or food consumption patterns. As a result, the ready reckoner provides a likely range for food waste yields. Local authorities however are able to control the quality and extent of communications and it should be noted that well designed communications are likely to help in achieving the upper ranges of predicted food waste yields.

Due to the limited number of trial rounds serving multi-occupancy properties, a correlation between deprivation and food waste yields was not found, so we can only offer one set of predictions for these areas. It may well be that case that other strategies for collecting food waste door-to-door in multi-occupancy properties, which go beyond the methods employed during the current trials, might be able to achieve higher yields.

Ready reckoner for separate weekly collections of food waste

The following ready reckoner is derived from Figures 7, 8 and 9 above. The formulae are based on the trend lines shown in these figures. The ranges are based on the degree to which actual data are scattered either side of the trend lines.

Indices of Multiple Deprivation

The ready reckoner uses Indices of Multiple Deprivation – see section 2.2 for a brief description. These indices can be downloaded from:

<http://www.communities.gov.uk/communities/neighbourhoodrenewal/deprivation/deprivation07/>

Ensure that you use the “Average score” for the area that you are using for the ready reckoner. If you are applying the ready reckoner to a whole local authority, use the “Average score” for the relevant local authority.

Areas with fortnightly refuse collections

Predicted yield *per household served per week* = either 1.25 kg or $(\text{IMD} \times -0.024) + 2.05$ kg, whichever is higher, plus or minus 0.30 kg

For example, if the relevant area has an IMD (Index of Multiple Deprivation) of 23, the predicted food waste yield would be estimated as: $(23 \times -0.0240) + 2.05 = 1.50$ plus or minus 0.30 kg per household served per week, i.e. between 1.20 and 1.80 kg/hh/wk. If the relevant area has an IMD of 40, the predicted food waste yield would be 1.25 kg/hh/wk⁹ plus or minus 0.30 kg/hh/wk.

Areas with weekly refuse collections using sacks

Predicted yield *per household served per week* = $(\text{IMD} \times -0.015) + 1.75$ kg, plus or minus 0.25 kg

For example, if the relevant area has an IMD (Index of Multiple Deprivation) of 23, the predicted food waste yield would be estimated as: $(23 \times -0.015) + 1.75 = 1.41$ plus or minus 0.25 kg per household served per week, i.e. between 1.16 and 1.66 kg/hh/wk.

Areas with weekly refuse collections using bins

Predicted yield *per household served per week* = $(\text{IMD} \times -0.011) + 1.50$ kg, plus or minus 0.25 kg

For example, if the relevant area has an IMD (Index of Multiple Deprivation) of 23, the predicted food waste yield would be estimated as: $(23 \times -0.011) + 1.50 = 1.25$ plus or minus 0.25 kg per household served per week, i.e. between 1.00 and 1.50 kg/hh/wk.

Predicted food waste yields for areas with multi-occupancy properties

Predicted yield *per household served per week* = 0.5 kg plus or minus 0.1 kg.

The above model suggests that an authority with the average level of deprivation for England (IMD = 23) would be predicted to achieve approximately 20% greater yields of food waste if it has fortnightly refuse collections, in comparison to the yields that would be predicted if the authority operates a weekly refuse collection service with wheeled bins. However it must be borne in mind that numerous other factors, including other socio-demographic factors and communications strategies, will affect food waste yields.

Key finding: the WRAP trials suggest that, for areas of similar levels of deprivation, separate weekly food waste collections running alongside fortnightly refuse collections are likely to achieve 20% higher yields (per household served) in comparison to weekly food waste collections running alongside weekly wheeled bin refuse collections. This again suggests the need for additional communications in areas where separate food waste collections are provided alongside weekly refuse collections.

⁹ For an IMD of 40, predicted yield = $(40 \times -0.024) + 2.05 = 1.09$ kg/hh/wk, which is less than 1.25 kg/hh/wk. Therefore the higher figure of 1.25 kg/hh/wk applies.

4.1.4 Hackney 'bring' scheme

A 'bring' scheme was trialled in Hackney as part of the WRAP supported trials. Summary details of the scheme are shown in the box below.

Hackney 'bring' scheme for collecting food waste

The trial scheme was launched in October 2007. The objective was to examine the performance and use of bring sites for food waste given the high relative costs of providing a door to door collection service for flats. Food waste bring containers were located near to the entrance of several estates and high-rise properties, alongside dry recycling bring containers.

100 food waste containers served 4,600 households in total. The average level of deprivation for the households served was relatively high with an average Index of Multiple Deprivation of 46.6 compared to an average for England of approximately 23 (see section 2.2 for a brief description of these indices).

Householders were provided with 7 litre caddies and liners. The containers were serviced three times per week using a small non-compacting vehicle.

In total 101.8 tonnes of food waste was collected over 70 weeks. The average yield per household served was 0.32 kg per week. This is somewhat lower than the yields attained via door-to-door collections in the two other multi-occupancy collection trials carried out in Newtownabbey and Kingston-upon-Thames.

Image 4: Servicing a food waste 'bring' container in Hackney



4.1.5 Performance of district wide collections

At the time of writing, three of the local authorities that participated in the food waste collection trials have rolled out separate food waste collections district wide. Data on collection tonnages and numbers of households served was collected, in order to calculate yields from these district wide collections, summarised in Table 7a.

Table 7a: Food waste yields for trials which rolled out collections district wide

Local authority	No. weeks valid tonnage data	Food waste yield, kg/hh served/week
Kingston-upon-Thames	14	1.82
Mid Bedfordshire	37	1.89
Oldham	44	1.25

The yields per household served achieved for these district wide collections are similar to those experienced during the collection trials. The actual yields (Table 7a above) are compared with those predicted by applying the ready reckoner (given in Section 4.1.3) in Table 7b below. As the ready reckoner takes account of the Index of Multiple Deprivation and the refuse collection frequency in each district, these details are included in Table 7b.

Table 7b: Comparison of actual and predicted yields for trials which rolled out collections district wide

Local authority	Index of Multiple Deprivation	Refuse collection frequency	Predicted yield (kg / hh served /wk)	Actual yield (kg / hh served /wk)
Kingston-upon-Thames	13.1	Fortnightly	1.74	1.82
Mid Bedfordshire	7.2	Fortnightly	1.88	1.89
Oldham	30.8	Fortnightly	1.31	1.25

The fact that these district wide collections are producing food waste yields close to those predicted by the ready reckoner lends considerable credibility to the findings of the collection trials. In particular, this indicates that the results from the trials can be replicated on a district-wide basis and can be used for planning purposes.

4.2 Participation rates achieved by the WRAP supported trials

The participation of householders was monitored in all kerbside trial areas. Several trials were monitored a number of times during the course of the trials. Participation rates¹⁰ for each of the monitored trial areas are shown in Figure 12 below.

Ten of the 20 trials for which there was data achieved participation rates of 70% or more initially. For those schemes monitored more than once it was often found that a drop-off in participation had occurred. This drop-off was most pronounced in the case of Guildford¹¹ but in many areas drop-off was no greater than would be expected for a newly introduced scheme. In some cases participation was found to have increased after initially dropping off (Mid Bedfordshire, Elmbridge and Calderdale).

The multi-occupancy trials in Kingston-upon-Thames and Newtownabbey achieved lower participation rates in comparison to the other schemes. This may be due to several factors:

- logistical problems in engaging with residents in flats;
- transient segments of the population which can be particularly difficult to engage with; and
- lifestyles of some residents, with reliance on ready meals rather than home prepared meals.

As with the analyses of yields (section 4.1), the results in Figure 12 have been grouped according to refuse collection frequency. Trials running alongside fortnightly refuse collections generally achieved slightly higher participation (average of 63%) in comparison to trials running alongside weekly refuse collections (average of 61%).

Key findings from participation rate monitoring carried out for the WRAP supported trials:

- ten of the 20 trials monitored achieved participation rates of over 70% during the first phase of monitoring;
- most of the trials that were monitored over more than one phase experienced decreasing participation over the course of the trials;
- trials collecting from multi-occupancy properties achieved lower participation rates in comparison to other trials; and
- trials running alongside fortnightly refuse collections generally achieved higher participation rates in comparison to trials running alongside weekly refuse collections.

Average participation rates across all phases of monitoring are summarised in Table 8.

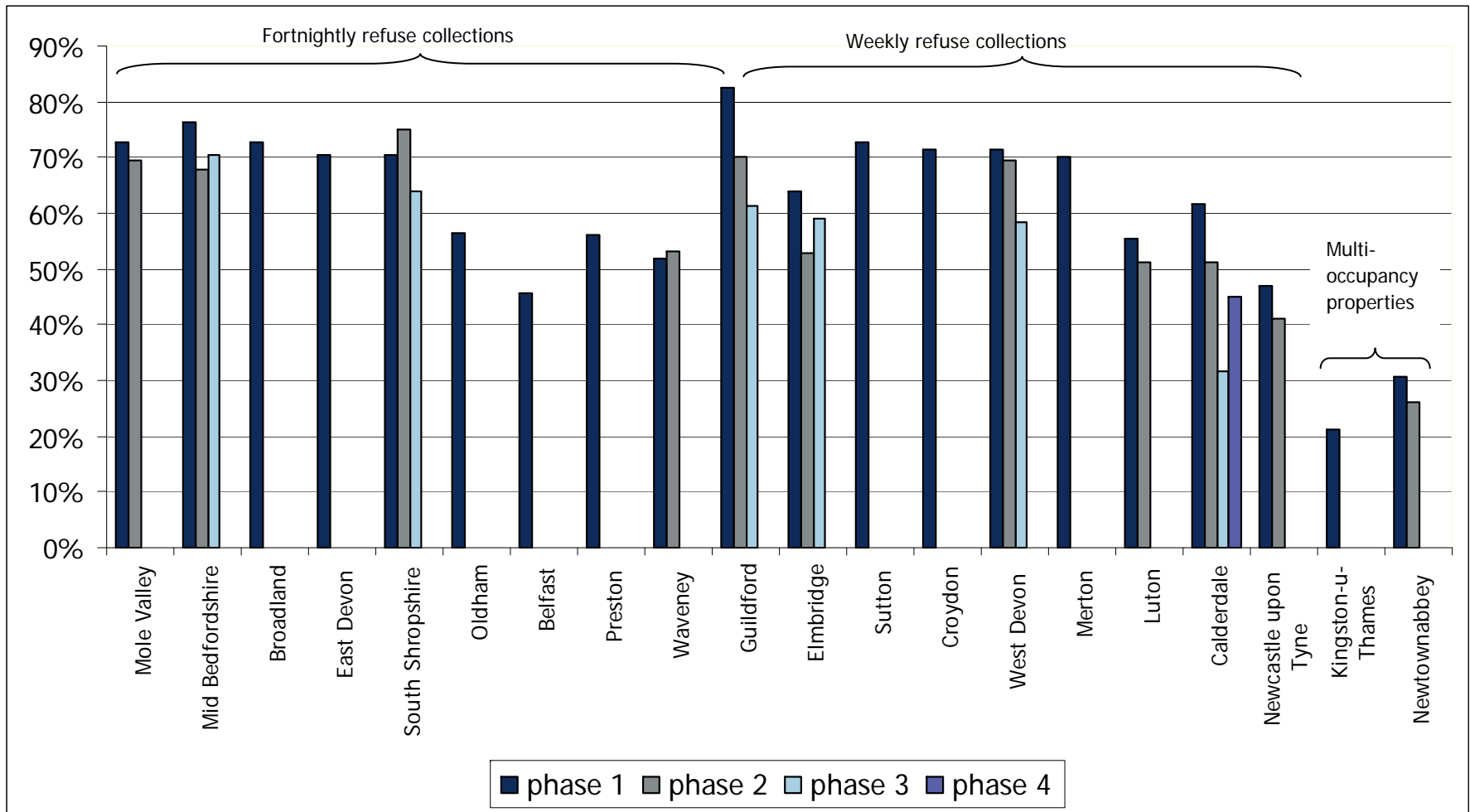
Table 8: Average participation rates for the WRAP trials

Trial area	Participation rate	Trial area	Participation rate
Belfast	45.60%	Mid Bedfordshire	71.48%
Broadland	72.74%	Mole Valley	71.13%
Calderdale	47.39%	Newcastle upon Tyne	43.95%
Croydon	71.45%	Newtownabbey	28.30%
East Devon	70.50%	Oldham	56.40%
Elmbridge	58.60%	Preston	55.99%
Guildford	71.28%	South Shropshire	69.81%
Kingston-u-Thames	21.30%	Sutton	72.79%
Luton	53.32%	Waveney	52.63%
Merton	70.17%	West Devon	66.44%

¹⁰ A brief description of how participation rates are determined is provided in Section 3.0, Table 5.

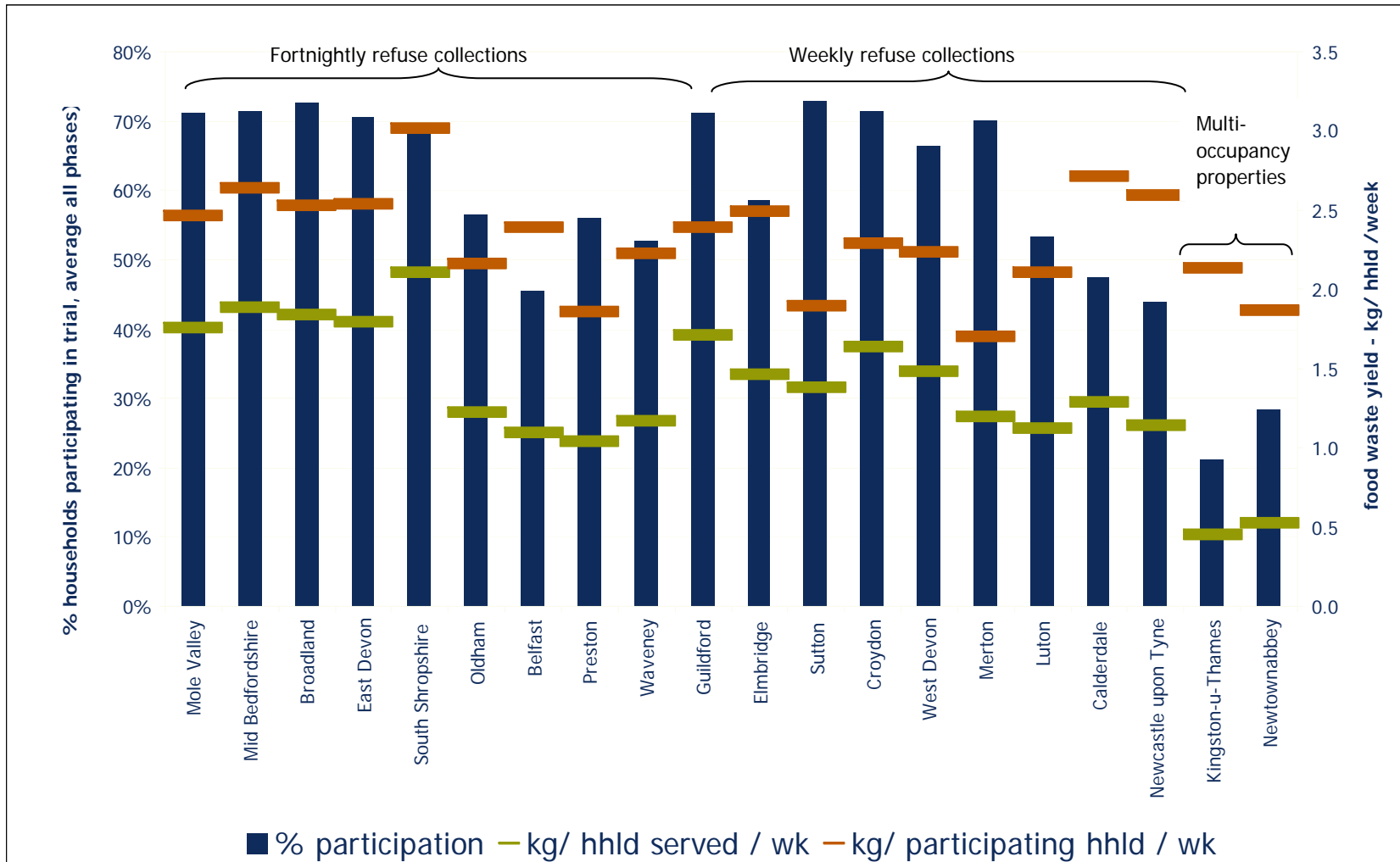
¹¹ Because participation in Guildford appeared to drop off so much, an additional phase of monitoring was carried out to ensure that the results were not simply anomalous or a mistake. This supported the second phase of monitoring and showed a fall-off in participation. It is possible that the first phase of monitoring over-estimated participation, hence the apparent drop-off may not be as pronounced as it appears.

Figure 12: Participation rates for the WRAP food waste trials



Note: Guildford had three trial rounds, all initially running alongside weekly refuse collections. However part of the way through the trials refuse collections for two of the rounds switched to fortnightly collections.

Figure 13: Relationship between participation rates and scheme yields



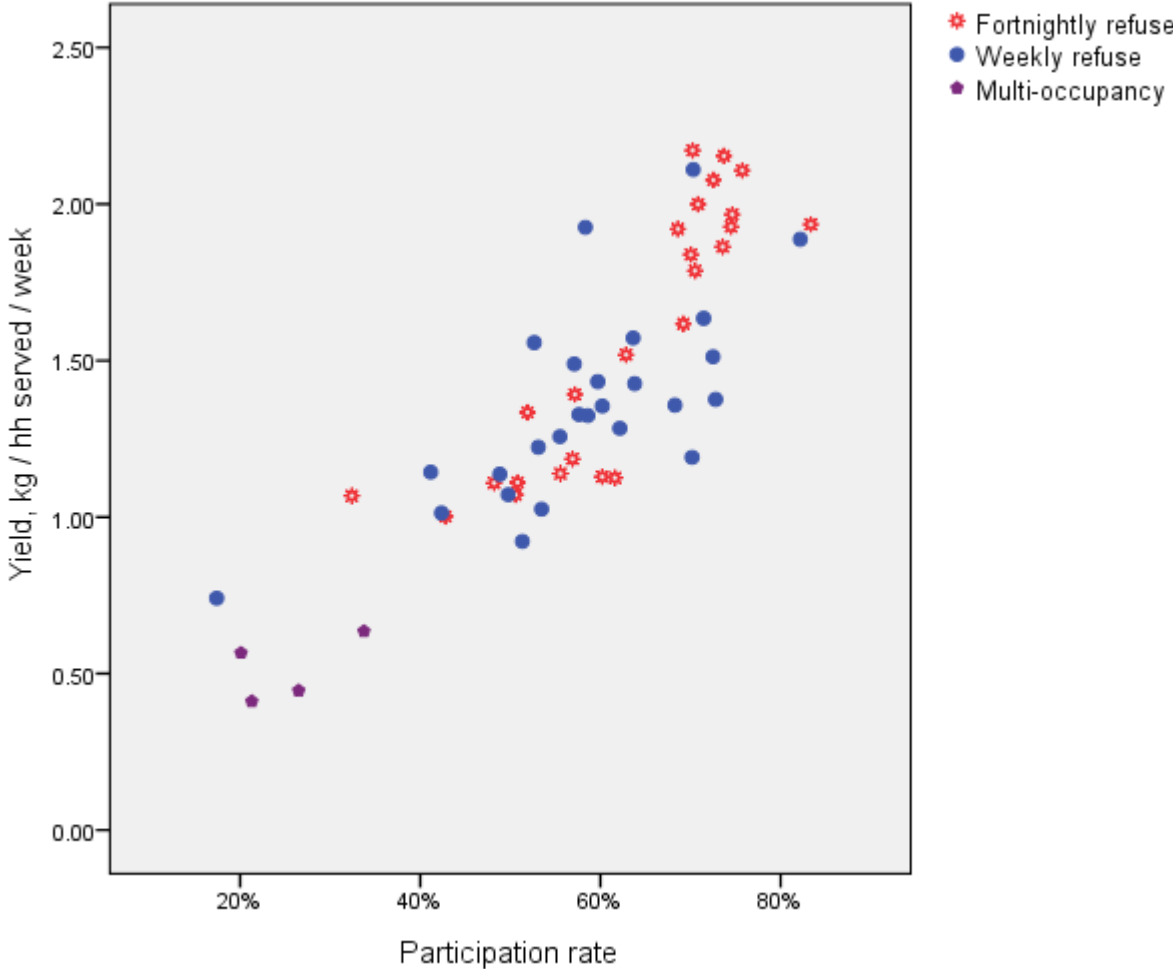
Notes: (1) Where participation rates were monitored over more than one phase, the average across all phases is shown here. (2) Some rounds in Guildford were running alongside fortnightly refuse collections for part of the trial duration.

As might be expected, higher participation rates are associated with higher yields, as demonstrated in Figure 13 above, where participation rates (blue bars) in each of the kerbside trials are plotted alongside average yields per household served per week (green wedges) and average yields per participating household per week (brown wedges).

The majority of trial areas with fortnightly refuse collections achieved high participation rates of 70% or more, along with the highest yields of all the trials. Although many of the trials with weekly refuse collections achieved similar participation rates, yields were lower. Additionally a disproportionate number of the trials achieving lower participation rates and yields were running alongside weekly collections.

This finding is further illustrated in Figure 14, which plots participation rate against yield (kg per household served per week) at a round level. This demonstrates how fortnightly refuse collections and higher participation appear to work together to produce generally higher yields of food waste in those schemes. Although some of the trial rounds with weekly refuse collections produced comparable yield to rounds with fortnightly collections, a disproportionate number of rounds with lower yields were found where refuse was collected weekly.

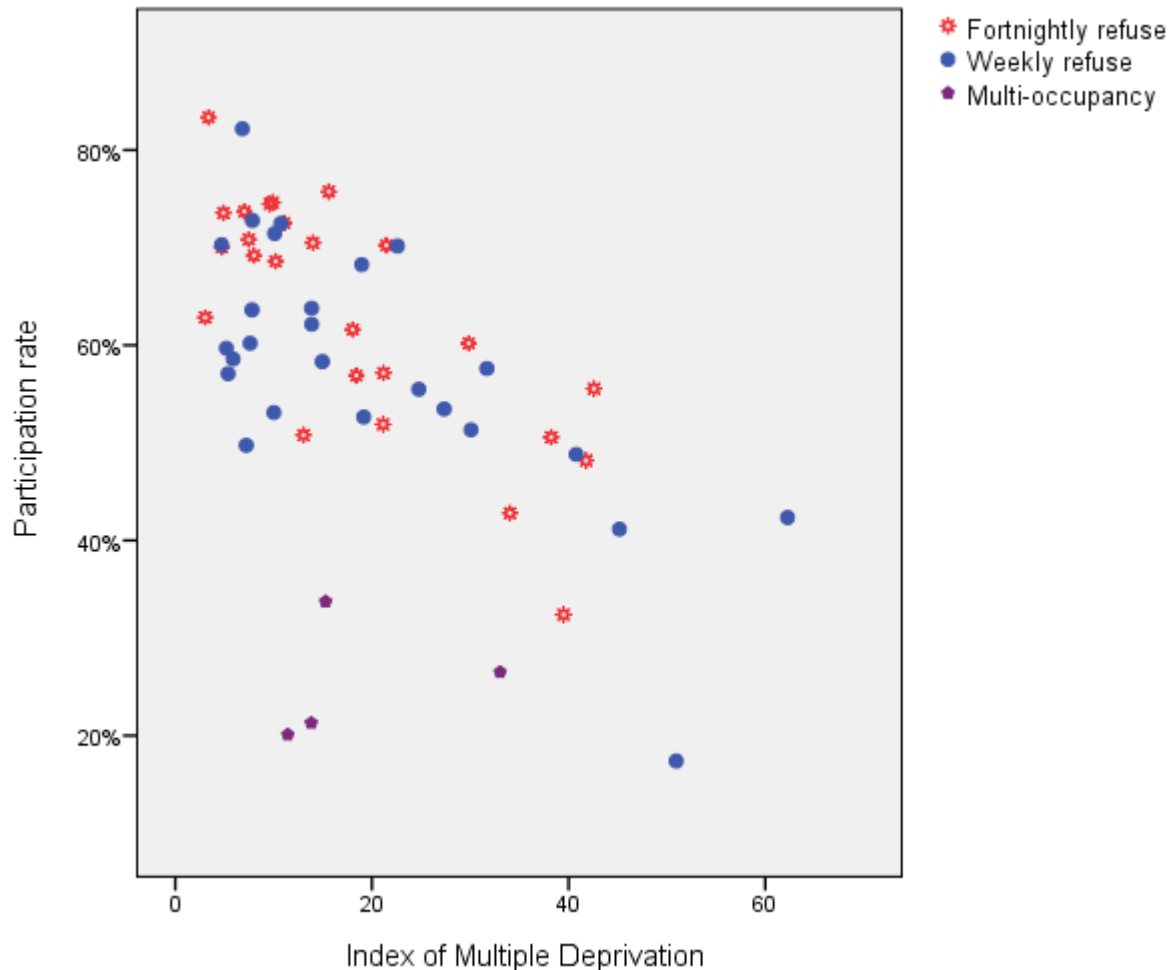
Figure 14: Participation rate plotted against yields per household served for trial rounds



Key finding: fortnightly refuse collection and higher participation appear to work together to produce higher yields of food waste in comparison to those trials with weekly refuse collections. Although some of the trial rounds with weekly refuse collections produced comparable yields to rounds with fortnightly refuse collections, a disproportionate number of the lower yields were found on trials with weekly refuse collections.

A strong correlation was found between levels of deprivation and participation rates achieved in the trial rounds, as illustrated in Figure 14a, with less deprived trial areas achieving higher participation rates. Trials running alongside fortnightly refuse collections generally achieved slightly higher participation rates than trials in areas with similar levels of deprivation running alongside weekly refuse collections.

Figure 14a: Participation rate plotted against Indices of Multiple Deprivation for trial rounds



Ready reckoner for predicting participation rates for separate weekly food waste collections

The following ready reckoner is derived from Figure 14a above. The ready reckoner uses Indices of Multiple Deprivation (IMD) – see section 2.2 for a brief description. These indices can be downloaded from: <http://www.communities.gov.uk/communities/neighbourhoodrenewal/deprivation/deprivation07/>

Ensure that you use the “Average score” for the area that you are using for the ready reckoner. If you are applying the ready reckoner to a whole local authority, use the “Average score” for the relevant local authority.

No distinction is made between food waste collections with fortnightly or weekly refuse collections for this ready reckoner, since there is still a good correlation between participation rates and levels of deprivation, even when refuse collection frequency is not taken in to account ($R^2 = 0.54$).

Approximate predicted participation rate = (IMD x -0.007) + 0.73

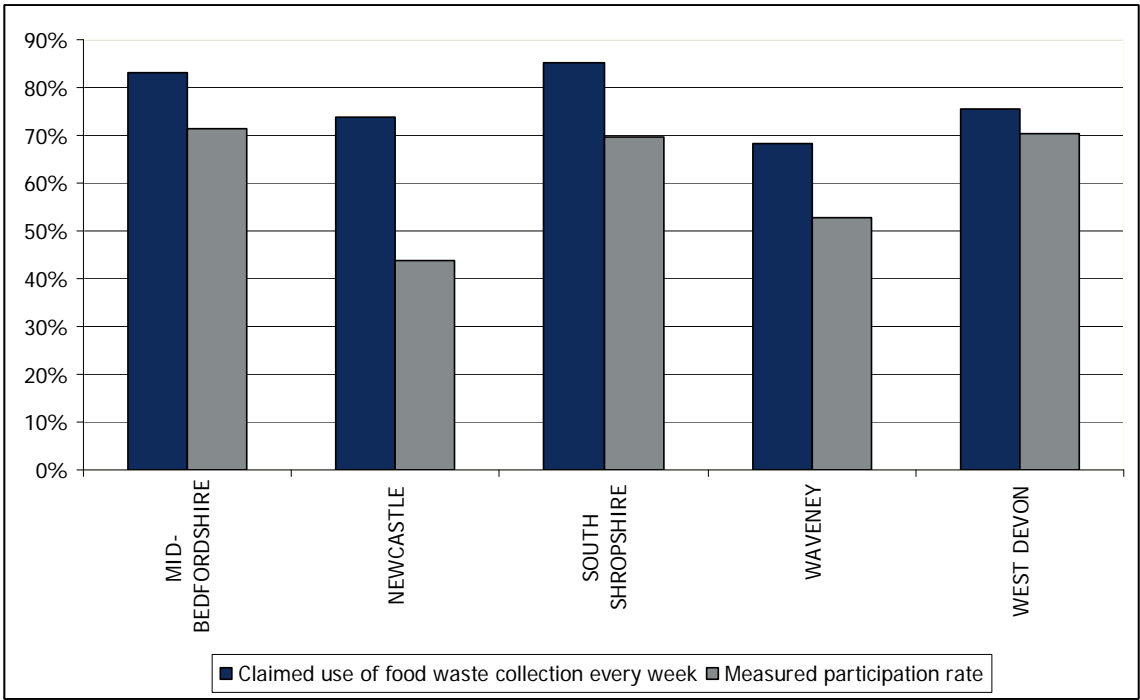
For example, if the average Index of Multiple Deprivation in the area in question is 23, the participation rate is predicted to be approximately $(23 \times -0.007) + 0.73 = 0.57$, ie 57%.

Participation rates for collections from multi-occupancy properties were found to be much lower, with no discernable correlation between levels of deprivation and participation rates achieved. The average participation rate achieved across all trial rounds collecting from multi-occupancy properties was 25%.

Participation rates were also analysed by ACORN categories⁵. However, for the purpose of comparing the performance of the trials, no conclusive links were found between ACORN categories and the participation rates achieved.

An attitudinal survey was carried out in five of the trial areas, this included asking interviewees how often they use the food waste collection service. A high proportion of respondents stated that they set out food waste for separate collection every week (represented by the dark blue bars in Figure 15), in fact consistently higher than the actual participation rates recorded in the respective trial areas (shown by the light blue bars). This reflects the commonly found behavioural characteristic whereby reported participation in recycling activity is less than actual participation.

Figure 15: Comparison of stated and actual participation in five trial areas



4.2.1 Set out rates achieved by the WRAP supported trials

The average set out rate for each of the trials is given in Table 8a. It is important to distinguish clearly between participating households and households setting out:

- participating households are those that set out food waste at least once during a consecutive period of three weeks;
- households setting out are those that set out food waste for collection on a particular week.

For the purposes of this analysis, the number of households setting out food waste has been calculated as the average of the number of households setting out food waste in a particular week across three weeks. The period of three weeks relates to the period over which the relevant trial rounds were monitored, in order to ascertain participation rates.

Table 8a: Average set out rates for the WRAP trials

Trial area	Set out rate	Trial area	Set out rate
Belfast	30.16%	Mid Bedfordshire	59.24%
Broadland	57.13%	Mole Valley	53.99%
Calderdale	35.91%	Newcastle upon Tyne	36.59%
Croydon	48.47%	Newtownabbey	21.02%
East Devon	54.30%	Oldham	38.55%
Elmbridge	41.01%	Preston	no data
Guildford	53.14%	South Shropshire	51.32%
Kingston-u-Thames	17.60%	Sutton	54.37%
Luton	36.55%	Waveney	37.38%
Merton	49.17%	West Devon	51.23%

Average participation and set out rates for each trial area are compared in Figure 15a below. Average set out rates were between 4 and 23 percentage points lower than average participation rates.

Key finding: Set out rates for food waste containers were lower than participation rates by an average of 15 percentage points. For example, if the participation rate in a particular area was found to be 70%, we might expect the set out rate to be 70% *minus* 15% = 55%. However the difference between set out and participation rates ranged from 4 to 23 percentage points across the trial areas.

A strong correlation was found between levels of deprivation and set out rates achieved in the trial rounds, as illustrated in Figure 15b below, with less deprived trial areas achieving higher set out rates. Trials in areas with fortnightly refuse collections generally achieved slightly higher set out rates than trials in areas with similar levels of deprivation but with weekly refuse collections. However the difference in performance for trials running alongside fortnightly and weekly refuse collections is less pronounced for set out rates, in comparison to yields per household served (Section 4.1) and participation rates (Section 4.2).

Figure 15a: Comparison of average participation rates and set out rates for the WRAP supported food waste trials

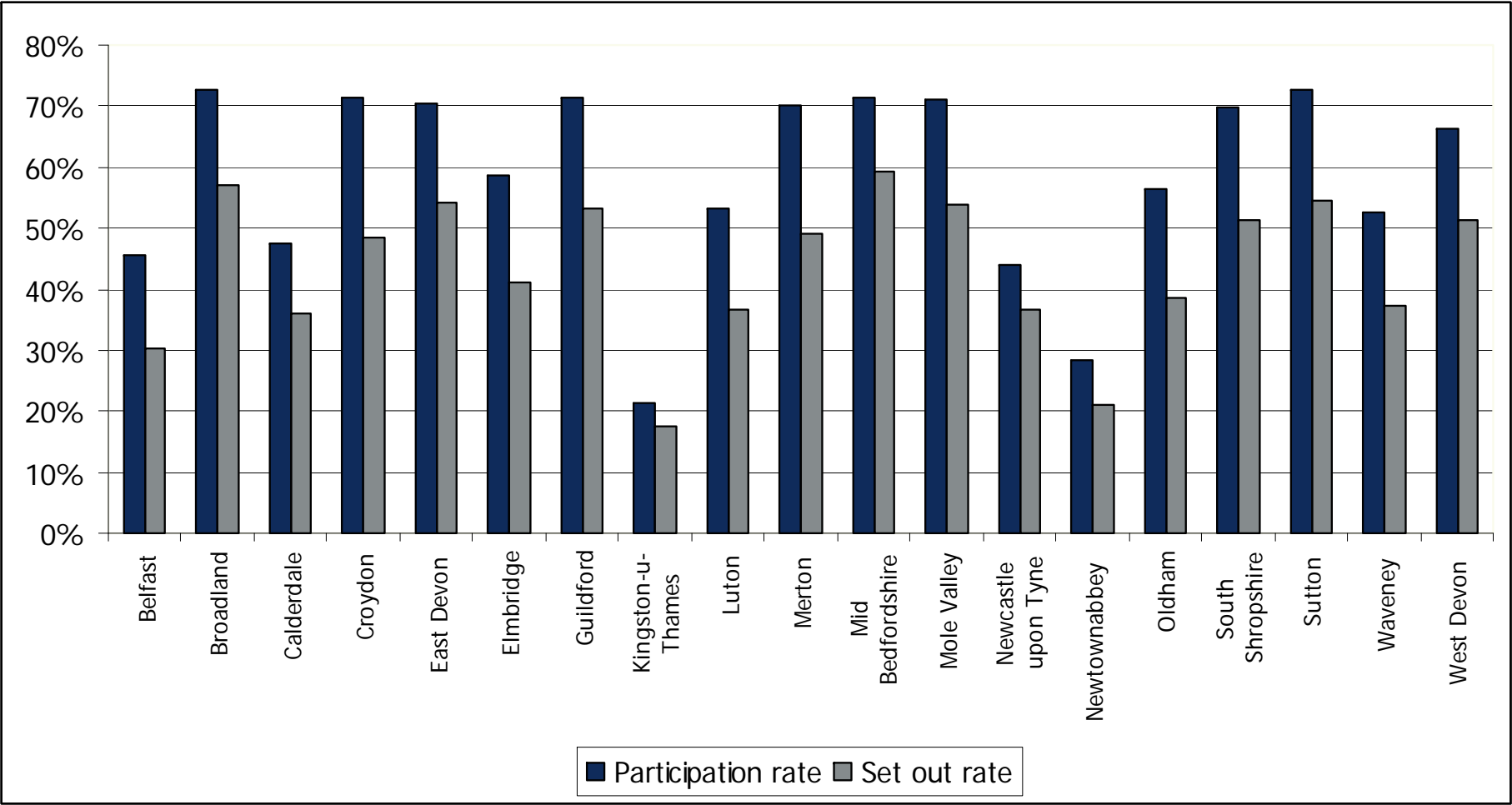
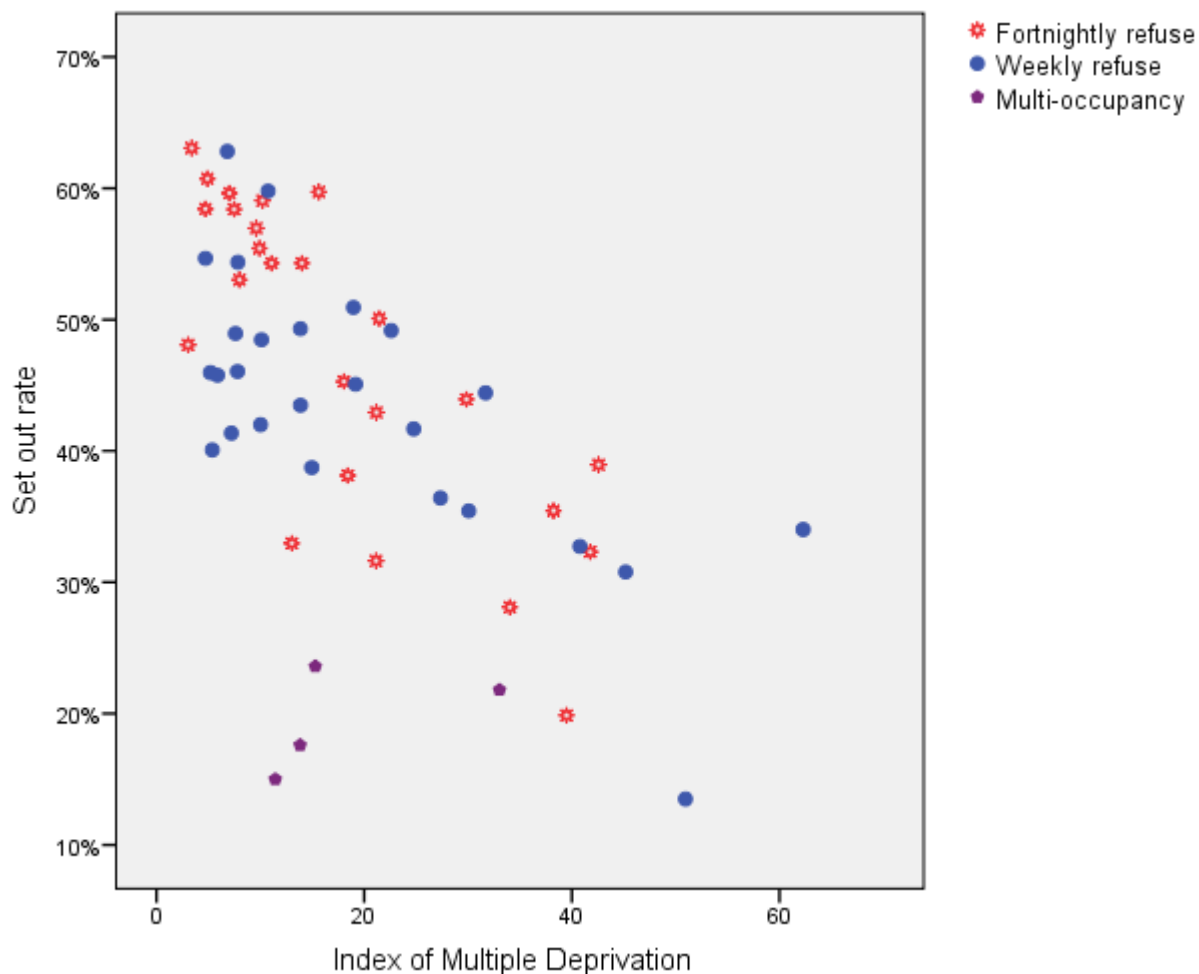


Figure 15b: Set out rate plotted against Indices of Multiple Deprivation for trial rounds



Ready reckoner for predicting set out rates for separate weekly food waste collections

The following ready reckoner is derived from Figure 15b above. The ready reckoner uses Indices of Multiple Deprivation (IMD) – see section 2.2 for a brief description. These indices can be downloaded from: <http://www.communities.gov.uk/communities/neighbourhoodrenewal/deprivation/deprivation07/>

Ensure that you use the “Average score” for the area that you are using for the ready reckoner. If you are applying the ready reckoner to a whole local authority, use the “Average score” for the relevant local authority.

No distinction is made between food waste collections with fortnightly or weekly refuse collections for this ready reckoner, since there is still a good correlation between set out rates and levels of deprivation, even when refuse collection frequency is not taken in to account ($R^2 = 0.55$).

Approximate predicted set out rate = (IMD x -0.006) + 0.55

For example, if the average Index of Multiple Deprivation in the area in question is 23, the set out rate is predicted to be approximately $(23 \times -0.006) + 0.55 = 0.41$, ie 41%.

Set out rates for collections from multi-occupancy properties were found to be much lower, with no discernable correlation between levels of deprivation and set out rates achieved. The average set out rate achieved across all trial rounds collecting from multi-occupancy properties was 20%.

4.3 Food waste capture and composition

Waste audits were carried out in six of the WRAP trial areas, focussing in particular on assessing how much food waste had been captured in the food waste collection from households participating in the schemes, how much was still being disposed of in refuse and recording the compositional breakdown of each of these fractions (see Section 3.0, Table 5).

Capture rates¹² for food waste in the six audited trial rounds are shown in Figure 16, with overall capture rates for all food waste represented by the brown bars, and capture rates for different types of food waste, indicated by the blue bars. The average capture rate for food waste across the waste audits ranged from 43% to 77%, with an average of 59% across the six audited trials.

Figure 16 also shows that those trials with higher overall captures of food waste are better at capturing all types of food waste than those with lower capture rates. The greatest difference is associated with unused and uneaten items, where capture rates in the lowest performing areas are less than half those in the highest performing. Whilst not all of this category will include packaged items, it is quite likely that less committed households will discard uneaten packaged food into the refuse bin, rather than taking the food out of its packaging and disposing of it in the food waste caddy. A more extensive series of waste audits across the different trial areas would no doubt have revealed differences in food waste capture across the sub-fractions in areas with weekly refuse collections compared with areas with fortnightly refuse collections, but this was outside the scope of the monitoring.

The results of the audits are further analysed in Figure 17, which shows the quantities of different types of food waste disposed of in refuse compared with fractions put in the food waste containers for separate collection, for each of the audited trials. The waste audits found that the non-edible fraction and food preparation by-products (represented by the brown section of the bars in Figure 17) accounted for the highest proportion of both separately collected food waste (53% of total food waste set out) and of total food waste (46% of food waste found in refuse, garden waste and food waste collections).

The quantities of food waste set out for separate collection as established by the audits were compared against scheme yield generated by the same rounds that had been audited, represented by the green bars in Figure 17 (no suitable cross-referencing data was available for Preston). Although the stacked compositional bars for separately collected food waste are not identical in height to these horizontal red bars, Figure 17 shows that these two measures are not too far apart, (though with the exception of Belfast City Council, for which average yields per participating household during the trial were significantly greater than food waste yields per household found in the waste audits). Overall, this lends some confidence that, despite the relatively small sample size, the waste audit results are reasonably robust representations of the food waste composition in the respective trial areas.

Key findings from waste audits carried out for the WRAP supported trials:

- the average capture rate for food waste (food waste presented for separate collection as a proportion of the total food waste put out at the kerbside) across the waste audits ranged from 43% to 77%, with an average of 59% across the six audited trials;
- the audits showed that trials with higher overall captures of food waste were better at capturing all types of food waste (in particular 'avoidable' food wastes, such as unopened or uneaten food) in comparison with trials with lower capture rates; and
- the waste audits found that 'unavoidable' food waste, such as peelings, cores and bones, accounted for the highest proportion of both separately collected food waste (53% of total food waste set out) and of total food waste arising for collection (46% of food waste found in refuse, garden waste and food waste collections).

¹² Capture rate in this instance means food waste presented for separate collection divided by total food waste put out (i.e. in refuse and for separate collection) expressed as a percentage.

Figure 16: Audit results for overall capture rates and captures for different types of food waste, in 6 WRAP support trials

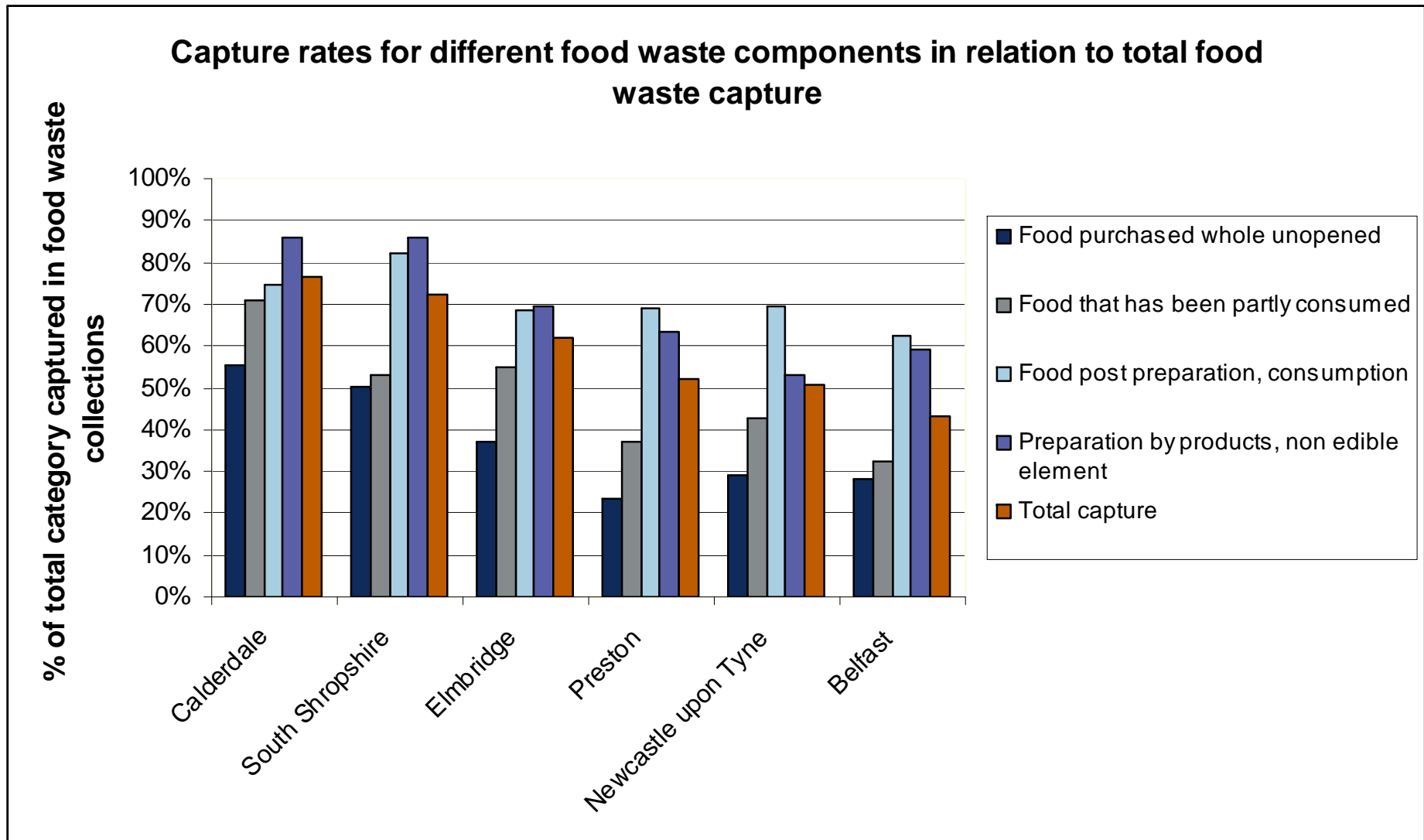
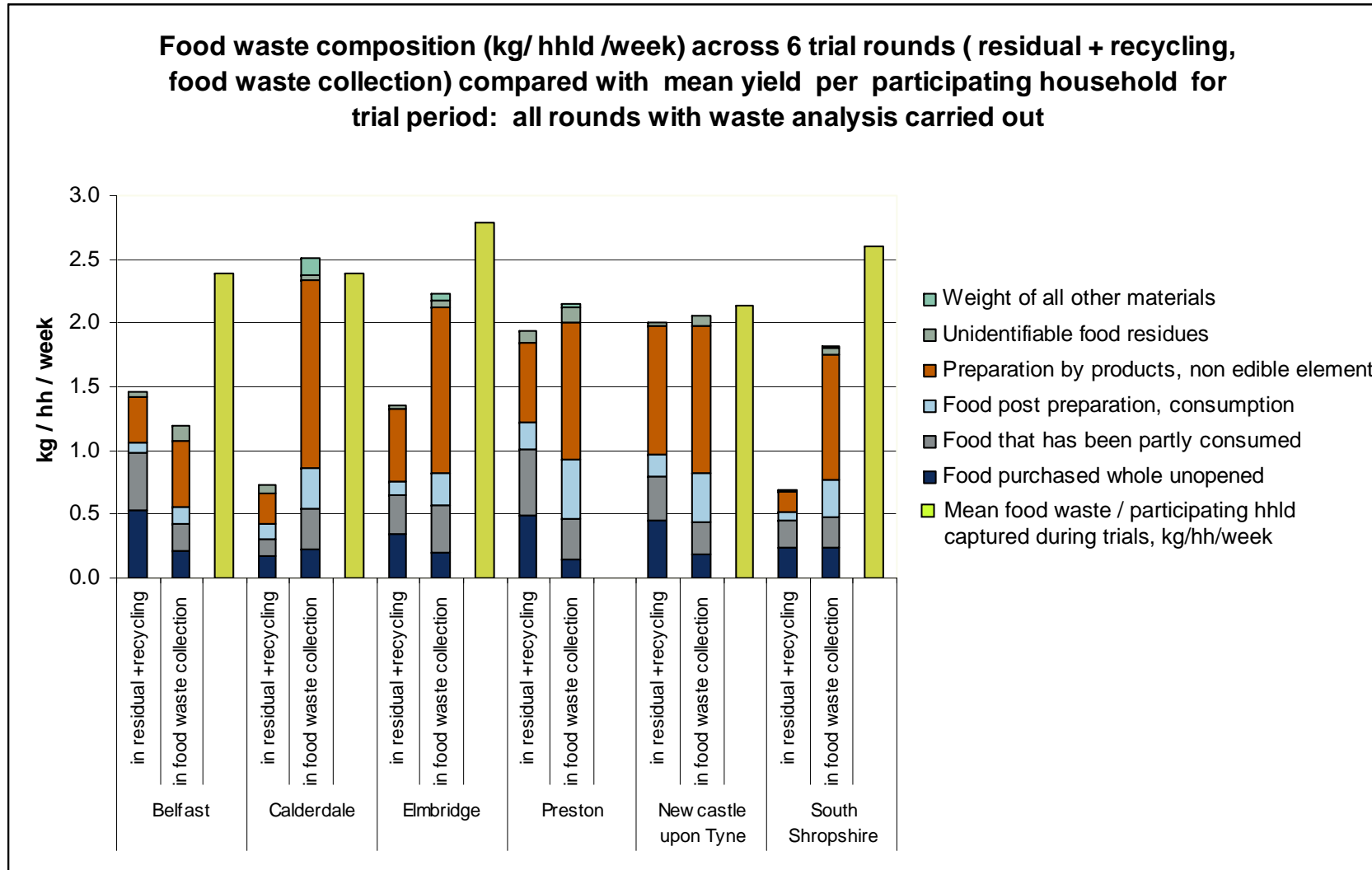


Figure 17: Audit results for different types of food waste in residual waste and separate food waste containers, for 6 WRAP supported trials



Note: The above chart shows food waste composition (in terms of kg per household per week) across 6 trial rounds (residual + recycling and food waste collections) compared with mean yield per participating household during the period of the trial for all rounds with waste analysis carried out. For each trial area, the left-hand bar shows the quantity and composition of food waste in refuse, whilst the right-hand bar shows the quantity and composition of food waste found in food waste collection containers.

4.4 Findings from the attitudinal surveys

Attitudinal surveys were conducted in five of the trial areas (Mid-Bedfordshire, Newcastle upon Tyne, South Shropshire, Waveney, West Devon), with around 450-650 residents interviewed in each area. The surveys investigated a wide range of issues (see Section 3.0) and findings which are particularly relevant to the performance of the trials are included here.

4.4.1 Barriers to participation

77% of respondents¹³ claimed to be participating in the trials. However actual participation was lower than this - see Section 4.2, Figure 17. Of those respondents who stated that they did not participate:

- 24% (combined) stated that concerns about hygiene, odour or vermin prevented them from participating in the trials;
- 21% stated that they did not produce enough food waste to merit participating;
- 9% stated that they did not participate because they home compost their food waste.

The most common reasons given for not participating in the food waste collections stated by respondents related to concerns around potential hygiene, odour or vermin issues (24% of non-participants combined). However only 6% of respondents taking part in the trials indicated that they had experienced a problem with any of these issues (see below). Clearly this is an issue that local authorities need to consider when communicating with residents in order to address any potential concerns of residents.

Interestingly, very few respondents (0.4%) reported that limited storage space for containers was a problem. This suggests that the provision of an additional container for the collection of food waste was not considered problematic amongst the vast majority of residents participating in the food waste trials.

4.4.2 Problems experienced with the trials

The surveys indicated that around a quarter of respondents (22%) had experienced problems with the service at some point since the trials had started. The most commonly stated problems experienced with the trial collections were:

- odour or vermin issues (6%);
- missed collections (4%);
- insufficient liners provided (3%); and
- collection day had changed (2%).

4.4.3 South Shropshire – change in food waste collection regime

Prior to the WRAP supported trial, South Shropshire had collected food waste mixed with garden waste on a fortnightly basis. Those residents included in the WRAP trial area were moved over to weekly separate collections of food waste. The following feedback obtained via the survey suggests strong support amongst residents for this type and frequency of collection:

- 63% of respondents strongly agreed that separate food waste collections were easier to use in comparison to the previous fortnightly collections, with 6% strongly disagreeing; and
- 78% of respondents strongly agreed that weekly food waste collections were easier to use in comparison with the previous mixed food and garden waste collections, with 6% strongly disagreeing.

4.4.4 Food purchasing habits

The attitudinal surveys indicated that some of the participating households (an overall average of 4- 8% of respondents) claimed to have changed their attitudes or habits relating to food purchasing and consumption as a result of receiving a food waste collection service. The feedback varied considerably between the different trial areas, and therefore the responses from individual trial areas are included here:

¹³ The figures presented in this section represent an area level average across the five trial areas surveyed.

- an average of 8% of respondents stated that their awareness about the desirability of avoiding food waste had increased as a result of the trials (ranging from 3% to 15% of respondents in the individual trial areas);
- an average of 5% of respondents stated that they now think more about what food they purchase (ranging from 4% to 8% of respondents in the individual trial areas); and
- an average of 4% of respondents stated that they try to avoid food packaging (ranging from 1% to 6% of respondents in the individual trial areas).

4.4.5 Home composting activity

24% of respondents reported that they compost at home. These respondents were asked if the food waste collection service had changed their home composting activity:

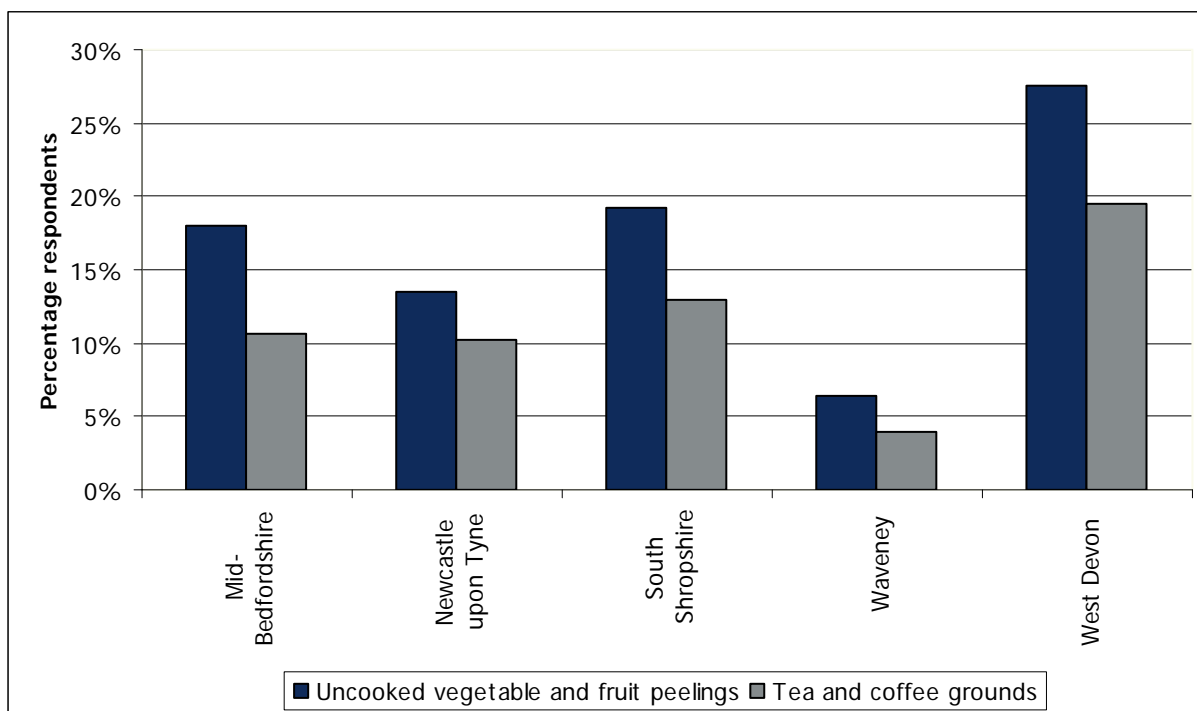
- 63% said the trials had made no difference;
- 24% reported that they home compost less than they had done prior to taking part in the trials; and
- 5% stated that they home compost more than they had done prior to the trials.

Residents were also asked how they dealt with different types of food waste. The types of food waste dealt with through home composting as opposed to the food waste collection scheme were predominantly:

- uncooked vegetable and fruit peelings; and
- tea bags and coffee grounds.

The proportions of respondents stating that they home compost these types of food waste are shown in Figure 18. It is worth noting that the trial areas in Waveney and Newcastle on Tyne are densely populated urban areas with low potential for home composting in comparison to the other trial areas shown in Figure 18. The majority of these respondents also stated that they participate in the food waste collections, indicating that they recycled some types of food waste (other than uncooked vegetable and fruit peelings or tea and coffee grounds) via the separate food waste collection.

Figure 18: Proportion of respondents stating they home compost food waste



The attitudinal surveys investigated other issues such as householder satisfaction with the containers, caddies and liners provided. These findings are described in Section 5.

Key findings from attitudinal surveys carried out for the WRAP supported trials:

- perceived concerns relating to hygiene, odour or vermin collectively were the most common reasons stated by survey respondents for not participating in the food waste collections (24% of non-participant respondents);
- however only 6% of respondents taking part in the trials indicated that they had experienced a problem with any of these issues;
- the other main reason given for non-participation was not producing enough food waste (21% of non-participants);
- use of home composting was cited by 9% of non-participants;
- a small proportion of participating households (4 to 8% respondents) claimed to have changed their attitudes or habits relating to food purchasing and consumption as a result of taking part in food waste collections;
- 24% of respondents stated that they carry out home composting and of these around one quarter stated that they compost less food waste as a result of the taking part in the trials.

5. Key practical lessons from the trials

This section summarises the key practical lessons learned from the WRAP supported food waste collection trials.

This section draws out key practical lessons and good practice from the food waste collection trials. The following issues are explored:

- collection vehicles;
- collection crews;
- collection rounds;
- reprocessors and quality of collected food waste;
- containers and liners;
- distribution (initial roll-out of collections); and
- communicating with residents and promoting the service.

Additionally several case studies have been produced which look at various aspects of the WRAP supported trials in greater detail than presented in this report. These case studies are summarised in the box below.

Food waste collection trials: case studies

- Food waste collection trials alongside **fortnightly refuse collections**
- Food waste collection trials in areas with **high density housing**
- Food waste collection trials in areas with **low density housing**
- Food waste collection trials from **multi-occupancy properties**
- **Liners** for food waste collections
- **Communications and publicity** for food waste collections.

These case studies can be viewed and downloaded at: www.wrap.org.uk/fwct.

Image 5: Promoting the food waste collection trial in Broadland District



5.1 Collection vehicles

The choice of collection vehicles and how they are operated by crews is vital in developing efficient and cost effective services, particularly for food waste collections. Before the trials commenced WRAP, and trial partners, reviewed good practice in Europe and the UK for the collection of organic wastes with the aim of identifying appropriate vehicles which could be used in the trials.

It is not the objective of this section to endorse a particular vehicle or manufacturer but rather to provide some general feedback and highlight some key considerations based on the operational experience of the partners throughout the trials.

Key factors which initially were considered and assumed to be important in collecting food waste and reflected choice in vehicle design are detailed below:

5.1.1 Sufficient capacity to contain the load in one trip

The average drive time to an ABPR compliant treatment facility was around 30 minutes from the collection rounds. It was very important therefore to have sufficient payload to undertake only single loads to limit the amount of non-collection time and maximize the numbers of properties served in a collection round. Pre-trial estimates of food waste collected by a two man crew were based on average set out rates of around 60% and collecting 2.5kg per property. This implied round sizes of around 1,400 properties and 2 tonnes collected per crew per day. This suggested that vehicles of around 7.5 tonnes gross vehicle weight (GVW) with available payloads of between 2.5 and 3 tonnes would be sufficient and provide for spare capacity. Larger refuse collection vehicles with payloads of 8 to 11 tonnes would likely be heavily under capacity on this basis. Avoiding the overloading of vehicles and ensuring the legal payload is not breached are other important considerations. Since food waste is dense by nature, volume was considered unlikely to be the limiting factor for collection vehicles prematurely filling up.

5.1.2 Multiple loading points

Loading of food waste via more than one aperture on the vehicle was considered important to avoid concentrating weight over one axle or on one side of the vehicle and creating imbalance. Also, loading times might be optimised if the vehicles could be loaded using *either* wheeled bins from a slave system *or* manually where appropriate by *both* crew members.

5.1.3 ABPR compliant collections

The Animal By-Products Regulations (ABPR) (2003) require the safe and secure storage of catering (food) wastes throughout the collection cycle. Vehicles should be leak proof and apertures closed when not being loaded.

5.1.4 Lower running costs

Along with the issue of rising energy costs, authorities needed to consider potential costs for increasing vehicle fleet sizes and the associated overheads, insurance, tax, maintenance and other related charges. Vehicles have varying running costs according to their size, complexity and how they are utilized within the collection rounds. Another reason for trialling smaller collection vehicles was related to improving fuel economies - larger refuse collection vehicles typically achieve 3 – 6 miles per gallon (mpg) compared to 12 – 15 mpg for smaller 7.5 tonne (gvw) vehicles.

5.1.5 Unloading

Vehicles would be required to tip into a secure area either at the treatment facility or an intermediate bulking point. Both DEFRA and DARD (Department of Agriculture and Rural Development in Northern Ireland) have produced guidance on loading and unloading of animal by-products. The high water content of food waste means that the waste may not easily be ejected from the collection vehicle and high degrees of lift might be required before it is fully tipped from the body. Unloading directly from small vehicles into larger trucks, as happens with many Italian collections, could help to minimise the non-collection time associated with direct haulage.

5.1.6 Choice of vehicles

A limited range of specialist vehicles were available at the start of the collection trials which met the above criteria and could be procured at short notice. Almost all the collection vehicles used in the trials were hired in over a short term period reflecting the length of the trial and also recognising the need to develop specific operational experience before decisions regarding future procurement could be made.

These points were felt important for the trials but do not represent an exhaustive list of key factors to be considered. Vehicles were procured/hired/leased directly by councils and/or their contractors.

The following examples of vehicles were used in the trial.

Image 6: Bespoke design used in Preston



Image 7: Farid Minimatic on Iveco chassis



Image 8: Vehicle used in Mid-Bedfordshire



Image 9: Mid Bedfordshire vehicle loading



Image 10: Farid Micro used by Elmbridge



Image 11: Localised bulking in Elmbridge – from vehicle directly into roll-on off skip



Image 12: Lifting the slave bins in Elmbridge



Image 13: Food waste collection in Hackney



Image 14: Food waste collected in Guildford



Image 15: Food waste collection in Newcastle upon Tyne



Image 16: Food waste collection in Kingston upon Thames



Image 17: Electric powered vehicle used in South Shropshire



Image 18: Food waste collection in Broadland



5.2 Feedback on collection vehicles from trial authorities

Trial partners discussed their experiences of the collections including vehicles, crews, round sizes and other operational factors at workshops held in October 2007 and July 2008. Many important points were raised and consensus was reached on key recommendations:

- **Ensure low loading heights** - may need to use a slave bin if loading height means it is too high to manually load
- **Consider a vehicle that is designed for ease of unloading** – ideally one which can tip into an RCV or skip for onward haulage if travel distances to treatment facilities are high.
- **Some Authorities might benefit from collecting food waste in split vehicles** – co-collecting with other materials in split vehicles might be an option to reduce fleet numbers although capacity and ability to unload both compartments at the same point are important factors.
- **Have a couple of loading points** - for crews to load simultaneously.
- **Get an even distribution of weight over the body of the vehicle** – either by careful manual loading or by using vehicles with sweeping plates to spread food waste across the vehicle body
- **Ensure the capacity is appropriate to the tonnage collected.**
- **Consider vehicle capacity in relation to distance to treatment facility and depot.**
- **Make sure the vehicle has enough cab space** - seats for extra crew, space for cleaning materials, place to store liners and leaflets, provision of hand washing facilities etc.
- **Don't worry too much about leakage** – it's not an issue if you use liners and choose the right vehicle.
- **Don't use compaction** – compaction will squeeze water from the food waste risking leachate. Make sure you buy/lease a vehicle where compaction can be turned off manually.
- **Monitor weights to avoid overloading**

5.3 Collection crew

5.3.1 Crewing levels for the food waste trials

The number of staff required to carry out collections is an important consideration for any collection service. The most significant cost element of running a collection service is related to the number of staff and their salaries. Ensuring good crew productivity was identified as very important in considering how schemes might be rolled out in the future. When determining crewing levels other considerations are also important, these centre on ensuring that staff can carry out their work safely and efficiently.

In general the trial authorities used one driver and one loader per vehicle. Many food waste collections in Northern Italy have developed using single operative crews with round sizes covering 600-800 households per day. However, there was reluctance to trial single operative collections during the trials due to unfamiliarity with the practice and the view that safer working practice could be achieved with crews of two. The average number of households per round across all the collection trials was around 1,300 households and therefore the productivity of these crews should not be dissimilar to single operative operations. The fact that the vast majority of trials operated successfully with one driver and one loader suggests that this could be a suitable norm for crew levels, applicable to a wide variety of circumstances.

In some urban settings it was considered necessary to have one driver plus two loaders per vehicle. For example, in Luton slave bins were used by 2 loaders collecting from different sides of a street so as to reduce the number of trips to the vehicle.

Image 19: Food waste being collected



Whilst it is beyond the scope of this report to comment on the financial costs/benefits of different approaches to collecting food waste, it is worth remarking that for separate food collections a driver plus loader is the crewing level that in most contexts is likely to maximise the productivity of staff and vehicles at the least cost. The loader can be collecting and emptying kerbside containers while the driver is moving the vehicle along the road and the driver can assist the loader when the vehicle is parked. Employing both staff with Class 2 driving licences (required for smaller collection vehicles) also means that the driving can be shared and can help maximise productivity which might normally be restricted through the day with loaders waiting for crews to catch up. Modelling work commissioned by WRAP has been carried out to address these issues and other financial costs/benefits issues in relation to food waste collections; see Appendix 1.

Image 20: Collection crew in West Devon



5.3.2 Manual handling issues

It is beyond the scope of this report to provide advice on health and safety matters, however for general guidance on health and safety for kerbside operatives, refer to the Health and Safety Executive, www.hse.gov.uk/waste. The partner authorities and their contractors undertook risk assessments on the collections prior to commencement of the service.

Notwithstanding the above, the partner authorities provided some feedback specifically on manual handling issues. Another authority considered that the average weight of individual bins (2 to 4 kilos) was well within safe parameters for repeated manual handling.

Three main slave systems were adopted by operatives across the different trials in order to improve their productivity:

- 1 Emptying of kerbside buckets into a wheeled bin with regular emptying of the wheeled bin into the vehicle using a bin lift.
- 2 Operatives taking two empty kerbside buckets and loading liners from 3 – 4 households at a time into the buckets before returning to the vehicle to empty them (manually).
- 3 Opening kerbside buckets and taking out the liners from 3 – 4 households at a time and manually placing them in the vehicle. This depends on the mechanical strength of the liners (so as they don't split/leak) and limited numbers per property.

5.3.3 Staff training and motivation

A common theme amongst the trials was the importance of collection crews as ambassadors of the service, both by providing an efficient service on the street, and in dealing with queries or concerns about the collections and explaining the service to residents.

Providing good and appropriate training fostered a positive attitude amongst collection crews, enabling them to have ownership and pride in the service. One authority considered that the recruitment process was also highly important, in order to identify staff with a genuine interest in the service and appreciation of the system.

Other positive suggestions from the partner authorities for improving staff motivation and performance include:

- Ongoing contact between local authority officers and crews (via monthly meetings in the case of one trial) to ensure that problems that the crews encountered were identified and ironed out
- Providing crews with clear operational procedures, with management ensuring that the crews abided by them
- Provision for training of new staff that join the food waste collection scheme.

It was also important for call centres to be fully informed about the collection service so that they were able to relay messages to the public in both trial and non-trial areas. Most partners provided a list of FAQs about the food waste collection service to assist call centre staff in dealing with queries from residents including why the scheme was being introduced.

Good practice tip: improving staff knowledge and motivation

Prior to rolling out food waste collections organise a training day for collection staff to explain why the collections are being introduced, setting out what is expected of them and dealing with any of their queries or concerns. This is also an opportunity to provide training and guidance on health and safety issues, including manual handling. Arrange a visit to the treatment plant so staff can observe and learn how the food waste will be treated and are able to talk with confidence to residents about the whole process of the food waste collections. If possible, go out with the crews for the first few collections to provide guidance, discuss how to deal with problems (i.e. hard-to-access properties) and help deal with queries from residents.

Image 21: Food waste collection trial in Calderdale



Key advice and recommendations from trial authorities with regard to collections crews include:

- **Have dedicated crews and the crews become dedicated!** If you recruit well using interviews and select people with an interest in recycling then the crew will develop ownership of the service.
- **Carry out risk assessments:** while there are similarities in services each collection scenario is different
- **Prior to the start of the service provide training to the collection crews:** cover why, what the service is all about and when it will start; health & safety and manual handling; what happens to the food waste after it is collected, etc. (Contact Training@wrap.org.uk for advice and guidance on delivering effective crew training sessions).
- **Take crews to the treatment facility:** to improve their understanding of the whole system and so they are more clear about process and contamination issues
- **When the scheme launches, go out with the crew for the first two weeks:** to answer questions and discuss issues.
- **Have clear operational procedures:** and make sure the crew stick to them.
- **Have early morning briefings:** to catch issues early and get feedback.
- **Carry a brush and shovel in the vehicle:** important if spills do occur

5.4 Collection rounds

5.4.1 Designing efficient collection rounds

A key challenge for the food waste trials was designing efficient rounds that matched the capacity of the vehicles and collection crews. Rounds pitched with too many households risk service quality issues as the crews will struggle to finish rounds on time. Rounds set at low pass rates would mean that the overall cost of collection becomes relatively high as vehicles and crews are not fully utilised.

In general the partner authorities matched vehicle collection capacities with their collection rounds reasonably well, particularly considering that various factors must be accounted for when designing food waste collection rounds. The most significant factors that had to be accounted for are summarised below.

Factors affecting round sizes

Contracted staff work hours minus time for:

- Check in time
- Travel to start of round
- Breaks
- Travel to treatment facility or bulking point
- Travel back to round or return to depot
- Ancillary time for vehicle checks and cleaning, etc.

= **Time available for collection.**

However, within the available productive collection time it is important to consider factors which affect the speed of collection including:

- Demographics and geography of the area;
- Number of set outs;
- Location of set outs;
- Loading time for each set out;
- Work rate of operatives; and
- Fill rate of vehicle (quantity and density/load capacity).

5.4.1.1 Pass rates and pick rates for the vehicles and crew

Pass rates and pick rates¹ achieved by vehicles and crews during the trials varied considerably as a direct result of different local conditions. The average hourly pass rate was around 200 households with actual collections from around 145 households. The average hours worked by crews during the collection day was 6.5 hours although the range was 6 – 8 hours.

Many trial authorities planned rounds with conservative property numbers to allow for initial uncertainty about participation rates and the time required to travel to treatment facilities. Some also made allowance for potential future expansion. All partners felt there was some spare capacity within the rounds to expand collections.

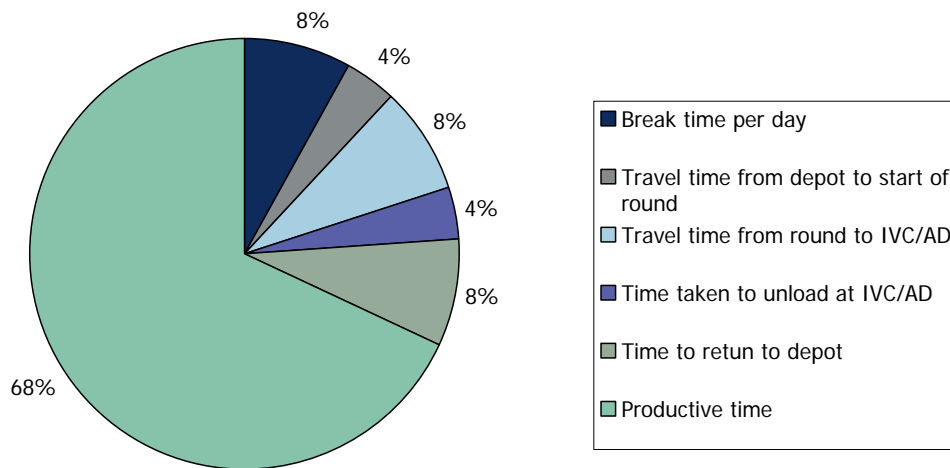
Collection operations were filmed on three occasions in order to obtain more precise timings for carrying kerbside containers to the collection vehicle for emptying and then returning the containers to the point of collection. This was to provide data for collection system modelling. Where trials serviced multi-occupancy properties, and food waste was collected from outside the doors of individual flatted dwellings, it is important to take account of the time required for collection operatives to ascend and descend staircases and also to gain access through security gates when deciding on the size of collection rounds.

5.4.1.2 Non-collection time during collection rounds

The available productive time within the working day, which is available for collecting and emptying kerbside containers, is limited by the amount of time the crew need to spend on a number of other tasks. This non-collection time is inherent in all collection schemes but will vary between authorities and even within the same authority area. Non-collection time might include the time taken to travel to and from the vehicle depot and the collection round, breaks, distributing liners or communications, and, crucially, time taken to travel to and from tipping locations. The greater the proportion of non-collection time then round productivity becomes lower and the cost per tonne of the service becomes high. Many trials were in the fortunate position of being able to identify a suitable treatment facility that was in reasonably close proximity to their respective collection rounds.

A minority of trial authorities did not benefit from having a suitable treatment facility nearby. For example, West Devon initially delivered food waste to an in-vessel composting facility that involved a 2½ hour round trip which impacted considerably on round productivity. In these instances a few authorities had considered alternative treatment options or bulking of food waste for onward haulage. The trials in Surrey explored the direct transfer of food waste from the collection vehicle to a roll-on-off skip during collections and then transporting food waste in bulk to an in-vessel composting facility in Dorset.

Figure 19: Average proportions of time spent per day on collection rounds by crews



In such situations it is vital to ensure that the bulking location has the appropriate permissions in place for the storage of food waste and that statutory and regulatory requirements relating to the amount of time that food waste can be stored prior to being treated are adhered to. General guidance relating to the handling and storage of food waste can be found at: <http://www.netregs.gov.uk/netregs/sectors/1781379/1781492/1784848/> ; <http://www.defra.gov.uk/animalh/by-prods/pdf/loading-unloading.pdf>

Good practice tip: improving efficiency of collection rounds (1)

Try to identify a treatment facility that is located reasonably close to your collection rounds. Alternatively, use smaller collection vehicles and bulk up food waste locally in skips, or into a larger capacity satellite vehicle and then deliver the food waste in bulk to a treatment facility.

Image 22: Localised bulking of food waste in Surrey



5.4.1.3 Mirror refuse collection rounds?

While the majority of trial authorities based the food waste collection rounds on their refuse collection rounds the simple mirroring of these rounds could be inefficient in a wider roll out. A number of factors are likely to contribute to very different numbers of properties that can be passed in a given round by either refuse or food waste crews. These factors include the type of containers, how they are emptied into the vehicle, the crew size and the travel distance to tip. While refuse rounds tend to have high set out rates, often approaching 100%, set out rates for food waste will be significantly lower depending on area and refuse system. Subsequently, many trial partners found food waste collection crews finishing earlier in the day. While there are benefits in terms of convenience of having same day collections for residents, and also the ease in communicating schedules, it is important to continually review the balance of rounds to ensure that services are running efficiently. It was felt that small inefficiencies within rounds could be countered through the addition of food waste collections from schools or local businesses if either adding more households or increasing participation within the round was not achievable.

5.4.1.4 Volume of food waste

Another important consideration in designing collection rounds is the volume of material to be collected. No data was collated on the volumes of food waste collected, just the weights. The bulk density of food waste is useful to know, since this can be used to estimate volumes from weight estimates (and vice versa). Data from another project carried out for WRAP by Resource Futures¹⁴ suggests that the bulk density of food waste varies between about 400 and 600 kg/m³, with an average of around 470 kg/m³. However the bulk density of food waste is dependent on several factors, including the composition of food waste and the method of containment. Therefore the bulk density figures suggested here should be treated with caution.

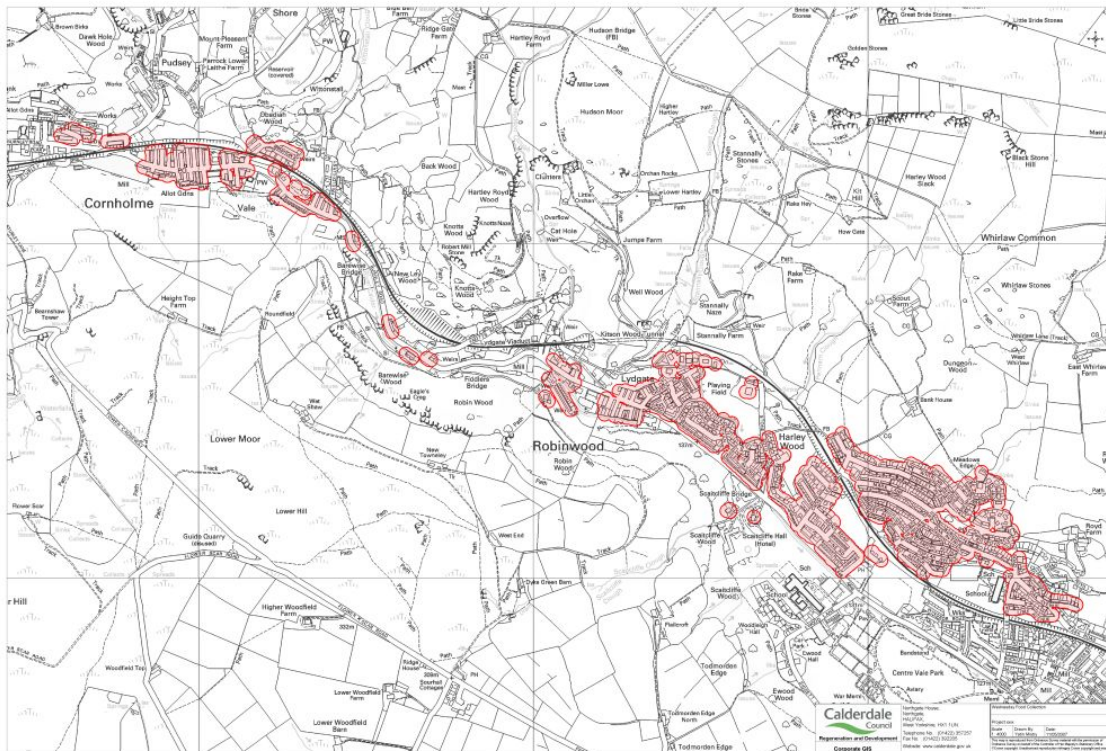
¹⁴ Resource Futures on behalf of ROTATE, *Review of Bulk Densities of Various Materials in Different Containment Systems*, 2007

5.4.1.5 Set out of food waste containers

The number of kerbside containers set out each week for collection by residents is the principle factor affecting crew work loads and the obvious factor to account for in designing collection rounds. Set out rates will vary from week to week, and over the life of a food waste collection scheme depending on the performance of the scheme and any measures carried out to improve its performance. It is difficult to predict set out rates for a new scheme as a number of factors will contribute to the level of public participation on a given day. Authorities should also consider a buffer within the round to allow for increased participation as a result of promotions or new housing build.

Experience from the trials suggests that set out rates for food waste containers are around 15 percentage points lower than the actual participation rate for that collection round. For example, a round with a 65% participation rate can be expected to have, on average, a set out rate of roughly 50%. For further comments on set out rates, refer to Section 4.2.1. It may be useful to consider the average trial data and the relative deprivation score for an authority as a very approximate indicator for predicting set out of food waste, provided that the round monitored has similar characteristics to the round where you are intending to implement food waste collections. It should be noted that the participation and set out measurements recorded by WRAP for the trials were collected between 3 and 9 months after the trials had started. Authorities should allow for additional resources and staff to cope with initial collection weeks where the set out rates are likely to be at the highest levels.

Figure 20: Food waste collection round map for a semi-rural trial area in Calderdale



Good practice tip: improving efficiency of collection rounds (2)

It is important to continually monitor the performance of any trials so collection rounds can be re-configured as necessary once the service is established so as to optimise collections. It is also important to avoid changing the collection service day for residents where possible.

5.4.1.6 Amount of food waste put out by householders

The amount of food waste put out by each household may also affect collection efficiencies. The relative amounts of food collected per household should not slow down the operation for the crew as long as it is contained within the kerbside bucket. However, areas generating larger quantities of food per household will increase the rate of fill of the vehicle and potentially necessitate an earlier return to tip and a corresponding reduction in round sizes. A similar effect would occur if the crew size was increased, e.g. driver plus 2 or 3. However, while there is increased productivity the increased staff costs tend to make the option more costly.

5.4.1.7 Setting out food waste in appropriate locations

Many of the trials reported that giving residents clear guidance on where to leave kerbside containers for collection (on doorstep, on pavement, etc) was important in reducing the amount of time spent collecting containers. It was also considered important to leave emptied containers in a tidy manner and in the same place they were presented. This reinforced good behaviour by residents in setting out their containers and helped to maximise levels of satisfaction with the collection service. It also reduced the number of collections missed through containers not being set out in the appropriate location by householders.

Image 23: Kerbside food waste containers awaiting collection in Calderdale



Image 24: Kerbside food waste containers awaiting collection alongside refuse bins and dry recycling boxes in South Shropshire (courtesy of South Shropshire District Council)



5.4.2 Summary

In general the partner authorities considered that they could improve the size and efficiency of their collection rounds once the trials had bedded in. Indeed, several authorities added additional properties to their rounds during the course of the trials and many are now planning to do so, since it was found that collection crews were servicing the initial collection rounds more quickly than anticipated.

From calculations of the different participation rates, studies of round travel times and discussion of trial costs with partners a range of factors were considered important for maximising round productivity and reducing overall collection costs. These factors include:

- 1 Increasing round sizes to align with contracted work hours
- 2 Increasing productivity of crew: skill levels, loading times, slave bins, motivation levels
- 3 Increasing participation within rounds; ongoing promotions, improving access to liners
- 4 Minimising travel time to treatment plant
- 5 Minimising vehicle capital and running costs through selection of appropriate vehicles.

5.5 Quality of collected food waste

5.5.1 Quality of material collected

All of the facilities processing food waste collected from the trials were interviewed and the main feedback from this exercise is outlined below:

- Very few, if any, loads from the trial areas were rejected.
- All of the reprocessors rated the quality of material delivered from the trial areas as being 'high', with the exception of two reprocessors who rated the quality as 'moderate'.
- Only occasional contamination was found. Where this occurred, it most frequently consisted of carrier bags, which many of the reprocessors reported were easy to extract prior to treatment. The processors did not report any major difficulties arising from householders using degradable rather than compostable liners. Other items reported as occasional contaminants by various reprocessors included cutlery and metal cans.
- An anaerobic digestion (AD) plant operator reported that the material collected from the trials was particular well suited as AD plant feedstock.
- One reprocessor operating an in-vessel composting (IVC) facility suggested that collected food waste might benefit from having wood chippings added in order to reduce levels of moisture in the material. However it was not possible to determine if this comment pertained specifically to material collected by the trial scheme or more generally.
- Another reprocessor expressed the view that the high quality of material from the trial areas was due to the quality communications to residents, and suggested that this was more than might be expected due to the trials being supported by government funding.

Overall, the quality of food waste collected during the trials was high and fully suitable for AD or IVC treatment, with very few – if any – serious contamination issues arising.

The partner authorities also reported very little contamination, though where it did arise it tended to be in less affluent areas, particularly where a higher proportion of the population do not have English as their first language.

Good practice tip: nipping contamination in the bud

One of the trials found high rates of contamination (up to 40% of containers) in less affluent areas during the first week of the food waste collection trial. Effective and increased levels of communication – use of contamination tags explaining why containers had not been collected backed up with door-to-door canvassing - reduced contamination to a negligible level almost immediately.

Image 25: Contamination tag, Waveney trial



5.5.2 Identifying a suitable treatment facility

An important issue in identifying a suitable treatment facility is the proximity of the facility to the collection rounds, as discussed in section 5.3.1 above. Additionally, experience from the trials showed that the following issues need to be considered:

- Where bulking up of food waste is required, it is important to consider the logistics of collection vehicles delivering waste to the bulking location and the onward delivery of the bulked up material to the treatment facility, particularly in regard of ensuring that collected food waste is not stored for a period of time in excess of regulatory requirements. For example, food waste should not be stored overnight in a collection vehicle.
- Local authorities should liaise with all relevant statutory bodies when identifying a treatment outlet (the Environment Agency and local Defra Animal Health), in order to address any potential issues in relation to

compliance (particularly ABPR) as early as possible or if services are contracted out, check that their contractor has the correct permissions in place.

5.6 Containers and liners

5.6.1 Kerbside containers and kitchen caddies

All of the WRAP trials provided residents with kerbside containers (20-25l) and kerbside caddies (5-7l), with the exception of Hackney where kerbside containers were not required. Levels of satisfaction with these containers amongst residents participating in the trials were high, as shown by the results of the attitudinal survey carried out in 5 trial areas.

Table 9: Attitudinal survey findings on levels of satisfaction with containers

Question	Response	Kerbside containers	Kitchen caddies
Did you find the collection containers provided useful?	Yes	95.0%	94.4%
	Too big	0.3%	0.2%
	Too small	2.2%	2.3%
	Other	2.5%	3.1%

Note: area level averages across five surveyed trial areas, 2,546 respondents in total.

A small minority of respondents found the containers to be too small. The highest proportions of residents finding the containers too small in the trial areas where the surveys were carried out were 5.0% for kerbside containers (Mid-Bedfordshire) and 6.4% for kitchen caddies (Newcastle upon Tyne).

Local authority officers provided the following feedback on specific issues relating to the containers and caddies used in the trials:

- it was important to ensure that the kerbside containers were fitted with handles that would not break with repeated lifting;
- most decided to provide containers and caddies in the same colour and the most common colours chosen by were brown or green, though blue was chosen in some cases;
- some local authorities received feedback from residents that they preferred neutral colours, such as grey or silver, for kitchen caddies; and
- kitchen caddies with lockable lids were considered to be over-engineered and not particularly beneficial, however lockable lids were considered to be essential for kerbside containers.

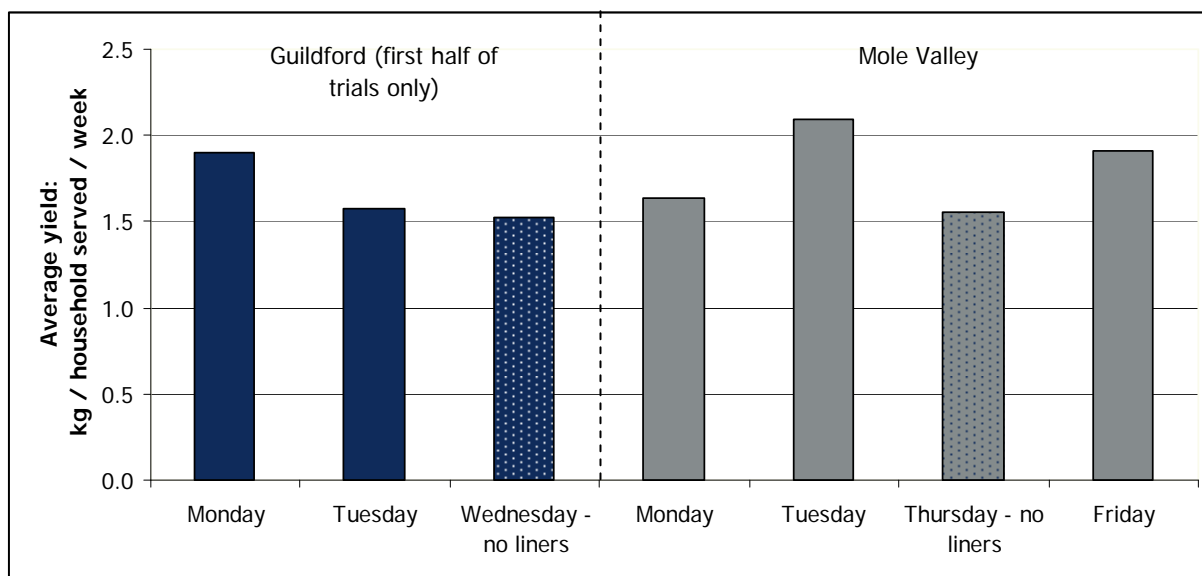
Image 26: Kerbside food waste containers, caddies and liners



5.6.2 Liners

All the trial rounds used liners with the exception of two rounds in Surrey. Previous research suggested that providing residents with liners can improve the performance of food waste schemes, primarily because it makes the scheme cleaner and easier for residents to participate¹⁵. This supposition appears to be supported by experience from the WRAP trials in Surrey, since rounds not supplying liners had marginally the lowest yields in their respective authorities, as shown in Figure 21.

Figure 21: Comparison of yields per household served for rounds with and without liners provided



Data for the first half of the trial period only (covering 25 weeks) is presented for Guildford, since the Monday and Tuesday rounds went from refuse weekly to refuse fortnightly during the course of the trial. Although yields from rounds not using liners are lower than those using liners (shown in Figure 21), the differences are not significant and moreover many other factors will be affecting food waste yields in individual rounds. Therefore this finding should be treated with caution in part due to the very small sample size.

Nonetheless, the results of the attitudinal surveys show that the vast majority of residents found the liners helpful, as illustrated in Table 10 below. Only 0.6% of respondents found the liners to be too small. The most commonly cited problem was liners leaking, though this was only experienced by 0.9% of respondents.

Table 10: Attitudinal survey findings on levels of satisfaction with liners

Question	Response	% respondents
Did you find the liners provided useful?	Yes	97.9%
	Too big	0.0%
	Too small	0.6%
	The liner is hard to tie	0.2%
	The liners leak	0.9%
	Other	0.3%

Note: area level averages across five surveyed trial areas, 2,542 respondents in total.

The provision of liners to residents has significant resource implications, particularly if they are provided free of charge. One local authority expressed surprise at the number of liners residents were getting through, with reports of residents using on average 4-5 liners per week. It seems that residents in this authority were using more liners than in many of the other trial areas. This is supported by data on the number of liners supplied and

¹⁵ *Eunomia, Kitchen Waste Collections: Optimising Container Selection, 2006.*

responses to the attitudinal surveys which indicate that residents most commonly use about 2 or 3 liners per week. Findings from the attitudinal surveys on liner usage are summarised in Table 11 below.

Table 11: Attitudinal survey findings on frequency of usage of liners

Question	Response	% respondents
How many food waste liners do you put out?	One to two per month	1.3%
	One every two weeks	2.0%
	One per week	18.3%
	About two or three per week	50.0%
	More than three per week	26.8%
	Don't know	1.5%

Note: area level averages across five surveyed trial areas, 2,435 respondents in total.

There was a fair degree of consistency in the feedback from the surveyed trial areas, for example the proportion of residents stating that they use 2 to 3 liners per week ranged from 47.0% (Mid-Bedfordshire) to 54.5% (West Devon).

In any event, the provision of liners potentially involves significant costs. The provision of liners for the trials was fully funded by WRAP. Nonetheless the partner authorities gave serious consideration to the issues associated with the costs of liners and offered the following comments based on their experience during the trials:

- if additional diversion of food waste from disposal due to use of liners could be proved and quantified, the associated avoided disposal costs could justify the provision of free liners;
- posting replacement supplies of liners is costly and time consuming – replenishing liners via collection crews or from shops, council buildings, etc was considered a better option;
- avoid giving out too many free liners during trial roll-out, in order to minimise cost of supplying liners that will not be used to non-participating households;
- consider joint buying or bulk procurement in order to reduce costs; and
- encourage householders to use the right size of liner for their kitchen caddy (or kerbside container) and to fill their caddies before changing liners.

Some local authorities have sought different solutions to making liners available to residents, for example, by setting up local supply networks so that residents who want to use liners can purchase them easily and at reasonable cost. This can have the added benefit of providing a new business opportunity for local retail outlets.

These and other issues are discussed in greater detail in the case study on liners: www.wrap.org.uk/fwct.

Image 27: Kitchen caddy with liner (courtesy of South Shropshire District Council)



5.7 Initial roll-out

The size of the trials ranged from one to five rounds per authority, therefore the logistics of roll-out were different to those that would be associated with district-wide roll out. Nevertheless there were some useful lessons learned about the 'nuts and bolts' of rolling out food waste collections..

5.7.1 Time scheduling for distribution

Some of the trial areas distributed containers two weeks ahead of the start of their trials. However this meant that there was two weeks worth of food waste to collect in the first week. This placed more pressure on the collection crews, since they also had to learn how best to carry out the collections and sometimes had to deal with contamination issues (see section 5.4).

Good practice tip: scheduling distribution of containers

Distribute containers one week prior to launch – you will have only one week's worth of food waste to collect in the first week of collection. Get agency staff to cover the collection crew's regular tasks so that they can help with distribution, get to know the rounds better and become more involved in the food waste collections.

Most authorities found that that one lorry and crew could distribute containers to about 500 to 600 households per day. Distribution to multi-occupancy properties was found to take two to three times longer in comparison to other residential housing.

5.7.2 Pre-packing materials to be distributed

The trials distributed kerbside containers, kitchen caddies and liners at the same time, and sometimes with explanatory leaflets (though in some areas leaflets had been posted to trial residents previously). These items were packed together (i.e. caddies, liners and leaflets placed inside kerbside containers) prior to being dropped off. Clearly, local authorities have the choice of carrying out the distribution themselves, passing the task on to their waste contractor or calling on the container provider to organise the distribution. One container provider contacted during the course of this study stated that of the local authorities purchasing food waste containers approximately 70% requested that they (as container provider) orchestrate the container distribution.

Putting together food waste kits (kerbside container, caddy, liner supply and leaflet) in the back of a lorry (as opposed to in a depot/warehouse) had the advantage that more containers could be carried on the lorry. This meant that the lorry had to return to the depot fewer times during the day.

Overall, however, it seems that the pre-packing (at a depot, or using a logistics company) worked just as well as packing items on a lorry. If items are pre-packed at a depot, it should be ensured that they are kept in a dry storage area, particularly if liners are being supplied, since the liners will start to decompose if they get wet. Likewise, when liners are presented at the kerbside they need to be contained within the receptacles and covered to prevent exposure to rain.

The importance of local knowledge of the collection areas was emphasised. If possible, it is beneficial for the staff that will be carrying out the food waste collections to assist with distribution. In any event, good local knowledge is required in order to carry out distribution effectively.

Image 28: Distributing containers in Broadland



5.8 Communications

5.8.1 General approaches to communications used in the trials

Communicating with residents is a key part of any food waste collection scheme. The primary focus for communications for most of the WRAP supported trials was in the run up to and during roll-out of the service. Leaflets were the most common means of communication. The attitudinal survey in five trial areas asked residents what communications materials or publicity about the trials they had seen and the most commonly cited communications stated by the respondents were:

- introductory leaflet, informing residents of the forthcoming launch of the collections (37% of respondents¹⁶);
- instructional leaflet, provided during the scheme launch (35%); and
- reminder leaflet, provided once trials were up and running (32%).

The next most common type of communication cited by respondents in the attitudinal surveys was door-to-door visits by local authority staff to explain the new collections (7% of respondents).

Some local authorities also employed other means to communicate with residents, particularly in the run-up to the launch of trials, including:

- local media, such as newspaper, television and radio coverage;
- road shows or stalls promoting and explaining the new collections; and
- articles in council magazines or newsletters.

As with any type of kerbside collection scheme, effective communication to residents on the merits of food waste recovery is necessary to maximise participation, maximise material capture, minimise contamination and

¹⁶ Area level averages for surveys findings in five trial areas.

announce any service changes that may affect residents. Effective communication does not comprise a single form of media but instead a combination of different approaches. The different approaches adopted during the food waste collection trials include:

- door-to-door canvassing;
- leaflet design and print (including narrative in minority languages);
- posters (in communal blocks);
- press releases; and
- web site promotion.

Further information on some of the partner authorities' experiences of communicating with residents on the collection trials is contained within the case study that accompanies this report.

Image 29: Television interview promoting the food waste trials in Broadland



5.8.2 WRAP support for producing publicity materials

WRAP provided templates and other support to assist the authorities in producing effective publicity materials for the food waste trials. An example of a leaflet produced using one of the WRAP templates is shown below.

The consensus amongst the partner authorities is that the WRAP materials have been of high quality and effective in getting key messages across to residents. More significantly, the attitudinal surveys carried out in five of the trial areas showed that residents have generally responded well to the leaflets:

- 95% of respondents thought that the leaflets provided all the information they required to take part in the collections;
- 88% of respondents stated that the leaflets encouraged them to participate in the collections; and
- 80% of respondents claimed that the leaflets had resulted in them generally recycling more than they had done previously.

Moreover, 75% of survey respondents stated that they had learned something about food waste. Although this represents a large majority of respondents, this is a lower proportion of respondents than for other issues (as detailed in the bullets above). This suggests that an increased focus on issues around food waste and its environmental impacts in the communications materials might get these messages across to a higher proportion of householders.

For some trials the materials supplied by WRAP were adapted to a style and branding specific to individual local authorities. In a few cases, problems were reported in merging the WRAP communications materials in this way, but for the most part the partner authorities found that the WRAP materials were easy to merge with their own templates and styles.

Image 30: Leaflet promoting the food waste trial in Newtownabbey

The benefits of recycling food waste

- Gives you the opportunity to recycle more of your waste.
- Reduces the odour caused by rotting food waste by providing a special containment system and regular service.
- It's easy and convenient as householders are provided with doorstep collection services.
- It reduces the amount of waste that has to be landfilled which helps to cut down the cost of waste disposal.
- It reduces the amount of methane gas produced in landfill sites, which is a cause of global warming.
- Your treated food waste will be used to create energy as a renewable bio-fuel.

don't delay recycle today

If you have any queries about this new collection please contact our helpline below:

Contact Newtownabbey
028 9034 0211
www.newtownabbey.gov.uk
info@newtownabbey.gov.uk

This leaflet is printed on recycled paper

Food Waste Recycling

Your New Food Waste Collection Service

NEW

don't delay recycle today

Newtownabbey BOROUGH COUNCIL

Good practice tip: WRAP support for communications

The communications support provided by WRAP has proved to be very popular with the partner authorities and with residents. In particular it was considered that the design and messages in the materials supplied by WRAP were simple, clear and easy to understand, with a pictorial approach and good use of icons. Templates for the leaflets designed for the trials are available at – <http://www.recyclenowpartners.org.uk/>.

WRAP can help you design effective communications materials for your food waste collection scheme and can provide expert advice on the best means of engaging with residents. Contact: lgs@wrap.org.uk.

5.8.3 Engaging with residents: specific issues

The partner authorities provided feedback on several specific issues in relation to communicating with residents about the collections, as described below.

5.8.3.1 Publicising launch dates

When communicating the new service it is important to be unequivocal about when the collections will start. One local authority issued a 'teaser' leaflet with a provisional start date. However, delays in the delivery of the collection vehicle meant that the actual launch date had to be put back, creating problems with communicating the final launch date and resulting in some residents putting out food waste before collections had commenced.

5.8.3.2 Promoting home composting

Food waste collections can compete with home composting activity. The attitudinal survey carried out in five trial areas showed that around one quarter of home composters said they composted less compostable food waste as a result of having a food waste collection service (see section 4.4). Therefore it is vital to counteract this effect

by continuing to promote home composting including explaining to residents that home composting is the environmentally preferable option for dealing with certain types of food waste (uncooked vegetables, fruit and peelings, etc).

5.8.3.3 Promoting food waste reduction

There is only limited evidence from the trials to show that implementing a food waste collection scheme reduces the amount of food waste produced; 8% of respondents to the surveys claimed increased awareness of the need to avoid food waste and 5% stated that they now think more about the food they buy. Avoided CO₂ emissions from preventing food waste amount to 4.5 tonnes per tonne of avoided food waste compared to 0.45 tonnes per tonne of food waste recycled through in-vessel composting, for example. WRAP's *Love Food Hate Waste* campaign has gained considerable momentum – as well as popular acclaim – since launching in November 2007 and should be the starting point for local authorities wishing to promote household food waste reduction (http://www.wrap.org.uk/love_food_hate_waste/partners/). Support may also be available from WRAP for local Love Food Hate Waste campaigns (see www.wrap.org.uk/local_authorities/local_authority_support/index.html).

5.8.3.4 Communications after roll-out

The trials have shown that collection yields and participation rates can fall off after the launch of the service particularly in areas with weekly refuse collections (see section 4.1). In view of this, it is especially important to invest in communicating with residents on an ongoing basis, in order to prevent participation in the scheme from decreasing. The additional food waste yields achieved through preventing a fall off in participation will maintain the efficiency of the scheme and make any investments in communications well worth while.

5.8.3.5 Getting messages across effectively

Many partner authorities considered that the most effective way to engage with residents was through door-to-door activities. For written or visual publicity materials, the use of pictures or icons was thought to be particularly effective in getting messages across to residents. For culturally diverse areas with significant proportions of the population for whom English is not their first language, it is important to provide translations for key communications materials for the main language groups. Additionally there is an opportunity to use cultural styles or icons to piggy-back messages promoting food waste collections.

For further information about communications strategies used during the WRAP trials, refer to the communications case study: www.wrap.org.uk/fwct.

Image 31: Bollywood inspired publicity promoting recycling to Luton residents



Appendix 1: other resources and guidance

This appendix lists other research and guidance to assist in increasing your understanding of food waste collection systems, deciding which system is most appropriate for you and improving the quality of service that you provide.

1.1 Reports from WRAP

Food waste collection guidance

This report provides comprehensive guidance on implementing and managing food waste collections. The report can be downloaded at: www.wrap.org.uk/fwct.

The food we waste

This ground-breaking report provides for the first time an objective assessment of the amounts and types of food we buy but don't eat. It is a call to action for government, retailers, food manufacturers, NGOs and all of us, in our role as consumers, to reduce the food we waste. The report is available to download from www.wrap.org.uk/thefoodwewaste.

Household Biowastes

Various useful reports and a summary of recent research into food waste issues are available at http://www.wrap.org.uk/local_authorities/research_guidance/food_waste, including:

- **Understanding Food Waste - Research Summary:** Key findings of WRAP's recent research on the nature, scale and causes of household food waste.
- **Dealing with Food Waste in the UK:** This report prepared for WRAP by Eunomia Research & Consulting, shows that there can be real cost and environmental gains from collecting garden and food waste separately from each other.
- **Managing Biowastes from Households in the UK: Applying Life-cycle Thinking in the Framework of Cost-benefit Analysis:** This report prepared by Eunomia Research & Consulting provides further details on the cost-benefit analysis for dealing with food and garden waste. It was the first major study of its kind in the UK and was key informing the design and need for the food waste collection trials. An updated analysis of the cost assessment taking account of the experience gained from the food waste collection trials is now available.

Love Food Hate Waste

The main website for WRAP's campaign for raising awareness about food waste issues is www.lovefoodhatewaste.com and in Scotland www.wasteawarelovefood.com

1.2 Reports from Defra

Enhancing participation in food waste collections

This study, carried out by Brook Lyndhurst on behalf of Defra, investigated public attitudes and behaviour in relation to food waste collections. The study also provides valuable guidance on how to engage the public and maximise participation in food waste collections. The project report is due to be published in Autumn 2009.

For further assistance in implementing food waste collections, local authorities should contact the ROTATE team at WRAP: email: lgs@wrap.org.uk, tel: 01295 819661.

Appendix 2: statistical tests on trial data

This appendix provides brief details on statistical tests and background information on data collected for the purposes of evaluating the performance of the WRAP supported food waste collection trials.

2.1 Food waste yield data

Food waste yield data is summarised in Table A2.1. This shows the mean yields of food waste for each area in units of kilogrammes per household served per week with respective standard deviations; and maximum yield and minimum yield values across the duration of the trials in each relevant area.

Table A2.1: Food waste yield data for the WRAP supported food waste collection trials

Local Authority	Food waste yield data			
	Mean kg hhd week	Standard deviation	Max mean kg hhd / week /round	Min mean kg hhd / week /round
Belfast	1.09	0.13	1.29	0.57
Broadland	1.84	0.18	2.50	1.51
Calderdale	1.28	0.18	1.79	0.73
Croydon	1.64	0.28	2.37	0.55
East Devon	1.79	0.29	2.78	1.07
Elmbridge	1.46	0.12	1.74	1.09
Guildford	1.70	0.18	2.68	1.44
Hackney	0.32	0.13	0.83	0.08
Kingston-u-Thames	0.45	0.10	0.73	0.25
Luton	1.12	0.17	1.54	0.78
Merton	1.19	0.37	2.60	0.69
Mid Bedfordshire	1.89	0.09	2.14	1.65
Mole Valley	1.75	0.11	2.05	1.21
Newcastle upon Tyne	1.14	0.10	1.37	0.90
Newtownabbey	0.53	0.07	0.88	0.43
Oldham	1.22	0.11	1.45	0.98
Preston	1.04	0.12	1.25	0.81
South Shropshire	2.10	0.43	4.24	1.33
Sutton	1.38	0.26	2.94	0.42
Waveney	1.17	0.22	1.80	0.86
West Devon	1.48	0.19	2.16	0.86

Figure 3 in Section 4.1.1 shows the yields achieved by each trial during, respectively, the first and second half of each trial. For example, if a particular trial had been running for a total of 40 weeks, average yields per household served per week were calculated for the first 20 weeks of that trial and compared to corresponding yields for the second 20 weeks. This is considered to be the most consistent approach to carrying out a comparative analysis of the performance of the trials, in terms of their performance during, respectively, the first and second half of the duration of each trial. The only major change that occurred in trial configurations was that Guildford changed the refuse collection frequency from weekly to fortnightly for two of their trial rounds. This factor was considered during the comparative analyses described in Section 4.1.

2.2 Comparisons of trial rounds with fortnightly and weekly refuse collections

T- tests were carried out on mean yield (kg per household served per week) grouped by whether or not trial rounds had refuse collected weekly or fortnightly (AWC systems). The results are summarised in Table A2.2.

Table A2.2: T-test outputs for comparison of food waste yields for trial rounds with weekly and fortnightly refuse collections

Group Statistics					
	AWCrefuse	N	Mean	Std. Deviation	Std. Error Mean
yield	weekly refuse	27	1.3199	.24132	.04644
	AWC refuse	30	1.5220	.48560	.08866
yieldfirst	weekly refuse	27	1.4122	.24827	.04778
	AWC refuse	30	1.5843	.51593	.09420
yieldsecond	weekly refuse	27	1.2340	.24431	.04702
	AWC refuse	30	1.4551	.47506	.08673

Similar tests were carried out across deprivation scores and found that for overall Index of Multiple Deprivation (IMD) scores and income scores, there were no statistically significant differences between the fortnightly (AWC) refuse and weekly (non-AWC) refuse systems represented on the rounds analysed, as shown in Table A2.3.

Table A2.3: T-test outputs for comparison of deprivation and income scores for trial rounds with weekly and fortnightly refuse waste collections

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
yield	Equal variances assumed	24.550	.000	-1.954	55	.056	-.20203	.10338	-.40920	.00514
	Equal variances not assumed			-2.019	43.450	.050	-.20203	.10009	-.40381	-.00025
yieldfirst	Equal variances assumed	18.176	.000	-1.575	55	.121	-.17203	.10921	-.39089	.04684
	Equal variances not assumed			-1.629	42.691	.111	-.17203	.10562	-.38508	.04102
yieldsecond	Equal variances assumed	27.861	.000	-2.173	55	.034	-.22112	.10178	-.42510	-.01715
	Equal variances not assumed			-2.241	44.283	.030	-.22112	.09866	-.41992	-.02233

T- tests were also carried out on mean yield (kg per household served per week) grouped by whether trial rounds with refuse collected weekly use wheeled bins or sacks for refuse. The results are summarised in Table A2.4.

Table A2.4: T-test outputs for comparison of food waste yields for trial rounds with weekly fortnightly refuse collections, comparing refuse containment with wheeled bins or sacks

Group Statistics					
	containment	N	Mean	Std. Deviation	Std. Error Mean
yield	wheeled bin	14	1.2086	.23460	.06270
	sack	13	1.4399	.19105	.05299
yieldfirst	wheeled bin	14	1.2938	.26418	.07060
	sack	13	1.5398	.15476	.04292
yieldsecond	wheeled bin	14	1.1237	.20412	.05455
	sack	13	1.3527	.23392	.06488

Similar tests were carried out across deprivation scores and found that for overall Index of Multiple Deprivation (IMD) scores, there were no statistically significant differences between the refuse containment systems represented on the rounds analysed, as shown in Table A2.5.

Table A2.5: T-test outputs for comparison of deprivation scores for trial rounds with weekly refuse collections using wheeled bins or sacks

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
yield	Equal variances assumed	1.200	.284	-2.796	25	.010	-.23133	.08273	-.40172	-.06094
	Equal variances not assumed			-2.818	24.604	.009	-.23133	.08209	-.40054	-.06213
yieldfirst	Equal variances assumed	4.578	.042	-2.922	25	.007	-.24601	.08420	-.41941	-.07260
	Equal variances not assumed			-2.977	21.242	.007	-.24601	.08263	-.41772	-.07429
yieldsecond	Equal variances assumed	.155	.697	-2.716	25	.012	-.22903	.08432	-.40270	-.05536
	Equal variances not assumed			-2.702	23.927	.012	-.22903	.08477	-.40401	-.05406

2.3 Investigation of effects of household sizes on food waste yields achieved by the WRAP supported trials

Census data was used to determine average household sizes for each of the areas covered by the WRAP trials. Figure A2.1 plots average weekly yields of food waste per household served (green bars) and per person served (brown bars). The average household sizes in each trial area are illustrated by the blue diamonds. The two multi-occupancy trials in Newtownabbey and Kingston-upon-Thames achieved the lowest yields and indeed have the lowest average number of people per household amongst the WRAP trials. This suggests that part of the reason for the relatively low food waste yields in these areas is due to smaller household sizes. However, when converted to the average yield per participating household (Figure A2.2) the brown bars show that the average yield per participating person in the multi-occupancy trials did not differ greatly from areas with larger households (and less waste per capita), suggesting that other factors, such as socio-demographics and lifestyle influences (such as eating out propensity to consume 'fast food' or purchase of BOGOFs), are at work here.

Figure A2.1: Average weekly food waste yields per household and person served, plotted against average household size

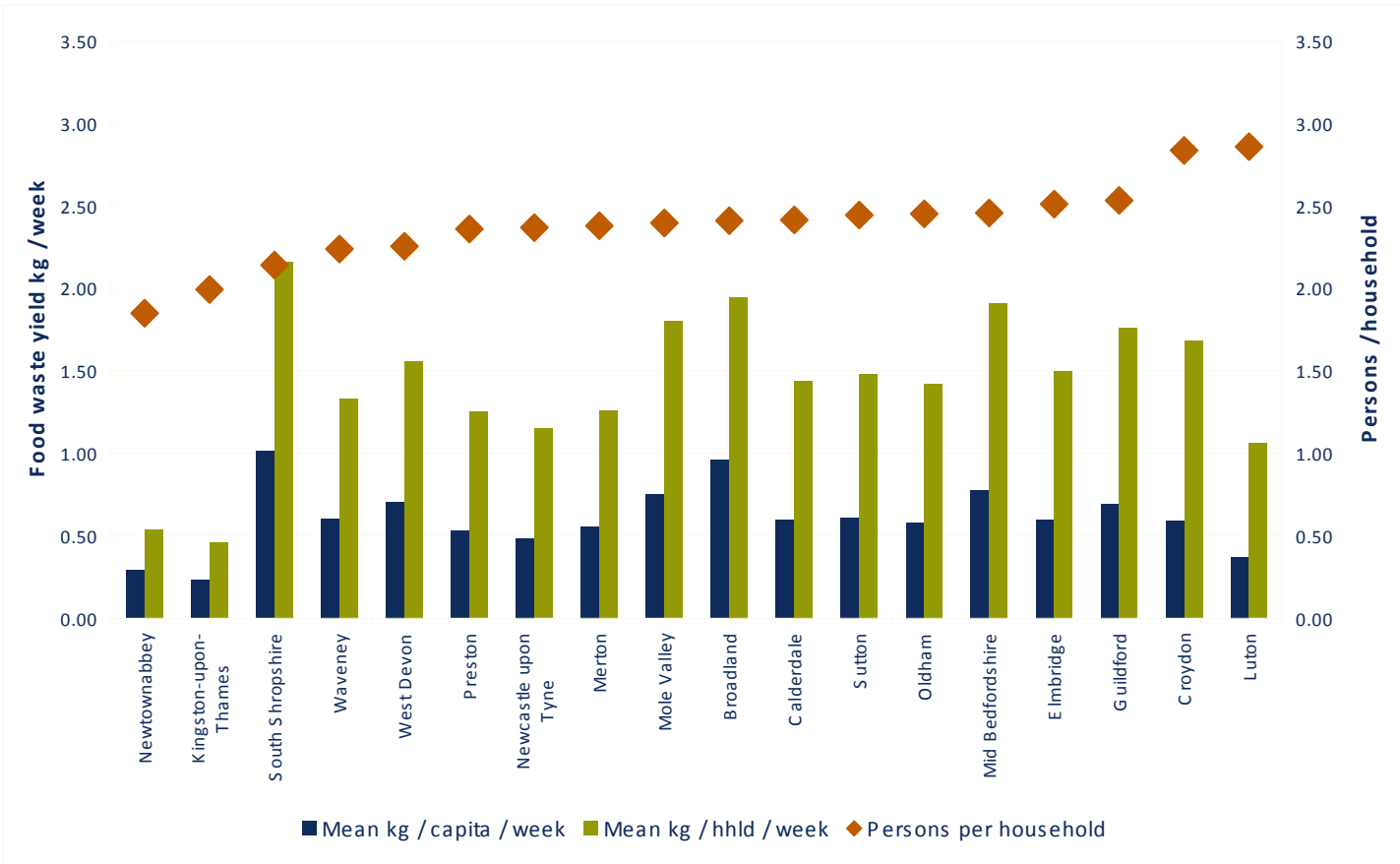


Figure A2.2: Average weekly food waste yields per household and per person participating, plotted alongside average household size

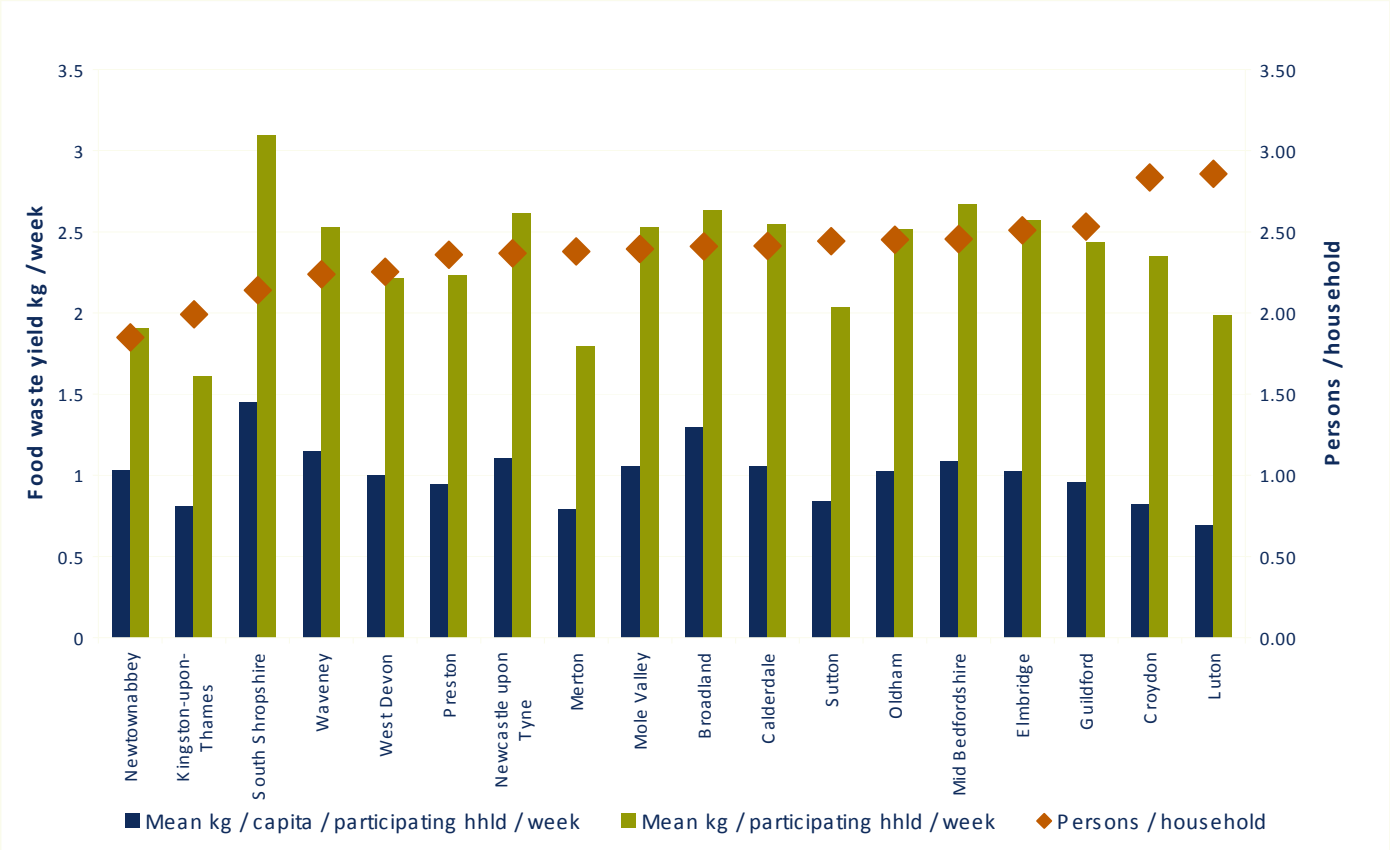


Figure A2.2 shows no clear pattern that links household size and food waste yields. The bars indicate that there was considerable variation in the average amounts of food waste set out per person participating household and per person across the 68 trial rounds.

By contrast, WRAP's The Food We Waste project found a strong correlation between household sizes and the amounts of food waste produced by each household. The Food We Waste project's findings are convincing, not least due to the reasonably large scale of data gathering, and the fact that the project was set up specifically in order to investigate issues such as correlations between household size and food waste arisings. The WRAP supported food waste trials were not set up in this manner, partly due to the trials being set up as practical food waste collection pilot schemes, rather than as a research project per se. The census level data on household sizes may not have been sufficiently sensitive in order to detect the effects of household sizes on food waste yields achieved by the trials. Nonetheless, it is striking that factors other than average household size were found to be significant in affecting the yields achieved by the WRAP supported trials; namely refuse collection frequency and level of deprivation.

Finally, it is worth noting that the Indices of Multiple Deprivation are related, at least to some degree, to average household sizes (i.e. more deprived areas tending to have lower average household sizes, influenced by smaller households in flats); and the effects of household sizes have indeed been detected in the food waste yields achieved by the WRAP trials, though through the indirectly related proxy factor of deprivation.

Appendix 3: Outline project plan used for trials

Scheme Design

A1	decide on trial area	AUTHORITY
A2	review productivity of collection service	WRAP
A3	review travel times to depot and compost facility	AUTHORITY
A4	estimate indicative set out rates	WRAP
A5	plan day route and round size	contractor
A6	develop contingency plan for operations	contractor
A7	Inform Area Committees	AUTHORITY

End market

		AUTHORITY
B1	Agree allocation of treatment capacity	AUTHORITY
B2	Agree gate fee and secure supply agreement	AUTHORITY
B3	Determine specification for material and contamination level accepted	AUTHORITY
B4	Arrange weighbridge at IVC or depot	contractor
B5	Check working hours at IVC	AUTHORITY
B6	Determine route to IVC from round	contractor
B7	Arrange method for collecting tonnage data	AUTHORITY

Communications

C1	Collect current scheme Promotions	WRAP
C2	Review current scheme designs	WRAP
C3	Approval process for artwork	BOTH
C4	develop design brief	WRAP
C5	Decide on concepts	WRAP
C6	develop Guidelines and templates	WRAP
C7	Agree text and logos	BOTH
C8	Concept finalisation and sign off	WRAP
C9	print time	contractor
C10	Tailor promotions specific to L.A.	WRAP
C11	Agree introductory flyer	AUTHORITY
C12	Agree instruction leaflet	AUTHORITY
C13	Identify space for additional promotional material and liners on vehicle	Contractors
C14	Agree design and logos for vehicle	AUTHORITY
C15	Arrange for decals	AUTHORITY
C16	Arrange photo opportunities	AUTHORITY
C17	Write and issue press release	AUTHORITY

Vehicle Refurb/modification

D1	review vehicle options	WRAP
D2	agree vehicle style	AUTHORITY
D3	Procure/ modify vehicle	AUTHORITY
D4	Add vehicle to O license	Contractors
D5	Arrange for storage of vehicle	Contractors
D6	Arrange insurance & tax	Contractors
D7	Agree maintenance schedule	Contractors
D8	Arrange breakdown cover	Contractors
D9	Agree ABPR with trading standards	AUTHORITY
D10	Devise method to prevent overloading	AUTHORITY
D11	Arrange PPE and spill kit on vehicle	Contractors

Containers

E1	procure boxes / liners	WRAP
E2	procure bins	WRAP
E3	sort out storage space for bins and liners	AUTHORITY
E4	Agree re-distribution method for liners	AUTHORITY
E5	Devise distribution method for bins, caddies and liners	AUTHORITY
E6	distribution of bins and initial liners	AUTHORITY

M&E

F1	Check for testing / survey work	WRAP
F2	design monitoring programme	WRAP
F3	Write Brief for M&E contractors	WRAP
F4	Tender Period for M&E contractors	Contractors
F5	secure monitoring companies	WRAP
F6	pre-project participation monitoring	WRAP

Depot (if bulking)

G1	Develop service agreements with site manager	AUTHORITY
G2	Set up depot space	AUTHORITY
G3	design off loading arrangements	BOTH
G4	Agree ABPR with trading standards	AUTHORITY
G5	Arrange haulage contractor	Contractors
G6	Devise method for skip empty and empty schedule	Contractors

Training

H1	Identify training needs for crew	BOTH
H2	Identify training needs for call-centre staff	BOTH
H3	Prepare training plan	WRAP
H4	Identify and prepare FAQs	WRAP
H5	Production of Training Package	WRAP
H6	training of crews	Contractors
H7	Training of call-centre staff	AUTHORITY
H8	Prepare brief outline to Councillors	AUTHORITY
H9	Send out Councillor note	AUTHORITY

Project Work

I1	Define invoicing system, reporting system, communication channels	WRAP
I2	service starts	AUTHORITY
I3	Advisor visit to check progress (quarterly)	WRAP
I4	Quarterly progress reports (quarterly)	WRAP
I5	sign off payments (quarterly)	WRAP
I6	chase up each month	WRAP
I7	distribution of literature (along with equipment)	AUTHORITY
I8	service stops	AUTHORITY
I9	appraisal of scheme	WRAP
I10	survey to residents	WRAP
I11	survey to staff	AUTHORITY
I12	analyse data	WRAP
I13	Project Closure	WRAP

**Waste & Resources
Action Programme**

The Old Academy
21 Horse Fair
Banbury, Oxon
OX16 0AH

Tel: 01295 819 900
Fax: 01295 819 911
E-mail: info@wrap.org.uk

Helpline freephone
0808 100 2040

www.wrap.org.uk/local_authorities/research_guidance/food_waste

