wrap

Working together for
a world without waste

Effect of food waste collections on arisings: recent evidence

Press F5 to view as presentation

Tom Quested

August 2013

Executive summary

- 7.2 million tonnes of food was thrown away by UK households in 2010, with at least 4 million tonnes being sent to landfill. Collecting food waste separately allows it to be diverted from landfill. There are also clear benefits of treating it (e.g. via composting or anaerobic digestion): reduced environmental impact and disposal costs, and obtaining beneficial outputs (e.g. compost, digestate, biogas).
- However, even if food waste is collected separately and treated, there are still substantial emissions associated with its production, processing, storage and transport. Ideally, the amount of food waste generated would be minimised and waste that can't be avoided would be collected and treated appropriately.
- This work looks at potential additional benefits that collections may have on waste prevention.
- Many respondents to questionnaires claim to change their behaviours relating to food waste prevention following the introduction of food waste collections. In some households, these changes might be associated with increased levels of waste, whilst in others a decrease might be expected.

Executive summary

- However, there is no evidence of a substantial net (or overall) effect on arisings. For example, local authorities and households with collections targeting food waste generate similar levels of waste to those without. This – and other evidence presented in this study – suggests that any net effect of introducing collections on the amount of food waste arising is small.
- Introducing food waste collections provides an opportunity to engage households on food waste prevention to reduce avoidable food waste arisings. Integrated advice has the potential to both:
  - Increase the number of households engaged in food waste prevention, and
  - Increase the number of households using separate collections
- This is further explored in '*Food waste messages for maximum impact*'

Introduction

- This presentation examines recent evidence about the interaction between food waste collections and food waste arisings in households
- In particular, it focuses on the following research questions:
  - Does the introduction of food waste collections have an impact on the amount of food waste generated?
  - If so, why does this happen?
  - What is the likely impact on food waste arisings if collections are more widely introduced?
  - Can anything be done to minimise food waste arisings as food waste collections are introduced, whilst ensuring that collections are properly used?
- The presentation briefly reviews previous work in this area, before examining new evidence and drawing conclusions in light of this evidence.

Previous work

Previous work – 1

In August 2011, WRAP published a literature review on this subject entitled, *Relationship between Household Food Waste Collection & Food Waste Prevention*. The main conclusion was:

"… there is little evidence to substantiate any firm conclusions that implementing a separate food waste collection will lead to a change in behaviour around food waste prevention 'at source'. There is, however, good evidence that there is a very considerable reduction in [local authority] collected food waste arisings overall (24% in the most convincing study). However the extent to which diversion to home composting contributes to this is unknown, and could be significant."

This presentation builds on the previous literature review and reassesses the above conclusion in light of recent evidence. There were two key pieces of evidence underpinning the above conclusion, summarised on the next slide.

Previous work – 2

1. A review of the introduction of Somerset Waste Partnership's waste collection service (*SORT IT!)*. This introduction occurred during 2004-2006 and involved changes to residual waste and recycling collections, including introduction of separate food waste collections. Other changes included charging for garden-waste collections and communication of these changes to residents. The review of evidence concluded:

"Composition analysis also indicates that total food waste collected through the SORT IT! collections (composting and refuse services) is about 24% less than collected previously through weekly refuse collections. This reduction may be due to the new food waste collections reducing food waste by highlighting to householders how much was produced, […] by encouraging more home composting or through moisture loss in storing and transferring food waste for composting. Composition analysis of HWRC waste suggests that more food waste being taken to HWRCs for disposal is only a small factor."

2. Analysis by Resource Futures of two datasets from WRAP research showed that local authorities with food waste collections had lower overall arisings of food waste than local authorities without food waste collections. The study also noted that there were many interacting factors that could affect the results and recommended research to measure food waste levels before and after the introduction of food waste collections.

Hypotheses

There are (at least) three potential effects of food waste collections on food waste arisings:

1. **The Prevention Effect**: the presence of collections could increase the awareness of food waste arisings and lead to prevention at source via changes in behaviour
2. **The Legitimisation Effect**: The fact that local authorities collect food waste for separate processing could 'legitimise' the generation of food waste. This could lead to people decreasing the extent of waste-preventing behaviours or increasing waste-generating behaviours. It could also lead to difficulties in engaging the public in initiatives aimed at preventing food waste.
3. **Interaction with Home Composting**. Food-waste collections could:
   - Raise awareness of quantities of home compostable food, which could lead to an increase in home composting
   - Provide containers that could assist with home composting (i.e. a caddie), which could also lead to an increase in home composting
   - Provide an alternative route for material usually home composted, leading to a reduction in home composting

Given previous evidence, the prevention effect was hitherto thought to be the strongest (and therefore most important) effect of food waste collections on arisings.

New Evidence

Sources of new evidence

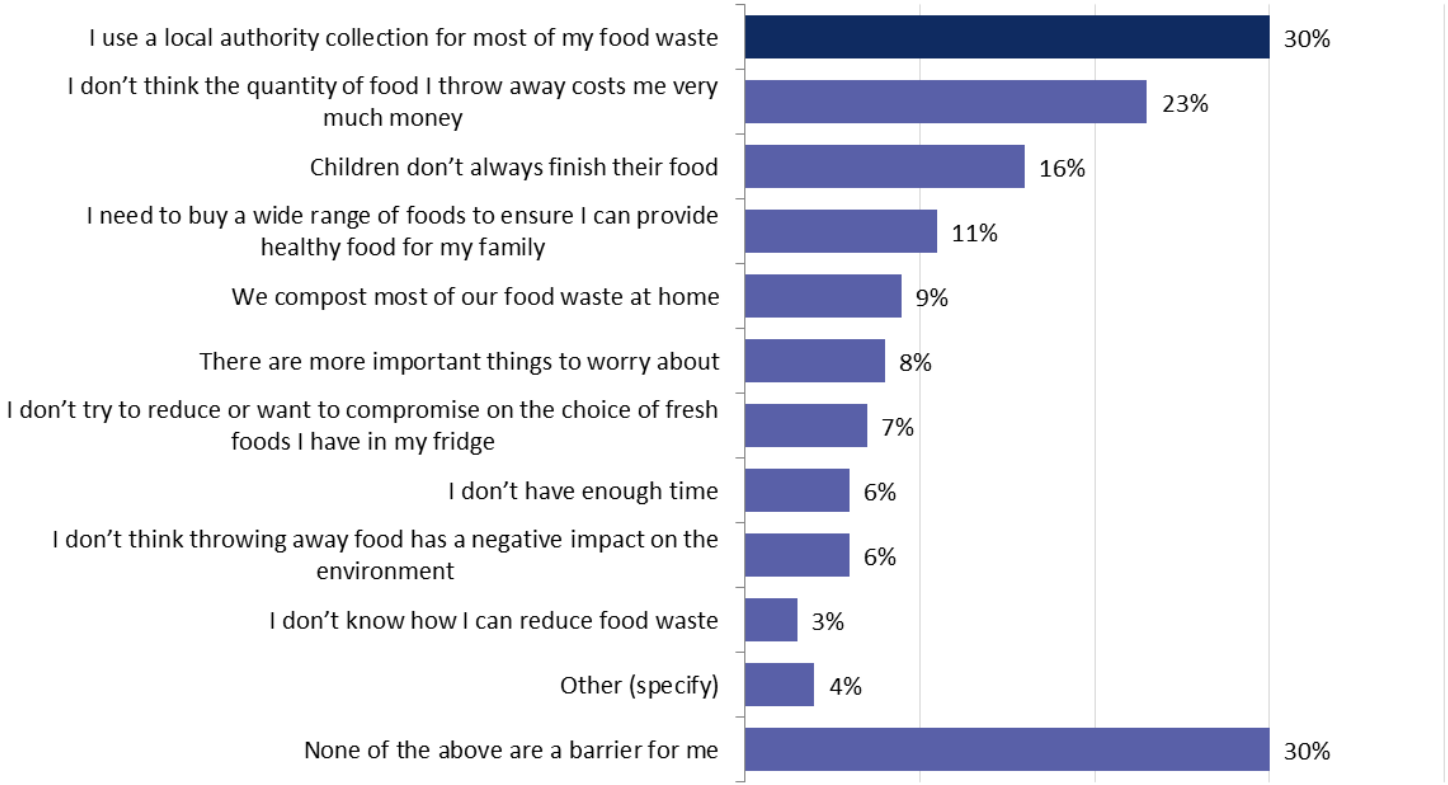
New evidence comes from a number of sources:

- **WRAP's Food Waste Tracker:** regular consumer food waste questionnaire (online panel, with a weighted representative sample of c. 2,600 UK households, data quoted in this presentation is from November '12)
- ***Fresher for Longer* research:** Consumer attitudes to food waste and packaging (one-off on-line survey, representative sample of c. 4,000 UK households, July '12)
- **Local Authority Synthesis:** Additional analysis of dataset behind Defra's project EV0806: *National compositional estimates for local authority collected waste and recycling in England, 2010/11* (analysis of c. 100 compositional analyses alongside data from WasteDataFlow)
- **Kitchen Diary 2012:** Preliminary results* of WRAP's food waste diary (c. 950 households representative of UK demographics, May '12)

*The kitchen diary research is currently unpublished and the figures presented in this report are not finalised. Very minor changes to the results may occur which are unlikely to change any of the conclusions in this presentation.

WRAP's food waste tracker points towards the legitimisation effect

Which (if any) of the following reasons hinder you from trying to minimise the amount of food that your household throws away?



Source: WRAP tracker - 647 people who use a council food waste collection to dispose of food waste; multicode (more than one answer could be given)

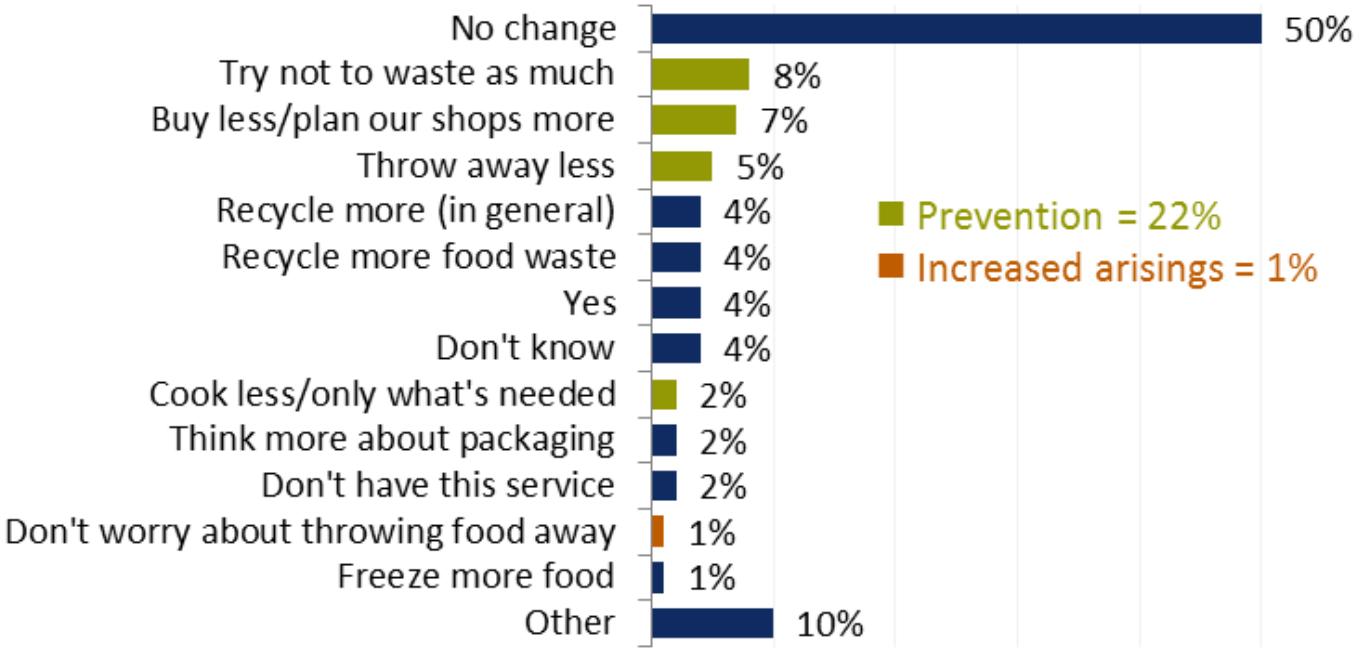
WRAP tracker and the legitimisation effect

- The previous slide indicates that 30% of respondents with food waste collections cited these collections as a barrier to reducing the amount of food they waste. This is more than any other reason given by those with collections. This result has been seen in multiple waves of the WRAP tracker and in all nations within the UK. The magnitude of this barrier is similar whether the collections only target food waste or accept mixed garden and food waste.
- For some people citing food waste collections as a barrier, it is conceivable that this is not the root cause of waste generated but a 'post-event justification', i.e. a way of justifying the generation of waste to themselves or the interviewer. If, however, the collections are a root cause, this result alone does not indicate how strong the relationship is between the collections and waste generation. As the primary research was not designed to explore the relationship between collections and prevention, there is no qualitative information to understand exactly why people are responding in this way.
- This result does hint that the relationship between collections and prevention has a conscious component for it to be picked up in the questionnaire.
- These effects have been investigated further using similar questions in different research…

Fresher for Longer: using an open question

(Potential response options were not provided to participants, and responses were subsequently coded; multiple options are possible from each respondent)

In what ways, if at all, has having a food waste collection changed how you think about your food waste; for instance has it altered how you shop, store, cook or throw away food, or not?

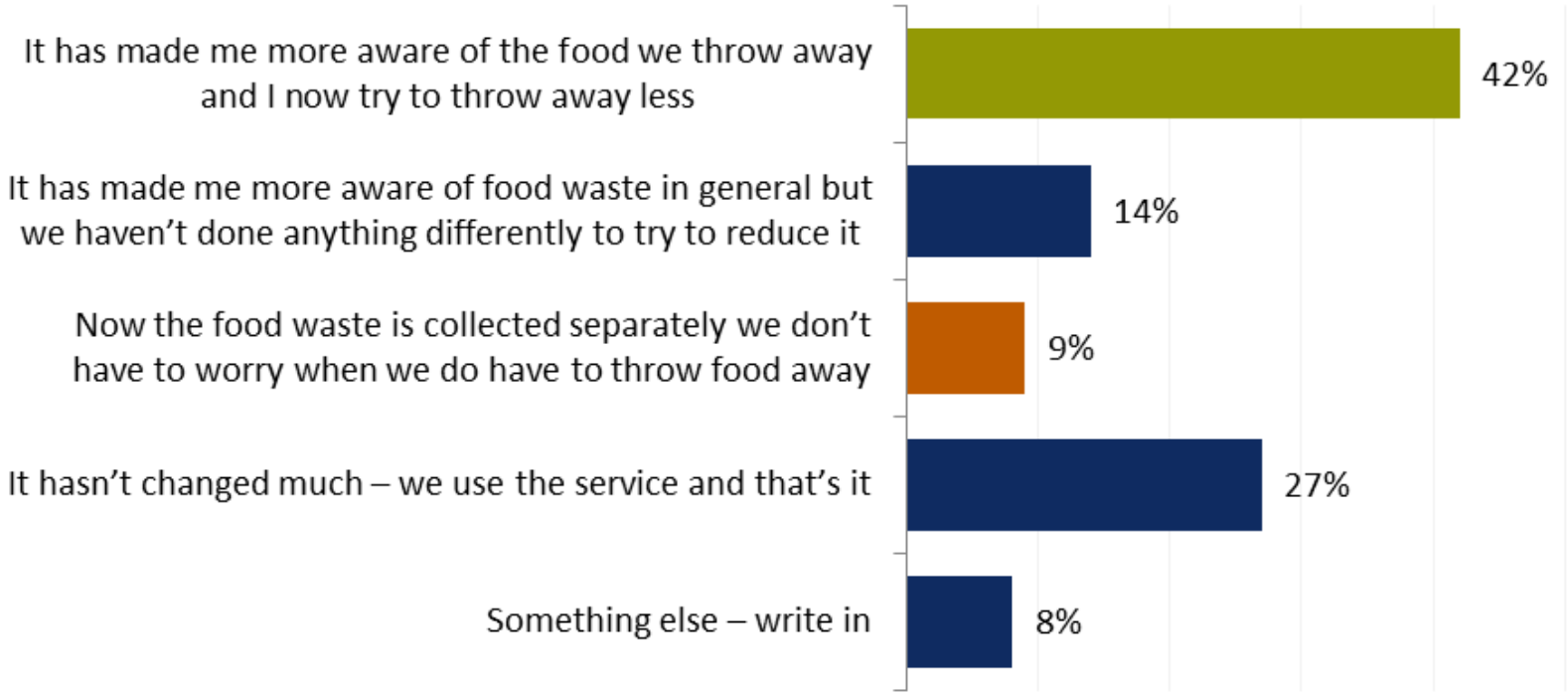


Base: Those with a food waste collection, split sample with closed version of question (*n* = 1015)

Fresher for Longer: using a closed question

(Potential response options were provided to participants, only one response option was allowed)

In what way, if at all, has having a food waste collection changed how you think about your food waste?



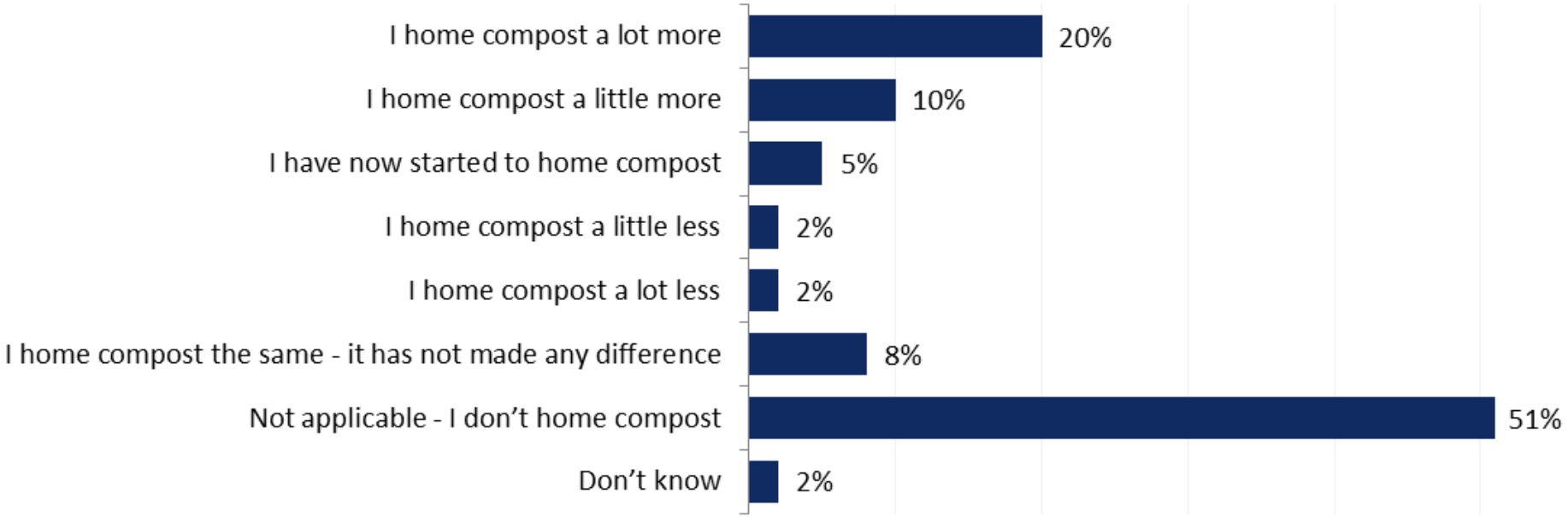
Base: Those with a food waste collection, split sample with open version of question (n = 1018); single code

Discussion of last two slides

- The previous two slides indicate that people with food waste collections are more likely to state that their introduction has led to a reduction in food waste than an increase. The results vary according to whether the question is asked open (no response options provided to participants) or closed (where a list of options is given): the closed version has a higher proportion of people claiming a prevention effect (42% versus 22%), and also a higher proportion claiming a legitimisation effect: 9% versus 1%.
- This substantial difference between results for open and closed questions indicates that too much significance should not be placed on these results alone. The differences could be due to issues of framing of the question and social desirability of responses.
- The difference between the WRAP Food Waste Tracker result (in which 30% of respondents claimed an 'adverse' relationship of collections on waste prevention) and the *Fresher for Longer* research (1-9% claiming such a relationship), also suggests that framing and social desirability are important factors for these questions.
- However, these results indicate that collections have the potential to alter how people consider food waste generation, and that this effect could be positive for one group of people whilst being negative for another.
- The same research also asked about food waste collections and home composting…

Fresher for Longer research: Home composting

Which of the following statements is true about the impact of the food waste collection on how much you put in your home compost?



Base: Those with a food waste collection (n = 2033) ; single code

Fresher for Longer research: home composting

- Taken at face value, the last slide indicates that the interaction between food waste collections and home composting could be quite large. It suggests that the introduction of collections may have a net effect of moving material out of council-collected waste streams and into home composting:
  - 30% claim to have increased home composting of food by a lot or a little
  - 5% claim to have started home composting of food
  - Only 4% of respondents claimed to have reduced the amount they home compost
- Social desirability may be a factor in shaping responses, although this may be less clear cut than for issues of waste prevention.
- However, the results from this question are not backed up by findings from kitchen-diary research…

Kitchen diaries 2012: interaction between home composting and food waste collections

Kitchen-diary research is one of the few sources of information about food waste arisings covering all major routes by which food waste leaves the home. This allows us to investigate the amount of food waste going to home composting for diary participants with and without food waste collections.

There is no significant difference between the average amount home composted by those with **access to collections** (375 grammes per household per week) and those without access (389 g / hh / wk).

However, the diaries do indicate an interaction between use of collections and home composting: those **using their collection** compost less (302 g / hh / wk) than those with access to a collection but not using it (581 g / hh / wk).

This information appears inconsistent with that on the previous two slides, from which we would expect those with collections (and using them) to compost more food waste.

Interaction between home composting and food waste collections - summary

Possible explanations for the discrepancy outlined on the previous slide include:

- Householders may not be aware of how food waste collections influence their home-composting practices and therefore this interaction won't be reflected in questionnaire responses: e.g. many people who would have otherwise started home composting may not consider it because they had access to food waste collections
- Questionnaire responses could be biased towards socially-desirable answers
- The presences of other, confounding variables influencing home compost levels that correlate with presence or absence of food waste collections

Other changes to collection schemes may have an impact on home composting levels. For instance, charging for garden-waste collections – as introduced in Somerset as part of the *Sort IT!* waste scheme – may encourage home composting, which in turn could influence the both home composting and the amount of food waste collected by local authorities. This effect would likely be strongest in areas where people have the space to home compost (e.g. rural and suburban settings) and where home composting of food is not already prevalent.

Comparative data

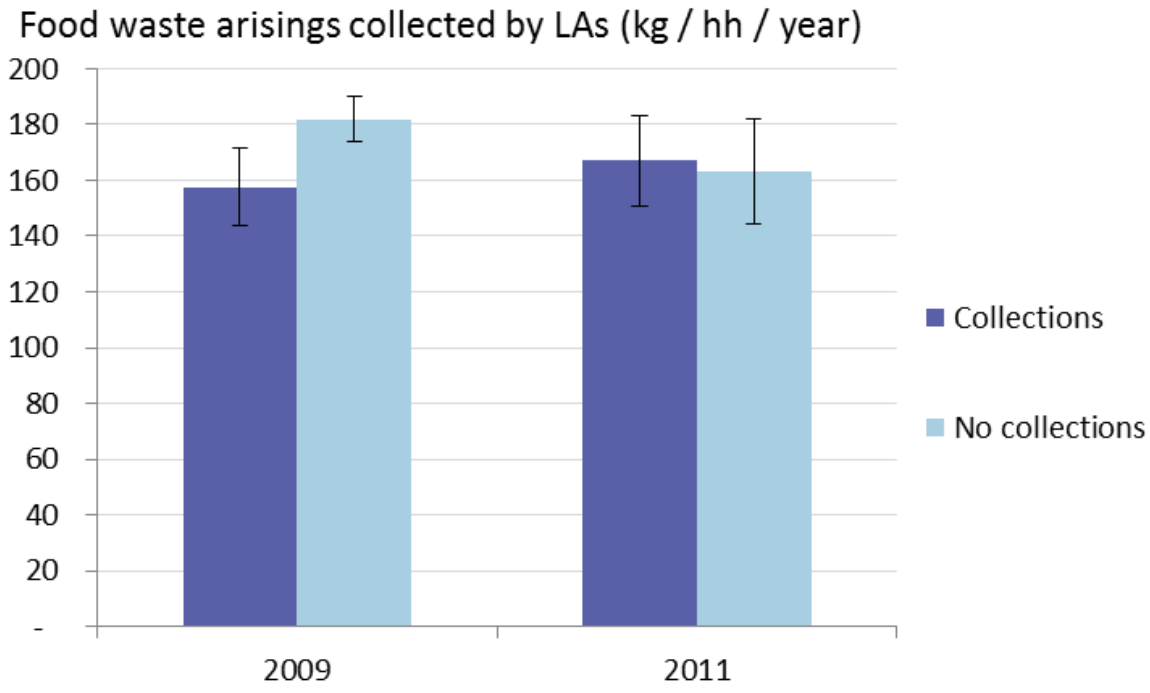
The next few slides make comparisons in food waste arisings between:

- Local authorities that offer food waste collections (either separately or mixed with garden waste) and those that have targeted food waste in their collections
- Households who use food waste collections compared to those that don't
- Households with or without access to food waste collections

Information is also presented on self-reported levels of food waste, split by presence or absence of food waste collections.

This information come from a range of sources, but appears to tell a consistent story…

Local authority synthesis: amount of food collected



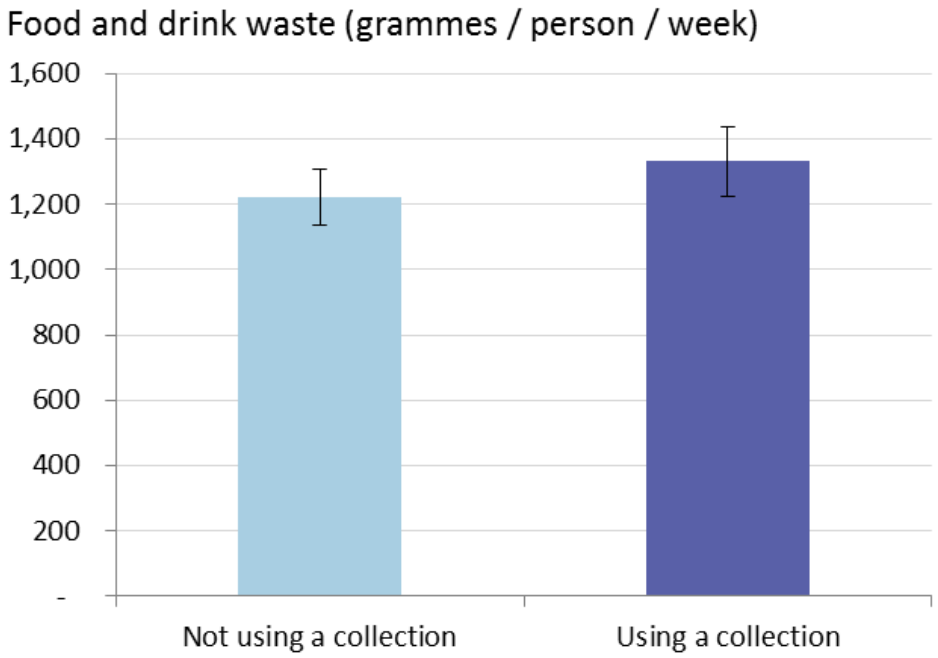
Error bars represent 95% confidence interval around the mean

This slide compares councils that collect food waste (either separately or with garden waste) to those that don't provide these services. The amount plotted in the graphs is a total of food waste in kerbside residual waste and in other kerbside streams targeting food waste (if present).

It shows that in 2009 there was significantly less waste was collected per household in councils that targeted food waste compared to those that did not. However, this difference was not observed in 2011.

Kitchen diaries 2012 – use of collections

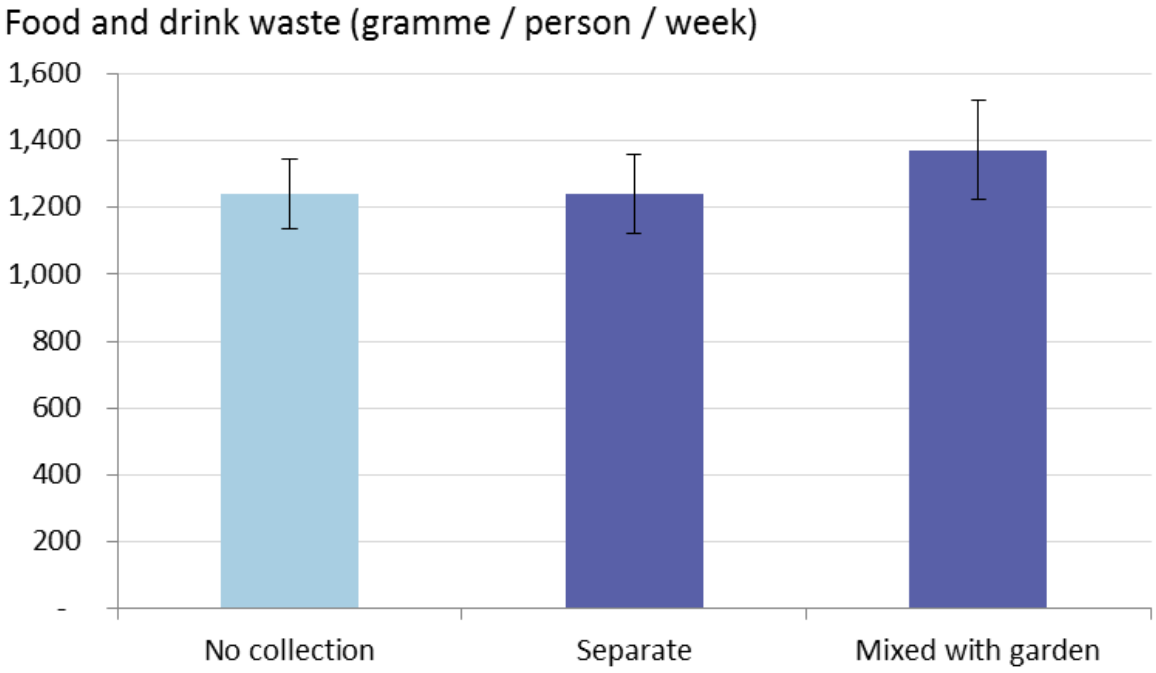
- Those households **using** a collection appear to waste very similar amounts of food compared to those not using a collection (either without access to a collection or with access but not using).
- The amount collected by local authorities in the residual plus targeted collections is similar between the two groups (data not shown below)



Error bars represent 95% confidence interval around the mean.
Amounts include food and drink waste:
- Collected by local authorities (residual and targeted collections)
- Poured down the kitchen sink
- Home composted
- Fed to animals

Kitchen diaries 2012 – access to collections

- Similar to the last slide, those **with access** to separate food waste collections waste similar amounts to those without access. Although those with mixed garden and food collections appear to waste more, this difference is not significant at the 95% confidence level.



Error bars represent 95% confidence interval around the mean.
Amounts include food and drink waste:

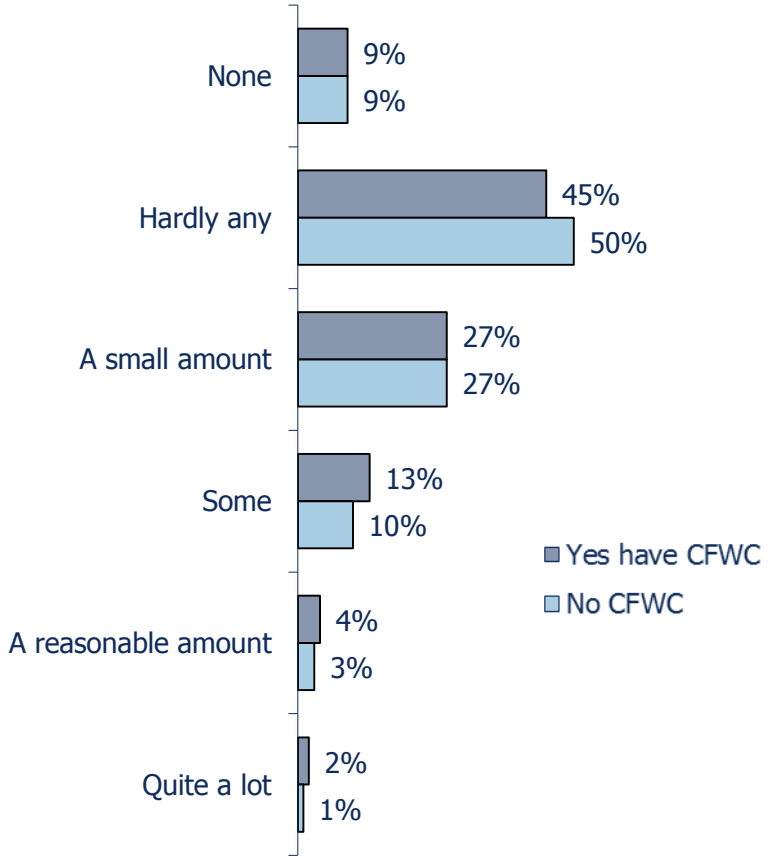
- Collected by local authorities (residual and targeted collections)
- Poured down the kitchen sink
- Home composted
- Fed to animals

WRAP food waste tracker – self reported levels of food waste

Question: Thinking about the different types of food in the previous question, how much uneaten food, overall, would you say you generally end up throwing away?

This question follows a similar one asking about waste of different types of food.

There are difficulties in interpreting self-reported levels of food waste, largely due to relatively low levels of awareness of quantities thrown away by respondents. However, there is no evidence from this question of substantial differences in arisings between those with and without food waste collections.



Base: Adults with at least some responsibility for cooking and/or food shopping: Has access to CFWC (3013), No Access to CFWC (2316)

Comparative data

The previous slides show comparative data from a range of sources that appear to tell a consistent story: that there are no significant differences in the amount of food waste generated relating to the presence or absence of food waste collections (or for the use / non-use of collections).

Previous comparisons of local authorities (slide 4, relating to 2007) indicates that local authorities with food waste collections had lower overall arisings, and more recent research shows a similar pattern for 2009. However, data for 2011 show no significant difference, nor do data from recent diary research.

This information is consistent with the notion that local authorities that adopted food waste collections early (before 2007) had lower food waste arisings (per household), but that subsequent adoption of food waste collections by other authorities has eradicated this historic difference. However, other explanations would also be consistent with this information.

It is likely that factors that might trigger behaviour change will have changed over time, (economic conditions, food prices, prevention activity) but there is no evidence as to how this might in turn influence any response to having a food waste collection.

The comparison between households with/without collections, or using/not using them assumes there are no underlying differences in factors (e.g. age) that could influence food waste between the two samples.

Longitudinal data

The final piece of evidence – on the next page – looks at a group of local authorities that:

- Had no food waste collections in 2006/7 and
- Had undertaken waste compositional analysis undertaken around 2006/7 **and** 2010/11

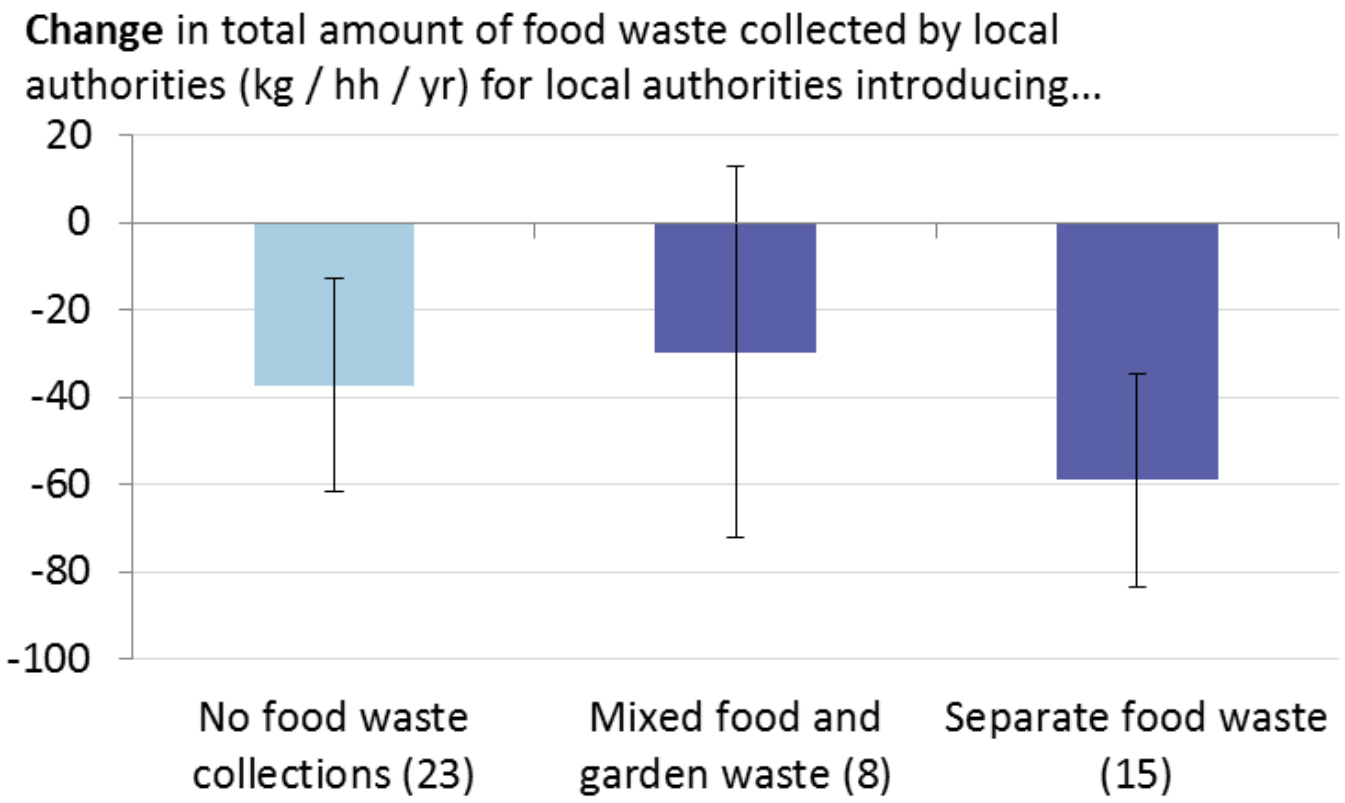
These authorities can be placed in three groups. Those that:

1. Did not introduce any food waste collections
2. Introduced a mixed food and garden collection between 2006/7 and 2010/11
3. Introduced a separate food waste collection between 2006/7 and 2010/11

The data on the next page are for the total amount of food waste collected by the local authority: i.e. that in the residual waste stream and in a separate food waste collection or mixed food and garden collection (if present).

Longitudinal data

There is no significant difference in the reduction between any two groups at the 95% confidence level



Error bars represent 95% confidence interval around the mean change; base size (numbers of relevant local authority studies) in brackets.

Longitudinal data

The results show that there has been a reduction in total food waste collected by local authorities (in residual plus collections targeting food waste). This is consistent with national trends in food waste arisings. (In 2011, WRAP reported a 13% reduction in household food waste, due to factors such as waste prevention activity, the recession and rising food prices*.)

The average reduction in waste arisings in authorities that did introduce separate food waste collections was greater than in other authorities. **However, this difference is not significant** (at the 95% confidence level).

Therefore, from this information there is no evidence that introducing food waste collections reduces or increases the amount of food waste generated when averaged over a number of households. This absence of evidence for an overall effect on arisings of introducing food waste collections is consistent with the comparative data shown earlier.

The absence of evidence is due to relatively small sample size and high variability in the measured reductions relative to any effect of introducing collections. If the sample size were bigger, it may be possible to pick up a small effect.

* Further insights on the factors that influence food waste arisings will be published later in 2013 (Econometric modelling and household food waste)

Discussion & conclusions

Discussion – 1

This presentation provides evidence that **introducing food waste collections may affect the amount of food waste generated within individual households**. There appear to be multiple effects that work in different directions:

- The WRAP Food Waste Tracker provides some evidence for the legitimisation effect, whereby the presence of collections may hinder prevention activity, or even lead to higher levels of waste than otherwise.
- The *Fresher for Longer* research also contains evidence of the legitimisation effect; however, there is also evidence of the prevention effect, and, taking the survey results at face value, this is stronger than the legitimisation effect.
- There is inconsistent evidence on the interaction between food waste collections and home composting. Questionnaire responses indicate collections should increase diversion to home composting, but kitchen-diary research suggests that those using a separate collection actually compost significantly less food waste.

However, there is no evidence of a substantial net (or overall) effect:

- Evidence from local authorities and households shows no significant differences between those with and without collections targeting food waste.
- Evidence from local authorities with longitudinal data shows no significant differences between those that introduced collections targeting food waste and those that did not.

This suggests that the net effect of introducing collections on arisings is small and of uncertain direction.

Discussion – 2

Given this recent evidence, the main conclusion of WRAP's 2011 literature review needs updating. No longer does there appear to be a strong (or measurable) net prevention effect of introducing food waste collections. The difference between the conclusions from the previous literature review and those from the current presentation could be due to:

- Local authorities that were early adopters of food waste collections may have had smaller amounts of food waste generated for other reasons. (For instance, they may have already done more work on waste prevention compared to the national average.) Given the potential for confounding relationships such as this, it is problematic to infer causality from the 'comparison' data shows on slides 18-21, hence the reason why other information sources have been included in this presentation.
- The 24% reduction in food waste arisings found in the review of Somerset's *SORT IT!* waste scheme may have been (partially) the result of other changes to waste services introduced at the same time. For instance, changes to residual collections, communications about waste services, or charging for garden-waste collections may all have had an impact on food waste arisings. In addition, these changes occurred in Somerset – a largely rural area which may favour the diversion of food waste to home composting. Given this, the Somerset study was unlikely to isolate the impact of changes to food waste collections alone, and the results may not be nationally representative, although they may be representative of other rural areas.

Discussion – 3

It is unlikely that 'proof' of any effect will be forthcoming in the UK in the next few years, such as the results of direct measurement before and after introduction of a collection with a matched control group.

Firstly, the effect of introducing food waste collections is likely to be context specific because multiple effects appear to be present (prevention, legitimisation, diversion to home composting). Therefore, the strength of each effect is likely to depend on the attitudes, practices and culture of people and households in an area. For the same intervention, some areas may exhibit a marked prevention effect, whilst others may demonstrate a legitimisation effect. This alone would preclude a definitive demonstration of the relationship between collections and prevention.

Furthermore, fundamental dynamics of food waste generation may render any study including direct measurement before and after introduction of collections expensive. The fact that a single household generates different amounts of food waste each week adds 'noise' to measurements, greatly increasing the number of households required in any study (and therefore the cost).

However, given the evidence in slides 9-15 that individual households claim to alter their behaviour when food waste collections are introduced, this suggests that there is an opportunity to engage households on the subject of waste prevention, in addition to participation in a collection scheme: where appropriate, to maximise the prevention effect and minimise the legitimisation effect.

This conclusion led WRAP to commission research to test communications relating to both food waste prevention and use of food waste collections (*Food waste messages for maximum impact*).

Summary

- Separate food waste collections ensure that food waste arisings can be treated to minimise environmental impact, reducing the amount of material sent to landfill.
- The benefits of separately collecting food waste are clear in terms of diverting waste from landfill, and the beneficial outputs from composting or AD. This work looks at potential additional benefits around waste prevention.
- Many respondents to questionnaires claim to change their behaviours relating to food waste prevention following the introduction of food waste collections. In some households, these changes might be associated with increased levels of waste, whilst in others a decrease might be expected.
- Any net effect on food waste arisings of introducing food waste collections (averaged over a population) is likely to be small, as no significant net effect has been discernible from the evidence in this presentation.

Summary

- 'Proof' of an effect at a population level will be challenging to obtain, but the introduction of a food waste collection provides an opportunity to engage households on waste prevention. This is further explored in *Food waste messages for maximum impact*
- Effective joined up messaging will help householders save money through wasting less avoidable food waste, and make sure that more of the food waste that can't be avoided is collected and treated appropriately