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**Executive Summary**

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# Consumer insight: date labels and storage guidance



Determining consumer understanding and use of date labels and storage guidance in order to reduce household food waste.

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Legacy research commissioned by the previous government.

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**Front cover photography:** Close up of date marks on a pot of yoghurt taken as part of 'Helping consumers to reduce food waste – a retail survey' WRAP 2010b

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# Executive summary

Previous research by WRAP, and others, suggests that helping consumers to better understand date labels and the importance of storing food correctly could make a significant contribution to reducing the 2.9 million tonnes of food and drink that are thrown away before ever being cooked or served (WRAP, 2009b). This research was designed to improve understanding of the role of date labels and storage guidance in food-related decision-making in order to understand the ways in which they contribute to household food waste, provide the evidence for change and ensure that any interventions in this area could be appropriately designed and targeted.

An analysis of food waste and kitchen diary responses (WRAP, 2009c) revealed that every year in the UK at least 450,000 tonnes of food is thrown away because it has passed a 'best before' date, but if stored in accordance with manufacturers' guidance food should be perfectly safe to eat up to and after this date. In addition, at least 380,000 tonnes of food is thrown away because it has passed a 'use by' date, but this waste could have been avoided through checking the date and either cooking or freezing before the end of the 'use by' date. A further 255,000 tonnes of food is also thrown away before it has even reached its 'use by' or 'best before' date, and the research suggests that much of this could have been avoided if the food had been stored in accordance with guidance and / or through consumers having greater confidence in date labels. WRAP estimates that over 2 million tonnes of food is not being stored as it should.

Although no specific research had previously been undertaken, date labels frequently emerge in the literature as an important factor in household food waste:

- Kitchen diary research by WRAP (2008b) found the reason given by participants for a fifth of avoidable food waste (by weight) being thrown away was that food was 'out of date'.
- Brook Lyndhurst (2007a) reported that 34% of respondents in a nationally representative sample attributed food waste to food 'going past the date on the label'.
- IGD (2007) found that "past its 'use by' date" was the main reason given for throwing away food, mentioned (unprompted) by 33% of respondents.

This, coupled with evidence that many consumers do not understand the meanings of different labels (FSA 2011), and that they are applied differently by retailers / manufacturers (WRAP 2010b), led to the hypothesis that some household food waste may be driven by consumer misinterpretation and mis-use of food dates and storage guidance.

This research was designed to enhance the evidence base around consumer understanding, interpretation and use of date labels and storage guidance. It comprised an evidence review, an extensive programme of qualitative and semi-ethnographic research, and a nationally representative online survey of 2,000 adults. The research components are summarised in Figure E1 and the study was structured around the following research questions:

- How are date labels – such as 'best before' and 'use by' labels – and storage guidance – such as 'once opened, use within three days' - understood, interpreted and used by consumers?
- What are the implications of this for household food waste?
- What impact could changes to labelling have on food waste?
- How could food date and storage information be made more valuable to consumers, with the aim of reducing food waste?
- What new ways of communicating with consumers could be developed to achieve this aim?

**Figure E1** Research components



Research into consumer attitudes and behaviours around food shows that this is a highly complex area of human behaviour. Food is not simply a functional part of survival for modern consumers, but food attitudes and behaviours are underpinned by systems of values, beliefs, personal and social norms, habits and many other social-psychological drivers. These drivers may not always be rational or even conscious and the links between knowledge / understanding and behaviour are complex and non-linear.

It is within this context that consumer food waste behaviour must be understood. Food practices – including not just behaviour, but also attitudes, values, beliefs and so forth – are often 'sacred space' in people's lives and are not easily changed. It is against this backdrop of complexity that this research into consumer understanding and use of date labels and storage guidance, and the implications for household food waste, takes place.

## Findings relating to the understanding and use of date labels

### Consumer understanding of date labels

Date labels are reported as being one of the most important pieces of information that consumers look for on food packaging (FSA, 2010; MAFF, 2000, cited in FSA, 2007). Yet, the literature suggests that misunderstanding of date labels is widespread, although estimates of the extent of this misinterpretation vary. Several studies have shown that around half of consumers are able to correctly identify the 'best before' date as a quality guideline and the 'use by' date as a safety indicator (e.g. FSA, 2009c; TNS, 2008; WRAP, 2008b). However, other estimates range from just 15% giving a correct answer (WRAP, 2010d) to as many as 83% (Brook Lyndhurst, 2008b). The variation in these estimates suggests that question format and type can have a large influence on results – for example, results may be influenced by whether the question is prompted or unprompted, the wording of the answer options, framing effects arising from previous questions and methodology (online survey or face to face interviews).

Taking this into account, the literature suggests that date labels are often used in conjunction with consumers' own judgement (Brook Lyndhurst, 2008b; WRAP, 2007c) and are relied upon to different degrees across different product categories (Verbeke and Ward, 2006; Terpstra et al., 2005; Tsiros and Heilman, 2005). Date labels are considered more important for food where there is a perceived safety risk - for example, meat and dairy products (Terpstra et al., 2005) and are referred to most often for these products, both at home and in-store (WRAP, 2010c). Date labels are less important for bakery products, cereals, and fresh fruit and vegetables (FSA, 2009c; Brook Lyndhurst, 2008a). The literature suggests that date labels are most valued by consumers when shopping, for example, MORI (2004) found that 60% of respondents claimed to regularly look at date labels in-store.

The literature also reported that the majority of consumers feel reasonably confident in their own understanding of date labels. WRAP (2010c) found that 96% of respondents feel "very" (37%) or "fairly" (59%) confident that they understand what the different food dates mean. The same study showed that 25% of people felt their understanding had improved over the last year and, for half of these, this was in part due to information from the media.

Given the potential influence of question format on response accuracy, during this research, understanding of the date labels was tested in a variety of ways:

- In the baseline questionnaire (section 3), participants were asked the following open question and given space to write in their unprompted answer: "What do the date labels on food packaging tell you?"
- The kitchen diary (section 4) revealed the relative importance of the use of date labels compared to other reasons why food waste thrown away and how this varied across product category.
- During the depth, telephone and post-accompanied shop interviews (sections 5 and 6), understanding of date labels was explored qualitatively, indirectly via discussion about decision-making, as well as through direct questioning.
- Understanding of different labels and label formats was tested directly via the online survey, by displaying labels to respondents and inviting them to choose the correct definition from a list of options (section 7).

The aim of using a range of methods to gauge understanding was to 'triangulate' results and gain insight into precisely how and why date labels are understood in particular ways by consumers. The findings of each of these techniques are summarised below.

In the baseline questionnaire, respondents were asked "What do the date labels on food packaging tell you?", 170 responses were given. In this unprompted setting, 23 respondents (14%) named and defined 'best before' dates correctly (where a "correct" response implies respondents either associated 'best before' dates with quality,

or referred to using them as a guideline only), while 25 (15%) named and defined 'use-by' dates correctly (where a "correct" response implies respondents either associated 'use by' with safety or gave a strict interpretation of using the date).

Roughly two thirds (62%) gave a generic definition which did not distinguish between different types of date label. Within these 'generic' definitions there was significant variation - the most common type was a blanket 'use / eat-by' style rule, followed by generic definitions relating to the life span of the product, about freshness or quality, and treating dates as a guideline, for example:

*W: That the food should not be eaten past that date.*

FEMALE, 36, E, BRISTOL

*W: I tend to use the date as a guideline and will eat some foods past that date, apart from meat, eggs etc."*

FEMALE, 27, C1, NOTTINGHAM

There seemed to be very little shared understanding of date labels across the sample, with participants often reporting highly personalised and idiosyncratic practices around their interpretation and use of date labels. In general, participants gave responses that were reflections of their practical application of date labels, rather than an understanding of the different label types. These practical, 'working' definitions of date labels were often based on a combination of indiscriminate or generic use of date labels (i.e. most did not tend to notice what *type* of date it was) with their own judgements, habits and personal rules of thumb:

*W: I don't tend to look at the date label on fresh fruit and veg, as you can tell by the look and feel of it whether it is near its sell by<sup>1</sup> date ... I would throw meat away past its sell by date, even if it looked ok.*

FEMALE, 32 YEARS, B, COVENTRY

This raises questions about the interface between 'technical' understanding and 'practical' interpretation of date labels, and the links between understanding, behaviour and food waste.

168 kitchen diaries were returned for analysis. The total number of reported food waste items was 2,227, giving an average number of avoidable food waste items of 13.3 per household over the 14 day research period.

Participants' understanding of date labels could also be assessed through the diary responses. For example:

- Products carrying a 'best before' date tended to be thrown away after the date on the label. However, an increase in entries one day after the date on the label suggests that some consumers may be incorrectly interpreting 'best before' dates as 'use by' dates rather than as quality guidelines.
- Just under 12% of items carrying a 'use by' date were thrown away on the date on the label. This suggests that some people may not realise that the 'use by' date means that food should be used by the end (i.e. midnight) of the day indicated on the label, or that they are treating the date as a 'buffer'.

Overall, 27 of the 69 qualitative interviewees (39%) *correctly* distinguished between and defined 'use by', 'best before' and 'display until' dates. This implies that even when probed about the differences between different labels, the majority of participants (roughly six out of every ten) could not give a precise definition of the labelling system:

*W: So yes, 'best before', may be when the shop should ideally like sold it by and then it gives you a few days grace to then use it by. So it should ideally be used by the 'use by' date before it, like I say, might not be as nice.*

FEMALE, 25, C2, COVENTRY

Through the quantitative element of the research programme, it was possible to test understanding in a simulated 'real-life' situation, by showing actual label formats either in isolation or associated with a product. Table E1 summarises one part of the results in relation to date label understanding. Respondents were asked "What information is shown on this label?", and respondents could choose however many options they liked. The correct definition in each case is highlighted in bold text.

<sup>1</sup> Many consumers, the media and even researchers tend to use 'catch-all' terms (such as 'sell by' date) to refer to all of the different types of food date (Brook Lyndhurst, 2008b).

**Table E1** Selected findings from the online survey: Understanding of date labels

Label shown	Label description	Question B1a: 'What information is shown in this label?'			Question B1c
		'The last day on which the food is at its highest quality'	'The last day on which the food is safe to eat'	'The day the food must be sold by'	'How easy is this label to understand?' ('Very easy' or 'Quite easy')
Best Before 26 AUG 2010	'Best before'	85	14	10	94
Display Until 24AUG2010 Best Before 26AUG2010	'Best before' and 'display until'	70	20	86	92
Use By 26 AUG 2010	'Use by'	25	76	6	95
Display Until 25 AUGUST 2010 Use By 27 AUGUST 2010	'Use by' and 'display until'	32	69	76	94
Display Until 27 AUG 2010	'Display until'	7	2	92	91

In terms of the understanding of date labels, the online survey reveals:

- 'Display until' dates appear familiar to, well understood and accurately interpreted by, the overwhelming majority of respondents.
- 'Best before' dates are also well understood and familiar in general: however, the presence of other information and / or dates (i.e. 'display until') acts to reduce accurate interpretation, in some cases markedly. The proportion linking the 'best before' date to quality reduced from 80% for the simple date to 75% when combined with a 'display until'. Those linking the 'best before' to safety was 14% with the simple date but increased to 20% when combined with a 'display until'.
- Although 'use by' dates are familiar and are reported as, by and large, 'easy' or 'very easy' to understand, they are the dates that are most likely to be incorrectly interpreted. Again, the presence of 'display until' further reduced accurate interpretation. The proportion linking the 'use by' date to quality was 25% with the simple date but increased to 32% when combined with a 'display until'.

The data suggests that, in general, older people pay less attention to date labels than younger people. They are more likely to rely on their own judgement than the date label in deciding what and when to eat and seem to treat any date label as a 'best before' guide rather than a 'do not eat this' rule. Older people are more likely than younger people to accurately interpret 'best before' but more likely than average to interpret 'use by' incorrectly.

Table E1 also shows that when asked about 'ease' of understanding, again the simple 'best before' and 'use by' date labels achieved the highest scores (94% and 95% respectively). But when asked in a separate part of the study 'which label format is most useful' (not linked to understanding) the 'best before' with a 'display until' date achieved a higher score (38%) than the 'best before' on its own (29%). The 'use by' date achieved a similar score both with and without a 'display until' date (24% and 25% respectively). This perhaps suggests the 'display

until' is perceived as valuable to some consumers in making freshness / shelf-life calculations, or the combination of two dates on a label may be more familiar to them.

In summary, a mixed picture emerges around consumer understanding of date labels: results vary widely by research methodology and depending on the type of 'understanding' that is under scrutiny. While most people are able to pick out the correct definition of the different date labels from a list, this understanding is not accessible to the majority of people in an unprompted situation, suggesting that it does not feature in most people's practical interpretation of date labels. This ambiguous interface between 'technical' understanding and practical interpretation of date labels raises questions about the links between understanding, behaviour and food waste. The next section explores in more depth the nature of consumers' 'working definitions' of date labels, in order to lay the foundation for a discussion about the links between understanding and behaviour and the implications of consumer interpretation and use of date labels for household food waste.

### **Consumer interpretation and use of date labels**

The research methodology enabled the project team to investigate consumer interpretation and use of date labels at different decision points – pre-shop, in-store, unpacking shopping, food management and meal preparation, as well as the variation in use of labels across different products and different groups of people.

#### Use of date labels in-store: trust and risk management

A majority of participants reported via the baseline questionnaire and interviews that they referred to date labels while shopping, particularly for products they were not familiar with. Some participants commented that they sometimes look for reduced items which are near their date. However, the primary reported use of date labels in-store was to aid selection of the freshest or 'best' product so that they would have as long as possible to use food up. In the baseline questionnaire, three quarters of participants reported referring to date labels in-store 'always' (41%) or 'most of the time' (34%). Participants often reported this 'savvy' shopping behaviour with pride, along with annoyance that supermarkets might try to sell them less-than-fresh items. Some participants commented that date labels were an effective accountability mechanism that prevented supermarkets putting 'old' food on the shelves:

*W: It annoys me to think that you're buying something that's out of date the next day, you know, or it hasn't got a very long shelf-life ... I always go to the back to make sure that I've got the longest date on there.*

FEMALE, 41, E, COVENTRY

Cluster analysis<sup>2</sup> of baseline questionnaire data revealed patterns in terms of how participants answered questions about use of date labels, suggesting a spectrum of behaviour, shown in Table E2 and discussed in section 3.

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<sup>2</sup> Cluster analysis is a group of statistical techniques through which a set of observations (in this case questionnaire respondents) are grouped into subsets, called clusters, which share similar characteristics. Cluster analysis was used in this study on an exploratory basis. The objective was to see if it was possible to group or categorise questionnaire respondents in terms of the links between date label and storage guidance behaviours, on the one hand, and wider sets of behaviours and attitudes around food on the other (see section 3).

**Table E2** Selected findings from the cluster analysis of the baseline questionnaire: Date label behaviours theme

<p><b>Questions Included [<i>in order of importance in determining the cluster</i>]:</b></p>	<p><b>3 clusters</b> were created, based on reported date label behaviour <i>in the shop</i> and as a form of <i>stock monitoring</i> (note that questions about disposal decisions were not included in the baseline questionnaire)</p>
<p><b>Q6</b> – How important are each of the following when you are choosing what food to buy? <i>How long until it goes off</i></p>	<p><b>Cluster 1: Date driven [39%]</b> Members of this group claim to always look for the longest date label available in the shop, and say that they keep an eye on date labels at home.</p>
<p><b>Q9</b> – When food shopping, how often do you choose the product with the longest food date?</p>	<p><b>Cluster 2: Date 'savvy' [48%]</b> These participants claim to sometimes refer to date labels, but less systematically than the 'Date driven' group.</p>
<p><b>Q12</b> – How often do you keep an eye on food dates so you know what needs eating when?</p>	<p><b>Cluster 3: Date disengaged [13%]</b> These participants show very little interest in date labels, tending to use them neither in the shop nor at home.</p>

Looking at interactions between the 'date label theme' clusters and the other clusters formulated through this research revealed that, unsurprisingly, a strong relationship was apparent between those who pay the most attention to date labels and those likely to have heightened concerns around food safety; 71% of those who were 'date driven' were also defined as 'safety sensitive' compared to only 33% of those who were 'date disengaged'. The apparent relationship between date label behaviours and food risk sensitivity supports the findings of the literature review that a stricter interpretation of food date labels may arise from heightened safety concerns; use of labels is often proportionate to levels of uncertainty.

Furthermore, it appears that those who pay the most attention to dates are not only more concerned about food risk but also more likely to plan their shopping, check cupboards and make a list, and are more likely than others to perceive reducing food waste as difficult. While those who generally ignore dates (the 'date disengaged'), are more relaxed about food safety and are more likely to be able or willing to make use of leftovers and foods past their best. They were more likely to be concerned about household food waste and believe they generally waste less food than others. The online survey revealed that individuals inclined to pay close attention to date labels are not only more likely (than average) to treat all labels as meaning 'use by' (as we saw earlier) but are also more likely to use the date label (any date label) as the basis for their eat/don't eat decision.

Despite the majority of consumers reporting in the questionnaire that they check date labels to some extent while shopping, this behaviour was observed relatively infrequently during the accompanied shops. Accompanied shop participants were asked to conduct their main grocery shop as they normally would and to 'think aloud' as they shopped, talking the accompanying researcher through the considerations behind their purchasing decisions. Only one of the ten accompanied shoppers used date labels deliberately and only a further two participants were observed to briefly glance at date labels on some products. The remaining seven shoppers were not observed to refer to date labels, nor did they mention doing so during their 'thinking aloud.'

This apparent over-reporting of reference to date labels when shopping may suggest that some consumers see checking the label as the right thing to do, or perhaps the clever ('savvy shopper') thing to do, but in a real life shopping situation, other considerations are more important in their decision-making. The typical shopper juggled an astonishing range of considerations as they shopped. Price (including special offers and "bargains") was the main factor at the forefront of most people's minds, most of the time. However, in shoppers' quest to achieve optimal value for money, price was constantly combined with, and traded off against, such considerations as:

- The physical appearance of products (selecting the 'nicest' potatoes or the pinkest ham).
- Consideration of their mental inventories of what was already at home.
- Favoured product variant (selecting smoked bacon rather than unsmoked).
- Catering to the particular preferences of different family members.
- Quantity of food needed / pack size.
- Brand.
- Plans for particular meals or occasions.

- The quickness and convenience of food preparation.
- General stocking up of cupboards to ensure they never ran short – including both staples and ‘treats’.
- The healthiness of products (e.g. calories) and the special dietary requirements of different family members (e.g. gluten free products).
- Consideration of storage space at home (“Have I got room in the freezer for this bread?”).

Shelf-life of food was considered while shopping, often by means other than reference to the date label. For example, fruit, vegetables, bread and cooked / cured meats (including bacon) were all examples of products that some participants assessed using touch and sight. Food from the reduced counter was often bought with the intention of it being eaten or frozen that day – the fact that it was in the reduced section indicated it was approaching the end of its shelf-life and those participants who bought reduced items did not always re-confirm this by checking the date. Some shoppers mentioned in their post-shop interviews that they did not need to look at dates on food that was bought to be eaten on that day, or on particular occasions in the near future (such as a dinner party or a picnic), since they knew exactly when the food would be eaten.

These observations suggest two important implications for how date labels are used in-store, and why:

- First, it is perhaps revealing that numerous interviewees considered date labels to be an accountability mechanism that prevented supermarkets putting ‘old’ food on the shelves. It is possible that the simple presence of the date label is enough to satisfy many consumers that the food is fresh and many do not feel the need to process the information on individual labels while shopping. In this sense, it may be the case that the date label itself, rather than the information on it, is most important in building general consumer trust. It is interesting to note that some depth interviewees stated that they were happy to operate without date labels when they shopped at local stores (such as butchers) that they trusted.
- Second, where specific date information was used deliberately, labels functioned principally as a tool of risk management, used to evaluate whether there would be enough time to use the product in question and, therefore, whether or not it would be a waste of money to buy it. This more deliberative use of date labels occurred in decisions around different types of food, including the most perishable products with the shortest shelf-life - for example, pre-packed vegetables and salads, higher value foods, such as chicken-based chilled ready meals and foods on special offer. One shopper, for example, decided to “go for” a two-for-one offer on cheddar cheese, after checking the date label and calculating that he would be able to get through both in the time given. Contextual factors, such as knowing that food would be eaten that day, the rate at which food is usually eaten, reduced the ‘value for money’ risk and, therefore, the need to look at the label.

In summary, the discrepancy between self-reported and actual behaviour may be partly explained by a number of factors. First, rather than being referred to deliberately on every occasion, date labels played a more generic trust-building role, with consumers perceiving the mere presence of any date type as guarding against the risk of being ‘ripped off’ by supermarkets. Second, date labels were one of a number of tools used to assess product shelf-life and ‘value for money’ in-store and these other tools were often more accessible or easier to use – for example, sensory inspection, consideration of when the food would be eaten, or personal rules of thumb about how long different foods could be kept. Purchasing decisions with the highest level of uncertainty around product shelf-life and when the food would be eaten were those for which date labels were used the most.

#### Use of date labels at home: disposal decisions

The literature suggests that there are often multiple drivers of disposal decisions (WRAP, 2007c). This was reflected in both the kitchen diaries and the depth and telephone interviews.

Over three quarters of participants (78%) claimed in the baseline questionnaire to keep an eye on date labels at home “always” or “most of the time”. When this topic was investigated more thoroughly during the depth and telephone interviews, the majority of interviewees reported that they used date labels to some extent at home, most often in conjunction with other tools – such as one’s own judgement.

The key decision point at which interviewees reported using dates most frequently was the moment of deciding whether to eat or dispose of food. The diary data supports this, as the largest proportion of food was thrown away at the eat / dispose decision point - together, mealtimes and snacks account for 40% of the waste. Shopping-related decision points (pre-shop stock check and post-shop unpacking) made up a further 20%. The remaining disposal decisions took place at ad hoc moments (e.g. when looking for something else) (16%) or during clear-outs (17%).

Four out of the ten accompanied shoppers threw food items away when unpacking their shopping at home. Examples of products thrown away at this stage were bread, yoghurt, cooked potatoes in a bowl, a jar of pickles and various frozen items. Some food was thrown away simply to make room for new items, regardless of its

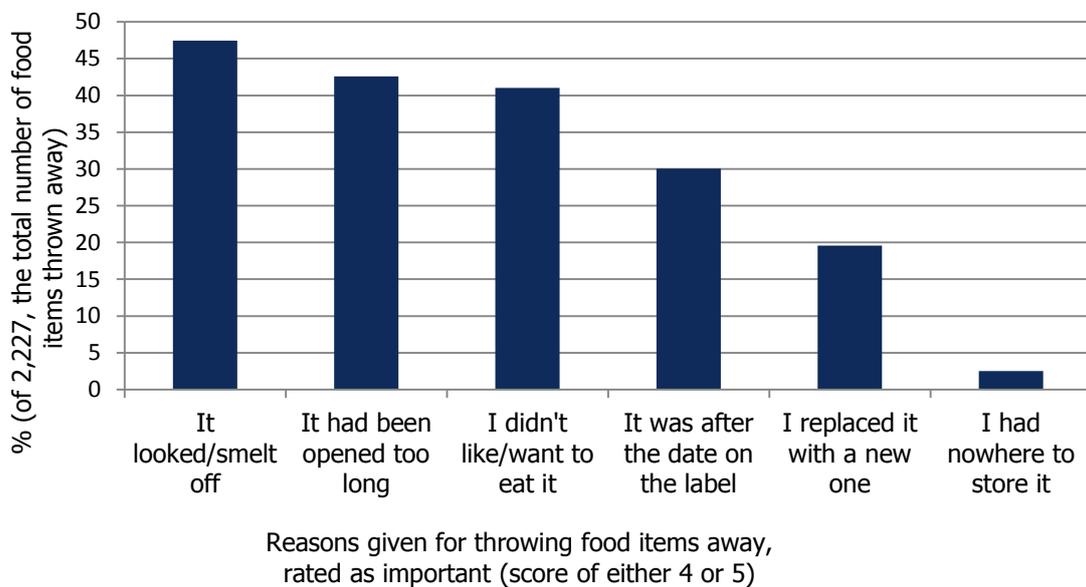
condition or the date on the label. In some cases, food that was out of date or past its best was thrown away because unpacking caused people to notice the condition of the food or the date on the label.

It was relatively rare for participants to report using dates for on-going food management, such as when planning a shop, unpacking shopping, deciding whether something could be frozen to prolong its life or deciding the order in which food should be eaten. This was reflected in the cluster analysis, which suggested either that a heightened awareness and use of date labels is not driven or discouraged by knowledge of food management techniques, or that other links (such as with risk awareness) are much stronger.

On balance, it would seem that whilst the majority of items are indeed disposed of at the 'cook / eat' decision point, the 'unpacking the shopping' point may nevertheless be a worthwhile target for behaviour change interventions - although these are likely to have most impact when coupled with changes to pre-shop planning activities, for example, stock checking before going shopping.

The use of sensory judgement - 'It looked / smelt off' - was the most common reported driver given for throwing food away in the kitchen diaries. This option was rated as important in 47% of diary entries. This was followed by storage considerations ('It has been opened too long') and issues of taste or inclination ('I didn't like / want to eat it'). 'It was after the date on the label' was reported as important in 30% of the kitchen diary entries (Figure E2).

**Figure E2** Selected findings from the kitchen diary: Relative frequency of important reasons given for why food items were thrown away



Analysis of responses highlighted the relative importance of the date label in disposal decisions for different product categories. Clear patterns emerged from the diary data; for example, in over 80% of disposal decisions around yoghurts and eggs, the date label was rated as important, compared to just 11% of disposed fresh fruit. In the case of drinks (including fruit juices and smoothies), cooking sauces and tinned food, the most common reason for disposal was that they had been open too long.

Thirty-two per cent of the food thrown away over the two week period was not in any packaging – the product either having been removed from its original packaging or purchased loose. In other words, no date label or storage guidance was present in around a third of disposal decisions.

Analysis was undertaken to derive the average number of items thrown away by households in each cluster, using the diary data. Recalling that for all 168 diary respondents the average number of food items thrown away over the two week period was 13.3, the table shows the average numbers of items thrown away for each cluster (Table E3). It suggests that different food attitudes and behaviours are linked to different amounts of waste (particularly themes related to food management behaviours, and shopping and stock management behaviours).

- Participants who were identified as 'date driven' threw away more food items, on average.
- The 'storage guidance aware' - tended to throw away less.

- Those who were 'safety sensitive' threw away more food items on average than those who were 'confident judges'.
- Consumers who manage food well – 'fridge foragers' - threw away 24% fewer items than those in the 'leftover leavers' cluster.
- Where participants planned more, they wasted less food - participants who planned their shopping, made a list and monitored what food they had at home wasted less food than 'spontaneous shoppers'.

Overall, based on kitchen diary data:

- Those who used storage guidance (52%) wasted ca. 15% less on average than those who didn't (48%).
- Those who kept an eye on dates at home / took notice of them in-store (49%) wasted ca. 20% less on average than those who were very focused on dates (39%) (the remaining 13% never used date labels).

**Table E3** Selected findings from the cluster analysis and kitchen diary: The average number of food items thrown away by cluster

Attitude/behaviour theme <sup>3</sup>	Cluster name (% questionnaire respondents)	Average food items thrown away
1 - Reported date label behaviours	Date driven (39%) In general, this group are very focused on date labels	14.3
	Date savvy (49%) These participants keep an eye on dates at home or shop for longer dates <i>at times</i>	12.0
	Date disengaged (13%) These participants show very little interest in date labels	11.6
2 - Reported storage guidance behaviours	Storage guidance agnostic (48%) This group generally claim to use it some of the time	13.6
	Storage guidance aware (52%) These participants claim to use or follow various forms of storage guidance <i>all or most of the time</i>	11.7
3 - Attitudes to food risk	Confident judges (42%) This group seem to be more confident about food safety and reheating food and are more willing to try eating food, which is not necessarily at its best	11.4
	Safety sensitive (58%) This group are very risk averse and are generally unwilling to attempt to eat food they perceive as potentially unsafe or even simply not top quality	13.9
4 - Food management behaviours	Leftover leavers (34%) This smaller group generally claim to <i>rarely</i> or <i>never</i> engage in cooking and kitchen activities which would make use of food towards the end of its shelf-life	15.3
	Fridge foragers (67%) This majority group of participants claim to use leftovers, use up food near or past its best and freeze food at least some of the time	11.6
5 - Shopping and stock management behaviours	Cupboard monitors / list makers (65%) This cluster generally claims to pre-plan their shopping, check what they have at home and take a list with them <i>most of the time</i>	11.3
	Spontaneous shoppers (35%) This smaller cluster plan what they are going to buy <i>sometimes</i> or <i>rarely</i>	15.5

<sup>3</sup> Note that the entire sample was clustered for each theme – the themes are not mutually exclusive.

Both the qualitative and quantitative research components show that use of date labels in disposal decisions varies across groups of people, as well as across product types. The following sub-sections outline further detail about exactly how, when and why date labels are used in different contexts by different groups.

### Exploration of the spectrum of date label behaviours

The baseline questionnaire, cluster analysis and interviews suggested that use of date labels may be thought of as a spectrum: at one end of the spectrum are people who ignore date labels; at the other end are people who actively seek out and rely heavily on date label information for their food decision-making. A minority of participants exhibited behaviour at the extremes of the spectrum – either relying almost exclusively on dates in their eat / dispose decisions, or ignoring them entirely.

#### ■ Heavy reliance on dates:

*W: I always use date labels and it's like I remember that that's the 9th. On bread I always use date labels and I would never eat it if it's past that date.*

*Q: And what about on other stuff?*

*W: Anything yes. I'm funny as well using it on the date that it says it's going to go out of date.*

*FEMALE, 32, B, COVENTRY*

#### ■ Minimal reference to dates:

*M: I mean if it looks all right, it smells all right, irrespective of the sell by date we eat it... Very seldom look at dates.*

*MALE, 69, C2, NOTTINGHAM*

Most participants' behaviour patterns lay somewhere in between these two extremes (highlighted, particularly through the proportions falling into the three clusters under the date labels theme, see Table E2), with the majority often using date labels in conjunction with various other factors to make disposal decisions.

Furthermore, the depth interviews in particular revealed that the majority of people's approach to using date labels is not fixed, but fluid and dynamic. Most participants had developed product-specific rules of thumb around use of date labels that were strongly linked to perceived safety risk and, to a lesser extent, perceived quality risk: interpretation and use of food dates was often determined more by *product type* than *date label type*. This in turn overlapped with their perceived ability to judge for themselves. However, these rules of thumb were largely flexible, and could be overridden by day-to-day changes in circumstance, situation, or even mood.

The importance of date labels within individual decision-making processes, therefore, not only varied by person, but also by product type, as well as by a number of contextual factors, outlined below.

#### Use of date labels: product type vs. label type

The depth interviews suggested that, for most participants, interpretation and use of date labels varied according to product type. In general, in the context of eat / dispose decisions, participants reported paying most attention to date labels on fresh meat and dairy products – particularly yoghurts - and least attention in the case of fruit, vegetables, bread and cereals (in over 80% of disposal decisions reported in the kitchen diary around yoghurts and eggs, the date label was rated as important, compared to just 11% of disposed fresh fruit). Overall, participants tended to rely more on date labels where safety was concerned and more on their own judgement with 'low risk' foods where the primary concern was quality.

The influence of product type on use of date labels is highlighted by the online survey results. Respondents were shown photographs of a product and asked "Which of the following describes when you would be happy to eat this product?" Table E4 shows selected results.

**Table E4** Selected results from online survey: Interpretation of date labels for various products

<b>Product (food date type)<sup>4</sup></b>	<b>I would eat it up until the date on the label</b>	<b>I would eat it after the date if it looked and smelt OK</b>
Fresh chicken breast fillets ('use by')	59%	35%
Yoghurt ('use by')	42%	53%
Milk ('use by')	42%	54%
Yoghurt ('best before')	32%	63%
Cheddar cheese ('use by')	24%	69%
Bread rolls ('best before')	21%	74%
Cheddar cheese ('best before')	20%	75%
Fresh potatoes ('best before')	10%	74%

Table E4 shows a clear pattern, with the date label being relied on most for fresh chicken and least for potatoes. The impact of product type is clear – for example, although chicken and cheddar cheese were both shown with a 'use by' label, there was a large difference in the proportion of people who said they would stick to that date – 51% for chicken and 21% for cheddar cheese.

The impact of different label types *within* product categories is also apparent: swapping the 'best before' for a 'use by' on yoghurt caused the proportion of people who said they would stick to the date label to rise ten percentage points, from 27% for yoghurt with 'best before' to 37% for yoghurt with 'use by'. This suggests that, within the general pattern of date use driven by product type, the label type does influence decision-making among some consumers. As might be expected, the influence of date type was largest among those who said they would stick to the date, and smallest among those who said they would rely on their own judgement. Similarly, the effect was largest among the products considered by participants to be higher risk (compare the 5 percentage point difference for cheddar cheese with the 10 percentage point difference for yoghurt).

To further explore the means by which people reach judgements about whether or not to eat particular foods, online survey respondents were further asked (without the use of images) 'How do you decide whether to eat or throw away this product?' The results are shown in Table E5. The results reveal a clear 'typology' of product, with chicken and potatoes at the two extremes, bread and cheese treated in a similar way, and yoghurt and milk treated in a similar way.

<sup>4</sup> For this question, the sample was split into three groups, with each sub-group shown a different format of the label. For example, in the case of chicken, the three subgroups saw one of three versions of the picture, with either a 'use by', 'use by end' or 'use by end of' label. The percentage figures shown are averages across the three label formats for each product. This is a valid presentation of the data, since no significant differences were caused for any product by the different label formats.

**Table E5** Selected results from online survey: How people judge various products

Criteria	Cheese <sup>5</sup>	Chicken	Yoghurt	Bread rolls	Milk	Potatoes
I rely entirely on the date given on the pack	7	<b>33</b>	17	5	<b>18</b>	3
I rely mostly on the date given on the pack	12	<b>30</b>	<b>22</b>	9	<b>22</b>	4
I rely on a mixture of the date and my own judgement	<b>42</b>	25	<b>42</b>	<b>41</b>	<b>39</b>	22
I rely mostly on my own judgement	<b>27</b>	6	13	<b>32</b>	15	<b>39</b>
I rely entirely on my own judgement	11	1	2	12	5	<b>31</b>

These results support the findings of the depth and telephone interviews, which suggested that the majority of people use date labels in conjunction with their own judgement and according to their own rules of thumb about different types of food. These product-specific rules of thumb were often linked to perceived safety risk, which was occasionally linked to previous experience of becoming ill from food, but was most often related to more general risk sensitivity. This sensitivity was at its height for foods where the safety threat was perceived to be potentially undetectable to the senses:

*M: Obviously you try to, in some things you will try to use it if it looks OK, smells OK, if there is no sign of it deteriorating then possibly it would get used. But the slightest thing that is wrong with it, it is thrown.*

*Q: Including if it is before its date?*

*M: Yes definitely yes.*

*Q: Is there anything that, if it was on the date but it looked fine, you would throw it away anyway to be on the safe side?*

*M: Yoghurt, yoghurt.*

*MALE, 57, C1, NOTTINGHAM*

Use of date labels was also driven by people's confidence in their own skills and ability to judge food safety and quality for themselves: where people were least confident in their own ability to judge, they relied on labels most:

*Q: So for milk you would tend to go off your own sensory judgement?*

*M: Yes, I know what is OK for that, but with things like the butter and stuff I don't really know what I'm looking for.*

*MALE, 25, C1, NOTTINGHAM*

Perceived ability to judge, therefore, seems to be a function of both internal factors (confidence in one's own ability to 'know what to look for'), as well as external factors (sensitivity to the threat of undetectable pathogens in the food itself). In addition to these factors, interviewees suggested that the nature of some products makes using sensory judgement more difficult. For example, some interviewees reported that the date label was particularly important in the case of ready meals, since they were cooked with a film lid or covered in sauce, which made it impossible to judge by looking or smelling.

<sup>5</sup> In this question no distinction was made between cheese with a 'use by' or a 'best before' date, and similarly for yoghurt. It was judged, in developing the questionnaire, that the question could not reasonably be asked in this format with these factors included.

Overall, the combination of perceived safety risk (especially risk that may be undetectable to the senses), confidence in one's own ability to judge, plus ease of making a judgement, seem to be the main factors in product-specific rules of thumb around date label use. The case of fresh fruit and vegetables illustrates all of these points: low food safety risk, plus dependable ("obvious") and easily visible / olfactory indicators of deterioration, make fresh fruit and vegetables among the product categories for which date labels are relied upon least. For these particular product categories, low reliance on date labels may also be due to the fact that people are more accustomed to buying fruit and vegetables loose, with no date label.

#### Quality risk and the desire to eat the best and freshest products

For food where safety is less of an issue, product-specific rules of thumb are often still in operation. One noteworthy example is bread. Most people felt able to judge if bread was okay to eat, and were much less worried about food safety. However, a significant minority disregarded their own judgement in favour of the date label, not for reasons of risk aversion, but due to a desire to eat only the most freshly made bread. In some cases, bread disposal decisions were based on neither judgement nor date labels, but uneaten bread was simply replaced as a matter of course with fresh bread on shopping day:

*W: I went shopping on that Saturday and bought some bread and came back and thought, oh I've already got a loaf, but it had been opened and I thought oh it's gone out of date tomorrow anyway so I'll just throw it away.*

FEMALE, 32, B, COVENTRY

#### The influence of contextual factors

Many interviewees reported that their interpretation of date labels was influenced by contextual factors. For example, some participants reported that the decision to use or throw away a particular food item that was past its best (including items past their 'best before' date) sometimes depended on whether they had an alternative in the house or if that was their only option. Similarly, moods and cravings sometimes overrode participants' standard approach to date labels. One participant described how she normally uses up vegetables that are past their best by making a soup, however, occasionally she will look in the bottom of her fridge and 'feel disgusted' and just throw them all out. Another participant reported that, despite normally checking dates carefully, his desire to eat something could overshadow his customary caution:

*Q: How much do you think you pay attention to the dates on food?*

*M: It depends what it is. If it is something I really want to eat, if it was a cake I would eat it, if it is vegetables they are out.*

MALE, 27, C1, NOTTINGHAM

Risk aversion or concern for food safety – and therefore strictness around date labels - was also somewhat contextual: it was often amplified with regard to children or the elderly, even among those who claimed to be relaxed about the food they ate themselves.

In summary, the ways in which respondents defined dates was highly varied and tied into their practical, personal and contextual interpretations of how date label information should be *applied*.

#### Trust in date labels

While most interviewees reported making some reference to date labels in their food decision-making, scepticism about date labels was common, even among those who tended to refer often to them:

*M: I, it's funny, I'm as cynical as I am gullible in that I sort of, I want to think that the 'use by' dates are sort of like the food will go off on this day, don't use it after it might be a bit funny, but I do think at the same time, the cynical side of me thinks, that by shortening the 'use by' dates, if people don't trust it, they throw it out, they go back to the shop and they buy more stuff.*

MALE, 27, C1, NOTTINGHAM

As well as suspecting date labels of being a ploy to encourage extra purchasing, some people's trust in date labels was undermined by the observation that date labelling can be inconsistent across retailers. Other participants mentioned that they had heard that supermarkets sometimes re-packaged products with a later date, which further undermined trust.

In this context, it is notable that some participants described being happy to operate without date labels when buying food from local shops that they trusted. This again suggests that date labels are valued by some as a guard against being sold sub-optimal products, which some perceive as more likely to happen when shopping at the larger retailers.

It is also possible that the experience of the majority of people of eating food past its date, including its 'use by' date, to no ill effect, contributed to the tendency to use dates as a rough guideline<sup>6</sup>. A small minority of the most risk averse, date-label-dependent participants claimed to prefer to leave a buffer of one day *before* the date on the label, just to be on the safe side of any perceived quality or safety risk. It was more common, however, for participants to report leaving margins *after* the date on the label, within which they would be happy to eat the product. This again varied with the general risk sensitivity of the participant, as well as with product type. Rather than interpret date labels as a completely accurate indicator of product quality and safety, many people, based on their own experience, used date labels as guidelines in conjunction with product-specific rules of thumb.

The research has demonstrated that the date label is rarely a stand-alone factor in disposal decisions, but is most often used in combination with other considerations. Decisions are often based on both the date label and sensory judgement, and interpretation of the date label is influenced by a number of contextual factors, as well as the type of product in question. Overall, despite some uncertainty about the accuracy and reliability of date labels, most participants considered date labels a useful guideline and reported using them to some extent in their decision-making.

## Findings relating to understanding and use of storage guidance

There is very little in the literature on consumer understanding and use of the storage guidance provided on food labels. Where it has been investigated, inappropriate storage of food has been identified as a contributor to household food waste (WRAP, 2008a; Brook Lyndhurst, 2008b; WRAP, 2007c). There is evidence that shelf-life expectations are influenced by food storage behaviour - those who store their fruit and vegetables in accordance with storage guidance appear to be more likely to think that these foods will last longer than those who store them otherwise (Brook Lyndhurst, 2008b). Similarly, those who, after opening the products, store cheese and fresh meat in new wrapping in the fridge are more likely to think that these last longer than those who store them in the original packaging (WRAP, 2010a).

WRAP research into consumer use of the freezer (2010a) indicated that there appears to be considerable confusion among consumers about what can and cannot be frozen and, more especially, when it can be frozen. This may in part be as a result of the different application of storage / freezing guidance by retailers and manufacturers (WRAP, 2010b).

A number of other drivers of storage behaviours are identified in the literature:

- The force of habit appears to be a key influence on consumers' food storage behaviour. Habits are picked up from parents or partners and then rarely thought about (FSA, 2010; Brook Lyndhurst, 2008b; Brennan et al., 2006).
- There is also some evidence that social norms may drive some food storage behaviours – in particular the social norm of having a fruit bowl, either as a 'reminder' to eat fruit or on display for visitors (Brook Lyndhurst, 2008a).

As such, the role of on-pack storage guidance in food storage behaviour was explored in detail via the baseline questionnaire, kitchen diaries, interviews, accompanied shops and online survey:

- To what extent are storage messages sought out, understood and used?
- To what extent do consumers abide by storage guidance such as 'Once opened, use within x days' and how does this relate to food storage habits?
- How are storage messages and logos (such as the freezer snowflake) understood and used?
- What is the impact of inconsistent storage guidance within product categories?

The main themes that emerged from the different research components are summarised below.

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<sup>6</sup> The converse is also possible, of course, though no reference to this eventuality – of having been made unwell through eating food past a 'use by' date – was made during the qualitative research.

## There is a spectrum of behaviours around storage guidance

Most participants adhered to highly personalised sets of storage habits that they had developed through a mixture of learning from others (parents, partners, friends) and through their own experience and experimentation. People's habits and rules of thumb were often informed by preferences and personal idiosyncrasies: for example, one participant tended to remove most food products from their packaging in order to put them in air-tight storage containers, because "I like to see them all stacked up". Most of these storage behaviours were so deeply ingrained and habitual that the majority of participants considered their own practices to be "common sense" and "obvious".

People's personal preferences influenced their storage decisions and participants often stored food in particular ways, despite knowing of more appropriate alternatives. A common example was fruit being stored outside the fridge in order to encourage family members (especially children) to eat it, or due to a preference for un-chilled fruits. Similarly, participants who were aware that they threw away a lot of bread often stated that this awareness would not induce them to freeze bread, because they did not like the taste of defrosted bread.

Reported use of storage guidance in-home is higher than for date labels – 82% of baseline questionnaire respondents claimed to 'Make sure they follow storage instructions on food packaging' 'always' or 'most of the time'. Respondents were also questioned separately about guidance on where to store food and how long to store food for. A large majority (nearly 80%) reported using guidance on food packaging for where to store food 'always' or 'most of the time', while a lower 65% claimed to use guidance on how long to keep food that has been opened but not finished. However, less than half (41%) claimed to check the pack for how food should be stored at home when in-store.

The huge majority of respondents (>90%) in the online survey indicated that they find storage guidance or tips on-pack to be 'useful' or 'very useful'. Reasonable proportions (>half) also thought that 'On display boards in the supermarket' or 'On the supermarket shelf' would be 'useful' or 'very useful'.

In terms of the influence of on-pack storage guidance, analysis of the baseline questionnaire suggested that participants could be grouped into those who said they followed storage guidance all or most of the time and those who said they did not often refer to it. However, storage behaviours were less easy to categorise into clearly defined groups, as in the case of date labels, of those who said they 'always' or 'never' used storage guidance (Table E6).

**Table E6** Selected findings from the cluster analysis: Storage guidance behaviours theme

<b>Questions Included [in order of importance in determining the cluster]</b>	<b>2 clusters</b> were created, by looking at how often participants claimed to use storage and usage guidance on food packaging, to follow it at home, and to look at it in the shop.
<b>Q13</b> – To what extent do you use guidance on food packaging to tell you how long to keep food that you have opened but not finished (e.g. 'Once opened, use within 3 days')?	<b>Cluster 1: Storage guidance 'agnostic' [48%]</b> This group have a mixed set of behaviours around storage guidance – they generally claim to use it some of the time, but their behaviours are mixed and they do not tend to rely on it.
<b>Q13</b> – To what extent do you use guidance on food packaging to tell you where to store food (e.g. in the fridge, freezer, a cool dark place)?	<b>Cluster 2: Storage guidance aware [52%]</b> These participants claim to use or follow various forms of storage guidance all or most of the time. This may not necessarily mean they make every decision by referring to the packaging, but may apply storage guidance they have read at some point to similar types of food products.
<b>Q13</b> – To what extent do you make sure you follow storage instructions on food packaging?	

Looking again at the interactions between the cluster themes, overall, those who pay the most attention to storage guidance not only appear more likely to use up food past its best, they also seem more likely to monitor their stock and plan their shopping trips and to be less worried about food safety.

Further analysis of the baseline questionnaire revealed that those who pay the most attention to storage guidance are more likely to purchase reduced price products. They are also more concerned about food waste

and report making more effort to reduce their waste. They were also more likely to say they would be willing to reduce their waste further.

### **Different types of storage guidance are used in different ways**

The research revealed different behavioural patterns around different types of storage guidance:

#### Where / how guidance e.g. 'Store in a cool dry place'

In previous research, some participants stated they would prefer specific instructions about where to store products (e.g. in the fridge, in a cupboard), rather than just a generic 'Store in a cool dry place' (IGD, 2007). Qualitative research gives the impression that inconsistencies or exceptions to general storage rules (e.g. most, but not all, fruits should be kept in the fridge) can undermine consumers' faith in 'top level' guidance. Focus group participants responded most positively to advice which was tailored to specific products and when the benefits of the suggested storage method were explained (Brook Lyndhurst, 2008b).

Contrary to baseline questionnaire responses, storage *guidance* does not currently seem to play a prominent role in most people's storage *choices*. The majority of depth interviewees reported that on-pack storage guidance did not play a major part in their decisions about where and how to store food (see below for observations about freezing behaviours). Within this overall context, participants reported referring to this type of storage guidance most frequently for new or unfamiliar products:

*W: Nine times out of 10 no, I just use common sense or what I have always done, you know, I have always done it this way so I will carry on doing it this way, but I think if I tend to buy a newish product...occasionally I might go to somewhere like Marks & Spencer's and buy some pasta or something like that, and I would, as it is something different that I am buying or something new, then yes I would look.*

FEMALE, 66, B, COVENTRY

Some participants talked about picking up tips about where to store products by looking at where they were stored in the supermarket. However, most people were happy and confident to use their own judgement and 'common sense' in their decisions about where and how to store food.

#### 'Once opened, use within X days'

Interviewees reported making greater use of 'use within x days' style storage guidance than where / how guidance, particularly for products with which they were not familiar. The overall pattern of use of this type of storage guidance echoed the patterns found in relation to date labels: a small minority at the risk averse end of the spectrum always followed 'use within' guidance to the letter, with one participant claiming that if she couldn't remember how long something had been open for, she would throw it away "to play it safe". Similarly, a (larger) minority at the other end of the spectrum claimed never to look at it. However, the majority reported making some use of 'use within x days' guidance, usually in combination with their own judgement:

*M: If it says use within three days, if I've stored it in the fridge I'm less bothered about keeping it for five days because I'm thinking well I've stored it properly, use within three days they probably mean within a week it's going to be fine.*

MALE, 44, A, NOTTINGHAM

Adherence to 'use within' guidance was, as with use of date labels, often proportionate to individuals' overall food risk sensitivity, coupled with product-specific rules of thumb about safety and quality risk. There was evidence that some participants assumed 'use within' guidance to be about food safety. In answer to a question about whether she viewed this type of advice as a strict safety rule or a more general quality guideline, one participant said:

*W: Well probably something quite strict, I would have thought it was on there, you know, to keep people healthier.*

FEMALE, 37, A, SOMERSET

There was evidence that, rather than reading the instructions on every product, people tended to generalise their approach to 'use within' guidance across product categories: knowledge of the recommended 'use within' period for one product was often extrapolated to other 'similar' products. In the case of a small number of highly risk sensitive participants, short 'use within' dates were applied indiscriminately across the board, out of a desire to

avoid eating any food that had been open 'too long' - for example, one participant claimed to never eat *anything* that had been open for more than three days.

This finding was not common, however, and the online survey revealed that longer 'use within' periods were preferred. Respondents were invited to choose between images of particular products carrying variations of 'Use within x days' guidance and to say which they would prefer to buy. For example, they were shown two images of ambient pasta sauce, one with instruction to use within five days of opening and one with instructions to use within seven days of opening. The objective of this question was to ascertain whether consumers would prefer products that they had longer to use up, or whether they would perceive shorter 'use within' guidance to signal food that was fresher, more 'natural' or less likely to have been 'tampered' with (e.g. through addition of preservatives to increase shelf-life).

The results of the survey are unequivocal – consumers show a strong preference for purchasing food that they have longer to use up once it has been opened. In the case of ham, 57% preferred the longer 'use within' period (three days), and just 7% chose the shorter one (two days). In the case of milk, three images were shown with 'use within' periods of two, three and four days; these were preferred by 5%, 9% and 54% of respondents respectively. Similarly with pasta sauce, 45% of respondents chose the product with seven days to be used up, while just 14% chose the product with five days to be used up.

This result is highly relevant when combined with the finding that, although most people do not read storage guidance on every occasion or stick religiously to it, it is often incorporated in a generalised way into storage behaviour.

#### Freezing guidance

Previous WRAP research (2010f) indicated that there is considerable confusion among consumers about how best to use their freezers.

The depth interviews suggested that use of the freezer was determined by a range of different factors (not least the size of people's freezers) and many people had developed complicated sets of rules about what they would and would not freeze, when and for how long.

The use of on-pack freezing guidance again varied along a spectrum. Some participants assumed that any food could be frozen and did not seek out storage guidance, while others said they would not freeze anything unless the packaging indicated that the food was suitable for freezing. This was often related to concerns about the safety of refreezing products:

*W: If it's like a fresh product I always make sure it's got the freezing symbol. Because I know some things have already been frozen and then put on the shelf, and I never know if you can re-freeze them unless it has got the symbol...if it hasn't got it on I will sort of think, oh, well I can't freeze it.*

FEMALE, 35, C1, COVENTRY

People's rules of thumb about how long food could be frozen also varied, with some people assuming food could be frozen indefinitely, others having a 'four week rule' across the board and a small number (erroneously) sticking to food dates, even when products had been frozen. A large number of participants expressed uncertainty about how long food could be kept in the freezer:

*M: It's all guess work for me, in the freezer I've got chilli and I don't know how long you can theoretically keep it for, it is guess work.*

MALE, 45, C1, NOTTINGHAM

It is perhaps for this reason that the online survey demonstrated a strong preference among consumers for freezer guidance to be as clear and explicit as possible. For example, when shown the snowflake logo, with and without text, the majority of respondents had a preference for the logo-with-text; and the presence of the text appeared to improve understanding; around 60% selecting the right answer when presented solely with the logo rising to 80% when the logo was presented with text. (The majority of respondents not selecting the right answer when presented with the logo plus text were selecting 'freeze on day of purchase', which shows that they do understand the logo but are also applying other guidance to its interpretation.)

It was rare for depth interviewees to report freezing opened or partially used food, or unopened food that was approaching its date. Most participants claimed to freeze food on the day they bought it, or not at all. Many participants drew a link between this behaviour and adhering to 'Freeze on day of purchase' advice (which, as previous research has shown (WRAP, 2010b) is indeed the most widespread freezing advice to be found on product packaging). This is another case where the advice found on some products tended to be generalised and incorporated into personal rules of thumb: the majority of people adopted the general rule of only freezing food on the day they bought it:

*Q: So if things seem to be getting towards their 'best before' date and you feel you're not going to be able to eat them, would you then freeze them?*

*W: No, because for some reason things always say 'freeze on day of purchase', even though I don't know how it knows when you bought it. So that's one thing I always do. As soon as my meat arrives, I order some mince, chicken, I put it all into the freezer and take it out the night before I want it. But I would never have something in the fridge for a week and then freeze it.*

FEMALE, 25, D, SOMERSET

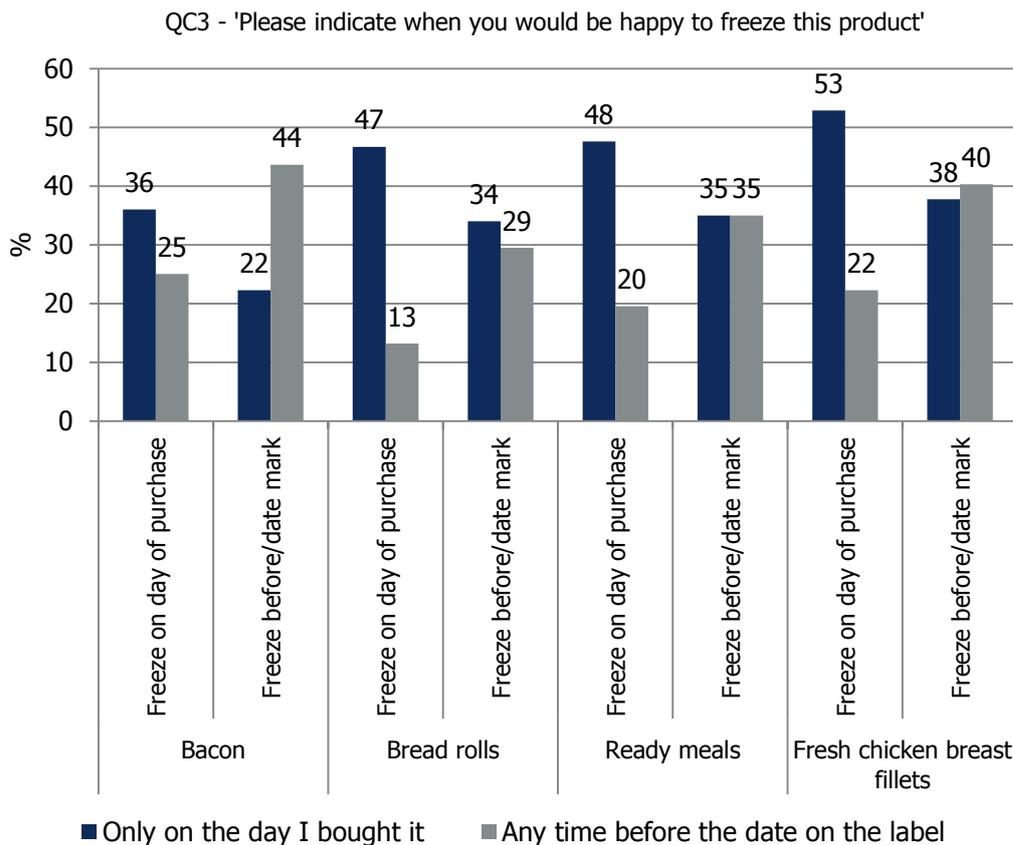
Respondents in the online survey were shown images of products (bacon, bread, a chilled ready meal and fresh chicken) with either 'Freeze on day of purchase' advice or a modified date label that gave 'freeze before / use by'<sup>7</sup> advice<sup>8</sup>. They were then asked when they would be happy to freeze this product: the presence of 'Freeze on day of purchase' advice was clearly associated, across all products, with an increase in the number of people saying they would freeze the product only on the day they bought it. Where people were shown the 'freeze before / use by' type label, across all products there was a marked increase in people saying they would be happy to freeze the food up until the date on the label. The results are summarised in Figure E3.

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<sup>7</sup> Note: the survey was tested with 'freeze by / use by' and 'freeze before / best before' labels, but following industry feedback WRAP guidance has been amended to 'freeze before / use by'.

<sup>8</sup> FSA guidance is that for safety, it's ok to freeze most raw or cooked food providing it is frozen before the 'use by' date, and defrost and use the product within 24 hours.

**Figure E3** Selected findings from the online survey: Responses to 'freeze on day of purchase' and 'freeze before / use by' labelling<sup>9</sup>



### Consumer understanding of the relationship between storage and date information

Date labels are only a reliable indicator of food quality or safety if products are stored correctly and, as such, the research (principally the depth interviews) explored consumer understanding of this connection. It is interesting to reflect that the cluster analysis revealed that those who used date labels didn't also necessarily use storage guidance despite their broader tendency to use information on food packaging. The most common source of confusion that emerged from the depth interviews in this area was the meaning of date labels in the context of freezing food, both when deciding when to freeze food and how long to keep it once frozen.

A small minority of participants reported (erroneously) adhering to the date on the label even with frozen foods:

*W: Yes I would freeze it straightaway... but I don't leave it more than a couple of days. You know, I will take it out of the freezer and chuck it if we didn't use it after a couple of days.*

*Q: What, from the freezer?*

*W: Yes, because I just find these 'use by' dates, you don't know when they've been packaged.*

*Q: So you would follow the use by date even if it was in the freezer?*

*W: Yes, I would.*

*FEMALE, 60, D, SOMERSET*

Most people had incorporated date labels and storage guidance into their food practices in ways that reflected their general approach to food, and their use and interpretation of labels was strongly influenced by a range of other factors. Most people used date labels and storage guidance as 'heuristics' or short cuts, in combination with

<sup>9</sup> Note: the survey was tested with 'freeze by / use by' and 'freeze before / best before' labels, but following industry feedback WRAP guidance has been amended to 'freeze before / use by'.

other factors, to help them make decisions: in this context, it is therefore unsurprising that most people had not explicitly considered the link between storage and date labels, beyond a general awareness that if food had been out of the fridge for any length of time, greater caution was required.

The research suggests that behaviour based on an understanding of the connection between date labels and storage guidance was not a particularly salient feature of most participants' food practices. However, the connection between date labels and freezing is an area of genuine uncertainty for many people. Although, the online survey results show that clearer guidance in this area – for example, a label that explicitly carries 'freeze before / use by' advice – decreases this uncertainty and makes a notable difference to how consumers say they would treat the food, further clarification would need to be given on 'how long' to keep food frozen.

Reported date label and storage guidance behaviours were not found to be related through the cluster analysis. Although there were links between the five behavioural themes which were examined here, no overarching or larger behavioural or attitudinal groups emerged from those links. Overall, this analysis suggests that while the links between different behaviours and attitudes around food are complex, date label and storage guidance behaviours may still be best understood as outcomes of the wider landscape of food behaviours and attitudes than in isolation.

## Implications for household food waste

Date labels and storage guidance have the potential to contribute directly to food waste – for example, misinterpretation of a 'best before' date as a strict cut-off date and adherence to 'freeze on day of purchase' guidelines may lead to food being thrown away unnecessarily.

This research suggests that date label behaviours may be understood as a spectrum, with minorities at each end of the spectrum who take a 'blanket approach' to date labels. Members of the minority group at the risk averse end of the spectrum throw away food on the date on the label, regardless of label type, product type, or any of the other drivers of date label behaviours that apply in the majority of cases. In this case, misinterpretation of date labels is a clear and direct cause of food waste. Overall, therefore, we can estimate that misinterpretation and mis-use of the 'best before' date has a systematic, direct effect on food waste outcomes for around one in six consumers, rising to one in five among younger age groups.

The differences between the clusters are most pronounced for the food management and stock management behaviours: 'spontaneous shoppers', for example, threw away a third more food than 'cupboard monitors / list makers' and 'leftover leavers' threw away a third more food than 'fridge foragers'<sup>10</sup>. This highlights that the largest differences in waste outcomes appear to be explained by food planning and management behaviours – that is, behaviours that are 'upstream' of the disposal decision, when this research has shown that date labels are used much less commonly.

This suggests that there is unfulfilled potential for date labels to play a more significant role in food management behaviours: date labels are currently used principally at the end of a product's shelf-life, by which time it is often 'too late'. However, they have untapped value as a food management tool, upstream of the disposal decision. Improved use of date labels in upstream food management behaviours could have an important, indirect effect on reducing food waste.

With regards to storage guidance, adherence to 'Use within x days' guidance is largely a function of an individual's risk sensitivity, both in general and with regard to specific products and is often correlated with an individual's approach to date labels. This suggests that among those consumers who are highly risk averse (between 10% and 20%), strict adherence to short 'use within' periods may lead to some food being thrown away unnecessarily.

Certain aspects of current freezing guidance also potentially contribute to household food waste. The 'Freeze on day of purchase' guidance, present on many products, has resulted in the widespread practice of freezing food only on the day it is bought. Even among those groups who are less risk averse, the possibility of freezing food that is approaching the end of its shelf-life does not seem to occur to most people. As the online survey showed, the impact of introducing 'freeze before / use by' label was considerable. Uncertainty, however, about how long

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<sup>10</sup> These clusters are, as explained in section 3, preliminary and warrant further analysis, but it is noteworthy that if the fridge forager/leftover leavers dichotomy applies to the population generally, and if they are present in the population as they were in our kitchen diary sample, then food waste nationally would be reduced by 10% if 'leftover leavers' could be persuaded to behave the same way as 'fridge foragers'.

food can be kept in the freezer may lead to some frozen foods being thrown away unnecessarily and, in general, undermines confidence about using the freezer.

## Recommendations for changes to labelling

This research has shown that 'understanding' of date labels is firmly embedded in their practical application – the way date labels are interpreted by any given individual is a function of their wider food practices, is highly dependent on product type and can change according to circumstance and mood. A technical understanding of the meaning of different date label types is rarely an important factor in how date labels are interpreted and used. In fact, the ability to correctly identify the definition of different date labels is reasonably high; yet the majority of people do not use date labels in accordance with their technical definitions. In the case of both date labels and storage guidance, it seems that behaviour is a greater influence on understanding, rather than the other way round.

The research has outlined the complex setting within which date labels and storage guidance are used by consumers. We have concluded that changes to date labels and / or storage guidance that have the potential to produce positive impacts in terms of food waste may not fulfil that potential unless they are accompanied by simultaneous actions that address the complexity of the setting in which those labels are used.

However, a few simple changes to date labels and storage guidance could increase the accessibility, clarity and value of this information to consumers and thereby feed into changes in behaviour over time. As such, the following changes are proposed:

### Continue to clarify the meaning of 'best before' and 'use by'

- Despite difficulties in assessing the level of understanding and 'correct' use of date labels (because results may be influenced by whether the question is prompted or unprompted, the wording of the answer options etc.) for both the food safety and waste agenda, improving understanding is important.
- The results suggest that 'use by' is understood least, and (worryingly) more likely to be inaccurately interpreted by older people. Although a small minority of the most risk averse, date-label-dependent participants claimed to prefer to leave a buffer of one day *before* the date on the label, just to be on the safe side, it was more common for participants to report leaving margins *after* the date on the label, within which they would be happy to eat the product. This again varied with the general risk sensitivity of the participant, as well as with product type.
- It would be most effective to communicate to consumers about date labels via carefully chosen products, given consumer propensity to generalise 'rules' and adopt advice into rules of thumb. Previous research supports this recommendation; people respond most positively to advice which is tailored to specific products and when the benefits were explained (Brook Lyndhurst, 2008b).
- Misinterpretation of 'best before' appears to be a significant factor in the disposal of bakery and fresh vegetables in particular.

### Remove 'display until' dates

Despite some consumers claiming to find the 'display until' date a useful piece of extra information, earlier research (WRAP, 2010b) has shown that stock control is apparently working well for many products/retailers without relying on 'display until' dates, and this research has shown that 'display until' dates potentially lead to household food waste in a number of ways:

- The presence of a 'display until' date reduced understanding of both 'best before' and 'use by' dates – the proportion of people interpreting 'use by' as a quality mark rose from 25% to 32% when a 'display until' date was present and the proportion interpreting 'best before' as a safety date increased from 14% to 20% when a 'display until' date was present.
- The simpler date formats (i.e. just a 'best before' or 'use by' date) were found easier to understand than those combining these dates with a 'display until' date.
- The qualitative element of the research found that many people do not pay attention to the type of date on the label and the 'display until' date is used, in a small number of cases, as a strict cut-off date, or at least as an indicator of optimal quality.
- The presence of an earlier date may bias consumers' expectations of how long the food will last, potentially leading to food being thrown away unnecessarily early.
- Linked to this was demand for simplification of the labelling system: many participants reported that they found date labels over-complicated and that the effort required to understand the detail outweighed the perceived potential benefits.

### Aim for consistent date type use within product categories, where appropriate

- Yoghurt and cheddar cheese are two examples of products that (due to their formulation) may carry either a 'best before' or a 'use by' date. This 'inconsistency' may increase uncertainty among those who do pay close attention to labels, who are typically the most risk averse consumers.

- Although interpretation and use of date labels is driven principally by product type, the online survey revealed that the type of date label present on the pack does have an effect on behaviour, albeit to a lesser extent than product type. Swapping the 'best before' for a 'use by' on yoghurt caused the proportion of people who said they would stick to the date label to rise ten percentage points, from 27% for yoghurt with 'best before' to 37% for yoghurt with 'use by'.
- The higher the perceived risk associated with a product, the less difference label type makes, since consumers are prone to simply default to a strict safety interpretation. The same change made just a 5% point difference for cheddar cheese (which is perceived to be lower risk, perhaps because of the more obvious signs of deterioration).

### **Investigate label redesign to make date labels easier to interpret**

- The online survey showed that understanding of date labels fell slightly when the disguised stock control date [ (2) ] was incorporated, and consumers found it a less useful label. For example, for 'best before' understanding reduced from 85% for the simple date to 77% for the label incorporating the disguised stock control date. However, this was still higher than for the 'best before' / 'display until' combination (71%). 'Ease' of understanding also fell from 94% to 83%. A similar, but less pronounced trend, was noted for 'use by'.
- Putting this information near to the consumer-facing date is likely to increase uncertainty and confusion and this research has shown that the higher the uncertainty, the more people are likely to 'default' to a strict safety interpretation of the date on the label. Where 'disguised' stock control dates are used, consider how they might be better disguised or located.
- Eye tracking research (FSA 2010) has shown that consumers spend very little, if any, time looking at date labels, both in-store and in the home. For a date label to effectively convey information, it must be simple and instantaneous – most consumers are unlikely to invest the time and effort to understand a complicated label or to read the small print. Date labels have thus far been applied as functional, legal requirements and most date labels have not been designed with consumer engagement in mind.

### **Enhance existing storage guidance**

- As part of a general process of improving in-home food management practices, providing tips and guidance on general storage behaviour may progressively feed through into the 'rules of thumb' that consumers typically rely on.
- The huge majority of respondents (>90%) indicated that they would find storage guidance or tips on-pack to be 'useful' or 'very useful'. Reasonable proportions (>half) also thought that 'On display boards in the supermarket' or 'On the supermarket shelf' would also be 'useful' or 'very useful'. The inference is clear: consumers would like storage guidance to be as close as possible to the product, so that *if* they wish to use it as part of their decision-making, they can.
- The existence of mixed messages (for example, fruit and eggs stored at ambient temperature in-store, but with on-pack advice to refrigerate) is also identified as a source of uncertainty for some consumers (Defra, 2009).
- Improving correct in-home storage (e.g. correct domestic fridge temperatures) would give manufacturers confidence to increase shelf-life.

### **Lengthen 'once opened, use within x days' guidance, where possible**

- Consumers' tendency to generalise advice as an alternative to checking the pack every time has led some more risk averse participants to be highly conservative about the amount of time they are happy to leave food open. Lengthening 'use within' periods, in cases where safety is not an issue, may lead to a lengthening of expectations around the shelf-life of opened foods.
- The majority of respondents for all the products shown, selected that they would prefer to buy the product with the longer date. For ham the increase was around 50% points preferring the longer date, for milk around 45% points and for ambient cooking sauce around 30% points.

### **Include the snowflake logo with explanatory text on suitable products**

- The introduction of accompanying text had a clear impact, with a higher proportion indicating that it means "This product can be frozen" (an increase from 62% to 81%) and the near complete elimination of erroneous and uncertain responses ("This product must be frozen", "This is a frozen meal" etc.).
- 89% of respondents considered it 'most useful' compared to just 1% claiming the same for the logo on its own.

### **Move to alternatives to 'Freeze on day of purchase' guidance, where possible**

- Again, consumer propensity to generalise and adopt 'rules of thumb' has led to widespread reluctance to freeze food once it has been stored in the fridge or cupboard at home, with previous WRAP research (2010f) finding that 59% of respondents only freeze food on the day they buy them.
- The online survey suggested that 'freeze before / use by' labels were an effective counter to this, particularly for products about which there is less risk sensitivity. For example, for bacon, the proportion indicating that they would freeze it 'any time before the date on the label' increased from 25% to 44% when the 'freeze before / use by' label was shown. For bread rolls the proportions increased from 13% to 29%. This indicates

that many consumers will make use of the flexibility alternative labelling gives them, though the large proportion of those buying food specifically to freeze it at home will continue to freeze it as soon as they get home.

- It is important to couple any 'freeze before / use by' label with appropriate 'use within x months' of freezing and defrosting guidance e.g. 'defrost and use within 24 hours'.

## Changes to consumer behaviour

Considering the insights based upon the general findings of this present research, a clear conclusion is that further and continued effort to promote improved food management skills will be an essential component of maximising the effectiveness of any changes to date labels and / or storage guidance.

The nature and extent of food management skills has been shown as a key determinant both of food waste behaviours in general and of the use of date labels and storage guidance in particular. Improved skills – in terms of cooking, shopping and, most crucially, in-home stock management – all have the potential either to bring dates and / or storage guidance into use at a sufficiently early point to make a positive difference (i.e. before or 'upstream' of the eat / throw decision) and / or to boost self-confidence so that 'judgement' leads to better use of date labels and / or storage guidance.

To an extent, the means of achieving such improvements in skills and confidence are already in operation through the auspices of the Love Food Hate Waste (LFHW) campaign. What is being suggested here, therefore, is that key features of LFHW would need to be augmented, adjusted or refined specifically to align with changes in date labels and / or storage guidance. Entirely new mechanisms would not need to be developed.

The research has shown that, although complex, the various factors that influence the use of date labels and storage guidance can be grouped under three headings. It is recommended that communications to raise awareness of changes to date labels and/or storage guidance should be tailored along the following dimensions:

- **Age** – younger people and older people have demonstrated different behaviours with respect to date labels in particular and could be expected to have differential responses to changes in labelling. Engaging with young people, in particular, who appear more likely than older people both to rely on labels (since they appear less confident about food generally, probably because they have spent fewer years buying, cooking and eating it, and possibly because of their different experiences of education and the different food products to which they have been exposed) and to have a premature safety default, would be important.
- **Products** – there are clear differences between the ways in which consumers treat different food products and in terms of the way they use date labels and/or storage guidance with respect to those products. Awareness raising about changes needs to be very clearly product specific rather than general: otherwise messages will not 'stick'. Changes to, for example, labelling of chicken, will need to be advertised [in its generic sense] as about chicken and changes to, for example, yoghurt will need yoghurt-specific messaging even if the change in the date label or storage guidance appears the same.
- **Risk** – although they are not as easy to identify as either products or young people, the 'risk averse' constitute a group of consumers the behaviour of which is crucial. How they respond to changes in date labels and storage guidance will significantly dictate the efficacy or otherwise of the changes. Methods to communicate with the risk averse – possibly through non-food specific channels (e.g. health-related websites), possibly through product-specific in-store information, possibly through peer-to-peer social marketing – will need to be developed.

Further detailed work to develop the specifics of these propositions would, of course, be needed. As with the development of the LFHW campaign itself, delicacy will be required and care will need to be taken to avoid – or, at least, account for – the various pitfalls and barriers to change that this research has suggested may occur.

This research concludes that there is indeed potential for changes in date labelling and storage guidance to make a positive contribution towards the goal of reducing avoidable food waste. This research has identified a specific range of changes that seem to have that potential. Given some of the indicators in this research – the numbers of people that fail to understand key date labels, the kinds of clusters identified and the range in the propensity of different clusters to throw away food – the potential gains would appear to be significant.

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The full bibliography is given in the main report.

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