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MSc Public Health Nutrition

‘Supermarket shopping and excess food waste:
A comparative study of Supermarket vs. Independent retail clientele.’

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Abstract

The aim of the study is to investigate the link between environmental attitudes and levels of food waste produced by supermarket shoppers as opposed to independent retail shoppers. The study also aims to look at the different factors that may influence shoppers' habits and how much food waste they may produce.

This study is both a quantitative and qualitative comparative study using a questionnaire to compare views of food waste and a food waste diary to compare methods of how the general public are disposing of it and their reasons why. The study took place at Hawarden Estate Farm shop and Tesco, Broughton Shopping Park. Random samples of 80 women over the age of 18, English speaking and who were independently living were asked to take part in the study. 40 participants were recruited at each of the two locations of whom fully completed the questionnaires. There were 5 participants who completed and returned the food waste diaries from home.

The independent variable measured by the food waste diary and questionnaire in this study is the supermarkets effect on amount of household food waste created in comparison to independent retailers. The dependent variable is the amount of household food waste created.

The quantitative data was statistically analysed using SPSS software. Qualitative data was analysed by comparing the answers given and discussed.

The study was unable to compare differences of food waste between supermarket and independent retail clientele due to the small number of food waste diaries completed. Date labels have been identified as a possible cause of excess food waste. When participants at both sites of the study were asked what they understood by

the term 'sell-by' date 80% answered correctly. A similar result was found when participants were asked about the 'use by' date where 86% answered correctly. The most confusion was seen when asked about the 'best before' date, only 38% of participants answered correctly.

There were more independent retailer shoppers who owned an outdoor composter (n=15) compared to supermarket shoppers (n=5). More participants owned an indoor food waste bin compared to having an outdoor composter with 56% of participants having one.

The most common type of food waste was found to be vegetable peelings and leftovers from meals.

It may be suggested that supermarkets encourage bulk buying which may increase food waste. Supermarket shoppers in this study seemed to have a less organised approach to their food shopping and bought more food on offer and in promotions that weren't intentional. This type of shopping could be influencing the amount of food waste that is being sent to landfill and adding to the greenhouse gases being produced.

Declaration of original work

I hereby declare that work contained herewith is original and is entirely my own work. It has not been previously submitted in support of a Degree, qualification or other course.

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1. Introduction

Food waste is a major problem, not just nationally but globally in terms of both scale and environmental impact. There are 8.3 million tonnes of food waste thrown away each year in the UK alone (WRAP, 2010), of which 65% of this is avoidable through better planning, purchasing, preparation and storing (WRAP, 2009). This is not just wasteful because good food is being thrown away. The production of food for consumers from field to shop requires large amounts of energy, water and packaging and is therefore a large waste of our resources.

Food waste however is not high on the agenda of most families when it comes to thinking about food shopping. Families are thinking about such things as getting the best quality and quantity for the lowest price. The convenience of supermarket shopping and prices available can offer this (Buckley, M., Cowan, C., McCarthy, M. & O'Sullivan, C. 2005). This may explain the continuous rise in popularity of the supermarket in recent years.

With the rise of the supermarket as the main method of food shopping in the UK, it is of interest to examine whether there is a link between the large amounts of food waste being thrown away and the way in which people shop for it in the first place. Is there a difference between the amounts of food waste thrown away by a household who shops at a supermarket to a household who shop at independent retailers such as local farm shops?

This study looks to identify and discuss possible trends in amounts of food waste produced by households from small samples of populations from both types of food shops using a validated questionnaire and food waste diary. This will look at both peoples' amounts of food waste and the opinions of their individual household. This study will also look at other possible links that may add to the problem such as date labelling on food packaging.

This research is the first of its kind to investigate if there is a link between shopping methods and the possible impact this decision of where to shop may have on the amount of food waste an individual household will throw away.

1.1 Definitions

Food waste is defined as 'any food substance, raw or cooked, which is discarded or intended or required to be discarded' (Defra, 2006).

A Supermarket is defined here as 'a large self-service store selling foods and household goods' (Oxford Dictionaries, 2010).

An Independent Retailer is defined here as 'a shop or outlet that is not part of a larger chain' (Food Dictionary, 2010). As an example and for the purpose of this study; a local farm shop is an independent retailer.

Avoidable food waste is food that was thrown away, that was at some point prior to disposal, edible (WRAP, 2009).

Unavoidable food waste is from food preparation that is not, and has not been, edible under normal circumstances e.g. meat bones, egg shells, tea bags (WRAP, 2009).

1.2 Food waste in the United Kingdom

In the United Kingdom (UK) over 8.3 million tonnes of food is thrown away by households, which mostly ends up in landfills (WRAP, 2010). Landfills contribute very potent greenhouse gases such as methane (CH₄) (greenhouse gases are described in more detail later), which is 25 times more potent than Carbon Dioxide (CO₂) (Defra, 2006). 2.2 million tonnes of this is avoidable food waste which is due to cooking, preparing or serving too much and a further 2.9 million tonnes is thrown away because it was not used before the 'use-by' date (WRAP, 2009). In Wales alone 350,000 tonnes of edible waste is thrown away each year (Flintshire County Council, n.d.). Not only is this

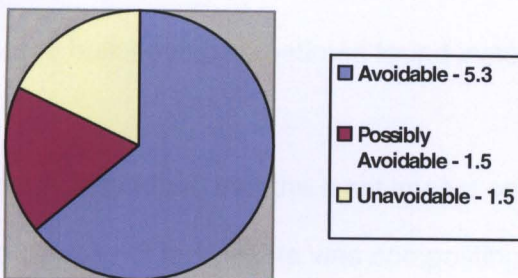
an issue in environmental terms that large amounts of food waste is ending up in landfills and contributing to greenhouse gases but throwing good food away also costs the average family (with children) around £680 per year (WRAP, 2010).

Throwing away perfectly edible food also wastes the resources used to provide us with products on the shelves in the first place. For example, far more is involved in the production of cheese than simply making the cheese then transporting it to be sold. Feeding and milking the cows, cooling and transporting the milk, making and transporting the cheese to then have it kept constantly at the right temperature requires a lot of time and energy (Love Food Hate Waste, n.d.) If this is then thrown away, it does not then harmlessly decompose as we might think, it rots and releases methane into the atmosphere along with the rest of the rotting food in landfill sites across the country.

'In recent years, growing concern about hunger, resource conservation, and the environmental and economic costs associated with food waste have raised public awareness' (Kantor, L. S., Lipton, K., Manchester, A. & Oliveira, V. 1997). Food waste has become such an environmental concern that many governments and organisations are now trying to increase awareness of the problem and tackle the issue. Some local authorities in the UK have started providing food waste bins to encourage recycling and responsible waste disposal. Campaigns such as 'Love Food Hate Waste' (WRAP, 2010) and the 'Healthier Food Mark' (Department of Health, 2009) are working with the Government, trying to improve education, raise awareness and offer tips as to how food waste can be reduced in the home by such medias as the internet which can be used as a resource for information and ideas.

Recycling food waste is still seen as a relatively new concept in the UK, with the food waste bins only having been recently piloted and eventually introduced in some areas of the country.

Figure 1: Weight of food and drink waste generated in the UK, split by avoidability (shown in millions of tonnes per year)



Source: Household food and drink waste in the UK. Report by WRAP (2009)

Figure 1 above shows that from the total 8.3 million tonnes of food waste produced in the UK, the majority is avoidable.

WRAP (2010) identifies that there are two main reasons for throwing away waste; cooking, preparing or serving too much food at mealtimes and not using up food before the 'use-by' date.

There are other factors that add to the problem when food shopping:

- poor planning which results in buying more than required,
- confusion over food labelling,
- poor food storage knowledge.

A review in 2010 also echoes that these 3 primary factors are the main cause of food waste in the household (Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F. *et al*, 2010).

The type of method used to get to the shops can influence the choices we make when shopping. If having to walk or use the bus, this factor will limit the shopper as to how much they can purchase by how much they can physically carry back. This could in effect influence how much thought goes into what that person chooses to buy at the shop and may reduce the likelihood of buying more than needed and what they

intend to buy. If travelling by car, this gives the shopper wider choice due to being able to purchase a larger quantity of items, and so are more able to take advantage of offers that encourage bulk buying sometimes found instore.

A recent study found that the least impact on the environment and most economical method to dispose of food waste was composting (Diggelman, C. & Ham, R. K. 2003). This should encourage local authorities and the government to look at home composting as the ideal method of disposing of food waste, educating the public on the benefits of home composting and raising awareness of the problems that are occurring because of the current methods and usual practices in place.

Looking through the current literature, there are no studies looking in detail at food waste levels and the link with how we shop for our food. There are studies that look into the environmental impact of transportation and production of food or 'food miles' as it is otherwise referred to as. For example, a study in 2005 (Pretty, J. N., Ball, A. S., Lang, T. & Morison, J. I. L.) looked at the full cost of a UK weekly food basket, calculating not just how much it cost to purchase, but the cost of packaging, manufacturing and transporting food. While this type of research is important to see the full cost of how food gets to our shelves, it does not go further into how the food once bought is wasted due to the many factors previously mentioned and adding to the environmental impact of landfills.

A study looking into the food industry and its role in the production of food waste found that waste minimisation can be successful in the food and drink industry with simple changes to communication between producers, retailers and consumers, reducing both waste and its CO₂ emissions and costs for disposing of waste (Henningsson, S., Hyde, K., Smith, A. & Campbell, M. 2004). From this study, it shows that communication needs to be improved to establish a permanent and effective change and reduction in food waste in the UK.

The 2004 study also looked into the amount of food wasted through rejection by the producers due to physical, visual or microbiological reasons is created and how this needs to be combatted to reduce waste further. This study is helpful to see the whole picture of the amount of food waste being produced, and although the food industry is integrated into food consumed at home, it again does not investigate shopping methods involving the retailers such as supermarkets. This validates the need for the current study to take place to fill in the missing research for this section of the food industry.

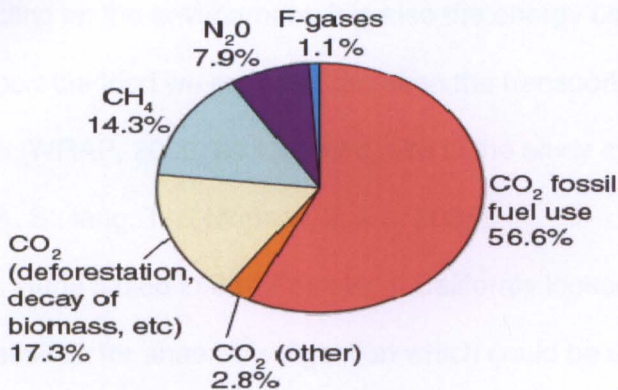
There appears to be a few solutions present that need support to implement that would help with the current situation. Outdoor composters in households who have the facilities for one should be encouraged to use them instead of sending waste to landfills. All local authorities should be providing all households with indoor food waste bins as very little space is required and little effort has to come from the household to use but much would be changed in greenhouse emissions if everyone made this small effort.

1.3 Greenhouse Gases and the 'Carbon Footprint'

As seen in figure 2 below, the global greenhouse gas emissions are mainly made up of carbon dioxide (CO₂). Carbon dioxide enters the atmosphere '...through the burning of fossil fuels, solid waste, trees and wood products, and also as a result of other chemical reactions' (U.S. Environmental Protection Agency, 2010). It is part of a natural cycle where it is removed from the atmosphere when it is absorbed by plants.

Methane (CH₄), which is emitted from organic materials in landfills, is a greenhouse gas, and is adding to the problem of global warming (Finnveden, G., Johansson, J., Lind, P. & Moberg, A, 2005).

Figure 2: Global Anthropogenic Greenhouse Gas Emissions 2004



Source: <http://www.epa.gov/climatechange/emissions/globalghg.html>

Although carbon dioxide accounts for 75% of greenhouse gas emissions, methane is 25 times more potent than carbon dioxide at trapping heat in the atmosphere and accounts for about one-sixth of all anthropogenic greenhouse gas emissions (Kemfert, C & Schill, W. P. 2009). Major sources of methane include livestock farming and landfills, both of which are deeply integrated into the UK food chain. The amounts of both these types of greenhouse gases could be reduced considerably by cutting down on the amount of food waste being sent to landfill.

Methods used to try to combat this problem and reduce food waste include:

- recycling where possible,
- composting,
- getting consumers to plan what foods to purchase to try to defer people from buying large quantities that aren't really needed.

Defra (2006) states that 'recycling in the UK already saves the equivalent in greenhouse gas emissions of taking 3.5 million cars off the road'. Instead of only using all raw materials to create new products, recyclable materials are being used instead. This both conserves the raw materials and stops unnecessary recyclable materials being sent to landfill.

However it is not just the methane and carbon dioxide produced at landfills that is impacting on the environment. It is also the energy used to produce, manufacture, transport the food we eat and then even the transportation of the waste products to landfill (WRAP, 2009) as identified also in the study mentioned previously (Pretty, J. N., Ball, A. S., Lang, T. & Morison, J. I. L, 2005).

A study based in San Francisco, California looked into ways of using the food waste as feedstock for anaerobic digestion which could be used as an alternative to landfilling (Zhang, R., El-Mashad, H. M., Hartman, K., Wang, F., Liu, G., Choate, C *et al*, 2006). Although this American study is showing positive solutions for the food waste inevitably produced, it does not tackle the issue of trying to reduce the amount of food waste thrown away and wasted in the first instance.

1.4 The role of supermarkets and food waste

The supermarket was identifiable in the food market in the mid 1980's, however it wasn't until the late 1990's that their popularity was really seen (Baron, S., Harris, K., Leaver, D. & Oldfield, B. M. 2001). The large UK groups entered the convenience retailing market in a substantial way along with the fuel companies to increase the appeal of being able to conveniently shop for everything in one location, also offering a wider selection of foods available that local shops could not offer. This has resulted in the fall in popularity of the independent retailers such as butchers, bakers and farm shops and the local way and method of shopping which was seen for so many years.

The role of supermarkets and its effect on food waste produced in the UK is one that has not been investigated before. In the UK, supermarkets dominate the grocery market, where over 75% of food such as bread, milk, meat and fruit is bought (Burch, D. & Lawrence, G. 2007) of which these sales are dominated by four major chains – Tesco, Asda, Sainsbury's and Morrisons.

TESCO
Every little helps

ASDA
part of the WAL-MART family

Sainsbury's
Try something new today

M
MORRISONS

Source of all 4 images: <http://www.google.co.uk/img/ghp?hl=en&tab=wi>

This majority share of the food market was seen to rapidly increase between 1950 to 1990 (Burch, D. & Lawrence, G. 2007). This may therefore imply that the amount of household food waste being produced by the UK is related to the large proportion of the food market owned by supermarkets, and how they sell and promote their food. Offers such as 'buy one get one free' and '2 for 1' may encourage bulk buying and unintentional purchasing of food, resulting in too much being bought, some of which ending up being thrown away.

The number of people living in a household will also effect the quantity purchased. The bigger the household, the larger the quantity needed. Offers provided by supermarkets are often aimed at this market, who are looking to save money where possible. However sometimes these offers make the consumer think they are saving money when in fact they are buying more of something which they do not need, and may even perish before they may get chance to consume the product.

Food sold in supermarkets is seen to be the cheapest way to purchase food. 'Price wars' between the major supermarkets sees consumers being constantly bombarded with advertisement of weekly deals, and each claiming they are cheaper than the other. With the food being relatively cheap, this reduces the incentive in some ways to avoid waste as it is inexpensive to purchase more if necessary (Godfray, H. C. J., Beddington, J. R., Crute, I. R., Haddad, L., Lawrence, D., Muir, J. F. *et al*, 2010).

Another problem that is resulting in more 'avoidable' food waste being thrown away is the aesthetics of the food we purchase, in particular fresh fruit and vegetables.

Consumers have now become used to seeing food at its highest cosmetic standards and

so suppliers are now forced to discard perfectly edible food that does not meet the requirements and standards now set by the retailers. This only encourages further waste of perfectly edible food and has set a demand amongst consumers to expect food such as fruit and vegetables to look a certain way (Henningsson, S., Hyde, K., Smith, A. & Campbell, M. 2004).

This demand for aesthetically pleasing food comes from the increase in production over recent years, generating an abundance of products allowing for greater standards to be met (Harvey, M., McMeekin, A. & Warde, A. 2004). There is now a trend however to return to older, more natural processes of producing foods, with local, organic, GM-free foods and so on, are becoming more popular. This may see a rise in popularity for the independent retailers such as farm shops who produce these kinds of foods.

1.5 Food Labelling

A major factor mentioned by WRAP that increases food waste is confusion of dates on food labels. Supermarkets use labels to identify when food should be used by, sold by, to indicate when it is best to eat food products, and correct storage instructions to enable food to retain safe levels of hygiene and be edible at a level which reflects the dates of consumption given. Consumers however are confused between these, sometimes unable to decipher between which date is to indicate what is safe to eat and what is not. This can lead to acting on the side of caution and throwing away food they are unsure of. This problem is currently being tackled by the government and the Food Standards Agency (FSA).

A survey commissioned by the FSA in the UK in 2009 of public attitudes found that only half of the respondents identified that the 'use by' date is the best measure of safety. Even more worrying is the finding that only just over half said they '...would never eat cooked meat beyond it's 'use by' date...' which suggests the other half were willing

to take the risk (FSA, 2009). It also found that one in three people would cook and eat raw meat up to three days past its 'use by' date.

When looking at attitudes towards the 'best before' dates, one quarter of respondents stated they would not eat bread or cereal if it was past its 'best before' date. This is a clear indication that food is wasted due to confusion about what these different dates mean, and how they should be used.

This survey also discovered that knowledge of dates was not the only impact on behaviour, as there was no difference between whether someone had correctly identified the different meanings behind the dates and whether people would eat certain foods past the use by or best before dates. Using their own judgement by smelling and looking at the foods themselves were also key factors as to whether foods are eaten and when in relation to the dates found on the packaging.

The Food Labelling Directive (2000/13/EEC) (FSA, 2003) requires that most packaging has a date indicating minimum durability, generally shown as the 'best before' date. This Directive also requires a 'use by' rather than 'best before' date on those prepackaged foods '...which from a microbiological point of view, are highly perishable and are therefore likely after a short period to constitute an immediate danger to human health' (FSA, 2003). In compliance with the Food Labelling Regulations 1996, this date should also be accompanied by correct storage guidelines to reflect the date that it can be properly stored up to. If these storage guidelines are not followed, then the 'use by' date becomes invalid and the food should be thrown away (FSA, 2008).

This therefore indicates that there is much confusion when interpreting date labels, causing either potential harm to health when ignoring the 'use by' date, or throwing out perfectly edible food away when there is a 'best before' date indicating it is safe to eat. Supermarkets have some responsibility to try to combat this confusion by using clearer labels, maybe even indicating on packaging what each date means.

1.6 Independent retailers and their role in food waste

In recent years the independent retailers popularity has been overtaken by the major retailers due to longer opening hours, cheaper prices and wider variety of produce all year round (Baron, S., Harris, K., Leaver, D. & Oldfield, B. M. 2001).

The type of shopping found at independent retailers such as farm shops is very different to supermarkets. Quantities can be decided by the customer which would suggest this encourages customers to buy only what they need and not what is cheaper as prices in independent retailers are on the whole higher than what you would find in a supermarket.

The environment in independent retailers tends to be more relaxed, friendly and sociable with one study reporting that more than three quarters of shoppers at a farmers market arrive in the company of others compared to more than three quarters of supermarkets arriving alone (Sommer, R., Herrick, J. & Sommer T, 1981). This study, although old and not conducted in the UK, is one of the only studies that compares behaviour in supermarkets to farmers markets. This point also reiterates and justifies the importance of this current study to gain knowledge in this area of research.

Not only do independent retailers provide local produce to customers, they are also important because they provide social and community services. There is an element of a personal approach where the majority of owners/managers are on first term names with their customers and this is one of their most positive strengths (Baron, S., Harris, K., Leaver, D. & Oldfield, B. M. 2001). This familiarity can be used to give advice to customers on quantities needed for what is required, how to store food properly, suggestions of how to serve, so as to reduce waste of food bought.

Shopping in local independent retailers such as farm shops could also be suggested as a way of helping reduce environmental impact by reducing transport-

related emissions as most produce sold is local and so requires shorter distance of transportation (Nichol, L. 2003).

Consumers should be encouraged to support their local independent retailers, not just to help with environmental issues, but to help keep them present in the community.

This study looks to investigate whether supermarket shopping exasperates the increasing amount of food waste compared to shopping in an independent retailer such as farm shops. There is currently no research looking into this idea in the UK. Therefore this research will contribute to a more in-depth understanding of the public's awareness of food waste and its link to emissions of greenhouse gasses.

Therefore the **aim** of this study is to:

- Investigate the link between environmental attitudes and levels of food waste produced by supermarket shoppers as opposed to independent retail shoppers.

The **objectives** to be able to meet the aim are:

- To determine the amount of food waste produced by an individual shopping at a supermarket compared to an individual shopping at an Estate Farm Shop
- To establish if there is a relationship between where people shop and their attitude towards food waste
- To establish if there is a link between where people shop and their attitude towards environmental issues
- To investigate whether 'bulk buying' in supermarkets exasperates the problem of food waste.

The **Alternate Hypotheses** for this study are as follows:

1st - There is a significant link between supermarket shoppers and an increase in household food waste produced compared to independent retailer clientele.

2nd - Pre-packaged food sold by supermarkets exasperates the problem of increased greenhouse gases

3rd - Regular purchasing of items promoting bulk buying increases the amount of household food waste produced.

2. Methodology

2.1 Study Design

This study is both a quantitative and qualitative comparative study using a questionnaire and food waste diary to compare views of food waste and methods of how the general public are disposing of it. The questionnaire part of the prospective study took place in two locations; Hawarden Estate Farm Shop, North Wales on the 27th September 2010 and Tesco Broughton Shopping Park, Cheshire on two occasions: 28th & 29th September 2010 (see Appendix 1 for permission letters & Appendix 2 for sample of questionnaire). Two days were needed at the Tesco location to make sure that even groups were obtained. These locations are only 2 miles apart from each other and so being in the same area means they are locations that can be used to compare views of local people.

The food waste diary stage of the study took place between 27th September 2010 and 11th October 2010 (see Appendix 6 for sample food waste diary). This was to give the participants enough time to complete and return their completed food waste diaries. Food waste diaries were given to participants to take away and complete at home.

The independent variable measured by the food waste diary and questionnaire in this study is the supermarkets effect on amount of household food waste created in comparison to independent retailers. The dependent variable is the amount of household food waste created.

2.2 Study Population

Random selections of 80 women over the age of 18, English speaking and who were independently living were asked to take part in the study, 40 at each of the two locations were recruited. Due to time constraints because of a delay waiting for ethical approval, the aimed target population size of 100 participants was not reached. The target size for the food waste diary section of the study was 40 participants (or half of the

total sample). However only 10 participants out of the 80 asked agreed to take part in this section of the study. From the 10 participants who took a diary home, 5 were returned completed (2 from the supermarket shopper participants and 3 from the independent retailer participants).

The inclusion criteria were put through for ethical approval as part of a proposal on 21st July 2010 by the Faculty of Applied and Health Sciences Research Ethics Committee of the University of Chester. Ethical approval was obtained before the study took place.

This inclusion criteria was chosen because when living independantly (renting/own home themselves) subjects are more likely to decide how their household waste is disposed of themselves. Women aged 18 or over are required as it is this age that classifies someone as an adult in England and Wales, and are more likely to live independantly. Also using only adults in the study meant less complications when applying for ethical approval. Women are also seen in most cases to organise the household food shopping.

Subjects gave their consent to take part in the study by agreeing to complete the questionnaire, and so a consent form was therefore not required.

Geographical origin is not important and so is not part of the exclusion criteria. Females under the age of 18 and dependently living, and males are the only exclusion criteria, the reasons having been explained in the inclusion criteria. There is no upper age limit applied as this allows for a broader representation of the public opinion.

2.3 Procedures

A pilot questionnaire and food waste diary was given to 10 women to check validity of the questionnaire and test if the information obtained would answer the researches aims and objectives . This was completed by random volunteers who were

available to give feedback to the researcher on any problems/improvements that could be made to make the questionnaire clearer and easy to understand.

Once reviewed and completed, random members of the public at each location who fit the inclusion criteria (see above) were asked to take part in the study by the researcher at both locations stated previously. The researcher used a badge to be visually recognisable as a student from the University of Chester to perspective participants. This was to stop people from avoiding the researcher due to interpreting their approach as a method to sell to them or ask for charity, which would make it very difficult to recruit the amount of participants required in the limited time available.

Participants were first asked to read the Participant Information Sheet (PIS) (see Appendix 4 for sample of PIS) before taking part. A consent form was not needed at this time as the participants were giving consent by completing the questionnaire at the time of the study taking part.

Subjects were given the option to either complete the questionnaire themselves or if preferred the researcher was available to ask the questions and fill in the answers on the form for them. This took approximately 5 minutes to complete 19 questions for each participant. Subjects were asked to give a true, honest account of their usual habits as no judgement would be made and entrants would remain anonymous as names were not required to complete the study.

Once completed, if not taking part in the waste diary part of the study, participants were handed a leaflet (see Appendix 3 for sample of leaflet) created by the researcher of handy leftover recipes, tips on how to reduce their own food waste, and facts and figures as a 'thank you' for taking part and something they can use to refer to, to help reduce food waste in their home.

Participants were asked if they wished to take away and complete a 3 day waste diary adapted from the tested version found on the 'Love Food Hate Waste'

gouvernement campaign web site. This was to be returned to the researcher in a pre paid envelope. The waste diary consists of 3 sections, one for each day in which they could record what had been thrown away that day in their household. Each section was split into mealtimes to make it easier complete.

The waste diary came with full instructions for the participant to read including how to measure what was being thrown away and examples of how to fill in the diary to avoid confusion. This was also to avoid diaries being filled in incorrectly meaning they would not be used in the study which would result in the participants time being wasted of which could be seen as an ethical issue.

A total of 5 participants took part in this second part of the study. These participants had 2 weeks in which to complete and return their waste diaries. The 3 days of the diary were to be completed consecutively and include one weekend day to gain a true representation of that participants normal food waste. Participants who wished to take part in this stage of the study did not receive the information leaflet until the completion of their waste diary so as not to influence the results entered. This was sent via mail after the diary was sent back to the researcher.

Consent for addresses to be provided for the researcher to send the leaflet was given by the participants. The researcher also reassured that addresses would not appear in the write up of the study and would be kept safe in a secured drawer in the reserachers home office.

Questionnaires and food waste diaries completed were stored in a file in the researcher's home office. No names were recorded either by the researcher or written on the documents so as to give privacy and anonymity to the subjects who chose to take part.

2.4 Data Analysis

The quantitative data from the questionnaire was cross-tabulated and a chi-square test was used to test for the level of significance using SPSS (version 14; SPSS, Inc.). The following questions were all cross tabulated to compare between the two types of shoppers:

- What do you understand by the following terms: 'sell-by', 'use by' and 'best before date' on some food packaging?
- What is the main type of food waste generally generated in your household?
- Do you regularly purchase 'buy one get one free' and '2 for 1' food offers?
- If 'yes' are the items purchased as offers intentional/part of your shopping list?
- Do you normally buy your fresh foods pre-packaged or loose? (Fresh foods questioned were fruit and vegetables, bread, meat, fish and cheese)
- Do you bring a shopping list?
- Are you aware of which greenhouse gases are produced by food waste sent to landfills?

The level of significance was set to <0.05 and a chi-square test were applied to each cross tabulation for each question to test for this.

The qualitative data from the questionnaire was not statistically analysed, instead quotes were selected that were relevant. These included answers to question 12 b that asked:

- Please give reasons for having/not having a composter or food waste bin,

and question 19 that asked:

- What do you think can be done that would encourage more people to compost/dispose of food waste responsibly?

These findings were compared, discussed and also used to validate other results from the questionnaire that had been statistically analysed.

Due to the delay in the start of gathering data with the questionnaires and handing out the food waste diaries, and the small number returned, it was not possible to statistically analyse the results found by the food waste diary. These findings were used to emphasise other results found from the questionnaire so as not to have wasted the time of the participants who did take part in this part of the study. The diaries did give some insight into the amounts of food waste a typical household can produce; there just wasn't enough to validate any findings as a trend.

3. Results

3.1 Comparing supermarket shoppers to independent retailer shoppers

Due to only 5 of the 10 food waste diaries handed out being returned, it was not possible to statistically analyse to give a significant answer to the first hypothesis. However, the diaries from the 3 independent retailer shoppers and 2 supermarket shoppers have been studied to see if there were any differences even if not significantly so. The data will also be used alongside answers from the questionnaires as further evidence.

3.1.1 Food waste diary results

All returned diaries showed that the most common type of food waste was found to be leftovers from meals. Also rotten or food past its 'use-by' date were among the most common answers. Fruit and vegetable peelings also featured in 2 of the diaries quite frequently. There was seen to be little difference between amounts of food waste between independent retailer shoppers and supermarket shoppers' food waste. However out of the 5 diaries completed, only 1 participant had an outdoor composter, who was an independent retailer participant.

There were 2 participants who had indoor food waste bins (provided by the local authority) of which one was a supermarket shopper and one an independent retailer shopper. The 2 participants to have neither an outdoor composter nor food waste bin stated their reasons were either they 'had no room', or 'had not thought it to be an issue and had little spare time'.

The meal which seemed to create the most food waste in all diaries was the evening meal and the least amount at breakfast, with only fruit peelings and teabags being mentioned if this was what was had as part of breakfast.

3.1.2 Questionnaire results

Results shown in the tables and graphs are split by groups. The 'Farm' group indicates the results from the independent retailer clientele, and the 'Tesco' group refers to the supermarket clientele.

Table 1: Comparing knowledge of the term 'sell-by' date.

Knowledge of date labelling

Count

		Sell by date		Total
		Correct	Incorrect	
group	Farm	36	4	40
	Tesco	28	12	40
Total		64	16	80

As discussed previously, date labels have been identified as a possible cause of excess food waste. When participants at both sites of the study were asked what they understood by the term 'sell-by' date (see Table 1), 80% answered correctly. A larger percentage of this was from the independent retailer participants (45% compared to 35%), however this was not statistically significant ($p=0.025$).

Table 2: Comparing knowledge of the term 'use by' date.

Knowledge of date labelling

Count

		Use by date		Total
		Correct	Incorrect	
group	Farm	33	7	40
	Tesco	36	4	40
Total		69	11	80

A similar result was found when comparing knowledge of the term 'use-by' date (see Table 2). Out of the total 80 participants, 86% answered correctly with more supermarket shoppers answering correctly compared to independent retailer shoppers,

however this again was not statistically significant ($p=0.330$) as there was only a difference of 3 participants answering correctly between the two groups.

Most confusion appeared to be when asked about the 'best before' date (see Table 3). Only 38% of participants answered correctly with there not being much difference between the 2 different groups. These findings were again found not to be significant ($p=0.356$) with only a difference of 4 more participants answering correctly from the supermarket shoppers group.

Table 3: Comparing knowledge of the term 'Best before' date.

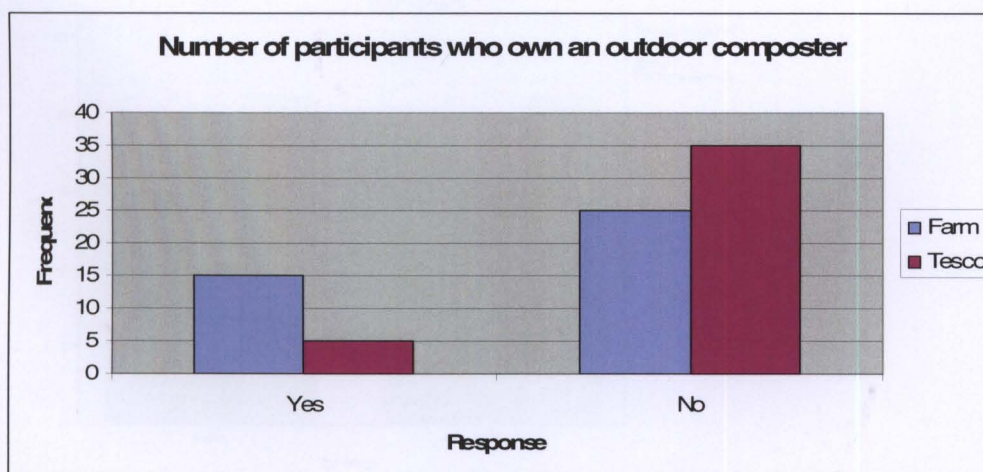
Knowledge of date labelling

Count

		Best before date		Total
		Correct	Incorrect	
group	Farm	13	27	40
	Tesco	17	23	40
Total		30	50	80

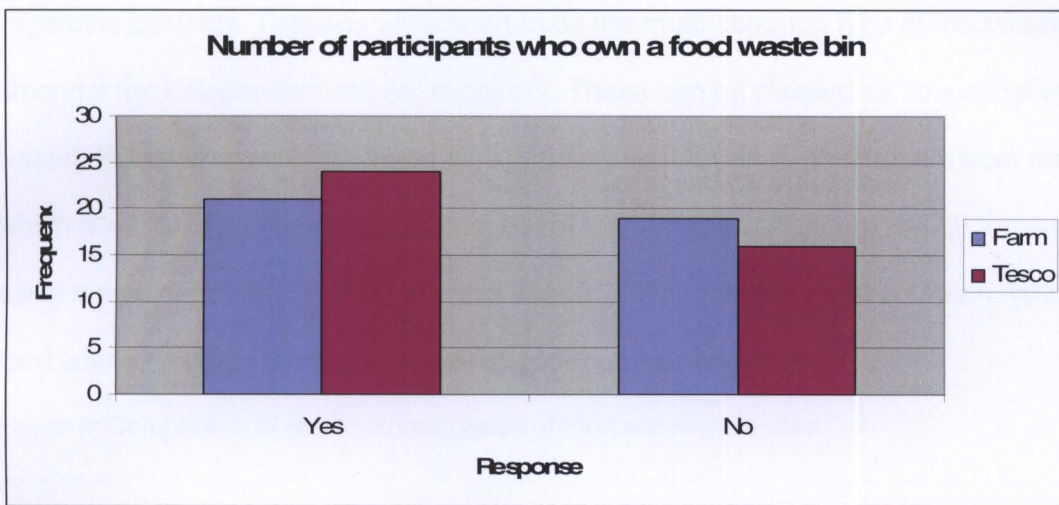
The way in which the supermarket shoppers dispose of their food waste differs slightly to the independent retailer shoppers in this study. There were more independent retailer shoppers who owned an outdoor composter ($n=15$) compared to supermarket shoppers ($n=5$) (see Figure 3).

Figure 3: Number of participants who own an outdoor composter



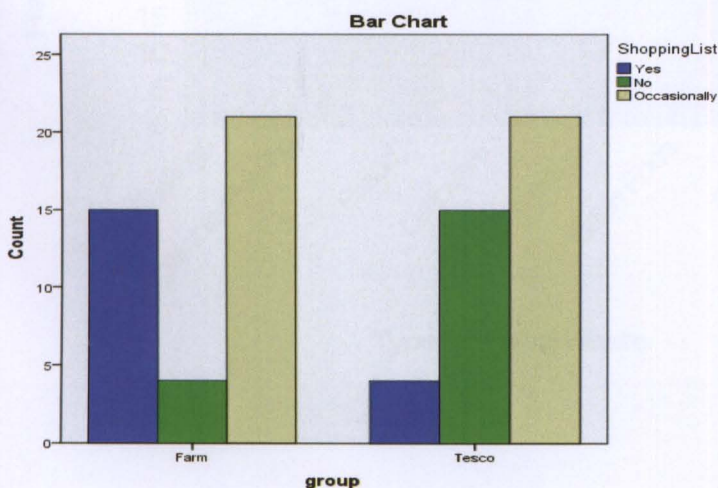
There was an increase in number of total participants who own an indoor food waste bin compared to having an outdoor composter with 56% of participants having one (see Figure 4). The food waste bins have been distributed by the local authority in some areas and so this appeared as the most common reason for having one when asked.

Figure 4: Number of participants who own a food waste bin



When comparing which group are more likely to take a shopping list, the independent retailer shoppers answered 'yes' more (38%) compared to supermarket shoppers (10%).

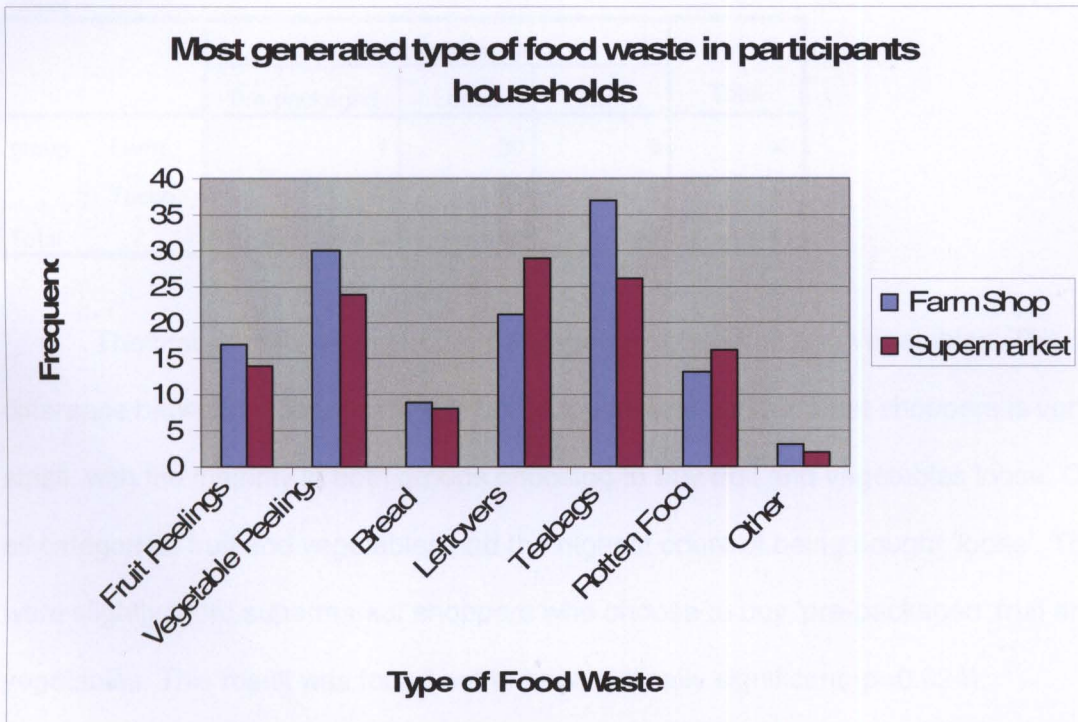
Figure 5: Comparison between shoppers who take a shopping list



This was found to be statistically significant ($p=0.002$). The same amount of shoppers in both groups said that they 'occasionally' took shopping lists when food shopping (see Figure 5 above).

The type of food waste generated from each group differs slightly, as seen in Figure 6 below. Amongst the most common types of food waste were teabags and vegetable peelings. Teabags were seen to be the most common type of food waste amongst the independent retailer shoppers. These can be classed as 'unavoidable waste'. However another common type of waste was found to be leftovers from meals which are avoidable, with a higher number of supermarket shoppers ($n=29$) throwing it away than independent retailer shoppers ($n=21$). This was the most common type of food waste amongst the supermarket shopper participants.

Figure 6: Comparison of most common types of food waste generated.



Rotten food can also be classed as an ‘avoidable waste’ and again supermarket shoppers were found to have a slightly higher number of participants stating it as one of the main types of food waste created by their household. Bread did not feature highly in either group.

3.2 Pre-packaged food

As discussed in chapter 1, pre-packaged food limits a customer to quantity of food they are able to purchase, sometimes either meaning their only option is to purchase too much or too little. The study used a questionnaire to gain some insight into whether there is a difference between where someone chooses to shop and whether this affects how much pre-packaged food is bought. Participants were asked to tick which applied to them for each food category.

Table 4: Comparison of how many fruit & vegetables are bought pre-packaged

Comparison of pre-packaged foods

Count		Fruit & vegetables			Total
		Pre-packaged	Loose	Both	
group	Farm	1	30	9	40
	Tesco	7	30	3	40
Total		8	60	12	80

The first section looked at pre-packaged or loose fruit and vegetables. The difference between independent retailer shoppers and supermarket shoppers is very small, with the majority in both groups choosing to buy fruit and vegetables loose. Out of all categories, fruit and vegetables had the highest count of being bought ‘loose’. There were slightly more supermarket shoppers who choose to buy ‘pre-packaged’ fruit and vegetables. This result was found not to be statistically significant ($p=0.024$).

The second category asked about bread packaging. Table 5 shows that for independent retailer shoppers it is more evenly spread as to whether they choose pre-

packaged or loose bread. However there were twice as many supermarket shoppers who chose pre-packaged bread over loose. More of the independent retailer shoppers chose to purchase loose bread than supermarket shoppers.

Table 5: Comparison of how much bread is bought pre-packaged

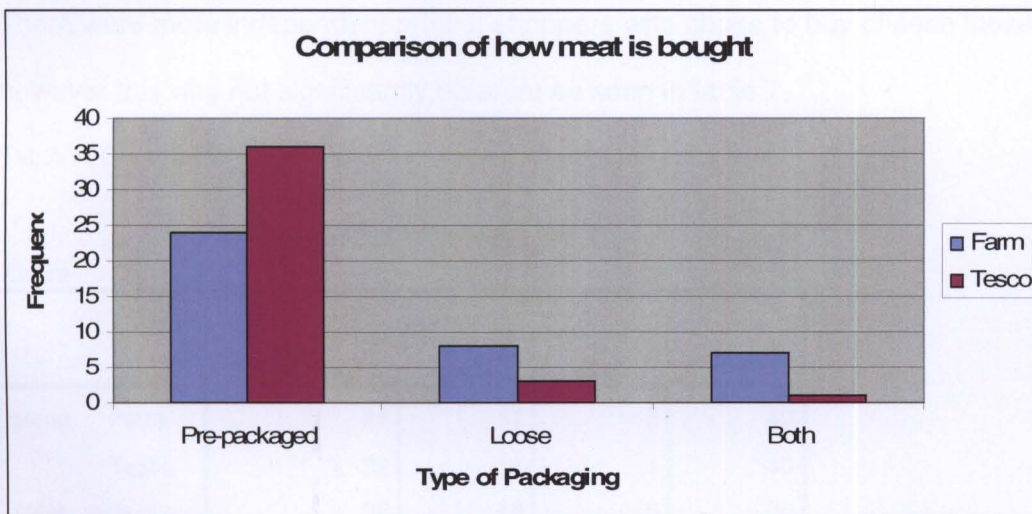
Comparison of pre-packaged foods

Count

		Bread			Total
		Pre-packaged	Loose	Both	
group	Farm	15	19	6	40
	Tesco	24	12	4	40
Total		39	31	10	80

The third question looked at how participants chose to buy their meat. One person did not answer this question due to being a vegetarian.

Figure 7: Comparison of how much meat is bought pre-packaged



The majority of meat bought at both types of shop was pre-packaged. More independent retailer shoppers chose to buy meat loose although this was still a small percentage (20% of 40 shoppers in current study, see Figure 7). A similar amount of independent retailer shoppers stated that they choose both options when shopping.

Fish packaging choices was also compared in the questionnaire. Table 6 shows that the majority of supermarket shoppers chose to buy pre-packaged fish (n=32) compared to only 13 independent retailer shoppers choosing to buy pre-packaged. One participant did not answer this question due to being a vegetarian.

Table 6: Comparison of how much fish is bought pre-packaged

Comparison of pre-packaged foods

Count

		Fish			Total
		Pre-packaged	Loose	Both	
group	Farm	13	21	5	39
	Tesco	32	7	1	40
Total		45	28	6	79

The last category in this section of the questionnaire was cheese. It was found that the majority of cheese is bought pre-packaged amongst these participants (70%). There were more independent retailer shoppers who chose to buy cheese loose, however this was not significantly different as seen in table 7.

Table 7: Comparison of how much cheese is bought pre-packaged

Comparison of pre-packaged foods

Count

		Cheese			Total
		Pre-packaged	Loose	Both	
group	Farm	24	11	5	40
	Tesco	32	7	1	40
Total		56	18	6	80

3.3 Promotional purchases

Participants were asked if they regularly purchased offers such as 'buy one get one free' and '2 for 1'. The results show that a slightly higher number of supermarket shoppers regularly purchase offers (see Table 8). This result however is not statistically significant ($p=0.237$).

Table 8: Comparison of purchases of food on offer

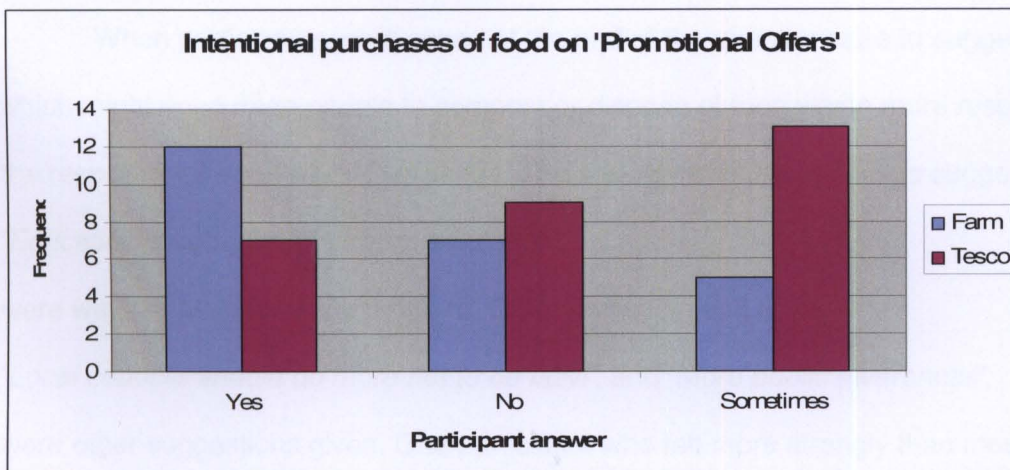
Purchases of food on 'promotional' offers

Count

		Offers		Total
		Yes	No	
group	Farm	24	16	40
	Tesco	29	11	40
Total		53	27	80

The independent retailer shoppers who do buy food on offers are more likely to buy them as intentional purchases (see Figure 8) rather than 'impulse buying' seen more within the supermarket shopper participants, however these findings again are not statistically significant ($p=0.096$).

Figure 8: Comparison of food bought on offer which is intentional



3.4 Awareness of environmental issues and qualitative data

Participants were asked:

- Are you aware of which greenhouse gases are produced by food waste sent to landfills?

The response was overall negative, with 64% answering ‘no’ (see Table 9 below). There were a slightly higher proportion of independent retailer shoppers who answered ‘yes’ and were able to identify correctly at least one greenhouse gas when asked to specify. The difference between the two groups was not overly different, with just 7 participants different.

Table 9: Comparison between groups awareness of greenhouse gases produced by food waste

Count		group aware of greenhouse gases		Total
		Yes	No	
group	Farm	18	22	40
	Tesco	11	29	40
Total		29	51	80

When participants were asked at the end of the questionnaire to suggest ways which might encourage people to compost or dispose of food waste more responsibly, the response followed a few key trends. The majority of the participants suggested that: *‘Education in schools’* and *‘more education’*; were ways to help solve the problem. Other answers such as: *‘Local councils should do more not to be lazy!’*, and *‘More public awareness’*; were other suggestions given. One participant who felt more strongly than most suggested that:

'...the large supermarkets have a major responsibility to reduce waste...also feel strongly that more emphasis should be put on 'educators' to inform our young children of the issues...'

4. Discussion

This study was unable to identify if there is a difference in amounts of food waste produced between supermarket shoppers and independent retailer shoppers. This was due to the small number of food waste diaries returned and so the small amount of data collected would not produce a statistically significant analysis. This will be discussed further in the limitations section of the study in this chapter.

The food waste diaries did identify that there is clearly a difference between which mealtimes tend to create more food waste than others. The evening meal seemed to create more food waste both in preparation of the meal, and leftovers after the household had eaten. In the UK the evening meal is seen as the main meal of the day and is usually where the largest quantity of food is consumed. This may explain the larger amounts of food waste created. This may also explain the smallest amount of waste was being produced at breakfast time, where people tend to consume the smallest amount of food because of different levels of appetite and sometimes due to time constraints.

The majority of the participants filling in the food diaries ate lunch outside of their accommodation and so any waste created would not have been included in the count of household food waste, however these amounts were still recorded in the waste diary. This is where the largest amount of food was thrown away along with everyday waste as facilities to dispose of food waste responsibly were not available outside of the household. This highlights a problem that is also contributing to food waste in landfills. If workplaces were provided with facilities also, this would help ease the problem on a much larger scale.

Knowledge of date labelling found on food packaging was compared between the two types of food shoppers and was found to be fairly similar in that the majority could

correctly describe definitions of the 'sell-by' and 'use by' date and the same mistakes were made for the definitions of the 'best before' date. The result that the majority could correctly define the terms 'sell-by' and 'use by' may have been due to their being more awareness of the meaning of these two terms. Both have a very clear definition, with most identifying that the 'sell-by' date only applies to the shops as the term 'sell-by' suggests so it would be presumed most would not be confused by this, which is reflected in the results of this study.

There seemed to be more confusion from supermarket shoppers about the 'sell-by' date than independent retailer shoppers; however this finding was found not to be statistically significant, and a larger study population would be required to test this as a theory. The same was found when participants were asked to define a 'use-by' date; the majority correctly defined the term and there was little between the groups to identify a trend.

The 'use by' date is one of great importance and informs the consumer of when it is safe to consume the food until. Without this date the consumer would be put at risk from eating food that is unfit and cause harm. This may be why there is less confusion because the name itself suggests its important meaning.

Participants were also asked to correctly define the term 'best before'. Only 30 (38%) of the total study population answered this correctly. The main mistake made was incorrectly identifying that the 'use-by' and 'best before' date both had the same meaning; that food must be consumed by this date. This clearly identifies that there is a gap in knowledge on what the different dates stand for and how they should be followed to keep food at its highest quality possible from when it's bought to its 'use by' or 'best before' date displayed. It might also be suggested that the name itself 'best before' is too vague and unclear and could be interpreted into too many meanings, creating confusion and resulting in food being disposed before required.

Participants who answered incorrectly were asked as to why they presumed these dates represented the same thing, the general reply was that they presumed that all foods would perish and become inedible not long after purchasing and so would need throwing away, and so presume the 'best before' date represented this.

Education on what the different dates represent and clearer food labelling would help combat this problem and reduce the amount of perfectly edible and avoidable food waste being created by households which are being sent to landfill, increasing the amount of greenhouse gases being produced.

The survey conducted in 2009 by the FSA also identified confusion amongst the public of what the dates on food labels actually mean. It found that some were willing to eat food, including meat that was a few days past its 'use by' date, and also found that some would not be willing to eat foods such as cereal that was past its 'best before' date. Although this shows in some aspects people using their own common sense in judging what is safe to eat, therefore stopping some food being sent to landfill, foods that are high risk such as raw meat should not be consumed in this way. In the opposite way, perfectly edible foods were seen to be inedible when past its 'best before' date in this report and so reiterates what was identified in this current study.

The FSA report was on a larger scale to the current study and so was a greater indication of amounts of food and drink waste produced by the UK households. However this report did not look at possible causes of these amounts of waste and what could be done to reduce these amounts. This justifies the need for this study to look at supermarkets and their possible role in the amount of food waste created.

When comparing the way in which supermarket shoppers and independent retailer shoppers dispose of their food waste, it was found to differ slightly. There was more independent retailer shoppers who owned an outdoor composter compared to

supermarket shoppers. The most common reasons for having an outdoor composter included:

- 'Recycle and use to fertilise the garden';
- 'Felt it is an important issue to reduce waste being sent to landfills.'

Reasons for supermarket shoppers not to have an outdoor composter included:

- 'Not enough room'
- 'Not really thought about the consequences of throwing food waste away with the normal rubbish'
- 'Don't have enough time.'

When asked about food waste bins however, the levels of participants owning one increased. This was due to the local authority now providing them in the area, and was the most common answer when participants were asked the reason for owning one. This identifies a solution that all households should be provided with the right facilities to dispose of waste responsibly and shown encouragement, which would create change in the amounts seen being sent to landfill.

From the questionnaire results, it can be seen that independent retailer shoppers seem to be more aware of their own impact on the environment and how much waste they are contributing. This finding is further justified when the amount of participants who were aware of what greenhouse gases are produced by food waste were analysed, more independent retailer shoppers answered correctly.

When looking at different age groups and comparing their knowledge of greenhouse gases produced by food, the older age groups '46-55' and '56-64' correctly identified them more frequently than any other age group ($p=0.001$). This may be due to this age group having received more education on the subject or been exposed to more

information than the younger age groups. They may also be more aware or more concerned by their own environmental impact.

As discussed in chapter 1, taking a shopping list when food shopping is a way to reduce 'impulse buying' by being more organised and buying only what you need and intended on purchasing. When participants were asked if they chose to take a shopping list, there was a significant difference between the two groups. The independent retailer shoppers were more likely to take a shopping list and buy food that is needed compared to supermarket shoppers, identifying that in general the independent retailer shoppers in this study choose to be more organised in the way in which they choose to shop.

When participants were asked about buying food in promotions such as '2 for 1' and 'buy one get one free' offers and as to whether these purchases were intentional, supermarket shoppers appeared to buy more promotional food products which may not have been intentional.

This result along with the previous point, shows that independent retailer shoppers in this study are generally more organised in the way they shop for food and do not buy into promotional offers as much as the supermarket shopper participants. This may be due to the way in which supermarkets operate and market their food to the customer, and shoppers feel they require less of a need to be organised when everything can be conveniently bought in one place. This may be also due to the price differences sometimes found when comparing supermarkets and independent retailers.

From these findings just discussed it can be suggested that supermarkets may increase amounts of food being bought using promotional offers to encourage 'bulk buying' and so may increase amounts of food being thrown away.

Using both the waste diaries that were returned and the questionnaires obtained, it enabled a small sample into how food is disposed of and the type of food waste being thrown away. The waste diary showed that there was very little difference between the amounts of food waste produced by both groups, however there was more of a difference between the ways in which the waste was disposed of. This goes back to the results of the amounts of participants who own food waste bins and outdoor composters, showing that the independent retailer shoppers in this current study are slightly more proactive in the way in which they dispose of their food waste, either recycling it into garden fertiliser in the outdoor composter bought by their own choice, or using food waste bins provided and collected by the local authority and again recycled into fertiliser.

Although a slightly larger amount of supermarket shoppers in this study own a food waste bin compared to the independent retailer shoppers, the majority of the reasons for owning one was because it was 'provided by the council'. This does not identify how much they actually use the food waste bins, if at all.

Looking at the types of food waste being thrown away, it was clearly identifiable which were the most common. The questionnaire asked the participants to tick which types of food waste from a selection of which they felt were their main type of food waste they tend to throw away. The results differed between supermarket and independent retailer shoppers for each category.

The most common type of food waste for the supermarket shopper was 'leftovers from meals' which was also evident in the food waste diaries. This result suggests that families' shopping at supermarkets may be purchasing more than is needed, possibly due to the lower prices or promotional offers which may stop people from thinking about how much they actually need to purchase and not just about what is cheaper. Portion size is something that needs to be considered when preparing a meal to cut this high

amount that these participants who are, although a small group, a representation of the public and how they shop, choose to dispose of what is classed as 'avoidable waste'.

'Leftovers' were closely followed by teabags and 'rotten food'. Teabags can be classed as 'unavoidable waste' as they are inedible. Teabags can be disposed of in food waste bins and outdoor composters to reduce the amount being sent to landfill. Rotten food however is an 'avoidable waste' and is usually created because of poor planning, buying more than you need and not using it in time before it becomes inedible.

The results for the independent retailer shoppers' most common types of waste are slightly different. The most common type of waste produced by these participants was 'teabags'. The second most common type of waste was 'vegetable peelings' which can be classed as an 'unavoidable waste', followed by 'leftovers from meals'. This may indicate again that due to a more organised and thoughtful way of shopping followed by these participants has meant that the main bulk of the waste produced in their case is 'unavoidable waste'.

Although these findings weren't found to be statistically significant, of the food waste diaries returned this content mirrored this result. This sample size of the larger population of both categories of shoppers may be representative of the trends generally found amongst shoppers.

The amount of pre-packaged food bought was also identified in the study population. This was looked at because pre-packaged food may limit the customers' choice of how much of a food they may wish to purchase, which could lead to wastage either due to much being bought ending up in spoilage or simply not being able to consume the whole amount.

The first category of food looked at was fruit and vegetables. It was found that most fruit and vegetables in both groups of shoppers are bought loose. This was also the

category with the largest amount that is bought loose. This may be due to there being more choice available to actually purchase it this way at both types of store. There were a few more supermarket shoppers who choose to buy fruit and vegetables pre-packaged; this again may be due to what's on offer. Some fruits for example are more often sold in punnets or packaging to protect from damage due its form which could occur if sold loose. This may explain the number of independent farm shoppers who chose the option 'both' as the farm shop where the independent retailer section of the study took place leaves the majority of fruit and vegetables loose to purchase quantities chosen by the customer.

The next category asked about was bread. Looking at the previous discussion which looked at types of food waste produced, it was seen that bread did not feature highly as one of the main types of food waste. This could indicate that the way in which is sold is appropriate for most types of households. The results showed a mix of both pre-packaged and 'loose' across both groups, with the supermarket shoppers choosing to purchase more of the pre-packaged bread than loose. This may be due to the fact that bread comes in sizes but is generally sold by the loaf so the quantity is almost predetermined whether loose or packaged. However if buying loose, it is possible to choose a larger variety of shapes and sizes to suit the purpose.

The third category looked at meat packaging. The majority of participants choose to buy meat pre-packaged, with supermarket shoppers choosing this more than the independent retailer shoppers. This may be due to the way in which the supermarket chooses to layout and sell their meat. The majority of the meat sold in supermarkets is pre-packed and found in the aisles. Although there is a meat counter generally available, the choice is smaller. Also the process of choosing your own cut etc takes more time, something of which is important to keep at a minimum for the typical supermarket shopper along with convenience which a pre-packaged product brings.

The next category asked about how fish was generally bought. The findings saw a large proportion of independent retailer shoppers (n=21) choose to buy fish loose compared to the 32 supermarket shoppers choosing to buy it pre-packaged. This may be for the same reasons as stated in the discussion on how meat is bought. It is more convenient to buy ready packaged in quantities already. In some cases it also may work out cheaper to buy pre-packaged with promotions on packs being '2 for £5' etc.

The final category looked at was how cheese is generally bought. The majority of all participants in this study buy cheese pre-packaged (n=56). This may be due to convenience of buying pre-packaged. Also cheese tends to be pre-packaged in the right amount that most people require. Again it was found that more independent retailer shoppers buy it loose; however there isn't a significant difference between the two groups to discuss a possible reason for this.

4.1 Answering hypotheses

From conducting this research and analysing the results it is now possible to attempt to answer the hypotheses stated in chapter 1. Due to the small amount of participants who agreed to take part in the second part of the study and actually returned the food waste diaries, it was decided that not enough data was found to give a true answer for the first hypothesis which truly represented the study population.

We are able to suggest from some answers from the questionnaire that some trends were identified that would suggest that supermarket shopping may increase the amount of food waste produced by its customers due to a number of factors including promotional offers and encouragement of impulse purchasing. However these findings were mostly found not to be statistically significant.

The second hypothesis which questions if pre-packaged food sold by supermarkets exasperates the problem of greenhouse gases can be answered with suggestion that

this could be the case. Pre-packaged foods bought by the supermarket shoppers in this study were also seen to be regularly throwing the same types of foods away. Not all participants owned a food waste bin or composter and so some of this food waste would be ending up in landfills thus producing greenhouse gases.

The third hypothesis questions if bulk buying in supermarkets exasperates the problem of food waste. This could be answered by looking at the answers from the questionnaire at the amount of participants who regularly purchase food on promotional offers and as to whether these purchases were intentional. From the results we saw that there were slightly more supermarket shoppers who were regularly purchasing offers that weren't intentional. This could suggest that bulk buying in supermarkets may exasperate the problem of food waste by encouraging 'impulse buying' of products not required.

4.2 Strengths and limitations

We are not aware of any study that looks at comparing shopping methods with levels of food waste produced by households in the UK using a food waste diary and questionnaire. Therefore this study can be seen as novel research in the UK. The study aimed to use two types of tools to obtain information and opinions from its participants to try to gain a rounded representation of the study population. The study also gained both qualitative and quantitative data which makes this study unique.

The two groups of participants were made of equal numbers to ensure that comparing this relatively small study population was fair and comparisons were justifiable. The use of a questionnaire was devised to be able to gain larger amounts of information relatively quickly so as not to take up too much of participants' time. Questionnaires are a good way of extracting key information needed to obtain a particular question without being too intrusive on the subject. Participants have the

option of filling in a questionnaire themselves, taking as much or as little time they like on each question.

The use of a food waste diary was aimed to gain more of an in depth look into peoples' food waste habits over 3 days of a participants week and to support information obtained from the questionnaire. This could be used to look at types, amounts and any other trends emerging from collecting this data. This method of data collection is harder to obtain as it is taking up a lot of somebody's time and so must be essential to the study to be able to justify it.

Due to this method of data collection being harder to obtain as it takes up a lot of somebody's time to complete, it was found to be very difficult to recruit women to take part in this further section of the study. Due to the low numbers recruited who did complete the food waste diaries, it was not possible to statistically analyse the data collected for it to be significant. To encourage more people to have taken part, there may have needed to be more of an incentive. Due to restrictions in funding this was not possible to offer, only a leaflet with tips, information and leftover recipes could be offered.

There were a few other limitations of this study. Time to complete the study was limited due to delays with ethical approval. This meant that the recruitment stage of the study had to be shorter than planned; resulting in the total aimed study population not being met by 20 participants. This also effected time to analyse results and the write up.

The actual recruitment of women into this study was found to be very difficult. This was due to potential participants being wary of someone approaching them, presuming that the researcher was either trying to sell something or asking for charity. This affected the amount of participants being recruited as already stated there was limited time for recruitment. Steps were thought of to try to combat this possible difficulty before the study took place, where the researcher would wear a badge identifying them as a

student from the University of Chester, however this was not as affective as expected and problems were still experienced.

Also asking for further participation in the study once the questionnaire had been completed was the majority of the time met with the same reply that they simply did not have time. This resulted in only 5 participants actually taking part in this second section of the study.

The questionnaire did not ask participants that if they owned a food waste bin, how much it actually got used, if at all. It is not enough to presume that, because a household has one, it does not mean that it gets used every day. This could have affected the results by showing how effective the councils' scheme of providing households with food bins was at deferring food waste from being sent to landfill.

The way in which participants were recruited could be seen to be subconsciously selective. Although the researcher was selecting at random at a wide age range, female members of the public, there is always an element of selection naturally, choosing females who might have looked more approachable than others. Due to this the participants in this study can to only some degree said to be randomly selected members of the public.

The selection process took place over 1 day to gain access to all types of working females. If the recruitment process took part only in the morning, this would exclude full-time females working during the day and so would not be a true representation of the target population.

As this is novel research in this country, it is difficult to compare these findings to previous literature due to there being no studies found with the same aims and methods. The closest research found to this current study was a report in 2009 by the FSA as mentioned previously in the Introduction chapter and again in the discussion. This report went more in depth into quantities of food waste being produced with a much larger

number of participants being analysed. The report used many methods to collect its data, including the same food waste diary as seen used in this current study designed by WRAP.

Therefore this study should be looked at by future studies as a starting point to base further research into this subject area, to learn from its strengths and limitations, and to compare results.

In conclusion:

- It was decided that not enough data was found to give a true answer for the first hypothesis which truly represented the study population due to the small amount of participants (only 5) who agreed to take part in the second part of the study and actually returned the food waste diaries.

Some trends were identified that would suggest that supermarket shopping may increase the amount of food waste produced by its customers due to a number of factors including promotional offers and encouragement of impulse purchasing. However these findings were mostly found not to be statistically significant.

- Higher amounts of pre-packaged foods were bought by the supermarket shoppers in this study and were also seen to be regularly throwing the same types of foods away. Not all participants owned a food waste bin or composter and so some of this food waste would be ending up in landfills thus producing greenhouse gases.

This suggests that supermarket shopping which sees more pre-packaged food being bought does exasperate the problem of greenhouse gases. Due to the results not being of statistical significance, this can only be suggested as a factor, more research with larger study populations may be required to fully realise this hypotheses.

- The results from the questionnaire saw that there were slightly more supermarket shoppers who were regularly purchasing food from offers that weren't intentional. This could suggest that bulk buying in supermarkets may exasperate the problem of food waste by encouraging 'impulse buying' of products not required, which could lead to wastage.

The most common type of food waste for the supermarket shopper was 'leftovers from meals' which was also evident in the food waste diaries compared to the most common type of waste produced by the independent retailer participants was 'teabags' followed closely by 'vegetable peelings' both of which are classed as 'unavoidable' waste.

The independent retailer shoppers were more likely to take a shopping list and buy food that is needed compared to supermarket shoppers, identifying that in general the independent retailer shoppers in this study choose to be more organised in the way in which they choose to shop.

Again these results were not found to be statistically significant so this can only be suggested.

Other conclusions found included:

- The food waste diaries identified that there is clearly a difference between which mealtimes tend to create more food waste than others. The evening meal seemed to create more food waste both in preparation of the meal, and leftovers after the household had eaten. The smallest amount of waste was produced at breakfast time, where people tend to consume the smallest amount of food because of different levels of appetite and sometimes due to time constraints. Lunchtime is where the largest amount of food was thrown away along with everyday waste as facilities to dispose of food waste responsibly were not available outside of the household.

- Knowledge of date labelling found on food packaging compared between the two types of food shoppers found fairly similar results in that the majority could correctly describe definitions of the 'sell-by' and 'use by' date and the same mistakes were made for the definitions of the 'best before' date.

Only 30 (38%) of the total study population answered correctly when asked to define the term 'best before'. The main mistake made was incorrectly identifying that the 'use-by' and 'best before' date both had the same meaning; that food must be consumed by this date.

Further research is needed for all these results to be realised, using a larger study population and more funding.

Disclosure of Potential Conflicts of Interest

There are no potential conflicts of interest.

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Appendix

Appendix 1 – Permission Letters

15th June 2010.

This is to confirm that permission has been given to Rachel Elizabeth Sullivan to carry out research amongst the customers of Hawarden Estate Farm Shop on a date to be arranged between Rachel and Alan Downes, Manager of the Farm Shop.



Alan Downes

Manager

**HAWARDEN ESTATE
FARM
SHOP**

Chester Road, Hawarden,
Flintshire, Wales, CH5 3FB
Tel/Fax: 01244 533442
www.hawardenestate.co.uk

**REAL
FOOD**
NATURAL PRODUCTS



Our ref: 23746945

25th June 2010

Broughton Retail Park
Chester Road,
Broughton,
Flintshire
CH4 0DR
Tel: 01244 587300

Dear Rachel Sullivan,

Your request to hold a questionnaire within Tesco Broughton Park has been authorised by deputy manager James Clarkson.

Yours Sincerely
For and on behalf of Tesco Stores Ltd

Faye Meacock
Customer Service Advisor

Appendix 2 – Sample Questionnaire



‘Supermarket shopping and excess food waste: A comparative study of Supermarket vs. Independent retail clientele.’

Food Waste: An unwanted raw or cooked food discarded during or after food preparation that is no longer fit for consumption or desirable.

1. Age (please tick): 18-25 26-35 36-45 46-55
56-64 64+

2. **Main** employment Status (please tick 1 box): Employed: Full time
Part Time
Unemployed Student Retired
Other (Please Specify):.....

3. Do you own or rent your house/flat/accommodation? (Please tick): Yes No
Other (Please specify):.....

4. Do you live in a (please tick 1 box): House Flat Bungalow
Shared House Other (Please Specify):.....

5. How many people live in the household? (Please Specify):.....

6. Are you the main food shopper in your household? (Please tick 1 box):
Yes No Share Responsibility
Other (Please specify):.....

7. How regularly do you shop for food at Hawarden Estate Farm/Tesco? (Please tick 1 box):

Daily Weekly Monthly Other (Please Specify):.....

8.a. Do you always shop at Hawarden Estate Farm/Tesco? (Please tick 1 box):

Always Occasionally Rarely

8.b. If you answered rarely, where do you normally shop?

.....

9. How do you **normally** travel to do your food shopping? (Tick more than one if this applies to you).

Car Bus Taxi Walk

Other (Please Specify):.....

10. Do you bring a shopping list? (Please tick 1 box): Yes No

Occasionally

Other (please specify):.....

11. Do you have an outdoor composter? (Please tick): Yes No

12a. Do you have a kitchen food waste bin? (Please tick): Yes No

12b. Please give reasons for having/not having a composter/food waste bin (E.g. provided by local council, feel is important issue, don't have time etc).

.....

13. What is the main type of **food** waste you generally generate in your household? (Tick more than one box if this applies to you):

Fruit peelings/stones Vegetable peelings Bread

Leftovers from meals Teabags Rotten food Other

14. What do you understand by the following terms: sell-by, use-by and best before date on some food packaging? (Please describe in your own words)

Sell-by means.....

Use-by means.....

Best-before means.....

15. Do you regularly purchase 'buy-one-get-one-free' and/or '2 for 1' food offers?
(Please tick):

Yes No

If you answered yes to Q15 please go to Q16, if No go to Q17.

16. Are the items purchased as offers intentional/part of your shopping list? (Please tick):

Yes No Other (Please Specify):.....

17. Do you normally buy your fresh foods pre-packaged or loose?
(Pre-packaged: where the quantity of a product has been chosen and packaged for you)

Fruit & Vegetables: Pre-packaged Loose Other:

Bread: Pre-packaged Loose Other:

Meat: Pre-packaged Loose Other:

Fish: Pre-packaged Loose Other:

Cheese: Pre-packaged Loose Other:

18. Are you aware of which greenhouse gases are produced by food waste sent to landfills? (Please tick):

Yes No

If you answered 'Yes' to Q18, please can you specify which greenhouse gases are produced:

19. What do you think can be done that would encourage more people to compost/dispose of food waste responsibly i.e. not sent to landfills?

.....

Thank you for taking time to complete this questionnaire as part of my research, your input is greatly appreciated.

Appendix 3 – Sample of Leaflet

Includes:

- Facts & Figures
- Recipes to use up leftovers
- Tips on how to reduce your household food waste
- Composting

Date labels explained...

'Use By'

Never eat products after this date. However you should check to see if it can be frozen before this date if you need to eat it at a later date.

'Best Before'

These dates refer to quality rather than food safety. They are safe to eat but might not taste their best after this date.

'Display Until & 'Sell By'

These are for shop use and should be ignored.

What can I compost?

- Fruit and vegetable peelings
- Rotten fruit and vegetables
- Leaves and grass cuttings
- Eggshells and cartons
- Teabags

Keep these out:

- Meat and Fish
- Cheese
- Leftovers from meals
- Weeds
- Packaging

If you have a local kerbside food collecting service, you can use this for anything you can't eat or home compost. They will come with a leaflet with instructions and what you can/cannot put in them.

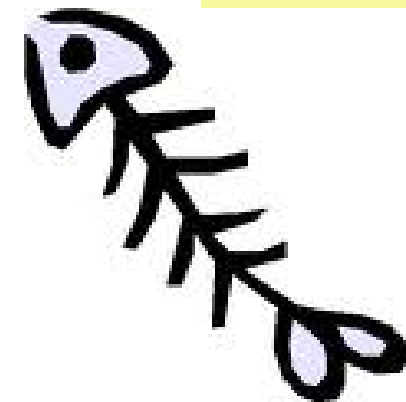
For more information visit:

http://www.recyclenow.com/what_more_can_i_do/can_it_be_recycled/food_waste.html

Food Waste

UNIVERSITY OF
CHESTER

By Rachel Sullivan



Facts & Figures...



- **8.3 million tonnes of food is thrown away by households in the UK each year.**
- Wasting food costs the average family with children £680 a year.
- **If we all stop wasting food that could have been eaten, the CO2 impact would be the equivalent of taking 1 in 4 cars off the road.**
- There are serious environmental implications, the amount of food we throw away is a waste of resources. Think of all the water, energy and packaging used in food production, transportation and storage!
- **Home composting is a great way to stop food waste going to landfill, and the garden will love it!**
- We actually throw away more food from

Recipes...to help use

Easy Spanish Paella

Uses up any leftover meat in your fridge...

Ingredients:

- 1 tbsp oil
- 1 onion, finely chopped
- 1 clove garlic, peeled & chopped
- 1 red & 1 yellow pepper, deseeded & chopped
- 200g long grain rice
- 250ml white wine
- 500ml chicken stock
- 125g frozen peas
- 350g pack mixed seafood
- leftover meat e.g. chicken
- About 2 spicy cooked sausages



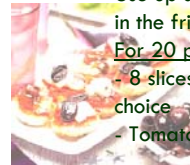
1. Heat the oil in a pan, add the onion and cook for 5 mins.
2. Add the peppers, garlic and cook for 3-4 mins.
3. Stir in the wine, rice, stock and seasoning and bring to

Mini Party Pizzas

Use up stale bread and choose toppings from what's in the fridge!

For 20 pizzas you will need:

- 8 slices of bread
- toppings of your choice
- Tomato sauce/Passata



1. Grill the bread on one side, cut into small circles using 4.5cm pastry cutter.
2. Preheat oven to 200C and place bread onto a baking tray. Spoon the sauce onto the bread, and

Summertime Smoothie

Uses up any over-ripe fruit!

Ingredients

- 2 over-ripe peaches, chopped, any soft bits removed
- 1 speckled banana, peeled & sliced
- 60g strawberries, hulled & leaves removed
- 125ml orange juice
- 125ml vanilla yoghurt



SUMMER SMOOTHIE

1. Put all the ingredients into a blender and blend

Tips on how to reduce



- **When you have leftover unwhipped cream, freeze it. It can then be used for making mash and creamy gratins!**
- Keep an eye on fruit! Separate ones that are ripening quicker.
- **If your bananas are over-ripe, mash them on toast with a sprinkle of cinnamon for a delicious breakfast!**
- Buy a big pack of bacon, and freeze each rasher in between greaseproof paper inside a freezer bag. This will allow you to separate the quantity you need!
- **If you wash spinach in cold water, shake off as much water as possible and store in an airtight container. It will keep fresher for longer, and works to revive old spinach also!**

For more facts and recipes go to:



University of
Chester

Appendix 4 – Participant Information Sheet

PARTICIPANT INFORMATION SHEET

‘Supermarket shopping and excess food waste: A comparative study of Supermarket vs. Independent retailer clientele’

What is the purpose of the study?

The purpose of the study is to investigate if supermarket shopping exaggerates the amount of food waste produced, comparing to Independent retailer shopping. The views and attitudes of shoppers towards food waste from both locations will also be compared.

Why have I been chosen?

You have been chosen because you are a female over the age of 18 and living independently (own/rent a property yourself).

Do I have to take part?

It is up to you to decide whether or not to take part. If you decide to take part you will be given this information sheet to keep. If you decide to take part you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive in any way.

What will happen to me if I take part?

If you decide to take part, you will be asked to complete the questionnaire. This will act as your consent for the researcher to complete the questionnaire with you and request for you to complete a 3 day waste diary if willing. No-one will be identifiable in the final report.

What are the possible disadvantages and risks of taking part?

There are no disadvantages or risks in taking part in this research.

What are the possible benefits of taking part?

You will be given an information leaflet once you have completed the questionnaire which includes facts and figures on food waste in the UK, tips on how you can reduce your food waste at home, and recipes to use up leftovers.

What if something goes wrong?

If you wish to complain or have any concerns about any aspect of the way you have been approached or treated during the course of this study, please contact:

Dean of the Faculty of Applied and Health Sciences, Professor Sarah Andrews at s.andrew@chester.ac.uk or telephone 01244 513055.

Will my taking part in the study be kept confidential?

All information which is collected about you during the course of the research will be kept strictly confidential so that only the researcher carrying out the research will have access to such information. All electronic copies will be protected with passwords and hard copies will be securely stored so that only the researcher will have access to these information.

What will happen to the results of the research study?

The results will be written up into a report. It is hoped that the findings may be used to improve the awareness and importance of reducing food waste in the UK. Individuals who participate will not be identified in any subsequent report or publication.

Who is organizing and funding the research?

Rachel Sullivan will be organizing the research. This will be carried out as part of a Masters dissertation at the University of Chester.

Who may I contact for further information?

If you would like more information about the research before you decide whether or not you would be willing to take part, please contact researcher Rachel Sullivan on 07791998195 or 0917659@chester.ac.uk.

Thank you for your interest in this research.

Appendix 5

Risk Assessment

Assessment Undertaken By		Rachel Sullivan		Page 1 of 1
Department/Location		Hawarden Estate Farm Shop/ Tesco Broughton Shopping Park		
Signed			Date: 4 th July 2010	
Hazards identified	Risk of or from & who is at risk	Control measures already in place	Further actions required	Review date
Abuse from public whilst completing questionnaires at location	Risk of abuse towards researcher	Questionnaires carried out in public places, in daylight hours.	<ul style="list-style-type: none">• Mobile phone must be taken• Someone aware of where researcher is	To be set

LOVE
FOOD
hate waste

Food Waste Diary



Introduction

Welcome to the Love Food Hate Waste diary!

You can use this diary in a number of ways to help you to understand more about the food that is thrown away in your home, and how you might cut this down. You can concentrate on **what's** being thrown away, throughout the day or just at main meal times, or you can include an estimate of **how much** is thrown away. You can also record **why** you throw away the food, and how you dispose of it. By doing this, and looking back after you've completed the diary, you'll hopefully see where and how you can reduce the amount of food you have to throw away, and also how you might dispose of the food that you can't avoid throwing away in a more environmentally friendly way (such as in to a compost bin). For help and advice on how to reduce the amount of food you throw away, and what you can do with the unavoidable food waste see lovefoodhatewaste.com

The diary is based over a period of 3 days, although you can keep it for shorter or a longer period of time if you wish to continue recording after the study, or even repeat the exercise after a while to see how successful your efforts at reducing the amount of food thrown away have been.

There's a section at the end where you can record any tips or ideas that have helped you to throw less food away. You can keep this for future reference, or share it with others by sending it to: lovefoodhatewaste.com

Within the diary is a scale of measurement so you can estimate the quantities of food that you are throwing away. On the following pages there is information on food amounts followed by some examples of completed tables so that you know how to go about filling in the tables. If you skip a meal, eat out or don't have any food waste on any occasion, please tick the box and give some information on why that particular section or table has not been completed (for future reference).

THINGS TO REMEMBER WHEN FILLING IN THE DIARY

- Every time you dispose of food, fill in what food it is, how much and how it was disposed of (e.g. in the regular waste bin, in the council food waste collection bin, home compost container, etc).
- For each day, there is a table for recording food thrown away for meals prepared or served in the morning, lunch time and evening. There is also a table relating to daily snacks and you will find a separate table at the end of the diary on page 12 for recording food disposed of due to a clear-out of cupboards or fridge. Please fill in the appropriate table every time food is thrown away.
- You should record information on all food thrown away, including inedible and unwanted food waste like vegetable peelings, fruit skins, bread crusts and teabags etc).
- If on any occasion, there is no food waste to record, please indicate on the table the reason for this (e.g. meal not eaten in the home or no food waste was created because you had a takeaway and everything was eaten.)

Good luck and have fun!

Ways of measuring

If you want to estimate the amount of food thrown away, we suggest using the following scales. Try and describe the foods and amounts in a way that can be easily understood, so descriptions like 'half a Mars bar' or 'half a loaf of Tesco's wholemeal bread' will mean more to you and others than simply 'chocolate' or 'bread'.

1) For "whole" food items, such as a fish finger, a slice of bread, a bar of chocolate, an apple, a meat joint, a leg of chicken, a cheese sandwich, a sausage or a banana:

Record how much is being thrown away using the scale:

- *A whole*
- *Half*
- *A quarter*
- *Less than a quarter*



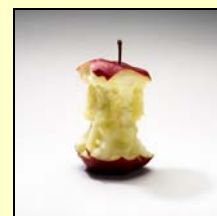
A whole



Half



A quarter



Less than a quarter

2) For other types of food, such as baked beans, pasta, rice, cereal, soup or yoghurt:

Record how much is being thrown away using the scale:

- A flat tea-spoon
- A heaped tea-spoon
- A flat table-spoon
- A heaped table-spoon
- A flat handful
- A heaped handful



A tea spoon



A table spoon



A flat handful

Examples of completing the diary

BREAKFAST : What food did you dispose of from breakfast / in the morning?

Number of people: 2 adults and 2 children

If table is left blank state why: no food waste meal eaten out _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)
Egg shells	From 4 eggs	Regular rubbish bin	Inedible waste
yogurt (Ski)	a heaped tea-spoon	down the sink	just the last little bits left at the bottom of the pot
cereal (Weetabix)	a flat table spoon	Fed to dog	it had gone all mushy
Teabags	Four	in the compost bin	They had been used

LUNCH : What food did you dispose of from lunch?

Number of people: one adult and two children

If table is left blank state why: no food waste meal eaten out _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)
Bread crusts	From 4 slices of bread	Bird table in garden	Kids won't eat crusts on sandwiches
Crisps	One heaped handful	Regular waste bin	Left in kids' lunchboxes
Banana skin	From one banana	in the compost bin	it is inedible - you can't eat it

TEA / DINNER : What food did you dispose of from tea/dinner?

Number of people: 5 adults and two children

If table is left blank state why: no food waste meal eaten out we had a takeaway and ate it all except 4 spring-rolls which we put in fridge to eat tomorrow.

WHAT?	HOW MUCH?	WHERE?	WHY?
-------	-----------	--------	------

Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)
N/A			

Example continued...

SNACKS : What food did you dispose of from snacks?			
WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)
<i>Apple (Cox)</i>	<i>One whole</i>	<i>Home compost bin</i>	<i>It was bruised / damaged</i>
<i>Peanuts (KP)</i>	<i>About 3 whole nuts</i>	<i>Regular waste bin</i>	<i>End of packet/too full to eat</i>
<i>Peelings</i>	<i>From 2 potatoes</i>	<i>Regular waste bin</i>	<i>Made chips for snack - skins had eyes on so I peeled them</i>
CLEARING OUT			
If you have disposed of any other food when you have been examining your cupboards, bread bin or fridge/ freezer, please use this space to describe what food was thrown away			
WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. unwanted leftovers; out of date; tasted bad; mouldy, freezer burnt)
<i>Loaf of white sliced bread (Hovis)</i>	<i>Half a loaf (about 13 slices)</i>	<i>In regular waste bin</i>	<i>Bought a new loaf and this one looked past its best</i>
<i>Home made lasagna</i>	<i>Half a Pyrex dish (about 500gms)</i>	<i>Fed to dog</i>	<i>Leftover from meal some time ago. Don't want to heat it up after so long in the fridge.</i>

Day 1:



BREAKFAST : What food did you dispose of from breakfast / in the morning?

Number of people: _____

If table is left blank state why: no food waste meal eaten out meal skipped _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

LUNCH : What food did you dispose of from lunch?

Number of people: _____

If table is left blank state why: no food waste meal eaten out meal skipped _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

TEA / DINNER : What food did you dispose of from tea/dinner?

Number of people: _____

If table is left blank state why: no food waste meal eaten out meal skipped _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

SNACKS : What food did you dispose of from snacks?

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

Remember if you have cleared out cupboards/fridge etc to dispose of, please list on page 12 what food was thrown away.

Day 2:

BREAKFAST : What food did you dispose of from breakfast / in the morning?

Number of people: _____

If table is left blank state why: no food waste meal eaten out meal skipped _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

LUNCH : What food did you dispose of from lunch?

Number of people: _____

If table is left blank state why: no food waste meal eaten out meal skipped _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

TEA / DINNER : What food did you dispose of from tea/dinner?

Number of people: _____
 If table is left blank state why: no food waste meal eaten out meal skipped _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

SNACKS : What food did you dispose of from snacks?

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

Remember if you have cleared out cupboards/fridge etc to dispose of, please list on page 12 what food was thrown away.

Day 3:

BREAKFAST : What food did you dispose of from breakfast / in the morning?

Number of people: _____

If table is left blank state why: no food waste meal eaten out meal skipped _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

LUNCH : What food did you dispose of from lunch?

Number of people: _____

If table is left blank state why: no food waste meal eaten out meal skipped _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

TEA / DINNER : What food did you dispose of from tea/dinner?

Number of people: _____

If table is left blank state why: no food waste meal eaten out meal skipped _____

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

SNACKS : What food did you dispose of from snacks?

WHAT?	HOW MUCH?	WHERE?	WHY?
Description of food (include brand if known)	Quantity disposed of (using scale or description)	Method of disposal (e.g. regular waste; council food waste collections; home compost; sink)	Why it was disposed of (e.g. inedible peelings; leftovers; out of date; tasted bad; mouldy)

Remember if you have cleared out cupboards/fridge etc to dispose of, please list on page 12 what food was thrown away.



CLEARING OUT



CLEARING OUT			
If you have disposed of any other food when you have been examining your cupboards, bread bin or fridge/ freezer, please use this space to describe what food was thrown away			
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Well done! You can now look back and see where you might be able to reduce the amount of food being thrown away, and don't forget there are lots of helpful tips, tools, recipes etc at lovefoodhatewaste.com.

Useful Tips & Ideas

Useful tips & ideas for reducing the amount of food being thrown away	
Useful Tip or Idea	Where did you find this? (your own discovery (!), from a friend or family member; from the lovefoodhatewaste web-site, from a book or magazine etc)

You can keep this as a record, and if you want to share these tips and ideas with others please send them to: lovefoodhatewaste.com