

New Zealand Food Waste Audits

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WasteMINZ

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Contact details

WasteMINZ

Jenny Marshall

Sector Group Co-ordinator

Phone 09 476 7162

Waste Not Consulting

Sunshine Yates

PO Box 78 372

Grey Lynn

Auckland 1245

Phone 09 360 5190

sunshine@wastenot.co.nz

www.wastenot.co.nz

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1 Introduction

WasteMINZ, the representative body of New Zealand's waste and resource recovery sector, has been the lead organisation on a national food waste project since the project's inception in late 2013. Through its Behaviour Change Sector Group, WasteMINZ has worked closely with local authorities across the country, gathering data on food waste in domestic refuse.

Food waste makes up approximately 30% of the average household's domestic waste, by weight. However, there has, to date, been no data in New Zealand on the composition of food waste, and no information on why food is discarded and how much of the food waste could be avoided.

In 2013/14, WasteMINZ developed a strategy to gather baseline food waste data for New Zealand. This strategy included the use of a methodology developed by WRAP (Waste and Resources Action Programme) in the UK in 2007, and updated in 2013.

Since 2007, WRAP has undertaken a nationwide behaviour change programme aimed at reducing the quantity of food purchased and then wasted by households in the UK. In 2007, baseline data on the composition of food waste disposed of by households was gathered through an audit of food waste from over 2,000 households. This process was repeated in 2013 to measure the effects of behaviour change programmes in the intervening years.

WasteMINZ designed a National Food Waste Prevention Project that has enabled councils across New Zealand to capture food waste data that is both region-specific and can be amalgamated into a national database. This data will be made available for use in the development of New Zealand-specific food waste behaviour change programmes. WasteMINZ has worked with Waste Not Consulting to adapt the WRAP methodology for this purpose, and this methodology has been used to audit food waste in domestic kerbside for 12 local authority areas around New Zealand.

This report outlines the combined results of these food waste audits. The audits in the 12 local authority areas have been aggregated in this report to provide a national overview. The local authorities from which food waste has been audited, and the proportion of the sample from each of these areas is outlined in the following table.

Nationwide, food waste from a total of 1,402 households was separated and weighed. Altogether, across all council audits, a total of 25,330 food samples were weighed, categorised, and recorded.

Table 1.1 – Distribution of food waste audits

Local authority	% of households sampled from each area
Auckland Council	19.1%
Ashburton District Council	8.4%
Hurunui District Council	8.4%
Hutt City Council	4.9%
New Plymouth District Council	8.4%
Porirua District Council	2.4%
Selwyn District Council	14.5%
South Wairarapa District Council	2.1%
Timaru District Council	4.1%
Waimakariri District Council	8.4%
Waipa District Council	4.3%
Wellington City Council	15.1%

All local authorities were given the opportunity to participate in the project. The local authorities included in the audit were self-selecting, and are those local authorities that chose to participate and fund their own involvement. A regional approach was taken in Wellington and Canterbury regions, with all local authorities in those regions contributing to the cost of a regional audit, and the audit being undertaken in a sample of the local authority areas in that region.

Selwyn District Council, while located in the Canterbury region, chose to fund a larger audit of food waste in its area.

While the populations of these councils are not necessarily representative of the country as a whole, it can be assumed that the sample size of 1,402 households is large enough to provide a relatively representative cross section of New Zealand’s population.

The audits were undertaken between March 2014 and February 2015, covering all seasons. Therefore, while there may be seasonal differences in the data from the individual council areas, the overall data is expected to be relatively representative.

This report outlines the combined results of all of the food waste audits, and includes the following elements:

1. Analysis and reporting on food waste data collected from audits of domestic kerbside refuse from 1,402 households
2. Analysis and reporting on survey data that was collected from 701 of the households that were included in the audit
3. Costing of *avoidable* food waste based on the average costs of foods in New Zealand.

2 Methodology

The aim of the food waste audits was to gather data on the quantity of food waste disposed of through domestic kerbside refuse collections in New Zealand, determine the proportion of that food waste that was avoidable, potentially avoidable, or non-avoidable, and calculate the cost of the avoidable food waste.

The methodology used for this project was based on a methodology devised in the UK by WRAP and adapted by Waste Not Consulting to suit the project requirements in New Zealand.

Since 2007, WRAP has undertaken a nationwide behaviour change programme aimed at reducing the quantity of food purchased, and then wasted, by households in the UK. The methodology used for WRAP's baseline data-gathering exercises is outlined in a 2008 report *The Food We Waste*. In 2013, WRAP released two follow-up reports, *Household Food and Drink Waste in the United Kingdom 2012* and *Methods Used for Household Food and Drink Waste in the UK 2012*, both of which update the data from the 2007 report. These reports were drawn on in the preparation of the methodology for this project.

A major difference between the 2012 WRAP study and the New Zealand research is that the WRAP study includes an analysis of food waste disposed of through domestic kerbside refuse collections, via the sewer, and to home composting and feeding to animals. This study only analyses food waste disposed of through domestic kerbside refuse collections.

There are several separate elements to the methodology used for this project. These include the following, which are described in further detail in the following sections:

1. Selection of sample areas
2. Survey of households in sample areas
3. Collection of sample of domestic kerbside refuse from sample areas
4. Separating and analysing the food waste in the sample of domestic kerbside refuse
5. Costing the 'avoidable' portion of the food waste
6. Analysing the waste audit data
7. Analysing the survey data.

2.1 Sample area selection

The audits in each local authority area were undertaken in streets that were selected by council staff. The streets were selected to ensure a suitable spread of household types that was representative of the district or city. This included areas that represented the district or city's:

- urban and rural mix
- range of affluence levels
- types of refuse collection systems (bags or wheelie bins)

The streets were also selected based on their weekly collection day, and the time of day that their refuse was collected by the council or private refuse contractor. This was necessary to allow the audit team to collect from all streets in a particular area on the same day before their official refuse collection took place.

It was recognised that the project would be unlikely to be able to represent all of the above factors adequately, when the number of factors and the size of the sample were taken into consideration. However, the sample selection was undertaken with these factors in mind.

2.2 Opt-out opportunity

The councils participating in the national programme of food waste audits, with the exception of councils in Canterbury and Auckland Council with regards to households in the Kerbside Organic Collection (KOC) trial area, chose to provide householders with the opportunity to opt out of participating in the project. To do this, a letter was distributed, approximately three weeks prior to the audit, to all households on the streets selected for the audit, introducing the householders to the project and informing them that their household was located on one of the sample streets. The letter provided householders with the opportunity to opt out of participating by calling or emailing the council.

Households that chose to opt out of the project were placed on an opt-out register, and their refuse was not collected as part of this project. An example of an opt-out letter is provided in Appendix 1.

2.3 Survey methodology

Basic information about the households included in the food waste audits was valuable to the data analysis. This information was gathered through a short written survey that was delivered to all households from which a refuse sample was collected. The survey was placed into their letterbox at the time of the refuse collection, along with a pre-paid, addressed envelope for the survey to be returned to council. A prize draw was set up for survey respondents, with grocery vouchers to be won.

Overall, a total of 701 surveys were completed and returned across New Zealand from the 1,402 households included in the food waste audits, a 50% return rate.

In Auckland, two audits were undertaken. The first audit included kerbside refuse from households in the KOC pilot areas on Auckland's North Shore. This audit was undertaken alongside a pre-pilot audit of domestic kerbside refuse from the same households. As council was already undertaking a significant survey of households in the KOC pilot areas, the questions required for the food waste audit were included in this survey, which was completed by Gravitas Research and Strategy. The questions used for the survey in the KOC pilot areas, however, do not exactly match those in the surveys undertaken as part of the food waste audits in the rest of the country. This means the results of the Auckland North Shore survey do not correlate directly with the results of the surveys elsewhere. The survey questions used by Gravitas and analysed for this project are included in Appendix 3.

The second Auckland food waste audit sampled kerbside refuse from Mt Albert, Henderson Valley, and Manurewa. During the collection of the refuse sample for this audit, a survey was placed into the letterbox of each household from which refuse was collected in Mt Albert and Henderson Valley. In Manurewa, Auckland Council had its WasteWise Advisors survey the householders face-to-face.

The questions in the second survey were modified by Auckland Council and do not match the survey questions used as part of this project in other parts of the country. The second Auckland survey is included in Appendix 4.

The survey used in all other areas of the country is included in Appendix 2.

2.4 Sample collection

The sampling of refuse for the food waste audits in each council area was undertaken by Waste Not Consulting. Each sample was collected from a random selection of households, on the streets chosen by the councils.

The sample collection was undertaken in the morning of the day of the household's usual waste collection. To ensure a random sample, the collection team drove to the first street on their list and collected all refuse set out by each household, starting at the beginning of the street and collecting from each subsequent household that had refuse set out, until waste from approximately ten households had been collected. The collection team then moved on to the next street and began the process again.

Only households to which refuse could be clearly attributed were included. Refuse was not collected from beside shared driveways, where it could not be determined which house the refuse had been set out by. Refuse was also not collected from areas where rubbish bags were amalgamated into piles. This was done to ensure the audit results for a particular household could be matched to the survey results from that household.

Waste disposed of in wheelie bins was bagged into large plastic bags, and the empty wheelie bin left at the kerbside. All of the collected refuse was tagged with a unique ID to identify the address from which it was collected and the tag number and address of the property was recorded.

Refuse was not collected from households that had contacted their local council to opt out of participating in the project.

Councils contacted the private waste collection contractors in their council area prior to the food waste audit and requested permission to collect refuse from their clients in the selected streets. Permission was provided by almost all private contractors. Where a private contractor did not agree for refuse to be collected from their clients, Waste Not ensured that households that set out refuse in bags or wheelie bins branded with that specific contractor's name were not collected.

In Auckland, a slightly different collection methodology was used for the first audit, as it accompanied a domestic kerbside refuse audit of households in the KOC pilot area. Waste Not Consulting was contracted by council to audit refuse from all households in nine audit zones within the three areas of the North Shore KOC pilot. A full methodology for the Auckland refuse collection is provided in the Auckland Food Waste Audit Report. While the collection methodology differed, it still resulted in the collection of a random sample of refuse.

In each audit area, the refuse was transported to a local landfill or transfer station for auditing on the same day as the collection.

2.5 Audit methodology

The audit locations and dates of the food waste audits are provided in the following table:

Table 2.1 – Food waste audit site and dates

Local authority	Collection period	Audit site
Auckland Council audit 1	26 to 28 March 2014	Waitakere Refuse and Recycling Centre
Auckland Council audit 2	30 & 31 July, 1 August 2014	
Waipa District Council	29 July 2014	
New Plymouth District Council	3 & 4 September 2014	Colson Road Landfill
Selwyn District Council	1 - 5 December 2014	The Pines Resource Recovery Park
Hurunui District Council	3 & 5 February 2015	Amberley Transfer Station
Waimakariri District Council	2 & 4 February 2015	
Ashburton District Council	11 & 12 February 2015	Redruth Ecocentre Timaru
Timaru District Council	9 & 10 February 2015	
Hutt City Council	26 - 30 May 2014	Southern Landfill
Porirua District Council		
Wellington City Council		
South Wairarapa District Council		

Waste Not supervised the auditing of the food waste at each of the locations. Depending on the location, either two or three teams of two auditors sorted the food waste.

Sorting was undertaken at the individual household level. The sample of waste from each household was weighed, the refuse was placed onto a sorting table, and the contents were sorted by a team of two auditors. The auditors started by removing all non-food waste from the sample. The food waste was then separated into its different components, placing each of these components into a separate container. All packaged food waste was removed from its packaging.



Food waste auditing



Sorted food samples

Once all food waste from a household had been sorted, the sample's unique ID was attached to one of the containers and all containers from the household sample were provided to the data recorder. The data recorder entered the sample number's unique ID into a spreadsheet, before weighing each individual container and entering a description of each container's contents.

Data on the food waste was based on a list of 16 food groups (bakery, fresh vegetables, dairy, processed fruit etc.), and a specific food type (white bread, carrots, cottage cheese etc.) within each food group. The data recorder then assessed the contents of each container according to whether it was 'Avoidable', 'Potentially avoidable' or 'Non-avoidable'. The definitions used for these categories were:

- **Avoidable** food waste is food that could have been eaten at some point in time. It does not take into account the current state of the item (which could be mouldy, or past its 'best before' date), but considers, instead, its past potential. The whole item is included, even if part of it is unavoidable (i.e. the skin on a whole banana).
- **Potentially avoidable** food waste is food that some people eat and others don't (e.g. apple and potato peels). This category also ignores the current state of the item (which could be mouldy, or past its 'best before' date).
- **Non-avoidable** food waste is food that is unlikely to be eaten by the majority of the population, such as banana skins, tea bags, and egg shells.

For items that were still in their original, unopened packaging, the 'best before' or 'use by' date was also recorded.

After each container had been weighed and recorded, the contents were disposed of.

A Waste Not Consulting supervisor was involved in data recording at all locations, and in most locations a second data recorder was also contracted.

Altogether, across all council audits, a total of 25,330 food samples were weighed, categorised, and recorded.

The 16 food groups used to categorise the food waste are listed below in Table 2.2. Definitions for these food groups are provided in Appendix 5. These food groups are based on WRAP’s 2013 *Household Food and Drink Waste in the UK* report, though some minor changes have been made. The WRAP category ‘Meals (homemade and pre-prepared)’ has been divided into ‘Homemade food’ and ‘Pre-prepared food’ and some of the food group names have been shortened or adjusted e.g. ‘Fresh vegetables and salads’ has been shortened to ‘Fresh vegetables’ and ‘Confectionery and snacks’ has been changed to ‘Snack foods’.

Table 2.2 – Food groups

Food groups
Bakery
Condiments
Dairy
Desserts
Drinks
Fats
Fresh fruits
Fresh vegetables
Homemade foods
Meat and fish
Other foods
Pre-prepared foods
Processed fruits
Processed vegetables
Snack foods
Staple foods

Within each of these food groups is a subset of food types. These are more specific descriptions of actual types of food. For example, under the food group ‘Fresh vegetables’ are the food types ‘Lettuce’, ‘Potatoes’, and ‘Carrots’. The list of food types was created as the audits progressed, with new food types being added as they were sorted. By the end of the audits a total of 322 different food types had been identified.

2.6 Seasonality

Food consumption by households is seasonal in nature. The composition of food waste, as determined from the audits undertaken in each council area, is likely to include a seasonal bias, as they represent a snapshot of food disposed of at a certain point in time.

As the national data has been gathered over time, the combined data is likely to include less seasonal bias.

Figure 2.1 provides a timeline of the audits and the number of household samples audited at each stage of the year. The figure shows that there is a slight over-representation of summer and autumn samples, and an under-representation of winter and spring samples.

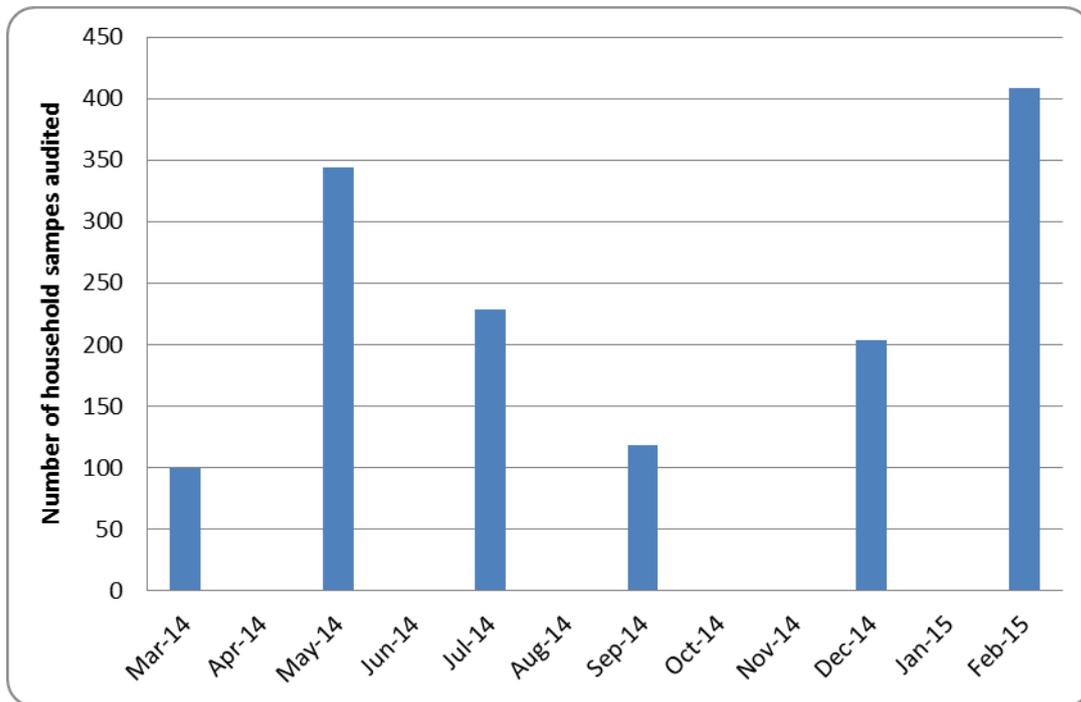


Figure 2.1 – Food waste audit timeline

2.7 Cost of food waste

After completion of the food waste audit, the cost, per unit quantity (either kilogram or litre), of every ‘avoidable’ food item listed in the audit was determined.

As there is no known source of national food prices for all food items sold in New Zealand, prices had to be determined through a number of sources.

1. Statistics New Zealand (Stats NZ) provided weighted average retail prices per kg for 135 of the most common foods, from their Consumer Price Index (CPI) basket. These were annualised for the period July 2013 to June 2014.
2. Food items not on the Stats NZ list were priced using the Countdown Online shopping website. This is the only online grocery shopping website in New Zealand associated with one of the main supermarkets. The average of the two lowest prices for each item was used as the average price for that item. While these prices cannot be deemed to be truly representative of the average retail price across NZ, and are not annualised, they provide a reasonably-reliable cost.
3. Home made meals were priced from two cookbooks – *The Healthy Food Guide July 2014* (published by Healthy Life Media Limited) and *Live Below the Line* (published by Tear Fund).

Notes provided by Stats NZ in its Food Price Index indicate that, for fresh produce, “prices are based on the cheapest available produce of good quality in each retail outlet at the time of price

collection”, and that other items are based on “the cheapest available brand or variety in each retail outlet at the time of price collection.”

The costs per kilogram or litre gathered from Stats NZ and supermarket shopping websites were then applied to all of the ‘avoidable’ food waste found in the audit, to determine the cost, per household, of this waste. For liquids, it was assumed that one litre of the liquid weighed one kilogram. While this is not entirely accurate, the quantity of avoidable liquids in the audit was so minimal (0.5% of all food by weight) that it was not deemed necessary to undertake a density analysis for each separate liquid.

Cooked rice and cooked pasta were priced differently to raw rice and raw pasta to account for the weight of the water in the cooked food.

3 Data analysis

The objective of the food waste audits was to gather data on the quantity of food waste generated by households in New Zealand, determine the proportion of the food waste that was avoidable, potentially avoidable, or non-avoidable, and calculate the cost of the avoidable food waste. To extrapolate the audit results to represent national data, it was necessary to identify the most reliable source of data on the total quantity of food waste in kerbside refuse collected from households in New Zealand.

3.1 Calculation of New Zealand's refuse tonnages

There are no national figures on the tonnage of food waste to landfill from domestic kerbside refuse collections. There are a number of factors that complicate any analysis relating to these figures. The primary complication is the lack of primary data on the tonnages and composition of domestic kerbside refuse.

Kerbside refuse tonnage and composition data is available from a number of territorial authorities around New Zealand. Data on per capita disposal of kerbside refuse has been gathered during audits by Waste Not Consulting of waste to landfill for over 30 territorial authorities. As the composition and quantity of kerbside refuse varies according to the types of kerbside collection systems that are available, data from these councils cannot be considered as necessarily representative of the country.

Due to the following factors, the data from the food waste audits cannot be reliably extrapolated to represent all domestic food waste in New Zealand:

- The proportions of households that use wheelie bins (and the size of wheelie bins used) versus refuse bags is not known for most territorial authorities. The use of wheelie bins rather than bags is known to affect the quantity of refuse set out.
- Not all households set out refuse every week. All of the samples included in the food waste audits were taken from households that had set out refuse (i.e. a 100% set out rate). Data on the overall set out rate (the proportion of households in any given week that set out refuse) is not known for all territorial areas.

It was, therefore, necessary to rely on the available metadata on kerbside refuse in New Zealand and on expert judgement to calculate information on per capita domestic kerbside refuse disposal.

This was the same method used by WRAP in the UK, as described in section 3.1 of *Methods used for Household Food and Drink Waste in the UK 2012*.

To extrapolate the results of the food waste audits to an annualised, national basis, it has been necessary to develop an estimate of the average annual weight of domestic kerbside refuse generated per household. Using data from research undertaken throughout New Zealand, Waste Not's expert judgement is that **an average of 180 kg per capita per annum of kerbside refuse from residential properties** is disposed of to landfills. This figure is based on data from a large number of solid waste audits and takes into account the varying usages of different services, particularly refuse bags and 240-litre wheelie bins in New Zealand.

Once the base figure for the quantity of kerbside refuse had been determined (180 kg per capita per annum), it was necessary to scale the results of the food waste audit to match the overall estimates of the annual tonnage of waste disposed of through kerbside refuse. Using 2013 census results on population and household numbers, a scaling factor was applied to the audit results.

This scaling factor was derived from:

- the results of the food waste audits indicated that each household set out an average of 9.44 kg of domestic kerbside refuse per week.
- data on population and household numbers, and the assumed average of 180 kg per capita per annum of kerbside refuse from residential properties were used to calculate an average of 9.47 kg of domestic kerbside refuse per week.

Accordingly, national-level results of the food waste audit are scaled up by a factor of 1.004. In the individual council audits, a larger scaling factor was generally required.

The audit results show that **food waste comprises 30.0% of kerbside refuse from residential properties**. This figure has been used to calculate a figure of **2.84 kg of food waste disposed of per household per week or 148 kg per household per annum**. These figures have been used as the basis for all further analysis.

The survey of households was returned by only 50% of households from which the refuse sample was collected. As a result, separate scaling factors were used to scale the results of the food waste audit of those households included in the survey.

3.2 Representativeness of food waste audit sample

The quantity of food waste produced by a household relates, in part, to the number of household occupants. Table 3.1 shows the proportion of different-sized households included in the audit samples, based on the results of the 701 households that completed the survey, compared to New Zealand’s actual household sizes, as provided in the 2013 census.

Table 3.1 – Household sizes in survey and census

Number of occupants in household	% of audit sample	% of households 2013 census
1	13%	23%
2	40%	34%
3	16%	16%
4	19%	15%
5	9%	7%
6	3%	3%
7	1%	2%

The surveyed households include an under-representation of one occupant households compared to the census results, and an over-representation of two occupant households.

The under-representation of single occupant households is, in part, the result of the requirement that the sample of kerbside refuse only be collected from properties where the refuse could be directly attributed to that property. Many single occupant households are in flats or apartments, and kerbside refuse from properties of those types is difficult to attribute directly to individual households.

The average weight of food waste per household, based on the proportion of occupants per household based on the survey respondents, is 3% higher than the proportion of food waste per average household based on the number of occupants in the 2013 census.

As surveys were not returned by 50% of the audited households, it is not known how different the representation of household sizes was across all audited households compared to the census data. It was, therefore, decided not to scale the results based on household size.

4 Audit results

4.1 Quantities of food waste generated

Based on the combined results of all food waste audits (scaled as per section 3.1), of the average 9.47 kg of domestic kerbside refuse set out per household per week, 2.84 kg (30%) is food waste. This equates to 493 kg of refuse per household per annum, of which 148 kg is food waste.

Based on the Stats NZ 2013 census figure of 1,549,890 households across New Zealand, it is estimated that 763,569 tonnes of refuse are collected through domestic kerbside refuse collections annually, of which 229,022 tonnes is food waste.

Table 4.1 – Average weekly set out of kerbside domestic refuse and food waste

Weekly waste generation	Weekly	Annually
Average set out of kerbside domestic refuse per household	9.47 kg	493 kg
Average set out of food waste in kerbside domestic refuse per household	2.84 kg	148 kg
Average set out of kerbside domestic refuse in New Zealand	14,684 tonnes	763,569 tonnes
Average set out of food waste in kerbside domestic refuse in New Zealand	4,404 tonnes	229,022 tonnes

Based on the combined results of all food waste audits, of the 2.84 kg of food waste per household per week, 54% is categorised as ‘avoidable’ food waste, 12% is ‘potentially avoidable’ food waste, and 35% as ‘non-avoidable’ food waste. These categories are described in Section 2.5.

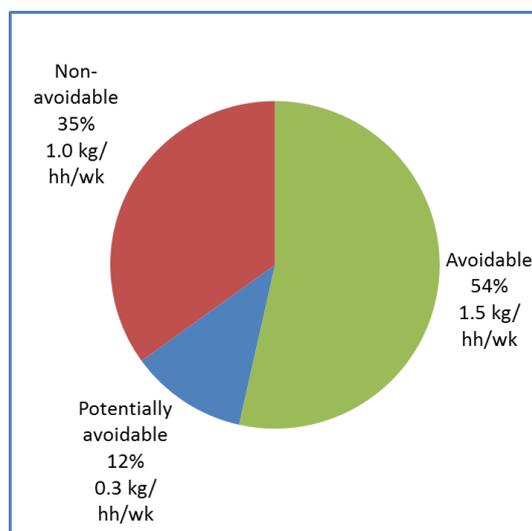


Figure 4.1 – Avoidability of food waste per household, per annum

4.2 Cost of avoidable food waste – by food group

The cost of all avoidable food waste was calculated using food costs determined as described in Section 2.7. This provides an indication of the amount of money households waste on a weekly and annual basis by buying food that they could, but do not consume.

Based on the results of the audit, the average household in New Zealand spends \$10.83 on food each week that is wasted unnecessarily, which equates to \$563 per annum.

On a national basis, these figures extrapolate to almost \$16.8 million per week, or \$872 million per annum.

Table 4.2 shows the cost of avoidable food waste per annum by food group. The food groups are ordered according to the cost of avoidable food waste, from largest to smallest. Individual food groups are discussed in further detail in the next section.

Table 4.2 – Cost of avoidable food waste in New Zealand, per annum, by food group

Food group category	Cost of avoidable food waste in New Zealand per annum
Meat and fish	\$152,736,167
Fresh vegetables	\$135,481,268
Homemade foods	\$121,160,557
Bakery	\$100,003,359
Fresh fruit	\$99,027,028
Pre-prepared foods	\$58,082,556
Snack foods	\$51,783,103
Condiments	\$49,517,940
Dairy	\$46,196,913
Desserts	\$25,307,955
Drinks	\$12,456,842
Staple foods	\$12,501,606
Processed fruits	\$2,751,477
Processed vegetables	\$2,178,798
Other foods	\$1,764,661
Fats	\$1,686,299
Total	\$872,636,528

4.3 Food groups

This study has found that approximately 229,022 tonnes of food waste are disposed of through domestic kerbside refuse collections in New Zealand annually. The audits categorised all food waste into 16 food groups. These food groups are described in Appendix 5.

Figure 4.2 shows the composition of this food waste by food group. Each food group is split into avoidable, potentially avoidable, and non-avoidable food waste.

The largest group of food waste, by weight, is fresh vegetables, at 28% of all food waste, and 14% of all food waste is avoidable fresh vegetables. Fresh fruits is the next largest category, at 24%, with 9% of all food waste being avoidable fresh fruits. Meat and fish comprise 14% of the food waste, over half of which is non-avoidable (mostly bones and seafood shells).

Nine per cent of all food waste is bakery items, and 6% is avoidable homemade food (leftovers). The non-avoidable portion of the drinks food group is tea bags and coffee grinds (3% of all food waste), and the non-avoidable portion of the dairy food group is egg shells (1.6% of all food waste). The 'other foods' food group includes pet food, baby food, medicinal supplements, and 'gunge', a food type used to categorise non-identifiable food waste. Most gunge was categorised as potentially avoidable.

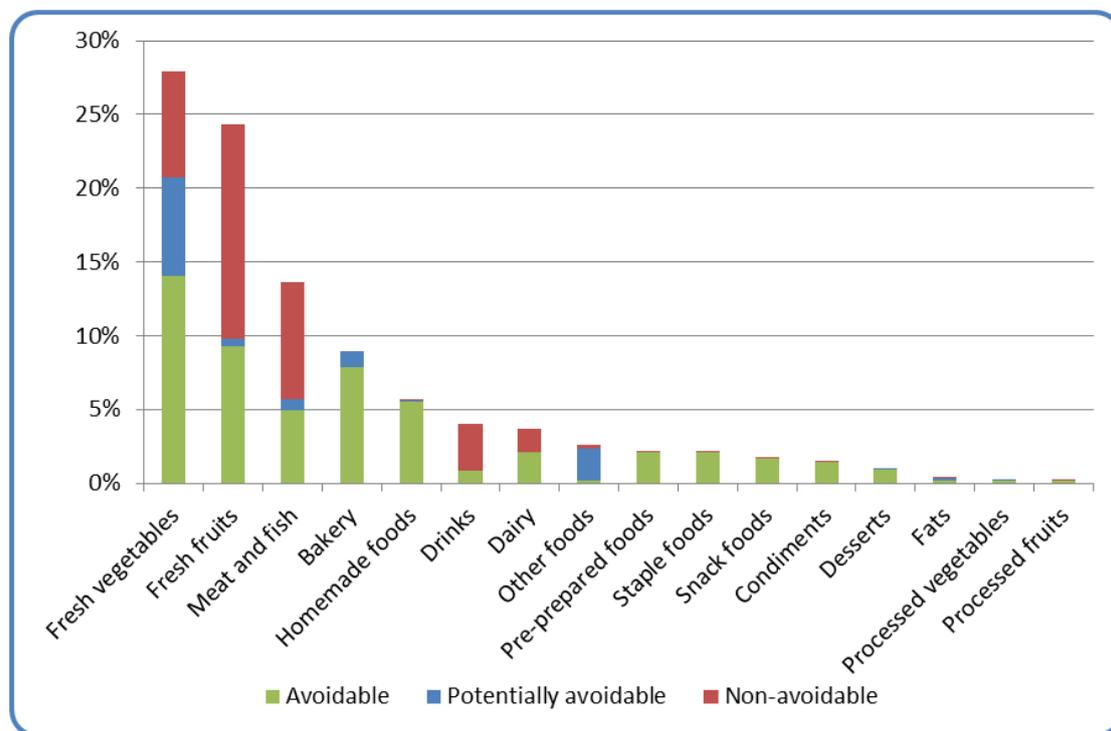


Figure 4.2 – Composition of food waste by food group, by avoidability

Table 4.3 provides the annual tonnages of the food groups that are disposed of through domestic kerbside refuse collections in New Zealand. The data is presented for all food combined, and according to avoidability.

Table 4.3 – Tonnes of food waste by food group and avoidability, per annum

Food groups	Total tonnage per annum (and %) food waste		Avoidable food waste	Potentially avoidable food waste	Non-avoidable food waste
Fresh vegetables	63,774	27.8%	31,980	15,634	16,159
Fresh fruits	55,684	24.3%	21,164	1,305	33,215
Meat and fish	31,291	13.7%	11,396	1,596	18,299
Bakery	20,575	9.0%	17,992	2,583	0
Homemade foods	13,090	5.7%	12,831	212	47
Drinks	9,128	4.0%	1,850	0	7,278
Dairy	8,426	3.7%	4,818	0	3,608
Other foods	6,057	2.6%	542	4,947	568
Pre-prepared foods	4,849	2.1%	4,722	55	72
Staple foods	4,828	2.1%	4,741	87	0
Snack foods	4,027	1.8%	3,738	0	289
Condiments	3,417	1.5%	3,298	7	112
Desserts	2,175	0.9%	2,162	13	0
Fats	743	0.3%	464	237	41
Processed vegetables	552	0.2%	444	108	0
Processed fruits	407	0.2%	403	0	4
Total	229,022	100.0%	122,547	26,784	79,692

4.3.1 Top 20 food types

Within each of the food groups listed in the previous section there are numerous food types. The following tables provide an overview of the top 20 food types (by weight).

Table 4.4 provides the top 20 food types, when all avoidable, potentially avoidable and non-avoidable food wastes are combined. A list of the top 100 food types is presented in Appendix 6.

Table 4.4 – Top 20 food types – all food waste combined

Top 20 food types – all food waste combined	Proportion of food waste	Tonnes of food waste
Bananas	7.2%	16,393 T
Bread	6.7%	15,361 T
Potatoes	5.9%	13,404 T
Poultry	4.9%	11,193 T
Leftovers	4.2%	9,621 T
Oranges, mandarins etc.	3.6%	8,142 T
Apples	2.9%	6,556 T
Tea/teabags	2.6%	6,065 T
Gunge	2.4%	5,416 T
Unidentifiable/mixed bones	2.2%	5,002 T
Carrots	2.1%	4,705 T
Onions	2.0%	4,656 T
Pumpkins	1.9%	4,455 T
Lemons	1.8%	4,189 T
Eggs	1.8%	4,167 T
Lettuces	1.8%	4,090 T
Sweetcorn/corn on the cob	1.7%	3,972 T
Cabbages	1.6%	3,726 T
Broccoli	1.6%	3,564 T
Avocados	1.5%	3,468 T

Table 4.5 on the next page lists the top 20 avoidable food waste types, ordered by weight, as well as the tonnes of each avoidable food waste disposed of to domestic kerbside refuse collections in New Zealand per annum, and the cost of each avoidable food type per annum.

Bread is the largest avoidable food type, by weight, at 10.5% of all avoidable food waste. Approximately \$51 million worth of bread is disposed of to domestic kerbside refuse collections annually. The next most common avoidable food waste is leftovers, at 7.8% (and a cost of \$101 million), followed by potatoes, at 5.2% of all avoidable food waste (and an annual cost of \$11 million).

The top 20 avoidable food types comprise 55% of all avoidable food waste. A list of the top 100 food types, by avoidability, is presented in Appendices 7 to 9.

A list of the top 10 food types, by cost, is provided in Appendix 10.

Table 4.5 - Top 20 food types – avoidable food waste

Top 20 avoidable food types	Proportion of avoidable food waste	Tonnes of avoidable food waste	National cost of avoidable food waste
Bread	10.5%	12,856 T	\$51,270,533
Leftovers	7.8%	9,489 T	\$100,507,602
Potatoes	5.2%	6,365 T	\$10,818,171
Apples	3.3%	4,025 T	\$11,347,084
Poultry	2.8%	3,403 T	\$40,792,129
Bananas	2.6%	3,242 T	\$8,428,428
Lettuces	2.6%	3,136 T	\$10,753,731
Oranges, mandarins etc.	2.3%	2,867 T	\$9,084,713
Pumpkins	2.2%	2,656 T	\$5,390,634
Carrots	1.9%	2,340 T	\$4,913,087
Cabbages	1.8%	2,211 T	\$3,779,953
Onions	1.7%	2,115 T	\$4,398,506
Takeaway - chips	1.7%	2,089 T	\$14,358,508
Tomatoes	1.5%	1,889 T	\$9,705,448
Rice	1.4%	1,727 T	\$1,223,851
Cake	1.3%	1,643 T	\$15,441,848
Sandwiches - homemade	1.3%	1,581 T	\$10,225,015
Yoghurt/yoghurt drinks	1.3%	1,557 T	\$12,988,706
Beef	1.2%	1,420 T	\$19,746,155
Cheese	1.1%	1,349 T	\$16,189,383

4.3.2 Fresh vegetables

‘Fresh vegetables’ was the largest food group, by weight, comprising 28% of all food waste, or 63,774 tonnes per annum.

Figure 4.3 provides an overview of the proportion of each of the top fresh vegetable types, and their avoidability.

Potatoes were the largest fresh vegetable food type, with 13,388 tonnes of potatoes disposed of through domestic kerbside collections annually. Almost half of the potatoes were avoidable waste, and the other half were potentially avoidable. The potentially avoidable category was composed of potato peels.

Onions were the next largest category. The non-avoidable portion was mostly onions skins. Carrots were the third largest fresh vegetable category, followed by, pumpkins, lettuces and sweetcorn.

In all other fresh vegetable types, the potentially avoidable portion is either vegetable skins or peels, or edible portions of stalks (i.e. silverbeet stalks). The non-avoidable portion of the fresh vegetables was seeds, pip, inedible skins/peels, and inedible stalks. There is a certain amount of subjectivity in categorising whether a particular portion of a food is edible or not.

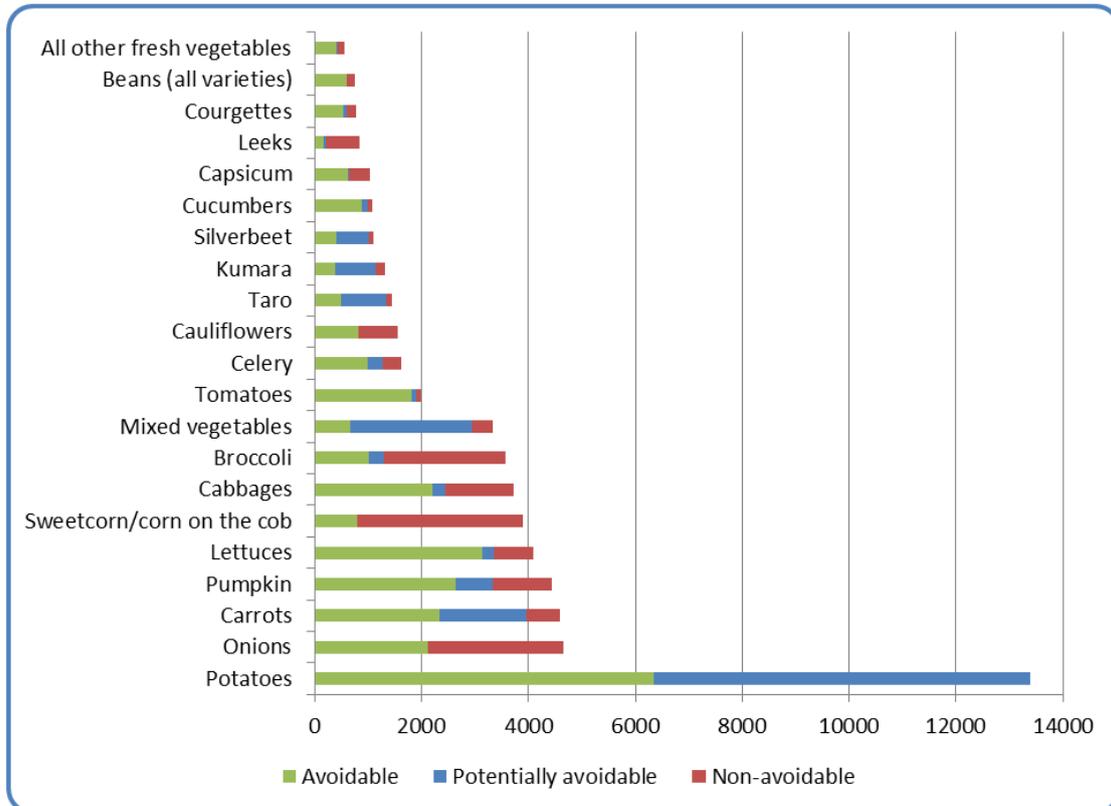


Figure 4.3 – Tonnes of fresh vegetables in domestic kerbside refuse per annum



4.3.3 Fresh fruits

New Zealand disposes of an estimated 55,684 tonnes of the ‘fresh fruits’ food group per annum through domestic kerbside refuse collections. This equates to 24% of all food waste disposed of in this way.

The composition of the fresh fruits, by food type, is provided in Figure 4.4. The largest fresh fruits type is bananas, 80% of which were non-avoidable banana peels.

In all instances, the non-avoidable portion of the fresh fruit type is skin, peel, or seeds/pips. In instances where the peel is edible, such as apple peel, these have been categorised as potentially avoidable.

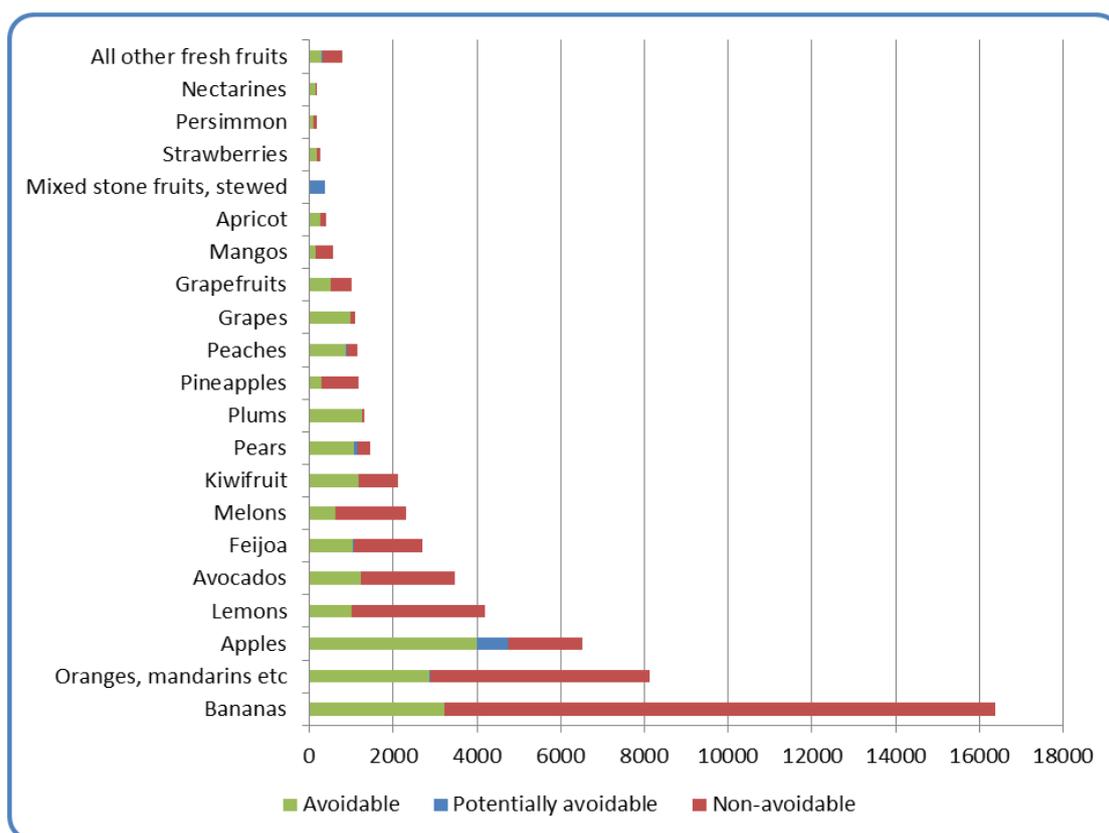


Figure 4.4 – Tonnes of fresh fruits in domestic kerbside refuse per annum



4.3.4 Meat and Fish

The 'Meat and fish' food group was the third largest food group, at 14% of all food waste. Based on the results of the audit, 31,291 tonnes of meat and fish waste are disposed of annually through the domestic kerbside refuse collection.

This food group includes cooked and raw meat and fish, as well as bones. It does not include meat and fish that are part of leftovers, either homemade or pre-prepared.

The non-avoidable category was composed almost entirely of bones or seafood shells. The potentially avoidable category generally refers to fat or skin.

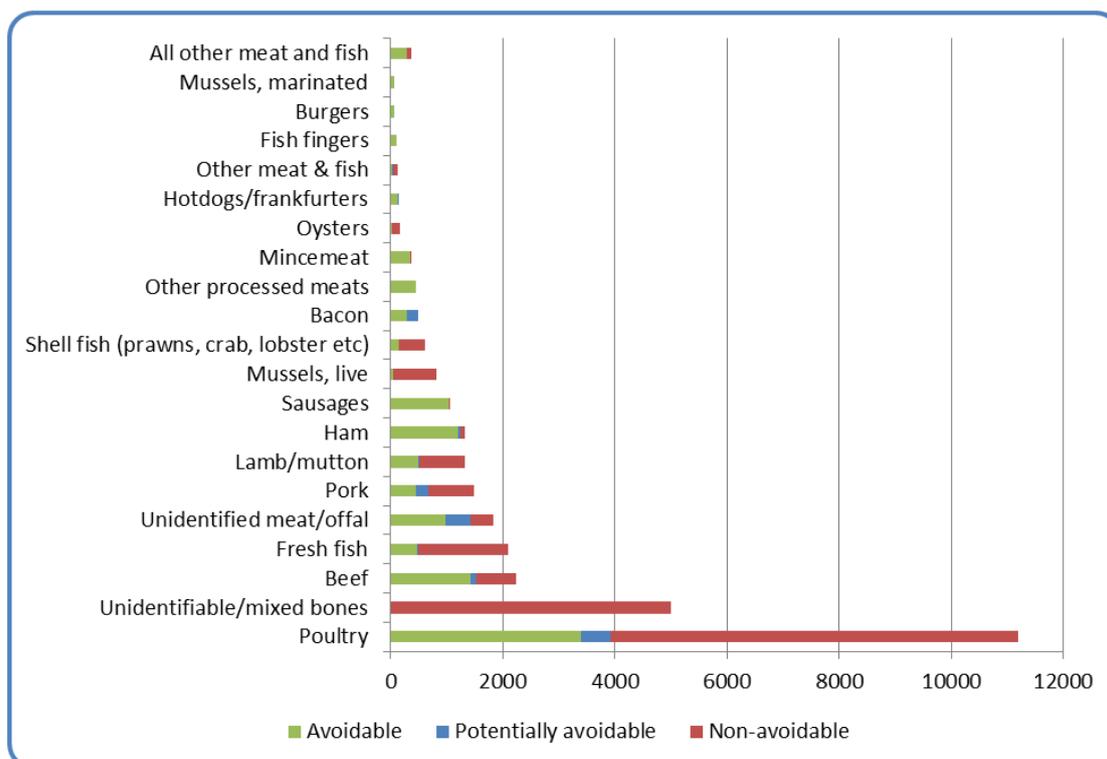


Figure 4.5 – Tonnes of meat and fish in domestic kerbside refuse per annum



4.3.5 Bakery

The 'Bakery' food group comprises 9% of all food waste (20,575 tonnes per annum) and includes the food types listed in Figure 4.6. Cakes were not included under the bakery food group, as these were categorised as desserts. Sandwiches were also not included. These were categorised as homemade or pre-prepared foods.

In analyses of food types in other sections of this report, four individual bread food types have been amalgamated to create an overall bread food type. The categories that make up the bread food type are white bread, mixed grain bread, wheatmeal bread, and bread roll/bagette.

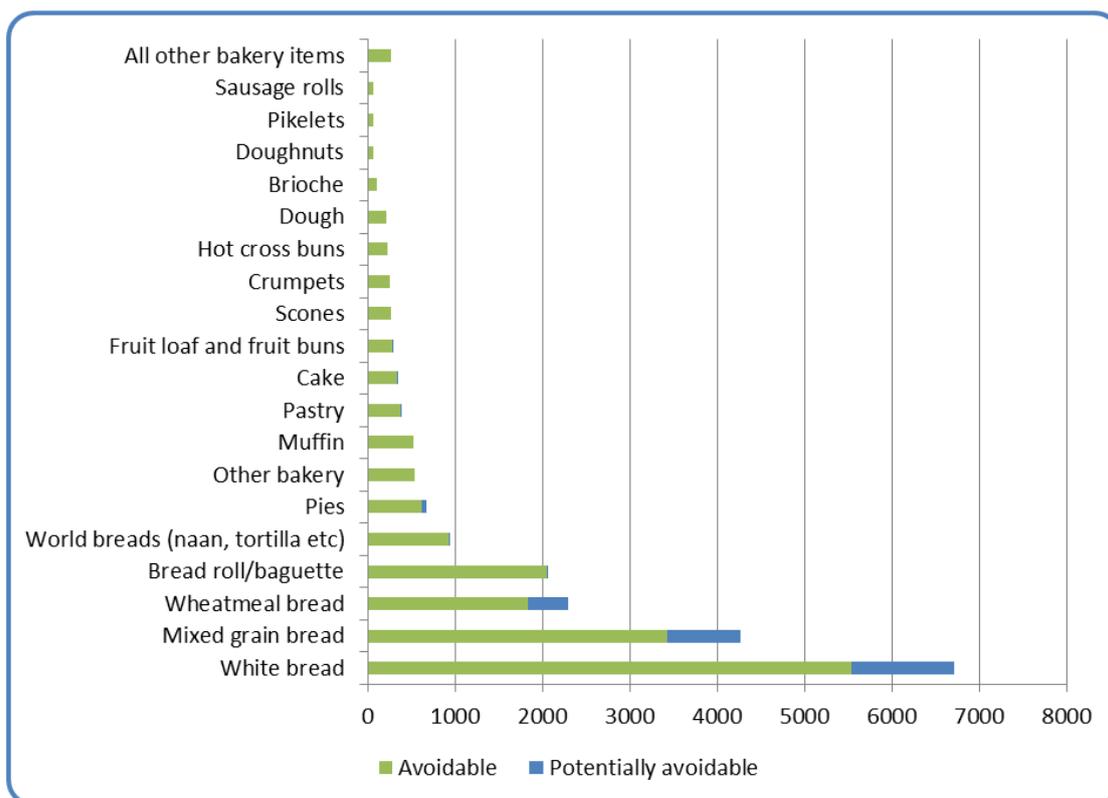


Figure 4.6 – Tonnes of bakery items in domestic kerbside refuse in per annum

The potentially avoidable portion of the bakery items is, in almost all cases, crusts.



4.3.6 Homemade foods

The ‘Homemade foods’ food group comprises 6% of food waste (13,090 tonnes per annum) and includes meals and snacks that are cooked at home. They are not necessarily created from raw materials; they may have been bought ready-made, such as instant noodles, and sachets of soup, but they have been heated or prepared in some way in the home.

The leftovers category is made up of leftovers that have been prepared in the home. This category includes foods that have been left over on dinner plates, or are surplus to requirement, or may have been stored in the fridge as leftovers and then disposed of. It also includes burnt and otherwise spoilt prepared foods.

These food types are shown in Figure 4.7.

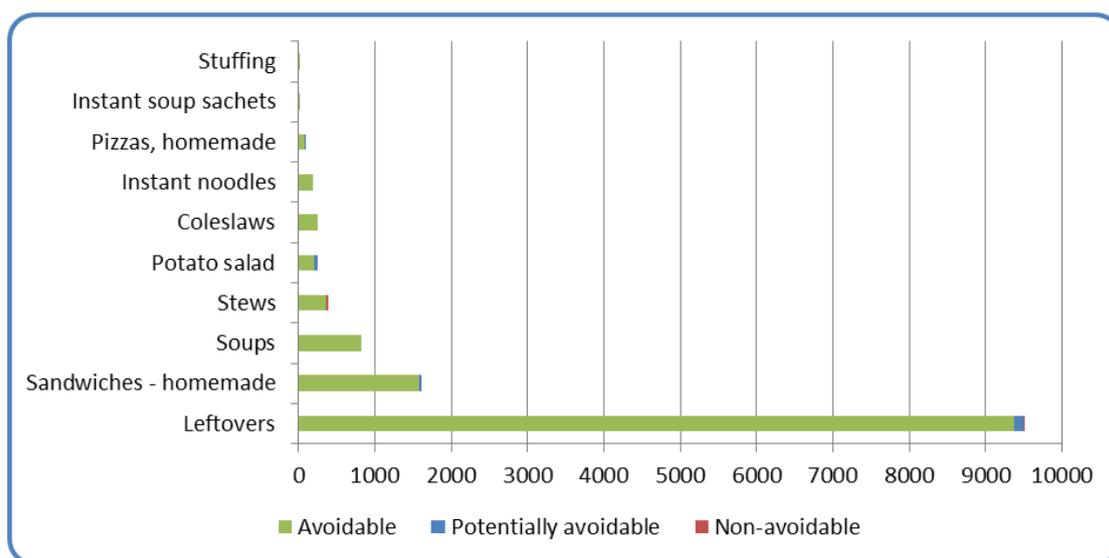


Figure 4.7 – Tonnes of homemade foods in domestic kerbside refuse in per annum

4.3.7 Drinks

There were very few liquids (classified in the ‘Drinks’ food group) in the food waste audits, as liquids are generally disposed of via the sink. ‘Drinks’ comprise 4% of all food waste or 9,128 tonnes per annum to domestic kerbside refuse collections.

The largest categories of the drinks food types were the solids – tea bags and coffee grinds. It is estimated that 5,950 tonnes of tea bags are disposed of to landfill via the domestic kerbside refuse collection annually. A further 768 tonnes of coffee grinds are disposed of in this way. It is expected that a large portion of coffee grinds are also disposed of via the sink.

The non-avoidable component of the Other drinks category includes a number of coconut shells that had contained coconut milk (and had straws inserted into them).

These food types are shown in Figure 4.8.

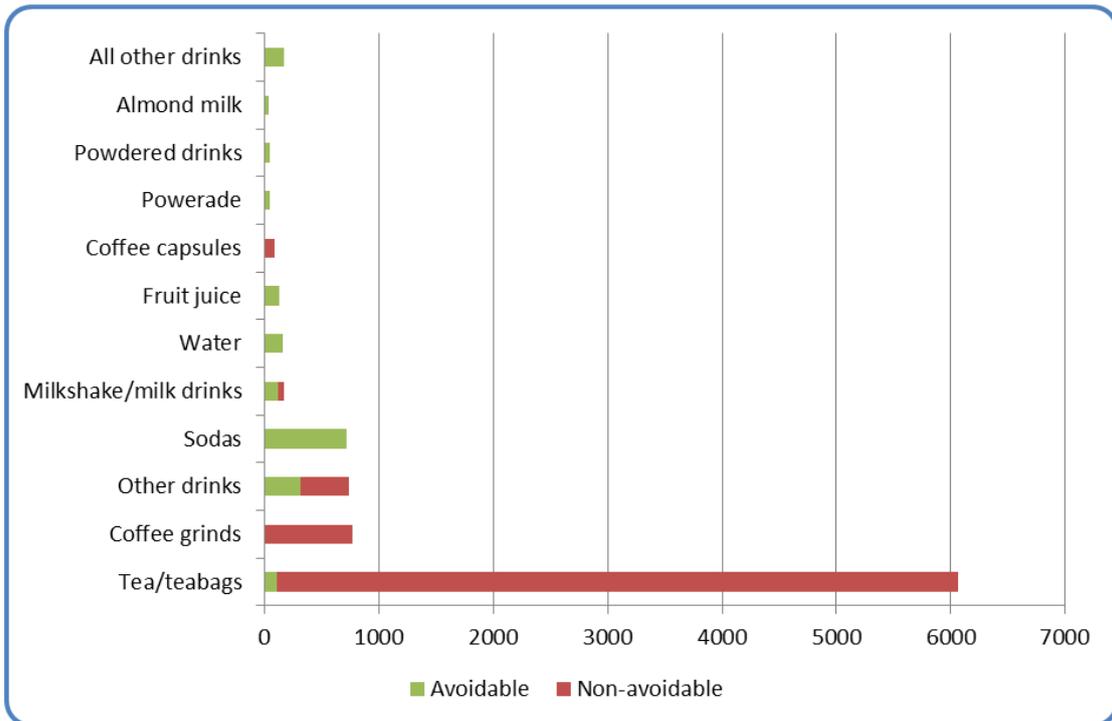


Figure 4.8 – Tonnes of drinks in domestic kerbside refuse per annum

4.3.8 Dairy products

‘Dairy products’ is the seventh largest food group, and comprised 3.7% of the country’s food waste to domestic kerbside refuse collections (8,426 tonnes per annum). The dairy category includes milk, milk products, and eggs. The inclusion of eggs in the dairy food group matches the Stats NZ Food Price Index categories.

Dairy products used in meals or other composite foods are not included in the dairy food group.

Figure 4.9 provides an overview of the dairy food types.

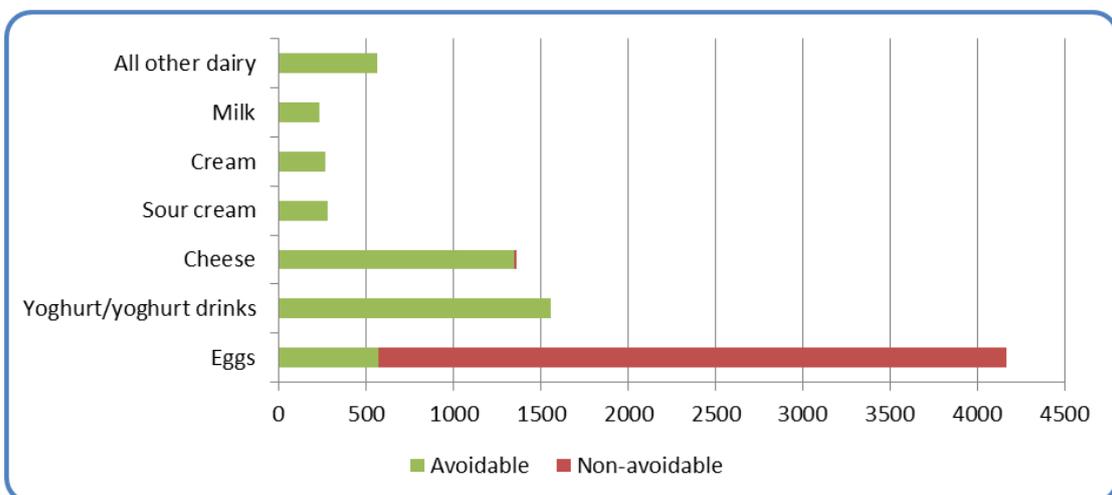


Figure 4.9 – Tonnes of dairy items in domestic kerbside refuse per annum

The non-avoidable portion of the egg category is egg shells.

4.3.9 Other foods

The 'Other foods' food group includes baby food, pet food, gunge, medicinal supplements, and other foods. This food group comprised 2.6% of all food waste or 6,057 tonnes to domestic kerbside refuse per annum.

The largest food type in this food group, 'Gunge', was composed of food items that could not be identified. These were generally categorised as potentially avoidable. The 'Other' food type was liquids drained off canned foods.

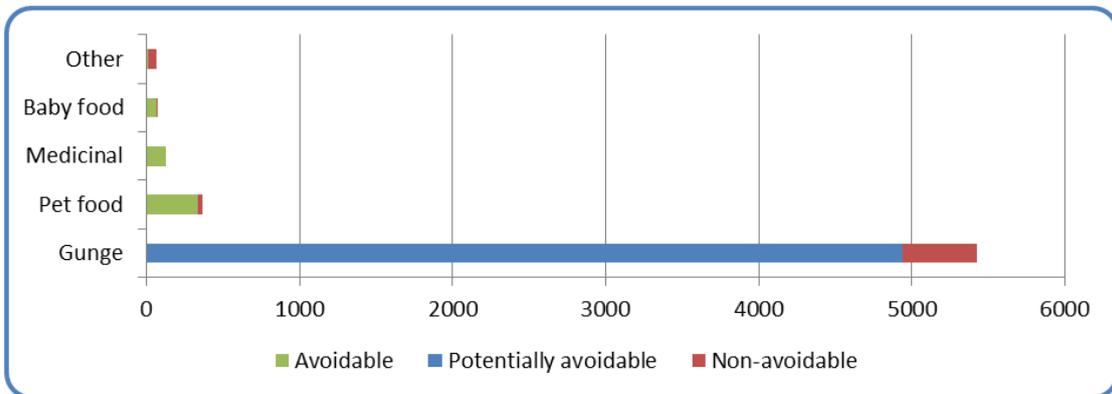


Figure 4.10 – Tonnes of other foods in domestic kerbside refuse in per annum

4.3.10 Pre-prepared foods

The 'Pre-prepared foods' food group is composed entirely of takeaway foods and represents 2.1% of all food waste, or 4,849 tonnes per annum to domestic kerbside refuse collections. The pre-prepared food types are shown in Figure 4.11.

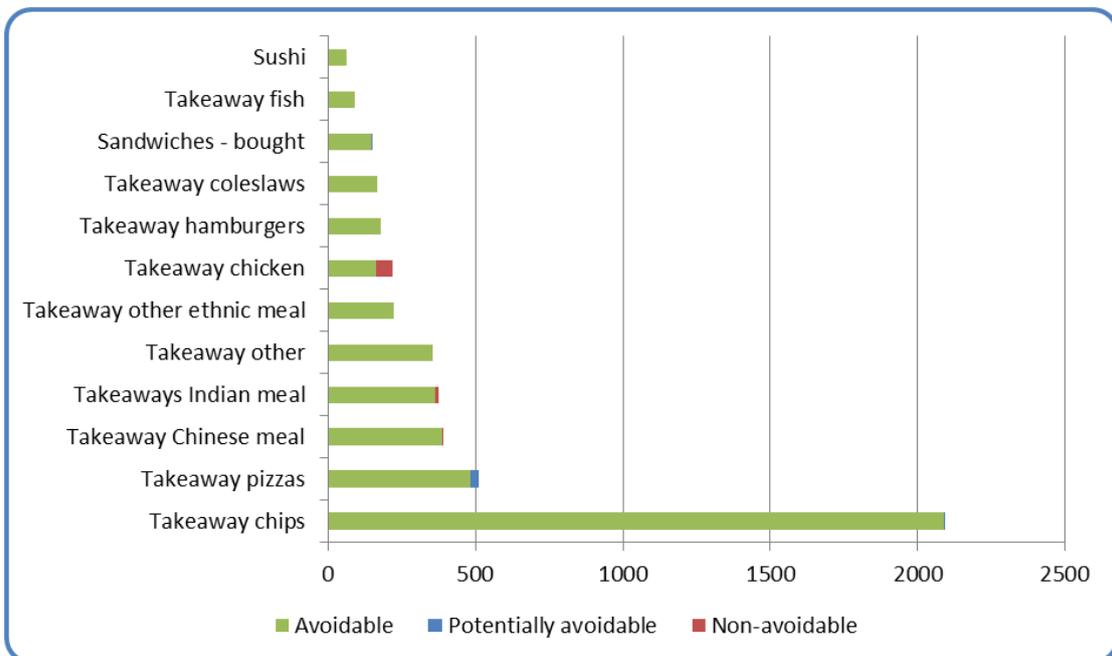


Figure 4.11 – Tonnes of pre-prepared foods in domestic kerbside refuse in per annum

4.3.11 Staple foods

‘Staple foods’ is a mixed food group that includes cereals, dried cooking ingredients, such as flour, and raw and cooked ingredients, such as rice and pasta. Staple foods comprised 2.1% of all food waste, or 4,828 tonnes to domestic kerbside refuse collections annually.

When rice or pasta were mixed with other ingredients they were listed as homemade food. However, when they were present, cooked or raw, without accompaniment, they were classified as staple foods.

The food types in the staple foods food group are listed in Figure 4.12.

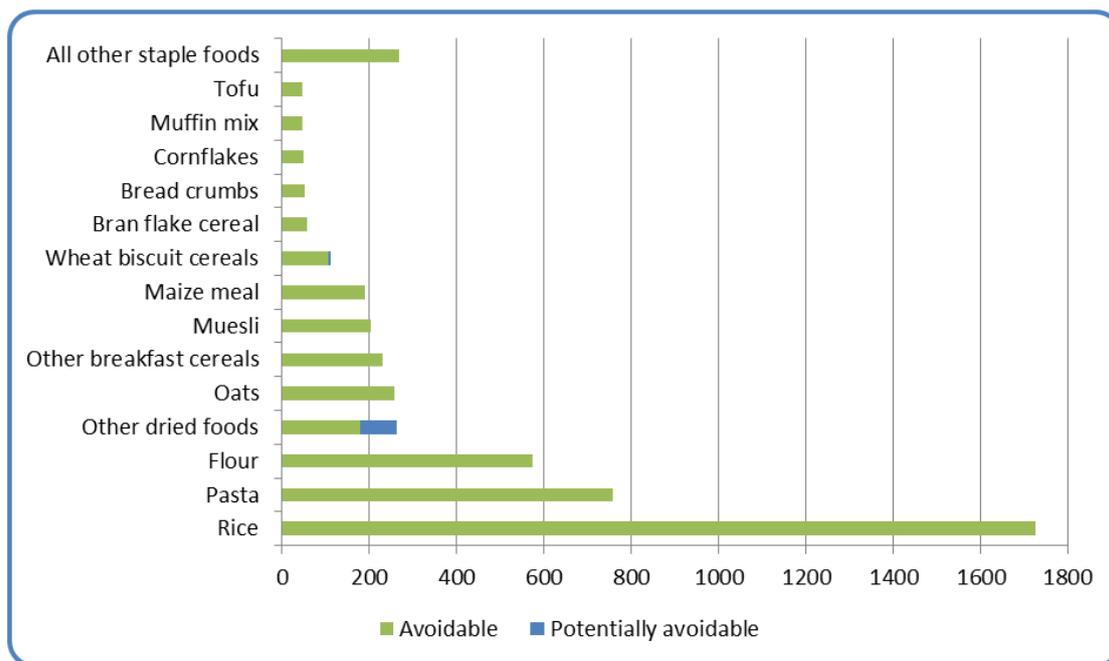


Figure 4.12 – Tonnes of staple foods in domestic kerbside refuse in per annum

4.3.12 Snack foods

According to the results of the food waste audit, approximately 4,027 tonnes of the ‘Snack foods’ food group are disposed of via the domestic kerbside refuse collection annually. This represents 1.8% of all food waste. The composition of this food group is provided in Figure 4.13.

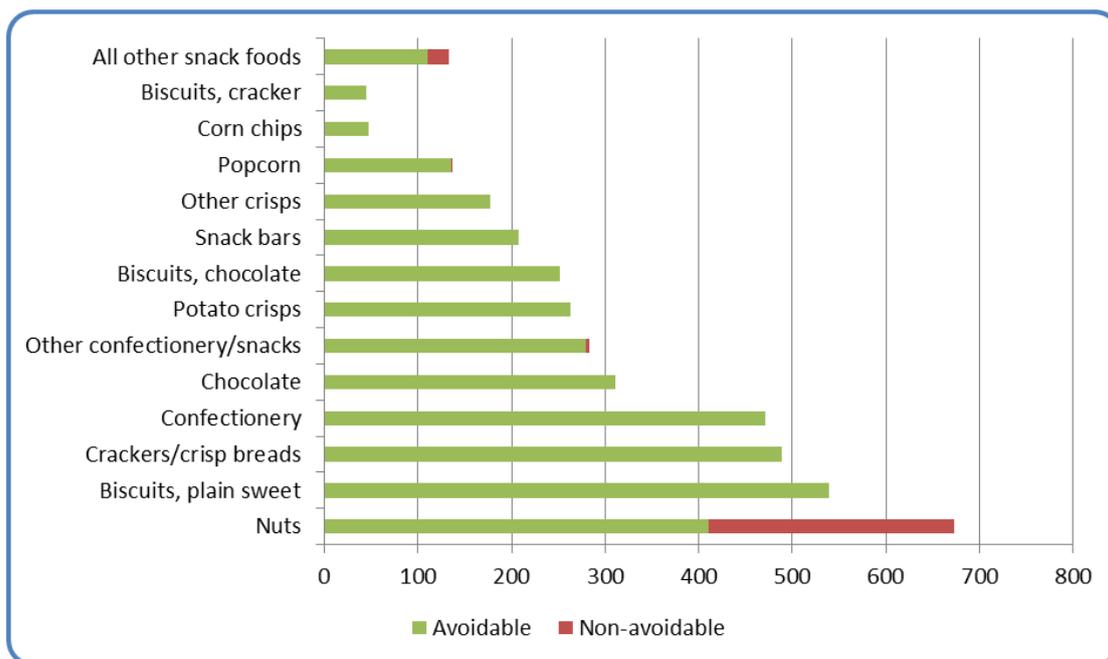


Figure 4.13 – Tonnes of snack foods in domestic kerbside refuse in per annum

All snack foods were categorised as avoidable, other than nut shells.

4.3.13 Condiments

A large number of food types were grouped in the ‘Condiments’ food group, which comprises 1.5% of all food waste, or 3,417 tonnes per annum to domestic kerbside refuse collections. The largest of these was herbs and spices. The list of condiments is provided in Figure 4.14.

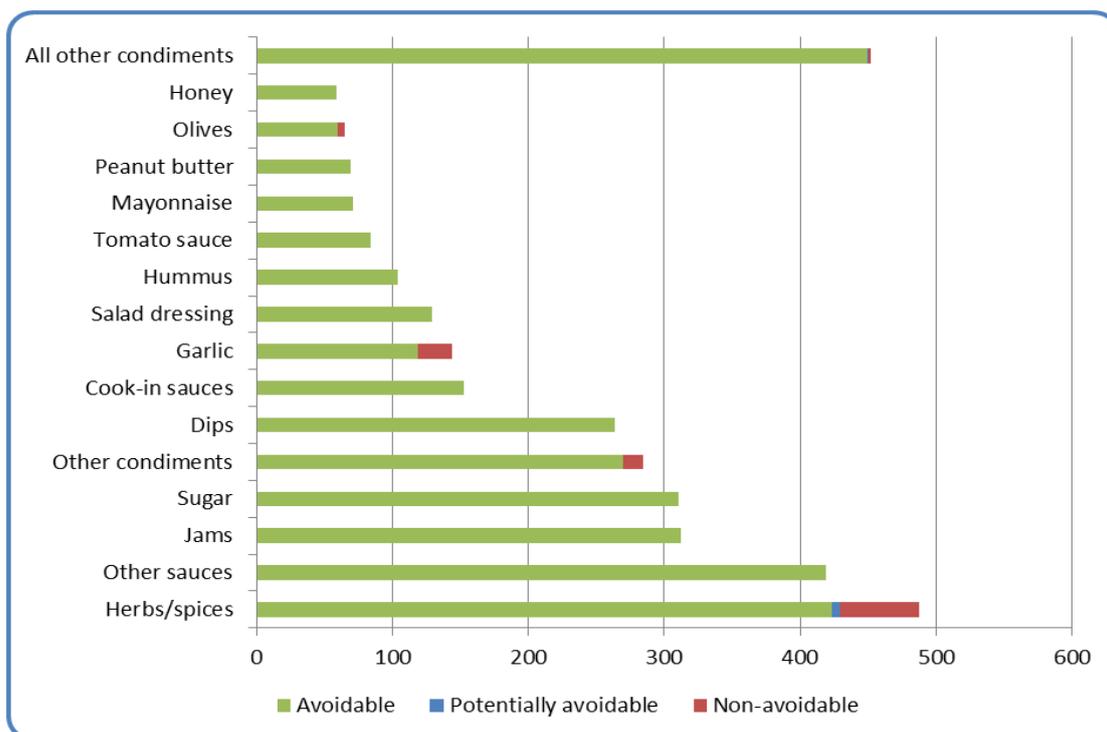


Figure 4.14 – Tonnes of condiments in domestic kerbside refuse in per annum

4.3.14 Desserts

The 'Desserts' food group comprised 0.9% of all food, or an estimated 2,175 tonnes per annum to domestic kerbside refuse collections. The desserts food types are shown in Figure 4.15.

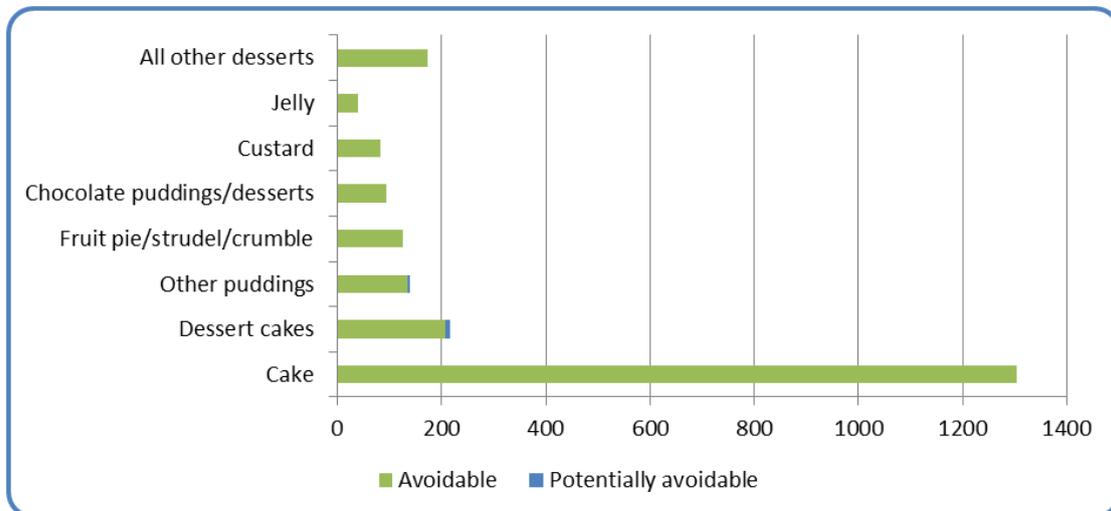


Figure 4.15 – Tonnes of desserts in domestic kerbside refuse per annum

4.3.15 Fats

The 'Fats' food group is composed of oils, butter, margarine, and other fats (including rendered fat from cooked meats). Altogether, an estimated 743 tonnes, 0.3% of all food waste, is disposed of annually through domestic kerbside refuse collections. These food types are shown in Figure 4.16.

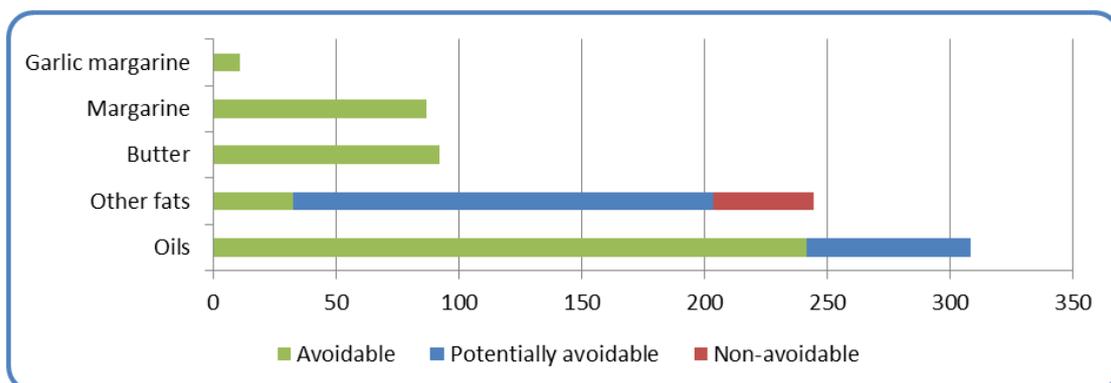


Figure 4.16 – Tonnes of fats in domestic kerbside refuse per annum

4.3.16 Processed vegetables

Vegetables were categorised as being in the 'Processed vegetables' food group if they were dried, frozen, canned, or otherwise processed. This food group represented 0.2% of all food waste, or 552 tonnes per annum to domestic kerbside refuse collections. Processed vegetables were not included in this category if they were part of a meal. It was not always possible to judge whether an item had been frozen or canned unless it was disposed of in its original packaging. Therefore

the results for this food group might be an under-representation of its true proportion of domestic kerbside refuse.

Figure 4.17 provides an overview of the processed vegetables found in the audit.

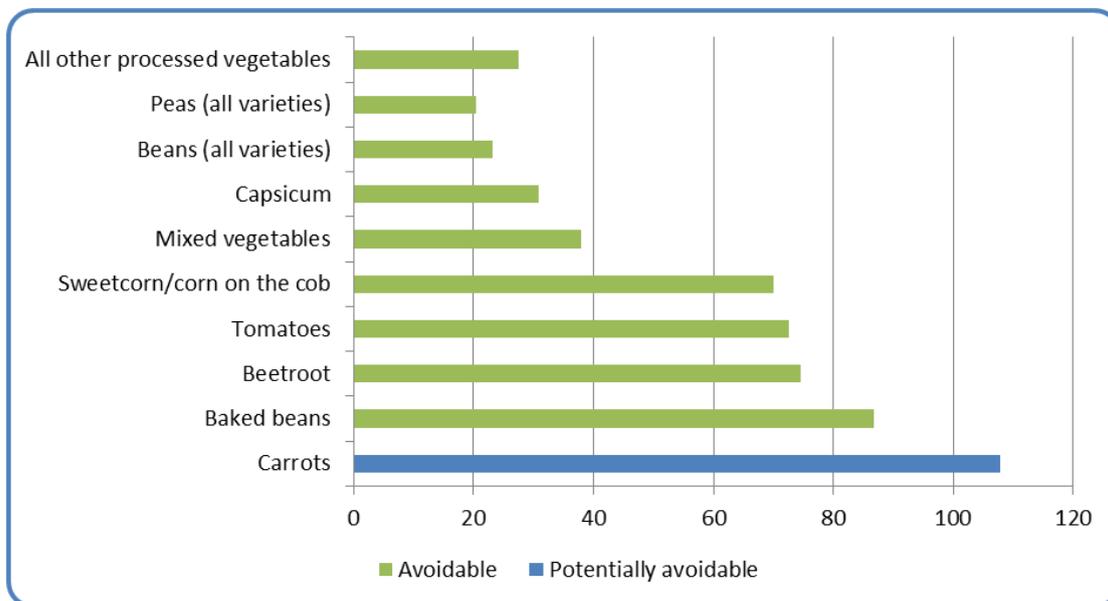


Figure 4.17 – Tonnes of processed vegetables in domestic kerbside refuse per annum

4.3.17 Processed fruits

‘Processed fruits’ comprised dried, canned, and frozen fruits, when they were not included as an ingredient in another food item and were able to be identified as canned or frozen, which was not always possible.

It is estimated that 407 tonnes of processed fruits, 0.2% of food waste, are disposed of annually through domestic kerbside refuse collections.

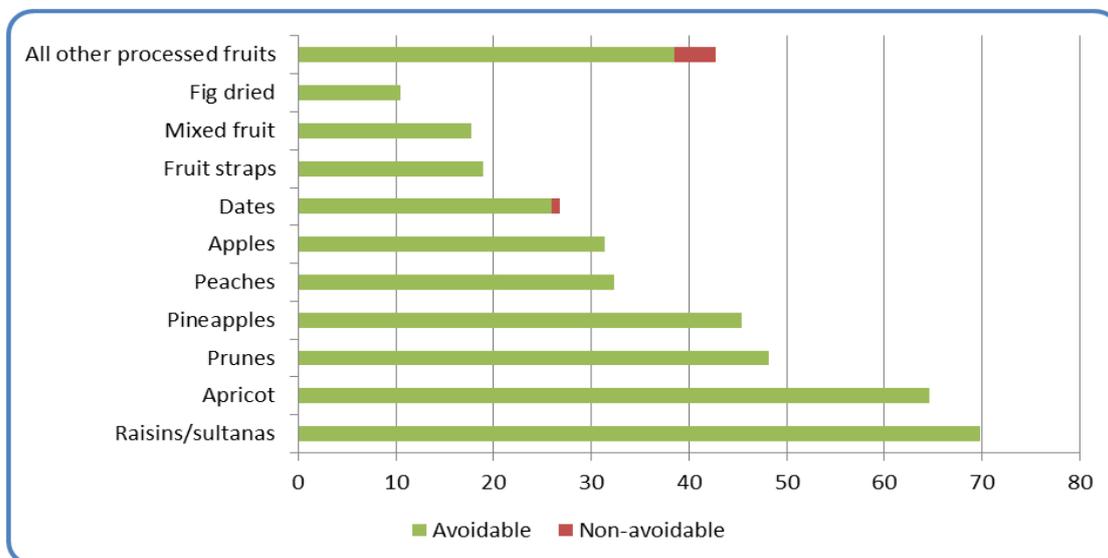


Figure 4.18 – Tonnes of processed fruits in domestic kerbside refuse per annum

4.4 Best before and Use by dates

During the audit, all food waste that was packaged in its original, unopened packaging had the ‘Best before’ or ‘Use by’ date recorded by the auditor before the packaging was removed. This information was documented by the data recorder.

Of the 25,330 food items recorded during the audits, 1.5%, or 379 items, were in their original packaging.

For each of the audits, the dates of the refuse disposal period that the collection for the audit covered was calculated, and the Best before and Use by dates were sorted according to whether they fell before the start of the food waste audit refuse collection period, during that period, or after that period.

Table 4.6 – Best before and Use by dates

Best before and Use by dates	Best before # and %		Use by # and %		Combined # and %	
Before disposal period covered by audit collection	175	50%	18	58%	193	51%
During disposal period covered by audit collection	59	17%	5	16%	64	17%
After disposal period covered by audit collection	114	33%	8	26%	122	32%
Total	348	100%	31	100%	379	100%

Of the 379 packaged food items in the food waste audits, 51% were past their Best before or Use by date before the period covered by the refuse collection. A further (17%) reached their Best before or Use by date during the collection period for the audits. It is not possible to tell exactly when these items were placed in the bin, and therefore whether it was before or after the Best before or Use by dates.

32% of all unopened, packaged items were disposed of before their Best before or Use by date.

5 Survey results

5.1 Analysis by household size

A survey form was delivered to every household from which a refuse sample was collected. Of the 1,402 households from which refuse was sampled, exactly half, 701 households, completed and returned a survey. The results of the surveys have been used to examine the effect of different household factors on the quantity and composition of food waste generated. The results of this survey have been used in the following sections to further analyse the waste audit results.

In Auckland the survey questions differed slightly to the rest of the country, and not all questions in the Auckland survey are able to be included in the analysis. Where the results of the Auckland survey are not included, this is specified.

The survey questions used in each audit are provided in Appendices 2 to 4.

In all of the following analyses, the data from these surveyed households has been scaled to be representative of the average weight of food and refuse disposed of to domestic kerbside refuse collections by households in New Zealand (see section 3.1).

All surveys asked how many occupants resided at the property. The answer to this question has been used to calculate the average weight of avoidable food waste, of all food waste combined, and of refuse, per week, per household size (based on number of occupants) and per occupant. This information is set out in Table 5.1. Two households did not provide occupant numbers.

As the sample sizes for the different household sizes are not large, the weights per household size should be considered to be indicative only.

Table 5.1 – Average weekly weight of food and refuse per household size

Household size	# of samples	Avoidable food waste		All food waste		Refuse	
		Kg/hh/wk	Kg/pp/wk	Kg/hh/wk	Kg/pp/wk	Kg/hh/wk	Kg/pp/wk
1 occupant	89	0.8 kg	0.8 kg	1.9 kg	1.9 kg	5.3 kg	5.3 kg
2 occupants	278	1.1 kg	0.5 kg	2.2 kg	1.1 kg	7.9 kg	3.9 kg
3 occupants	113	1.6 kg	0.5 kg	2.8 kg	0.9 kg	9.3 kg	3.1 kg
4 occupants	134	1.9 kg	0.5 kg	3.9 kg	1.0 kg	12.2 kg	3.0 kg
5 occupants	60	1.9 kg	0.4 kg	3.9 kg	0.8 kg	13.6 kg	2.7 kg
6 occupants	21	3.1 kg	0.5 kg	5.2 kg	0.9 kg	15.9 kg	2.6 kg
7 occupants	4	3.4 kg	0.5 kg	6.2 kg	0.9 kg	25.3 kg	3.6 kg

The weight of avoidable food, all food waste, and refuse increases, per household, proportionally to the number of household occupants.

The weight of avoidable food waste, and all food waste is similar, per person, per week, for all household sizes apart from single occupant households. One occupant households generate more food, (avoidable and other) per occupant than any other size household.

The weight of refuse also increases with the number of occupants in the household. However, the quantity of refuse per person, whilst highest in households with one occupant, decreases as the size of the household increases. The exception is seven occupant households. The data for seven occupant households, however, is based on a sample of only four households, one of which disposed of 64.6 kg of refuse. If this outlier sample is removed, the average weight of refuse per person per week for households with seven occupants is 1.6 kg.

Due to the lack of information on the frequency of refuse set out by the different households (i.e. large households may set out refuse more frequently than small households), the reliability of the results cannot be assessed.

5.2 Analysis by household type

Table 5.2 provides the average weight of avoidable food, all food waste, and of refuse by household type. Households that responded to the survey were asked to specify to which age group the households’ inhabitants belonged. Using these age groupings, the average weight of avoidable food, all food waste combined, and of refuse, per set out, was calculated for households that have children under the age of 15, households that do not have children under the age of 15, and households that only have occupants over the age of 65.

The results from the survey used for the first Auckland audit was not able to be included in these results as different age groupings were used.

Table 5.2 – Average set out rates for food and refuse per household type

Type of household	Average #	Avoidable food waste		All food waste		Refuse	
	pp/hh	Kg/hh/wk	Kg/pp/wk	Kg/hh/wk	Kg/pp/wk	Kg/hh/wk	Kg/pp/wk
Households with children under 15 yrs	4.1	1.9 kg	0.5 kg	3.5 kg	0.9 kg	12.6 kg	3.1 kg
Households without children under 15 yrs	2.5	1.5 kg	0.6 kg	2.9 kg	1.1 kg	8.6 kg	3.4 kg
Households with only inhabitants 65 yrs and over	1.6	0.8 kg	0.5 kg	1.8 kg	1.1 kg	7.0 kg	4.3 kg

The statistical significance of the difference between the results was calculated using a student T-test with a one-tailed distribution. When comparing the data sets of avoidable food waste for households with children under 15 and households without children under 15, the P value was 0.012, indicating that the difference is significant.

Households with children under 15 generate more avoidable food waste, more overall food waste, and more refuse than households without children. Households with occupants over 65 generate lower quantities of all three waste streams, per household, than younger households.

However, when calculating food waste generation per person, people in households with children generate a similar quantity of avoidable food waste, per person, per week, as the other types of households, slightly less overall food waste, and less refuse.

This suggests that the number of occupants in a household has more effect on waste generation than the age of the inhabitants.

5.3 Analysis by household food waste disposal method

The survey asked respondents to state how they dispose of food waste. The survey provided three questions to which respondents could answer Yes or No. These were:

1. Does your household currently compost or worm farm any of your food waste at home?
2. Does your household currently feed any of your food waste to animals?
3. Does your household currently use an in-sink disposal system to dispose of any of your food waste?

Based on the responses to these questions, Table 5.3 has been generated. The table shows the proportion of households that claim to use each different disposal option for their food waste, and the average quantity of avoidable food waste and all food waste disposed of to domestic kerbside refuse, per household, according to the disposal methods they claim to use.

Households that stated that they use several methods to dispose of their food waste have been amalgamated into a 'several disposal methods' category.

The two Auckland surveys asked these questions in a different manner, and cannot, as a result, be included in this analysis.

Table 5.3 – Average weight of avoidable food waste and all food waste, per household, disposed of to kerbside refuse collection, according to disposal methods

Food disposal method	Proportion of households	Avoidable food waste, Kg/hh/wk	All food waste Kg/hh/wk
Kerbside collections	27%	1.3 kg	2.8 kg
Compost or worm farm	22%	1.2 kg	2.1 kg
In-sink disposal	17%	1.4 kg	2.9 kg
Feed to animals	11%	1.4 kg	2.6 kg
Several disposal methods	23%	1.2 kg	2.1 kg

On average, households that claim to dispose of their food waste to kerbside refuse collections dispose of 2.8 kg of food waste per week to kerbside refuse collections, of which 1.3 kg is avoidable food waste. Households that claim to compost or worm farm food waste dispose of 2.1 kg of food waste (including 1.2 kg of avoidable food waste) to kerbside collections per week.

Households that use a kitchen ins-ink disposal unit dispose of the largest quantity of food waste to domestic kerbside collections (2.9 kg per set out, of which 1.4 kg is avoidable), and households

that feed food waste to animals are the third largest disposers of food waste to kerbside collections (2.6 kg of food waste per set out, of which 1.4 kg is avoidable food).

Of the households that claim to use several methods for the disposal of their food waste, 85% use a compost or worm farm as one of those methods, and 80% also feed food to animals. Forty-seven percent of these households have an in-sink disposal unit.

The statistical significance of the difference between the results was calculated using a student T-test with a one-tailed distribution. Table 5.4 provides the P value and statistical significance when comparing the key food waste disposal methods.

Table 5.4 – Statistical significance of difference in all food waste to domestic kerbside collections, per household, according to disposal methods

Food disposal methods	Kerbside collections	In-sink disposal
Compost or worm farm	0.007 Very significant	0.011 Significant
In-sink disposal	0.455 Not significant	-
Several disposal methods	0.005 Very significant	0.008 Very significant

There is a very significant statistical difference in the weight of food waste to domestic kerbside collections from households that compost or worm farm, or use several disposal methods, as compared to households that solely use the kerbside refuse collection. The difference in food to domestic kerbside collections between households that use an in-sink disposal unit for food waste disposal compared to those that solely use the kerbside collection is not significant.

5.4 Perception of wastage

The survey asked householders to estimate the amount of food waste that they throw away every week, based on a scale of 0 to 5, where 0 is 'None' and 5 is 'A lot'.

Figure 5.1 shows the difference between the householders' estimate of the scale of their food waste disposal, and their actual, average, food waste disposal. This is based on all types of food waste combined (avoidable, potentially avoidable and non-avoidable).

This analysis includes households in the second Auckland food waste audit, but not those in the first audit, as the question in the first survey is not comparable.

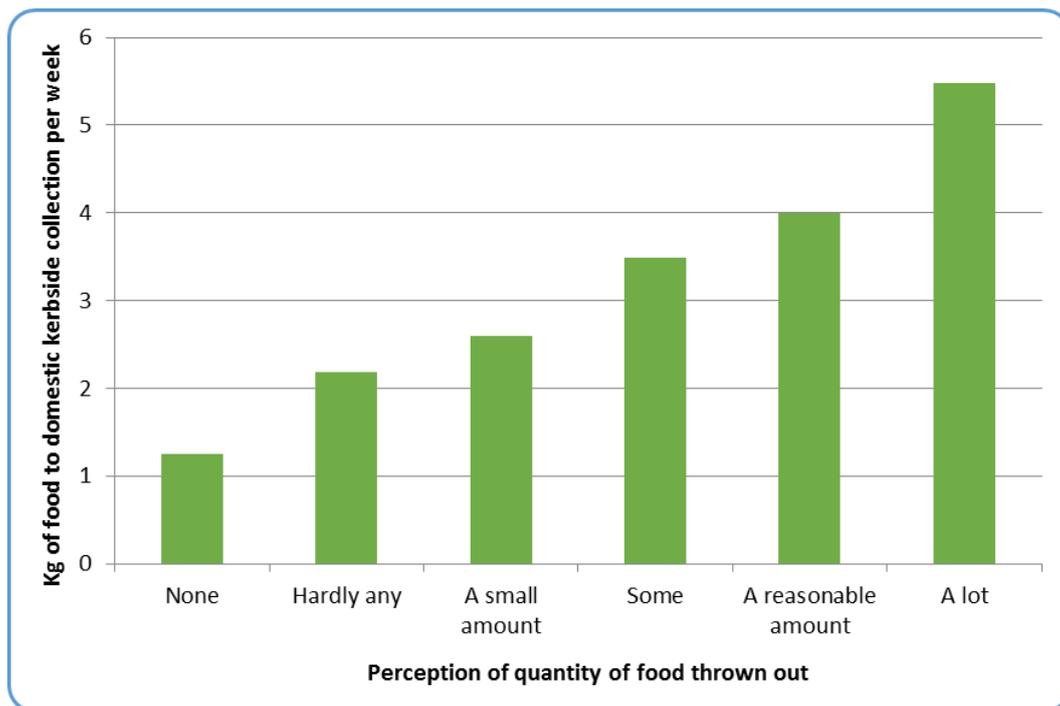


Figure 5.1 – Perception of food wastage versus actual food wastage

Of the 673 households that answered this question in the survey (excludes households in the first Auckland food waste audit), 27 households (4% of households) claimed to not dispose of any food waste. These households actually disposed of an average of 1.3 kg of food waste to kerbside refuse collections per week.

The amount of food waste generated by households that claim to throw out ‘Hardly any’ through to those who claim to throw out ‘A lot’ shows an incremental increase. Only 4 households (1%) of households claim to throw out ‘A lot’ of food waste.

5.5 Ethnicity

The survey asked which ethnic/cultural group the household most identifies with. The surveys from all council food waste audits are included in this analysis, though the list of ethnicities provided in the first Auckland food waste survey was larger than in the others, and the answers have therefore been amalgamated to match the other surveys. A total of 698 households answered this question.

Table 5.5 provides an overview of the ethnicity of the households that responded to this question.

655 households provided one ethnic/cultural group, 41 provided two ethnic/cultural groups, and 2 households provided three ethnic/cultural groups.

Data from the 2013 census on ethnicity of the population of New Zealand has also been included in the table. The census states that: “Where a person reported more than one ethnic group, they have been counted in each applicable group.” The same method has been used for the household ethnicity data from the survey.

It is noted that household data from the survey is being compared with census data on individuals.

Table 5.5 – Ethnicity of households that responded to survey

Ethnic/cultural group	# of households in survey	% of households in survey	% of people in 2013 census
European	643	87%	74%
Māori	47	6%	15%
Asian	23	3%	12%
Pacific Peoples	17	2%	7%
Middle Eastern / Latin American / African	2	0%	1%
Other			
<i>New Zealand</i>	<i>10</i>	<i>1%</i>	<i>2%</i>

When compared to the census population data, the survey responses include an over-representation of European households, and an under-representation of all other households. However, as the survey was returned by only 50% of households, it cannot be said with any certainty how representative the audit sample was of the ethnic makeup of New Zealand.

Table 5.3 is comparing households with people (from census), and does not take into account the number of occupants living in a household. As there may be a tendency for some cultures to live in extended families, and therefore have more occupants per household, the actual proportions of individuals of each ethnicity may be different to the survey results.

5.6 Comparison with overseas food waste audits

As previously mentioned, WRAP undertook an audit of food waste in the UK in 2012, which is presented in *Household Food and Drink Waste in the United Kingdom 2012*. In 2013, Sustainability Victoria, in Australia, undertook a similar food waste audit, the results of which are presented in *Victorian Statewide Garbage Bin Audits: Food, Household Chemicals and Recyclables, 2013*. The methodology used for the three audits is similar, though not identical.

Table 5.4 provides a comparison of the kilograms of food in each food group disposed of to domestic kerbside refuse collections, per household, per annum, from the three studies.

Some of the food groups, such as homemade and pre-prepared meals, differ between the audits, and have been amalgamated in Table 5.6. The Sustainability Victoria study did not include ‘fats’ or ‘other foods’ food groups.

Table 5.6 – Comparison of composition of food waste in New Zealand, UK and Victoria food waste audits, per household, per annum

Food groups	NZ 2014/15		UK 2012		Victoria 2013	
	kg/hh/pa		kg/hh/pa		kg/hh/pa	
Fresh vegetables	41.1 kg	27.8%	51.9 kg	29.7%	50.7 kg	28.4%
Fresh fruits	35.9 kg	24.3%	27.0 kg	15.5%	25.2 kg	14.1%
Meat and fish	20.2 kg	13.7%	17.0 kg	9.8%	15.1 kg	8.5%
Bakery	11.6 kg	7.8%	17.0 kg	9.8%	29.1 kg	16.3%
Homemade and pre-prepared foods	13.3 kg	9.0%	11.9 kg	6.8%	22.9 kg	12.8%
Drinks	5.9 kg	4.0%	17.0 kg	9.8%	5.7 kg	3.2%
Dairy	5.4 kg	3.7%	5.2 kg	3.0%	15.6 kg	8.7%
Other foods	3.9 kg	2.6%	10.0 kg	5.7%	-	-
Staple foods	3.1 kg	2.1%	2.9 kg	1.7%	5.7 kg	3.2%
Snack foods	2.6 kg	1.8%	2.2 kg	1.3%	1.6 kg	0.9%
Condiments	2.2 kg	1.5%	2.3 kg	1.3%	2.1 kg	1.2%
Desserts	1.4 kg	0.9%	4.1 kg	2.3%	2.1 kg	1.2%
Fats	0.5 kg	0.3%	0.6 kg	0.4%	-	-
Processed vegetables	0.4 kg	0.2%	5.2 kg	3.0%	2.1 kg	1.2%
Processed fruits	0.3 kg	0.2%	0.3 kg	0.2%	0.5 kg	0.3%
Total	147.8 kg	100.0%	174.7 kg	100.0%	178.4 kg	100.0%

According to these studies, less food waste is generated per household per annum in New Zealand than in the UK or in Victoria.

There are differences in the food waste composition in each country. New Zealand has a higher proportion of fresh fruit and meat and fish waste than in the UK or Victoria. Victoria has a higher proportion of bakery and dairy waste than in the UK or New Zealand. The UK has a higher proportion of drink waste.

Some of the dissimilarities may be due to differences in auditing methods and others may be due to different consumption and disposal patterns.

The results from the above table are presented graphically in Figure 5.2.

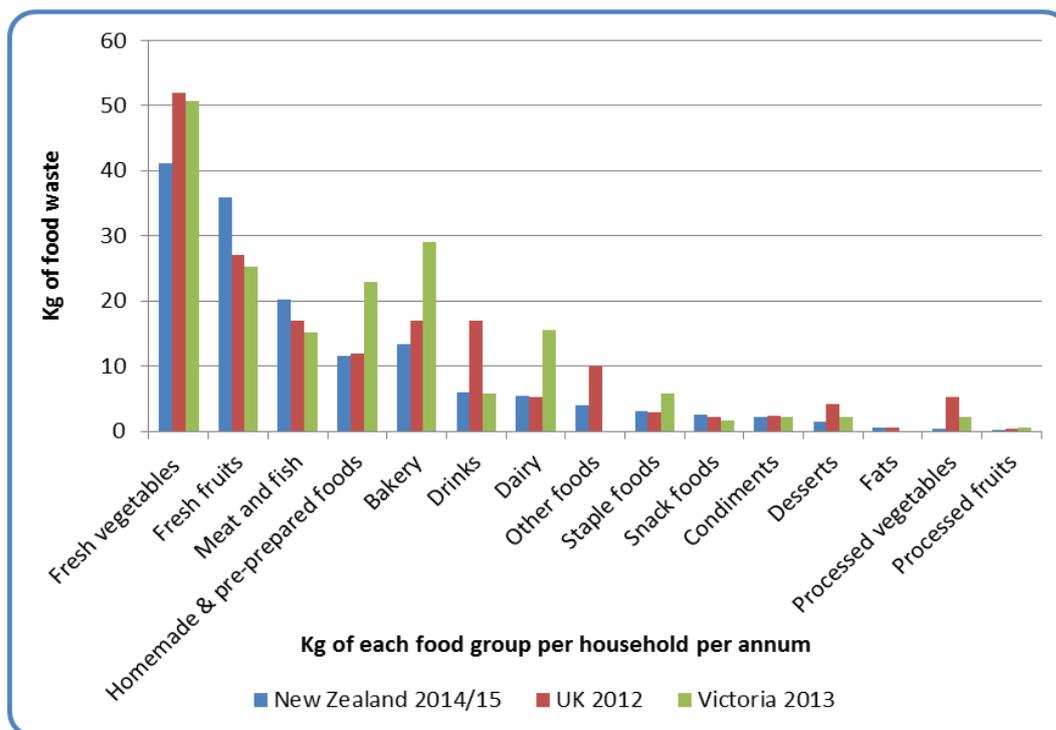


Figure 5.2 – Comparison of food group disposal per household per year

A comparison of the avoidability of food waste in the three food waste audits is more difficult to present, as the WRAP report only provides a combined breakdown of avoidability for the three waste streams that they analysed. These waste streams were:

- Local Authority-collected food and drink waste
- Food and drink waste disposed of through the sewer
- Food and drink waste home composted and fed to animals.

In New Zealand and in Victoria, the food waste studies did not include food waste disposed of through the sewers or through home composting and feeding to animals.

A comparison between the avoidability of food waste from the New Zealand and Sustainability Victoria food waste audits is provided in Table 5.7.

Table 5.7 – Comparison of avoidability of food waste in New Zealand and Victoria food waste audits

Food groups	New Zealand 2014/2015	Victoria 2013
Avoidable	54%	65%
Potentially avoidable	12%	11%
Non-avoidable	35%	24%

A higher proportion of avoidable food waste was reported in Victoria than in New Zealand. It is not known whether this difference is due to differences in auditing methods or differences in householders’ consumption and disposal behaviour.

It is noted that the food groups that Victoria disposed more of than New Zealand (dairy, bakery, staple foods, homemade and prepared food), are all mostly avoidable foods.

6 Results per household

This section provides a summary of the food waste audit results for the average New Zealand household. In reality, there is no such thing as an 'average' New Zealand household – few, if any, households in New Zealand conform exactly to the 'average'.

These figures are provided as a snapshot of food waste generation in New Zealand, at a level that readers can more easily relate to. All of these results are based on one week's worth of kerbside refuse disposal

The average household in New Zealand sets out 9.47 kg of refuse per week for a kerbside refuse collection. According to the results of this food waste audit, 30.0% of this refuse is food waste. This equates to 2.84 kg of food waste, per household, per week.

Of this food waste, 54% is avoidable, 12% is potentially avoidable and 35% is non-avoidable.

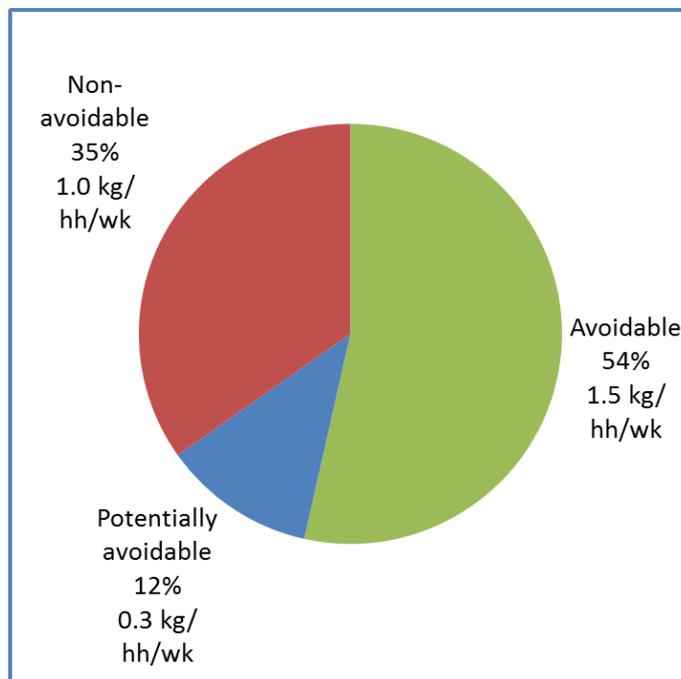


Figure 6.1 – Food waste generated by average New Zealand household, per week

The average New Zealand household throws out 1.5 kg of avoidable, edible, food waste per week.

The average composition of this avoidable food waste, by weight, by food group, is shown in Figure 6.2.

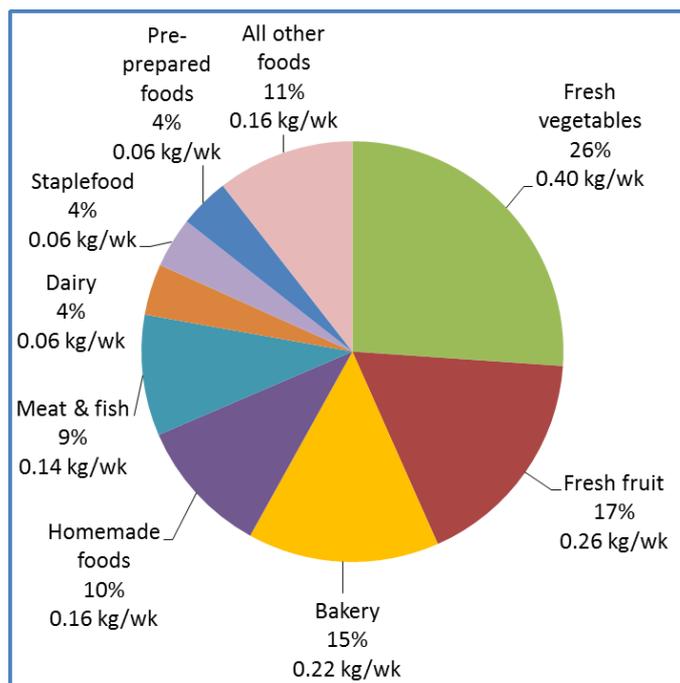


Figure 6.2 – Composition of avoidable food waste disposed of to kerbside refuse collection by average New Zealand household, per week

The average cost of this avoidable food waste per household, per week, is \$10.83.

The cost of the avoidable food waste in the top food groups is shown in Figure 6.3. The proportions are different to Figure 6.2, as the average cost of food varies between food groups.

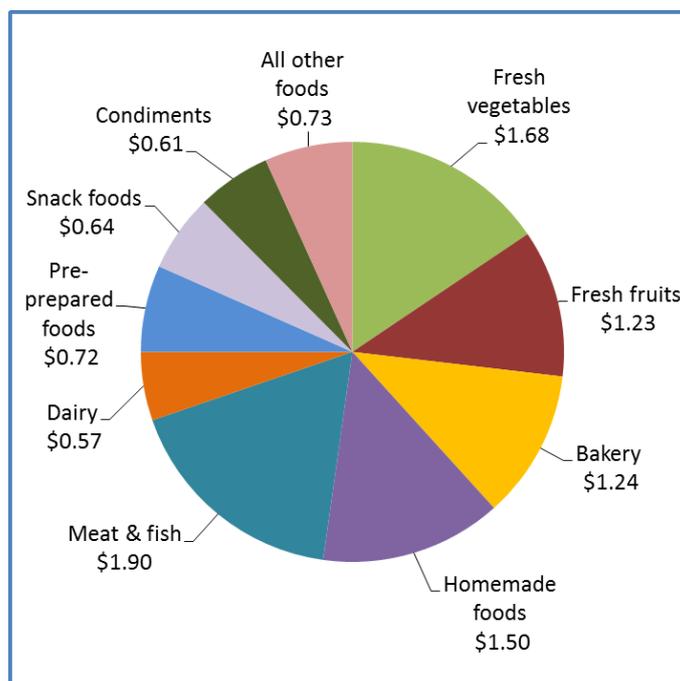


Figure 6.3 – Cost of food waste disposed of to domestic kerbside collection by average New Zealand household, per week

Appendix 1 – Example of opt-out letter

18 August 2014

Dear Resident

Food Waste Audit

What food are we throwing away and how much is it costing us?

New Plymouth District Council would like to better understand what happens to our food waste. Recent unpublished research suggests that as much as half of the food we throw away could be avoidable. Understanding the problem is important as it could be costing households money and causing unnecessary greenhouse gas emissions. Similar research internationally has led to initiatives that have saved millions of dollars while simultaneously reducing the food waste problem.

To better understand the food waste issue in the New Plymouth district, rubbish from 120 households are to be audited.

Your street has been selected to be included within the audit sample.

This does not mean every bin or bag on your street will be audited, but your waste is within the sample area and *could* be audited.

All data collected from the 120 bin/bag sample would only be reported in an aggregated form. That is, no individual household information will be reported anywhere, at any time, ever.

If for any reason you would prefer your household waste be excluded from the audit, please contact us before **Friday 22 August 2014** via email enquiries@npdc.govt.nz or call 06 759 6060 and ask to be added to the 'food waste audit exclusion register'. You will need to provide your address details.

If you are registering via email, simply put '*food waste audit exclusion register*' in the subject line and your residential address details in the body text of the email.



For those households willing to participate and whose food waste is audited, after the audit you will receive a short survey that asks questions like 'Do you compost at home?' and 'How many people live in your household?' The surveys can be completed online or be returned in a free post envelope provided. All residents who complete and return the surveys will go in the draw to win one of three \$100 grocery vouchers (that's a one in forty chance of winning).

What will happen on the day?

You will put out your rubbish as per normal in the morning and you do not need to do anything differently to what you normally do. A Council engaged auditor will collect your bag or empty your bin and no waste will be left behind. Bags and bins will be selected at random along your street. The waste from your bag or bin will be consolidated with the other waste collected and audited. This snapshot will help establish the volume and composition of food waste across the New Plymouth District.

What about my privacy?

Data about your household's food waste will be combined with data from all the other households in the waste audit. No information about individual households' waste will be included in any reports on the trial.

What happens to the waste?

All waste will be sent to landfill on the same day that it is collected and audited.

If you have any further questions with regards to this research, please contact one of the solid waste team - Mike Baker or Kimberley Hope.

Regards



Kimberley Hope
Water and Wastes

Appendix 2 – Example of national survey

Dear Resident

WAIPA DISTRICT COUNCIL (FOOD WASTE AUDIT)

As you may be aware Waipa District Council is working with Sustainable Cambridge to better understand the issue of food waste. An audit of 60 random households has been undertaken and waste from your house was included. The results of the audit will tell us how much food waste is being generated and what it is composed of. So we can understand a little more regarding food waste, we need your help to answer a short survey on the back of this letter.

Please post the survey back to us in the free post envelope enclosed, or drop it into our office located at 101 Bank Street, Te Awamutu.

All completed surveys returned by Friday, 8th August 2014 will go into a draw to win one of three \$100 grocery vouchers.

Thank you for taking the time to complete and return the survey.

Yours sincerely

Hope Williams
WASTE MINIMISATION OFFICER

WAIPA DISTRICT COUNCIL FOOD WASTE SURVEY

Please note: all of the information you provide in this survey will be kept confidential and no individual household information will be reported anywhere, at any time, ever.

1. Does your household currently compost or worm farm any of your food waste at home?

Circle one: Yes / No

2. Does your household currently feed any of your food waste to animals?

Circle one: Yes / No

3. Does your household currently use an in-sink disposal system to dispose of any of your food waste?

Circle one: Yes / No

4. Using a scale from 0 – 5, where 5 is ‘a lot’, and 0 is ‘none at all’, overall how much food would you say you throw away in general? Circle one:

0	1	2	3	4	5
None	Hardly any	A small amount	some	A reasonable amount	A lot

5. How many occupants are there in total within your household? _____

6. Into which of the following age groups do the members of your household fall? (write in number of occupants within each age band)

0-4 years _____ 5-14 years _____ 15-24 years _____ 25-34 years _____
 35 – 44 years _____ 45-54 years _____ 55-64 years _____ 65 years & older _____

7. Which ethnic/cultural group does your household most identify with? (please circle)

European Māori Pacific Asian
 Middle Eastern/Latin American/African Other Ethnicity (please specify) _____

8. What is your residential address and contact details? (this information is so that we can contact you if you win)

House number: _____ Street name: _____
 Telephone No: _____ E-mail: _____

Once again, thank you for completing this survey.

Appendix 3 – Auckland survey used in KOC pilot areas

The following questions are from a survey of households in the Kerbside Organic Collection pilot on the North Shore. This survey was undertaken by Gravitas Research and Strategy for Auckland Council and the answers to the questions relevant to the food waste audits were passed on to Waste Not Consulting for analysis.

1. Now thinking about what you did with your food waste (e.g. vegetable and fruit scraps and other food waste) before the organics trial started in May. Please exclude any use of the organics trial bins.

How do you usually dispose of food waste (e.g. vegetable and fruit scraps and other food waste) in your household? Please select as many as apply.

- Put in the rubbish for collection (e.g. collected in the orange/yellow bags or wheelie bin)
- Compost it
- Bury in the garden
- Kitchen waste disposal unit or insinkerator
- Worm farm
- Give to chickens, pigs or other animals
- Don't Know
- Other (please specify)

2. Which of these did you use to dispose most of your food waste before the organics trial started? Please exclude any use of the organics trial bins. (Please select one only.)

- Put in the rubbish for collection (e.g. collected in the orange/yellow bags or wheelie bin)
- Compost it
- Bury in the garden
- Kitchen waste disposal unit or insinkerator
- Worm farm
- Give to chickens, pigs or other animals
- Don't Know
- Other (please specify)

3. How much food waste (including food scraps and other food waste) does your household put out in the rubbish collection in a typical week/each time you put your rubbish out?

1. A lot – more than half of my household's rubbish bag / wheelie bin would be food waste
2. Quite a bit – around half of all my household's rubbish bag / wheelie bin would be food waste
3. Some – some of my household's rubbish bag / wheelie bin would be food waste
4. Not much – hardly any of all my household's rubbish bag / wheelie bin would be food waste
5. None – my household does not put any food waste into the rubbish collection

6. Don't know

4. Which ethnic group(s) do you belong to?

- New Zealand European
- Other European
- Maori
- Samoan
- Cook Island Maori
- Tongan
- Niuean
- Tokelauan
- Fijian
- Other Pacific Peoples
- Chinese
- Korean
- Indian
- Other Asian
- Middle Eastern
- Latin American
- African
- Other (please specify)
- Don't know
- I prefer not to say

5. Number of adults and children in household

- Children under 5 years
- Children 5-18 years
- Children 18+ years
- Adults

Appendix 4 – Auckland survey used in Manurewa, Mt Albert and Henderson Valley

28 July 2014

Dear resident

HELP US TO REDUCE FOOD WASTE IN AUCKLAND

Auckland Council is conducting a food waste audit to see how much and what kind of food Aucklanders are throwing away. We are collecting rubbish from over 100 randomly selected households across the city – and looking at it to see how much food waste there is. This will help us develop programmes to reduce waste.

Your house has been randomly chosen as one of the places we are collecting from.

We are asking all households that have been randomly selected to provide us with some basic information by answering the questions on the other side of this letter. We would greatly appreciate your cooperation. Everyone who responds to these questions will go into a draw for one of three \$100 grocery vouchers which will be drawn on 15 August.

If you have any questions, please contact Maria Hernandez, WasteWise Advisor either by calling 301 0101 or by emailing wastewise@aucklandcouncil.govt.nz.

Thank you in advance for your help!

Kind regards,



Caitlin Scott
Waste Minimisation Manager

AUCKLAND FOOD WASTE AUDIT QUESTIONNAIRE

Please note: the information you provide in this questionnaire will be kept confidential and no individual household information will be reported anywhere, at any time.

1. How many people live in your house? _____

2. How do you currently dispose of food waste in your home? (choose as many options as necessary)

Rubbish <input type="checkbox"/>	Kitchen waste disposal <input type="checkbox"/>	Compost <input type="checkbox"/>	Bokashi <input type="checkbox"/>	Feed to animals <input type="checkbox"/>	Bury <input type="checkbox"/>	Other <input type="checkbox"/>
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3. What is the main way you dispose of food waste in your home?

Rubbish <input type="checkbox"/>	Kitchen waste disposal <input type="checkbox"/>	Compost <input type="checkbox"/>	Bokashi <input type="checkbox"/>	Feed to animals <input type="checkbox"/>	Bury <input type="checkbox"/>	Other <input type="checkbox"/>
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4. Which of the following age groups do the members of your household fall? (write in number of occupants within each age band)

0-4 years _____	5-14 years _____	15-24 years _____	25-34 years _____
35 – 44 years _____	45-54 years _____	55-64 years _____	65 years & older _____

5. Which ethnic/cultural group does your household most identify with? (please circle)

European	Māori	Pacific Peoples
Asian	Middle Eastern/ Latin American/African	Other Ethnicity (please specify) _____

6. What is your residential address and contact details? This information is so that we can contact you if you win.

House number: _____ Street name: _____

Telephone number: _____ Email: _____

7. **Optional:** Using a scale from 0 – 5, where 0 is ‘none at all’ and 5 is ‘a lot’, overall how much food would you say you throw away in general?

0	1	2	3	4	5
None	Hardly any	A small amount	Some	A reasonable amount	A lot

Remember, all households who respond to these questions and have them to us before 15 August will go in the draw for one of three \$100 grocery vouchers.

Thank you again for your assistance!

Appendix 5 – Food group definitions

Food group	Description
Bakery	All bakery items, including bread, pastries, pies, scones etc.
Condiments	Includes condiments, sauces, herbs and spices, including garlic and ginger, dried and fresh herbs, seasoning sachets, jams, honey, salad dressing etc.
Dairy	All dairy products, including eggs. Includes cheeses, milk, yogurt etc.
Desserts	All cakes, puddings, ice cream etc. Does not include bakery type pastries.
Drinks	Tea bags, coffee grinds and granules, milkshakes, fruit juice, water, alcohol etc.
Fats	Oils, butter, margarine, lard.
Fresh fruits	All fresh fruit, including fresh fruit that has been cooked fruit, and excluding dried, canned or frozen fruit.
Fresh vegetables	All fresh vegetables, including fresh vegetables that have been cooked, and excluding canned or frozen vegetables,
Homemade food	All home prepared mixed foods, cooked or raw, including Leftovers, homemade sandwiches, instant noodles, stews and soups.
Meat and fish	All meat and fish that are not included in a meal (which would then be categorised as homemade food). Includes shell fish, canned fish, bones etc.
Pre-prepared meals	All types of take away meals and snacks, including fish and chips, Indian and Chinese take away meals, coleslaw salads from take away restaurants, burgers, pizzas etc.
Processed fruit	Dried, canned or frozen fruits, when they can be identified as such, and is not included as an ingredient in another food.
Processed vegetables	Canned or frozen vegetables, when they can be identified as such, and is not included as an ingredient in another food.
Snack foods	Snack foods including sweets, biscuits, chocolate, nuts, crackers and chippies etc.
Staple foods	Rice and pasta, dry and cooked (but not included with other ingredients), cereals, flour etc.
Other	The other category includes unidentifiable food (categorised as Gunge), pet food, and baby food.

Appendix 6 – Top 100 food types

Top 100 food types – Avoidable, Potentially avoidable and Non-avoidable combined	Proportion of all food waste	Kg per household per annum	Tonnes per region per annum
Bananas	7%	10.6 kg	16,393 T
Potatoes	6%	8.6 kg	13,404 T
Poultry	5%	7.2 kg	11,193 T
Leftovers	4%	6.2 kg	9,621 T
Oranges, mandarins etc.	4%	5.3 kg	8,142 T
White bread	3%	4.3 kg	6,722 T
Apples	3%	4.2 kg	6,556 T
Tea/teabags	3%	3.9 kg	6,065 T
Gunge	2%	3.5 kg	5,416 T
Unidentifiable/mixed bones	2%	3.2 kg	5,002 T
Carrots	2%	3.0 kg	4,705 T
Onions	2%	3.0 kg	4,656 T
Pumpkins	2%	2.9 kg	4,455 T
Mixed grain bread	2%	2.8 kg	4,270 T
Lemons	2%	2.7 kg	4,189 T
Eggs	2%	2.7 kg	4,167 T
Lettuces	2%	2.6 kg	4,090 T
Sweetcorn/corn on the cob	2%	2.6 kg	3,972 T
Cabbages	2%	2.4 kg	3,726 T
Broccoli	2%	2.3 kg	3,564 T
Avocados	2%	2.2 kg	3,468 T
Mixed vegetables	1%	2.2 kg	3,366 T
Feijoa	1%	1.7 kg	2,683 T
Melons	1%	1.5 kg	2,310 T
Wheatmeal bread	1%	1.5 kg	2,300 T
Beef	1%	1.4 kg	2,235 T
Kiwifruit	1%	1.4 kg	2,126 T
Fresh fish	1%	1.3 kg	2,092 T
Takeaway chips	1%	1.3 kg	2,092 T
Bread roll/baguette	1%	1.3 kg	2,069 T
Tomatoes	1%	1.3 kg	2,054 T
Unidentified meat/offal	1%	1.2 kg	1,840 T
Rice	1%	1.1 kg	1,727 T
Cake	1%	1.1 kg	1,648 T
Celery	1%	1.0 kg	1,615 T
Sandwiches - homemade	1%	1.0 kg	1,614 T
Cauliflowers	1%	1.0 kg	1,557 T

Top 100 food types – Avoidable, Potentially avoidable and Non-avoidable combined	Proportion of all food waste	Kg per household per annum	Tonnes per region per annum
Yoghurt/yoghurt drinks	1%	1.0 kg	1,557 T
Pork	1%	1.0 kg	1,483 T
Pears	1%	0.9 kg	1,462 T
Taro	1%	0.9 kg	1,439 T
Cheese	1%	0.9 kg	1,361 T
Lamb/mutton	1%	0.9 kg	1,325 T
Ham	1%	0.9 kg	1,324 T
Kumara	1%	0.8 kg	1,314 T
Plums	1%	0.8 kg	1,304 T
Pineapples	1%	0.8 kg	1,212 T
Peaches	1%	0.8 kg	1,180 T
Grapes	0%	0.7 kg	1,103 T
Silverbeet	0%	0.7 kg	1,096 T
Cucumbers	0%	0.7 kg	1,071 T
Capsicum	0%	0.7 kg	1,067 T
Sausages	0%	0.7 kg	1,043 T
Grapefruits	0%	0.6 kg	998 T
World breads (naan, tortilla etc)	0%	0.6 kg	940 T
Leeks	0%	0.5 kg	838 T
Mussels, live	0%	0.5 kg	817 T
Soups	0%	0.5 kg	816 T
Beans (all varieties)	0%	0.5 kg	778 T
Courgettes	0%	0.5 kg	778 T
Coffee grinds	0%	0.5 kg	768 T
Pasta	0%	0.5 kg	758 T
Other drinks	0%	0.5 kg	737 T
Sodas	0%	0.5 kg	720 T
Pies	0%	0.4 kg	677 T
Nuts	0%	0.4 kg	673 T
Beetroot	0%	0.4 kg	640 T
Shell fish (prawns, crab, lobster etc)	0%	0.4 kg	608 T
Flour	0%	0.4 kg	573 T
Mangos	0%	0.4 kg	572 T
Other bakery	0%	0.3 kg	541 T
Biscuits, plain sweet	0%	0.3 kg	539 T
Muffin	0%	0.3 kg	529 T
Takeaway pizzas	0%	0.3 kg	510 T
Crackers/crisp breads	0%	0.3 kg	509 T
Spinach	0%	0.3 kg	508 T
Herbs/spices	0%	0.3 kg	488 T

Top 100 food types – Avoidable, Potentially avoidable and Non-avoidable combined	Proportion of all food waste	Kg per household per annum	Tonnes per region per annum
Bacon	0%	0.3 kg	488 T
Confectionery	0%	0.3 kg	472 T
Apricot	0%	0.3 kg	466 T
Other processed meats	0%	0.3 kg	452 T
Other sauces	0%	0.3 kg	420 T
Coleslaws	0%	0.3 kg	413 T
Mushrooms	0%	0.3 kg	394 T
Takeaway Chinese meal	0%	0.3 kg	390 T
Stews	0%	0.3 kg	389 T
Spring onions	0%	0.2 kg	382 T
Pastry	0%	0.2 kg	380 T
Mince meat	0%	0.2 kg	377 T
Takeaway Indian meal	0%	0.2 kg	376 T
Pet food	0%	0.2 kg	368 T
Mixed stone fruits, stewed	0%	0.2 kg	360 T
Bokchoy/chinese cabbage	0%	0.2 kg	342 T
Jams	0%	0.2 kg	313 T
Sugar	0%	0.2 kg	311 T
Chocolate	0%	0.2 kg	311 T
Oils	0%	0.2 kg	308 T
Parsnips	0%	0.2 kg	293 T
Other condiments	0%	0.2 kg	288 T
Fruit loaf and fruit buns	0%	0.2 kg	288 T

Appendix 7 – Top 100 avoidable food types

Top 100 food types – Avoidable food waste only	Proportion of all avoidable food waste	Kg per household per annum	Tonnes per region per annum
Leftovers	8%	6.1 kg	9,489 T
Potatoes	5%	4.1 kg	6,365 T
White bread	5%	3.6 kg	5,550 T
Apples	3%	2.6 kg	4,025 T
Mixed grain bread	3%	2.2 kg	3,424 T
Poultry	3%	2.2 kg	3,403 T
Bananas	3%	2.1 kg	3,242 T
Lettuces	3%	2.0 kg	3,136 T
Oranges, mandarins etc.	2%	1.8 kg	2,867 T
Pumpkins	2%	1.7 kg	2,656 T
Carrots	2%	1.5 kg	2,340 T
Cabbages	2%	1.4 kg	2,211 T
Onions	2%	1.4 kg	2,115 T
Takeaway chips	2%	1.3 kg	2,089 T
Bread roll/baguette	2%	1.3 kg	2,047 T
Tomatoes	2%	1.2 kg	1,889 T
Wheatmeal bread	1%	1.2 kg	1,836 T
Rice	1%	1.1 kg	1,727 T
Cake	1%	1.1 kg	1,643 T
Sandwiches - homemade	1%	1.0 kg	1,581 T
Yoghurt/yoghurt drinks	1%	1.0 kg	1,557 T
Beef	1%	0.9 kg	1,420 T
Cheese	1%	0.9 kg	1,349 T
Plums	1%	0.8 kg	1,260 T
Avocados	1%	0.8 kg	1,218 T
Ham	1%	0.8 kg	1,203 T
Kiwifruit	1%	0.7 kg	1,160 T
Pears	1%	0.7 kg	1,055 T
Sausages	1%	0.7 kg	1,037 T
Feijoa	1%	0.7 kg	1,034 T
Broccoli	1%	0.7 kg	1,023 T
Lemons	1%	0.6 kg	998 T
Celery	1%	0.6 kg	985 T
Unidentified meat/offal	1%	0.6 kg	970 T
Grapes	1%	0.6 kg	968 T
World breads (naan, tortilla etc)	1%	0.6 kg	936 T
Peaches	1%	0.6 kg	911 T

Top 100 food types – Avoidable food waste only	Proportion of all avoidable food waste	Kg per household per annum	Tonnes per region per annum
Cucumbers	1%	0.6 kg	887 T
Sweetcorn/corn on the cob	1%	0.6 kg	872 T
Cauliflowers	1%	0.5 kg	828 T
Soups	1%	0.5 kg	817 T
Pasta	1%	0.5 kg	758 T
Sodas	1%	0.5 kg	720 T
Mixed vegetables	1%	0.5 kg	702 T
Capsicum	1%	0.4 kg	658 T
Beans (all varieties)	1%	0.4 kg	632 T
Melons	1%	0.4 kg	622 T
Pies	1%	0.4 kg	616 T
Flour	0%	0.4 kg	573 T
Eggs	0%	0.4 kg	570 T
Other bakery	0%	0.3 kg	541 T
Biscuits, plain sweet	0%	0.3 kg	539 T
Muffin	0%	0.3 kg	529 T
Courgettes	0%	0.3 kg	527 T
Crackers/crisp breads	0%	0.3 kg	509 T
Taro	0%	0.3 kg	504 T
Grapefruits	0%	0.3 kg	502 T
Lamb/mutton	0%	0.3 kg	500 T
Beetroot	0%	0.3 kg	486 T
Takeaway pizzas	0%	0.3 kg	483 T
Confectionery	0%	0.3 kg	472 T
Fresh fish	0%	0.3 kg	462 T
Other processed meats	0%	0.3 kg	452 T
Pork	0%	0.3 kg	452 T
Herbs/spices	0%	0.3 kg	424 T
Other sauces	0%	0.3 kg	420 T
Coleslaws	0%	0.3 kg	413 T
Silverbeet	0%	0.3 kg	411 T
Nuts	0%	0.3 kg	410 T
Kumara	0%	0.3 kg	389 T
Takeaway Chinese meal	0%	0.2 kg	387 T
Pastry	0%	0.2 kg	378 T
Takeaway Indian meal	0%	0.2 kg	362 T
Stews	0%	0.2 kg	353 T
Mincemeat	0%	0.2 kg	347 T
Pineapples	0%	0.2 kg	344 T
Pet food	0%	0.2 kg	336 T
Apricot	0%	0.2 kg	316 T

Top 100 food types – Avoidable food waste only	Proportion of all avoidable food waste	Kg per household per annum	Tonnes per region per annum
Other drinks	0%	0.2 kg	314 T
Jams	0%	0.2 kg	313 T
Mushrooms	0%	0.2 kg	312 T
Sugar	0%	0.2 kg	311 T
Spinach	0%	0.2 kg	311 T
Chocolate	0%	0.2 kg	311 T
Bacon	0%	0.2 kg	286 T
Fruit loaf and fruit buns	0%	0.2 kg	284 T
Sour cream	0%	0.2 kg	282 T
Other confectionery/snacks	0%	0.2 kg	280 T
Other condiments	0%	0.2 kg	274 T
Scones	0%	0.2 kg	270 T
Cream	0%	0.2 kg	270 T
Dips	0%	0.2 kg	264 T
Potato crisps	0%	0.2 kg	263 T
Crumpets	0%	0.2 kg	259 T
Oats	0%	0.2 kg	256 T
Takeaway other	0%	0.2 kg	255 T
Biscuits, chocolate	0%	0.2 kg	252 T
Oils	0%	0.2 kg	242 T
Milk	0%	0.1 kg	232 T
Other breakfast cereals	0%	0.1 kg	230 T

Appendix 8 – Top potentially avoidable food types

All food types – Potentially avoidable food waste only	Proportion of all potentially avoidable food waste	Kg per household per annum	Tonnes per region per annum
Potatoes	26%	4.5 kg	7,039 T
Gunge	18%	3.2 kg	4,934 T
Mixed vegetables	8%	1.5 kg	2,270 T
Carrots	6%	1.1 kg	1,727 T
White bread	4%	0.8 kg	1,173 T
Mixed grain bread	3%	0.5 kg	846 T
Taro	3%	0.5 kg	830 T
Kumara	3%	0.5 kg	766 T
Apples	3%	0.5 kg	756 T
Pumpkins	3%	0.4 kg	687 T
Silverbeet	2%	0.4 kg	598 T
Poultry	2%	0.3 kg	515 T
Wheatmeal bread	2%	0.3 kg	464 T
Unidentified meat/offal	2%	0.3 kg	462 T
Mixed stone fruits, stewed	1%	0.2 kg	360 T
Celery	1%	0.2 kg	296 T
Broccoli	1%	0.2 kg	282 T
Cabbages	1%	0.1 kg	225 T
Lettuces	1%	0.1 kg	223 T
Pork	1%	0.1 kg	218 T
Bacon	1%	0.1 kg	202 T
Lard	1%	0.1 kg	171 T
Left overs	0%	0.1 kg	124 T
Beef	0%	0.1 kg	115 T
Cucumbers	0%	0.1 kg	104 T
Turnips/swedes	0%	0.1 kg	86 T
Tomatoes	0%	0.1 kg	86 T
Other dried foods	0%	0.1 kg	83 T
Pears	0%	0.1 kg	83 T
Parsnips	0%	0.0 kg	76 T
Mushrooms	0%	0.0 kg	71 T
Oils	0%	0.0 kg	67 T
Courgettes	0%	0.0 kg	65 T
Pies	0%	0.0 kg	61 T

All food types – Potentially avoidable food waste only	Proportion of all potentially avoidable food waste	Kg per household per annum	Tonnes per region per annum
Leeks	0%	0.0 kg	59 T
Potato salad	0%	0.0 kg	53 T
Spinach	0%	0.0 kg	53 T
Spring onions	0%	0.0 kg	45 T
Ham	0%	0.0 kg	41 T
Other raw vegetables	0%	0.0 kg	37 T
Sandwiches - homemade	0%	0.0 kg	34 T
Jewish artichoke	0%	0.0 kg	31 T
Mixed fruit	0%	0.0 kg	30 T
Takeaway pizzas	0%	0.0 kg	27 T
Beetroot	0%	0.0 kg	26 T
Feijoa	0%	0.0 kg	23 T
Fish and chips other, takeaway	0%	0.0 kg	23 T
Bread roll/baguette	0%	0.0 kg	22 T
Bokchoy/chinese cabbage	0%	0.0 kg	22 T
Fresh fish	0%	0.0 kg	19 T
Oranges, mandarins etc.	0%	0.0 kg	15 T
Capsicum	0%	0.0 kg	15 T
Lemons	0%	0.0 kg	14 T
Lamb/mutton	0%	0.0 kg	13 T
Other meat & fish	0%	0.0 kg	11 T
Kiwifruit	0%	0.0 kg	11 T
Aubergines	0%	0.0 kg	9 T
Dessert cakes	0%	0.0 kg	9 T
Kale	0%	0.0 kg	8 T
Avocados	0%	0.0 kg	7 T
Onions	0%	0.0 kg	6 T
Herbs/spices	0%	0.0 kg	6 T
Cake	0%	0.0 kg	6 T
Other	0%	0.0 kg	5 T
World breads (naan, tortilla etc)	0%	0.0 kg	5 T
Other puddings	0%	0.0 kg	4 T
Wheat biscuit cereals	0%	0.0 kg	4 T
Fruit loaf and fruit buns	0%	0.0 kg	3 T
Takeaway chips	0%	0.0 kg	3 T
Peaches	0%	0.0 kg	3 T
Pastry	0%	0.0 kg	2 T
Sandwiches - bought	0%	0.0 kg	2 T
Daikon radish	0%	0.0 kg	2 T
Persimmon	0%	0.0 kg	2 T

All food types – Potentially avoidable food waste only	Proportion of all potentially avoidable food waste	Kg per household per annum	Tonnes per region per annum
Ginger	0%	0.0 kg	1 T
Asparagus	0%	0.0 kg	1 T
Pizzas, homemade	0%	0.0 kg	1 T
Nectarines	0%	0.0 kg	1 T
Peas (all varieties)	0%	0.0 kg	1 T
Yams	0%	0.0 kg	1 T

Appendix 9 – Top non-avoidable food types

All food types – non-avoidable food waste only	Proportion of all non-avoidable food waste	Kg per household per annum	Tonnes per region per annum
Bananas	16%	8.5 kg	13,149 T
Poultry	9%	4.7 kg	7,274 T
Tea/teabags	7%	3.8 kg	5,952 T
Oranges, mandarins etc.	7%	3.4 kg	5,260 T
Unidentifiable/mixed bones	6%	3.2 kg	5,001 T
Eggs	5%	2.3 kg	3,597 T
Lemons	4%	2.0 kg	3,176 T
Sweetcorn/corn on the cob	4%	2.0 kg	3,100 T
Onions	3%	1.6 kg	2,535 T
Broccoli	3%	1.5 kg	2,259 T
Avocados	3%	1.4 kg	2,242 T
Apples	2%	1.1 kg	1,775 T
Melons	2%	1.1 kg	1,688 T
Feijoa	2%	1.0 kg	1,627 T
Fresh fish	2%	1.0 kg	1,610 T
Cabbages	2%	0.8 kg	1,290 T
Pumpkins	1%	0.7 kg	1,111 T
Kiwifruit	1%	0.6 kg	954 T
Pineapples	1%	0.6 kg	868 T
Pork	1%	0.5 kg	813 T
Lamb/mutton	1%	0.5 kg	812 T
Mussels, live	1%	0.5 kg	779 T
Coffee grinds	1%	0.5 kg	768 T
Lettuces	1%	0.5 kg	731 T
Cauliflowers	1%	0.5 kg	729 T
Beef	1%	0.5 kg	700 T
Carrots	1%	0.4 kg	638 T
Leeks	1%	0.4 kg	618 T
Grapefruits	1%	0.3 kg	496 T
Gunge	1%	0.3 kg	481 T
Shell fish (prawns, crab, lobster etc)	1%	0.3 kg	464 T
Other drinks	1%	0.3 kg	423 T
Unidentified meat/offal	1%	0.3 kg	408 T
Mangos	1%	0.3 kg	407 T
Capsicum	0%	0.3 kg	394 T
Mixed vegetables	0%	0.3 kg	393 T

All food types – non-avoidable food waste only	Proportion of all non-avoidable food waste	Kg per household per annum	Tonnes per region per annum
Celery	0%	0.2 kg	334 T
Pears	0%	0.2 kg	325 T
Peaches	0%	0.2 kg	266 T
Nuts	0%	0.2 kg	263 T
Courgettes	0%	0.1 kg	185 T
Other raw vegetables	0%	0.1 kg	165 T
Kumara	0%	0.1 kg	159 T
Apricot	0%	0.1 kg	150 T
Beans (all varieties)	0%	0.1 kg	145 T
Spinach	0%	0.1 kg	145 T
Bokchoy/chinese cabbage	0%	0.1 kg	144 T
Oysters	0%	0.1 kg	143 T
Other fruit	0%	0.1 kg	139 T
Grapes	0%	0.1 kg	135 T
Beetroot	0%	0.1 kg	128 T
Asparagus	0%	0.1 kg	109 T
Spring onions	0%	0.1 kg	108 T
Taro	0%	0.1 kg	106 T
Mixed fruit	0%	0.1 kg	100 T
Other meat & fish	0%	0.1 kg	93 T
Persimmon	0%	0.1 kg	92 T
Coffee capsules	0%	0.1 kg	89 T
Silverbeet	0%	0.1 kg	86 T
Cucumbers	0%	0.1 kg	80 T
Ham	0%	0.1 kg	80 T
Tomatoes	0%	0.1 kg	80 T
Strawberries	0%	0.0 kg	76 T
Tamarillo	0%	0.0 kg	65 T
Peas (all varieties)	0%	0.0 kg	60 T
Aubergines	0%	0.0 kg	59 T
Herbs/spices	0%	0.0 kg	59 T
Parsnips	0%	0.0 kg	57 T
Takeaway chicken	0%	0.0 kg	55 T
Other	0%	0.0 kg	48 T
Milkshake/milk drinks	0%	0.0 kg	48 T
Pomegranates	0%	0.0 kg	45 T
Plums	0%	0.0 kg	44 T
Rhubarb	0%	0.0 kg	42 T
Lamb liver	0%	0.0 kg	41 T
Lard	0%	0.0 kg	41 T

All food types – non-avoidable food waste only	Proportion of all non-avoidable food waste	Kg per household per annum	Tonnes per region per annum
Ribs	0%	0.0 kg	41 T
Limes	0%	0.0 kg	38 T
Passion fruit	0%	0.0 kg	38 T
Stews	0%	0.0 kg	37 T
Fennel	0%	0.0 kg	36 T
Pet food	0%	0.0 kg	33 T
Brussel Sprouts	0%	0.0 kg	32 T
Radish	0%	0.0 kg	31 T
Mince meat	0%	0.0 kg	30 T
Nectarines	0%	0.0 kg	26 T
Garlic	0%	0.0 kg	25 T
Coconut	0%	0.0 kg	22 T
Turnips/swedes	0%	0.0 kg	21 T
Cherries	0%	0.0 kg	20 T
Other condiments	0%	0.0 kg	15 T
Kale	0%	0.0 kg	14 T
Takeaway Indian meal	0%	0.0 kg	14 T
Stonefruits mixed	0%	0.0 kg	12 T
Cheese	0%	0.0 kg	12 T
Mushrooms	0%	0.0 kg	11 T
Left overs	0%	0.0 kg	10 T
Daikon radish	0%	0.0 kg	9 T
Salad dressing	0%	0.0 kg	8 T
Baby food	0%	0.0 kg	7 T

Appendix 10 – Top 10 avoidable food types by cost

Top 10 avoidable food types – by cost	Cost of avoidable food waste type	Proportion of overall cost of avoidable food waste
Leftovers	\$100,507,602	11.5%
Bread	\$51,270,533	5.9%
Poultry	\$40,792,129	4.7%
Beef	\$19,746,155	2.3%
Ham	\$16,238,488	1.9%
Cheese	\$16,189,383	1.9%
Cake	\$15,441,848	1.8%
Herbs/spices	\$15,039,259	1.7%
Takeaway - chips	\$14,358,508	1.6%
World breads (naan, tortilla etc)	\$14,151,350	1.6%