Priority behaviours for interventions to reduce household food waste in Australia

FIGHT FOOD WASTE
Cooperative Research Centre
REDUCE - TRANSFORM - ENGAGE

Australian Government
Department of Industry, Science, Energy and Resources

AusIndustry
Cooperative Research Centres Program

This research was commissioned by the Project Steering Group for the Designing effective interventions to reduce household food waste project within Fight Food Waste Cooperative Research Centre. Project Steering Group members are:

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Published November 2021

Acknowledgements

The work has been supported by the Fight Food Waste Cooperative Research Centre whose activities are funded by the Australian Government's Cooperative Research Centre Program.

Disclaimer

The Fight Food Waste Cooperative Research Centre (CRC) gratefully acknowledges the Australian Government's Cooperative Research Centre Program financial contribution as well as that from participants of this project.

This document should be cited as:

Ananda, J., Karunasena, G.G., and Pearson, D. (2021). Priority behaviours for interventions to reduce household food waste in Australia. Fight Food Waste Cooperative Research Centre, Adelaide. Australia.

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1. Executive summary

This report identifies priority behaviours for interventions to reduce household food waste in Australia. It is part of *"Designing effective interventions to reduce household food waste" (the Household Project)*, a Fight Food Waste Cooperative Research Centre (FFW CRC) research project. The report specifies behaviours linked to high or low food waste, the most wasted household food products, behaviours linked with these wasted products and recommended interventions for the behaviours and products identified.

The study analysed household food waste data collected in the second Work Package of the project, entitled *'Australian household food waste'*. This included data from 2885 surveys, 1462 electronic diaries and 495 kerbside bin audits (Karunasena and Pearson, 2021a). A total of forty (40) behavioural variables (as identified by a team of experts and review of literature) were used for the analysis. This comprised five (5) food planning variables, five (5) food purchasing variables, five (5) storing variables, seven (7) food preparation and consumption variables, ten (10) food disposal variables, five (5) motivation variables and five (5) perception variables on the effort required to change behaviour (referred to as behavioural control variables).

A comprehensive dataset containing product-level food waste, behaviours and socio-demographic variables of respondents was created. Product specific food waste data, from the electronic diary, was matched with behavioural and socio-demographic data, from the survey, using the unique respondent identification code. Data on behavioural variables was collected on a five-point scale. This was consolidated into binary categories to preserve the degrees of freedom for statistical analysis. Similarly, the age, household structure and household income categorical variables were consolidated into fewer categories for a more simplified statistical analysis. The electronic diary contained data on 745 specific products that are commonly wasted in Australian households.

Out of the forty (40) behaviours investigated, twelve (12) variables had a statistically significant correlation with high food waste and six (6) behaviours had a statistically significant correlation with low food waste. These eighteen (18) behaviours were workshopped with a panel of food waste experts, resulting in the selection of seven (7) behaviours to prioritise for the development of household food waste interventions (see Figure 1).

The analysis also identified the top fifteen (15) products (based on dollar value) wasted in households alongside the behaviours and demographic variables that are related to these foods being wasted.

The expert panel identified cooked beef, sliced bread and bread rolls, vegetable salads, banana and cooked rice as the top five (5) most wasted products, and hence could be prioritised for product specific household food waste reduction interventions (see Table 1).

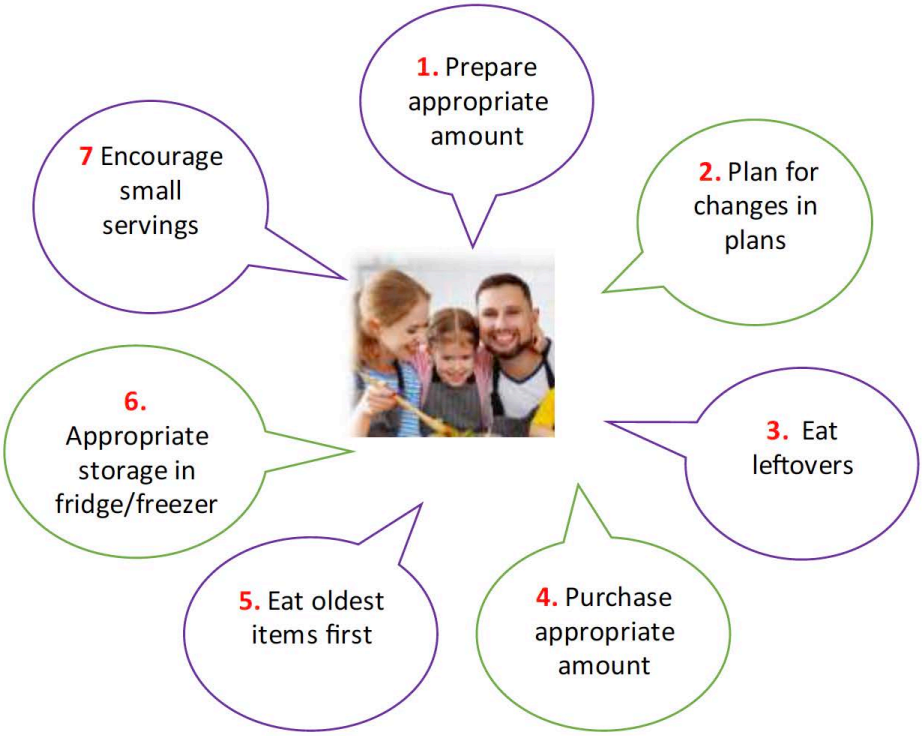


Figure 1: Priority behaviours to focus on for development of household food waste interventions

Table 1: Top 5 products to prioritise for interventions

The following table outlines the key products to prioritize in order to reduce value of household food waste in Australia and behaviours that are driving those products to be wasted.

Top 5 products (Based on dollar value)	**Behaviours contributing to waste and needing to be targeted in interventions**
Beef (cooked)	- Improper use of fridge/freezer for storing the items - Preparing too much food for meals resulting in leftovers which are often disposed of later - Not finishing meals (linked to serving too much food)
Bread slices and roll	- Improper use of fridge/freezer for storing the items - Take-away dining practices
Vegetable salads	- Improper use of fridge/freezer for storing the items

Banana	- Preference to eat fresh
Cooked rice	- Lack of meal planning

2. Introduction

The Australian economy loses $36.6 billion per annum due to food waste. It has been estimated that households account for around 50% of the dollar value of this wasted food (National Food Waste Strategy Feasibility Study, 2021). As such, households are a key focus in the fight against food waste in Australia.

This aim of this research is to identify *'Priority interventions to reduce household food waste in Australia'*. This report addresses this objective by analysing behaviours that lead to high or low food waste, the most wasted food products and their associated behaviours and recommendations for house food waste reduction interventions based on the behaviours and products identified.

3. Background

The Fight Food Waste Cooperative Research Centre (FFW CRC) was established in 2018 to support the Australian government in its efforts to halve food waste by 2030. Within FFW CRC, the "Engage" program provides evidence-based advice to assist in the development of interventions to reduce household food waste.

"Designing effective interventions to reduce household food waste" (the Household Project) is a research project within the "Engage" program. The project provides evidence-based insights through seven (7) Work Packages (WP) covering; food waste behaviours and attitudes of Australian households, quantification of perceived and actual household food waste, advice regarding priority segments, identification of global best practise interventions, household food waste reduction interventions for priority segments, messages for selected intervention and cost-effective methodologies for evaluating the impact of selected interventions.

The Benchmark study (WP1) into Australian's food waste behaviours and attitudes provided the insight that householders underestimate the amount of food waste they produce, and it was deemed

necessary to undertake further research to capture a better household measure of the amount of food waste produced and why it was happening (Fight Food Waste CRC, 2019).

The In-home research (WP2) used three measures of household food waste (Karunasena and Pearson, 2021a). The study started with a self-report food waste survey that asked householders to estimate food waste (Karunasena & Pearson, 2021b), then used an electronic-diary where they recorded food waste over a seven-day period (Karunasena & Pearson, 2021c), and finally, included a physical bin audit (Karunasena & Pearson, 2021e) to measure the food waste found in the bin (matched to the same period as the electronic-diary). The study compared the three food waste records and then, using focus group discussions (Karunasena & Pearson, 2021d), explored the causes of food waste and potential opportunities to reduce it.

The Segmentation research (WP3) used a cluster analysis based on data collected from the three sources in the In-home research (WP2). This identified the *"Profiles of Australian households for food waste reduction interventions"* (Karunasena, Pearson, Borg & Boulet, 2021).

The Best Practice Interventions (WP4) was based on a literature review and interviews with global experts. It identified *"Global best practice for designing interventions to reduce household food waste"* (Karunasena, Pearson & Nabi, 2020).

This report (WP5) builds on data from previous four Work Packages to identify *"Priority behaviours for interventions to reduce household food waste in Australia".* This is achieved by identifying behaviours that are linked with high or low food waste as well as identifying the most wasted food products and behaviours linked with these wasted products. Finally, it provides recommendations for household food waste reduction interventions based on the behaviours and products identified.

4. Methodology

The following steps were followed to identify behaviours that need to be prioritised.

1. Establish a team of experts to guide the research

   The expert panel consisted of:

   - Mark Barthel, Chief Operating Officer, Stop Food Waste Australia

- Laura Christian, Principal Policy Officer, Strategic Policy, Office of Resource Recovery, Department of Environment and Science Queensland
- Emily Dunstan, Manager, Behavioural Insights & Social Research, Sustainability Victoria
- Mark Hilton, Senior Policy Officer, Office of Resource Recovery Environment Policy and Programs, Department of Environment and Science Queensland
- Sam Oakden, Voluntary Agreement Manager, Stop Food Waste Australia
- Jennifer Weston, A/Senior Programs Officer, Waste Avoidance and Resource Recovery, Department of Water and Environmental Regulation Western Australia
- Jessica Wundke, Principal Adviser, Policy and Projects at Green Industries South Australia
- Dr. Gamithri Karunasena, Household Food Waste Project Manager, Fight Food Waste CRC
- Professor David Pearson, Engage Program Leader, Fight Food Waste CRC

2. Identify all behaviours associated with high and low household food waste. From the 40 behaviours investigated in the survey from In-home research (WP2), an ANOVA analysis identified 12 behaviours with a statistically significant correlation to high, and six to low, household food waste amounts.
3. Identify the top 15 products most wasted products in households based on value ($) and weight (kg). This was based on analysis of electronic diary data from In-home research (WP2) which collected information on 745 products.
4. Identify behaviours linked to the top 15 products wasted at home. This was based on analysis of survey (behaviours) and electronic diary (most wasted products) data from In-home research (WP2).
5. Identify behaviours to prioritise for household food waste reductions based on a refined list of behaviours (12 linked to high and six linked to low food waste as well as those linked to top 15 most wasted products) through workshop with experts. Ultimately, five products of focus and seven associated behaviours were identified to prioritise for development of interventions to reduce household food waste.

5. Data analysis

This study utilised data from two different data collection instruments used in In-home research (WP2) (Karunasena & Pearson, 2021).

First the self-report online survey (Karunasena & Pearson, 2021b) which comprised 2804 respondents (81 respondents were removed from actual sample of 2885 as result of data cleaning). This sample is representative of the Australian population in terms of age, gender, and geographic location across the states and territories. The 15-minute online survey was completed by adults who were either mainly or jointly responsible for food management at home and at home at least four nights in the past seven days. Respondents were offered a small monetary payment for their participation.

Second, the same respondents were recruited to complete an electronic diary over four weeks after they had completed the survey. The electronic diary was a custom-built web-based tool where respondents recorded the details food items/meals disposed of over the designated seven-day period. Out of the 2804 who completed the survey, 1426 completed the electronic diary (36 respondents were removed from actual sample of 1462 as result of data cleaning). The dataset contains the food waste details of 745 food items resulting in over 40,000 observations.

Table 2 compares the demographic profiles of the survey and electronic diary respondents with the Australian population. Both samples closely resemble the Australian population for gender, age, and income. The 18–34-year age category was under-represented whilst the 55–74-year-old category was slightly over-represented. The former variation is expected since a considerable number of Australian youths still live at home and hence are unlikely to play a significant role in household food management, which was a requirement for study participation. In terms of household income, there was a slight over-representation in the income category <$1000 for both samples compared to the Australian population.

Table 2: Demographic profiles of the survey and electronic diary samples

Variable	Survey (%) (n = 2804)	Electronic Diary (%) (n = 1426)	Australian population* (%)
Gender			
- Female	62	63	51
- Male	38	37	49

Age group - 18-34 years - 35-54 years - 55-74 years - 75+ years	17 37 39 7	16 38 41 5	31 34 26 9
Household income - <$1000 per week - $1000-1999 per week - $2000-2999 per week - $3000+ per week - Prefer not to say	31 29 15 16 8	28 30 15 19 8	23 28 20 18 11

*Based on the latest Australian Bureau of Statistics Census data 2016.

5.1. Survey measures and data modification for analysis

The survey contained data on respondents' food behaviour across the five components of food provisioning: food planning, purchasing, storage, preparation, and disposal. It also contained data on motivation to reduce food waste, perceived effort to change each of the previously mentioned five components as well as socio-demographic information of respondents. A total of forty behavioural variables were used for the analysis. This comprised five food planning variables, five food purchasing variables, five storing variables, seven food preparation and consumption variables, ten food disposal variables, five motivation variables and five effort perceptions variables. Socio-demographic variables were age, gender, household structure and household income.

Food behaviour variables were measured on a 5-point Likert scale with 1 representing 'Strongly Disagree' and 5 representing 'Strongly Agree'. For example, 'Before going shopping for food, how often do you, or another member of your household, check what food is already in the cupboard?'. The levels of the behavioural variables were re-coded as binary predictors by collapsing to two levels from five levels.. The response levels 'Almost every time', 'Most times' and 'Half the time' were re-coded as respondents depicting the behaviour ('Yes') and 'Never or rarely' and 'Sometimes' were re-

coded as depicting the behaviour in question ('No'). This modification was necessary to sufficient degrees of freedom in the long list of predictor variables. Similarly, the age, household structure and household income categorical variables were also consolidated into fewer categories.

Observations from the electronic diary, which contained the product-level food waste, were matched with the survey dataset using the unique respondent ID code. This created one dataset containing product-level food waste, behaviour and socio-demographic variables of respondents. Since the analysis was based on individual product waste covering 745 specific food items, positive observations for each product category were limited. Therefore, food waste variables were consolidated into binary response categories to preserve the degrees of freedom for statistical analysis. Summary statistics of variables used in the analysis are provided in the Table 3.

Variable	N = 1,462[1]
Top-up shopping	1,143 (78%)
Take-away food ordering	763 (52%)
Meal planning	1,070 (74%)
Write a basic grocery list	1,137 (79%)
Write a complete grocery list	1,154 (79%)
Stick to shopping list	1,012 (71%)
Specials buying	1,182 (81%)
Refrigerate/freeze food	1,377 (94%)
Cook oldest food first	1,393 (95%)
Cook too much	273 (19%)
Store leftovers & dispose later	354 (25%)
Like fresh food	1,273 (88%)
Change of plans	654 (53%)
Do not finish meals	633 (46%)
Effort to change shopping behaviour	
Low	1,075 (74%)
High	373 (26%)
Effort to change storing behaviour	

Low	1,131 (78%)
High	323 (22%)
Effort to change preparation	
Low	1,104 (76%)
High	342 (24%)
Lack of leftover cooking skills	280 (20%)
Cannot use leftover ingredients	287 (20%)
Do not dispose	745 (52%)
Perceived FW avoidance	1,190 (81%)
Age	
<24 years	237 (16%)
25-44 years	552 (38%)
45-64 years	594 (41%)
65+ years	79 (5.4%)
Household structure	
Single	252 (18%)
Unrelated	31 (2.3%)
Couple	450 (33%)
Family	644 (47%)
Household income (A$/week)	
<$500	278 (21%)
500-999	125 (9.3%)
$1000-1549	166 (12%)
$1550-1999	150 (11%)
$2000-2999	313 (23%)
>$3000	310 (23%)
[1] n (%)	

5.2. Analytical approach

To ascertain the most wasted product by monetary value, the quantities of product discarded (electronic dairy) were multiplied by their respective prices. Prices were sourced from the published price list from Woolworths online during November and December 2020. When prices were not available from Woolworths online they were sourced from online price lists of other supermarkets. All prices used in the analysis were based on full price rather than sale price. It should be noted that Woolworths' products tend to be closer to the lower price point.

The top fifteen products wasted (by value) were chosen for behavioural modelling. Accordingly, fifteen separate Tobit regression (Tobin, 1958) models were estimated to evaluate the relationship between the forty behaviours and these top fifteen wasted food products. The quantity of product waste, the dependent variable, used in the analysis was skewed and had many zero values. In such situations, the standard linear regression is inappropriate and yields bias estimates (Eisenberg *et al.,* 2015). Tobit regression is widely used to analyse non-negative continuous variables that are skewed and contain many zero observations.

Understanding zero observations in product waste data is the first step in choosing the analytical strategy. There are many zero values for those households that did not waste a particular product during data collection period. These zero values are true zeros and are not missing values. For example, in the beef steak Tobit regression, 152 households (about 10% of the sample) recorded positive values for beef steak waste. This means 1310 households recorded zero for beef steak waste because these households did not discard beef steak during the data collection period. In this context, the standard regression analysis would lead to biased and inconsistent estimates. It also omits all the observations with zero beef steak waste values and the number of observations in the model would have been reduced to 152 from 1462.

The problem with this approach is that it reduces the estimation efficiency resulting in a small sample size. It can be argued that the resultant regression is a truncated model, and the inferences are made only for the sub-population known to have discarded beef steak waste. However, the issue is that this sub-sample is no longer probabilistic as it should be according to the sample procedure of the survey. Even worse, excluding households that reported no beef steak waste would be equivalent to assuming that these households do not and will not waste beef steak under any circumstances, which does not hold true.

Tobit model uses a similar approach to ' b ' model, a regression model for binary outcomes that uses the concept of a latent variable in its formulation (Boulton and Willliford 2018). In other words, the dependent variable in the Tobit model is not the observed variable (the quantity of product discarded, in our case) but rather a latent variable truncated at zero. Using the Maximum Likelihood

(ML) estimation, the regression equation formulated predicts the latent dependent variable as opposed to the observed dependent variable.

6. Findings

This section presents the main results obtained from the analysis. First, descriptive statistics of the variables analysed are presented. Thereafter, results relevant to the first objective – the top fifteen most wasted products by value and weight are presented. Second, behavioural modelling results linking product waste with household food behaviour are presented. Under this section, Tobit regression results and average marginal effects of Tobit regressions are presented. Finally, based on the preceding analyses, the potential areas for product waste reduction interventions are identified.

6.1. Top 12 behaviours linked to high food waste

An ANOVA analysis conducted on per capita food waste identified the following 12 behaviours (see table 4) corelated to high food waste and top 6 behaviours corelated to low food waste (see table 5)

Table 4: Top 12 behaviours linked to high food waste

Rank	Variable
1	Household food managers **prepare too much food** which is not all eaten, and they dispose of the extra food straight away
2	Household food managers **prepare extra food, store these leftovers** with the intention to be eaten later on, but ends up disposing of them
3	Household food managers **don't cook the meals as they plan**
4	Household food managers don't know how to use cooked **leftovers**
5	Household food managers **buy too much food**
6	Household food managers don't know how to use **leftover uncooked ingredients**
7	Household food managers encounter last minute **change of plans** (Family members don't turn up)
8	Household food managers **buy food for just in case**
9	Household members **do not finish their meals**
10	Household food managers find it **hard to fit food into the fridge/freezer** because it is already full
11	Household food managers are **not sure if food is still safe to eat**

12	Household food managers do not keep food past its **'use by'** or **'best before'** date

*Ranking based on highest to lowest correlation with high food waste

Note: Some of these behaviours are linked and may drive each other.

6.2. Top 6 behaviours linked to low food waste

Rank	Variable
1	Household food managers try to **use up the oldest food first**
2	Household food managers put **food in the refrigerator/freezer** so it keeps for as long as possible
3	Household food managers **check what food is already in the fridge/freezer**
4	Household food managers **move the oldest items to the front or top** so they can used first
5	Household food managers **stick to ingredients**
6	Household food managers **only prepare as much as is needed**

Table 5: Top 6 behaviours linked to low food waste

*Ranking based on highest to lowest correlation with high food waste

6.3. Top 15 most wasted products

The most wasted food products, based on monetary value, are shown in Figure 2. This analysis paints a picture of relative importance of various food items in terms of value lost at the consumption stage. Beef steak (cooked) was the highest value product wasted. Just over one tenth of the sample (n=152) reported beef steak waste during the data collection week. On average, beef steak (cooked) discarded at home yielded a loss of $0.69 per household per week for the whole sample. This was followed by bread roll ($0.48), cheese (both dairy and non-dairy) ($0.39), vegetable salads (raw, fresh) ($0.38) and ham ($0.32). Although our dataset did not contain data on household food expenditure, the literature confirms that a considerable amount of weekly household budget is allocated for purchasing essentials such as milk and dairy products, bread, cereals and meat.

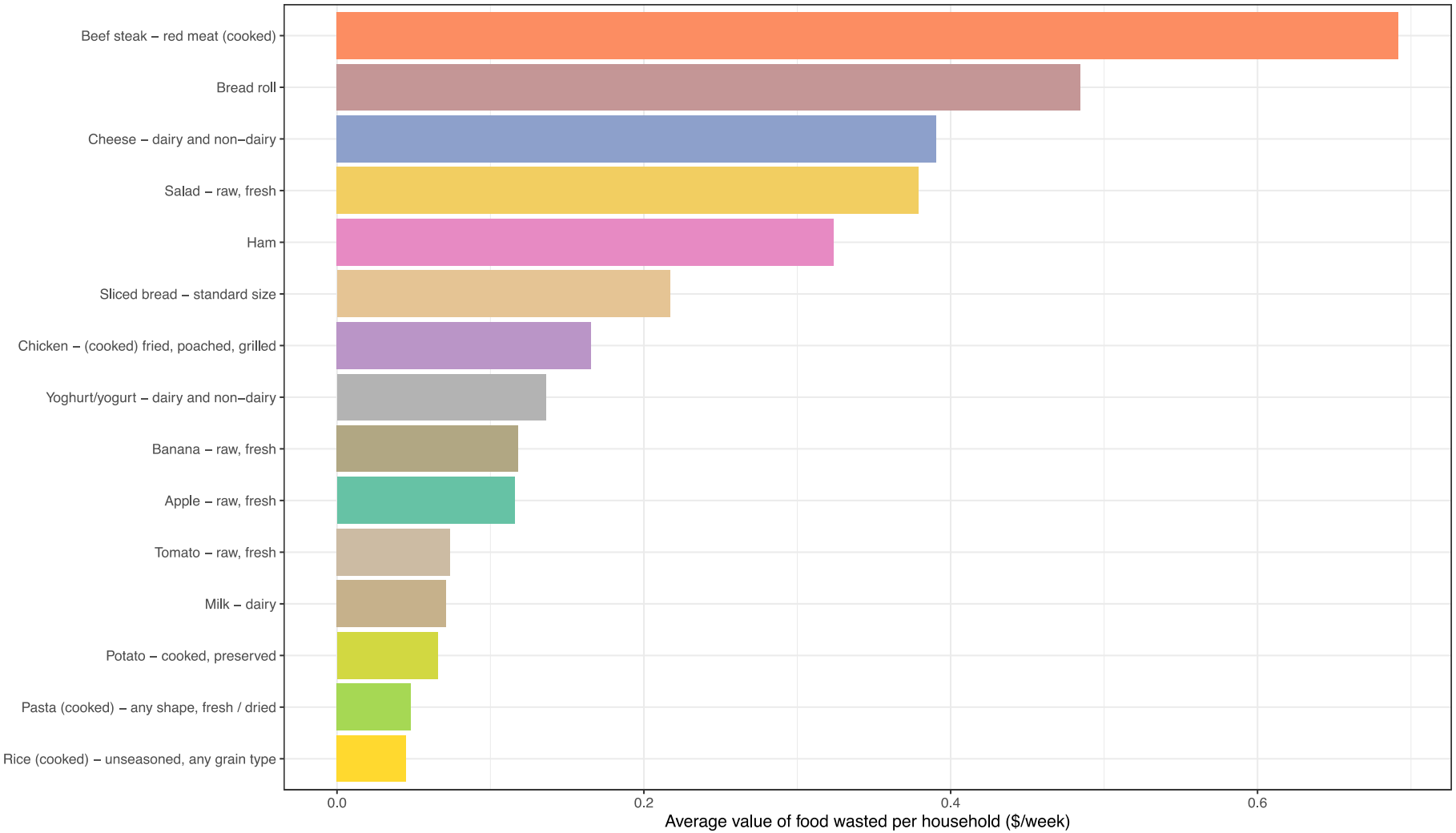


Figure 2: Top 15 wasted food products by monetary value

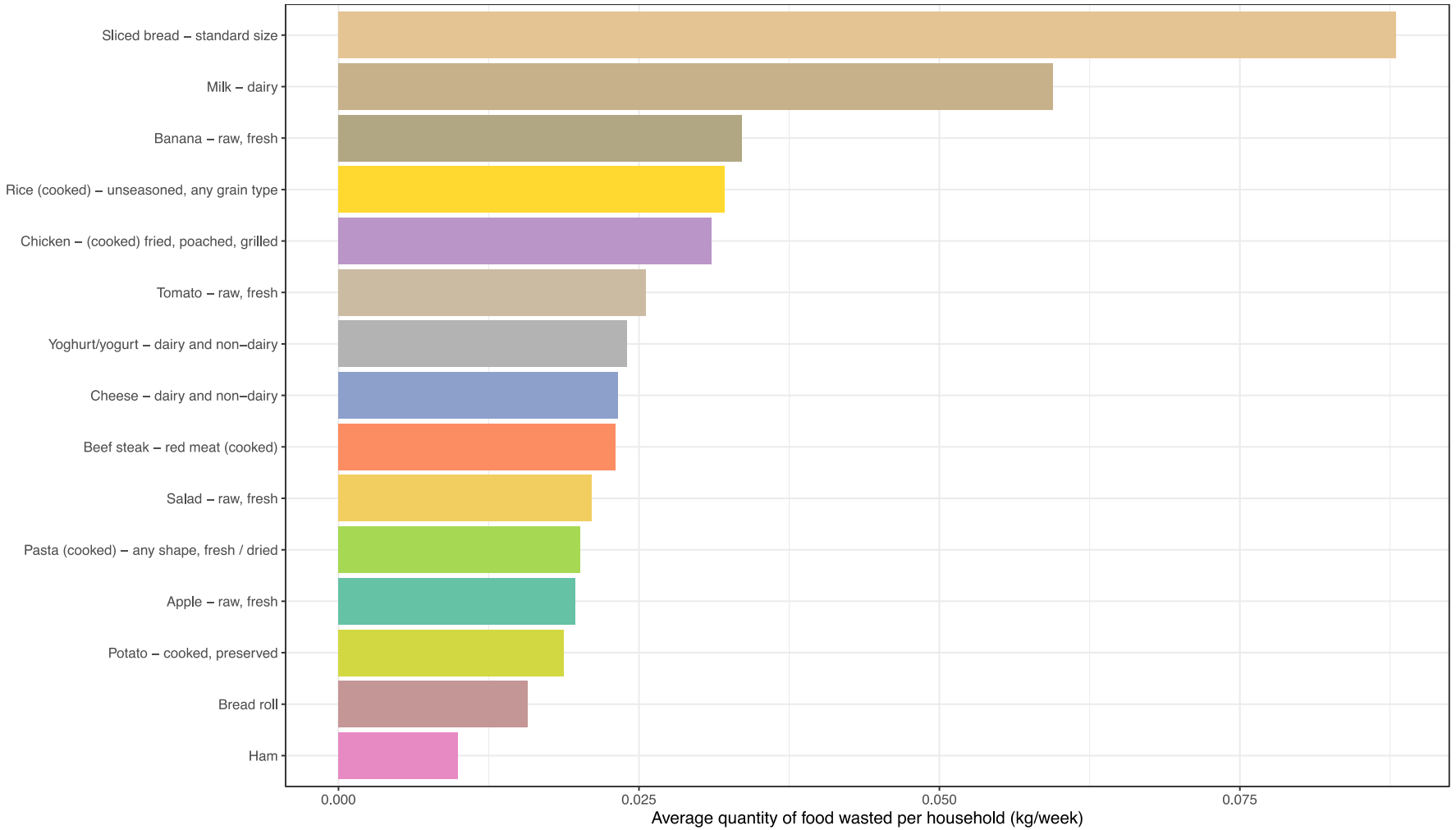


Figure 3: Top 15 food product waste by weight

The most wasted food products, based on weight, are shown in Figure 3. In terms of relative weight of food discarded per week by the average household, bread (0.09 kg), milk (dairy) (0.06 kg), banana (raw, fresh) (0.04 kg), rice (cooked) (0.03 kg) and chicken (cooked) (0.03 kg) were the most wasted items.

6.4. Behaviours leading to wasting the top 15 products

6.4.1. Results of Tobit regressions

The Tobit regression results provide insights on the behaviours linked to household product waste. Fifteen separate Tobit regressions, one for each product, were estimated. One additional Tobit model was estimated for meals waste. A total of forty behavioural variables were tested for all dependent variables with majority of behavioural variables showing statistically significant associations with product waste. A total of three socio-demographic variables, age, household structure and household income were used, and they were significant for certain product waste items.

Table 6 presents the Tobit regression results for fifteen product waste and overall meals waste. It can be seen from Table 6 that different behavioural factors are affecting the waste from the different food products. For example, beef steak model results shown in column 2 of Table 6 indicate that sticking to a list when grocery shopping has a negative influence on beef steak (cooked) waste, which is statistically significant at the 0.05 level. It reduces the likelihood of beef steak (cooked) being wasted. Since adhering to a grocery list would prevent over-purchasing food, it can potentially reduce product waste, particularly red meat in this case.

Among the other behavioural factors: not finishing meals, refrigeration practices, over-preparing food and then disposing ('Store and dispose surplus'), take-away meal ordering and change of plans were also associated with increased amounts of beef steak waste. For bread rolls waste, ordering take-away food and refrigeration practices had a statistically significant effect. Salad waste was linked to household refrigeration practices and not finishing meals. Cheese waste was associated with not finishing meals, buying specials when shopping, not using oldest food first and households who have difficulty with cooking using leftovers. Top-up grocery shopping, not finishing meals and using a basic grocery list variables showed a statistically significant influence on sliced bread being wasted.

Table 6 also shows that family households have a statistically significant relationship with wasting several products. They include bread rolls, chicken, apples, potatoes, and meals. This is not surprising since these food products are closely associated with food preferences of young children.

Interestingly, older age groups were significantly associated with higher beef steak waste. There is evidence that older age groups waste less food overall on average (Koivupuro *et al.* 2012) but our results paint a more nuanced picture based on individual product waste. Three older age groups were also associated with higher amounts of banana waste compared to the reference group, 18-24 years. This provides further evidence that food preferences, and therefore products being wasted, differ among various age groups and household types.

Unsurprisingly, not finishing meals was the most important behavioural factor associated with the greatest number of product discards. Most of the products that were analysed are used in both cooked and uncooked meals. The behaviour of 'not finishing meals' was associated with seven food products (beef steak, ham, cheese, sliced bread, tomato, potatoes, salads) along with overall meals waste as a category. It could be linked to the size of serving and cooking portions, plate size and meal planning. In addition to not finishing cooked meals, incorrect refrigeration practices, excessive food preparation, take-away ordering, and difficulty in using leftovers were among the most common behavioural factors linked to product level food waste.

Table 6: Tobit regression results

Model								
	Beef steak	**Bread rolls**	**Salads**	**Cheese**	**Ham**	**Sliced bread**	**Milk**	**Rice**
(Intercept)	-1.08***	-1.00***	-0.43***	-0.34**	-0.94***	-0.68***	-0.68***	-0.28*
	(0.25)	(0.20)	(0.10)	(0.11)	(0.19)	(0.16)	(0.15)	(0.13)
Sticks to a shopping list: Yes	-0.15*		-0.04					
	(0.06)		(0.03)					
Refrigerates food: Yes	0.46*	0.33*	0.17*					-0.06
	(0.20)	(0.15)	(0.08)					(0.08)
Hard to fit food into the fridge as it is already full: Yes	0.10		0.03					
	(0.06)		(0.03)					
Stores and eats surplus food: Yes	-0.13						0.15	
	(0.07)						(0.08)	
Stores and disposes of surplus food: Yes	0.18**							0.09
	(0.07)							(0.05)
Unsure if food is still safe to eat: Yes	-0.07							
	(0.06)							
Does not dispose food: Yes	-0.13*	-0.12**	-0.10***	-0.08*	-0.07	-0.29***	-0.19**	-0.08*
	(0.06)	(0.05)	(0.03)	(0.04)	(0.05)	(0.07)	(0.07)	(0.04)

Change of plans during the week: Yes	0.13*							-0.04
	(0.06)							(0.04)
Does not finish meals: Yes	0.18**		0.06*	0.11**	0.12*	0.23**	0.08	0.07
	(0.07)		(0.03)	(0.04)	(0.05)	(0.07)	(0.07)	(0.04)
High effort to change food disposal	0.07			-0.06				
	(0.07)			(0.06)				
Buys items using top-up shopping during the week: Yes		0.06	0.04		0.10	-0.02		0.09
		(0.06)	(0.03)		(0.07)	(0.08)		(0.05)
Orders take away food: Yes		0.11*		0.05			0.23**	0.05
		(0.05)		(0.04)			(0.07)	(0.04)
Writes a basic grocery list: Yes		-0.05				0.17*		-0.10
		(0.05)				(0.09)		(0.06)
Reads storing instructions (on packaging/item): Yes			-0.03					
			(0.03)					
Buys too much food: Yes			0.03	0.07				
			(0.03)	(0.04)				
Discards by expiry/use by date: Yes			0.03					
			(0.03)					

Experiences difficulty with cooking/using leftovers: Yes			-0.06	-0.18**				
			(0.05)	(0.06)				
Experiences difficulty using leftover ingredients: Yes			-0.06					
			(0.04)					
Buys specials when shopping: Yes				-0.10*				
				(0.05)				
Cooks oldest foods first: Yes				-0.16*				
				(0.08)				
Exhibits high effort to change food storage practices: High				0.06	0.09	-0.20*		
				(0.06)	(0.05)	(0.09)		
Exhibits high effort to change preparation practices: High				0.10				
				(0.05)				
Moves food items around whilst in storage: Yes					0.08	-0.15	-0.10	
					(0.06)	(0.08)	(0.08)	
Allows food to be self-served: Yes					-0.11*			0.05
					(0.05)			(0.04)
Likes to eat the freshest food: Yes					0.08			

					(0.08)			
Buys items to have 'just-in-case' Yes						0.12		
						(0.07)		
Cooks too much food: Yes						-0.15		
						(0.09)		
Plans meals: Yes								0.11*
								(0.05)
Writes a complete grocery list: Yes								-0.09
								(0.06)
Prepares food as needed: Yes								-0.05
								(0.05)
Exhibits high effort to change shopping practices: High								0.04
								(0.04)
Perceives they are avoiding waste	-0.12	-0.07						
	(0.07)	(0.05)						
Age between 25-44 years	0.07	0.12	-0.01	-0.02	-0.01	0.17	-0.16	-0.01
	(0.08)	(0.07)	(0.04)	(0.06)	(0.07)	(0.10)	(0.09)	(0.05)
Age between 45-64 years	0.22*	0.21**	-0.01	0.02	0.07	0.16	-0.12	-0.04
	(0.09)	(0.08)	(0.04)	(0.06)	(0.08)	(0.10)	(0.09)	(0.06)
Age between 65+ years	0.38**	0.09	-0.04	0.15	0.11	0.38*	-0.22	-0.08

	(0.15)	(0.14)	(0.07)	(0.10)	(0.13)	(0.17)	(0.19)	(0.12)
Household structure: Unrelated		0.12			0.21			
		(0.15)			(0.17)			
Household structure: Couple		-0.00			0.07			
		(0.07)			(0.11)			
Household structure: Family		0.16*			0.11			
		(0.07)			(0.11)			
Household income: $500-999 p.w.	-0.26*	-0.13	-0.01	0.09	0.12	-0.25	-0.06	-0.10
	(0.13)	(0.09)	(0.05)	(0.07)	(0.09)	(0.13)	(0.12)	(0.07)
Household income: $1000-1549 p.w.	0.06	-0.15	0.04	0.00	0.01	0.01	-0.04	0.01
	(0.09)	(0.08)	(0.04)	(0.07)	(0.09)	(0.11)	(0.11)	(0.06)
Household income: $1550-1999 p.w.	0.03	-0.05	0.00	-0.06	-0.01	-0.11	-0.03	0.03
	(0.09)	(0.08)	(0.05)	(0.07)	(0.09)	(0.12)	(0.11)	(0.06)
Household income: $2000-2999 p.w.	-0.10	-0.18**	-0.03	0.03	0.05	-0.23*	-0.34**	-0.24***
	(0.09)	(0.07)	(0.04)	(0.06)	(0.08)	(0.10)	(0.10)	(0.06)
Household income: >$3000 p.w.	-0.08	-0.02	0.01	0.06	0.12	-0.07	-0.02	-0.07
	(0.08)	(0.06)	(0.04)	(0.06)	(0.07)	(0.10)	(0.10)	(0.06)
logSigma	-0.69***	-0.79***	-1.27***	-0.90***	-1.05***	-0.20***	-0.28***	-0.92***

	(0.08)	(0.07)	(0.06)	(0.06)	(0.11)	(0.05)	(0.06)	(0.06)
AIC	592.66	690.56	651.52	733.17	368.32	1378.62	1106.19	709.52
BIC	696.35	787.74	757.37	834.83	467.49	1470.01	1182.84	822.56
Log Likelihood	-275.33	-326.28	-304.76	-346.58	-164.16	-671.31	-538.10	-331.76
Num. obs.	1030	1230	1142	1192	1052	1185	1224	1007
$^{***}p < 0.001$; $^{**}p < 0.01$; $^{*}p < 0.05$; Standard errors are in parenthesis								

Table 6: Tobit regression results contd.

Model								
	Yoghurt	**Banana**	**Tomato**	**Chicken**	**Pasta**	**Apple**	**Potato**	**Meals**
(Intercept)	-1.00***	-0.44***	-0.19**	-0.52***	-0.61***	-0.41***	-0.55***	
	(0.22)	(0.07)	(0.06)	(0.11)	(0.13)	(0.09)	(0.12)	
Buys item during the week using top-up shopping trips	0.11			0.04		0.04		
	(0.08)			(0.04)		(0.03)		
Checks what items are already in pantry/fridge/freezer (Inventory check)	-0.12							

	(0.09)							
Refrigerates food	0.23			0.05	0.20*	-0.09*		
	(0.15)			(0.06)	(0.09)	(0.04)		
Prepares food only as needed	-0.13						-0.08	
	(0.07)						(0.05)	
Cooks more food than required for the meal, and then stores and eats surplus	0.10			0.05				
	(0.08)			(0.04)				
Cooks more food than required for the meal, then stores and disposes of surplus.	-0.05		-0.06*			0.06*		
	(0.07)		(0.03)			(0.03)		
Allows food to be self-served	0.17**				-0.03	0.03		
	(0.06)				(0.03)	(0.03)		
Does not dispose of food	-0.14*	-0.04	-0.06**	-0.14***	-0.10**		-0.10*	
	(0.06)	(0.02)	(0.02)	(0.03)	(0.03)		(0.04)	
Discards items by expiry/use by date	0.07	0.04	-0.04	0.05		0.03		
	(0.06)	(0.02)	(0.02)	(0.03)		(0.03)		
Exhibits high effort to change food planning practices	0.10		-0.03	-0.05	0.02	0.04		
	(0.07)		(0.03)	(0.04)	(0.03)	(0.03)		

Exhibits high effort to change shopping practices	0.12			0.04				
	(0.07)			(0.04)				
Buys too much food		0.04		0.06				
		(0.02)		(0.03)				
Likes to eat the freshest food		0.08*	0.07*					
		(0.04)	(0.03)					
Does not finish meals		0.02	-0.00	0.04			0.09*	
		(0.03)	(0.02)	(0.03)			(0.05)	
Buys items to have 'just-in-case'		0.02						
		(0.02)						
Sticks to a shopping list			-0.07**	-0.03		0.02		
			(0.02)	(0.03)		(0.03)		
Unsure if food is still safe to eat: Yes			0.01	-0.05		0.02		
			(0.02)	(0.03)		(0.03)		
Changes plans			-0.03					
			(0.02)					
Experiences difficulty in cooking and using leftovers			-0.09*			-0.09*		
			(0.04)			(0.03)		

Exhibits high effort to change preparation practices			0.05			0.05		
			(0.03)			(0.03)		
Exhibits high effort to change food disposal practices			-0.04	0.04		-0.03		
			(0.03)	(0.04)		(0.03)		
Perceives themselves to be avoiding waste			0.04			-0.06*		
			(0.03)			(0.03)		
Orders take-away food				0.03	0.14***	0.02		
				(0.03)	(0.03)	(0.03)		
Sticks to recipe ingredients				0.03	0.08			
				(0.04)	(0.04)			
Plans meals					0.05			
					(0.04)			
Reads storing instructions on packaging/items					-0.04	0.05	-0.02	
					(0.03)	(0.03)	(0.04)	
Moves food items around whilst in storage					-0.05		-0.07	
					(0.04)		(0.05)	
Hard to fit food into the fridge as it is already full: Yes					-0.02			

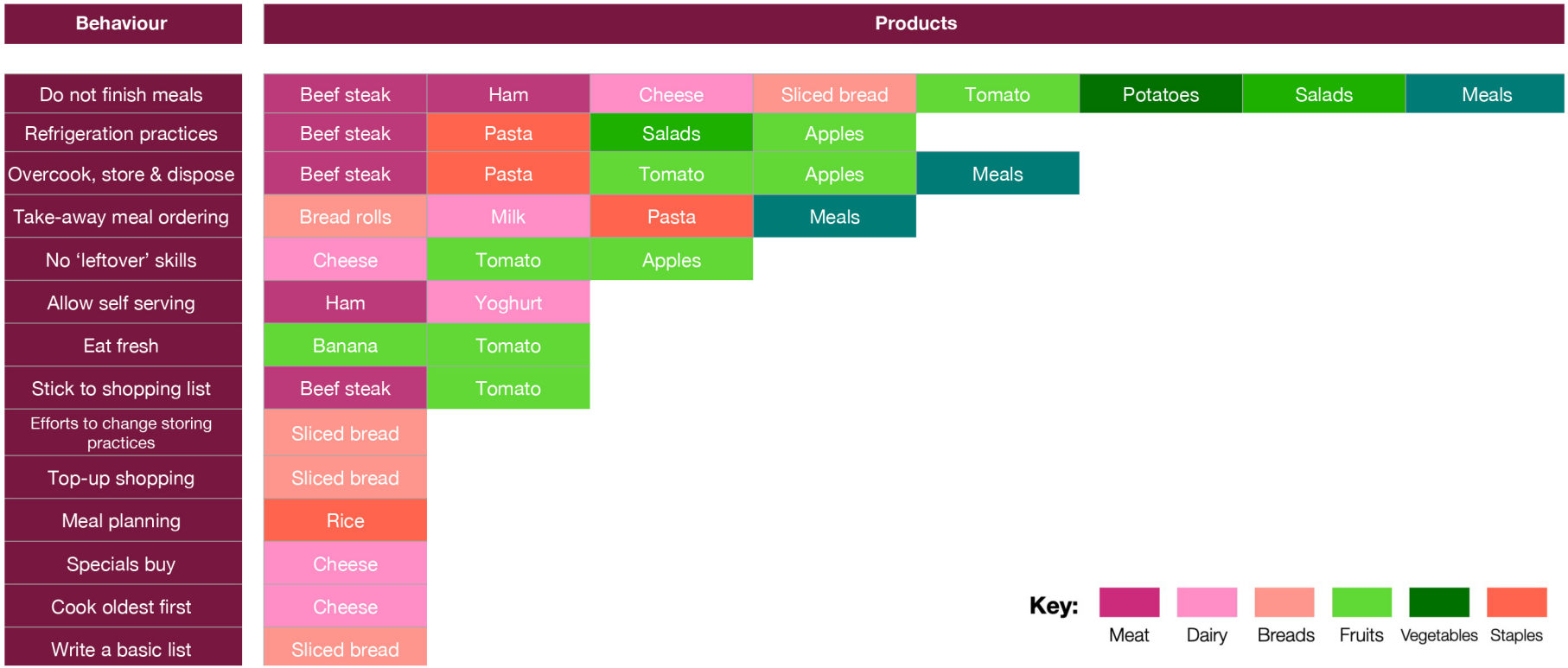
					(0.03)			
Writes a basic grocery list						0.03		
						(0.03)		
Writes a complete/detailed grocery list							-0.06	
							(0.05)	
Experiences difficulty in using leftover ingredients							-0.13*	
							(0.06)	
Age: 25-44 years	0.06	0.12**	0.03	-0.00	0.09*	-0.01	0.07	
	(0.08)	(0.04)	(0.03)	(0.04)	(0.04)	(0.03)	(0.07)	
Age: 45-64 years	0.06	0.15***	0.05	0.00	0.04	-0.00	0.10	
	(0.09)	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.07)	
Age: 65+ years	0.13	0.16**	0.07	0.02	0.16	-0.01	0.16	
	(0.15)	(0.06)	(0.05)	(0.08)	(0.08)	(0.07)	(0.11)	
Household structure: Unrelated		0.06		0.02	0.04	0.02	0.12	
		(0.08)		(0.11)	(0.10)	(0.09)	(0.16)	
Household structure: Couple		-0.04		0.08	-0.10	-0.00	0.12	
		(0.04)		(0.05)	(0.06)	(0.05)	(0.07)	
Household structure: Family		0.02		0.14*	0.06	0.11*	0.23**	
		(0.04)		(0.05)	(0.06)	(0.05)	(0.08)	
Household income: $500-999 p.w.	-0.02	0.03	0.06	0.06	0.02	0.09*	0.06	

	(0.10)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.07)	
Household income: $1000-1549 p.w.	-0.02	0.03	0.04	-0.01	0.00	0.06	-0.05	
	(0.09)	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.07)	
Household income: $1550-1999 p.w.	0.03	-0.05	-0.00	-0.02	-0.01	0.08	0.03	
	(0.09)	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.07)	
Household income: $2000-2999 p.w.	-0.17*	-0.06	0.03	-0.05	-0.15**	0.02	-0.05	
	(0.09)	(0.04)	(0.03)	(0.04)	(0.05)	(0.04)	(0.07)	
Household income: >$3000 p.w.	-0.09	0.00	0.01	0.01	-0.01	0.09*	0.07	
	(0.09)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)	(0.06)	
logSigma	-0.65***	-1.31***	-1.43***	-1.18***	-1.26***	-1.43***	-0.98***	
	(0.08)	(0.05)	(0.05)	(0.06)	(0.07)	(0.06)	(0.08)	
AIC	640.58	747.10	592.61	693.64	530.94	542.56	549.57	
BIC	746.08	842.79	706.08	827.80	645.01	680.08	650.29	
Log Likelihood	-299.29	-354.55	-273.31	-319.82	-242.47	-243.28	-254.78	
Num. obs.	1123	1137	1026	1063	1053	1004	1137	
***p < 0.001; **p < 0.01; *p < 0.05; Standard errors are in parenthesis								

6.4.2. Most common food behaviours associated with product waste

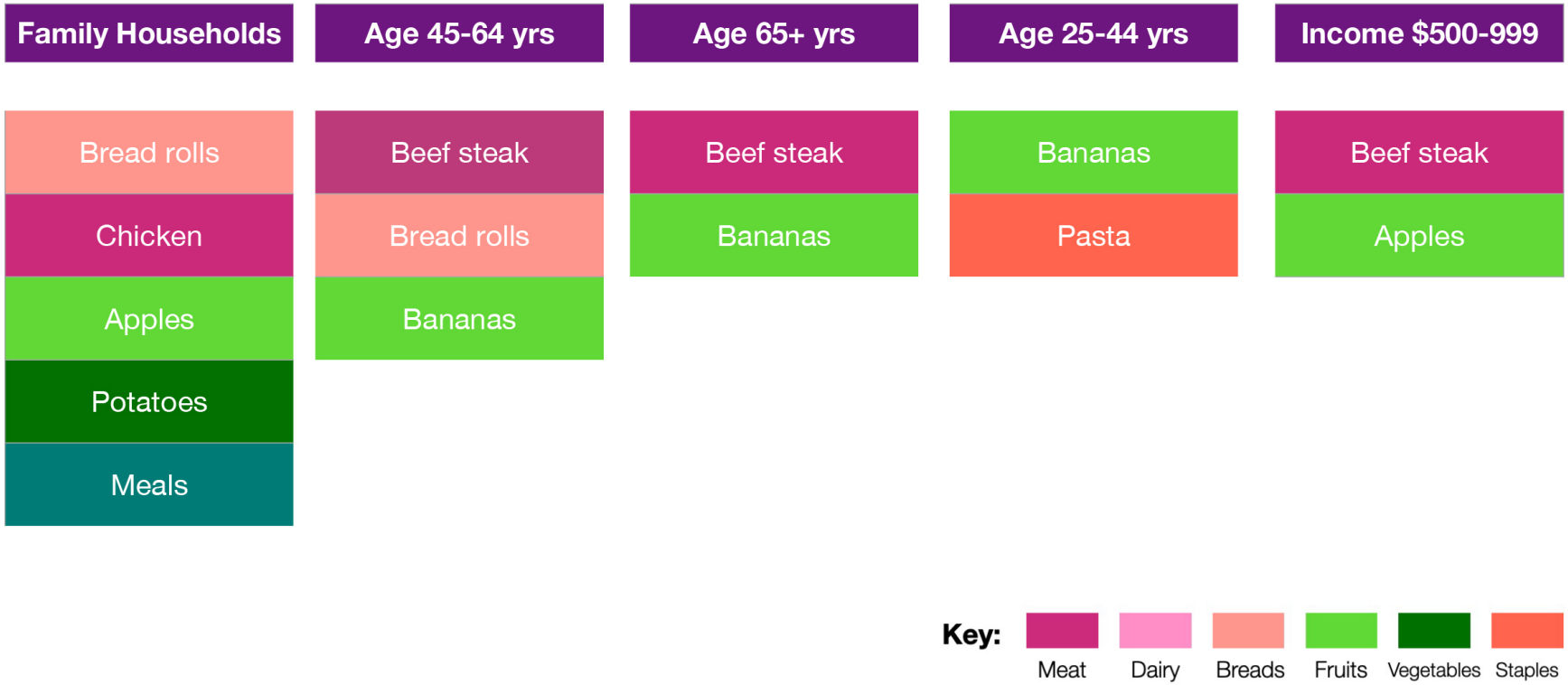
Figure 4 summarises the behaviour-product waste segmentation. The most common behaviour variables with a statistical significance < 0.05 level are shown. The first column depicts behavioural variables, and the right-hand side of the figure shows the individual products that showed a statistically significant relationship with the corresponding behavioural variables.

Figure 5 summarises the product waste by socio-demographic variables. Family households showed a statistically significant association with bread rolls, chicken, apple and potato waste and meals overall whilst age groups 45-64 years and 65+ years were associated with higher amounts of beef steak waste and banana waste.



Note: Only behavioural variables with < 0.05 level statistical significance are shown

Figure 4: Behaviour – product segmentation summary



Note: Only behavioural variables with < 0.05 level statistical significance are shown

Figure 5: Socio-demographic – product waste segmentation summary

6.5. Product waste effect sizes - Average marginal effects

Product waste effect sizes in terms of food behaviour and socio-demographic variables were estimated from Tobit regressions. Tobit regression includes all observations, which allows the estimation of both the quantity responses of those who actively discard, say beef steak for example, and the quantity responses resulting from the changes in the probability of discarding beef steak from zero to a positive value. Therefore, the Tobit coefficient provides the effect on the latent dependent variable (incorporating both the observed and unobserved beef steak waste) to a unit change in any independent variable. However, in our case, we are interested in the observed **average** beef steak waste for the whole sample not just for a sub-sample which may not be probabilistic. This is particularly important as we want to extrapolate the results to a national level. Therefore, average marginal effects (AME), which are more robust and cover the entire sample, were estimated.

Table 7 presents the estimated AMEs for fifteen wasted food products and meal waste. Overall, AMEs estimated were of smaller magnitude. This is expected as the analysis was conducted at a product level and food product quantities were chosen from a list of 745 individual products. In beef steak Tobit regression, 'overcooking, storing and disposing the surplus later' was found to have a statistically significant effect on beef steak waste. The average marginal effect coefficient was 0.014 for those households who overcook, store, and dispose the surplus food later. This implies that, holding all other variables at their mean, households who display this behaviour waste 14g of beef steak (cooked) per week on average than households who do not overcook, store, and dispose surplus food later.

Table 7: Results of the Tobit regressions - Average Marginal Effects (AME)*

Variable/Tobit Model	Beefsteak	Bread rolls	Cheese	Salads	Ham	Sliced bread	Milk	Rice
Top-up shopping						-0.007		
Take- away food ordering		0.010					0.034	
Meal planning								0.016
Write a basic grocery list						0.034		
Sticking to the shopping list	-0.012							
Specials buying			-0.012					
Refrigerate food	0.037	0.029		0.022				
Cook oldest food first			-0.019					
Cook too much food								
Overcook, store and dispose surplus	0.014							
Allow self-serve					-0.005			
Do not dispose	-0.011	-0.011	-0.010	-0.014		-0.058	-0.029	-0.001
Like to eat the freshest food								
Change of plans	0.010							
Do not finish meals	0.014		0.013	0.009	0.005	0.045		
Difficulty in leftover cooking			-0.021					
Difficulty in leftover ingredients								
Effort to change storing behaviour						-0.039		

Perceived avoidance of waste								
Age: 25-44 years								
Age: 45-64 years	0.017	0.019						
Age: 65+ years	0.031							
Household structure: Family		0.015						
No. of income earners		-0.016						
Household income: $500-999 p.w.	-0.021							
Household income: $2000-2999 p.w.						-0.045	-0.05	-0.034

Note: * <0.05 level

Table 7 contd.

Variable/Tobit Model	Yoghurt	Banana	Tomato	Chicken	Pasta	Apple	Potato	Meals
Top-up shopping								
Take away food ordering					0.014			0.109
Meal planning								
Write a basic grocery list								
Sticking to the shopping list			-0.014					
Specials buying								
Refrigerate food					0.021	-0.013		
Fridge full								
Cook oldest food first								

Cook too much food								0.149
Overcook, store and dispose surplus			-0.012		-0.01	0.009		
Allow self-serve	0.014							
Do not dispose food	-0.012			-0.022			-0.008	
Like to eat the freshest food		0.016	0.014					
Change of plans								
Do not finish meals			-0.006				0.007	0.156
Difficulty in leftover cooking			-0.017			-0.013		
Difficulty in using leftover ingredients							-0.011	
Perceived avoidance of food waste						-0.009		-0.086
Age: 25-44 years		0.023			0.009			
Age: 45-64 years		0.03						
Age: 65+ years		0.033						
Household structure: Family				0.022		0.016	0.018	0.164
Household income: $500-999 p.w.						0.014		
Household income: $2000-2999 p.w.					-0.016	0.013		

6.6. Product Waste Intervention Potential (PWIP)

Average marginal effect sizes of Tobit regressions were used to construct a Product Waste Intervention Potential rating and ranking scheme. Product waste was classified as 'High' if the AME is **greater than 15g/household/week** and 'Low' if the AME is **less than 15g/household/week**. This rating scheme was developed to identify the most promising behavioural and socio-demographic variables to target for interventions and the ranking of variables enabled prioritising of the product waste reduction interventions. Table 8 shows the PWIP ranking for beef steak.

Table 8: Potential product waste reduction in response to intervention: beef steak

	Intervention Type	Ranking based on potential average reduction per household	Product Waste Intervention Potential (PWIP)
★	Food storing: Refrigeration practices	1	High
	Food preparation: Over-preparing food	4	Low
	Food disposal: Not finishing meals	4	Low
	Food purchasing: Sticking to the shopping list	5	Low
	Food preparation - 'change of plans'	6	Low
★	Interventions targeting 45-64 year olds	3	High
★	Interventions targeting 65+ year olds	2	High

Note: the star refers to the areas of interventions with highest potential product waste reduction

Table 9: Potential product waste reduction in response to intervention: bread roll

Intervention Type	Ranking based on the potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Food storing: Refrigeration practices	1	High
Dining: Take-away dining practices	4	Low
★ Interventions targeting 45-64 year olds	2	High
Interventions targeting Family households	3	Low

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 10: Potential product waste reduction in response to intervention: salads

Intervention Type	Ranking based on Potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Food storing: refrigeration practices	1	High
Food disposal: Not finishing meals	2	Low

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 11: Potential product waste reduction in response to intervention: rice (cooked)

Intervention Type	Ranking based on the potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Food planning: Meal planning	1	High

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 12: Potential product waste reduction in response to intervention: banana

Intervention Type	Ranking based on the Potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Food disposal: Like to eat fresh	3	High
★ Interventions targeting aged 25-44 yrs	2	High
★ Interventions targeting aged 45-64 yrs	3	High
★ Interventions targeting aged 65+ yrs	1	High

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 13: Potential product waste reduction in response to intervention: sliced-bread

Intervention Type	Ranking based on the Potential average reduction per household	Product Waste Intervention Potential (PWIP)
Shopping behaviour: 'Top-up' grocery buying	2	Low
Food disposal: Not finishing meals	3	Low
★ Interventions targeting 25-44 year olds	1	High

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 14: Potential product waste reduction in response to intervention: cheese

Intervention Type	Ranking based on Potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Food preparation: Leftover cooking skills	1	High
Food disposal: Not finishing meals	2	Low
Food purchasing: 'Specials' buying	3	Low

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 15: Potential product waste reduction in response to intervention: chicken

Intervention Type	Ranking based on the Potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Interventions targeting family households	1	High

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 16: Potential product waste reduction in response to intervention: tomato (raw)

Intervention Type	Ranking based on the Potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Food disposal: Leftover cooking skills	1	High
Food purchasing: Sticking to shopping list	2	Low
Food disposal: Like to eat fresh	2	Low
Food preparation: Over-preparing food	4	Low
Food disposal: Not finishing meals	5	Low

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 17: Potential product waste reduction in response to intervention: pasta (cooked)

Intervention Type	Ranking based on the potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Food storing: Refrigeration practices	1	High
Dining: Take -away dining practices	2	Low
Interventions targeting 25-44 year olds	3	Low

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 18: Potential product waste reduction in response to intervention: potato (cooked, preserved)

Intervention Type	Ranking based on the potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Interventions targeting family households	1	High
Food disposal: Not finishing meals	2	Low

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 19: Potential product waste reduction in response to intervention: apples

Intervention Type	Ranking based on the Potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Interventions targeting family households	1	High
Interventions to enhance behaviour control	2	Low

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 20: Potential product waste reduction in response to intervention: meals

Intervention Type	Ranking based on the Potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Food disposal: Not finishing meals	2	High
★ Food preparation: Over-preparing food	3	High
★ Dining: Take-away dining practices	4	High
★ Interventions to enhance behaviour control	5	High
★ Interventions targeting family households	1	High

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 21: Potential product waste reduction in response to intervention: milk

Intervention Type	Ranking based on the potential average reduction per household	Product Waste Intervention Potential (PWIP)
★ Dining: Take-away dining practices	1	High

Note: The star refers to the areas of interventions with highest potential product waste reduction

Table 22: Potential product waste reduction in response to intervention: yogurt and non-dairy

Intervention Type	Ranking based on the potential average reduction per household	Product Waste Intervention Potential (PWIP)
Food serving: Allow self-serving of food	1	Low

It should be noted that both the PWIP rating and ranking schemes were based on effect sizes (AMEs) and do not consider the type and effectiveness of the intervention and its diffusion rates within the community. However, this provides a useful starting point when designing waste reduction interventions focussing on specific products.

7. Priorities for Interventions

This section presents the areas identified for prioritization by the expert panel, to reduce household food waste in Australia. It also captures potential interventions and stakeholders who could take up these interventions.

7.1. Priority #01

Ensure all Australians are aware of the amount of food waste emerging from households and its negative impacts.

Australians currently do not realise how much food they are wasting each week. This makes it less likely they will be motivated to change their behaviour because they do not see a need to change their practices. Bringing their attention to the amounts they waste has the potential to create engagement and drive motivation to change.

7.1.1. Priority level:

This is a **High** priority for Australia.

7.1.2. Example interventions:

A communication campaign that raises awareness about amount and negative impact of household food waste alongside suggesting simple behaviour(s) they could adopt to reduce it in their homes.

7.1.3. Potential stakeholders recommended to take up the intervention:

This awareness campaign would benefit from being implemented by a collaboration with a wide range of stakeholders. This would assist in providing consistency, amplification and repetition of the message.

- Federal government
- State and territory governments
- Local governments
- Supermarkets
- Manufacturers with consumer-focused brands
- Other interested stakeholder from industry and for purpose sector

7.2. Priority #02

7.2.1. Target behaviour: Meal planning

a) Household manager thinks of how many meals needed to be cooked
b) Household manager checks how many people will be at home/away from home during the week to eat the meals cooked
c) Household managers makes a meal plan for three/four days and leave the rest of the days to take outs, deliveries or to eat leftovers resulting from unexpected events.
d) Household manager makes sure to cook meals that were planned

7.2.2. Priority level:

This is a **High** priority intervention for Australia

7.2.3. Example interventions:

a) Develop and encourage use through education.
b) Introduce a meal planning Apps/ ready made meal plans to choose from

7.2.4. Potential stakeholders recommended to take up the intervention:

a) Federal government
b) State and territory governments
c) Local governments
d) Supermarkets

7.3. Priority #03

7.3.1. Target behaviour: Create a shopping list

e) Household manager/food purchaser writes a weekly shopping list based on their planned meals before going to the shops.
f) Household manager/food purchaser looks in their cupboards and fridge to check supplies available before writing a list.

7.3.2. Priority level:

This is a **Medium** priority intervention for Australia

7.3.3. Example interventions:

c) Develop and encourage use through education.
d) Make list-writing simple and convenient for people through the use of Paper/Web/App based shopping list creators and templates

7.3.4. Potential stakeholders recommended to take up the intervention:

e) Federal government
f) State and territory governments
g) Local governments
h) Supermarkets
i) Manufacturers with consumer-focused brands
j) Other interested stakeholder from industry and for purpose sector

7.4. Priority #04

7.4.1. Target behaviour: Use the shopping list

Household manager/food purchaser buys **only** the items on their shopping list when at the supermarket/shops

7.4.2. Priority level:

This is a **High** priority intervention for Australia

7.4.3. Example interventions:

a) Encourage through education (e.g. Communication campaign/App)
b) Showcasing others already doing this behaviour (use of social norms)

c) Shopping when not hungry to reduce the likelihood of impulse purchasing

7.4.4. Potential stakeholders recommended to take up the intervention:

This intervention needs to be implemented in collaboration with:

a) Federal government
b) State and territory governments
c) Local governments
d) Supermarkets
e) Manufacturers with consumer-focused brands
f) Other interested stakeholder from industry and for purpose sector

7.5. Priority #05

7.5.1. Target behaviour: Ensure leftovers are eaten

a) Householders label their leftovers with an 'Eat by' date when storing them
b) Householders store their cooked leftovers in fridge/freezer and eat them before they go off
c) Householders eat leftover ingredients before they go off

7.5.2. Priority level:

This is a **High** priority intervention for Australia

7.5.3. Example interventions:

a) Develop and encourage use through education
b) Provide content via Web or App, such as recipes that could use leftover ingredients or cooked leftovers
c) Showcase recipes for common ingredients and meals and use notable and well-known food celebrities to demonstrate these recipes
d) Leftover containers with 'Eat by' date labeling

7.5.4. Potential stakeholders recommended to take up the intervention:

a) Federal government
b) State and territory governments
c) Local governments
d) Supermarkets
e) Manufacturers with consumer-focused brands
f) Other interested stakeholder from industry and for purpose sector

7.6. Priority #06

7.6.1. Target behaviour: optimal storage

Householders store products correctly to optimize and extend product life

7.6.2. Priority level:

This is a **high** priority intervention for Australia

7.6.3. Example interventions:

a) Encourage use of fridge and freezer through education

b) Provide information on how to store all products correctly.
c) Smart fridges which help households to keep a track of stored food.

7.6.4. Potential stakeholders recommended to take up the intervention:

a) Federal government
b) State Governments
c) Supermarkets
d) Industry players

7.7. Priority #07

7.7.1. Target behaviour: reduce plate waste

Encourage small servings at each meal, but with the opportunity to have a second helping

7.7.2. Priority level

This is a **high** priority intervention for Australia

7.7.3. Example interventions:

a) Encourage use through education
b) Plate size prompts – have households use smaller plates to restrict the amount that can be given as a portion
c) Have household members serve themselves at each mealtime
d) Products sold at retailers to make the serving size more salient and relatable to consumers

7.7.4. Potential stakeholders recommended to take up the intervention:

a) Federal government
b) State Governments
c) Supermarkets

7.8. Priority #08

7.8.1. Target behaviour: eat oldest items first

Householders label a shelf within their fridge as “Use me first” and store items on this shelf that need to be eaten sooner.

7.8.2. Priority level:

This is a **high** priority intervention for Australia

7.8.3. Example interventions:

a) Provide a product (eg. Use-me box, a tag to demarcate the “Use me first’ area in the fridge) and encourage use of a "USE ME" shelf/container in fridge and pantry.
b) Provide labels for consumers to put on containers and products that say ‘Use me’ or ‘Date purchased’

7.8.4. Potential stakeholders recommended to take up the intervention:

a) Federal government
b) State Governments

c) Supermarkets
d) Industry players who could supply or sponsor the product

7.9. Priority #09

7.9.1. Target behaviour: prepare the appropriate amount

Householders cook the correct quantities of food needed and avoid preparing extra food

7.9.2. Priority level:

This is a **high** priority intervention for Australia

7.9.3. Example interventions:

a) Portion calculators and associated cups/scales to measure the serving size.
b) Products make serving amounts more salient and visible on packaging – "This will feed two adults"
c) Encouraging to check hunger levels before cooking

7.9.4. Potential stake holders recommended to take up the intervention:

a) Federal government
b) State Governments
c) Supermarkets
d) Industry players who could supply or sponsor the products

7.10. Priority #10

7.10.1. Target behaviour: plan to eat-up leftovers

Households plan for a "leftover day" when making their meal plans as part of their weekly meals.

7.10.2. Priority level:

This is a **high** priority intervention for Australia

7.10.3. Example interventions:

a) Encourage use through education
b) Use goal-setting and implementation intentions to prompt households to nominate a day ahead of time that will be 'leftovers only'
c) Use public commitments and prompts in the household by making the leftover day prominent

7.10.4. Potential stakeholders recommended to take up the intervention:

a) Federal government
b) State Governments
c) Supermarkets

7.11. Priority #11

7.11.1. Target behaviour: Accurate knowledge, and use of, use by and best before dates

a) Householder checks quality of food with a use-by date before throwing it away.

7.11.2. Priority level:

This is a **low** priority intervention for Australia

7.11.3. Example interventions:

a) Encourage use through education
b) Use rules-of-thumb to help consumers know when to chuck and when to keep an item
c) Place coloured stickers/labels on items that are approaching their use-by date within the week

7.11.4. Potential stakeholders recommended to take up the intervention:

a) Federal government
b) State Governments
c) Supermarkets

The following table summarises the behaviours that need to be prioritised and interventions to reduce household food waste.

Table 23: Behaviours and intervention to prioritise and stakeholders recommended to drive interventions

Target behaviours and areas of focus	Potential interventions	Federal government	State/Territory governments	Supermarkets
1. General awareness creation to build the understanding that we are currently wasting food and drive motivation to reduce this.	A communication campaign	**x**	**x**	**x**
2. Household manager thinks of how many meals needed to be cooked Household manager checks how many people will be at home/away from home during the week to eat the meals cooked Household manager makes a meal plan for three/four days and leave the rest of the days to take outs, deliveries or to eat leftovers resulting from unexpected events. Household manager makes sure to cook meals that were planned	Encourage use through education Introduce a meal planning Apps/ readymade meal plans to choose from	Collaborative	Collaborative	Collaborative
3. Household manager/food purchaser writes a shopping list weekly based on their planned meals before going to the shops. Household manager/food purchaser looks in their cupboards and fridge to check supplies available before writing a list.	Paper/Web/App based portion calculator Paper/Web/App based shopping lists	Collaborative	Collaborative	Collaborative
4. Household manager/food purchaser buys only the items on their shopping list when at the supermarket/shops	Encourage through education (e.g. Communication campaign/App)	**x**	**x**	
5. Ensure leftovers are eaten d) Householders label their leftovers with an 'Eat by' date when storing them e) Householders store their cooked leftovers in fridge/freezer and eat them before they go off	Develop and encourage use through education			

f) Householders eat leftover ingredients before they go off	Provide content via Web or App, such as recipes that could use leftover ingredients or cooked leftovers Sending reminders to eat leftover food (cooked and consume within X days) e.g. App based or Smart fridges Showcase recipes for common ingredients and meals and use notable and well-known food celebrities to demonstrate these recipes Leftover containers with 'Eat by' date labeling			
6. Householders store products correctly to optimize and extend product life	Encourage use of fridge and freezer through education Provide information on how to store all products correctly. Smart fridges which help households to keep a track of stored food.	**x**	**x**	**x**
7. Encourage small servings with the opportunity to have second helping.	Encourage use through education Plate size prompts – have households use smaller plates to restrict the amount that can be given as a portion Have household members serve themselves at each mealtime	**x**	**x**	**x**

	Products sold at retailers to make the serving size more salient and relatable to consumers			
8. Householders label a shelf within their fridge as "Use me first" and store items on this shelf that need to be eaten sooner	Provide a product (eg. Use-me box, a tag to demarcate the "Use me first' area in the fridge) and encourage use of a "USE ME" shelf/container in fridge and pantry. Provide labels for consumers to put on containers and products that say 'Use me' or 'Date purchased'	**x**	**x**	
9. Householders cook the correct quantities of food needed and avoid preparing extra food	Portion calculators and associated cups/scales to measure the serving size. Products make serving amounts more salient and visible on packaging – "This will feed two adults" Encouraging to check hunger levels before cooking	**x**	**x**	**x**
10. Households plan for a "leftover day" when making their meal plans as part of their weekly meals.	Encourage use through education Use goal-setting and implementation intentions to prompt households to nominate a day ahead of time that will be 'leftovers only' Use public commitments and prompts in the household by making the leftover day prominent	**x**	**x**	**x**

11. Accurate knowledge, and use of, use by and best before dates Householder checks quality of food with a use-by date before throwing it away.	Encourage use through education Use rules-of-thumb to help consumers know when to chuck and when to keep an item Place coloured stickers/labels on items that are approaching their use-by date within the week	**x**	**x**	**x**

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