



# Different Dinners: a Trial to Support Climate-Friendly Dietary Choices

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Technical Report 2023/9



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# Executive summary

## Introduction

The purpose of the trial was to further our understanding of the types of interventions that work to support willing Aucklanders to make food choices that have a lower carbon impact.

Food consumption is a fertile area for potential emissions reductions. Stats NZ report that food and non-alcoholic beverages represent a large contributor to household consumption emissions (around 25% of New Zealanders' carbon footprint)<sup>1</sup>. The contribution of food and non-alcoholic beverages is second only to transport. There is strong evidence that increasing plant-based food choices leads to carbon emission reductions, as well as health and wellbeing benefits<sup>2</sup>.

A significant amount of research has informed the development of this trial. In 2021, following the completion of Te Tāruke-ā-Tāwhiri, Auckland Council's Climate Action Solutions team undertook a *Sustainable Healthy Food Choices Research and Development Project* in order to better understand how to support willing Aucklanders to make small changes toward choosing vegetarian dinners one or two more times per week.

The research found that dietary practices are complex, influenced by a mixture of factors including culture, taste preferences, cost, variety, convenience, and health. That study made several recommendations that were picked up in the design of this trial. They included:

- Focus on tastiness of non-meat options rather than environmental benefits.
- Make it easier to try alternatives to frequently eaten meals.
- Address unfamiliarity aversion and knowledge gap.
- Create new habits.

The behavioural insights gained from that research informed the development of the Different Dinners trial.

## Method

This study was a randomised controlled trial that tested four interventions designed to support willing Aucklanders to make small changes toward choosing vegetarian dinners one or two more times per week among Aucklanders.

A total of 732 participants were selected through a baseline survey undertaken in August 2022 via Auckland Council's People's Panel. They met specific criteria with respect to their stated consumption of meat at dinner, their willingness to trial vegetarian dinners and confidence levels in doing so, and the extent to which they made decisions about dinner in their household.

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<sup>1</sup> Greenhouse gas emissions (consumption-based): Year ended 2019 (provisional) | Stats NZ

<sup>2</sup> EAT Lancet Summary report <https://eatforum.org/eat-lancet-commission/eat-lancet-commission-summary-report/> and Drew, J., Cleghorn, C., Macmillan, A., and Mizdrak, A. (2020). Healthy and climate-friendly eating patterns in the New Zealand context. *Environmental Health Perspectives*, 128(1), 017007.

The interventions were either based on established behavioural insights principles known to support and enable behaviour change, or they sought to address one or more known barriers to trying vegetarian dinners. They were:

- A recipe pack (consisting of booklet, fridge magnet meal planner, and shopping list).
- A one-off *My Plant-Power* food box from My Food Bag.
- Text message reminder.
- Commitment and plan.

Different groups of participants received different combinations of these interventions. The control group received nothing initially but were sent the recipe pack three to four weeks after the other participants received their interventions. Each group had more than 100 participants, as per the table below.

<b>Group 1 n=119</b>	<b>Group 2 n=112</b>	<b>Group 3 n=122</b>	<b>Group 4 n=118</b>	<b>Group 5 n=128</b>	<b>Group 6 n=133</b>
My Food Bag box + Recipe pack	My Food Bag box + Recipe pack + Text messages	My Food Bag box + Recipe pack + Commitment and plan	Recipe pack + Text messages  (no food box)	Recipe pack + Commitment and plan  (no food box)	<b><i>Control</i></b> <i>Nothing initially but sent a recipe pack once they completed their follow-up survey</i>

Data was collected at three time points – the baseline survey, follow-up survey 1 (three weeks after participants received their intervention) and a final follow-up survey (three weeks after the first follow-up).

The research was developed and undertaken by researchers from Auckland Council’s Research and Evaluation Unit (RIMU) and the Climate Action Solutions team. The research method was reviewed by Auckland Council’s Research Ethics Advisory Group.

## **Results**

After receiving their items, participants in all five intervention groups (Groups 1-5) reported notable decreases in the number of meat-containing dinners eaten compared with the baseline, in the week prior to each data collection point.

The decreases ranged between -0.9 and -1.2 meals per week, compared to the control group (Group 6).

These findings had a household-wide impact. The average household size of people eating together was 3.1 (that is, 2.1 people in addition to the respondent). This means the trial reached 2269 Aucklanders.

For the households of participants in groups 1-5 the changes between the baseline survey and the first follow-up survey ranged from -2.8 to -4.1 meat-containing meals per week, compared to -1.4 for Group 6 (control). So adjusting for the control group, the overall difference was a reduction of 1.4 to 2.8 meat-containing meals per week.

An important goal of the trial was to identify which of the interventions was most effective. No statistically significant differences in the effectiveness of the different interventions were found. This indicates that the interventions were all similarly effective at supporting dietary change. The study did find however that setting a commitment and having a plan appeared to help people maintain their momentum over time.

Immediately after the follow-up 1 survey, Group 6 (control) participants were sent the recipe pack (Groups 1 through 5 received nothing further). Following the receipt of the recipe pack participants in Group 6 reported significantly *greater* decreases in meat consumption than Groups 1 through 5, essentially ‘catching up’ to these other groups in terms of number of meat-containing meals consumed for dinner. Statistical testing confirms that the decrease seen for Group 6 (control) after they received their recipe pack was indeed significantly greater than for the other groups, who had already received their interventions.

With regard to costs, we found that the lower cost recipe pack was just as effective as a higher-cost recipe box.

Participants were asked how useful they found the different items they received. The free My Plant Power box was rated most highly, with 81 per cent of those who had received one reporting it was useful. The plant-powered recipe booklet (49%), shopping list (47%) and fridge magnet (46%), which collectively made up the ‘recipe pack’ were all rated as generally useful by those who had received them.

The commitment and plan intervention was split evenly between useful (38%), somewhat useful (29%), and not useful (33%), despite there being indications that these interventions had a meaningful impact on maintenance of behaviour change.

A larger proportion felt the text messages were not useful (44%) than were useful (30%), suggesting a need to improve the content and/or timing of these messages if they are to be used in the future.

## **Estimated emissions reduction**

It is estimated that the interventions had modest impacts on carbon emissions in line with the modest dietary changes we sought to support. Analysis showed that, for households, the amount of carbon saved per year ranged between 158 kg-CO<sub>2</sub>e and 332 kg-CO<sub>2</sub>e.

There was an estimated average saving per individual, per year, of 75.3 kg CO<sub>2</sub>e (carbon dioxide equivalent) and an average estimated saving of 240.6 kg CO<sub>2</sub>e per household. If we assume that all 732 participants and their households reduced their emissions of 240.6 kg, this simple extrapolation suggests an overall reduction of 176,000 kg CO<sub>2</sub>e (the equivalent of planting 2000 pine trees<sup>3</sup>).

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<sup>3</sup> <https://www.zerocarbon.online/calculator-2/#planting>

## Implications

This study provides valuable evidence for what works to support moderate but meaningful shifts in dietary patterns.

In addition to potentially acting as a catalyst for further individual change, small to moderate changes in dietary choices can have notable impacts when scaled across the population. For example, if half of New Zealand's population (estimated to be 2,563,700)<sup>4</sup> choose to reduce one meat-containing meal per week for a year (the minimum changed by this study), and assuming that individual carbon saving from reducing one meat-containing meal is 73 kg of CO<sub>2</sub>e, this action could result in saving 193,000,000 kg of CO<sub>2</sub>e or 193,000 tonnes of CO<sub>2</sub>e a year. That's the equivalent of planting over 1.6 million pine trees.<sup>5</sup>

In addition, the direct cost saving of the carbon avoided in the above extrapolation, at today's prices (\$72/tonne of CO<sub>2</sub>e<sup>6</sup>), would be \$13.9m.

Several learnings from this trial could be applied to similar future campaigns aimed to support people to adopt lower carbon choices. There was no evidence in this trial that the combination of a My Plant Power box and recipe pack had any greater effect than the recipe pack on its own. Given the recipe pack cost approximately one tenth that of the My Plant Power box, it is a highly cost-effective approach. It is possible that there may have been a stronger impact if the My Plant Power box had been available for longer than for three meals over one week, however this remains untested.

Any future work could focus on improving upon and/or rolling out a recipe pack as a foundational item.

## Conclusion

This study provides valuable evidence of interventions that work to support moderate but meaningful shifts in dietary patterns. Appealing yet lower-cost interventions such as a vegetarian recipe pack can result in meaningful impacts.

Interventions like this, along with other climate actions undertaken by Auckland Council, central government, industry, businesses and communities, will ultimately help with the implementation of the food priority action area in Te-Tāruke-ā -Tāwhiri: Auckland's Climate Plan.

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<sup>4</sup> Stats NZ provisional population estimates as at 30 Sept 2022 calculated New Zealand's population as 5,127,400. Half of this is 2,563,700.

<sup>5</sup> <https://www.zerocarbon.online/calculator-2/#planting>

<sup>6</sup> Calculated from the spot price of \$72 per metric tonne of CO<sub>2</sub>e in New Zealand in early 2023. The reason the price of carbon is important is because it conveys the cost or benefits of greenhouse gas emissions and, in this case, the benefit to the economy and society of emissions being avoided. For more information please see: Emissions pricing | Ministry for the Environment.



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# 1 Introduction

In 2015 Auckland Council became a member of *C40 Cities*, joining many other international cities in making a commitment to take bold climate action and lead the way towards a healthier and more sustainable future.<sup>7</sup> In June 2019 a climate emergency was declared and in December 2020 Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan was adopted.

Te Tāruke-ā-Tāwhiri sets out ambitious priorities to halve emissions by 2030, reach net zero emissions by 2050 and prepare for the impacts of climate change. One of the eight priority action areas within the plan is focused on food, and aims to develop 'a low carbon, resilient, local food system that provides all Aucklanders with access to fresh and healthy food'.

Research undertaken at that time to inform the development of the plan found that nine out of ten Aucklanders felt Auckland Council has a role to play in both helping reduce Auckland's emissions and preparing for the impacts of climate change, with over half feeling this role is a relatively critical one.<sup>8</sup> A further 82 per cent agreed they would be willing to change their lifestyle to ensure we meet our climate commitments, with two in five saying they would be willing to make 'radical change'.<sup>9</sup>

This project is part of a broader programme of work looking at how Auckland Council can respond to its commitments to address climate change. It aims to contribute to a low carbon food system by supporting more low carbon, climate friendly dietary choices.

## 1.1 The importance of dietary behaviour for reducing emissions

New Zealand households produce 71 per cent of the country's consumption emissions<sup>10</sup>, and in Auckland, these emissions continue to rise at a higher rate than population growth<sup>11</sup>.

Food consumption is a fertile area for potential emissions reductions. Stats NZ report that food and non-alcoholic beverages represent a large contributor to household consumption emissions (around 25% of New Zealanders' carbon footprint)<sup>12</sup>. The contribution of food and non-alcoholic beverages is second only to transport.

There is strong evidence that increasing plant-based food choices leads to carbon emission reductions. In 2019, a global commission led by the Lancet (EAT-Lancet Commission on Food, Planet, Health) found that a diet rich in plant-based foods and with fewer animal source foods confers both improved health and environmental benefits.<sup>13</sup> The commission called for a significant change to the way people eat globally to try and address the environmental and health

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<sup>7</sup> <https://www.c40.org/>

<sup>8</sup> Colmar Brunton *Climate Change Action and Public Perceptions, 2019* (commissioned by Auckland Council's Chief Sustainability Office)

<sup>9</sup> Ibid.

<sup>10</sup> <https://www.stats.govt.nz/information-releases/greenhouse-gas-emissions-consumption-based-year-ended-2017>

<sup>11</sup> <https://www.stats.govt.nz/information-releases/greenhouse-gas-emissions-by-region-industry-and-household-year-ended-2018>

<sup>12</sup> Greenhouse gas emissions (consumption-based): Year ended 2019 (provisional) | Stats NZ

<sup>13</sup> EAT Lancet Summary report <https://eatforum.org/eat-lancet-commission/eat-lancet-commission-summary-report/>

impacts of food production and consumption. Their report outlined, for the first time, what a healthy diet that fits within planetary boundaries looks like – a plant-based or plant-forward flexitarian diet.<sup>14</sup>

New Zealand research published in 2020 asserted that by following the New Zealand dietary guidelines (as outlined by the Ministry of Health), and by applying specific dietary scenarios (particularly those that prioritise plant-based foods), there is substantial potential to provide both climate and health gains.<sup>15</sup> The researchers found that shifting population-level consumption to align with the NZ Dietary Health guidelines could bring about diet-related emissions savings of 4 to 42 per cent and healthcare system cost savings of \$14 to 20 billion<sup>16</sup>.

Although dietary change has not featured prominently in climate discussions, there is growing interest and openness to reconsidering dietary choices for climate reasons. For example, the Colmar Brunton *Better Futures 2020* study found that 49 per cent of New Zealanders, and more specifically 53 per cent of Aucklanders, agreed that “New Zealanders need to change their diet to save our environment”.<sup>17</sup> One fifth (21%) of Auckland adults taking part in the Better Futures study reported being meat-free, a jump of 18 percentage points from five years earlier.<sup>18</sup>

Despite the growing interest and awareness about food choices and climate impact, numerous studies between 2019 and 2022 identified a need to better understand how voluntary changes in food choices could be supported across the general population (see for example Bonto et. al. (2022) and Chang et. al. 2023).<sup>19</sup> In addition, Taufik et. al. (2019) identified a need for “future real-life intervention studies to focus on plant-based food consumption other than fruit and vegetables, such as legumes or whole grains”, as well as a need for studies that focus on a “decrease in animal-based food consumption, either separately or in combination with increasing plant-based food consumption”.<sup>20</sup>

The Different Dinners Trial is an attempt to contribute to this knowledge gap within the Tāmaki-Makaurau / Auckland context.

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<sup>14</sup> <https://livelightly.nz/take-action/eat/takingabiteoutofyourcarbonfootprint>

<sup>15</sup> Drew, J., Cleghorn, C., Macmillan, A., and Mizdrak, A. (2020). Healthy and climate-friendly eating patterns in the New Zealand context. *Environmental Health Perspectives*, 128(1), 017007.

<sup>16</sup> Ibid.

<sup>17</sup> Colmar Brunton (2020) *Better Futures 2020*. Results for Auckland were specifically commissioned by Auckland Council. Since this trial has been undertaken and results analysed, a further Better Futures study undertaken by Kantar (formerly Colmar Brunton) in 2023 found that 40 per cent of New Zealanders agreed that “New Zealanders need to change their diet to save our environment”, down from 49 per cent in 2020. The results for Auckland respondents are not known at the time of writing.

<sup>18</sup> Ibid.

<sup>19</sup> See for example, Ronto, R., Saberi, G., Leila Robbers, G. M., Godrich, S., Lawrence, M., Somerset, S., Fanzo, J., and Chau, J. Y. (2022). Identifying effective interventions to promote consumption of protein-rich foods from lower ecological footprint sources: A systematic literature review. *PLOS Global Public Health*, 2(3), e0000209. <https://doi.org/10.1371/journal.pgph.0000209> and Chang, K. B., Wooden, A., Rosman, L., Altema-Johnson, D., and Ramsing, R. (2023). Strategies for reducing meat consumption within college and university settings: A systematic review and meta-analysis. *Frontiers in Sustainable Food Systems*, 7. <https://doi.org/10.3389/fsufs.2023.1103060>

<sup>20</sup> Taufik, D., Verain, M. C., Bouwman, E. P., and Reinders, M. J. (2019). Determinants of real-life behavioural interventions to stimulate more plant-based and less animal-based diets: A systematic review. *Trends in Food Science & Technology*, 93, 281-303. <https://doi.org/10.1016/j.tifs.2019.09.019>

## 1.2 Additional benefits to individuals and society

In addition to the EAT-Lancet Commission on Food, Planet, Health mentioned above, the Lancet<sup>21</sup> led a Global Syndemic Commission in 2019. The report describes obesity, under-nutrition and climate change as pandemics which, taken together, form a global ‘syndemic’, a synergy of pandemics occurring in time and place and affecting each other. This represents a paramount challenge for people, the environment, and our health, with the food system an underlying driver of these problems.<sup>22</sup>

A study published in early 2023 modelled different red and processed meat replacement scenarios to consider health, equity, greenhouse gas emissions (GHGe), and cost outcomes in New Zealand.<sup>23</sup> The researchers found that, when compared with current red and processed meat intake, each scenario was nutritionally adequate, improved Quality Adjusted Life Years (QALYs), (by 159-297 per 1000 people), reduced health system costs by \$2,530 to \$5,096 per adult over their lifetime, and reduced emissions by 19 to 35 per cent. The researchers also found that the per capita health gains for Māori was 1.6 to 2.3 times that of non-Māori, and in some scenarios grocery costs decreased.<sup>24</sup>

## 1.3 Background to this trial

A significant amount of research informed the development of this trial.

In 2021, following the completion of Te Tāruke-ā-Tāwhiri, Auckland Council’s Climate Action Solutions team undertook the *Sustainable Healthy Food Choices Research and Development Project*. The goal of that research project was to inform the development of a programme of work to support Aucklanders to make more healthy, low carbon food choices that contribute to reducing climate impacts of consumer decisions and to improving individuals’ health.

PwC were commissioned to complete the research and development project, the output of which were two reports – Phase One a review of relevant literature and key informant interviews<sup>25</sup> and Phase Two a Primary Research Report.<sup>26</sup>

The first phase of the project collated and summarised existing insights into how to support more sustainable and healthy food purchases, and provided recommendations for the design of a subsequent pilot for Tāmaki Makaurau. The second phase tested key behavioural insights with Aucklanders within a prototype online supermarket experience.

The behavioural insights gained from this research informed the development of the Different Dinners trial. This is discussed further in section 1.4.

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<sup>21</sup> <https://www.thelancet.com/>

<sup>22</sup> [https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(18\)33192-1.pdf](https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(18)33192-1.pdf)

<sup>23</sup> Reynolds, A. N., Mhurchu, C. N., Kok, Z., and Cleghorn, C. (2023). The neglected potential of red and processed meat replacement with alternative protein sources: Simulation Modelling and Systematic Review. *EClinicalMedicine*, 56, 101774.

<sup>24</sup> Ibid.

<sup>25</sup> Unpublished report. If you would like to see a copy please contact the authors of this report.

<sup>26</sup> PwC (2021) *Sustainable, healthy food choices research and development project. Primary research summary report*. A report prepared for Auckland Council. Available on Knowledge Auckland website.

## 1.4 What our previous research tells us about encouraging dietary shifts

Dietary practices are complex, influenced by a mixture of factors including culture, taste preferences, cost, variety, convenience, and health.

Auckland Council's *Sustainable Healthy Food Choices Research and Development Project* mentioned above identified barriers and a range of recommendations. The following are of particular relevance for this trial:

- **Focus on tastiness of non-meat options rather than environmental benefits.** Because taste is a key driver of food choices, address taste perception by promoting how plant-based options can be tasty.
- **Make it easier to try alternatives to frequently eaten meals.** Make access to sustainable food choices easy and convenient (for example, by trialing easy to prepare ingredient/meal kits). Address choice overload by ensuring participants know the meals are healthy and climate friendly.
- **Address unfamiliarity aversion and knowledge gap.** Make it easy for people to learn and try out a new way of cooking and eating.
- **Create new habits.** Design a behaviour change programme to break habits people have already developed, such as cooking a particular animal product-based meal on a certain night of the week.

Building on these recommendations, this study trialled different ways to support small but meaningful reductions in meat consumption.

## 2 Method

The goal of the Different Dinners trial was to support small changes toward choosing vegetarian dinners one or two more times per week.

The *Sustainable Healthy Food Choices Research and Development Project* found that people are more likely to eat meat at dinner time than other meals, so the focus of the trial was on dinner choices.

The target audience was someone who eats meat for dinner five or more times per week, is willing to trial vegetarian dinners, has relatively low confidence in cooking vegetarian, and makes the decisions about dinner in their household.

Participants were selected from Auckland Council's People's Panel. The interventions and randomised controlled trial were designed by researchers from Auckland Council's Research and Evaluation Unit (RIMU) and Climate Action Solutions team. The study design was reviewed by Auckland Council's Research Ethics Advisory Group.

### 2.1 Surveys

Data were collected from participants at three time points:

1. **Baseline survey:** A survey at the start of the trial, prior to receiving any interventions.
2. **Follow-up 1:** A survey conducted approximately three weeks after participants received the interventions they were allocated.
3. **Follow-up 2:** A survey conducted approximately three weeks after Follow-up 1.

The baseline survey was focused on determining eligibility for participation, willingness, and collecting baseline information on eating behaviours and household composition. See Section 2.3 for more details on how people were selected for the trial.

Follow-up 1 and 2 were shorter surveys sent to those who were participating in the trial. The surveys focused on eating behaviour and collecting feedback on the interventions.

The first follow-up survey was sent approximately four to six weeks after participants had received their intervention tools.

If participants did not respond to Follow-up 1 or 2 invitations, they were sent up to three email reminders, and up to two phone calls, to encourage responses. If they answered the phone call, they were offered the opportunity to complete the survey on the phone with a study team member.

The surveys were administered online. Due to Covid restrictions during the project design phase, and uncertainty about when face-to-face engagement would be possible, a requirement for this trial was that it be delivered without face-to-face contact.

## 2.2 Participant selection

As mentioned above, a baseline survey was undertaken at the start of the trial, which was used to select participants for the trial. This was undertaken through the People's Panel, Auckland Council's online survey panel.<sup>27</sup> The People's Panel is broadly representative of the wider Auckland population.<sup>28</sup>

In August 2022 a randomly selected, broadly representative sample from the People's Panel were sent an email inviting them to complete a survey about what they and members of their household eat. Respondents were also told that, depending on their answers, they may receive a food-related giveaway. The survey invitation was sent to 17,992 people. A total of 3129 people responded. Of these 3129, 732 took part in the trial, as outlined below.

## 2.3 Eligibility for the trial

The trial was designed to test ways to support high meat-eaters to try replacing one or two meat-based dinners per week with vegetarian dinners. As such, a number of inclusion criteria were set to ensure those who participated were able to fully participate.

Participants to the baseline survey answered a series of screening questions, without knowing what the trial was. Once their eligibility had been established, they were invited to participate, and the trial was explained to them. To be eligible, they or their household had to state in the baseline survey that they:

- eat meat for dinner five or more times per week, and
- were willing to try eating one or two more vegetarian dinners per week.

In addition, the participant needed to

- live in a household size of two or more
- have the ability to influence what the household has for dinner
- not be extremely confident in cooking vegetarian meals
- generally eat the same meal for dinner as at least one other person in their household.

Once participants had answered the questions to determine their eligibility, they were invited to take part in the trial and were asked more questions to determine that they:

- were interested in taking part (once trial was explained to them)
- agreed to completing two follow-up surveys over the proceeding two months
- were willing to share their postal address to receive giveaways
- were willing to share their mobile number so they can be contacted as required.

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<sup>27</sup> Over 55,000 Aucklanders aged 15 and over are signed up to the [People's Panel](#). Panel members are recruited through a variety of channels including questions at the end of major council surveys and consultations; targeted campaigns to recruit more members from various ethnic groups and younger Aucklanders; and a sign-up form on the Auckland Council website. The demographic profile of the panel does not exactly match the Auckland population, and work is ongoing to recruit more members from various ethnic groups and younger Aucklanders.

<sup>28</sup> Auckland Council has conducted parallel surveys alongside other independent online panels, to investigate skews in panel opinions. Panel opinion is mostly similar to the wider Auckland public however panel members tend to be more knowledgeable about council plans and activities.

Using this information, people were allocated to one of six groups (see section 2.5 for more detail).

A total of 732 participants were eligible and agreed to be part of the trial. See Appendix 1 for their demographic characteristics and Appendix 2 for the full list of survey questions.

## 2.4 The interventions

The trial included four possible interventions:

- a recipe pack (consisting of recipe booklet, fridge magnet meal planner, and shopping list)
- a one-off *My Plant-Power* food box from My Food Bag
- text message reminder
- commitment and plan.

Different groups of participants received different combinations of these interventions. Further details on these interventions are outlined below.

### 2.4.1 Recipe pack

All participants received a recipe pack, which consisted of three items designed to work together: a recipe booklet, a fridge magnet planner, and a shopping list. The recipe pack intervention was intended to:

- dispel the perception that plant-based meals are ‘the lesser option’, by helping people cook tasty vegetarian or vegan meals
- make it easy and more affordable than an ongoing food box subscription for people to try new, appealing vegetarian or vegan options
- make it easy for people to plan what meals to eat for the upcoming week
- make it easy for people to make shopping lists (and thus follow through on buying the ingredients for the new plant-based meals they are trying during the week)
- provide visual prompts to incorporate more plant-based meals
- help people start a new habit of having plant-based meals for dinner some of the week
- help people continue or maintain their new eating habits after trying new meals in the My Plant Power box (for groups that received the My Plant Power food box).

### Recipe Booklet

The recipe booklet (Figure 1) was designed by Auckland Council’s Climate Actions Solutions team, using My Food Bag recipes.<sup>29</sup> It contains 11 nutritionally balanced vegetarian recipes that were created by chefs and nutritionists.

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<sup>29</sup> The booklet can be found here: [https://livelightly.nz/media/3jobblte/different-dinners-cookbook\\_online.pdf](https://livelightly.nz/media/3jobblte/different-dinners-cookbook_online.pdf)



**Figure 1: Live Lightly Different Dinners vegetarian recipe booklet**

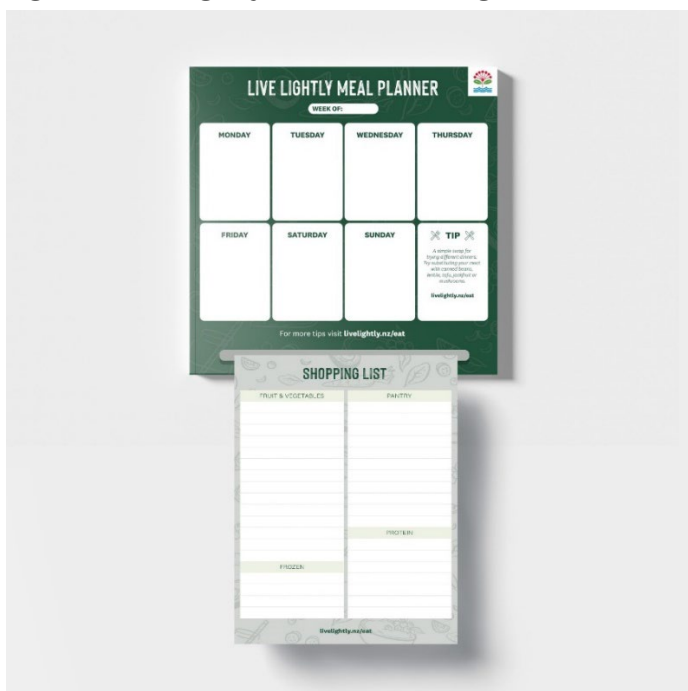


### **Fridge magnet and shopping list**

The fridge magnet meal planner (Figure 2) was designed to help people plan out what meals they were going to eat for the week.<sup>30</sup> It had space for each day of the week, came with a magnetised dry erase marker, and contained the following prompt: *“TIP: A simple swap for trying Different Dinners: Try substituting your meat with canned beans, lentils, tofu, jackfruit or mushrooms.”*

The shopping list (Figure 2) was designed to help people plan their supermarket shopping. It contained quadrants for different food groups, with fruits and vegetables given top priority.

**Figure 2: Live Lightly Meal Planner magnet (with slot for shopping list) and shopping list**



<sup>30</sup> Meal planning was described as an effective intervention to help reduce meat consumption by participants of the Marks & Spencer’s Sparking Change trial. See Trewern, J., Chenoweth, J., and Christie, I. (2022). Sparking change: Evaluating the effectiveness of a multi-component intervention at encouraging more sustainable food behaviours. *Appetite*, 171, 105933.

### 2.4.2 My Plant-Power food box from My Food Bag

My Food Bag is a New Zealand-based business, co-founded by celebrity chef and nutritionist Nadia Lim. Customers subscribe and receive weekly meal boxes. Each week customers select the meals they would like to eat that week, and a box is couriered to customers' homes containing apportioned ingredients and cooking instructions.<sup>31</sup>

A one-time *My Plant Power* food box, containing three vegetarian or vegan meals for four people was used in this study.<sup>32</sup> Participants were provided with a voucher code to cover the full cost of one week's box, and participants ordered their preferred meals from the My Plant Power recipe options directly from My Food Bag. Participants were provided seven different recipes to choose from.

The food box intervention was intended to:

- dispel the perception that plant-based meals are 'the lesser option', by exposing people to tasty, well-designed, nutritionally balanced vegetarian or vegan meals
- make it easy for people to try new, appealing vegetarian or vegan options
- break through unfamiliarity aversion
- help people start a new habit of having plant-based meals for dinner some of the week.

**Figure 3. My Food Bag food box promotional photo (Not actual My Plant Power food box)**



Source: My Food Bag website

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<sup>31</sup> Please note that My Food Bag was chosen as a provider for the purposes of this research only, and this is not a commercial endorsement from Auckland Council.

<sup>32</sup> Using a food box for four people was chosen to simplify the delivery of a small pilot. If a participating household size was smaller than four, participants were sent some simple tips on how to reduce food wastage and a link to the Love Food Hate Waste website. If a participating household size was larger than four, participants were sent some recommendations about how they might 'bulk-up' their meals with additional veges and plant-based protein.

### 2.4.3 Text message reminders

Text message reminders have been used widely in behavioural insights trials to provide timely, motivating reminders.<sup>33</sup>

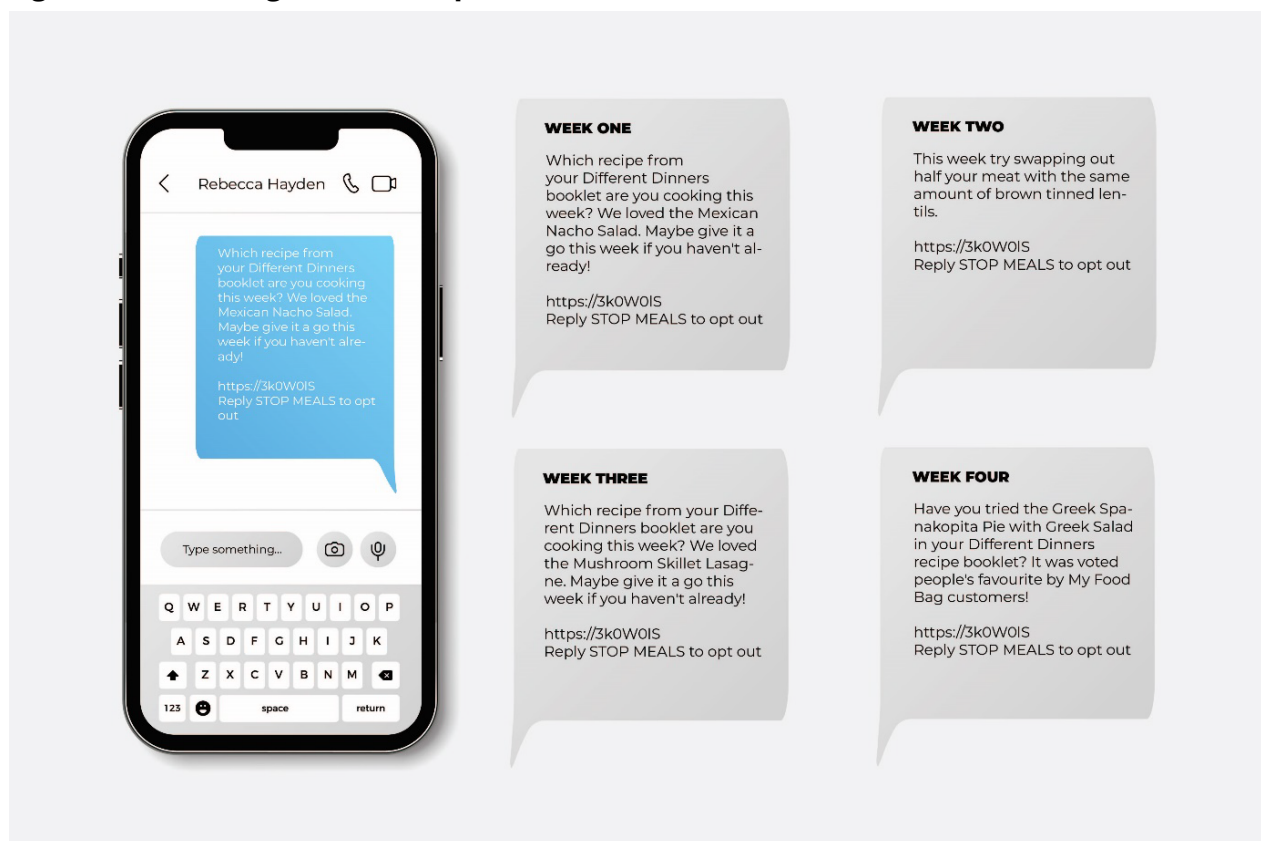
In this trial, text messages were sent on Tuesdays at 4pm for four consecutive weeks. The messages included a link to the recipe booklet to prompt people near the end of their workday when they might be thinking about what to cook for dinner and might be heading to do a shop. The texts contained messages that encourage people to try a new meat-free meal that week (see Figure 4).

Everyone who received a text message also received a My Plant Power box and/or a recipe pack. The text messages were timed to start in the week when participants received these items.

The text message reminders were intended to:

- provide ongoing prompts to incorporate more plant-based meals
- encourage recipients to try new meals by providing recommendations.

**Figure 4. Text messages sent to recipients**



<sup>33</sup> For examples of how this has been achieved refer to Service, O., Hallsworth, M., Halpern, D., Algate, F., Gallagher, R., Nguyen, S., Ruda, S., Sanders, M. (not dated) *EAST. Four simple ways to apply behavioural insights*. The Behavioural Insights Team, United Kingdom. <https://www.bi.team/publications/east-four-simple-ways-to-apply-behavioural-insights/>

## 2.4.4 Commitment and Plan

Eliciting a commitment and making a plan are two separate, but related interventions that have been used widely in interventions to encourage and support sustainable behaviour change.

### Eliciting a commitment

People generally want to follow through on their intentions and tend to feel bad when they don't. Eliciting a commitment from someone is one way to help them act in accordance with their intentions. When people actively commit to doing something, it strengthens their resolve to follow through. Research shows that commitments have a strong effect on people's behaviour and are most effective when they are written and when the commitment is made public.<sup>34</sup>

### Making a plan

People commonly have intentions to change their behaviour (e.g. eat healthier) but do not end up taking action – a phenomenon known in psychology as the 'intention-behaviour gap'. This is because behaviour is influenced by more than just good intentions. Factors such as emotions and the environment around us can result in us not doing the originally intended behaviour. Helping people make a plan can significantly increase their ability to follow through.<sup>35</sup> Identifying potential obstacles and developing an 'if-then plan' (in the form of 'IF a certain thing happens, THEN I will respond in the following way') can lead to better goal attainment and habit formation.

### Incorporating commitments and plan making

In this trial, a commitment was elicited by asking participants to commit in the baseline survey to adding one extra vegetarian dinner per week for the next four weeks.

Participants were encouraged to make a plan by selecting one of two options:

*IF I am not sure what vegetarian meal(s) to cook this week THEN I will look at the vegetarian recipe booklet before I go shopping and choose one extra vegetarian meal for the week*

*IF I am likely to forget which ingredients to buy at the supermarket THEN I will make a list with all the ingredients for my new vegetarian meal*

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<sup>34</sup> For example, 'commitment devices' were used successfully in a trial by the Behavioural Insights Team and Jobcentre Plus in the United Kingdom to increase employment outcomes. Job seekers were encouraged to make commitments to their job advisor about what they were going to do in the next week. They wrote their commitments down in front of the job advisor, who then followed up whether they were successful. The job seekers were encouraged to make the commitments unambiguous by specifying when and where they are going to perform the action. The results showed a significant increase in those off benefits at 13 weeks.

[https://www.bi.team/wp-content/uploads/2015/07/BIT-Publication-EAST\\_FA\\_WEB.pdf](https://www.bi.team/wp-content/uploads/2015/07/BIT-Publication-EAST_FA_WEB.pdf)

<sup>35</sup> Experiments show, for example, that people who were helped to make a plan were more likely than those who weren't to use a new bus route and shop at a bio-store. See Bamberg, S. (2002). Effects of implementation intentions on the actual performance of new environmentally friendly behaviors. Results of two field experiments. *Journal of Environmental Psychology*, 22, 399-411. In another study, a short plan-making intervention significantly increased physical activity amongst those with chronic back pain, compared to a control group who didn't receive the intervention. Christiansen, S., Oettingen, G., Dahme, B., and Klinger, R. (2010). A short goal-pursuit intervention to improve physical capacity: A randomized clinical trial in chronic back pain patients. *Pain*, 149, 444-452.

## 2.5 Groups and interventions

Section 2.4 describes the four interventions tested in this trial: a one-time My Plant Power food box with three meals for four people, the recipe pack, text message reminders, and a commitment and plan.

To test the impact of these interventions, participants were placed into groups that received different combinations of the interventions. The mixture of these interventions ‘built on’ each another, enabling us to test additive effects. Table 1 below shows which interventions were included in each group.

**Table 1. Interventions included in each group**

	My Plant Power food box	Recipe pack	Text message reminder	Commitment and plan
Group 1	✓	✓		
Group 2	✓	✓	✓	
Group 3	✓	✓		✓
Group 4		✓	✓	
Group 5		✓		✓
Group 6 (control)		(✓ after Follow-up 1)		

Once participants had been assigned to one of the five intervention groups or the control group, they received a welcome email with information specific to the giveaway they were receiving. For example, the participants receiving the free food box received instructions about how to redeem their voucher, while participants receiving the recipe kit were told it would be in the mail in the next couple of days.

A link was provided in the welcome email to a special landing page with more information about the trial and Frequently Asked Questions pertaining to the participants’ giveaway. There were two unique landing pages, one for those who received the free food box to trial, and one for those who were not. The link also had food bulking and saving tips for households who received a food box giveaway, but had more than, or less than four household members.

A unique landing page on the My Food Bag site was also created for participants to easily redeem their voucher.

# 3 Results

## 3.1 Note on sub-sample used for analysis

A total of 732 participants took part in the Different Dinners trial. However, results shown in this report are for a subsample of that group (488 participants, or 66% of all those who took part in the trial). The reason for this is outlined below.

As described in Section 2.1, once the trial had started all 732 participants were invited to complete two consecutive follow-up surveys. They could complete one or both of those surveys, and they did not have to have completed the first follow-up survey to undertake the second follow-up survey. Most participants (577, or 79%) completed either one or both – 155 (21%) did not complete either and could not be included in this analysis due to a lack of information.

Of the 577 who had completed at least one follow-up survey, 89 only completed the second survey. Their results are not included in this analysis.

Therefore, changes in reported eating behaviour between the baseline survey and the first follow-up survey were calculated for those who completed the first follow-up survey (n=488), and changes between the first follow-up survey and the second follow-up survey are for those who completed both follow-up surveys (n=417).<sup>36</sup> See Appendix 1 for demographic characteristics.

## 3.2 The interventions reduced the number of meat-containing dinners

At the start of the trial (baseline) all six groups reported an average of between 6.0 and 6.3 meat-containing dinners per week. There were no significant differences between the groups at this time point.<sup>37</sup>

As Table 2 shows, after receiving their items, participants in all five intervention groups (Groups 1-5) reported notable decreases in the number of meat-containing dinners eaten in the previous week. The decreases ranged between -0.9 and -1.2 meals per week.

The changes in Groups 1-5 were greater than the change seen for Group 6 (control), which reported a decrease of -0.5 meat-containing dinners per week over the same period. Statistical analysis showed that these initial decreases in meat consumption for Groups 1 through 5 were significantly greater than Group 6.<sup>38</sup>

Table 2 shows the average number of meat-containing dinners consumed in the week prior to each data collection point.

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<sup>36</sup> 71 participants who had completed the first follow-up survey did not go on to complete the second follow-up survey.

<sup>37</sup>  $F(5,481) = 1.21, p = .305$

<sup>38</sup> A linear regression was run on the change in meat consumption between Baseline and Follow-up 1. The rates of change for Groups 1-5 were all significantly greater than for Group 6 (control), all  $p$ s < .028.

**Table 2. Average number of meat-containing dinners per week, at each time point**

	<b>Baseline n=732</b>	<b>Follow-up 1 n=488</b>	<b>Follow-up 2 n=417</b>
Group 1 (food box + recipe pack)	6.1	5.0	5.2
Group 2 (food box + recipe pack + text messages)	6.3	5.2	5.3
Group 3 (food box + recipe pack + commitment & plan)	6.2	5.0	5.0
Group 4 (recipe pack + text messages)	6.1	4.9	5.2
Group 5 (recipe pack + commitment & plan)	6.1	5.2	5.0
Group 6 (control)	6.0	5.5	4.9

Immediately after the first follow-up survey, Group 6 (control) participants were sent a recipe pack containing a recipe booklet, fridge magnet planner with erasable pen, and a supermarket shopping list. Groups 1 through 5 received nothing further.

Following the receipt of the recipe pack (i.e. between Follow-up 1 and Follow-up 2), Group 6 reported significantly greater decreases in meat consumption than the other groups, essentially ‘catching up’ to these groups in terms of number of meat-containing meals consumed for dinner. Statistical testing confirms that the decrease seen for Group 6 after they received their recipe pack was significantly greater than for the other groups, who had already received their interventions.<sup>39</sup>

An important point of the trial was to identify which of the interventions was most effective. Other than all of Groups 1-5 showing greater reductions in meat-containing dinners than Group 6 (control), we could not detect any statistically significant differences in the effectiveness of the different interventions tested.<sup>40</sup> This indicates that the interventions were all similarly effective.

### **3.3 Completing a commitment and plan may help maintain changes in behaviour**

Although we could not detect any significant differences among the five intervention groups when considered separately, a visual inspection of Figure 5 appears to show that the two groups that involved a commitment and plan (Groups 3 and 5) were better able to maintain a flat or downwards trend in meat-containing dinners over time.

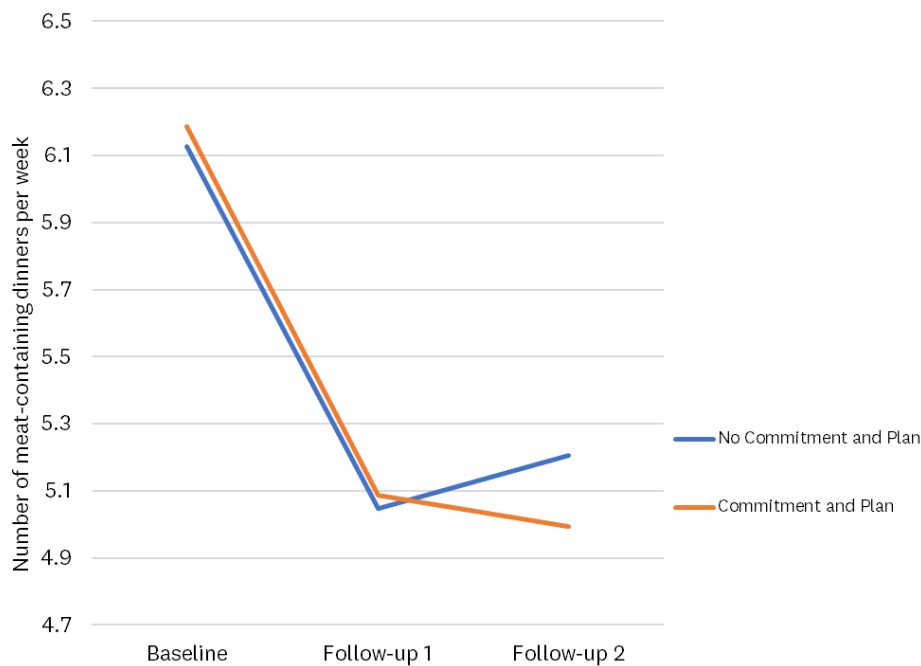
To test for this possibility, Groups 3 and 5 were combined into a ‘Commitment and Plan’ group, and changes over time for this combined group were compared to a ‘No Commitment and Plan’ group, comprised of the three remaining intervention groups (i.e. 1, 2 and 4). At the second follow-up, the new Commitment and Plan group averaged 5.0 meat-containing dinners per week, while the new No Commitment and Plan group averaged 5.2. This can be seen in Figure 5 below.

<sup>39</sup> A linear regression was run on the change in meat consumption between Follow-up 1 and Follow-up 2. The rate of change for Group 6 (control) was significantly greater than for each of Groups 1 through 5, all  $ps < .037$ .

<sup>40</sup> An ANOVA was conducted to compare the mean number of meat-containing dinners at Follow-up 1. The overall test was significant ( $F(5,481) = 2.27, p = .047$ ), however post-hoc tests showed that the only significant differences were between Group 6 (control) and the other intervention groups. No significant differences were detected between Groups 1 through 5 at Follow-up 1 (all  $ps > .170$ ).

The difference between these two new groups was very close to being statistically significant<sup>41</sup>, indicating that signing a commitment to reduce the number of meat-containing meals, and then making a plan for how to achieve this commitment, could result in greater long-term changes in behaviour.

**Figure 5. Change in the average number of meat-containing dinners over time for those making a commitment and plan and those not doing so**



### 3.4 The interventions had household-wide effects

While the results shown above are about changes in individual respondents' dinner habits (i.e. how many meat-containing dinners they personally ate), the participants also reported on eating with others in their household, and their ability to influence what their fellow household members ate.

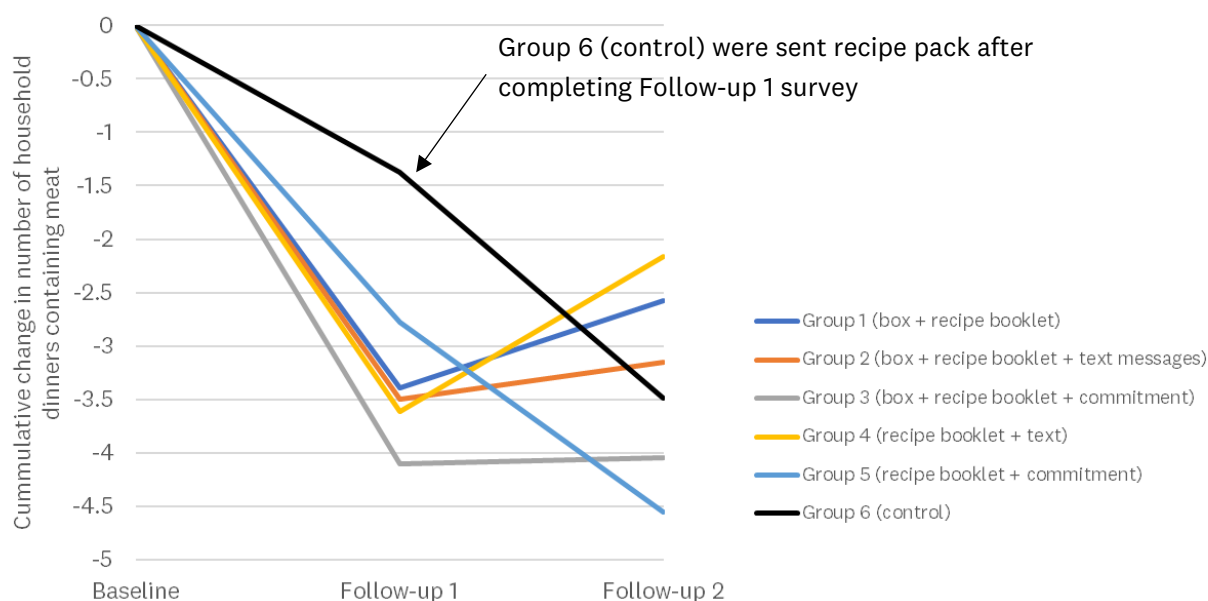
The average household size of people eating together was 3.1 (that is, 2.1 people in addition to the respondent). This means the trial reached 2269 Aucklanders. Each participant's reported household situation (i.e. how many others they ate with and had influence over) was used to calculate the household-level effects of the interventions.

Figure 6 shows the cumulative change in the number of meat-containing dinners eaten by households in each group, in relation to each household's baseline consumption level. There were notable changes over time. For Group 1-5 households the changes between baseline and Follow-up 1 ranged from -2.8 to -4.1 meat-containing meals per week, compared to -1.4 for Group 6. (control). This indicates an overall reduction of 1.4 to 2.7 meat-containing meals per week, per household.

<sup>41</sup> An ANOVA was run on Follow-up 2 dinners, with Baseline and Follow-up 1 dinners included as covariates. This analysis showed that the difference between the two groups was marginally significant,  $F(1,347) = 3.61, p = .058$ .



**Figure 6. Cumulative change in household-level meat-containing dinners over time**



### 3.5 Perceived usefulness of the interventions

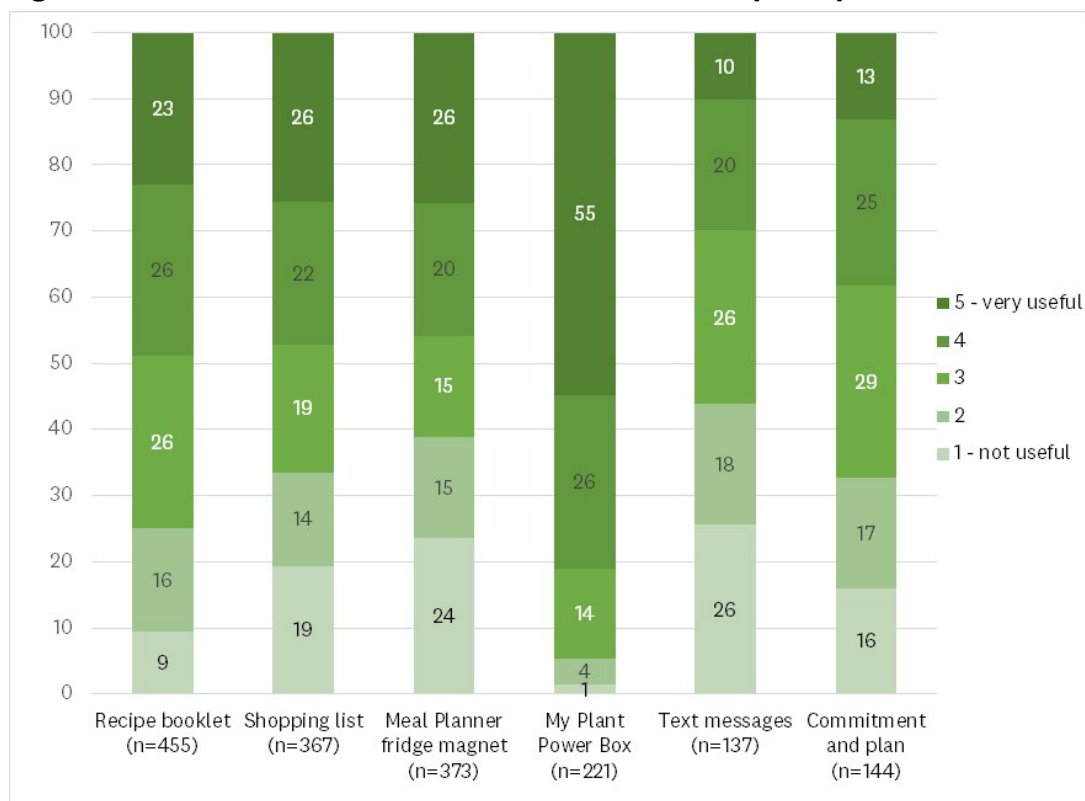
Participants were asked how useful they found the different items they received, on a scale of 1 (not useful) to 5 (very useful).

The My Plant Power box was rated most highly, with 81 per cent reporting it was useful (4 or 5 on a scale of 1-5). The plant-powered recipe booklet (49%), shopping list (48%) and fridge magnet (46%), which collectively made up the 'recipe pack' were all rated as generally useful, however the latter two had relatively high numbers of respondents rating them as not useful (1 or 2 on a scale of 1-5).

Responses on the usefulness of making a commitment and plan was split between useful (38%), somewhat useful (29%), and not useful (33%), despite there being indications these interventions had a meaningful impact on maintenance of behaviour change.

The text messages with reminders were more likely to be seen by recipients as not useful (44%) than useful (30%), indicating a need to improve the content of these messages if they are to be used in the future. Refer to Figure 7.

**Figure 7. Perceived usefulness of the different items sent to participants**



Notes: Percentages are calculated of those who answered each question, and does not include those who responded 'don't know' or 'not applicable'.

-The recipe booklet, shopping list and meal planner fridge magnet were all part of the recipe pack.

- Participants were asked these questions in the first follow-up survey, except for the control group (Group 6) who were asked to rate the usefulness of the recipe booklet in the second follow-up survey. As they were the control group, they had not received anything until after the first follow-up survey.

### 3.6 Comments from participants

The follow-up surveys included opportunities for participants to provide comments about how participating in the trial changed how they and their household eat, as well as providing any other suggestions about what might support them to try more vegetarian meals. General themes among their responses are presented here.

Most of the participants who completed the second follow-up survey provided a response regarding whether participating in the trial changed how they and their household eat.

Most had really enjoyed the experience and were willing to try preparing vegetarian meals more often:

*It has made a big difference!!!! We used lots of the meal ideas and felt really good after eating them!*  
(female, 45-49, usually eats same meal with 1 other)

*Participating in this trial makes us more aware of how many meals we are eating with meat in them. And it's also helped us to consider alternatives - which is fantastic. I'm all for more meat-free meals. Anything to help the planet and our health :)*  
(female, 50-55, usually eats same meal with 2 others)

*Kept the food bag subscription going for a bit - was surprised how interesting the vegetarian options were, especially compared to their meat options. Will be trying to make an effort to eat less meat in the diet.*

*(male, 25-29, usually eats same meal with 1 other)*

Many noted that the experience had opened their minds to alternative ways of eating,

*It has made us think about eating more meatless meals.*

*(female, 50-54, usually eats same meal with 4 others)*

*It's made us mindful that it's a great change*

*(female, 40-44, usually eats same meal with 1 other)*

*Yes, trying falafel has been life changing my son and I are enjoying it. I really enjoy salads for dinner, keeping my dinners quite light.*

*(female, 40-44, usually eats same meal with 2 others)*

or had provided the right motivation for them to do so:

*We aren't so scared to try cooking vegetarian meals now.*

*(female, 55-59, usually eats same meal with 1 other)*

Several appreciated the ideas from the recipe book.

*We were already heading towards eating more vegetarian meals, so not really. It has given some good recipe ideas through the book though!*

*(male, 30-34, usually eats same meal with 1 other)*

*Kids are involved in meal planning now and sometimes cooking - we are committing to having two meat free meals a week which is a massive change for my dedicated carnivores. Has also reduced our wastage using the meal planner and our shopping is easier to budget too.*

*(female, 40-44, usually eats same meal with 5 or more others)*

A few felt that the trial had been the kick start they needed to either try eating less meat or return to earlier dietary practices:

*Yes. I used to eat more plant based meals in my home country but hasn't been doing that as much when I moved overseas. This program has been helpful in kickstarting my old eating habit*

*(female, 40-44, usually eats same meal with 1 other).*

*I'm keen to try to include more vegetarian meals so this has been a great way to give ideas*

*(female, 45-49, usually eats same meal with 4 others)*

Many commented that while they were keen on including more vegetarian dinners in their diet, and were trying to make changes, it was challenging to influence the eating habits of others in their households:

*I try and have meat free lunches and enjoy trying vegetarian meals. My kids have meat free lunchboxes most of the time. I am still trying to convince the rest of my household with the dinners*

*(female, 35-39, usually eats same meal with 1 other)*

Some had enjoyed the experience, but had slipped back into old habits:

*It did in the beginning but not afterwards as we're trying to eat low carb and it's very hard to do that with vegetarian meals*

(female, 30-34, usually eats same meal with 1 other)

*It's given some vege ideas. But I don't see the problem with eating meat in the first place.*

(male, 35-39, usually eats same meal with 1 other)

Almost one in five said it had not changed how they and their household eat. Many did not provide a reason why (they just responded 'no'), but some did. Their reasons often involved having partners or children who would not eat vegetarian or non-meat-based meals, for example:

*My three teenagers just aren't willing to embrace vegetarian meals no matter how hard I try.*

(female, 50-54, usually eats same meal with 4 others)

*Not really because my brother and father would still eat meat with every meal we would just cook them meat separately like sausages.*

(female, 20-24, usually eats same meal with 3 others)

Several commented that the meals were not aligned with their tastes

*No. none of the recipe is suit our family where originally from*

(Gender diverse, 25-29, usually eats same meal with 1 other)

*Not much really as Chinese food has had a lot of better vegetarian options already.*

(male, 40-44, usually eats same meal with 3 others)

*We are more from an Asian background and have more Asian vegetarian meals, The foodbag provided was more European type of vegetarian meals which was not ideal for us.*

(female, 35-39, usually eats same meal with 1 other)

Or they provided health-related reasons:

*Not as much as I would have liked! Dietary restrictions for IBS mean a lot of vegetables are actually problem foods for us :( but the cookbook was lovely and we did try*

(female, 25-29, usually eats same meal with 1 other)

The most common suggestions by respondents for what might help support them to try more vegetarian meals in future aligned with the sentiment 'do more of the same and improve on it'.

People's primary suggestions included:

- Wanting access to more recipes that were affordable, seasonal, easy, flavoursome and healthy.
- More recipes with less dairy, more protein, and more culturally appropriate foods.
- Some suggested channels for delivering this could include online tools, weekly emails and more cookbooks.

# 4 Estimated emissions reduction, well-being and health system benefits

This section calculates the carbon emission benefits associated with the dietary changes seen in this trial. The next section (Section 5) provides an indication of what might be possible if such interventions were scaled up.

Building on recent research from the University of Otago (Drew et al, 2020)<sup>42</sup> which modelled the well-being and health system cost-saving benefits of changing dietary behaviours, we also attempt to estimate the potential longer-term benefits in these areas.

## 4.1 Carbon savings

The research by Drew et. al modelled a range of scenarios in which the New Zealand population adopted dietary changes to reduce red and processed meat, consistent with New Zealand dietary guidelines.

Custom analysis undertaken for Auckland Council by a contractor who corresponded with the lead author of Drew et al. (2020) calculated the reduction in kg-CO<sub>2</sub>e (kilograms of carbon dioxide equivalent gasses) associated with swapping one meat-based meal for a vegetarian meal per week, to be 73kg<sup>43</sup> per year.

The amount of carbon saved, and the value of these emission reductions, was calculated for individuals and households, using the change between the baseline and second follow-up survey. The change in number of meat-containing meals per week was multiplied by 73kg to get the kg-CO<sub>2</sub>e saved, and this was then multiplied by the market cost of carbon (\$0.072 per kg).<sup>44</sup>

The analysis showed that, for households, the amount of carbon saved per year ranged between 158 kg-CO<sub>2</sub>e and 332 kg-CO<sub>2</sub>e. Using the current market price of carbon, these reductions in emissions were worth \$11.35 and \$21.23 for every year the dietary change is maintained, respectively.

As Table 4 shows, this trial resulted in an estimated average saving per individual, per year, of 75.3 kg CO<sub>2</sub>e and an average estimated saving of 240.6 kg CO<sub>2</sub>e per household. This applies to Groups 1 to 5. If we assume that all 732 participants and their households reduced their emissions

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<sup>42</sup> Drew, J., Cleghorn, C., Macmillan, A., and Mizdrak, A. (2020). Healthy and climate-friendly eating patterns in the New Zealand context. *Environmental Health Perspectives*, 128(1), 017007.

<sup>43</sup> This is calculated from the daily per adult kgCO<sub>2</sub>e savings estimates described in Table 1, page 3 – ‘Once weekly plant-based meal (DG2)’, as described in Drew, J., Cleghorn, C., Macmillan, A., and Mizdrak, A. (2020). Healthy and climate-friendly eating patterns in the New Zealand context. *Environmental Health Perspectives*. This calculation is the difference between the baseline or typical NZ diet and one weekly vegetarian meal (DG2), removing the emissions savings made from meeting the dietary guidelines (DG1).

<sup>44</sup> Calculated from the spot price of \$72 per metric tonne of CO<sub>2</sub>e in New Zealand in early 2023. The reason the price of carbon is important is because it conveys the cost or benefits of greenhouse gas emissions and, in this case, the benefit to the economy and society of emissions being avoided. For more information please see: Emissions pricing | Ministry for the Environment.

of 240.6 kg, this simple extrapolation suggests an overall reduction of 176,000 kg CO<sub>2</sub>e (the equivalent of planting 2000 pine trees).<sup>45</sup>

**Table 3. Annual carbon savings for individuals and households, for dietary changes between baseline and follow-up 2**

<b>Individual impacts</b>	Change in weekly meat-containing meals	Carbon saved (kg-CO <sub>2</sub> e) per year	Value of carbon saved per year
Group 1 (food box + recipe pack)	-0.9	65.7	\$4.73
Group 2 (food box + recipe pack + text messages)	-1.0	70.8	\$5.10
Group 3 (food box + recipe pack + commitment & plan)	-1.2	89.8	\$6.46
Group 4 (recipe pack + text messages)	-0.9	65.7	\$4.73
Group 5 (recipe pack + commitment & plan)	-1.2	84.7	\$6.10
Average for Groups 1-5	-1.0	75.3	\$5.42
<b>Household impacts</b>			
Group 1 (food box + recipe pack)	-2.58	188.3	\$13.56
Group 2 (food box + recipe pack + text messages)	-3.15	230.0	\$16.56
Group 3 (food box + recipe pack + commitment & plan)	-4.04	294.9	\$21.23
Group 4 (recipe pack + text messages)	-2.16	157.7	\$11.35
Group 5 (recipe pack + commitment & plan)	-4.55	332.2	\$23.91
Average for Groups 1-5	-3.3	240.6	\$17.32

## 4.2 Health and well-being benefits of dietary changes

Research indicates that reductions in red and processed meat have a range of health and well-being benefits, in addition to lowering emissions.

Drew and colleagues<sup>46</sup> (noted in the section above) found that, when modelled out over the lifetime of the current New Zealand population, dietary changes involving varying degrees of reduction in red and processed meat would confer large population health gains (1.0-1.5 million quality-adjusted life-years) and health care system cost savings (NZ\$14 to 20 billion)<sup>47</sup>.

Drawing on their analysis<sup>48</sup>, we calculated the Quality Adjusted Life Year (QALY, expressed in weeks) and health system cost saving impacts of the dietary changes seen in this study.

<sup>45</sup> <https://www.zerocarbon.online/calculator-2/#planting>

<sup>46</sup> Drew, J., Cleghorn, C., Macmillan, A., and Mizdrak, A. (2020). Healthy and climate-friendly eating patterns in the New Zealand context. *Environmental Health Perspectives*, 128(1), 017007.

<sup>47</sup> It is noted that these health gains are not solely from a reduction in red and processed meat, but also changes in other dietary risk factors. The effects cover intakes of fruit, vegetables, red meat, processed meat, sugar-sweetened beverages, sodium, and percentage of polyunsaturated fat intake.

<sup>48</sup> Notably, the impacts of adopting one extra weekly vegetarian meal (DG2), excluding the impacts of adopting the broader New Zealand Dietary Guidelines (DG1)

Table 5 assumes the dietary changes between baseline and follow-up 2 persist for life, for all participants. Table 6 assumes that the changes persist for 10 per cent of participants.

Considering household-level effects, averaged across Groups 1-5, and assuming 100 per cent of the households maintain the reported dietary changes, the interventions resulted in an estimated average gain of 7.4 QALY, and health system savings of \$2,319 over their lifetime. If we assume only 10 per cent of participants maintain their reported dietary changes, there is a gain of 0.7 QALY and health system savings of \$232 per household (over their lifetime).<sup>49</sup>

A reduction in one meat-containing meal per week<sup>50</sup> adopted by half of the New Zealand population could add approximately 11,000 QALY to the lives of those making the changes and could reduce health system costs by up to an estimated \$186.2m.

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<sup>49</sup> These figures are approximations only. Accurately accounting for the way a change in consumption effects disease incidence in our specific sample requires running the multistate life-table (MSLT) model used by Drew et al. (2020). We have not run this model. As per footnote 45, these health gains are not solely from the reduction in red and processed meat, but also changes in other dietary risk factors.

<sup>50</sup> A reduction of -1.0 meat-containing dinners per week was the average reduction for Groups 1-5 combined between Baseline and Follow-up 2.

**Table 4. Quality Adjusted Life Years and health system cost savings, for dietary changes between Baseline and Follow-up 2, assuming 100% of participants maintain their dietary change for life**

	Individual impacts			Household impacts		
	Change in weekly meat-containing meals	Quality Adjusted Life Weeks	Health system costs saved	Change in weekly meat-containing meals	Quality Adjusted Life Weeks	Health system costs saved
Group 1 (food box + recipe pack)	-0.9	2.0	\$633.33	-2.58	5.8	\$1,815.55
Group 2 (food box + recipe pack + text messages)	-1.0	2.2	\$682.59	-3.15	7.1	\$2,216.66
Group 3 (food box + recipe pack + commitment & plan)	-1.2	2.8	\$865.55	-4.04	9.1	\$2,842.96
Group 4 (recipe pack + text messages)	-0.9	2.0	\$633.33	-2.16	4.8	\$1,520.00
Group 5 (recipe pack + commitment & plan)	-1.2	2.6	\$816.30	-4.55	10.2	\$3,201.85
Average for Groups 1-5	-1.0	2.3	\$726.22	-3.3	7.4	\$2,319.40

**Table 5. Quality Adjusted Life Years and health system cost savings, for dietary changes between Baseline and Follow-up 2, assuming 10% of participants maintain their dietary change for life<sup>51</sup>**

	Individual impacts			Household impacts		
	Change in weekly meat-containing meals	Quality Adjusted Life Weeks	Health system costs saved	Change in weekly meat-containing meals	Quality Adjusted Life Weeks	Health system costs saved
Group 1 (food box + recipe pack)	-0.9	0.2	\$63.33	-2.58	0.6	\$181.56
Group 2 (food box + recipe pack + text messages)	-1.0	0.2	\$68.26	-3.15	0.7	\$221.67
Group 3 (food box + recipe pack + commitment & plan)	-1.2	0.3	\$86.56	-4.04	0.9	\$284.30
Group 4 (recipe pack + text messages)	-0.9	0.2	\$63.33	-2.16	0.5	\$152.00
Group 5 (recipe pack + commitment & plan)	-1.2	0.3	\$81.63	-4.55	1.0	\$320.18
Average for Groups 1-5	-1.0	0.2	\$72.62	-3.3	0.7	\$231.94

<sup>51</sup> Note: These savings are over the lifecourse of the population. These results are also run with a 3% discount rate. For more detail please refer to source article: Reynolds, A. N., Mhurchu, C. N., Kok, Z., and Cleghorn, C. (2023). The neglected potential of red and processed meat replacement with alternative protein sources: Simulation Modelling and Systematic Review. *EClinicalMedicine*, 56, 101774.



# 5 Discussion

This study trialled a range of ways to support people to make small to moderate sized changes in how much meat they consume at dinner. The level of investment required by Auckland Council towards interventions varied, with the biggest investment being the provision of a My Plant Power box free of charge to approximately 300 households.

## 5.1 Impacts on dietary behaviour

All four interventions had a significant impact on the number of meat-containing dinners people ate, compared to the control group. For individuals in Groups 1 to 5, the decrease ranged between -0.9 and -1.2 meals per week, compared to -0.5 in the control group. The interventions impacted more than just the individual participants, and there were notable changes at the household level. For Group 1-5 households the changes between baseline and the first follow-up ranged from -2.8 to -4.1 meat-containing meals per week, compared to -1.4 for Group 6 (control).

When the control group was sent a recipe pack after the follow-up 1 survey, they significantly decreased their meat consumption and 'caught up' to the other intervention groups. This supports the idea that the recipe pack successfully supported a change in dietary behaviour. There are indications that signing a commitment and making a plan at the start helped people maintain their dietary changes over the trial.

## 5.2 Impacts on carbon emissions, QALYs and health care costs

The interventions had modest impacts on carbon emissions, Quality Adjusted Life Years, and future health care costs, in line with the modest dietary changes we sought to support. In addition to potentially acting as a catalyst for further individual change, small to moderate changes in dietary choices can have notable impacts when scaled across the population.

For example, if half of New Zealand's population (estimated to be 2,563,700)<sup>52</sup> choose to reduce one meat-containing meal per week for a year<sup>53</sup>, and assuming that individual carbon saving from reducing one meat-containing meal is 73 kg of CO<sub>2</sub>e, this action could result in saving 193,000,000 kg of CO<sub>2</sub>e or 193,000 metric tonnes of CO<sub>2</sub>e a year. That's the equivalent of planting over 1.6 million pine trees.<sup>54</sup>

In addition, the direct cost saving of the carbon avoided in the above extrapolation, at today's prices (\$72/tonne of CO<sub>2</sub>e<sup>55</sup>), would be \$13.9m.

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<sup>52</sup> Stats NZ provisional population estimates as at 30 Sept 2022 calculated New Zealand's population as 5,127,400. Half of this is 2,563,700.

<sup>53</sup> A reduction of -1.0 meat-containing dinners per week was the average reduction for Groups 1-5 combined between Baseline and Follow-up 2.

<sup>54</sup> <https://www.zerocarbon.online/calculator-2/#planting>

<sup>55</sup> Calculated from the spot price of \$72 per metric tonne of CO<sub>2</sub>e in New Zealand in early 2023. The reason the price of carbon is important is because it conveys the cost or benefits of greenhouse gas emissions and, in this case, the benefit

### 5.3 Implications for future campaigns

Several learnings from this trial could be applied to similar future campaigns aimed to support people to adopt lower carbon choices. In respect of future food focussed campaigns, it is recommended to build and improve on the recipe pack and commitment and plan-making as core interventions.

Any future work could focus on improving upon and/or rolling out a recipe pack as a foundational item. Although a large proportion of participants rated My Plant Power Box as very useful (see Section 3.5), there was no evidence in this trial that the combination of a My Plant Power box and recipe pack had any greater effect than the recipe pack on its own. Given the recipe pack cost approximately one tenth that of the My Plant Power box, it is a highly cost-effective approach. It is possible that there may have been a stronger impact if the My Plant Power box had been available for longer than for three meals over one week, however this remains untested.

There was some evidence that making a commitment and having a plan helped to solidify behaviour changes over time. These approaches could be improved by trialling different ways of eliciting commitments (e.g. public, written), and creating more personalised plan making approaches that help individuals and households addresses barriers.

The relative ineffectiveness of the text message reminders might be addressed by personalising when they are sent to occur just before the recipient usually does their supermarket shop. Tuesday at 4pm may not have been a timely enough reminder for participants, especially those who shop in the weekend.

Future approaches may test these core interventions against new approaches, such as practical cooking classes suggested in the *Sustainable Healthy Food Choices Research and Development Project*.

More needs to be known about how to ensure behaviour change momentum is maintained over the long-term, and how to support change amongst those who are less open to trying new ways of eating (noting that some openness was a pre-requisite for inclusion in the present trial).

### 5.4 Conclusion

This study provides valuable evidence of interventions that work to support moderate but meaningful shifts in dietary patterns. It provides evidence that appealing yet lower-cost interventions such as a vegetarian recipe pack can result in meaningful impacts.

Interventions like this, along with other climate actions undertaken by Auckland Council, central government, industry, businesses and communities will ultimately help with the implementation of the food priority action area in Te-Tāruke-ā -Tāwhiri: Auckland's Climate Plan.

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to the economy and society of emissions being avoided. For more information please see: Emissions pricing | Ministry for the Environment.

# Appendix 1: Sample characteristics

	Total participants who took part in the trial (including control group)		Participants who completed the first follow-up survey		Participants who completed the second follow-up survey*	
<b>Gender</b>	Number	%	Number	%	Number	%
Male	242	33.1	156	32.0	133	31.9
Female	484	66.1	326	66.8	279	66.9
Gender diverse	6	0.8	6	1.2	5	1.2
<b>Total</b>	<b>732</b>	<b>100.0</b>	<b>488</b>	<b>100</b>	<b>417</b>	<b>100</b>
<b>Age</b>	Number	%	Number	%	Number	%
Less than 18	1	0.1	1	0.2	0	0.0
18-19 years	2	0.3	1	0.2	1	0.2
20-24 years	16	2.2	8	1.6	7	1.7
25-29	39	5.3	30	6.1	25	6.0
30-34	71	9.7	48	9.8	44	10.6
35-39	114	15.6	83	17.0	77	18.5
40-44	98	13.4	69	14.1	61	14.6
45-49	97	13.3	69	14.1	56	13.4
50-54	76	10.4	49	10.0	38	9.1
55-59	84	11.5	54	11.1	47	11.3
60-64	46	6.3	26	5.3	20	4.8
65-69	38	5.2	23	4.7	21	5.0
70 and over	42	3.8	23	4.7	17	4.1
Prefer not to say	8	1.9	4	0.8	3	0.7
<b>Total</b>	<b>732</b>	<b>100.0</b>	<b>488</b>	<b>100.0</b>	<b>417</b>	<b>100</b>
<b>Household composition</b>	Number	%	Number	%	Number	%
Extended family (3+ generations living together)	38	5.2	15	3.1	13	3.1
Group flatting	17	2.3	16	3.3	16	3.8
Household with kids of mixed ages	27	3.7	15	3.1	14	3.4
Household with mainly older kids	97	13.3	69	14.1	56	13.4
Household with mainly pre-school kids	87	11.9	64	13.1	57	13.7
Household with mainly school age kids	187	25.5	136	27.9	112	26.9
Middle-aged couple	102	13.9	60	12.3	50	12.0
Middle-aged single	5	0.7	3	0.6	3	0.7
Older couple	80	10.9	49	10.0	41	9.8
Older single	4	0.5	2	0.4	2	0.5
Young couple	64	8.7	44	9.0	38	9.1
Something else	21	2.9	12	2.5	12	2.9
Prefer not to say	3	0.4	3	0.6	3	0.7
<b>Total</b>	<b>732</b>	<b>100.0</b>	<b>488</b>	<b>100.0</b>	<b>417</b>	<b>100.0</b>

- Includes only those who had completed the first follow-up survey prior to the second survey.

Local board	Total participants who took part in the trial (including control group)		Participants who completed the first follow-up survey		Participants who completed the second follow-up survey	
	Number	%	Number	%	Number	%
Rodney	33	4.5	18	3.7	15	3.6
Hibiscus and Bays	58	7.9	36	7.4	31	7.4
Upper Harbour	30	4.1	20	4.1	18	4.3
Kaipātiki	55	7.5	40	8.2	31	7.4
Devonport-Takapuna	39	5.3	26	5.3	23	5.5
Henderson-Massey	46	6.3	30	6.1	28	6.7
Waitākere Ranges	46	6.3	28	5.7	23	5.5
Whau	34	4.6	24	4.9	21	5.0
Albert-Eden	55	7.5	34	7.0	26	6.2
Waiheke	2	0.3	2	0.4	1	0.2
Waitematā	39	5.3	27	5.5	23	5.5
Puketāpapa	29	4.0	19	3.9	17	4.1
Maungakiekie-Tāmaki	41	5.6	29	5.9	28	6.7
Ōrākei	48	6.6	32	6.6	27	6.5
Howick	55	7.5	42	8.6	33	7.9
Māngere-Ōtāhuhu	23	3.1	13	2.7	13	3.1
Manurewa	23	3.1	14	2.9	12	2.9
Ōtara-Papatoetoe	16	2.2	10	2.0	6	1.4
Papakura	21	2.9	15	3.1	14	3.4
Franklin	38	5.2	28	5.7	26	6.2
Not available	1	0.1	1	0.2	1	0.2
<b>Total</b>	<b>732</b>	<b>100.0</b>	<b>488</b>	<b>100.0</b>	417	100.0
Ethnicity (multi choice)	Number	%	Number	%	Number	%
Māori	87	11.9	53	10.9	44	10.6
NZ European/Pakeha	479	65.4	331	67.8	285	68.3
Other European	68	9.3	39	8.0	34	8.2
Samoan	24	3.3	14	2.9	12	2.9
Tongan	4	0.5	1	0.2	1	0.2
Fijian	8	1.1	3	0.6	1	0.2
Niuean	5	0.7	3	0.6	2	0.5
Cook Islands	12	1.6	5	1.0	5	1.2
Other Pacific peoples	3	0.4	3	0.6	3	0.7
Southeast Asian	23	3.1	18	3.7	13	3.1
Chinese	50	6.8	36	7.4	30	7.2
Indian	35	4.8	25	5.1	22	5.3
Other Asian	18	2.5	14	2.9	12	2.9
African	6	0.8	3	0.6	2	0.5
Middle Eastern	2	0.3	2	0.4	1	0.2
Latin American	8	1.1	4	0.8	3	0.7
Other Ethnicity	26	3.6	18	3.7	14	3.4
Prefer not to say	23	3.1	12	2.5	12	2.9

- Includes only those who had completed the first follow-up survey prior to the second survey.

Number of people in household who usually eat the same meal as they do	Total participants who took part in the trial (including control group)		Participants who completed the first follow-up survey		Participants who completed the second follow-up survey *	
	Number	%	Number	%	Number	%
1	321	43.9	206	42.2	178	42.7
2	138	18.9	94	19.3	77	18.5
3	155	21.2	111	22.7	95	22.8
4	71	9.7	46	9.4	41	9.8
5 or more	47	6.4	31	6.4	26	6.2
<b>Total</b>	<b>732</b>	<b>100.0</b>	<b>488</b>	<b>100.0</b>	<b>417</b>	<b>100.0</b>

- Includes only those who had completed the first follow-up survey prior to the second survey.

# Appendix 2: Survey questions

## Live Lightly Different Dinners baseline survey

Kia ora! Thanks in advance for taking part in this survey. First, we have a few questions about you.

Q1: Are you:

- Male
- Female
- Gender diverse
- I prefer not to say

Q2: Which age group do you belong to?

- Less than 18 years
- 18-19
- 20-24
- 25-29
- 30-34
- 35-39
- 40-44
- 45-49
- 50-54
- 55-59
- 60-64
- 65-69
- 70-74
- 75+ years
- I prefer not to say.

Q3 Which ethnic group(s) do you belong to?

*We want to hear from Aucklanders of all backgrounds and this information helps us understand if there are groups that we need to hear more from. Please select all that apply.*

- NZ European / Pākehā
- Māori
- Other European
- Samoan
- Tongan
- Fijian
- Niuean
- Cook Islands
- Tokelauan
- Other Pacific peoples
- Southeast Asian
- Korean
- Chinese
- Indian
- Other Asian
- African
- Middle Eastern
- Latin American
- Other ethnicity

- I prefer not to say

Q4: How would you best describe your household?

- Young single
- Young couple
- Group flatting
- Household with mainly pre-school kids
- Household with mainly school age kids
- Household with mainly older kids
- Household with kids of mixed ages
- Extended family (3+ generations living together)
- Middle-aged single
- Middle-aged couple
- Older single
- Older couple
- Something else
- I prefer not to say

Q5: Including yourself, how many people usually live in your household?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 or more
- I prefer not to say

Q6: Now we would like to learn a little bit about you and your household's eating preferences.

How much influence do you have over what you and your household buys at the supermarket and cooks for dinner?

- A lot of influence
- Some influence
- No influence at all
- I don't know

Q7: Thinking about **lunch**... In the last week, how many times did you eat lunch?

- None - *skip to Q9*
- 1
- 2
- 3
- 4
- 5
- 6
- 7

Q8 ... And how many of these lunches **included meat**?

- None
- 1
- 2

- 3
- 4
- 5
- 6
- 7

Q9: **In general**, how many of your lunches per week **typically** include meat?

- None
- 1
- 2
- 3
- 4
- 5
- 6
- 7

Q10: Thinking about **dinner**...In the last week, how many times did you **eat dinner**?

- None – skip to Q12
- 1
- 2
- 3
- 4
- 5
- 6
- 7

Q11: How many of these dinners **included meat**?

- None
- 1
- 2
- 3
- 4
- 5
- 6
- 7

Q12: **In general**, how many of your dinners per week **typically** include meat?

- None
- 1
- 2
- 3
- 4
- 5
- 6
- 7

Q13: How confident are you cooking vegetarian meals?

- Extremely confident
- Very confident
- Somewhat confident
- Not very confident
- Not confident at all



Q14: How many people who live in your household usually eat the same meal for dinner as you?  
*If you eat with others, but cook separate meals, please answer 'No one else'.*

- No one else
- 1 other person
- 2 other people
- 3 other people
- 4 other people
- 5+ other people
- Not applicable - I live alone

Q15: How open are you (and any people you usually eat with) to trying one or two more vegetarian dinners each week?

- Very open
- Somewhat open
- Not open at all – *skip to end*

Q16: You've told us you could be open to trying some more vegetarian dinners so we would like to invite you to be part of the Different Dinners Trial being run by the Live Lightly Team! The Live Lightly Team aims to engage and enable Aucklanders to make everyday lifestyle choices that are healthy for them and the planet. The Different Dinners trial is about enabling Auckland households to try meals they don't usually cook.

By simply providing a few details the Live Lightly Team could be sending one or both of the following giveaways to you: A My Food Bag voucher for a FREE My Plant Power bag (which contains dinner for 3 nights for four people) / a plant-powered recipe booklet, a meal planner fridge magnet, and handy shopping list for you to make your own shopping plan

*Please note: There are limited spaces in this trial, so get in quick by completing this survey if you would like to participate. You may be randomly allocated a giveaway after answering a few more questions.*

*If you miss out on a giveaway today, we may be able to send you a giveaway in about a month.*

Are you interested in being part of Live Lightly's Different Dinners trial?

- Yes - *move to Q17*
- No - *skip to end*

Q17: Great to hear you're interested in being part of the Different Dinners trial! Before we can confirm your participation, we just have a few more questions to make sure you can take part in all aspects of the trial.

After you have received one or more giveaways, the Live Lightly Team will follow-up with two 1-minute surveys over the next two months to find out how you found them. Are you happy to complete both of these 1-minute surveys?

- Yes - *move to Q18*
- No - *skip to end*

Q18: The Live Lightly Team will need your postal address to send you the plant-powered recipe booklet, a meal planner fridge magnet, and handy shopping list for you to make your own shopping plan. Are you happy to share your postal address with the Live Lightly Team?

*Please note, any personal information you give in this survey will only be used for the purpose of conducting the Different Dinners trial, it will not be used for any other reason.*

- Yes - move to Q18
- No - skip to end

Q18: Please enter **your address** so the Live Lightly Team can send you your giveaway.

Q19: Please provide **your name** so we can address the giveaway to you:

*Display Q 20 if GroupSelection = 4*

Q20 Depending on the giveaway you receive, the Live Lightly Team might need to use your mobile phone number to send you one text message per week for the next four weeks with a popular recipe suggestion or a helpful tip. Are you happy to share your **mobile number** with the Live Lightly Team? *Please note, any personal information you give in this survey will only be used for the purpose of conducting the Different Dinners trial, it will not be used for any other reason.*

- Yes
- No – skip to end
- Not applicable - I do not have a mobile number – skip to end

*Display Q 24 if GroupSelection = 1,2,or 3*

Q21 Depending on the giveaway you receive, the Live Lightly Team might need to use your mobile phone number to: send you one text message per week for the next four weeks with a popular recipe suggestion or a helpful tip / contact you if you receive the My Food Bag giveaway and something goes wrong with the delivery Are you happy to share your mobile number with the Live Lightly Team? *Please note, any personal information you give in this survey will only be used for the purpose of conducting the Different Dinners trial, it will not be used for any other reason.*

- Yes – move to Q22
- No – skip to end
- Not applicable - I do not have a mobile number – skip to end

Q22: Please enter your mobile number below:

*Questions for those who were in Group 4 – receiving a My Food Bag*

Q23: If you receive a My Food Bag voucher for a FREE My Plant Power food bag:

Do you agree to place your order by midnight tomorrow (Thursday 22 September), and to schedule your delivery for no later than Monday 3 October?

- Yes I agree
- No I do not agree

Do you agree to schedule your delivery within the next two weeks?

- Yes I agree
- No I do not agree

Do you agree to use the food bag for your household only?

- Yes I agree
- No I do not agree

Do you agree to not give away the food voucher to someone else?

- Yes I agree
- No I do not agree

If any of these questions answered No, I do not agree, skip to end

If you receive a voucher for a FREE My Plant Power food bag you will need to set-up a My Food Bag account to redeem the voucher (or already have an account). My Food Bag is a weekly or fortnightly subscription service. After you've ordered your FREE My Plant Power food bag, you can cancel your subscription from Monday 26 September, so you don't get charged for the next delivery (we will send a reminder to cancel).

Are you happy to set-up a My Food Bag account (or use your existing one) to receive a FREE My Plant Power food bag?

- Yes - *move to next question*
- No - *skip to end*

To set up a My Food Bag account you will need to enter the following information: Your credit or debit card details, and your postal address *Remember, My Food Bag won't charge you for the first bag because this bag is free with the voucher as part of the trial. Once you've ordered the free bag, you can cancel your subscription from Monday 26 September.*

Are you still happy to set-up a **My Food Bag account** (or use your existing one) to receive a voucher for a FREE My Plant Power food bag?

- Yes - *move to next question*
- No - *skip to end*

**Q29: Now it's time to find out whether you will receive a giveaway!** Click the 'next' button to find out!

*There are limited spaces in the trial and not everyone will receive a giveaway. If you miss out on a giveaway today, we may be able to send you a giveaway in about a month.*

If any of these questions answered No, I do not agree, skip to end

*Message for those who were in Group 1*

Q30 Congratulations, you will be receiving: a **FREE My Plant Power** bag (which contains dinner for 3 nights for four people), and a plant-powered recipe booklet, a meal planner fridge magnet, and a handy shopping

list for you to make your own shopping plan Please click 'Finish' to submit your survey, and get your voucher code.

*If in Group 1 and household size = 2:*

Q31 **Food-saving tips for smaller households:** You may choose to freeze leftovers to eat another day, or you might like to invite someone over to share a meal with you!

*If in Group 1 and household size = 5 or more:*

Q32 **Food-bulking tips for larger households:** You might want to add some extra ingredients to your meal to make it go further. Depending on the recipe, this might look like doubling the vegetables (e.g. 2 broccolis instead of 1), adding an extra tin of beans, or cooking up some more rice.

*Message for those who were in Group 2*

Q33 Congratulations, you will be receiving: a **FREE My Plant Power** bag (which contains dinner for 3 nights for four people), and a plant-powered recipe booklet, a meal planner fridge magnet, and a handy shopping list for you to make your own shopping plan Please click 'Finish' to submit your survey, and get your voucher code.

*If in Group 2 and household size = 2:*

Q34 **Food-saving tips for smaller households:** You may choose to freeze leftovers to eat another day, or you might like to invite someone over to share a meal with you!

*If in Group 2 and household size = 5 or more:*

Q35 **Food-bulking tips for larger households:** You might want to add some extra ingredients to your meal to make it go further. Depending on the recipe, this might look like doubling the vegetables (e.g. 2 broccolis instead of 1), adding an extra tin of beans, or cooking up some more rice.

*Message for those who were in Group 3*

Q36 Congratulations, you will be receiving: a **FREE My Plant Power** bag (which contains dinner for 3 nights for four people), a plant-powered recipe booklet, a meal planner fridge magnet, and a handy shopping list

for you to make your own shopping plan

Please click 'Next' to continue the survey and get your voucher code.

*If in Group 3 and household size = 2:*

Q37 **Food-saving tips for smaller households:** You may choose to freeze leftovers to eat another day, or you might like to invite someone over to share a meal with you!

*If in Group 3 and household size = 5 or more:*

Q38 **Food-bulking tips for larger households:** You might want to add some extra ingredients to your meal to make it go further. Depending on the recipe, this might look like doubling the vegetables (e.g. 2 broccolis instead of 1), adding an extra tin of beans, or cooking up some more rice.

*Message for those who were in Group 4*

Q39 Congratulations, you will be receiving: a plant-powered recipe booklet a meal planner fridge magnet, and a handy shopping list for you to make your own shopping plan *Please click 'Finish' to submit your survey.*

*Message for those who were in Group 5*

Q40 Congratulations, you will be receiving: a plant-powered recipe booklet, a meal planner fridge magnet, and a handy shopping list for you to make your own shopping plan *Please click 'Next' to continue the survey.*

Q42 **Congratulations, we are almost there!** We have a few more questions before the end of the survey.

Studies show that making a plan can help us follow through on the things we'd like to do.

Would you be willing to make a plan to **add one extra vegetarian dinner** per week?

- Yes
- No

*Display Q 43 and 44 if Q42 = yes*

Q43 Please tick the below to commit to adding one extra vegetarian dinner per week for the next four weeks.

- I commit to adding one extra vegetarian dinner per week for the next four weeks

Q44 Some people find it helpful to make an 'IF-THEN' plan, which identifies a likely barrier to achieving goals and then helps to avoid that barrier.

*For example, "IF I usually order meat-based mains when out at a restaurant, THEN I will look up the menu online before I arrive and will decide in advance which vegetarian main I will get."*

Please select the IF-THEN plan you most prefer:

- **IF** I am not sure what vegetarian meal(s) to cook this week **THEN** I will look at the vegetarian recipe booklet before I go shopping and choose one extra vegetarian meal for the week
- **IF** I am likely to forget which ingredients to buy at the supermarket **THEN** I will make a list with all the ingredients for my new vegetarian meal.

*Message for those who were in Group 6 (Control group)*

Q41 You have been randomly assigned to group who will **receive a small giveaway in about a month!**

*Please click '**Finish**' to submit your survey.*

SURVEY END



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