FOOD STANDARDS Australia New Zealand
Te Mana Kounga Kai – Ahitereiria me Aotearoa

P1055 – Consumer Survey Report

Consumers' perceptions of and attitudes towards genetically modified foods

December 2022

Executive summary

This report presents findings of a quantitative survey of consumers' perceptions of and attitudes towards genetically modified foods carried out in June 2022 to inform Proposal P1055 – Definitions for gene technology and new breeding techniques. The survey complements the qualitative focus group research and literature review undertaken in June 2021 by testing the findings on a large, nationally representative sample of Australian and New Zealand consumers.

The survey was conducted online by Ipsos Public Affairs Ltd through their 'Fast Facts' platform. It is based on a nationally representative sample of 1,000 Australians and 500 New Zealanders aged 18 years or older, with quotas for age, sex, and (Australia only) location. Data analysis was carried out by FSANZ.

Key findings of the survey include:

- **Most Australians and New Zealanders have confidence in the food supply.**
  68.2% of respondents had confidence that the food they buy in shops and supermarkets is safe to eat. Being male, tertiary-educated and trusting of food-related professions and institutions was significantly associated with having a higher level of confidence in the food supply.
- **GM foods are not a top-of-mind food safety issue.**
  The vast majority (80.5%) of respondents did not choose GM foods in their top 3 food safety issues. This is despite a substantial minority (42.1%) believing that GM whole foods such as fruit and vegetables were already for sale in Australia/New Zealand when they are not.
- **Nearly half of respondents had some level of concern regarding GM food.**
  When asked directly about concerns regarding GM foods, 46.7% of respondents indicated they had some level of concern. Key concerns about GM foods were safety to humans, the trustworthiness of GM producers or scientists, environmental impact and animal welfare.
- **The uses to which GM technology is put matters.**
  Support for GM foods generally was mixed, with 30% supportive, 30% neutral and 40% opposed. However, when asked about specific applications of GM foods that had an obvious benefit for society, the level of opposition was lower (12.2% – 25.4%) and the level of support higher (42.8% – 58.9%). When asked about a specific application that was presented as having primarily industry benefits, level of support reverted to baseline.
- **People have a low level of knowledge about GM foods.**
  People had relatively low self-reported knowledge of GM foods, and this was borne out by objective measures of understanding. However, of those who did have some knowledge, there was more awareness of genome editing as a concept than older forms of genetic modification. Once other factors were controlled for, level of knowledge was not significantly associated with level of support for GM foods.

- **Trust is the most important determinant of support for GM foods.** Although the survey validated the literature suggesting that being younger, male and tertiary-educated is associated with higher levels of support for GM, trust in GM producers and scientists was a much better predictor of level of support for GM foods than these demographic factors. Once other factors were controlled for, trust in the general food supply was not significantly associated with support for GM foods.
- **Government websites were the preferred source of information about GM foods.** Nearly half of respondents (47.1%) wanted more information about GM foods, while 13.6% were unsure. Of those who desired more information, government websites were the most frequently chosen preferred communication method, with just over half of respondents selecting this option (51.6%).

Implications

While government authorities, including FSANZ, have a significant role to play in upholding consumer confidence in the general food supply, the survey findings suggest that consumer support for GM foods will in large part depend on the GM industry building and maintaining trust with consumers directly. While GM foods are not currently a top three food safety issue for most consumers, this may in part be a function of the absence of GM whole foods in the Australian/New Zealand marketplace (despite a sizeable minority of consumers believing that they are already for sale). There is evidence of substantial variability in consumers' top food safety concerns across different comparable surveys, suggesting that GM foods could easily become a higher priority issue for consumers in future.

Consumers' concerns and varying responses to the scenarios presented suggests that building and maintaining consumer trust could include ensuring that scientists and producers are understood to be operating in good faith, and that products developed with GM techniques have an explicit benefit for wider society beyond industry (including the environment and/or animal welfare). As a trusted supplier of information, government agencies have a potential role to play in providing unbiased information to help consumers learn more about genetic modification and the range of techniques that are emerging.

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Introduction

This report presents findings of a quantitative survey of consumers' attitudes and perceptions of genetically modified foods carried out in June 2022 to inform Proposal P1055 – Definitions for gene technology and new breeding techniques. The survey complements the qualitative focus group research and literature review undertaken in June 2021 by testing the findings on a large, nationally representative sample of Australian and New Zealand consumers.

The objective of the study was to gain an understanding of Australian and New Zealand consumers':

- Level of trust in government and food manufacturers to maintain a safe food supply in Australia and New Zealand;
- Perceived level of self-knowledge of genetically modified foods;
- Risk perceptions of genetically modified foods, including their relative level of concern *vis a vis* other food safety issues;
- Overall level of support for genetically modified foods as well as their level of support for specific scenarios of genetically modified foods; and
- Desire to know more about genetically modified foods, and through what channels.

The survey findings provide valuable context to inform P1055 and will be used to better target any communication and education material.

Background

Proposal P1055 seeks to amend the definitions for 'gene technology' and 'food produced using gene technology' in the Australia New Zealand Food Standards Code (the Code). These definitions determine what foods are classed as genetically modified (GM) food under the Code. Currently, all GM food available for sale in Australia and New Zealand must have been assessed for safety by FSANZ and be expressly permitted and listed in relevant Code schedules. FSANZ is proposing to update the definitions to make them clearer and better able to accommodate food produced by existing, emerging and future genetic technologies.

FSANZ commenced this proposal in early 2020, following the Review of food derived using new breeding techniques. New breeding techniques, or NBTs, are new methods being used to change the genetic make-up of plants, animals and microbes (e.g. bacteria and yeast), which are then used for food. The most commonly known NBT is genome editing, which can make changes more precisely than older methods of genetic modification. The review recommended amending the Code definitions for 'food produced using gene technology' and 'gene technology' after finding they lack clarity and are not fit-for-purpose, resulting in uncertainty about the assessment and approval requirements for NBT foods. The review also identified the need to regulate NBT foods in a manner that matches the risk that they pose.

Key literature

In 2021, FSANZ commissioned two pieces of research on consumers' perceptions of and attitudes towards GM foods and NBTs:

- A systematic literature review on consumers' awareness, knowledge, risk perceptions and behaviours in relation to the use of NBTs, including genome editing, for food production; and
- New empirical research using focus groups to investigate consumer awareness, knowledge, and attitudes to NBTs in Australia and New Zealand.

In addition, two key pieces of research were published since the literature review was conducted. These are:

- The Office of the Gene Technology Regulator's community attitudes report for 2021; and
- The UK Food Standards Agency's research on consumer perceptions of genome edited food.

These studies are briefly summarised below, with further details in the discussion following the key results from the survey.

Literature Review – Australian National University (Grant et al. 2021)

FSANZ commissioned the Australian National Centre for the Public Awareness of Science at the Australian National University to carry out a systematic literature review on the awareness and knowledge, risk perceptions, and behavioural responses of consumers to the use of NBTs in the production of food. The review found 146 relevant studies, primarily in the international literature.

The literature review found that the evidence in this space is both limited and flawed, with methodological, framing, and other biases. However, the available evidence suggested that, while awareness and knowledge of NBTs is low, attitudes and behavioural responses to NBTs are slightly more positive than toward older forms of genetic modification and slightly more negative than toward conventional breeding techniques. The review found that there was a lack of research around consumers' values, policy considerations, or the broader context within which people come to understand technologies such as NBTs.

You can read the full literature review on the Proposal P1055 webpage. Further findings from the literature review will be discussed in the context of the findings from the quantitative survey.

Focus Groups – University of Adelaide (Ankeny and Harms 2021)

FSANZ commissioned the Food Values Research Group at the University of Adelaide to conduct focus groups to gain a deeper understanding of Australian and New Zealand consumers' awareness and knowledge of NBTs. The research also aimed to determine whether there were differences in the ways in which community members view NBTs compared to older techniques of genetic modification. Two asynchronous online focus groups were held with 79 participants (49 Australia, 30 New Zealand) over three days.

The focus group research found that participants had a moderately supportive view of genome editing following the viewing of an educational video that described genome editing as a new technology with various medical, plant, and animal-based applications. When presented with a series of scenarios that each described a potential application of a form of gene technology as part of the food supply, the majority of participants were generally positive. However, a key finding of the focus groups was that, even when participants were generally positive, they still had questions and/or concerns that they wanted to be addressed.

You can read the report from the focus groups on the Proposal P1055 webpage. Further findings from the focus groups will be discussed in the context of the findings from the quantitative survey.

Community attitudes towards gene technology – Office of the Gene Technology Regulator (Donnelly et al. 2021)

The Office of the Gene Technology Regulator (OGTR) regularly conducts surveys of consumer attitudes towards gene technology in order to analyse current attitudes and trends over time. The survey was conducted online with a nationally representative sample of 2,209 Australians, with quotas set for states and territories, rural and metropolitan, and sex.

In the latest report, published in 2021, respondents were divided into four broad attitudes: those who are very supportive of GM (18%); those who moderately support GM and its applications but have some reservations (52%); those who are moderately opposed to GM but open to changing their mind (19%); and those who are implacably opposed (11%).

You can read the full report at the OGTR's Community attitudes 2021 report webpage. Further findings from the latest survey will be discussed in the context of the findings from the quantitative survey.

Consumer perceptions of genome edited food – UK Food Standards Agency (Ipsos MORI 2021)

The UK Food Standards Agency (FSA) commissioned Ipsos MORI to conduct a mixed methods social science research project on consumer perceptions of genome edited food to inform a review of the regulation on genome editing. The research project involved online workshops with 80 participants and a survey of 2,066 consumers representative of England, Wales, and Northern Ireland.

The study found that consumers tended to have low awareness and knowledge of genome edited food, but tended to find it more acceptable than GM food because they perceived it as safer and more natural. Generally, more informed consumers were more accepting of genome edited food, despite some still having concerns. These concerns focused on safety risk to humans and animal welfare. Consumers were also concerned that large corporations' pursuit of profit might undermine the potential benefits that genome edited foods represent for consumers, animals, and the environment unless regulated carefully.

You can read the full report on the UK FSA's webpage. Further findings from the project will be discussed in the context of the findings from the quantitative survey.

Methods

FSANZ commissioned Ipsos Public Affairs Pty Ltd (hereafter Ipsos) to conduct a rapid digital survey of a nationally representative sample of 1,000 Australians and 500 New Zealanders. The survey was carried out using Ipsos's 'Fast Facts' digital platform, and was nationally representative in terms of age, sex, and (Australia only) location. Ipsos provided de-identified data to FSANZ for analysis. The report was peer-reviewed by an external academic with expertise in statistical analysis. Peer review comments were considered and incorporated into the final version of the report.

Survey instrument

The survey instrument was developed through an iterative process involving Ipsos and FSANZ staff with expertise in genetic modification and NBTs and social science. Initial survey questions were adapted from the qualitative research on NBTs, submissions made to the P1055 first Call for Submissions process, and existing international and Australian surveys. The resulting survey instrument was piloted among 20 associates of FSANZ staff, and changes were made to the instrument following feedback. Changes included revisions of question wording to make them clearer, and adding two additional scenarios in order to provide a more diverse range of GM applications.

The final survey instrument consisted of 21 questions, incorporating demographic information, measures of trust in government and the food system, top food safety concerns, as well as attitudes towards and knowledge of GM foods, and preferred information sources. The survey instrument is available at Appendix 1: Survey Instrument.

The survey was designed to examine consumers' attitudes towards 'genetically modified foods' rather than attempting to distinguish between older forms of genetic modification and newer forms that are sometimes collectively known as 'New Breeding Techniques'. This was because both the literature review (Grant et al. 2021) and the focus groups (Ankeny and Harms 2021) found that consumers do not tend to conceptually separate NBTs from other forms of genetic modification.

Sampling

1,000 Australians and 500 New Zealanders aged 18 years or older were recruited for this survey via Ipsos's online panel of respondents. Quotas were set for three demographic variables in the Australian sample (age group, sex, State/Territory) and for two demographic variables in the New Zealand sample (age group, and sex) to ensure national representation on these variables.

Data collection started on 21 June 2022, and was completed on 25 June 2022. A final sample of 1,500 respondents was obtained (1,000 from Australia and 500 from New Zealand).

Analysis

Analysis was carried out using IBM SPSS Statistics software, Version 28.

Normality of the data was tested using visual inspection of histograms.[1] In all cases where data were not normally distributed, log transformations failed to normalise the data. Descriptive statistics (percentages, mean ranks, means, standard deviations) are reported where appropriate. Differences in means/mean ranks were tested using ANOVAs/t-tests or non-parametric equivalents with Bonferroni-corrected p values/alphas.[2]

Several regression models were used to test associations between multiple predictor variables (e.g., demographic factors) and dependent variables of interest (e.g., consumer support for GM foods). The regression models tested whether a given variable *uniquely* predicts a dependent variable, while controlling for all other predictor variables in the model (e.g., whether sex predicts level of support for GM foods when age and education are controlled for). For each regression analysis, relevant statistical assumptions were tested and met (e.g., no multicollinearity, no heteroscedasticity or outliers, linearity of the logit for continuous variables, etc., see Field, 2018).

When the dependent variable of interest was measured on a continuous scale, we used hierarchical multiple regression analysis. Hierarchical regression was used because associations between some variables was expected based on the previous literature, and therefore these were added to the model first. The expected associations are described for each model in the findings. When associations were more exploratory, these predictor variables were added last to the model. When categorical predictor variables had more than two categories (e.g., age), we created dummy variables and nominated a reference category. We also used a bootstrapping procedure where appropriate to account for non-normally distributed residuals. Bootstrapping was conducted using 2,000 samples (Field, 2018).[3]

When the dependent variable of interest was categorical (e.g., perceived knowledge of GM foods), we used multinomial logistic regression[4]. Pearson's Chi square tests were also used to test associations between categorical variables where analyses were more exploratory and it was more informative to compare many categories, rather than select one reference category as is required in logistic regression. Compared to the regression models, chi square tests are more descriptive (as opposed to predictive), as they do not control for other variables. The nature of the chi-square associations were tested with a series of pairwise z-tests with p-values adjusted according to the Bonferroni method, with significance set at the .05 level. The SPSS output for z-tests does not report exact p values, only where p values

[1] We did not test normality using Shapiro Wilk tests, as Shapiro Wilk tests are unreliable with large samples (n >300) because they are too sensitive (Field, 2018; Kim, 2013). Normality was assessed for each group relevant to the analysis (e.g., when comparing outcome measures between Australian and New Zealand participants, normality was assessed for Australian and New Zealand groups separately, rather than for the data overall).

[2] Means and standard deviations are appropriate for describing normally-distributed data, whereas mean ranks are appropriate for non-normally distributed (or skewed) data based on non-parametric tests.

[3] Bootstrapping is where SPSS takes 2000 samples of the data in order to estimate how it is distributed, given that a normal distribution cannot be assumed.

[4] We did not use ordinal logistic regression because the data violated the proportional odds assumption, as determined by the test of parallel lines in SPSS. Proportional odds is a fundamental assumption of ordinal regression analysis, where it is assumed that each independent variable has an identical effect at each cumulative split of the dependent variable.

are < 0.05. Chi-square tests were not possible when cell counts were too low (i.e., when more than 20% of the expected counts were less than five; Field, 2018).

Sample description

Sex, age, and education level

Table 1 summarises the sex, age, and education demographics of the sample.[5]

The sample was nationally representative by age and sex, as quotas were applied for these demographic characteristics.

Although quotas were not applied for level of educational attainment, a good spread of education levels was achieved in the sample. However, for the Australian sample there is evidence of an under-sampling of people with a High School level of education or below, and an over-sampling of tertiary-educated respondents. However, this could be in part due to the fact that Australian census numbers include people from 15 years, whereas the current survey only includes people aged 18 years and above. For the New Zealand sample, there is evidence of an under-sampling of people with a TAFE-level of education and an over-sampling of all other education levels (see Figure 1 below).

Table 1: Sex, age, and education level of respondents

		Australia		New Zealand		Total	
		Number	Percent	Number	Percent	Number	Percent
Sex	Male	490	49.0%	245	49.0%	735	49.0%
	Female	510	51.0%	255	51.0%	765	51.0%
Age Group	18-34	300	30.0%	155	31.0%	455	30.3%
	35-49	260	26.0%	125	25.0%	385	25.7%
	50-64	230	23.0%	120	24.0%	350	23.3%
	65-99	210	21.0%	100	20.0%	310	20.7%
Education Level	High School or below	273	27.3%	146	29.2%	419	27.9%
	TAFE	303	30.3%	129	25.8%	432	28.8%
	Undergraduate	266	26.6%	144	28.8%	410	27.3%
	Postgraduate	158	15.8%	81	16.2%	239	15.9%

[5] Sex and age group were asked by Ipsos prior to participants' commencement of FSANZ's survey instrument. As these questions were used to establish quotas for a nationally representative sample, sex was limited to the binary of male and female. In addition, FSANZ asked participants for the highest level of education they had completed. Seven options were presented, which have been collapsed into four education level categories.

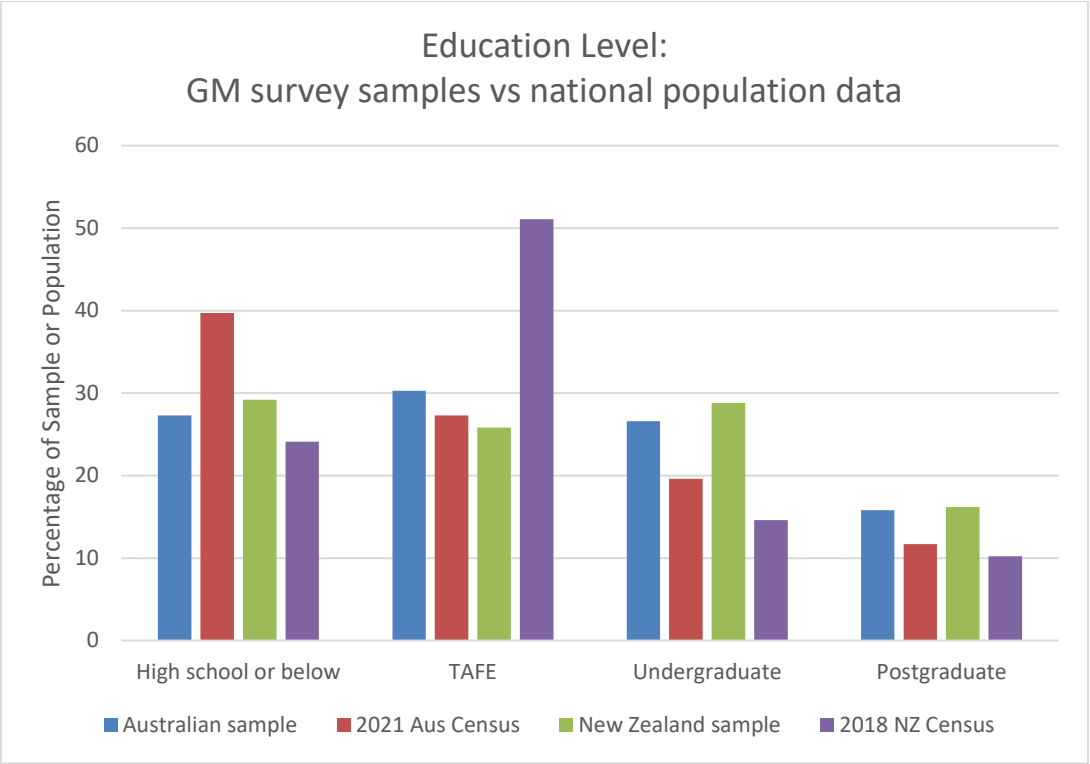

Figure 1: Sampled education level vs national population data for Australia and New Zealand. National data from Australia is sourced from the 2021 Australian census, and includes all people aged 15-74 years (ABS 2022). National data for New Zealand is sourced from the 2018 New Zealand census, and includes all people aged 15+ years (Stats NZ 2020).

Cultural background

Participants were asked how they would describe their cultural background. They were presented with 10 categories, and could select all that applied. In addition, 'Other' and 'Prefer not to say' were available as options, with a free text field for those who selected 'Other'. All answers in response to 'Other' were able to be recoded into one of the existing categories. Participants who selected *only* 'Australian' or 'New Zealander' were recoded into 'Anglo-Celtic or European'. The results of this recoding are described in Table 2 below.

The majority (79.9%) of respondents had an Anglo-Celtic or European background. 19.0% of the sample had a non-European background, and 1.1% preferred not to answer. The next highest cultural background after European was Asian (10.9%). 1.8% of the Australian sample was Aboriginal and/or Torres Strait Islander; 9.4% of the New Zealand sample was Māori, and 2.6% of the New Zealand sample was Pacific Islander.

There is evidence of an over-sampling of Anglo-Celtic and European background in New Zealand and a slight under-sampling in Australia. There is also evidence of an under-sampling of Aboriginal and Torres Strait Islanders, Māori, Pacific Islanders, and Asians (see Figure 2 below). People from the Middle East, Latin America, and/or Africa were slightly over-sampled in New Zealand.

Table 2: Cultural background of respondents

	Australia		New Zealand		Total	
	Number	Percent	Number	Percent	Number	Percent
Anglo-Celtic or European	827	82.7%	362	74.2%	1198	79.9%
Aboriginal and/or Torres Strait Islander	18	1.8%	3	0.6%	21	1.4%
Māori	6	0.6%	47	9.4%	53	3.5%
Pacific Islander	5	0.5%	13	2.6%	18	1.2%
Asian	109	10.9%	54	10.8%	163	10.9%
African	8	0.8%	9	1.8%	17	1.1%
Hispanic or Latinx	15	1.5%	6	1.2%	21	1.4%
Middle Eastern	16	1.6%	3	0.6%	19	1.3%
Prefer not to say	10	1.0%	6	1.2%	16	1.1%

* As respondents were able to select multiple responses, percentages do not add up to 100.

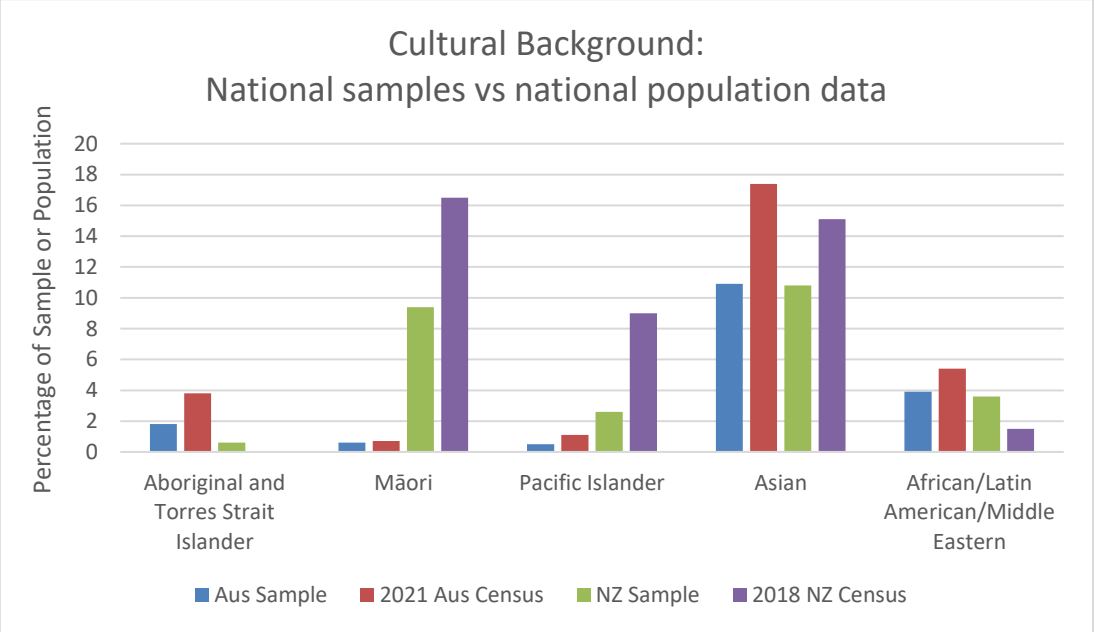

Figure 2: Cultural backgrounds sampled for the GM survey vs national population data.
Sources: National population data from Australia is sourced from the 2021 Australian census, Ancestry by state and Territory (ABS 2022a). National population data for New Zealand is sourced from the 2018 New Zealand census (NZ Stats 2020).
NB: European ancestry has been excluded from the graph as it made it difficult to read due to the small sample and population sizes of the other cultural backgrounds in comparison.

Location

Ipsos asked participants for location information prior to commencing FSANZ's survey instrument. Quotas were applied for State and Territory in Australia to ensure a nationally representative sample (Table 3 below). In addition, metro or regional location was requested within Australia, with nationally representative results (Table 4 below). Quotas were not applied for location in the New Zealand sample, and there is evidence of an over-sampling of people from the Otago region in particular (Table 5 below).

Table 3: State or Territory Location of Australian Participants

		Number	Sample Percent	2021 Census
Australian State or Territory	New South Wales	321	32.1%	31.4%
	Victoria	261	26.1%	25.5%
	Queensland	200	20.0%	20.5%
	South Australia	73	7.3%	7.0%
	Western Australia	100	10.0%	10.7%
	Tasmania	20	2.0%	2.2%
	Northern Territory	5	0.5%	1.0%
	Australian Capital Territory	20	2.0%	1.8%
	Total	1000	100.0%	100%

Table 4: Metro or Regional Location of Australian Participants

		Number	Percent	2021 Census*
Metro/Regional Australia	Metro	705	70.5%	71.7%
	Regional	295	29.5%	28.3%

* Data from the 2021 census is drawn from the population located in 'major cities' (ABS 2022b).

Table 5: Regional Location of New Zealand Participants

		Number	Percent	2018 Census*
New Zealand Region	Auckland	161	32.2%	33.4%
	Canterbury	71	14.2%	12.8%
	Marlborough	4	0.8%	1.0%
	Nelson	4	0.8%	1.1%
	Otago	40	8.0%	4.8%
	Southland	10	2.0%	2.1%
	Tasman	4	0.8%	1.1%
	West Coast	2	0.4%	0.7%
	Bay of Plenty	33	6.6%	6.6%
	Gisborne	6	1.2%	1.0%
	Hawke's Bay	12	2.4%	3.5%
	Manawatu-Whanganui	29	5.8%	5.1%
	Northland	14	2.8%	3.8%
	Taranaki	6	1.2%	2.5%
	Waikato	42	8.4%	9.7%
	Wellington	62	12.4%	10.8%
	Total	500	100.0%	100%

* Data is drawn from 'regional council area of usual residence one year ago (2017)' (Stats NZ 2022).

Socio-Economic Status

Participants were asked to provide their postcode. Postcodes for Australian residents were compared against the Australian Bureau of Statistics' (ABS) 2016 Socio-Economic Index for Areas (SEIFA) Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) to

provide a score. This score ranks areas on a continuum from most disadvantaged to most advantaged. For more information, see the ABS's Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia, 2016. The IRSAD is divided into deciles; for ease of interpretation and to facilitate analysis, these have been collapsed into three SES categories: Low (Deciles 1-3); Medium (Deciles 4-7); and High (Deciles 8-10). The results of this categorisation are in Table 6 below. As seen in Table 6, there is evidence of some over-sampling of the high SES population, and an under-sampling of the medium SES population in Australia.

Table 6: Socio-economic status of Australian postal area

		Number	Percent	IRSAD 2016*
SES Area	Low	219	21.9%	22.4%
	Medium	343	34.4%	37.9%
	High	436	43.7%	39.7%

* Data calculated from usual resident population in the Postal Area Index of Relative Socio-economic Advantage and Disadvantage, 2016 (ABS 2018).

New Zealand does not have an equivalent postcode-level index of advantage or disadvantage, so a similar analysis was not able to be undertaken among the New Zealand sample population.

Results

Trust in government and the food systems

Q1. Trust in professionals and institutions

Respondents were asked to rate "how much do you trust the following people and institutions to do what is right" on a seven point scale, with 1 meaning "Do not trust at all" and 7 meaning "Trust completely".

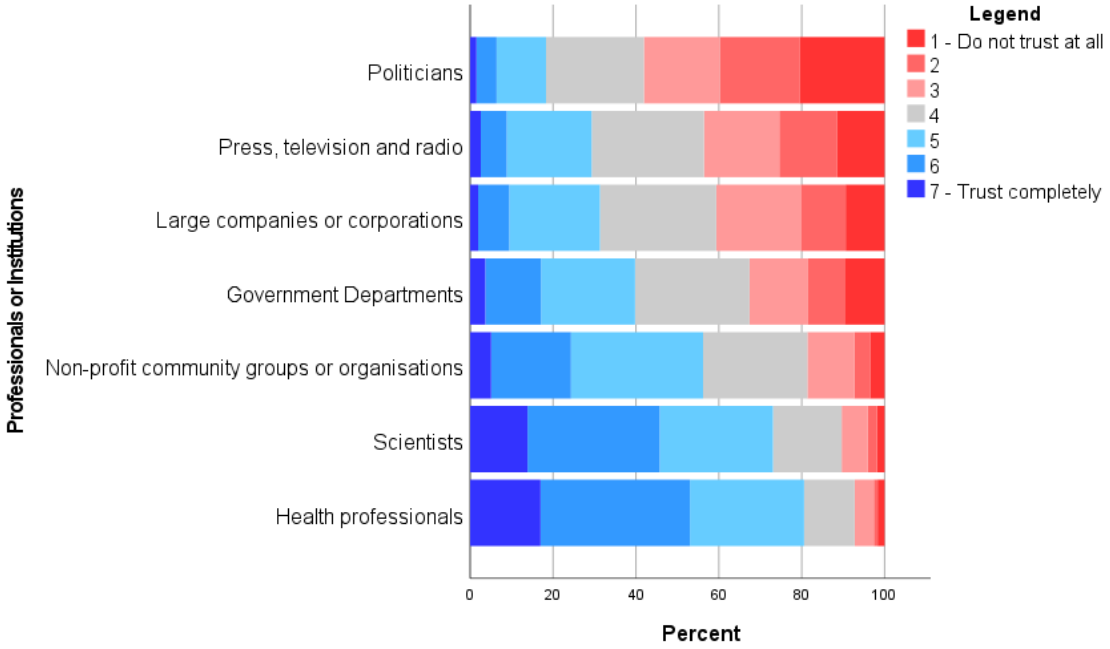

Figure 3: Level of trust in professionals and institutions
Q: How much do you trust the following people and institutions to do what is right? (Please rate each item on a scale from 1-7, from "1 - Do not trust at all" through to "7 - Trust completely")
Base: All respondents (n = 1500)

Health professionals were the most trusted (mean rank = 5.74), with 80.6% of respondents reporting a level of trust above the midpoint (see Figure 3 above; Table 8 in Appendix 2: Data Tables shows the frequency of scores for each professional/institution). This was followed by scientists (mean rank = 5.41), with 73.1% of respondents reporting a level of trust above the midpoint. For government departments (mean rank = 3.71), 39.9% of respondents had a level of trust above the midpoint. Least trusted were politicians (mean rank = 2.34), who were trusted by only 18.3% of respondents. A Friedman test with follow-up Wilcoxon signed-rank tests confirmed that level of trust significantly differed among the different types of professionals and institutions ($\chi^2(6) = 3580.43$, $p < 0.001$; all Wilcoxon p values < 0.008[6]).

Q2. Confidence in the safety of food

Respondents were asked to rate how confident they were that "all food (including drinks) sold in Australian/New Zealand shops and supermarkets is safe to eat" on a seven point scale, with 1 meaning "Do not trust at all" and 7 meaning "Trust completely".

[6] A Bonferroni-corrected alpha of 0.008 was used, given that 6 comparisons were made (i.e., comparisons between each descending mean rank; health vs. scientists; scientists vs. non-profit; non-profit vs. government; government vs. large companies; large companies vs. press/television/radio; press/television/radio vs. politicians).

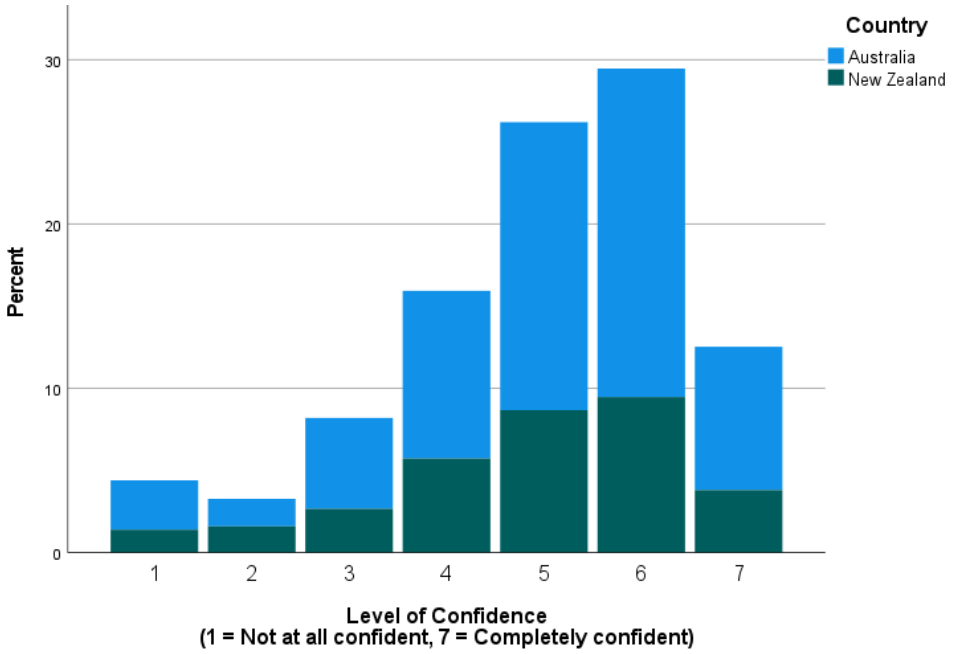

Figure 4: Level of confidence in the Australian/New Zealand food system
Q: How confident are you that all food (including drinks) sold in Australian/New Zealand shops and supermarkets is safe to eat? (1 = "Not at all confident" and 7 = "Completely confident")
Base: All respondents (n = 1000 Australia, n = 500 New Zealand)

The overall mean score was 4.95 out of 7, with a standard deviation (SD) of 1.51. There was no significant difference in level of confidence between Australian (M = 4.99, SD 1.50), and New Zealand (M = 4.87, SD 1.52) respondents ($t(1498) = 1.45$, p = .149). Both countries had a mean level of confidence above the midpoint, indicating that consumers generally have confidence in the food system.

68.2% of respondents rated their level of confidence in the Australian New Zealand food system above the midpoint, compared to 15.9% who rated their level of confidence below the midpoint and 15.9% who rated their confidence at the midpoint (see Figure 4 above; for frequencies disaggregated by country see Table 9 in Appendix 2: Data Tables)

Factors predicting level of confidence in the food supply

Being male, tertiary-educated, distrusting politicians, and trusting supermarket chains, small food producers, large food producers, government/public food authorities, and scientists was associated with a higher level of confidence in the Australian/New Zealand food supply. The factor that best predicted level of confidence was trust in food-related professions and institutions. Details of how this was determined are below.

Malek and Umberger's (2021) analysis of the 2020 FoodIQ survey suggested that age, sex, and education were all significantly associated with level of confidence in the Australian food supply. A five-stage hierarchical multiple regression was conducted with level of confidence as the dependent variable. Sex was entered at stage 1, education at stage 2, and age at stage 3. European background (European vs. non-European) was entered at stage 4, trust in professionals and institutions more broadly (Q1) was entered at stage 5, and trust in food-related professions and institutions (Q3) was entered at stage 6. All six models were found to be significant based on the ANOVA tests (all p values < 0.001). The addition of each variable significantly improved the model (i.e., all changes in the R^2 values were significant; all p

values < 0.001), except for age and European background (models 3 and 4, respectively; p values > 0.05.). The full statistical results of the hierarchical regression analysis (including beta and p values for each association and adjusted R^2 for each model) are available in Table 10 in Appendix 2: Data Tables.

Based on Model 4 (where only demographic factors had been entered), gender, education and age were significantly associated with level of confidence in the food supply ($F(6) = 7.19$, $p < 0.001$). Being male, tertiary educated and aged 18-34 years (vs. 35-49 years) was associated with a greater level of confidence in the food supply. However, these factors only accounted for 2.4% of the variance in the sample (adjusted $R^2 = 0.024$). European background was not significantly associated with level of confidence in the food supply.

Once level of trust in professionals and institutions in general was added to the model (Model 5), the amount of variance accounted for by the model greatly increased to 22.0% (adjusted $R^2 = 0.220$). Based on Model 5, being male, 18-34 years of age (vs. 35-49 years of age), and having higher levels of trust in press/television/radio, government departments, health professionals, large companies/corporations and scientists were significantly associated with a greater level of confidence in the food supply (all p values < 0.05). Levels of trust in politicians and not-for-profit organisations were not significantly associated with level of confidence in the food supply.

Once level of trust in food-related professions and institutions was controlled for (Model 6), age and levels of trust in all professionals and institutions in general became non-significant ($p > 0.05$), except for level of trust in politicians, which became significant ($p = 0.005$). Specifically, a lower level of trust in politicians in general became significantly associated with a higher level of confidence in the food supply. Furthermore, the amount of variance accounted for by the model greatly increased to 53.4% (adjusted $R^2 = 0.529$). Based on this final model, being male, tertiary-educated, having a lower level of trust in politicians in general, and having a higher level of trust in all food-related professions and institutions (supermarket chains, small and large food producers, government/public food authorities, scientists) was associated with a greater level of confidence in the food supply (all p values < .004). Taken together, these findings indicate that demographic factors are only weakly associated with level of confidence in the food supply. The most important predictor of a high level of confidence in the food supply was a high level of trust in food-related professions and institutions (supermarket chains, small and large food producers, government/public food authorities, scientists).

Q3. Trust in food-related professions and institutions

Respondents were asked “how much do you trust the following people and institutions to ensure that all food (including drinks) sold in Australian/New Zealand shops and supermarkets is safe to eat?” on a seven point scale, with 1 meaning “Do not trust at all” and 7 meaning “Trust completely”.

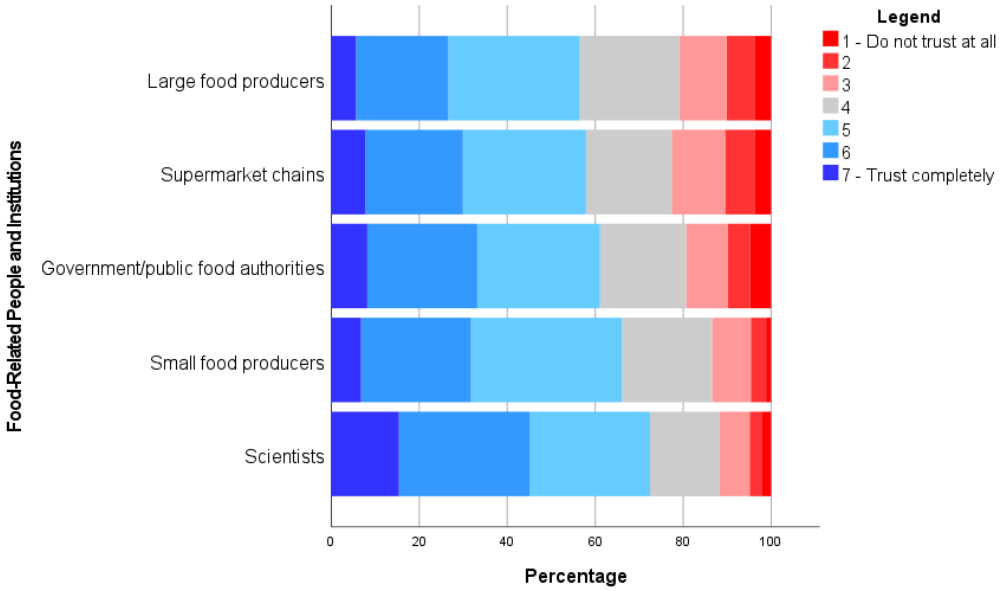

Figure 5: Level of trust in food-related professions and institutions
Q: How much do you trust the following people and institutions to ensure that all food (including drinks) sold in Australian/New Zealand shops and supermarkets is safe to eat? (Please rate each item on a scale from 1-7, from "1 – Do not trust at all" through to "7 – Trust completely")
Base: All respondents (n = 1500)

Scientists were the most trusted among the listed people and institutions (mean rank = 3.52), with 72.5% of respondents reporting a level of trust above the midpoint (Figure 5 below; data for this response is available in Table 11 in Appendix 2: Data Tables). This was followed by small food producers (mean rank = 3.07), with 66.1% of respondents reporting a level of trust above the midpoint. For government/public food authorities (mean rank = 2.95), 61.1% of respondents reported a level of trust above the midpoint. Least trusted were supermarket chains (mean rank = 2.80) and large food producers (mean rank = 2.67), although the majority of people (57.9% and 56.5%, respectively) still rated their level of trust above the midpoint. A Friedman test with follow-up Wilcoxon signed-rank tests confirmed that level of trust significantly differed among the different types of people and institutions ($\chi^2(6) = 3580.43$, $p < 0.001$). All differences in levels of trust were statistically significant (all p values < .01[7]), except for the difference between supermarket chains and large food producers (p = .069).

Level of trust was compared between general professionals/institutions (asked in Question 1) and similar food-related professionals/institutions (asked in Question 3): government departments vs government/public food authorities, large companies or corporations vs large food producers, and scientists generally vs food-related scientists. A Wilcoxon-signed rank test found that level of trust for government/public food authorities was significantly higher than level of trust for government departments more generally ($z = -17.18$, $p < .001$). Similarly, level of trust for large food producers was significantly higher than level of trust for large companies or corporations ($Z = -18.89$, $p < .001$). Levels of trust in scientists generally

[7] A Bonferroni-corrected alpha of 0.01 was used, given that a total of 4 comparisons were made (i.e., comparisons between each descending mean rank; scientists vs. small food producers; small food producers vs. government/public food authorities; government/public food authorities vs supermarket chains; supermarket chains vs. large food producers).

and in food-related scientists did not differ significantly (z = -0.71, p = .478). This could be because the role of scientists in the food system may not be well understood by general consumers, but it could also be because scientists had a higher level of trust overall.

Q4. Top food safety issues

Respondents were asked to rank their "top 3 most important food safety issues" out of a provided list that was adapted from the FoodIQ survey (Malek and Umberger 2021). The list was randomised for each respondent.

"Carcinogens or cancer-causing chemicals in food" was the most frequently selected issue, with 42.0% of respondents selecting it in their top 3 (see Figure 6; data is available in Table 12 in Appendix 2: Data Tables). This was closely followed by chemicals in food (39.3%), and pesticides or pesticide residues (36.4%). The least selected issue was biotechnology (5.7%). Genetically modified food or organisms was the third-least selected issue, with 19.5% of respondents selecting it within their top 3.

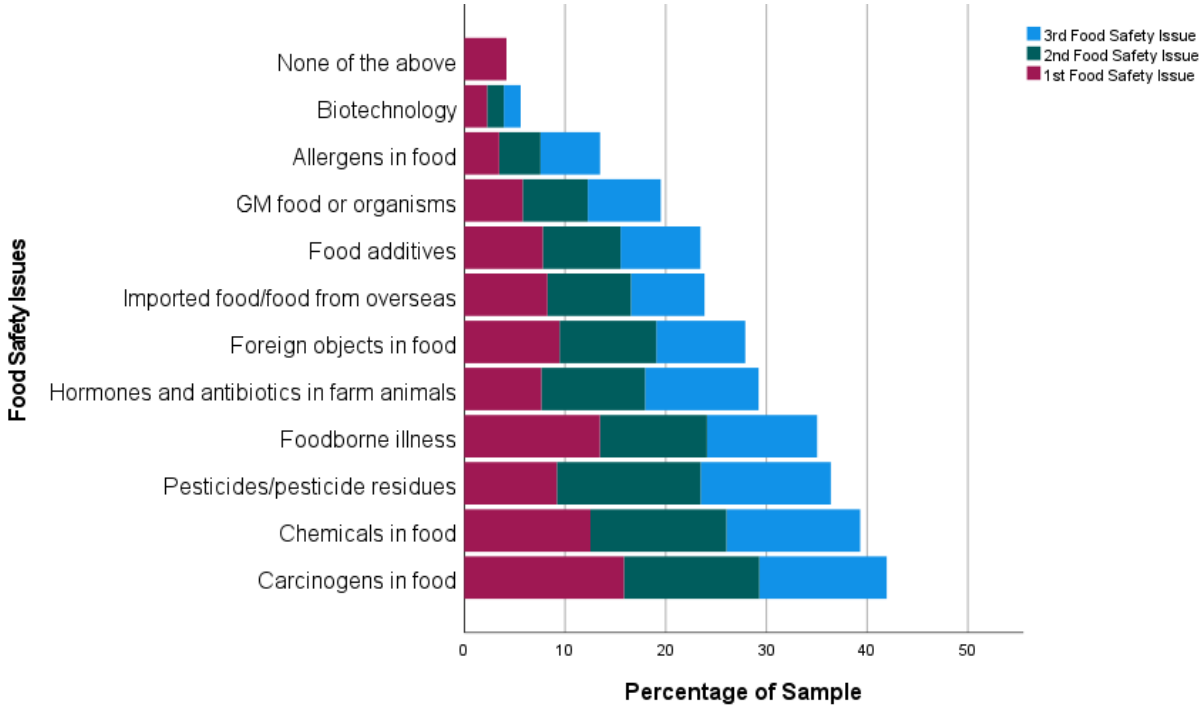

Figure 6: Top 3 food safety issues
Q: Out of the following items, could you please rank your top 3 most important food safety issues?
Base: All respondents (n=1500)

Factors associated with top food safety issues

A chi-square test showed that choosing GM foods or organisms as a top 3 food safety concern was not significantly associated with any demographic factors (age, sex, level of education, cultural background, country, metro/regional Australian location, SES level) or level of confidence in the food supply (all p values > .05). However, people who selected GM foods or organisms as one of their top 3 food safety concerns were more likely to later indicate in Q8 that they opposed GM foods ($\chi^2(2) = 116.88$, $p < .001$, Cramer's $V = .279$).

A chi-square analysis found that age, sex, education level, cultural background, country, and level of confidence in the Australian/New Zealand food supply were found to be significantly

associated with a number of other top food safety concerns chosen by respondents (see summary at Table 7 on page 24). That is, although these factors were not significantly associated with selecting GM foods or organisms as a top safety concern, they were significantly associated with selecting other items.

Age ($\chi^2(33) = 59.52$, $p = .003$, Cramer's $V = .115$): People aged 18-34 years were significantly more likely to select 'Biotechnology' as their top safety concern (4.6%) compared to those aged 50-64 years (1.1%) and 65+ years (0.6%). Those aged 18-34 years (5.5%) and 35-44 years (6.2%) were significantly less likely to select 'imported food' as a top safety concern compared to those aged 50-64 years (9.7%) and 65+ years (13.2%).

Sex ($\chi^2(11) = 21.84$, $p = .026$, Cramer's $V = .121$): Males were significantly more likely to select 'Biotechnology' (3.3%) or 'Imported food' (10.1%) as their top safety concern than females (1.3% and 6.5%, respectively).

Education ($\chi^2(11) = 30.52$, $p < .001$, Cramer's $V = .143$): People with a tertiary education were significantly more likely to select 'Pesticides/pesticide residues' (11.2%) or 'Biotechnology' (3.5%) as their top safety concern than non-tertiary educated respondents (7.6% and 1.3%, respectively). Non-tertiary educated respondents were more likely to select 'None of the above' (5.3%) than tertiary educated respondents (2.8%).

Cultural background ($\chi^2(11) = 26.69$, $p < .005$, Cramer's $V = .133$): People with a European background were significantly more likely to select 'Foodborne illness' (14.4%) or 'Imported food' (9.2%) as their top safety concern than people without a European background (9.9% and 4.6%, respectively). People without a European background were significantly more likely to select 'Food additives' (10.6%) or 'Allergens in food' (6.3%) as their top safety concern than people with a European background (7.1% and 2.8%, respectively).

Country ($\chi^2(11) = 37.51$, $p < .001$, Cramer's $V = .158$): People from New Zealand were significantly more likely to select 'Carcinogens' (19.0%) or 'Contamination of food with foreign objects' (11.8%) as their top food safety issue compared to people from Australia (14.3% and 8.3%, respectively). Australians were significantly more likely to select 'Food additives' (9.2%) or 'Imported food' (10.5%) as their top concern compared to New Zealanders (5.2% and 3.8%, respectively).

Level of confidence in the Australian/New Zealand food supply ($\chi^2(22) = 43.92$, $p = .004$, Cramer's $V = .121$): For the purposes of this analysis, level of confidence was grouped into three categories: Low Confidence (1-3), Neutral (4), and High Confidence (5-7). People with a High level of confidence in the food supply were significantly less likely to select 'Chemicals in food' (10.6%) as their top food safety concern than those with Low (16.8%) or Neutral (16.7%) confidence. People with a Low level of confidence were significantly more likely to select 'Imported food' (10.1%) as their top food safety concern than those with Neutral confidence (4.2%). People with a Neutral level of confidence were significantly more likely to select 'None of the above' (7.1%) than people with a Low confidence (2.1%).

Australian state or territory was not significantly associated with top safety concern ($p = .164$), nor was metro/regional location ($p = .107$), or SES area ($p = .719$).

Table 7: Summary of significant associations between top food safety concern and respondent characteristics
Key: '+' indicates that the category of respondent was significantly more likely to answer with the corresponding response compared to the category/ies of respondent marked with '-'.*

	Age (years)				Sex		Country		Education		Cultural Background		Level of Confidence in Food System		
Food Safety Issue	18-34	35-49	50-64	65+	M	F	AU	NZ	Tertiary	Non-Tertiary	Euro	Non-Euro	Low (1-3)	Neutral (4)	High (5-7)
Biotechnology	+		-	-	+	-			+	-					
Imported food	-	-	+	+	+	-	+	-			+	-	+		
Carcinogens							-	+							
Foreign objects in food							-	+							
Food additives							+	-			-	+			
Pesticides									+	-					
Foodborne illness											+	-			
Food allergens											-	+			
Chemicals in food													+	+	-
GM food or organisms															
Hormones and antibiotics															
None of the above									-	+			-	+	

* Associations are based on chi-square analyses and are considered significant at the .05 level, after Bonferroni correction was applied to the p values.

Knowledge of Genetically Modified foods

Q5. Perceived level of knowledge about GM foods

Respondents were provided with the following definition of genetically modified (GM) foods:

> Genetically modified foods are food or food ingredients derived from plants, animals or microbes whose genetic material (DNA) has been modified using specific laboratory techniques to introduce a new or different characteristic, or improve an existing characteristic.

Respondents were then asked “how much [they] feel [they] know about genetically modified foods”. Answers were sourced using a 5-point Likert-type scale with the options described as “A great deal”, “A fair amount”, “A little”, “Heard of it but know nothing about” and “Never heard of it” as well as “Can’t say/don’t know”.

The answer most often chosen by respondents was “A little” (45.1%), followed by “Heard of it but know nothing about” (24.7%). The least chosen response, apart from “Can’t say/don’t know” was “Never heard of it” (2.7%) (see Figure 7 below).

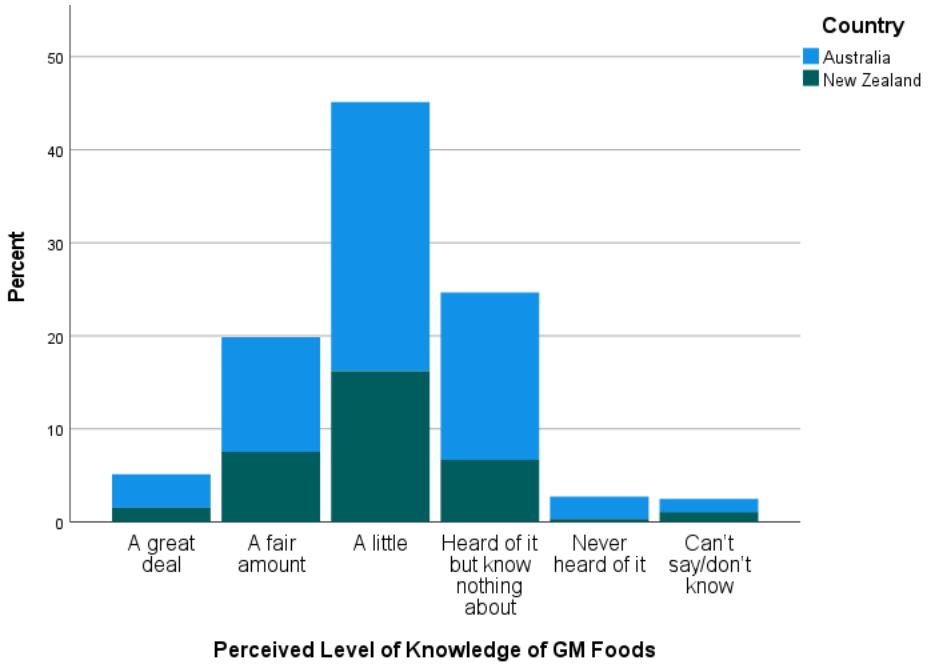

Figure 7: Perceived level of knowledge of GM foods
Q: How much do you feel you know about genetically modified foods?
Base: All respondents (n = 1000 AU, n = 500 NZ)

Factors associated with perceived level of knowledge

The 2021 literature review found that age and sex was associated with perceived level of knowledge about NBTs. We therefore tested whether age, sex (and other factors) were associated with perceived level of knowledge of GM foods in the current survey. For analytical purposes, level of knowledge was divided into three broad categories: High (“A great deal”, “A fair amount”), Medium (“A little”) and Low (“Heard of it but know nothing about”, “Never heard of it”, “Can’t say/don’t know”).

We performed a multinomial logistic regression to determine whether age (18-34 years vs. 35-49 years, 50-64 years, and 65-99 years), sex, education (tertiary vs non-tertiary), cultural background (European vs. non-European) and country are associated with having a High or Medium level of knowledge compared to a Low level. The logistic regression model was statistically significant ($\chi^2(14) = 127.135$, $p < .001$). The findings are summarised below, with the full statistical information from the analysis available in Table 13 in Appendix 2: Data Tables.

Overall, being tertiary-educated and from New Zealand were the strongest predictors of having a perceived level of knowledge above Low. Additionally, those aged 65-99 years were around twice as likely compared to those aged 18-34 years to report having a Medium level of knowledge rather than Low. Other age groups did not have a statistically significant association with perceived level of knowledge. Being male was only weakly associated with choosing a High rather than Low level of perceived knowledge. Further details of each association are described below:

High vs Low level of perceived knowledge: People who were male ($p < .001$, OR = 1.79), tertiary-educated ($p < .001$, OR = 2.68) and from New Zealand ($p = .017$, OR = 1.45) were more likely to report that they had a High level of knowledge rather than a Low level of knowledge. Age was not significantly associated with choosing a High vs a Low level of knowledge ($p > .05$).

Medium vs Low level of perceived knowledge: People who were aged 65-99 years (compared to those aged 18-34 years, $p <.001$, OR = 1.90), tertiary-educated ($p < .001$, OR = 1.77), and from New Zealand ($p = .004$, OR = 1.48) were more likely to report a Medium level of knowledge rather than a Low level of knowledge. Sex, European background, and ages other than 65-99 years were not significantly associated with choosing a Medium vs a Low level of knowledge ($p > .05$).

Q6. Understanding of Genetically Modified foods

Respondents who answered “A great deal”, “A fair amount”, or “A little” in response to the question on perceived level of knowledge (Q5) were asked to identify accurate descriptions of genetically modified foods from a set of four options that were presented in a randomised order for each participant. The options provided broadly described genetic modification, genome editing, mutagenesis, and conventional breeding, as follows:

Genetic modification:	Scientists have inserted DNA from one living thing into the DNA of another living thing to introduce a new or different characteristic.
Genome editing:	Scientists have created small, specific changes to part of a living thing’s DNA to improve or remove existing characteristics.
Mutagenesis:	Scientists have exposed seeds to chemicals, radiation, or enzymes to generate new varieties with desirable traits.
Conventional breeding:	Farmers have genetically improved the animals and plants through selective breeding and artificial insemination.

Participants were able to select multiple answers. The most frequently selected response was the definition that aligned most closely with genome editing (61.0%; see Figure 8 below

and frequencies disaggregated by country in Table 14 in Appendix 2: Data Tables). The definition that aligned to older forms of genetic modification was chosen by 45.4% of people, which was approximately the same percentage of people who chose the definition for conventional breeding (44.1%). Mutagenesis was the least chosen definition at 33.9%.

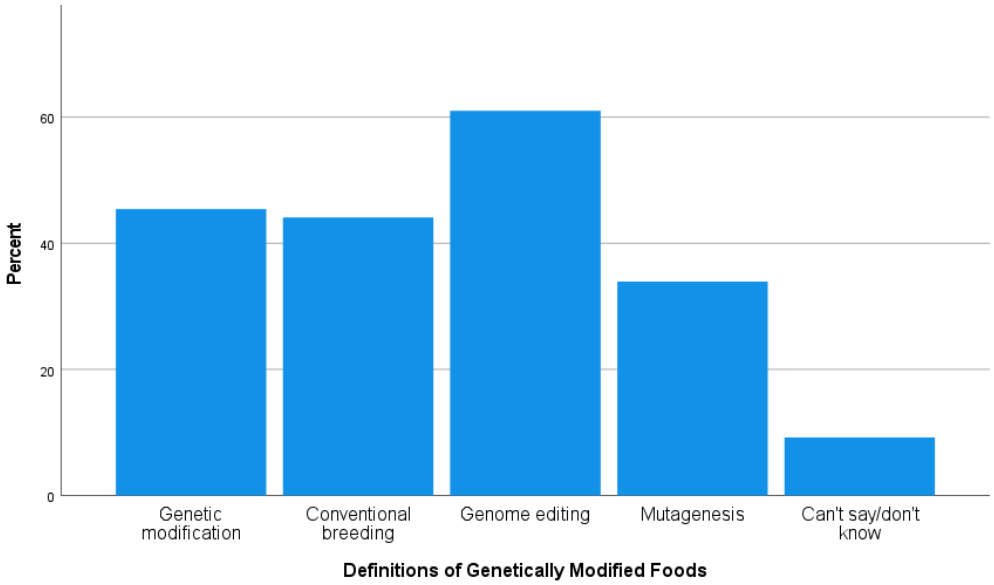

Figure 8: Definitions of genetically modified foods
Q: To the best of your knowledge, which of the following descriptions do you think apply to genetically modified foods? (Please select all that apply)
Base: n = 1052 (Respondents who answered "A great deal", "A fair amount", or "A little" in response to the question on perceived level of knowledge (Q5))

Selecting the definitions that aligned with both genome editing and genetic modification, and no other definitions, was considered to be the 'correct' answer. Answers that selected only genome editing or genetic modification and neither of the incorrect answers was considered to be a 'partially correct' answer. Answers that included the definitions for either mutagenesis or conventional breeding were considered to be 'incorrect'. By these definitions, 7% of people were correct, 57.1% were partially correct, and 26.6% were incorrect. 9.2% stated that they did not know (see Figure 9 below, and frequencies disaggregated by country in Table 15 in Appendix 2: Data Tables).

Of those who were partially correct (meaning they selected one out of the two possible correct responses and no others), the majority (75.7%) selected the definition that most aligned with genome editing rather than genetic modification (24.3%).

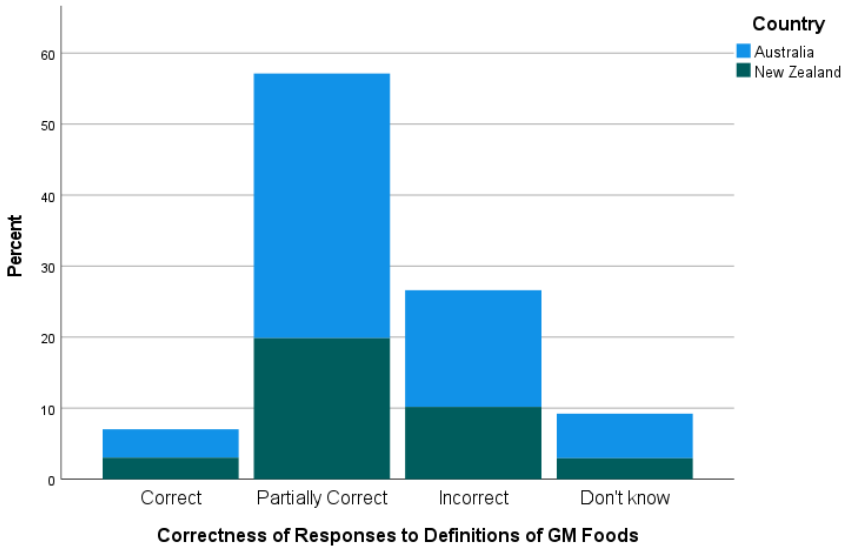

Figure 9: Correctness of responses to definitions of genetically modified food
Base: n = 1052

Factors predicting correctness of responses

We performed a multinomial logistic regression to determine whether age (18-34 vs 35-49, 45-59, and 65-99 years), sex, education (tertiary vs non-tertiary), cultural background (European vs. non-European), country and perceived level of knowledge were associated with having a correct, partially correct, or 'Don't know' response compared to an incorrect response. The logistic regression model was statistically significant ($\chi^2(24) = 70.324$, $p < .001$). The full statistical information from the analysis is available in Table 16 in Appendix 2: Data Tables.

Correct vs Incorrect response: People who indicated that they had a High perceived level of knowledge were significantly more likely to choose a Correct rather than Incorrect response compared to those with a Medium level of knowledge (p = .013, OR = 1.97). People with a Low level of perceived knowledge were not asked this question. There were no other significant associations with Correct responses.

Partially Correct vs Incorrect response: People who were aged 50-64 years (p = .003, OR = 1.83) and 65-99 years (p = .013, OR = 1.70) were significantly more likely to choose a Partially Correct than Incorrect response compared to those aged 18-34 years. There were no other significant associations with Partially Correct responses.

Don't Know vs Incorrect response: People who did not have a tertiary education (p =.002, OR = 2.42) were significantly more likely to respond with 'Don't know' rather than an Incorrect response compared to those with a tertiary education. People who reported that they had a High level of knowledge were significantly less likely to respond with 'Don't know' rather than an incorrect response compared to those with a Medium level of knowledge (p = .001, OR = .338).

Age, sex, country, and cultural background (European/not-European) were not significantly associated with the correctness of the responses chosen.

Q7. Knowledge of current availability

Respondents were asked whether, to the best of their knowledge, genetically modified foods are currently for sale in Australia/New Zealand. There were four possible answers: “Yes – genetically modified fruits, vegetables and/or meat or dairy products as well as food ingredients”, “Yes – genetically modified food ingredients but not whole foods”, “No”, and “Don’t know”. The correct answer was “Yes – genetically modified food ingredients but not whole foods.”

A substantial minority of respondents (42.1%) incorrectly believed that genetically modified whole foods such as fruits and vegetables were already for sale in Australia and/or New Zealand (see Figure 10 below). This was followed by “Don’t know”, chosen by 33.3% of respondents. Only 17.7% of people chose the correct response, while 6.9% believed that genetically modified foods were not for sale in Australia or New Zealand in any capacity.

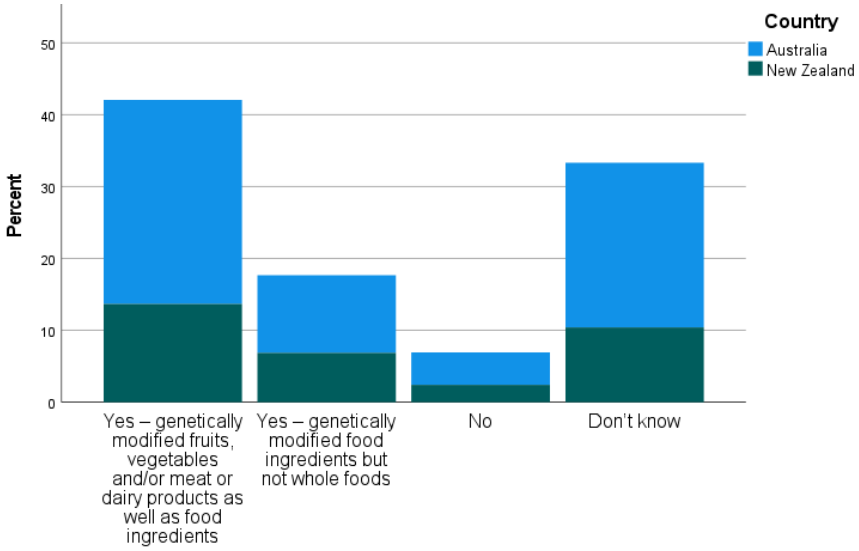

Figure 10: Perceived availability of genetically modified foods
Q7: To the best of your knowledge, are genetically modified foods currently for sale in Australia/New Zealand?
Base: All respondents (n = 1000 AU, n = 500 NZ)

Factors associated with perceived availability of GM foods

We performed a multinomial logistic regression to determine whether age (18-34 vs 35-49, 45-59, and 65-99 years), sex, education (tertiary vs non-tertiary), cultural background (European vs. non-European), country and perceived level of knowledge (High vs Medium and Low) were associated with a correct (“Yes – genetically modified food ingredients but not whole foods”) or “Don’t Know” response vs an Incorrect (“No”, “Yes – genetically modified fruits, vegetables and/or meat or dairy products as well as food ingredients”) response. The logistic regression model was statistically significant ($\chi^2(18) = 267.71$, $p < .001$). The full statistical information from the analysis is available in Table 17 in Appendix 2: Data Tables.

Correct vs Incorrect response: There were no significant factors associated with choosing the correct vs an incorrect response about the availability of GM foods in Australia/New Zealand.

“Don’t Know” vs Incorrect response: People who were tertiary-educated were significantly less likely to answer that they didn’t know ($p = .002$, $OR = .653$). People who had a Medium

(p < .001, OR = 3.31) or Low (p < .001, OR = 11.10) level of perceived knowledge were significantly more likely.

There was no significant association between age group, sex, cultural background, or country and knowledge of current availability.

Support, concern, and trust for Genetically Modified foods

Q8. Support for Genetically Modified foods

Respondents were asked to "indicate how supportive [they] are of the use of genetic modification techniques to produce food or food ingredients" using a 7-point scale, where 7 was "completely supportive" and 1 was "completely against".

Most respondents (59.6%) were either neutral (i.e., selected the midpoint; 29.6%) or were generally supportive of GM foods (i.e., selected above the midpoint; 30.0%). 40.4% of respondents were generally against GM foods (i.e., gave an answer below the midpoint; see Figure 11 below, and frequencies disaggregated by country in Table 18 in Appendix 2: Data Tables).

There was no significant difference in support for GM foods between Australia (*M* = 3.70, *SD* = 1.65) and New Zealand (*M* = 3.68, *SD* = 1.61) (*t*(1498) = .167, p = .867) .

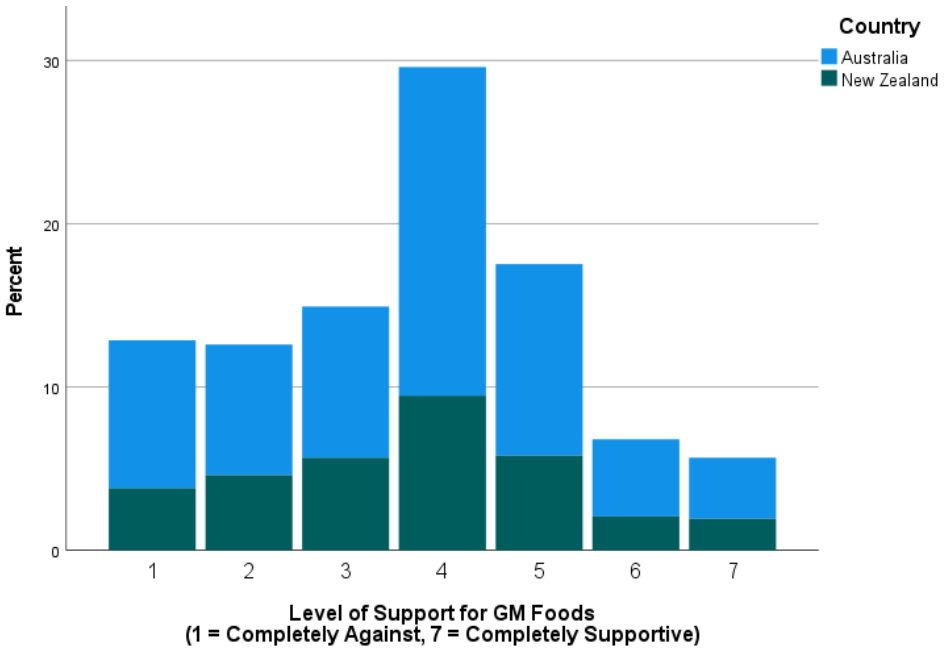

Figure 11: Level of support for genetically modified foods
Q: On a scale of 1-7, where 7 Is completely supportive and 1 is completely against, please indicate how supportive you are of the use of genetic modification techniques to produce food or food ingredients?
Base: All respondents (n = 1000 AU, n = 500 NZ)

Factors predicting level of support for GM foods

The FSANZ-commissioned literature review on NBTs (Grant et al. 2021) found that men and younger people tend to be more accepting of both older forms of GM and NBTs. Level of education or knowledge was not found to influence attitudes. A statistical analysis of our

survey results found that being younger, male, and tertiary-educated was associated with a higher level of support for GM foods, however having a higher level of trust in GM producers and scientists was a much better predictor for having a higher level of support for GM food than these demographic factors. Details of how this was determined are below.

We conducted a six-stage hierarchical multiple regression with level of support for GM foods as the dependent variable. Given the findings from Grant et al. (2021), age was entered at stage 1, and sex at stage 2. Education level was entered at stage 3, perceived level of knowledge (Q5) at stage 4, level of confidence in the food supply (Q2) at stage 5, and trust in GM producers and scientists (Q11) at stage 6. All six models were found to be significant based on the ANOVA tests (all p values < .001), and the addition of each variable significantly improved the model (i.e., all changes in R^2 values were significant; all p values < .05). The full statistical results of the hierarchical regression analysis (including beta and p values for each association and adjusted R^2 for each model) are available in Table 19 in Appendix 2: Data Tables.

Based on Model 5 (i.e., when all variables were entered except for trust in GM producers and scientists), age, sex, education, level of perceived knowledge, and level of confidence in the food supply were found to have a statistically significant association with level of support for GM foods, accounting for 16.2% of the variance in the sample ($F(9) = 33.12$, $p < .001$, adjusted $R^2 = 0.162$). Being younger (aged 18-34 years vs. 50-64 years), male, tertiary-educated, having a higher level of perceived knowledge, and a higher level of confidence in the food supply was associated with a greater level of support for GM foods (all p values < .05).

Once level of trust in GM producers and scientists was controlled for (Model 6), level of perceived knowledge and level of confidence in the food supply were no longer significant predictors of level of support for GM foods (p values > .05). Furthermore, the amount of variance accounted for by the model greatly increased to 48.3% ($F(11) = 128.41$, $p < .001$; adjusted $R^2 = 0.483$). In this final model, being younger, male, tertiary-educated, and having a higher level of trust in GM producers and scientists was associated with a greater level of support for GM foods (all p values < .05).

Taken together, these findings suggest that, although demographic factors are associated with level of support for GM foods, trust in GM producers and scientists is a much better predictor of level of support for GM foods.

Q9. Level of concern about Genetically Modified foods

Respondents were asked “to what extent are you concerned or unconcerned about genetically modified foods or food ingredients in Australia/New Zealand”. Answers were sourced using a five point Likert-type scale, ranging from “Very unconcerned” to “Very concerned”, as well as “Can’t say/don’t know”.

The most frequently chosen response was “Somewhat concerned”, with 31.9% of respondents selecting this option (see Figure 12 below and Table 20 in Appendix 2: Data Tables). This was closely followed by neutral (28.7%). The least frequently chosen response was “Very unconcerned” (6.1%).

When collapsed into four categories, almost half of respondents held some level of concern around genetically modified foods (46.7%), compared to 20.6% who were some level of unconcerned and 28.7% who were neutral.

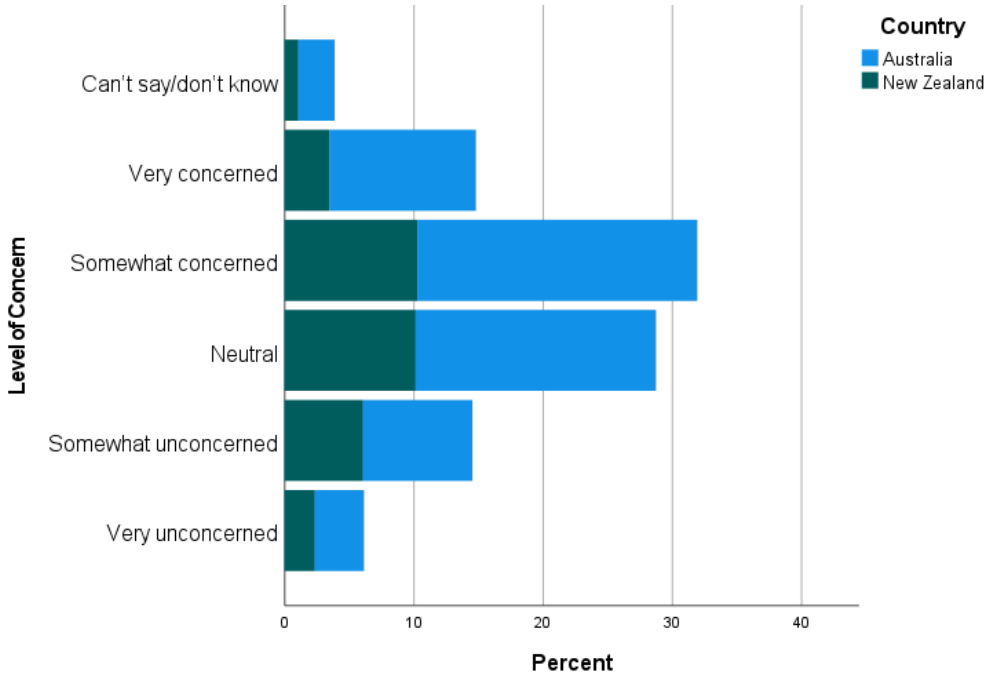

Figure 12: Level of concern for genetically modified foods
Q: To what extent are you concerned or unconcerned about genetically modified foods or food ingredients in Australia/New Zealand?
Base: All respondents (n = 1000 AU, n = 500 NZ)

Factors associated with level of concern

For the purposes of analysis, concern was divided into four categories: Unconcerned ("Very unconcerned", "Somewhat unconcerned"), Neutral ("Neutral"), Concerned ("Very concerned", "Somewhat concerned") and Unsure ("Can't say/Don't know").

We performed a multinomial logistic regression to determine whether age (18-34 vs 35-49, 45-59, and 65-99 years), sex, education (tertiary vs non-tertiary), cultural background (European vs. non-European), country, level of confidence in the food supply, perceived level of knowledge (High vs Medium and Low), and level of trust for GM producers and scientists were unique predictors for being Concerned vs Unconcerned, Neutral, or Unsure about GM foods.[8] The logistic regression model was statistically significant ($\chi^2(42) = 435.81$, $p < .001$). The full statistical information from the analysis is available in Table 21 in Appendix 2: Data Tables.

Unconcerned vs Concerned: People who had a European background ($p < .001$, OR = 1.97), who were from New Zealand ($p < .001$, OR 1.82), or had a greater level of trust in GM scientists ($p < .001$, OR = 1.37) were more likely to be Unconcerned than Concerned. People

[8] Level of support for GM foods was excluded as a variable for this analysis because it violated the linearity of the logit assumption (Field 2018).

who had a Low level of knowledge were somewhat more likely to be Concerned than Unconcerned (p = .016, OR = 1.67).

Neutral vs Concerned: People who were male (p < .001, OR = 1.54), from New Zealand (p = .007, OR = 1.452), with a Medium (p < .001, OR = 2.00) or Low (p < .001, OR = 3.05) level of knowledge, or who had a greater level of trust in large GM producers (p = .005, OR = 1.24) and GM scientists (p = .027, OR = 1.17) were more likely to be Neutral than Concerned.

Unsure vs Concerned: People who had a Low level of knowledge (p < .001, OR = 22.75), or who had a higher level of trust in large GM producers (p = .010, OR = 1.64) and a higher level of trust in GM scientists (p = .011, OR = 1.58) were more likely to be Unsure than Concerned.

Q10. Ranked concerns about Genetically Modified foods

Respondents who indicated some level of concern about genetically modified foods were asked to rank their top 3 concerns from a list that was drawn from the concerns expressed by submitters to the P1055 first Call for Submission. Safety was a key concern of consumers, with “the safety of humans eating GM foods” (47.5%) and “a lack of long-term safety data on GM foods” (36.8%) the issues that were most frequently selected within the top 3 (see Figure 13 below and Table 22 in Appendix 2: Data Tables).

Other key concerns were “the trustworthiness of companies or scientists developing GM foods or technologies” (27.9%), “the environmental impact from introducing GM crops” (25.7%), and “the welfare of animals bred using GM technologies” (23.1%). “Ensuring government oversight before GM foods enter the market” was one of the less frequently chosen concerns, with 13.3% of respondents choosing this option. It is important to note that, although not one of the most frequently selected concerns overall, “the unnaturalness of GMs” was chosen as the top GM concern by 9.6% of people, making it the third highest issue if considering the top concern alone.

The least selected options (apart from ‘None of the above’) were related to affordability; “the potential lower cost of GM foods making them the only affordable option for some people” was selected as a top 3 issue by 6.3% of people and “the potential higher cost of GM foods making them unaffordable for some people” was selected by 7.1% of people.

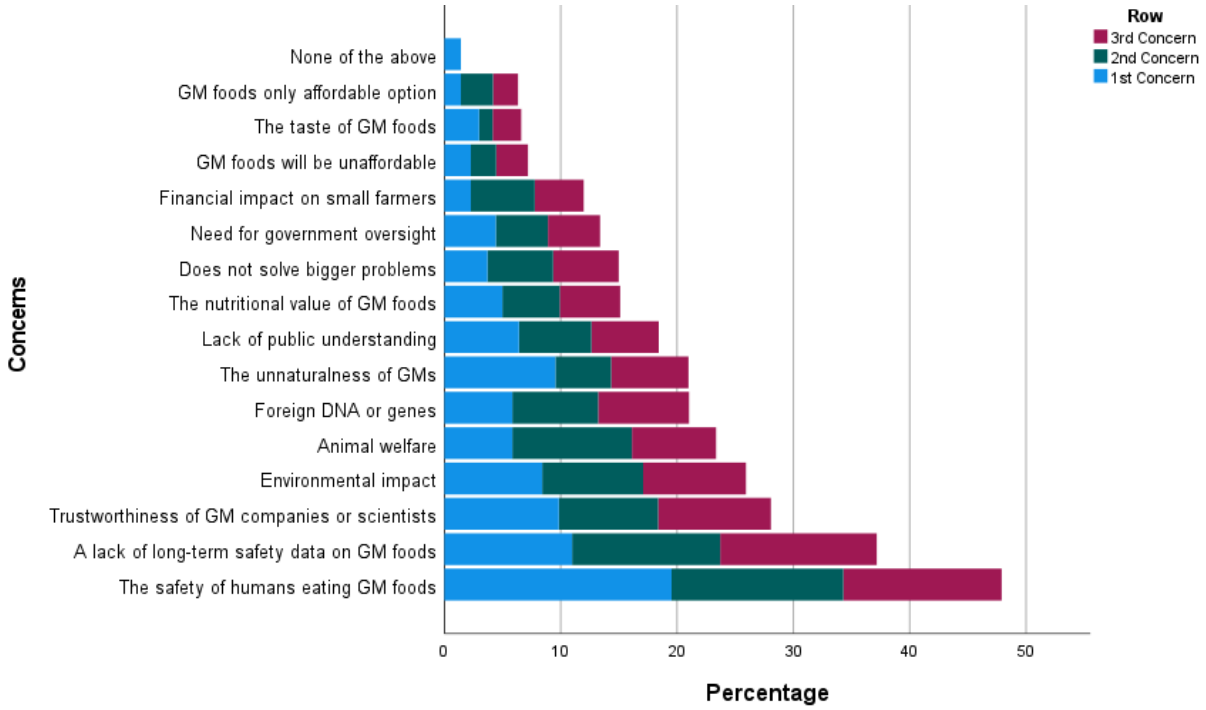

Figure 13: Top 3 concerns about genetically modified foods
Q: Out of the following items, could you please rank your top 3 concerns?
Base: n = 701

A chi-square analysis found that age and sex had a small but significant association with the top concern selected.

Age ($\chi^2(15) = 39.94$, $p < .001$, Cramer's $V = .239$): Due to low cell counts, age was dichotomously coded into 18-49 years and 50+ years for this test. People who were aged 50+ years were more likely to select "The safety of humans eating GM foods" (56.9% vs. 43.1%) and "Trustworthiness of GM companies or scientists" (63.8% vs. 36.2%) than those aged 18-49 years. People aged 18-49 years were more likely to select "Taste of GM foods" (90.5%) than those aged 50+ years (9.5%).

Sex ($\chi^2(15) = 29.81$, $p < .013$, Cramer's $V = .206$): Females were more likely to select "the safety of humans eating GM foods" as their top concern (23.4%) than males (14.7%). Whereas males were more likely to select "the taste of GM foods" as their top concern (4.5%) than females (1.8%). There were no other significant sex differences.

Country ($p = .566$), Australian metro/regional location ($p = .293$), education ($p = .107$), European background ($p = .569$), was not significantly associated with the top concern selected. Due to low cell counts, it was not possible to test for associations with Australian state or territory, SES level, level of confidence in the Australian/New Zealand food supply, level of support for GM foods, or level of perceived knowledge even after recoding into a smaller number of groups.

Q11. Trust in GM producers and scientists

Respondents were asked "how much [they] trust producers of genetically modified (GM) foods to ensure that the food they produce for sale in Australia/New Zealand is safe to eat" on a seven point scale, with 1 meaning "Do not trust at all" and 7 meaning "Trust completely".

GM scientists were the most trusted (M = 4.16, SD = 1.57), with 44.7% of respondents indicating a level of trust above the midpoint (31% had a level of trust below the midpoint). This was followed by small GM food producers (M = 3.84, SD = 1.49), with 33.7% of respondents indicating a level of trust above the midpoint (36.5% below it). Least trusted were large GM food producers (M = 3.68, SD = 1.59), with 31.1% of respondents indicating a level of trust above the midpoint (42% with a level of trust below the midpoint) (see Figure 14 below and Table 23 in Appendix 2: Data Tables). A repeated-measures ANOVA (with post-hoc paired-samples t-tests with Bonferroni-corrected p values) confirmed that levels of trust were significantly different among the three types of GM food producers ($F = 163.15$, $p < 0.001$; all post-hoc p values < 0.001).

The relative levels of trust in different types of GM food producers was consistent with the findings regarding relative levels of trust in different types of food producers in general. That is, people also trusted general scientists the most, followed by small food producers generally, followed by large food producers generally (see previous section 'Q1. Trust in Professionals and Institutions'). However, there are differences in peoples' absolute levels of trust in GM food producers vs. general food producers.

Level of trust was compared between general food producers (asked in Question 3) and similar GM-related food producers (asked in Question 11): GM food scientists vs. general food scientists; small GM food producers vs. small food producers generally; and large GM food producers vs. large food producers generally. A Wilcoxon signed-rank test found that level of trust in general food scientists was significantly higher than levels of trust in GM food scientists ($Z = -22.08$, $p < 0.001$). Levels of trust were also significantly higher in small food producers generally ($Z = -21.39$, $p < 0.001$) and large food producers generally ($Z = -19.71$, $p < 0.001$), compared to their GM-specific counterparts[9].

[9] We used Wilcoxon-signed rank tests given that the ratings for general food producers (Q3) were not normally distributed. The results of this analysis did not change when we used paired-sample t-tests with a bootstrapping procedure (all p values < 0.001), which Field (2018) suggests may be more appropriate when data for only one of the pairs is non-normally distributed.

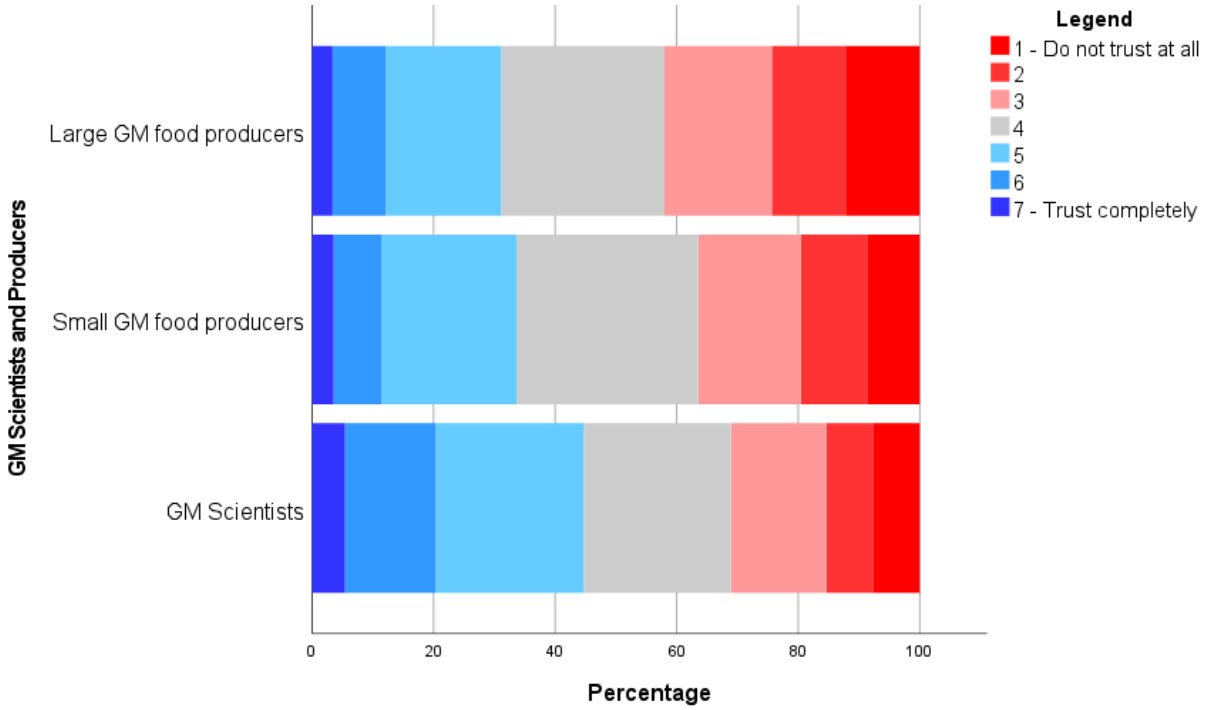

Figure 14: Levels of trust in GM producers and scientists
Q: How much do you trust producers of genetically modified (GM) foods to ensure that the food they produce for sale in Australia/New Zealand is safe to eat? (Please rate each item on a scale from 1-7, from "1 – Do not trust at all" through to "7 – Trust completely")
Base: All respondents (n = 1500)

Specific applications of GM foods

Respondents were presented with five different scenarios that each presented a different potential food-related application of genetic modification, and were asked to indicate their level of support for it. Responses for each question were provided through a five-point Likert-type scale that ranged from "Strongly supportive" to "Very opposed", with an additional "Don't know" option. Three of the five scenarios were taken directly from the focus group research (Ankeny and Harm 2021), and two additional scenarios were used to test some of the findings from that research. Details of the specific questions asked is available in the survey instrument in Appendix 1: Survey Instrument.

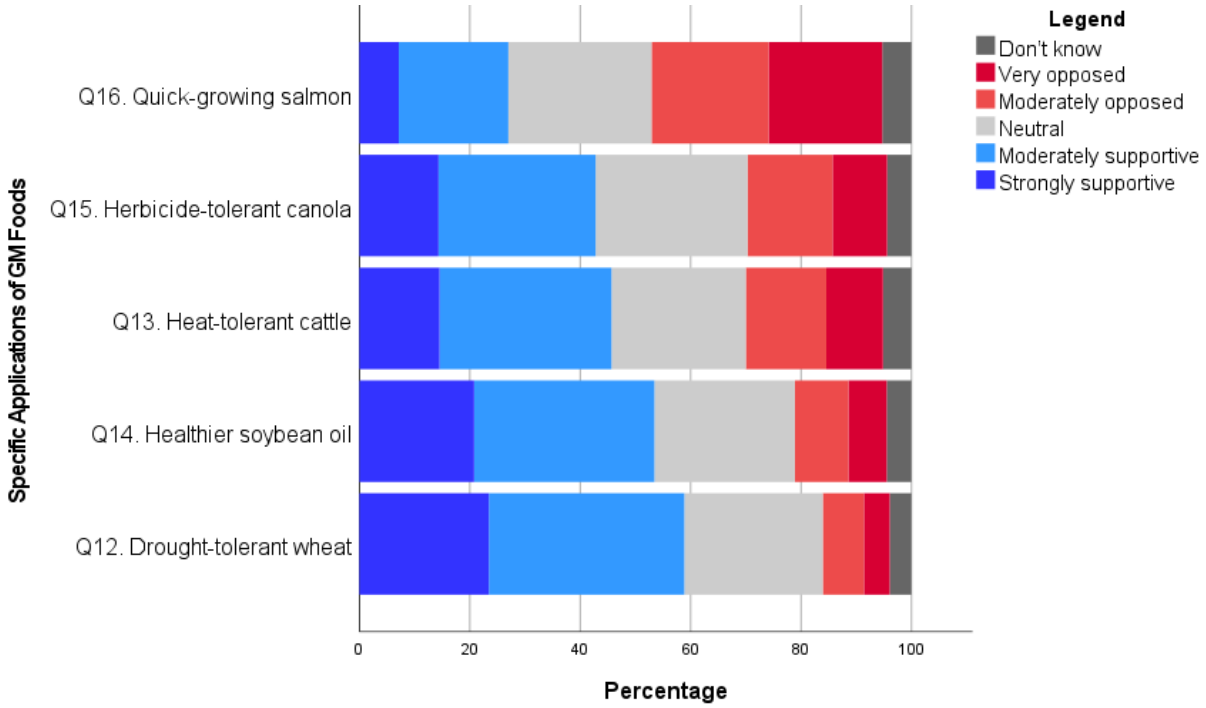

Figure 15: Comparison of responses to five specific applications of GM foods
Base: All respondents (n = 1000 AU, n = 500 NZ)

Drought-tolerant wheat (Q12) was the most supported application of GM foods, with 58.9% of respondents indicating that they were supportive, 25.1% neutral and 12.2% opposed. This was followed by healthier soybean oil (Q14), which had 53.5% of respondents supportive, 25.4% of neutral, and 16.6% opposed. Heat-tolerant cattle (Q13) and herbicide-tolerant canola (Q15) had similar levels of support and opposition. 45.6% of respondents indicated that they were supportive of gene-edited heat-tolerant cattle, with 24.3% neutral and 24.9% of people opposed, while 42.8% of people were supportive of gene edited herbicide-tolerant canola, 27.5% were neutral, and 25.4% of people were opposed. The application that had the least support and the greatest opposition was genetically modified quick-growing salmon (Q16), with 27.0% of people supportive, 25.9% neutral, and 41.8% of people opposed.

Level of neutrality was similar among all applications, and level of support or opposition did not substantially differ between countries. Frequency data for these questions is available in Table 24 in Appendix 2: Data Tables.

Consistency of scenario responses

Respondents were coded based on whether they were consistent in their responses to the five different scenarios presented, and in which way. Respondents were classified as being "Consistently Opposed" if they chose Very Opposed or Moderately Opposed for every scenario, "Consistently Neutral" if they chose Neutral for every scenario, "Consistently Supportive" if they chose Moderately or Strongly Supportive for every scenario, "Consistently Unsure" if they selected "Don't Know" for each scenario, and "Inconsistent" if their responses varied.

76.9% of respondents were inconsistent in their responses. 6.9% were consistently supportive, 7.6% of respondents were consistently opposed, and 8.6% were either consistently neutral (7.1%) or unsure (1.5%).

We performed a multinomial logistic regression to determine whether various factors (age, sex, education, cultural background, country, level of perceived knowledge of GM, and level of confidence in the food supply) uniquely predicted the consistency of people's responses to each of the scenarios.[10] We compared factors that made people more likely to be Consistently Supportive, Consistently Opposed or Consistently Neutral or Unsure in their responses to the scenarios compared to being Inconsistent. The multiple logistic regression model was statistically significant ($\chi^2(30) = 213.691$, $p < .001$). The full statistical information from the analysis is available in Table 25 in Appendix 2: Data Tables.

Cultural background was not significantly associated with consistency of scenario responses.

Consistently Supportive: People who were male ($p < .001$, OR = 2.22), from Australia ($p = .029$, OR = 1.69), or who had a high level of confidence in the food supply ($p = .018$, OR = 1.21) were more likely to be consistently supportive than inconsistent.

Consistently Opposed: People who were aged 50-64 years (vs 18-34 years, $p = .001$, OR = 2.72), who were not tertiary-educated ($p = .014$, OR = 1.75), who were from Australia ($p = .005$, OR = 1.94), who had a High level of perceived knowledge (vs Medium [$p < .001$, OR = 3.32] and Low [$p < .001$, OR = 6.33]), or who had a lower level of confidence in the food system ($p < .001$, OR = 1.35) were more likely to be consistently opposed than inconsistent.

Consistently Neutral or Unsure: People who were aged 18-34 years (vs 65-99 years, $p = .002$, OR = 2.72), who were male ($p = .034$, OR = 1.51), who had a Low level of perceived knowledge ($p < .001$, OR = 6.33) or who had a higher level of confidence in the food system ($p = .038$, OR = 1.14) were more likely to be consistently neutral or unsure than inconsistent.

[10] Level of support for GM foods was excluded as a variable for this analysis because it violated the linearity of the logit assumption (Field 2018).

Communication preferences

Q17. Desire for information about GM foods

Respondents were asked if they wanted to know more about genetically modified foods. 47.1% of people indicated that they would like to know more, 39.3% responded that they did not, and 13.6% did not know.

We performed a multinomial logistic regression to determine whether various factors (age, sex, education, cultural background, country, level of confidence in the food supply, level of perceived knowledge of GM, and level of support for GM foods) uniquely predicted whether people wanted more information about GM foods. We compared factors that made people more likely to answer "Yes" or "Don't Know" in their responses to the scenarios compared to "No". The multiple logistic regression model was statistically significant ($\chi^2(22) = 90.823$, $p < .001$). The full statistical information from the analysis is available in Table 26 in Appendix 2: Data Tables.

Age group, sex, education level, cultural background, country, level of confidence in the food supply and level of support for GM foods were not significantly associated with responses to this question.

Yes vs No: People who had a High level of perceived knowledge were more to answer Yes than people with a Medium ($p = .002$, OR = 1.56) or Low ($p < .001$, OR = 2.74) level of perceived knowledge. There were no other significant factors associated with wanting to know more about GM foods.

Don't Know vs No: People who did not have a tertiary education ($p = .021$, OR = 1.52), and who had a Low (vs High) level of perceived knowledge ($p = .016$, OR = 1.88) were more likely to say "Don't Know".

Q18. Preferred communication methods

Respondents who stated that they would like to know more about genetically modified foods were asked to indicate their preferred communication methods. The most commonly chosen option was government websites (51.6%), followed by newspapers/news websites (44.7%) and television or radio campaigns (42.0%) (see Figure 16 below). Doctors/GPs were least chosen option (24.3%). Commonly specified other methods were: email, brochures or information sheets sent in the post, and newsletters. Given that respondents could select more than one option, it was not possible to statistically analyse whether certain factors (e.g., education, age, sex) were associated with different types of preferred communication methods.

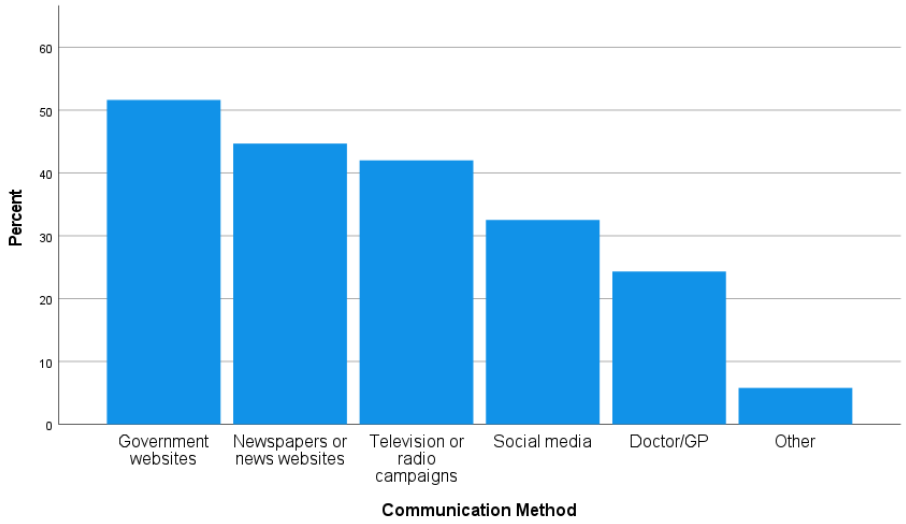

Figure 16: Preferred communication methods
Q: What would be your preferred way to receive information about genetically modified foods? (Please check all that apply)
Base: n = 707 (Respondents who answered 'Yes' to Q17)

Discussion

Trust and confidence

Trust in professionals and institutions

Trust and confidence are essential to the effective functioning of the food system and can have impacts on public health outcomes by influencing consumer behaviours and attitudes (Tonkin et al. 2021a). Globally, there have been signs of increasing distrust in government, scientists and health professionals as the legitimacy of 'experts' and their information is challenged through social media and some traditional media outlets (Tonkin et al. 2021b).

The current survey found that consumers in Australia and New Zealand have a high level of trust in health professionals and scientists. There was a more ambivalent response in respect of government departments, and politicians were the least trusted. The only significant difference between countries was that the level of trust in politicians, with New Zealanders trusting politicians significantly more than Australians.

Trust in the food system

Consumers generally trust that food and drinks sold in Australia/New Zealand shops and supermarkets are safe to eat. The mean score was 4.9 out of 7, with no statistically significant differences between Australia and New Zealand. Similar questions[11] about

[11] The question asked in the 2007 FSANZ Community Attitudes Survey was: "On a scale of 1 to 7, where 1 is "not at all confident", and 7 is "extremely confident", how confident are you that the food supply as a whole, from the farm to your plate, is producing safe food for consumption?" The question asked in the FoodIQ survey was:

confidence, using the same rating scale, were asked in the 2007 FSANZ Community Attitudes Survey (TNS Social Research 2008; hereafter 2007 FSANZ survey) and the University of Adelaide's Centre for Global Food and Resources' Food Insights Questionnaire (Malek and Umberger 2021; hereafter 2020 FoodIQ survey).

The 2007 FSANZ survey had a lower Australian mean score (4.74, SD 1.33) and a higher New Zealand mean score (4.93, SD 1.93) compared to the current survey. The 2020 FoodIQ survey, which only covered Australia, had a higher mean score (5.5) than the current survey. However, the percentage of respondents who rated their level of confidence above the midpoint in the current survey (68%) was broadly consistent with the findings of the 2007 FSANZ survey (67%), and the Australian FoodIQ survey findings from 2018 to 2020 (68%).

Sex and education had a significant association with level of confidence. Being male and tertiary educated was associated with a higher level of confidence in the food supply. However, these demographic variables had a small association, accounting for only 2.3% of the variance of the sample. Level of trust in professionals and institutions had a much more sizeable association with the level of confidence respondents had in the Australian/New Zealand food supply. When entered into the multiple regression model, this measure accounted for approximately 20% of the variance in the sample, and was therefore a much greater predictor than any demographic characteristics.

When level of trust in food-related professionals and institutions was entered into the multiple regression model for level of confidence in the food supply, level of trust in professionals and institutions overall became insignificant except for level of trust in politicians. It also increased the amount of variance accounted for in the model from 21.9% to 52.9%. This suggests that level of trust in food-related professionals and institutions is a key contributor to level of confidence in the Australian/New Zealand food supply.

The final model for level of confidence in the Australian/New Zealand food supply found that being male, tertiary-educated and trusting politicians, supermarket chains, small food producers, large food producers, government/public food authorities and scientists was associated with a higher level of confidence, accounting for 52.9% of variance in the sample.

Respondents had a significantly higher level of trust for food-related government authorities and large companies than they did for their general counterparts. There was no statistically significant difference between trust in general and food-related scientists, but scientists remained the most trusted, perhaps indicating an overall higher level of trust in scientists generally or a lack of understanding of the role that scientists play in the food system.

Identical questions on trust in supermarket chains, small food companies, large food companies, government/public food authorities and scientists were asked in a quantitative survey administered as part of the focus groups research (n = 79; Ankeny and Harms 2021). After statistically comparing the result, the only significant difference between the means was that for large food companies. Respondents in the current survey had a significantly higher level of trust than focus group participants (a mean score of 4.54 compared to 3.99; p <

"Overall, how confident are you in the safety of the Australian food supply?", and used the same rating scale of 1 = "Not at all confident" and 7 = "Extremely confident".

.001). This result is likely to have been impacted by the timing and context in which these questions were asked. In the focus groups, the trust questions were asked on the third day, after the participants had already spent two days discussing genetically modified food applications and issues of trust around the companies behind GM. For the current survey, participants were asked about trust prior to any questions around GM food specifically.

Food safety concerns

The top food safety concerns in this survey were carcinogens in food (42%), chemicals in food (39.3) and pesticides or pesticide residues (36.4%). However, it is important to note that foodborne illness had a higher percentage of people choosing it as their top food safety issue than either chemicals in food or pesticides. These are substantially different from the results in the 2020 FoodIQ survey, which used the same set of concerns, where imported food was the most chosen food safety issue (37.6%), followed by foodborne illness (37.4%) and contamination of food with foreign objects (32.4%). Chemicals in food was the least chosen food safety issue in the FoodIQ survey. This suggests that there is some variability in the issues that are of top concern to consumers at any given time, perhaps influenced by issues highlighted in the media around the time the survey is undertaken. Nevertheless, GM foods were consistently a low priority for consumers. In both surveys, GM foods were the third-least important food safety issue and were chosen by less than 20% of respondents.

Level of confidence had a small association on survey respondents' top food safety concerns. Those who had a low level of confidence in the food supply were more likely to select 'Imported food' as their top food safety concern. Those with a high level of confidence were less likely to select 'Chemicals in food' as their top safety concern.

Genetically modified food or organisms was selected by 19.5% of respondents in the current survey. Males and people aged 18-34 years were significantly more likely to select 'Biotechnology' as their top food safety concern. There were no statistically significant associations with selecting GM foods as a food safety concern.

Trust and support for GM foods

Trust plays an important role in areas of perceived technological risk that have a high social salience, such as genetically modified foods (Poortinga and Pidgeon 2005). International research suggests that consumers who are generally more trusting, and have a higher level of trust in the food system, are less averse to genetically modified food (Ding et al. 2011), however the nature of this relationship is contested (Poortinga and Pidgeon 2005). That is, while a higher level of trust may lead to a greater level of acceptance of GM foods, it is also possible that both level of trust and GM food acceptance are related to an additional factor: respondents' perceptions of risk more generally. This survey did not ask questions to ascertain respondents' general risk perceptions, and therefore cannot assess whether this underlies participants' responses. Nonetheless, the survey found that trust played an important role in people's level of support for GM foods.

When asked about their level of support for GM foods generally, responses were fairly evenly split: 30% of respondents indicated that they had a level of support above the midpoint, 40.4% indicated they had a level of support below the midpoint, and 29.6% responded at the midpoint. This is substantially different than the findings from the OGTR's most recent

community attitudes survey (Donnelly et al. 2021). The OGTR survey used an 11 point scale in which 0 means “Completely against” and 10 means “Completely supportive”. When asked about level of support for genetic modification and gene technology “for use in foods and crops” 44% of respondents in the OGTR survey answered with a score between 7 and 10 inclusive (defined as supportive), 29% answered with a score between 4 and 6 (defined as neutral), and 20% answered with a score between 0 and 3 (defined as opposed). A further 7% were unsure. After converting the 7 point scale used in this survey to an 11 point scale[12] to mirror the OGTR’s scale, the current survey found 30% supportive, 44.5% neutral and 25.5% opposed by the definitions used by OGTR.

It is not clear why there is a difference between the findings of the OGTR and this survey. One relevant difference is that the current survey did not allow respondents to select “Can’t say/don’t know” for this question, which may have increased the number of respondents in the neutral category. However, it is also important to note that the OGTR survey, which is conducted on a biannual basis, has found longitudinal variability in the level of support for GM technology in food and crops year-on-year, with the 2021 results having a level of support significantly higher from those of 2019. In 2019, the results were closer to those found in the present survey, with 35% supportive, 32% neutral, 24% opposed and 9% unsure.

A multiple regression based on the previous FSANZ commissioned GM literature review (Grant et al. 2021) found that being younger, male and tertiary-educated, with a higher level of perceived knowledge about GM and a higher level of confidence in the food supply, was associated with a greater level of support for GM foods, accounting for 16.2% of the variance in the sample. This is consistent with the OGTR survey’s findings that males were more likely to be supportive, while females were more likely to be neutral or unsure (it is unclear whether the OGTR tested significance of any other associations). When level of trust for GM producers and scientists was added into the model, level of perceived knowledge and level of confidence in the food supply were no longer significant contributors. The final model found that being younger, male, tertiary-educated and having a higher level of trust in GM scientists and producers was associated with a higher level of support for GM foods, accounting for 48.3% of the variability in the sample.

Knowledge, understanding and awareness

The literature review commissioned by FSANZ (Grant et al. 2021) specifically looked at awareness and knowledge of NBTs, such as gene editing, rather than GM foods as a whole. It found that knowledge and awareness of NBTs is low in Australia and has not been investigated in New Zealand. Internationally, it found that knowledge of NBTs is lower than knowledge of GM. However, they also found that general consumers do not conceptually separate NBTs from other genetic technologies, which is why the current survey did not attempt to conceptually separate them.

The current survey tested consumers’ knowledge and understanding of GM foods through a series of questions asking respondents’ self-reported level of knowledge and testing their

[12] The 7 point scale used in this survey (x_7) was mathematically converted into an 11 point scale (X_{11}) using the following formula: $X_{11} = (x_7 – 1)(10/6) +1$. Formula adapted from Lewis and Sauro (2020).

understanding of definitions of gene techniques and current availability of GM foods in the Australian/New Zealand market.

Self-reported knowledge

When asked about how much they felt they know about GM foods, nearly half (45.1%) of respondents answered that they knew “A little” – the central option in a five-step Likert-style scale that ranged from “A great deal” to “Never heard of it”. The next most frequently chosen option was “Heard of it but know nothing about it” (24.7%) and “A fair amount”. “Never heard of it” was the least frequently chosen option, excepting “Can’t say/don’t know”.

The Ipsos MORI (2021) survey commissioned by the UK FSA used the same scale as that employed in this survey. Similar to the results in the Australian/New Zealand context, it found that the response with the highest frequency was “Just a little” (39%). This was followed by “Heard of it but know nothing about it” (27%) and “A fair amount” (20%). In comparison to the Australian/New Zealand sample, more UK respondents had “never heard” of genetically modified foods (9%), and less felt they had “A great deal” of knowledge (4%).

The questions asked about knowledge of gene technology/genetic modification in the focus groups and the OGTR survey were not comparable to the questions in this survey as they employed a different scale with fewer levels of gradation.

Understanding of GM

Respondents who answered that they had some level of knowledge about GM foods (“A little”, “A fair amount” or “A great deal”) were asked to identify the correct definitions of GM foods from four provided ones. The definitions covered genetic modification, genome editing, mutagenesis and conventional breeding. The definitions aligning with genetic modification and genome editing were considered to be the ‘correct’ answers. In contrast to the literature review, which found that there was a low awareness of new breeding techniques such as gene editing, the most frequently selected response was the definition that most closely aligned with genome editing (61.0%). Furthermore, where respondents had chosen only one definition out of the four, the definition that was overwhelmingly chosen (75.7%) was that for genome editing. There was evidence of some confusion about how older forms of GM technology (45.4%) differ from conventional breeding (44.1%) and mutagenesis (33.9%), as they had relatively similar frequencies of response. Only 7% of people in this survey correctly answered by selecting the definitions for both genome editing and older forms of genetic modification and no others. A much higher proportion (57.1%) were partially correct, in that they selected one of the two correct definitions and no others. As noted above, those who were partially correct overwhelmingly selected the definition for genome editing. 26.6% of respondents were incorrect, and 9.2% said they didn’t know.

These findings suggest that, in contrast to the findings of the literature review, consumers *do* differentiate between genome editing and older forms of genetic modifications, and that genome editing is more widely understood as a technique for genetically modifying foods than older forms of GM. The only demographic variable associated with choosing the correct responses was education level, with tertiary-educated people more likely to select the correct responses and less likely to select that they didn’t know.

In the UK's survey, participants were given two definitions, one that aligned with genome editing and one that aligned with older forms of genetic modification, and were asked to identify whether each definition corresponded to genome editing, GM, both or neither. They found that most respondents did not identify the scientific technique correctly. 28% of people identified genome editing correctly and 36% correctly identified genetic modification. However, it is important to note that the definitions used in this study differed from international definitions, and a further 28% of people who said that the definition for GM matched both techniques would be correct under some international definitions. 62% were incorrect in their understanding of gene editing, and 25% were incorrect in their understanding of genetic modification. 10% did not know in either case.

Awareness of availability of GM foods

One of the findings from the focus groups was that many participants incorrectly believed that GM whole foods were currently for sale in Australia/New Zealand. This was tested in the survey by asking all respondents whether they believed that GM foods are currently for sale in Australia/New Zealand. There were four possible answers. The most frequently chosen response (42.1%) was the incorrect belief that GM whole foods such as fruits and vegetables were already for sale in Australia and/or New Zealand. This was followed by "Don't know", which was selected by a third of people. Only 17.7% of people correctly understood that GM food ingredients but not whole foods are for sale in Australia/New Zealand. 6.9% of people incorrectly believed that GM foods were not for sale in any capacity.

The OGTR survey (Donnelly et al. 2021) asked respondents whether they believed four different statements about GM foods in Australia were true or false. Three of these are relevant to the current survey, as follows:

- Most of the vegetable oils produced in Australia are made from genetically modified crops.
- Most of the fresh fruit and vegetables grown in Australia are genetically modified.
- Most of the processed foods in Australian supermarkets contain genetically modified ingredients.

Their survey found that 34% of people correctly believed that most vegetable oils are from GM crops, while 21% were incorrect and 44% did not know. 29% of people incorrectly believed that most fresh fruit and vegetables grown in Australia are genetically modified, 36% were correct and 36% did not know. 38% of people incorrectly believed that most processed foods in Australian supermarkets contain GM ingredients, 22% were correct and 41% did not know.

Although the questions asked across the two surveys are not directly comparable, there is evidence in both of a widespread lack of understanding of the current regulatory environment for GM foods. The vast majority of people in both surveys (82.3% in the current survey, up to 79% in the OGTR survey) were either incorrect or stated that they did not know about the availability of GM foods in the Australian and/or New Zealand marketplace.

Support and concerns

Overall, the current survey found that 30% of people supported GM foods, 30% were neutral about them and 40% of people were opposed. However, the focus groups found that participant support for and concerns about GM foods differed according to the type of application, and that the uses to which this technology is put matters. This finding was mirrored within the literature review. There was a higher level of support in both the focus groups and the studies surveyed in the literature review for GM applications that had benefits for human health, the environment or animal welfare. However, it is also important to note that these same issues could also be perceived as reasons to oppose the technology. The key factor appears to be whether people trust GM food producers and scientists to "do the right thing" and ensure that these benefits are realised.

Another factor identified by the literature review was differential levels of support for specific applications of GM technology involving plants or animals. Generally, applications that involved crops had a higher level of support than applications that involved livestock. This appears to be due to animal welfare concerns.

Support for specific scenarios

In order to test the findings from the focus groups, five specific scenarios were presented to survey respondents and their support or opposition was sought on a 5-point Likert-type scale to mirror the scale used in the focus groups. Three scenarios were taken directly from the focus groups research, and two were introduced to test the findings about the perceived benefits.

As was anticipated from the focus group findings, for most of the specific scenarios presented, the level of support was higher than the baseline level of support for GM foods while opposition was lower. Around 25% of respondents were neutral in each scenario, which is similar to the 30% of respondents who were neutral about GM foods in general.

The scenario with the highest level of support was drought-tolerant wheat. This scenario was described as gene editing and was presented with clear benefits for food security in the face of climate change. 58.9% of survey respondents supported this application, with only 12.2% opposed. This was substantially different than the overall level of support for GM foods, which had 30% supportive and 40% opposed.

The scenario with the next highest level of support was for healthier soybean oil. This scenario was described as gene editing and was presented with clear benefits for human health by reducing consumption of trans fats. 53.5% of people were supportive of this application, with 16.6% of people opposed. Once again, this was a substantially higher level of support than that for GM foods in general.

This was followed by heat-tolerant cattle. This scenario was described as gene editing and was presented as having benefits for animal welfare by enabling animals to withstand warmer temperatures and increasing resistance to sunburn/melanoma. This application was supported by 45.6% of people, with 24.9% opposed.

The scenario with the next highest level of support was herbicide-tolerant canola. This scenario was described as gene editing and as having benefits for the farmer's income by

increasing the yield of the crop. This application was supported by 42.8% of people, with 25.4% opposed.

Finally, the scenario with the lowest level of support was quick-growing salmon. This scenario was described as transgenesis and as having benefits for the farmer by increasing speed of production and reducing feed consumption. This application was supported by 27% of people, and opposed by 41.8% of people. This approximates the level of support/opposition for GM foods overall.

The different levels of support for the specific applications presented are in line with the findings from the literature review and focus groups. Applications that were presented as having benefits for human health or society (in the form of food security) had much higher levels of support than those indicated for GM foods in general. Heat-tolerant cattle and herbicide-tolerant canola had slightly lower levels of support than the top two, likely due to the fact that the benefits they suggest (for animal welfare and the environment) can also be reasons for concern about these same applications. In the focus groups, participants were concerned that a greater ability to withstand heat may enable farmers to put cattle in more hostile environments, and negative media around glyphosate has potentially raised concerns about a technology that would enable it to be used in greater quantities. It was anticipated that quick-growing salmon would have the lowest level of support as it was described as having benefits primarily for the farmer's income, rather than broader society. Interestingly, the support for this application appears to have broadly reverted to the overall level of support for GM foods that was initially measured, whereas the other applications all had a higher level of support.

These findings appear to validate the findings of the focus groups and the literature review: the uses to which the technology is put matters. Understanding the societal benefits for specific applications appears to increase the level of support that people have for GM foods. Where these benefits are not apparent, support appears to revert back to the overall level of support for GM foods.

In the three scenarios that were replicated from the focus groups (drought-tolerant wheat, heat-tolerant cattle and healthier soybean oil), there were similar levels of opposition between the focus groups and the survey. However, the survey results had higher levels of neutrality (25% in survey versus a max of 15% in focus groups), and a lower level of support (max of 58.9% in survey vs max of 88% in focus groups). The lower level of neutrality in the focus groups may be due to the educational component: participants in the focus groups were shown a video about gene editing at the start of the session, prior to discussing the specific applications, that emphasised the benefits of this technology. This may have resulted in some of the participants who would otherwise have been neutral shifting to a supportive position. There was no similar educational component in the current survey. This could indicate the importance of communication and education in shaping people's attitudes towards this technology.

Trends in response to specific scenarios

Multinomial regressions were conducted on each of the specific scenarios and on the consistency of people's responses to the scenarios, to determine what factors might be associated with people's level of support or opposition.

Across scenarios, people who were aged 50-64 years or who had a high level of perceived knowledge were generally more likely to be polarised in their responses – tending to being either supportive or opposed rather than neutral or unsure. Having a higher level of confidence in the food system was associated with being supportive of the scenarios, but having a lower level of confidence was not always associated with being opposed to them. Not being tertiary-educated and having a low level of perceived knowledge was associated with answering “Don’t Know”.

When analysing the consistency of responses, some similar trends emerged. People with a high level of perceived knowledge were more likely to be consistently polarised, being more likely to be either consistently supportive or consistently opposed rather than inconsistent in their responses. Having a higher level of confidence in the food supply was associated with being consistently supportive, and a lower level of confidence was associated with being consistently opposed.

Although it didn’t come out in the scenario-by-scenario analysis, people from Australia were more likely to be consistently polarised – either consistently supportive or consistently opposed – than people from New Zealand. Females were also more likely to be inconsistent in their responses to the scenarios, while males were more likely to be either consistently supportive or consistently neutral.

Concerns

A key finding from the focus groups was that, although participants may support the use of genetic modification in order to realise specific benefits for society, the environment, or animal welfare, this did not prevent them from having concerns about the way in which the technology was utilised. This was tested in the current survey by asking people separately about their level of concern about GM foods. We then asked people who indicated that they had some level of concern what their top three concerns were from a list drawn from the focus groups and submissions to the P1055 Call for Submissions.

It is important to first contextualise people’s concerns around GM foods within a broader range of food safety issues. GM foods were one of the least frequently chosen concerns for people when ranking food safety issues. This suggests that they are not a top-of-mind food safety issue for the vast majority of respondents, despite a substantial proportion of people believing that GM foods, whole or otherwise, were already for sale in Australia/New Zealand.

However, when asked directly about any concerns about GM foods, nearly half of respondents (47.6%) indicated that they had some level of concern. Key concerns among those respondents were: safety, the trustworthiness of GM companies or scientists, environmental impact and animal welfare. People who were aged 50+ years and/or were female were more likely to select safety as their top concern, while people who were less than 50 years old and/or male were more likely to select taste as their top concern.

The top concerns found in this survey mirror those raised in the focus groups (Ankeny and Harm 2021) and the UK FSA’s research on consumer perceptions of genome edited food (Ipsos MORI 2021). However, the UK research found that in addition to these concerns, their workshop participants raised regulation as an issue, including aspects around transparency and consumer choice. This was not a key concern in the Australian/New Zealand focus groups, and the necessity of government oversight was one of the less frequently chosen

concerns in this survey despite the importance put on safety. This could suggest either a lack of awareness of the role of government in regulating genetically modified food in Australia/New Zealand, as found in the focus groups, or a lack of prioritisation of this role.

It is important to note the relative salience of environmental impact and animal welfare. Although the environment and animal welfare may be compelling reasons to support the use of GM technology in food production, as discussed in the specific scenarios, they are also reasons to be concerned about these applications. A mitigating factor in the level of concern may be the level of trust that people have for the GM producers and scientists to ensure that these technologies are used for the benefit of the environment and animal welfare, and not to their detriment. Both level of concern and level of support for GM foods was significantly associated with respondents' level of trust in GM producers and scientists.

Communication

The literature review (Grant et al. 2021) found that, due to the relatively low awareness of GM foods and NBTs, communication is an important factor in influencing community attitudes into the future. Bray and Ankeny (2017) have argued that there should be "a more sophisticated and broader engagement about GM, against the backdrop of more complex considerations of values." This is supported by the current survey, which found that people have complex responses that depend upon the specific applications of GM in foods and their level of trust for those who are responsible for deploying the technology.

Types of respondents

The OGTR's most recent community attitudes survey (Donnelly et al. 2021) placed respondents into one of four categories: those who were supportive of GM (18%), those who were conservatively supportive of GM (52%), those who opposed GM but were open to persuasion (19%) and those who were comprehensively opposed to GM (11%).

In addition to those categories identified by the OGTR survey, we have added an additional category – those who were neutral, but could be persuaded in either direction (towards support or opposition) by the specific scenarios. This led to a Likert-style framework of five positions that together captured 88.1% of the respondents. The other 11.9% of the sample were either inconsistent in their positions (such as supporting GM in general, but opposing every scenario or vice versa) or were consistently unsure. Because the categories differed to that used by the OGTR survey, they are not directly comparable.

Chi-square analyses were run on each of these five positions to identify respondent characteristics that were significantly associated with membership of each group. The findings are consistent with the literature, that being younger, male and tertiary-educated is associated with being supportive of GM foods, while being older, female and non-tertiary educated was associated with being opposed to GM foods. In addition, trust and confidence in both the food supply and GM producers and scientists mapped onto these categories. The neutral category was only significantly associated with level of trust in GM producers and scientists.

Consistently supportive	**Supportive, *but…***	**Neutral, *but…***	**Opposed, *however…***	**Consistently opposed**
Defined as: • Supporting GM • Supportive in all scenarios	Defined as: • Supporting GM • Inconsistent response to scenarios	Defined as: • Neutral to GM • Inconsistent response to scenarios	Defined as: • Opposing GM • Inconsistent response to scenarios	Defined as: • Opposing GM • Opposed in all scenarios
4.5%	**24.0%**	**22.5%**	**30.5%**	**6.6%**
More likely to be… • Male • Tertiary educated • Medium-High confidence in food supply • More trusting of GM producers • Higher level of trust in GM scientists	More likely to be… • Younger • Male • Tertiary educated • High confidence in food supply • More trusting of GM producers • Higher level of trust in GM scientists	More likely to be… • Neutral in trust about GM producers • Neutral about GM scientists	More likely to be… • Older • Female • Not tertiary-educated • Low-Medium confidence in food supply • Less trusting of GM producers • Lower level of trust in GM scientists	More likely to be… • Older • Female • Not tertiary-educated • Low confidence in food supply • Less trusting of GM producers • Lower level of trust in GM scientists

Figure 17: Identifiable respondent groups. These groups account for 88.1% of the sample. The other 11.9% were inconsistent in their positions across the survey, and could not be adequately categorised.

Communication methods

Nearly half of respondents (47.1%) said that they would like to know more about genetically modified foods. Those who were supportive or opposed according to the above groups were neither more nor less likely to say that they did or did not want information about genetically modified foods. The only factors associated with wanting to know more about GM foods was already having a high level of perceived knowledge.

Findings were generally mixed about people's preferred communication methods, however government websites were the option that was most frequently chosen, followed by newspapers/news websites and television or radio campaigns. Social media was one of the less frequently chosen options, as was doctor/GP.

The OGTR survey found that the public are currently getting their information predominantly from Google searches (44%), television documentaries (37%), news (32%) and current affairs (29%), and news websites (26%). Social media was one of the least frequently chosen responses. People trusted TV documentaries the most (80%), followed by news sources, trusted by 65% of people. 75% of people expressed concern about fake news and information, which may be why social media was one of the less chosen responses. Government websites were not an option in this survey.

It is important to note, however, that the qualitative research highlighted consumers' sensitivity to perceived bias. Consumers wanted to be presented with balanced information to enable them to make up their own minds rather than being led or persuaded to a specific viewpoint. The findings from the current survey suggest the potential role of government as a trusted source to provide unbiased information about genetically modified foods to enable consumers to make up their own minds.

Limitations

This study has the usual limitations associated with an online survey conducted on a nationally representative sample.

The non-response rate of potential survey respondents is unknown. Although the final sample was nationally representative by three factors (sex, age, and (AU only) location), it is possible that non-respondents of the survey had common factors that made them more likely to be non-responsive that have not been adequately considered in the survey.

As noted in the sample description above, when compared against the most recent census data from Australia and New Zealand, there are some areas in which the sample departs from the respective national population demographics. There is evidence of an under-sampling of people with a high school education and below in Australia, and an oversampling of all other education levels. In New Zealand, there is evidence of an under-sampling of people with a TAFE-level of education, and an over-sampling of all other education levels.

There is evidence of over-sampling of people from Otago, and a slight under-sampling of people from other regions in New Zealand. There is evidence of some over-sampling of people living in high SES areas and under-sampling of people living in medium SES areas.

There is also evidence of under-sampling of Aboriginal and Torres Strait Islanders in Australia, Māori and Pacific Islanders in New Zealand, and Asians in both countries. There is a slight over-sampling of Middle Eastern, Latin American and African populations in New Zealand.

This study is also limited by its cross-sectional survey design, meaning that all analyses are purely correlational. Although the statistical models used to analyse the data provide a degree of predictive power, these models are limited in that they were only able to control for variables that were measured in the current survey. It is therefore not possible to infer causation from any of the analyses. For example, it is not possible to definitely conclude that having a high level of trust in GM food producers *causes* people to have high levels of support for GM foods, as there may be a third variable that influences both levels of trust and levels of support that was not measured in the current study (such as risk perception; see further discussion of this issue in the Discussion section). Nonetheless, the current study provides valuable insight into consumers' current perceptions of and attitudes towards GM foods, and the various factors and/or contexts that are *associated* with a given perception or attitude.

Conclusions

This report presents the findings of a quantitative survey of consumers' attitudes and perceptions of genetically modified foods carried out in June 2022 to inform Proposal P1055 – Definitions for gene technology and new breeding techniques.

The survey found that, although GM foods are not a top-of-mind food safety issue for the vast majority of consumers, nearly half of people have some level of concern about them and want to know that they are safe. Level of support for GM foods generally was quite mixed, with 30% supportive, 30% neutral, and 40% opposed. However, when asked about specific applications of GM food, there was generally a higher level of support and a lower level of opposition than this baseline. The specific benefits of each application matters: people were more likely to support applications that presented benefits to society, human health, the environment and animal welfare. People reverted to their base level of support when applications emphasised industry benefits.

Only a small minority of respondents (6.6%) were completely opposed to GM foods (i.e. they indicated they did not support GM foods generally and consistently opposed each scenario). A similarly small minority (4.5%) completely supported GM foods (i.e. they indicated they supported GM foods and consistently supported each scenario). The vast majority (77%) of people fell somewhere in between, meaning that they had different responses to different scenarios regardless of their support or opposition for GM foods overall. This validates the focus group and literature review findings that the uses to which GM technology is put matters to consumers, and that applications with broad societal/environmental benefits are preferred. It also suggests the importance of communication in shaping attitudes – individual views are not set in stone and people are open to being persuaded one way or another by the information that is presented.

Trust was an important factor for people's level of support and concern about GM foods. Respondents who had a higher level of trust in GM producers/scientists were more likely to be supportive of GM foods. Trust had a greater association with the level of support for GM foods than did any of the demographic factors that have previously been reported in literature reviews. That is, although (consistent with the literature) being younger, male and highly educated was associated with higher level of support for GM, level of trust in GM producers/scientists was a much better predictor of the level of support for GM foods.

People had relatively low levels of perceived knowledge about GM foods, and this was largely borne out through participants' confused understanding of GM definitions and incorrect beliefs about the availability of GM whole foods in the Australian/New Zealand market. Level of knowledge, perceived or objective, was not correlated with level of support for GM once the other factors were controlled for, which suggests that providing education about GM foods would not be the most important factor in shaping people's attitudes about GM foods. Rather, communicating the trustworthiness of the people and institutions that are responsible for GM foods appears to be of key importance.

Implications

While government authorities, including FSANZ, have a significant role to play in upholding consumer confidence in the general food supply, the survey findings suggest that consumer support for GM foods will in large part depend on the GM industry building and maintaining trust with consumers directly. While GM foods are not currently a top three food safety issue for most consumers, this may be due in part to the absence of GM whole foods in the Australian/New Zealand marketplace (despite a sizeable minority of consumers believing that they are already for sale). There is evidence of substantial variability in consumers' top food safety concerns across different comparable surveys, suggesting that GM foods could easily become a higher priority issue for consumers in future.

Consumers' reported concerns and varying responses to the scenarios presented suggest that building and maintaining consumer trust could include ensuring that scientists and producers are understood to be operating in good faith, and that products developed with GM techniques have an explicit societal benefit beyond industry (including the environment and/or animal welfare). As a trusted supplier of information, government agencies have a potential role to play in providing unbiased information for consumers to help them learn more about genetic modification and the range of techniques that are emerging.

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Appendices

Appendix 1: Survey Instrument

Section 1: Demographics

NOTES: AGE, SEX, AND STATE/TERRITORY (FOR AUSTRALIA ONLY) ARE AUTOMATICALLY INCLUDED.

D1. May we please ask the postcode in which you live?

(Please enter your numeric postcode below)

D2. What is the highest level of education that you have completed?

- Primary School
- High School (Year 10 or equivalent)
- High School (Year 11 or equivalent)
- High School (Year 12 or equivalent)
- TAFE – Technical and Further Education (Certificate, Diploma, Advance Diploma, or Associate Degree);
- Undergraduate (Bachelor Degree, with or without Honours)
- Postgraduate (Graduate Certificate, Graduate Diploma, Masters, or PhD)

D3. How would you describe your cultural background? (Please select all that apply)

- Aboriginal and/or Torres Strait Islander
- Māori
- Pacific Islander
- Australian
- New Zealander
- Anglo-Celtic or European
- Asian
- African
- Hispanic or Latino/Latina
- Middle Eastern
- Other (please specify): [TEXT BOX]
- Prefer not to say [EXCLUSIVE]

Section 2: Trust in Government and the Food System, and Top Safety Concerns

Q1. How much do you trust the following people and institutions to do what is right?

(Please rate each item on a scale from 1-7, from "1–- Do not trust at all" through to "7–- Trust completely")

	Do not trust at all						*Trust completely*
Press, television and radio	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Politicians	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Government Departments	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Non-profit community groups or organisations	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Health professionals	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Large companies or corporations	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Scientists	*1*	*2*	*3*	*4*	*5*	*6*	*7*

Q2. How confident are you that all food (including drinks) sold in {FOR AU: Australian; FOR NZ: New Zealand} shops and supermarkets is safe to eat?

Not at all confident						*Completely confident*
1	*2*	*3*	*4*	*5*	*6*	*7*

Q3. How much do you trust the following people and institutions to ensure that all food (including drinks) sold in {FOR AU: Australian; FOR NZ: New Zealand} shops and supermarkets is safe to eat?

(Please rate each item on a scale from 1-7, from "1–- Do not trust at all" through to "7–- Trust completely")

	Do not trust at all						*Trust completely*
Supermarket chains	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Small food producers	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Large food producers	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Government/public food authorities	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Scientists	*1*	*2*	*3*	*4*	*5*	*6*	*7*

Q4. Out of the following items, could you please rank your <u>top 3</u> most important food safety issues?

(Please rank your top 3: if you wish to change your ranking, simply click on an option to un-select this)

- Foodborne illness from bacteria/contaminants
- Carcinogens or cancer-causing chemicals in food
- Chemicals in food
- Pesticides/pesticide residues
- Food additives (e.g. flavours, colours, or preservatives)
- The presence of allergens in food/undeclared allergens
- Hormones and antibiotics used to produce farm animal products
- Biotechnology
- Genetically modified food or organisms
- Imported food/food from overseas
- Contamination of food with foreign objects (e.g. glass, needles)
- None of the above [ANCHOR; EXCLUSIVE]

[RANDOMISE ORDER]

Section 3: Genetically Modified Foods

Q5. Genetically modified foods are food or food ingredients derived from plants, animals or microbes whose genetic material (DNA) has been modified using specific laboratory techniques to introduce a new or different characteristic, or improve an existing characteristic.

How much do you feel you know about genetically modified foods?

- A great deal
- A fair amount
- A little
- Heard of it but know nothing about
- Never heard of it
- Can't say/don't know

Q6. [IF ANSWERED "A GREAT DEAL, A FAIR AMOUNT, OR A LITTLE" IN QUESTION 8, OTHERWISE SKIP TO Q10] To the best of your knowledge, which of the following descriptions do you think apply to genetically modified foods? (Please select all that apply).

Genetically modified foods are derived from plants, animals or microbes where…

- Scientists have inserted DNA from one living thing into the DNA of another living thing to introduce a new or different characteristic.
- Farmers have genetically improved the animals and plants through selective breeding and artificial insemination.

- Scientists have created small, specific changes to part of a living thing's DNA to improve or remove existing characteristics.
- Scientists have exposed seeds to chemicals, radiation, or enzymes to generate new varieties with desirable traits.
- Can't say/don't know

[RANDOMISE ORDER OF RESPONSES, EXCEPT FOR CAN'T SAY/DON'T KNOW, MULTIPLE SELECTIONS POSSIBLE]

Q7. To the best of your knowledge, are genetically modified foods currently for sale in {FOR AU: Australia; FOR NZ: New Zealand}?

- Yes – genetically modified fruits, vegetables and/or meat or dairy products as well as food ingredients
- Yes – genetically modified food ingredients but not whole foods
- No
- Don't know

Q8. On a scale of 1-7, where 7 is completely supportive and 1 is completely against, please indicate how supportive you are of the use of genetic modification techniques to produce food or food ingredients?

Completely against						***Completely supportive***
1	*2*	*3*	*4*	*5*	*6*	*7*

Q9. To what extent are you concerned or unconcerned about genetically modified foods or food ingredients in {FOR AU: Australia; FOR NZ: New Zealand}?

- Very unconcerned
- Somewhat unconcerned
- Neutral
- Somewhat concerned
- Very concerned
- Can't say/don't know

[IF ANSWERED "SOMEWHAT CONCERNED OR VERY CONCERNED" IN QUESTION 12, CONTINUE TO RANKING QUESTION Q13; OTHERWISE SKIP TO Q14]
Q10. Out of the following items, could you please rank your top 3 concerns?

(Please rank your top 3: if you wish to change your ranking, simply click on an option to un-select this)

- The welfare of animals bred using GM technologies;
- The safety of humans eating GM foods;
- The trustworthiness of companies or scientists developing GM foods or GM technologies;

- A lack of long-term safety data on GM foods;
- Ensuring government oversight before GM foods enter the market;
- The environmental impact from introducing GM crops, including monocultures or cross-contamination with other crops;
- The lack of public understanding of GM foods;
- The financial impact on small-scale farmers if they cannot access GM technology;
- The taste of GM foods;
- The nutritional value of GM foods;
- The potential higher cost of GM foods making them unaffordable for some people;
- The potential lower cost of GM foods making them the only affordable option for some people;
- That GM foods do not solve the bigger problem (e.g. climate change or animal welfare concerns);
- The unnaturalness of GMs;
- The presence of foreign DNA or genes in GM foods.
- None of the above [ANCHOR; EXCLUSIVE]

[RANDOMISE ORDER, ALLOW PARTICIPANTS TO RANK THREE CONCERNS]

Q11. How much do you trust producers of genetically modified (GM) foods to ensure that the food they produce for sale in {FOR AU: Australia; FOR NZ: New Zealand} is safe to eat?

(Please rate each item on a scale from 1-7, from "1–- Do not trust at all" through to "7–- Trust completely")

	Do not trust at all						***Trust completely***
Small GM food producers	*1*	*2*	*3*	*4*	*5*	*6*	*7*
Large GM food producers	*1*	*2*	*3*	*4*	*5*	*6*	*7*
GM Scientists	*1*	*2*	*3*	*4*	*5*	*6*	*7*

[RANDOMISE THE ORDER OF PRODUCERS/SCIENTISTS]

Section 4: Specific Applications of GM

[PRE-AMBLE TO SECTION DISPLAYED ON ITS OWN PAGE]:

On the following screens are a few different applications of genetically modified (GM) foods or food ingredients. For each description that's shown, we would like to know how supportive you would be of the use of that type of genetic modification.

There are no right or wrong answers. We are simply interested in your opinions, to understand **how supportive <u>you</u> would be of the use of each type of genetic modification**.

When you are ready to continue, please click "Next".

Q12. ***Scientists have developed a way to create drought-tolerant wheat through gene editing. Rather than adding new genes, this method involves editing the plant's own genes. This is intended to improve the efficiency and sustainability of farming, as well as provide significant economic benefits by reducing loss from drought.***

- Very opposed
- Moderately opposed
- Neutral
- Moderately supportive
- Strongly supportive
- Don't know

Q13. ***Scientists have developed a new variety of heat tolerant cattle using a genetic modification technique called gene editing. Rather than adding new genes, this method involves editing one of the cow's own genes. This changes the properties of the cow's hair coat, enabling the cow to withstand warmer temperatures without developing heat stress. It also makes them resistant to sunburn/melanoma.***

- Very opposed
- Moderately opposed
- Neutral
- Moderately supportive
- Strongly supportive
- Don't know

Q14. ***Soybean oil is commonly used as a cooking oil, and in salad dressings, baked goods, fried foods, snack foods, and margarine. Scientists have found a way to reduce the formation of unhealthy trans fats in soybean oil through a process of gene editing which involves turning off particular genes found within the plant itself.***

- Very opposed
- Moderately opposed
- Neutral
- Moderately supportive
- Strongly supportive
- Don't know

Q15. ***Scientists have developed a new variety of herbicide-tolerant canola using gene editing. This method involves editing one of the canola's own genes so it can continue to grow in the presence of herbicide which is used by the farmer to control weeds. Controlling weeds is important because they compete with the crop for water and may also reduce the yield of a crop, affecting the farmer's income.***

- Very opposed
- Moderately opposed
- Neutral

- Moderately supportive
- Strongly supportive
- Don’t know

Q16. ***The “AquAdvantage” salmon is a new type of farmed Atlantic salmon which has been genetically modified to reach market size in half the amount of time and use 25% less feed. This was done by introducing a new gene (for a growth hormone) from the Chinook salmon. The salmon are grown in land-based pens to prevent escape into the ocean.***

- Very opposed
- Moderately opposed
- Neutral
- Moderately supportive
- Strongly supportive
- Don’t know

Section 5: Information

Q17. Thanks for your time so far – you’re nearly finished this survey! Would you like to know more about genetically modified foods?

- Yes
- No
- Don’t know

Q18. [IF ANSWERED “YES” TO QUESTION 20, OTHERWISE SKIP TO END] What would be your preferred way to receive information about genetically modified foods? (Please check all that apply)

- Newspapers or news websites
- Television or radio campaigns
- Government websites
- Social media (e.g. Facebook, Instagram, Twitter, TikTok)
- Doctor/GP
- Other (please specify): [INSERT TEXT BOX; ANCHOR]

[RANDOMISE ORDER; MULTIPLE SELECTIONS POSSIBLE]

Appendix 2: Data Tables

Table 8: Level of trust in professionals and institutions
Q1: How much do you trust the following people and institutions to do what is right? (Please rate each item on a scale from 1-7, from "1–- Do not trust at all" through to "7–- Trust completely")
Base: All respondents (n = 1500)

	Press, television and radio	Politicians	Government Departments	Non-profit community groups or organisations	Health professionals	Large companies or corporations	Scientists
1–- Do not trust at all	11.4%	20.5%	9.7%	3.5%	1.7%	9.4%	1.8%
2	14.0%	19.2%	8.9%	3.8%	0.9%	10.6%	2.3%
3	18.2%	18.3%	14.0%	11.3%	4.6%	20.6%	6.2%
4	27.1%	23.6%	27.6%	25.2%	12.2%	28.1%	16.6%
5	20.5%	11.9%	22.7%	31.9%	27.5%	21.9%	27.3%
6	6.3%	4.9%	13.5%	19.3%	36.1%	7.5%	31.9%
7–- Trust completely	2.6%	1.5%	3.7%	5.1%	17.0%	1.9%	13.9%

Table 9: Level of confidence in the safety of Australian/New Zealand food
Q2: How confident are you that all food (including drinks) sold in Australian/New Zealand shops and supermarkets is safe to eat? (1 = "Not at all confident" and 7 = "Completely confident")
Base: All respondents (1,000 AU, 500 NZ)

		Country		
		Australia	New Zealand	Total
Q5. How confident are you that all food (including drinks) sold in Australian shops and supermarkets is safe to eat?	1 - Not at all confident	4.5%	4.2%	4.4%
	2	2.5%	4.8%	3.3%
	3	8.3%	8.0%	8.2%
	4	15.3%	17.2%	15.9%
	5	26.3%	26.0%	26.2%
	6	30.0%	28.4%	29.5%
	7 - Completely confident	13.1%	11.4%	12.5%

Table 10: Hierarchical regression testing the association of sex, education, age, European background, level of trust in professionals and institutions, levels of trust in food-related producers and institutions, with level of confidence in the Australian/New Zealand food supply (Q2)

	β	t	p	Adjusted R^2
Model 1			**< .001***	**.014**
Sex (male vs female)	-.121	-4.727	< .001	
Model 2			**< .001***	**.023**
Sex (male vs female)	-.117	-4.599	< .001	
Education (non-tertiary vs tertiary)	.100	3.901	< .001	
Model 3			**.168***	**.025**
Sex (male vs female)	-.113	-4.423	< .001	
Education (non-tertiary vs tertiary)	.101	3.868	< .001	
Age Group (35-49 vs 18-34)	-.065	-2.157	.031	
Age Group (50-64 vs 18-34)	-.033	-1.095	.281	
Age Group (65-99 vs 18-34)	-.012	-.417	.675	
Model 4			**.601***	**.024**
Sex (male vs female)	-.113	-4.392	< .001	
Education (non-tertiary vs tertiary)	.099	3.746	< .001	
Age Group (35-49 vs 18-34)	-.063	-2.096	.037	
Age Group (50-64 vs 18-34)	-.030	-.962	.331	
Age Group (65-99 vs 18-34)	-.009	-.294	.773	
European Background (No/Yes)	-.014	-.523	.595	
Model 5			**< .001***	**.220**

		β	t	p	Adjusted R^2
Sex (male/ female)		-.113	-4.386	< .001	
Education (non-tertiary/tertiary)		.100	3.764	.147	
Age Group (35-49 vs 18-34)		-.063	-2.102	.028	
Age Group (50-64 vs 18-34)		-0.28	-.918	.489	
Age Group (65-99 vs 18-34)		-.008	-.272	.122	
European Background (No/Yes)		-.019	-.686	.552	
Level of trust in professionals and institutions	Press, television and radio	.132	4.231	<.001	
	Politicians	-.053	-1.582	.096	
	Government departments	.100	2.872	.004	
	Non-profit community groups or organisations	.054	1.974	.063	
	Health professionals	.144	4.763	< .001	
	Large companies or corporations	.131	4.329	< .001	
	Scientists	.104	3.349	.004	
Model 6				**< .001***	**.534**
Sex (male/ female)		-.079	-4.419	<.001	
Education (non-tertiary/tertiary)		.055	2.916	.005	
Age Group (35-49 vs 18-34)		-.005	-.229	.817	
Age Group (50-64 vs 18-34)		-.010	-.463	.628	
Age Group (65-99 vs 18-34)		-.036	-1.649	.088	
European Background (No/Yes)		.007	.397	.712	
Level of trust in professionals and institutions	Press, television and radio	.020	.821	.442	
	Politicians	-.078	-2.942	.005.	
	Government departments	.015	.544	.614	
	Non-profit community groups or organisations	-.013	-.612	.582	
	Health professionals	-.015	-.640	.623	
	Large companies or corporations	-.028	-1.136	.259	
	Scientists	-.039	-1.374	.228	
Level of trust in food-related	Supermarket chains	.290	10.106	<.001	

		β	t	p	Adjusted R^2
producers and institutions	Small food producers	.102	4.698	<.001	
	Large food producers	.242	8.416	<.001	
	Government/ public food authorities	.189	6.641	<.001	
	Scientists	.123	4.319	.001	

* These p values tested for significant changes in R^2 values. Note: All models were significant based on the ANOVA tests ($p < 0.001$). Bootstrapping was applied (2000 samples).

Table 11: Level of trust in food-related professions and institutions
Q3: How much do you trust the following people and institutions to ensure that all food (including drinks) sold in Australian/New Zealand shops and supermarkets is safe to eat? (Please rate each item on a scale from 1-7, from "1 – Do not trust at all" through to "7 – Trust completely")
Base: All respondents (n = 1500)

	Supermarket chains	Small food producers	Large food producers	Government/ public food authorities	Scientists
1 - Do not trust at all	3.8%	1.1%	3.8%	4.7%	2.0%
2	6.7%	3.5%	6.3%	5.1%	2.9%
3	12.1%	8.8%	10.7%	9.5%	6.9%
4	19.5%	20.5%	22.6%	19.5%	15.7%
5	28.0%	34.3%	29.9%	27.9%	27.4%
6	22.1%	25.0%	20.9%	25.0%	29.7%
7 - Trust completely	7.8%	6.8%	5.7%	8.2%	15.4%

Table 12: Top 3 food safety issues by ranking
Q4: Out of the following items, could you please rank your top 3 most important food safety issues?
Base: All respondents (n = 1500)

	1st Issue	2nd Issue	3rd Issue	Total
Carcinogens or cancer-causing chemicals in food	15.9%	13.4%	12.7%	42.0%
Chemicals in food	12.5%	13.5%	13.3%	39.3%
Pesticides/pesticide residues	9.2%	14.3%	12.9%	36.4%
Foodborne illness from bacteria/contaminants	13.5%	10.6%	10.9%	35.0%
Hormones and antibiotics used to produce farm animal products	7.7%	10.3%	11.3%	29.3%
Contamination of food with foreign objects (e.g. glass, needles)	9.5%	9.6%	8.8%	27.9%
Imported food/food from overseas	8.3%	8.3%	7.3%	23.9%
Food additives (e.g. flavours, colours, or preservatives)	7.8%	7.7%	7.9%	23.4%
Genetically modified food or organisms	5.8%	6.5%	7.2%	19.5%
The presence of allergens in food/undeclared allergens	3.5%	4.1%	5.9%	13.5%
Biotechnology	2.3%	1.7%	1.7%	5.7%
None of the above	4.2%	0.0%	0.0%	4.2%

Table 13: Multinomial logistic regression testing the association of age, sex, education, cultural background, and country with perceived level of knowledge of GM foods (Q5)

Model ($\chi^2(14) = 127.135$, $p < .001$)	B	Wald	p	Exp(B)
High Level of Knowledge				
Age Group (35-49 vs 18-34)	-.266	1.986	.156	.766
Age Group (50-64 vs 18-34)	-.351	2.917	.089	.704
Age Group (65-99 vs 18-34)	-.154	.497	.490	.857
Sex (male vs female)	-.580	15.753	< .001	.560
Education (non-tertiary vs tertiary)	.986	41.773	< .001	2.680
European Background	-.445	5.621	.019*	.641
Country	.372	5.659	.022	1.451
Medium Level of Knowledge				
Age Group (35-49 vs 18-34)	.218	1.656	.220	1.244
Age Group (50-64 vs 18-34)	.315	3.248	.078	1.371
Age Group (65-99 vs 18-34)	.644	12.018	< .001	1.904
Sex (male vs female)	-.053	.178	.661	.949
Education (non-tertiary vs tertiary)	.569	17.126	< .001	1.766
European Background	-.218	1.559	.210	.804
Country	.391	8.380	.005	1.479

* Age Group, Sex, Education, and Country were significant in Likelihood Ratio Tests ($p < .05$). European background was not significant ($p = .058$).
Note: Bootstrapping was applied (2000 samples).

Table 14: Definitions of genetically modified foods
Q6: To the best of your knowledge, which of the following descriptions do you think apply to genetically modified foods?
Base: Respondents who answered "A great deal", "A fair amount" or "A little" in Q5 (n = 670 AU, n = 379 NZ)

	Australia	New Zealand	Total
Scientists have created small, specific changes to part of a living thing's DNA to improve or remove existing characteristics.	59.7%	63.3%	61.0%
Scientists have inserted DNA from one living thing into the DNA of another living thing to introduce a new or different characteristic.	44.3%	47.5%	45.4%
Farmers have genetically improved the animals and plants through selective breeding and artificial insemination.	41.9%	48.0%	44.1%
Scientists have exposed seeds to chemicals, radiation, or enzymes to generate new varieties with desirable traits.	32.8%	35.9%	33.9%
Can't say/don't know	9.8%	8.2%	9.2%

Table 15: Correctness of responses to genetically modified food definitions
Q6: To the best of your knowledge, which of the following descriptions do you think apply to genetically modified foods?
Base: Respondents who answered "A great deal", "A fair amount" or "A little" in Q8 (n = 670 AU, n = 379 NZ)

	Australia		New Zealand		Total	
	Number	Percent	Number	Percent	Number	Percent
Correct	42	6.2%	32	8.4%	74	7.0%
Partially Correct	392	58.2%	209	55.1%	601	57.1%
Incorrect	173	25.7%	107	28.2%	280	26.6%
Don't know	66	9.8%	31	8.2%	97	9.2%

Table 16: Multinomial logistic regression testing the association of age, sex, education, cultural background, country and level of knowledge, with correctness of responses to GM food definitions (Q6)

Model ($\chi^2(24) = 70.324$, $p < .001$)	B	Wald	p	Exp(B)
Correct Response				
Age Group (35-49 vs 18-34)	.157	.200	.663	1.171
Age Group (50-64 vs 18-34)	.405	1.066	.289	1.499
Age Group (65-99 vs 18-34)	.518	1.815	.177	1.679
Sex (male vs female)	-.209	.592	.447	.812
Education (non-tertiary vs tertiary)	.409	2.187	.165	1.505
European Background	.145	.170	.686	1.156
Country	.223	.690	.425	1.249
Level of Knowledge (High vs Medium)	.681	6.216	.013	1.977
Partially Correct Response				
Age Group (35-49 vs 18-34)	.182	.882	.350	1.199
Age Group (50-64 vs 18-34)	.603	7.783	.003	1.828
Age Group (65-99 vs 18-34)	.529	5.891	.013	1.697
Sex (male vs female)	.099	.450	.515	1.104
Education (non-tertiary vs tertiary)	.000	.000	.997	1.000
European Background	-.351	3.430	.063	.704
Country	-.187	1.524	.226	.829
Level of Knowledge (High vs Medium)	.261	2.742	.109	1.298
"Don't Know"				
Age Group (35-49 vs 18-34)	.069	.045	.831	1.071
Age Group (50-64 vs 18-34)	.269	.590	.459	1.308
Age Group (65-99 vs 18-34)	-.048	.017	.893	.953

Model ($\chi^2(24) = 70.324, p < .001$)	B	Wald	p	Exp(B)
Sex (male vs female)	.199	.673	.407	1.220
Education (non-tertiary vs tertiary)	-.885	11.069	.002	.413
European Background	-.547	3.054	.074	.579
Country	-.316	1.529	.220	.729
Level of Knowledge (High vs Medium)	-1.108	11.133	< .001	.330

* Education and Level of Perceived Knowledge were significant in Likelihood Ratio Tests ($p < .05$). Age Group, Sex, European Background, and Country were not significant ($p > .05$).

Table 17: Multinomial logistic regression testing the association of age, sex, education, cultural background, country and level of knowledge, with correctness of responses to knowledge of GM food availability (Q7)

Model ($\chi^2(18) = 267.71, p < .001$)	B	Wald	p	Exp(B)
Correct Response				
Age Group (35-49 vs 18-34)	-.375	3.517	.061	.687
Age Group (50-64 vs 18-34)	-.151	.532	.466	.860
Age Group (65-99 vs 18-34)	.067	.105	.746	1.069
Sex (male vs female)	-.284	3.730	.053	.753
Education (non-tertiary vs tertiary)	-.102	.454	.500	.903
European Background	-.237	1.674	.196	.789
Country	.244	2.627	.105	1.276
Level of Knowledge (Medium vs High)	.029	.030	.862	1.029
Level of Knowledge (Low vs High)	-.036	.028	.868	.965
"Don't Know"		.		
Age Group (35-49 vs 18-34)	.150	.772	.380	1.162
Age Group (50-64 vs 18-34)	.063	.121	.728	1.065
Age Group (65-99 vs 18-34)	.093	.238	.626	1.097
Sex (male vs female)	.167	1.731	.188	1.182
Education (non-tertiary vs tertiary)	-.426	10.054	.002	.653
European Background	-.261	2.330	.127	.770
Country	.059	.191	.662	1.061
Level of Knowledge (Medium vs High)	1.198	36.876	< .001	3.312
Level of Knowledge (Low vs High)	2.407	136.577	< .001	11.103

Note: The reference category is Incorrect.

Table 18: Level of support for genetically modified foods
Q8: On a scale of 1-7, where 7 is completely supportive and 1 is completely against, please indicate how supportive you are of the use of genetic modification techniques to produce food or food ingredients.
Base: All respondents (n = 1000 AU, n = 500 NZ)

		Australia	New Zealand	Total
Q8. Level of support for GM foods	1 - Completely against	13.6%	11.4%	12.9%
	2	12.0%	13.8%	12.6%
	3	13.9%	17.0%	14.9%
	4	30.2%	28.4%	29.6%
	5	17.6%	17.4%	17.5%
	6	7.1%	6.2%	6.8%
	7 - Completely supportive	5.6%	5.8%	5.7%

Table 19: Hierarchical regression testing the association of age, sex, education, perceived level of knowledge about GM foods (Q6), level of confidence in the Australian/New Zealand food supply (Q2), and level of trust in GM producers and scientists (Q11) with level of support for GM foods.

	β	t	p	Adjusted R^2
Model 1			**< .001***	**.042**
Age Group (35-49 vs 18-34)	-.092	-3.117	.001	
Age Group (50-64 vs 18-34)	-.227	-7.694	< .001	
Age Group (65-99 vs 18-34)	-1.68	-5.758	< .001	
Model 2			**< .001***	**.080**
Age Group (35-49 vs 18-34)	-.082	-2.811	.002	
Age Group (50-64 vs 18-34)	-.211	-7.295	< .001	
Age Group (65-99 vs 18-34)	-.175	-6.113	< .001	
Sex (male vs female)	-.198	-7.968	< .001	
Model 3			**< .001***	**.094**
Age Group (35-49 vs 18-34)	-.082	-.2835	.002	
Age Group (50-64 vs 18-34)	-.189	-6.508	< .001	
Age Group (65-99 vs 18-34)	-.149	-5.176	< .001	
Sex (male/ female)	-.193	-7.822	< .001	
Education (non-tertiary/tertiary)	.124	4.899	< .001	
Model 4			**.008***	**.099**
Age Group (35-49 vs 18-34)	-.076	-2.627	.005	
Age Group (50-64 vs 18-34)	-.181	-6.226	< .001	
Age Group (65-99 vs 18-34)	-.143	-4.921	< .001	

	β	t	p	Adjusted R^2
Sex (male/ female)	-.184	-7.425	< .001	
Education (non-tertiary/tertiary)	.111	4.317	< .001	
Level of Knowledge (Med vs High)	-.079	-2.547	.017	
Level of Knowledge (Low vs High)	-.093	-2.975	.005	
Model 5			**< .001***	**.162**
Age Group (35-49 vs 18-34)	-.060	-2.1454	.024	
Age Group (50-64 vs 18-34)	-.174	-.6177	< .001	
Age Group (65-99 vs 18-34)	-.141	-5.026	< .001	
Sex (male/ female)	-1.56	-6.456	< .001	
Education (non-tertiary/tertiary)	.084	3.389	< .001	
Level of Knowledge (Med vs High)	-.073	-2.430	.022	
Level of Knowledge (Low vs High)	-.095	-3.153	.002	
Confidence in Food Supply	.256	10.669	< .001	
Model 6			**< .001***	**.483**
Age Group (35-49 vs 18-34)	-.008	-.357	.724	
Age Group (50-64 vs 18-34)	-.080	-3.576	< .001	
Age Group (65-99 vs 18-34)	-.073	-3.308	.001	
Sex (male/ female)	-.124	-6.522	< .001	
Education (non-tertiary/tertiary)	.042	2.132	.030	
Level of Knowledge (Med vs High)	-.044	-1.880	.070	
Level of Knowledge (Low vs High)	-.040	-1.695	.089	
Confidence in Food Supply	.013	.610	.584	
Trust in Small GM Food Producers	.208	6.343	< .001	
Trust in Large GM Food Producers	.216	6.311	< .001	
Trust in GM Scientists	.265	8.287	< .001	

** These p values tested for significant changes in R^2 values.*
Note: All models were significant based on the ANOVA tests (p < 0.001). Bootstrapping was applied (2000 samples).

Table 20: Level of concern around genetically modified foods
Q9: To what extent are you concerned or unconcerned about genetically modified foods or food ingredients in Australia/New Zealand?
Base: All respondents (n = 1000 AU, n = 500 NZ)

	Country		
	Australia	New Zealand	Total
Very unconcerned	5.7%	7.0%	6.1%
Somewhat unconcerned	12.7%	18.2%	14.5%
Neutral	27.9%	30.4%	28.7%
Somewhat concerned	32.5%	30.8%	31.9%
Very concerned	17.0%	10.4%	14.8%
Can't say/don't know	4.2%	3.2%	3.9%

Table 21: Multinomial logistic regression testing the association of age, sex, education, cultural background, country level of confidence in the food supply (Q2), level of perceived knowledge (Q5), and level of trust for GM producers and scientists (Q11), with level of concern about GM foods (Q9)

Model ($\chi^2(39) = 339.20$, $p < .001$)	B	Wald	p	Exp(B)
Unconcerned vs Concerned				
Age Group (35-49 vs 18-34)	.123	.388	.533	1.131
Age Group (50-64 vs 18-34)	-.214	1.008	.315	.807
Age Group (65-99 vs 18-34)	.056	.067	.795	1.057
Sex (male vs female)	-.113	.573	.449	.894
Education (non-tertiary vs tertiary)	-.134	.751	.386	.875
European Background	.680	11.107	< .001	1.974
Country	.601	15.552	< .001	1.824
Level of Knowledge (Medium vs High)	-.238	1.894	.169	.789
Level of Knowledge (Low vs High)	-.512	5.851	.016	.599
Level of confidence in food supply	.011	.041	.840	1.011
Level of trust in small GM food producers	.145	3.049	.081	1.155
Level of trust in large GM food producers	.084	1.078	.299	1.088
Level of trust in GM scientists	.315	16.337	< .001	1.370
Neutral vs Concerned				
Age Group (35-49 vs 18-34)	-.091	.280	.597	.913
Age Group (50-64 vs 18-34)	-.373	3.994	.046	.689
Age Group (65-99 vs 18-34)	-.232	1.428	.232	.793
Sex (male vs female)	-.432	10.895	<.001	.649
Education (non-tertiary vs tertiary)	-.064	.217	.641	.938

Model ($\chi^2(39) = 339.20, p < .001$)	B	Wald	p	Exp(B)
European Background	.051	.094	.759	1.052
Country	.373	7.277	.007	1.452
Level of Knowledge (Medium vs High)	.695	15.343	<.001	2.004
Level of Knowledge (Low vs High)	1.116	33.980	<.001	3.052
Level of confidence in food supply	-.081	2.892	.089	.922
Level of trust in small GM food producers	.054	.508	.476	1.056
Level of trust in large GM food producers	.212	7.899	.005	1.236
Level of trust in GM scientists	.159	4.906	.027	1.173
Unsure vs Concerned				
Age Group (35-49 vs 18-34)	-.189	.255	.613	.827
Age Group (50-64 vs 18-34)	-.540	1.894	.169	.583
Age Group (65-99 vs 18-34)	-.642	2.051	.152	.526
Sex (male vs female)	-.144	.240	.625	.866
Education (non-tertiary vs tertiary)	-.349	1.074	.300	.705
European Background	.398	.868	.352	1.489
Country	.109	.113	.737	1.115
Level of Knowledge (Medium vs High)	1.153	2.147	.143	3.167
Level of Knowledge (Low vs High)	3.125	17.816	<.001	22.752
Level of confidence in food supply	.017	.027	.869	1.017
Level of trust in small GM food producers	-.067	.127	.721	.935
Level of trust in large GM food producers	.497	6.659	.010	1.644
Level of trust in GM scientists	-.459	6.525	.011	.632

Table 22: Top 3 concerns about genetically modified foods
Q10: Out of the following items, could you please rank your top 3 concerns?
Base: Respondents who answered "Somewhat" or "Very" concerned in Q9 (n = 691)

	1st Concern	2nd Concern	3rd Concern	Total
The safety of humans eating GM foods	19.5%	14.8%	13.6%	47.5%
A lack of long-term safety data on GM foods	11.0%	12.7%	13.5%	36.8%
The trustworthiness of companies or scientists developing GM foods or GM technologies	9.8%	8.5%	9.7%	27.9%
The environmental impact from introducing GM crops, including monocultures or cross-contamination with other crops	8.4%	8.7%	8.8%	25.7%
The welfare of animals bred using GM technologies	5.8%	10.3%	7.2%	23.1%
The presence of foreign DNA or genes in GM foods	5.8%	7.4%	7.8%	20.8%
The unnaturalness of GMs	9.6%	4.8%	6.7%	20.8%
The lack of public understanding of GM foods	6.4%	6.2%	5.8%	18.3%
The nutritional value of GM foods	5.0%	4.9%	5.2%	15.0%
Ensuring government oversight before GM foods enter the market	4.4%	4.5%	4.5%	13.3%
The financial impact on small-scale farmers if they cannot access GM technology	2.3%	5.5%	4.2%	11.8%
The taste of GM foods	3.0%	1.2%	2.5%	6.6%
That GM foods do not solve the bigger problem (e.g. climate change or animal welfare concerns)	3.7%	5.6%	5.6%	14.8%
The potential higher cost of GM foods making them unaffordable for some people	2.3%	2.2%	2.7%	7.1%
The potential lower cost of GM foods making them the only affordable option for some people	1.4%	2.7%	2.2%	6.3%
None of the above	1.4%	0.0%	0.0%	1.4%
Total	100.0%	100.0%	100.0%	301.9%

Table 23: Levels of trust in GM producers and scientists

	Small GM food producers	Large GM food producers	GM Scientists
1 - Do not trust at all	8.7%	12.0%	7.7%
2	10.9%	12.3%	7.6%
3	16.9%	17.7%	15.7%
4	29.9%	26.9%	24.2%
5	22.3%	18.9%	24.3%
6	7.8%	8.8%	14.9%
7 - Trust completely	3.6%	3.4%	5.5%

Table 24: Level of support or opposition for five different food-related applications of GM technology
Q12 through Q16: For each description that's shown, we would like to know how supportive you would be of the use of that type of genetic modification.
Base: All respondents (n = 1000 AU, n = 500 NZ)

		Country		
		Australia	New Zealand	Total
Drought-Tolerant Wheat	Very opposed	5.1%	3.8%	4.7%
	Moderately opposed	7.7%	7.0%	7.5%
	Neutral	24.8%	25.6%	25.1%
	Moderately supportive	35.6%	35.0%	35.4%
	Strongly supportive	23.0%	24.4%	23.5%
	Don't know	3.8%	4.2%	3.9%
Heat-Tolerant Cattle	Very opposed	10.8%	9.2%	10.3%
	Moderately opposed	13.5%	16.8%	14.6%
	Neutral	24.8%	23.4%	24.3%
	Moderately supportive	31.3%	30.8%	31.1%
	Strongly supportive	14.7%	14.2%	14.5%
	Don't know	4.9%	5.6%	5.1%
Healthier Soybean Oil	Very opposed	7.1%	6.6%	6.9%
	Moderately opposed	8.4%	12.4%	9.7%
	Neutral	26.8%	22.6%	25.4%
	Moderately supportive	32.3%	33.4%	32.7%
	Strongly supportive	21.0%	20.4%	20.8%
	Don't know	4.4%	4.6%	4.5%
Herbicide-Tolerant Canola	Very opposed	9.2%	11.2%	9.9%
	Moderately opposed	14.2%	17.8%	15.4%
	Neutral	27.9%	26.8%	27.5%
	Moderately supportive	29.5%	26.4%	28.5%
	Strongly supportive	14.8%	13.4%	14.3%
	Don't know	4.4%	4.4%	4.4%
Quick-Growing Salmon	Very opposed	19.9%	22.0%	20.6%
	Moderately opposed	19.6%	24.4%	21.2%

		Country		
		Australia	New Zealand	Total
	Neutral	26.5%	24.8%	25.9%
	Moderately supportive	20.5%	18.6%	19.9%
	Strongly supportive	7.9%	5.6%	7.1%
	Don't know	5.6%	4.6%	5.3%

Table 25: Multinomial logistic regression testing various predictors of being consistently supportive, consistently opposed, or consistently neutral or unsure vs being inconsistent in response to the scenarios.

Model ($\chi^2(30) = 213.691$, $p < .001$).	B	Wald	p	Exp(B)
Consistently Supportive vs Inconsistent				
Age Group (35-49 vs 18-34)	.283	.986	.321	1.327
Age Group (50-64 vs 18-34)	.186	.359	.549	1.205
Age Group (65-99 vs 18-34)	.263	.747	.387	1.301
Sex (male vs female)	-.799	12.492	<.001	.450
Education (non-tertiary vs tertiary)	.065	.086	.769	1.067
European Background	.109	.150	.698	1.116
Country	-.528	4.756	.029	.590
Level of Knowledge (Medium vs High)	-.333	1.753	.186	.717
Level of Knowledge (Low vs High)	-.329	1.307	.253	.720
Level of confidence in food supply	.194	5.586	.018	1.214
Consistently Opposed vs Inconsistent				
Age Group (35-49 vs 18-34)	.520	2.893	.089	1.682
Age Group (50-64 vs 18-34)	1.001	10.819	.001	2.721
Age Group (65-99 vs 18-34)	.559	2.826	.093	1.749
Sex (male vs female)	.331	2.417	.120	1.392
Education (non-tertiary vs tertiary)	-.560	6.004	.014	.571
European Background	-.238	.732	.392	.788
Country	-.664	8.040	.005	.515
Level of Knowledge (Medium vs High)	-1.201	26.527	<.001	.301
Level of Knowledge (Low vs High)	-1.843	32.943	<.001	.158
Level of confidence in food supply	-.303	25.163	<.001	.739
Consistently Neutral or Unsure				
Age Group (35-49 vs 18-34)	-.130	.298	.585	.878
Age Group (50-64 vs 18-34)	-.534	3.851	.050	.586

Model ($\chi^2(30) = 213.691$, $p < .001$).	B	Wald	p	Exp(B)
Age Group (65-99 vs 18-34)	-1.001	9.596	.002	.367
Sex (male vs female)	-.413	4.470	.034	.661
Education (non-tertiary vs tertiary)	-.349	2.724	.099	.705
European Background	-.205	.675	.411	.815
Country	-.411	3.502	.061	.663
Level of Knowledge (Medium vs High)	.694	3.807	.051	2.001
Level of Knowledge (Low vs High)	1.845	29.175	<.001	6.331
Level of confidence in food supply	-.131	4.288	.038	.877

Table 26: Multinomial logistic regression testing various predictors of having a desire for more information about GM foods.

Model ($\chi^2(22) = 90.823$, $p < .001$).	B	Wald	p	Exp(B)
Yes vs No				
Age Group (35-49 vs 18-34)	.039	.066	.798	1.040
Age Group (50-64 vs 18-34)	.023	.020	.889	1.023
Age Group (65-99 vs 18-34)	.276	2.544	.111	1.318
Sex (male vs female)	.012	.010	.922	1.012
Education (non-tertiary vs tertiary)	-.111	.828	.363	.895
European Background	-.173	1.314	.252	.841
Country	-.192	2.492	.114	.825
Level of Knowledge (Medium vs High)	-.442	9.424	.002	.643
Level of Knowledge (Low vs High)	-1.009	39.076	<.001	.365
Level of confidence in food supply	-.031	.593	.441	.970
Level of support for GM foods	.058	2.298	.130	1.060
Don't Know vs No				
Age Group (35-49 vs 18-34)	-.088	.151	.697	.916
Age Group (50-64 vs 18-34)	-.089	.142	.706	.915
Age Group (65-99 vs 18-34)	.132	.289	.591	1.141
Sex (male vs female)	-.078	.210	.646	.925
Education (non-tertiary vs tertiary)	-.418	5.288	.021	.659
European Background	-.134	.354	.552	.874
Country	-.010	.004	.952	.990

Model ($\chi^2(22) = 90.823, p < .001$).	B	Wald	p	Exp(B)
Level of Knowledge (Medium vs High)	.475	3.444	.063	1.609
Level of Knowledge (Low vs High)	.629	5.792	.016	1.875
Level of confidence in food supply	-.079	2.004	.157	.924
Level of support for GM foods	.034	.363	.547	1.035