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

SD2

PROPOSAL P301

PRIMARY PRODUCTION AND PROCESSING STANDARD FOR EGGS & EGG PRODUCTS

QUANTITATIVE SURVEY OF CONSUMER BEHAVIOUR AND EGG CONSUMPTION

September 2009

EXECUTIVE SUMMARY

This study used an online diary instrument to collect quantitative data on egg consumption in Australia and consumer handling of eggs. Self-report information on domestic egg handling was obtained from a representative sample of 1,673 Australian households. This sample also provided information on raw, lightly cooked and total egg consumption for 4,616 individuals. This report will describe the methodology used and the findings of the egg handling components of the diary instrument (the findings of the egg consumption component are detailed in the Assessment Report).

How do Australians consume their eggs?

Of the 89 per cent of individuals who consumed egg (or foods containing egg) over the survey period of seven days, 39 percent of all exposures were categorised as being 'well cooked'; 56 per cent 'lightly cooked'; and 5 per cent 'raw'.

Where do Australians get their eggs from?

The majority of Australian households get their eggs from "supermarkets" (81 per cent). Other common sources of eggs are "other retail stores" (18 per cent) (such as fruit and vegetable shops, butchers, and corner shops), and "farmers and growers markets" (11 per cent). Only a small proportion of consumers obtain their eggs from "back yard producers" (9 per cent) or from their "own chickens" (5 per cent).

Are Australian households storing their eggs in the refrigerator?

Yes, 93 per cent of Australian households are storing their eggs in the refrigerator, as recommended by health authorities. At refrigerator temperatures, growth of most types of pathogens is slowed.

Are Australian households storing leftovers safely?

Yes, 71 per cent of Australian households store left over meals containing eggs in the fridge, 12 per cent store them in the freezer, and 40 per cent dispose of them. Very few households (1 per cent) reported that they store left over meals at room temperature.

The results are very similar for left over egg yolk and egg whites. Forty-four per cent dispose of them, 31 per cent use them in another dish made the same day and 22 per cent store them in the fridge for later use.

These results suggest that Australian households are storing left over foods containing eggs safely.

How are Australians handling their eggs?

The study found the following behaviours were common:

- 54 per cent of households always or almost always sample raw batter when making cakes.
- 16 per cent of households always or almost always re-use egg cartons to store new eggs.
- Only 49 per cent of Australian households use the best before date to check whether their eggs are still good to eat.
- Only 39 per cent of Australian households would not use a cracked egg.
- 47 per cent of Australian households would wash a dirty egg and 39 per cent would wipe it.

However, a positive finding was that over half (54 per cent) of Australian households report that they always or almost always wash their hands after handling eggs and a further 21 per cent of households sometimes wash their hands after handling them.

Do households with vulnerable members have better food handling behaviours than other households?

In this study any households members who were aged 75 years or older or children aged 4 years or under were categorised as vulnerable. Chi square analysis was conducted to determine whether there were differences in food handling behaviour between households with and without vulnerable members.

The only significant difference between households with and without children was in how often someone in the household would sample raw batter when making cakes. A higher proportion of households with vulnerable members were reported that someone in the households always or almost always sample raw batter when making cakes (62 per cent, compared to 53 per cent of households with no vulnerable members).

Were there differences between households which get their eggs from different sources (e.g. farmers and growers markets, supermarkets)?

Yes, the following differences between households with different sources of eggs were found using Chi square analysis:

- 26 per cent of households which obtain eggs from farmers/growers markets have tried specialty egg dishes, compared to only 17 per cent of supermarket/other retail store households and 22 per cent of back yard producer/own chicken households.
- A higher proportion of households which obtain eggs from a back yard producer/own chickens report that they always or almost always re-use egg cartons (55 per cent, compared to 7 per cent for supermarket/other retail store buyers and 22 per cent for farmers/growers market buyers).
- 52 per cent of households which obtain their eggs from a back yard producer or from their own chickens report that they would remove a leaking egg from a carton, but continue to keep the eggs in the same carton, compared to 45 per cent of supermarket/retail households and 35 per cent of farmers/growers market households.
- A higher proportion of supermarket/other retail store households report

checking the best before date on eggs (57 per cent) compared to 49 per cent of households which obtain their eggs from farmers/growers markets and 32 per cent of households with eggs from back yard producers or their own chickens.

- 99 per cent of back yard producer/own chickens households and farmers/growers market households would wash, wipe or use a dirty egg with the dirt still on it, compared to 95 per cent of supermarket/other retail store households.
- A higher proportion of farmers/growers markets households report always or almost always washing their hands after handling eggs (62 per cent, compared to 60 per cent of back yard producer/own chicken households and 53 per cent of supermarket/other retail store households).

Were there differences between households of different income levels?

Yes, the following differences between households with different income levels were found using Chi square analysis:

- 96 per cent of high income households store their eggs in the fridge, compared to 91 per cent of low income households.
- A higher proportion of low income households would use leftover egg yolks or whites in another dish made the same day, or would store them in the fridge or freezer for later use (67 per cent) compared to high income households (48 per cent).
- The proportion of middle income households reporting that they check the best before date on eggs (57 per cent) was higher than for high income households (52 per cent) and low income households (47 per cent).
- The proportion of households reporting that they would use a cracked egg increases as household income decreases. Sixty-two per cent of low income households would use a cracked egg, compared to 42 per cent of high income households.
- 57 per cent of low income households reported that they always or almost always wash their hands after handling eggs, compared to 53 per cent of middle income households and 50 per cent of high income households.
- A higher proportion of high income households reported having a household member who had tried one or more of the specialty egg dishes listed than low income households (21 per cent, compared to 15 per cent of low income households).

Were there differences between households with different sources of eggs?

Yes, the following differences between households with different sources of eggs were found using Chi square analysis:

- A higher proportion of households which obtain eggs from farmers/growers markets use leftover egg yolks or whites in another dish the same day or to store them in the fridge or freezer for use later on (71 per cent) compared to households which obtain their eggs from supermarkets and other retail stores (56 per cent) or from back yard producers or their own chickens (56 per cent).

- 55 per cent of back yard producer/own chicken households always or almost always re-use egg cartons, compared to 7 per cent of supermarket/other retail store buyers and 22 per cent of farmers/growers market buyers.
- A higher proportion of back yard producer/own chicken households report that they would remove a leaking egg from an egg carton but leave the remaining eggs in the same carton (52 per cent), compared to 45 per cent of supermarket/other retail store households and 35 per cent of farmers/growers market households.
- 57 per cent of supermarket/other retail store households report checking the best before date on egg cartons, compared to 49 per cent of farmers/growers market households and 32 per cent of back yard producer/own chicken households.
- A higher proportion of back yard producer/own chicken households and farmers/growers market households reported that they would wash, wipe or use a dirty egg (99 per cent) compared to 95 per cent of supermarket/other retail store households.
- The households which were most likely to have tried one or more specialty egg dishes were those who obtain their eggs from farmers/growers markets (26 per cent, compared to 17 per cent of supermarket/other retail store households and 22 per cent of back yard producer/own chickens households).

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INTRODUCTION

Purpose

A shortage of data exists on domestic food handling practices in Australia, particularly in relation to the handling of eggs. This study described in this report was undertaken with two main objectives:

- to develop quantitative estimates of the proportion of eggs which are consumed raw and lightly cooked in Australia
- to collect quantitative information on consumers' storage and food safety behaviours with regard to eggs.

This report focuses on the second of the two objectives, consumers' storage and food safety behaviours. Consumers' egg consumption behaviour is reported in the body of the Assessment Report.

Background

FSANZ is currently developing a Primary Production and Processing Standard for Eggs and Egg Products. As part of the development of the Standard, a scientific risk assessment was conducted to determine where potential microbiological and chemical hazards could occur in the production, distribution and consumption of eggs. One of the main findings of the risk assessment was the low risk of contamination of eggs with *Salmonella*, a pathogen which is killed by thorough cooking but poses a risk to consumers when contaminated eggs are uncooked or lightly cooked.

The risk of an egg consumer contracting salmonellosis depends on how the egg is processed after laying and the risk status of the person eating the egg. Factors which influence the risk of a consumer contracting salmonellosis from consuming raw egg include: the presence of *Salmonella* bacteria in the egg and/or on the egg shell, the temperature at which the egg is stored, how long the egg is stored for before consumption and the handling behaviours of the person preparing the egg (Food Standards Australia New Zealand, 2009). Salmonellosis can be particularly dangerous for the young, old and immunocompromised individuals .(Lake, Hudson, Cressey, & Gilbert, 2004).

Many of the factors in *Salmonella* contamination, listed above, are dealt with by egg producers and egg processors. However, consumer behaviour in domestic food preparation may also play a role in the safety of eggs and egg dishes consumed in Australia. Three factors are important in domestic food handling practices – cross contamination, storage temperature and consumption of raw or lightly cooked eggs. Cross contamination during handling and preparation of eggs can occur when:

- food preparers fail to wash hands after handling eggs, then handle other food items
- households re-use egg cartons to store new eggs
- food handlers allow leaking eggs to contaminate other eggs in the same carton

- food handlers use cracked or dirty eggs

The temperature at which eggs and dishes prepared using eggs are stored is important in determining bacteria growth. The growth of salmonellae bacteria is prevented at recommended refrigerator temperatures, so storage of eggs (which have a very small risk of being contaminated with *Salmonella*) in the refrigerator is preferable. In addition, the growth of many other foodborne pathogens is reduced at refrigerator temperatures.

Thorough cooking will kill *Salmonella* and other foodborne pathogens present either in eggs or in foods being prepared with eggs, however eating foods which contain raw eggs poses a potential for *Salmonellosis* (Food Standards Australia New Zealand, 2009). This includes sampling egg dishes before they are cooked. For example, eating small amounts of raw batter when making cakes and biscuits that contain egg in the mixture.

Existing research

A small number of Australian and overseas studies have examined consumers' perception of risk from raw eggs, awareness of *Salmonella*, self-reported hand washing after handling eggs and whether consumers eat foods containing raw eggs, such as cookie dough or cake batter. These include the U.S. Food and Drug Administration (FDA) Food Safety Survey (Lando & Verrill, 2008), two recent studies commissioned in Australia by the New South Wales Food Authority (NSW FA, 2009) and the Department of Human Services in Victoria (Auspoll Pty Ltd, 2008), a 1999 postal survey conducted in Melbourne (Mitakakis et al., 2004), a national telephone survey conducted in 1997 (Jay, Comar, & Govenlock, 1999a), and an online survey conducted in Finland in 2003 (Lievonen, Havulinna, & Maijala, 2004). These are briefly described below.

US FDA Food Safety Survey

A nationally representative telephone survey conducted in 1988, 1993, 1998, 2001 and 2006 to track American consumers' behaviour, understanding and perceptions of food and food safety.

New South Wales Food Authority consumer egg handling research

An online survey of 505 residents of New South Wales conducted in 2008. Respondents answered questions on egg handling, preparation and perceptions of risks posed by raw eggs.

Department of Human Services Victoria Egg Safety Awareness Research

An online survey of 1000 residents of regional and metropolitan Victoria conducted in 2003. Screening questions were used to recruit individuals responsible for egg purchasing, storage and preparation. Respondents answered questions on egg preparation, storage, food safety knowledge and asked how they would respond to particular egg safety messages.

Food Safety in Family Homes in Melbourne

A mail survey of 524 households in Melbourne, conducted between 1997 and 1999 in. Screening questions were used to recruit households with four households members, two children aged 1 to 15 years and who owned their own home. Respondents answered questions regarding food handling including how often they store eggs in the refrigerator.

National Australian Food Safety Telephone Survey

A telephone survey of 1,203 randomly selected Australian households conducted in 1997. Respondents answered questions on food handling and knowledge of foodborne pathogens, including *Salmonella.*

Egg Consumption Patterns in and Salmonella Risk in Finland

A survey of 918 Finns completed online and via postal survey in 2003. The survey included a food frequency questionnaire to collect data on the frequency and quantity of egg consumption, and questions on egg purchasing, storage and handling behaviours.

Awareness of egg safety

Generally, a significant proportion of consumers think that raw eggs are safe to eat. However the proportion of consumers who believe consuming raw eggs may by risky varies depending on the country in which the study is conducted and, possibly, also the wording of the question.

A food safety survey conducted by the United States Food and Drug Administration in 2006 (Lando & Verrill, 2008) found that 34 per cent of respondents believed that it was very likely that "raw eggs have germs that could make you sick". In comparison, the study conducted in Victoria found that 42 per cent of respondents thought that eggs are "safe to eat if lightly cooked", 22 per cent that eggs are "safe to eat only if well cooked" and 34 per cent of respondents thought that eggs were "safe to eat raw" (Auspoll Pty Ltd, 2008). The Victorian study also found that 42 per cent of respondents reported that the following information was new to them "Uncooked foods containing raw eggs are higher risk than cooked foods". The New South Wales survey found that 41 per cent of respondents thought that "raw and undercooked eggs are as safe as cooked eggs" and that 52 per cent would serve foods containing raw eggs to people aged over 65 years (2009).

Importantly, many Australian consumers are not aware of the types of dishes that contain raw egg. The Victorian study found that of nine foods listed in the survey that commonly contain raw eggs, only between 9 and 73 per cent of respondents knew that they might contain raw eggs (Auspoll Pty Ltd, 2008). Awareness that particular dishes may contain raw eggs was 73 per cent for egg nog, 70 per cent for mayonnaise, 44 per cent for hollandaise sauce, 30 per cent for tartare sauce, 27 per cent for chocolate mousse, 25 per cent for custard, 17 per cent for Caesar salad, 11 per cent for tiramisu and 9 per cent for Asian pork rolls.

Awareness of *Salmonella*

Awareness of *Salmonella* as a food pathogen is high in Australia and in other parts of the world. The National telephone survey of Australian households found that 96 per cent of respondents had heard of *Salmonella* as a food poisoning agent, the highest awareness of all of the pathogens listed (Jay et al., 1999a). This compares with 86 per cent of Americans in the US FDA study (Lando & Verrill, 2008).

More specifically, two studies have collected data on consumers; awareness of the link between *Salmonella* and eggs. The National telephone survey of Australian households found that only 11 per cent of respondents were able to identify eggs as associated with *Salmonella*, compared to 53 per cent for poultry and 41 per cent for red meat (Jay et al., 1999a). In comparison, the Victorian survey found that 66 per cent of respondents through *Salmonella* could be related to egg consumption (Auspoll Pty Ltd, 2008). The apparent increase in awareness of the link between *Salmonella* and eggs may be due to recent outbreaks of *Salmonella* in Tasmania and Victoria which were linked to egg consumption (Auspoll Pty Ltd, 2008; Food Standards Australia New Zealand, 2009).

Awareness of safe egg handling practices

Refrigeration

The existing literature suggests that the proportion of households storing eggs in the refrigerator is very high. The mail survey conducted in Melbourne in 1997 found that 85 per cent of households reported always storing eggs in the refrigerator and a further 4 per cent usually do so (Mitakakis et al., 2004). The Victorian study found that 87 per cent of households reported storing eggs in the refrigerator, and that the most common place within the refrigerator to store them was in the carton on the shelf of the fridge (56 per cent) (Auspoll Pty Ltd, 2008). These results are very similar to those in the Finnish study, which found 93 per cent of respondents stored their eggs in the refrigerator (Lievonen & Maijala, 2005). In comparison, a Belgian study conducted in 1998 found that 59 per cent of households reported storing their eggs in the refrigerator and a further 16 per cent in cool storage (Grijspeerdt & Herman, 1999).

Handwashing

Self-reported hand washing after handling eggs is high. Seventy six per cent of respondents in the Victorian study reported always washing their hands after they have finished handling and preparing eggs and a further 16 per cent report that they sometimes do (Auspoll Pty Ltd, 2008). In comparison only 34 per cent of respondents in the Finnish study said that they always wash their hands after breaking eggs (Lievonen & Maijala, 2005). In the United States, 41 per cent of respondents reported that they would wash their hands with soap after cracking open a raw egg, 27 per cent would rinse or wipe their hands and 29 per cent would continue cooking (Lando & Verrill, 2008).

However, it is important to note that behaviours such as hand washing are frequently over estimated when using self-report measures (Redmond & Griffith, 2003).

Respondents may consider hand washing to be a more socially desirable response and therefore over report the frequency with which they wash their hands. This has been demonstrated in an American study which found that although 75 per cent of respondents reported that not washing your hands after handling raw eggs was 'risky behaviour', when they were actually observed 60 per cent of participants failed to wash their hands after handling raw eggs (Anderson, 2002). An observational study conducted in the public toilets of a food hall in Australia found that only 20 per cent of females and 7 per cent of males washed their hands using soap, for at least ten seconds and also dried them (Buchtmann, 2002). This was despite a telephone interview conducted as part of the same study found that 97 per cent of respondents recognised the correct method for washing hands.

Cracked and dirty eggs

Existing research suggests that consumer understanding of what to do with cracked and dirty eggs is limited. The Victorian study found that 62 per cent of respondents said that they would throw away an egg with a cracked shell and that 30 per cent would check it, and then use it (Auspoll Pty Ltd, 2008). Fifty one per cent reported that if they had an egg with a dirty shell they would wash and then use it, and 39 per cent would use it regardless. The New South Wales study found that 37 per cent would use an egg with a cracked or dirty shell and 51 per cent would wash it and then use it (NSW FA, 2009).

Report structure

The structure of the report is as follows:

- The methodology describes how the study was conducted and how the data were analysed.
- The results displays the main findings from each of the behavioural questions, with a further break down of results by key groups where significant differences were found.
- The discussion summarises the results and puts them in the context of other relevant Australian and overseas studies.
- The conclusion outlines how the objectives of the research were met by the data collected.
- The Appendix contains a text version of the final diary instrument used in the online study.

METHODS

A seven day online diary was used to collect data on egg consumption and storage and handling behaviours. Respondents were encouraged to fill out the online diary daily over a 7 day period. One respondent (the Main Grocery Buyer of the household) filled out information on their own egg consumption and for other members of each household. This enabled consumption information to be collected for all individuals (including children) in a household in a consistent manner. The approach allowed datasets to be produced at the level of individuals and also households.

Diary instrument

The diary instrument was developed through an iterative process involving Roy Morgan Research and FSANZ staff with expertise in dietary modelling, food safety and consumer research.

The main focus of the diary was the recording of daily egg consumption. Respondents were given drop down lists of egg dishes and foods that might contain eggs. For each person in the household, the respondent recorded which of the listed dishes and foods they had eaten that day and the number of portions eaten. Portion sizes were provided in the diary. These were developed from standard recipes used for dietary modelling by FSANZ. Eggs and egg dishes were categorised as well cooked, lightly cooked, or raw. Details of portion sizes and categorisation of well cooked/lightly cooked/raw are contained in the Technical Report.

A second major focus of the survey was to collect data on respondents' storage, handling and preparation of eggs. This included where they obtain their eggs, where they store eggs and how they check that eggs are still good to eat. A number of validation questions were included. These included whether the recorded week's consumption was typical and whether there were likely to be seasonal differences in egg consumption.

The diary included standard demographic questions, including sex, age and indigenous status of the respondent and each of the household members. Additional demographic information for each of the households, such as household income and location, was collected by the provider of the online panel and was included in the databases.

Pilot Testing

Pilot testing was conducted prior to the main study to enable refinement of the diary instrument. A sample of 240 households for the pilot testing was drawn from the Roy Morgan Single Source online panel. The pilot testing of the diary was conducted from Friday 27th June till Monday 7th July 2008 (a period of 10 days) to allow extra time for respondents who didn't start the survey on the day the initial invitation email was sent. Respondents were offered an incentive of $7 in the invitation email if they completed all 7 days of the diary. A 1800 phone number was available for respondents requiring help with filling out the diary.

The pilot testing highlighted some changes which needed to be made to the diary instrument. These included changes in the wording of the questions to make them clearer and changes to the format of the programmed questionnaire to facilitate linking between the daily records of the respondents. The pilot testing also revealed that the diary instrument took longer to complete than expected. As a result, the incentive given to respondents for completing the diary was increased from $7 to $8.50. These changes are described in more detail in the Appendix 4 of the Technical Report.

Sampling

Main Grocery Buyers were recruited using an online research panel, to fill out the survey on behalf of the household. It was decided that the Main Grocery Buyer in the household would be best able to answer behavioural questions included in the survey, such as where the household stores eggs. Also, their role as the Main Grocery Buyer in the household (and generally also the person in the household with the most responsibility for preparing food) they would be the most aware of what other household members were eating. Invitations to participate in the survey were sent to a sample of the research provider's online research panel via email. Respondents filled out the diary instrument online via a link included in the invitation email. Reminder emails were sent on each subsequent day of the survey period with a link to that day's diary. Respondents were able to access the current day's diary as well as those of previous days of the survey period. However they were not able to access the next day's diary to ensure they didn't record consumption of eggs and egg dishes before it occurred. Participants were rewarded a cash equivalent of $8.50 by the research provider for completing all seven days of the food diary to encourage participation.

The survey commenced on Wednesday 16th July and closed on Sunday 27th July 2008. A final sample of 1,673 households and consumption records for 4,616 individuals was obtained.

For the sample of Main Grocery Buyers, young adults (18 to 34 year olds) and males were over sampled to account for lower response rates from these groups.

The sampling errors[1] were ± 2.40 (n=1,673) for the household sample and ± 1.44 (n=4,616) for the individual sample at the 95% confidence level.

Timing of the survey

The survey was conducted over ten days in July, i.e. in winter, therefore two validation questions were included to determine whether the timing of the survey had an effect on the results. For the first question "Was the number of eggs consumed by the household this week more, less or the same as the number that the household would usually consume in a typical week?, the majority of households reported that their consumption of eggs during that week

[1] Sampling error is an estimation of the degree to which the values obtained from the sample differ from those that would be obtained from the entire population.

had been about the same as usual. The number of households reporting that their egg consumption was a little or a lot less than usual was similar to the number reporting that their egg consumption was a little or a lot more than normal. This suggests that the overall egg consumption of the households during the survey period was relatively typical.

Similar results were found for the second validity question, "Do you think your household consumes more or less raw or lightly cooked eggs in summer than in winter?". Most households reported that they consumed about the same amount of raw and lightly cooked eggs all year round. The number of households reporting that they ate more raw and lightly cooked eggs in summer was similar to those reporting they consumed less in summer.

The results of the validity questions suggest the consumption data collected in the study is representative of egg consumption during other times of year.

Weighting Procedures

A separate set of weights was applied to each of the two data sets: the household data set (containing behavioural and demographic information) and the individual data set (containing egg consumption data and demographic information). Australian Bureau of Statistics population estimates for 2008 were used to weight the data from the 4,616 individuals to reflect the Australian population. The weights for individuals were based on sex, age and region. Australian Bureau of Statistics information was also used to apply weights to the 1,673 households in the survey to reflect the household composition of Australia. The household weights were based on the number of people living in the household and region.

A separate set of proportional weights was used for chi square analysis. These were used to adjust the proportions of households (by household size and state or territory) to reflect Australian households. However, unlike the main weights (as described above) the proportional weights did not boost the numbers of households to reflect the number of households in Australia.

Sample description

The demographic characteristics of the individuals included in the survey are shown in the tables below. Tables 1 to 5 show information for all of the 4,616 individuals included in the survey. Tables 6 and 7 show information for the 1,673 households included in the survey. The data in the tables in this section is not weighted to reflect populations.

Table 1. Sex of individuals

	Number	Percent
Female	2301	49.8
Male	2315	50.2
Total	4616	100.0

Table 2. Age of individuals

	Number	Percent
0-4 years	350	7.6
5-9 years	272	5.9
10-14 years	264	5.7
15-17 years	165	3.6
18-24 years	393	8.5
25-34 years	688	14.9
35-44 years	623	13.5
45-54 years	591	12.8
55-64 years	600	13.0
65-74 years	559	12.1
75-84 years	101	2.2
85 years or more	10	0.2
Total	4616	100.0

Table 3. Region of individuals

	Number	Percent
ACT	69	1.5
NSW	1482	32.1
VIC	1234	26.7
QLD	902	19.5
SA	382	8.3
WA	445	9.6
NT	24	0.5
TAS	78	1.7
Total	4616	100.0

Table 4. Location of individuals

	Number	Percent
Capital cities	3322	72.0
Country areas	1294	28.0
Total	4616	100.0

Table 5. Indigenous status of individuals

Are you of Aboriginal or Torres Strait Islander origin?	Number	Percent
Yes	81	1.8
No	4517	97.9
Can't say	18	0.4
Total	4616	100.0

Table 6. Household income (before tax)

	Number	Percent
Less than $21,000	162	9.7
$21,000-$40,999	385	23.0
$41,000-$60,999	315	18.8
$61,000-$80,999	243	14.5
$81,000-$100,999	172	10.3
$101,000 or more	183	10.9
Not stated	213	12.7
Total	1673	100.0

Table 7. Household size

Number of people in household	Number	Percent
1	224	13.4
2	686	41.0
3	293	17.5
4	295	17.6
5	115	6.9
6	41	2.5
7	12	0.7
8	7	0.4
Total	1673	100.0

Table 8. Number of households with one or more indigenous Australians

Household contains one or more indigenous Australians	Number	Percent
Yes	49	2.9
No	1624	97.1
Total	1673	100.0

Table 9. Households with one or more vulnerable people in them.

Vulnerable group		Number	Percent
Child aged 4 years or under	Yes	257	15.4
	No	1416	84.6
	Total	1673	100.0
Person aged 75 years or more	Yes	89	5.3
	No	1584	94.7
	Total	1673	100.0
Both	Yes	1	0.1
	No	1672	99.9
	Total	1673	100.0

Analysis Procedures

The data from the online diary was entered into two databases, one for individuals and one for households. The Australian Bureau of Statistics population estimates used to weight the data were applied.

The analysis of egg consumption data was conducted using the individuals dataset. An estimate of the quantity of egg in one portion of each type of egg dish was calculated based on standard recipes used in dietary modelling by FSANZ. This factor was multiplied by the the number of portions recorded by respondents to calculate the quantity of raw, lightly cooked and well cooked eggs eaten by each individual.

Using the data on the quantity of eggs eaten by individuals over the survey period, the proportion of eggs consumed raw, lightly cooked and well cooked was calculated. Adults, children aged 4 years and under and adults aged 75 years and over were compared to determine whether there were differences in the proportion of eggs which they had consumed raw over the survey period.

An additional measure, “egg exposure events” was developed to express the number of occasions an individual consumed egg (or a food containing egg). Where an individual ate two or more different foods containing eggs at one meal, these foods were counted as separate exposure events. The design of the diary instrument also meant that where the same dish (for example, an omelette) had been consumed at two separate occasions on the same day, this was recorded as one egg exposure event. The proportion of egg exposure events which were from raw, lightly cooked and well cooked eggs was calculated to compare with the data on the quantity of eggs consumed raw, lightly cooked and well cooked.

In analysing egg handling behaviours the household dataset was used. The results for each question are reported first, displayed in bar charts and using the original answer categories from the diary instrument. Chi-square analysis was carried out to test for significant differences between groups to determine if different household groups had different egg handling behaviours.

The key groups that were compared in analysis were:

- Households with and without vulnerable members
- Capital city and country households
- Households with different levels of income
- Households who obtain their eggs from different sources

Grouping variable		Definition
Vulnerable members	Household with a vulnerable member	A household member aged 4 years and under or aged 75 years and older
	Household without a vulnerable member	No household members aged 4 years and under or aged 75 years and older
Location	Capital city households	Households in capital cities
	Country households	Households in country areas
Household income (before tax)	Low income households	$40,999 or less
	Middle income households	$41,000 to $80,999
	High income households	$81,000 and above
Where household usually obtains eggs		Supermarket or other retail store
		Farmers or growers market
		Back yard producer or own chickens
		Other source

Where the answer category ‘Not stated’ or ‘Can’t say’ was selected, or no answer was given the household is excluded from the analysis.

For the questions where multiple responses were allowed, new variables were created with a single response from each household to enable chi-square analysis. This was done by collapsing answer categories and by prioritising some answer categories that were of particular interest. Where a household had recorded more than one answer to a multiple response question, a decision was made as to which of the answers that was provided was of most interest. How the answer categories were prioritised is shown below.

Question	Prioritisation of answer categories
How do you usually store eggs?	At room temperature > In the fridge > Can't say
From where do you usually obtain the eggs your household uses?	Backyard producer or own chickens > Farmers or growers market > Supermarket or other retail store > Other
Which of these egg dishes have you or other people in the household eaten in Australia?	Household has tried one or more specialty egg dishes > Household has not tried any of the specialty egg dishes
What do you usually do with left over meals made from eggs?	Store at room temperature > Doesn't store at room temperature
If you have left over egg yolks or egg whites after making a dish (e.g. pavlova, mayonnaise), what do you usually do with the left over egg yolks or egg whites?	
If an egg has broken and leaked into the carton, which of the following do you do?	Remove the broken egg, but continue to keep the eggs in the same carton > Doesn't keep the eggs in the same carton
How do you decide whether eggs are still good to use or eat?	Check best before date > Doesn't check best before date
If the egg has a small crack, which of the following do you do?	Not use the egg > Checks or uses the egg
If you found an egg with a small amount of dirt on it, which of the following would you do?	Not use the egg > Washes/wipes/uses the egg

As an example, if a household has selected 'At room temperature' and 'In the fridge' for the first question in the table, that answer would be categorised as 'At room temperature'.

RESULTS

Bar graphs showing the breakdown of responses to the behavioural questions included in the diary are shown below. Households which selected 'Can't say' as a response or which did not respond to the question are excluded from the graph. The number of households which responded to the question (excluding 'Can't says') is noted below each graph. Where multiple responses to a question were allowed, this is noted below the figure. All other questions only allowed one response. For each question, the results of the chi-square analysis of differences between groups is shown. Where a significant difference ($p < .05$) was found between groups, the chi-square statistic is reported and the data are displayed in clustered bar graphs. Where no significant difference was found between groups, this is noted in the text.

Consumption of eggs in Australia

During the survey period of seven days, 89 per cent of individuals (n=4616) reported consuming eggs or foods containing egg. Of the total number of eggs consumed, 26 per cent were categorised as being 'well cooked'; 71 per cent 'lightly cooked'; and 3 per cent 'raw' (Figure 1).

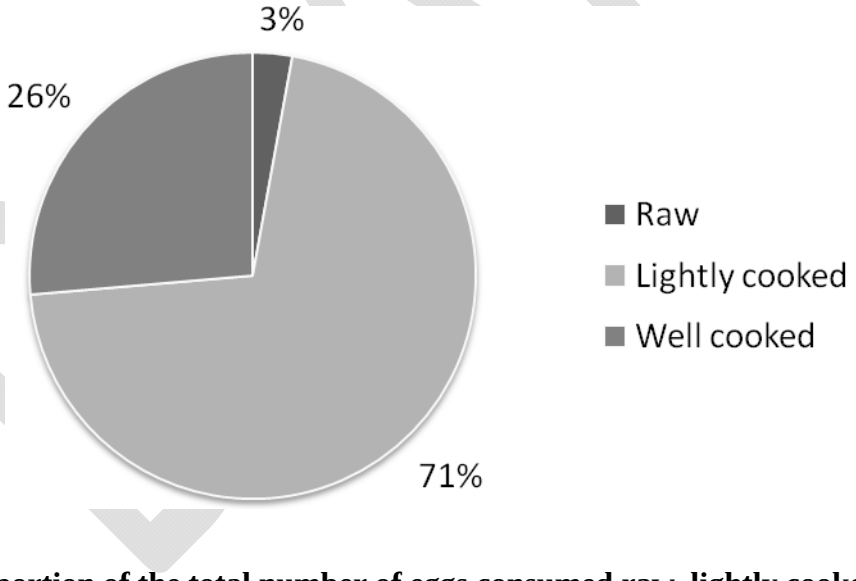

Figure 1. Proportion of the total number of eggs consumed raw, lightly cooked and well cooked.

Of the total egg exposure events (the number of occasions an individual consumed egg or a food containing egg) which were recorded, five per cent were categorised as 'raw' (Figure 2). For remaining egg exposures, 56 and 39 per cent were 'lightly-cooked' and 'well-cooked' respectively.

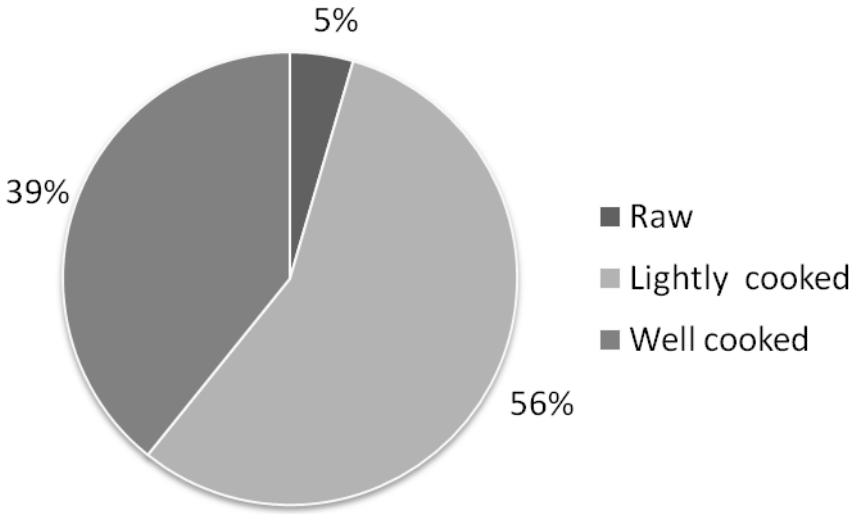

Figure 2. Proportion of 'egg exposure events' that were raw, lightly cooked and well cooked.

From the FSANZ survey, a comparison was made of consumption of raw eggs between ages; approximately 11 per cent of children aged 4 years and under were exposed to raw eggs during the survey period compared with 24 percent of 25-34 year olds. Of the total eggs consumed by children aged 4 years and under, 1.4 percent were raw, compared to 3.7 per cent for 25-34 year olds. For individuals aged 75-84 years old, 3.0 per cent of all eggs consumed were raw

Consumption of specialty egg dishes

Figure 3, below, shows the results from the question regarding specialty egg dishes that Australian households have tried. The majority of households (80 per cent) did not contain anyone who had tried any of the specialty egg dishes listed in the survey. The specialty dish most commonly tried by the households in the survey was a pickled egg (13 per cent), followed by a salted duck egg (5 per cent). Only 4 per cent of households had tried a century egg (also known as a thousand year egg, pidan egg, or pine blossom egg) and only 1 per cent had tried a balut egg.

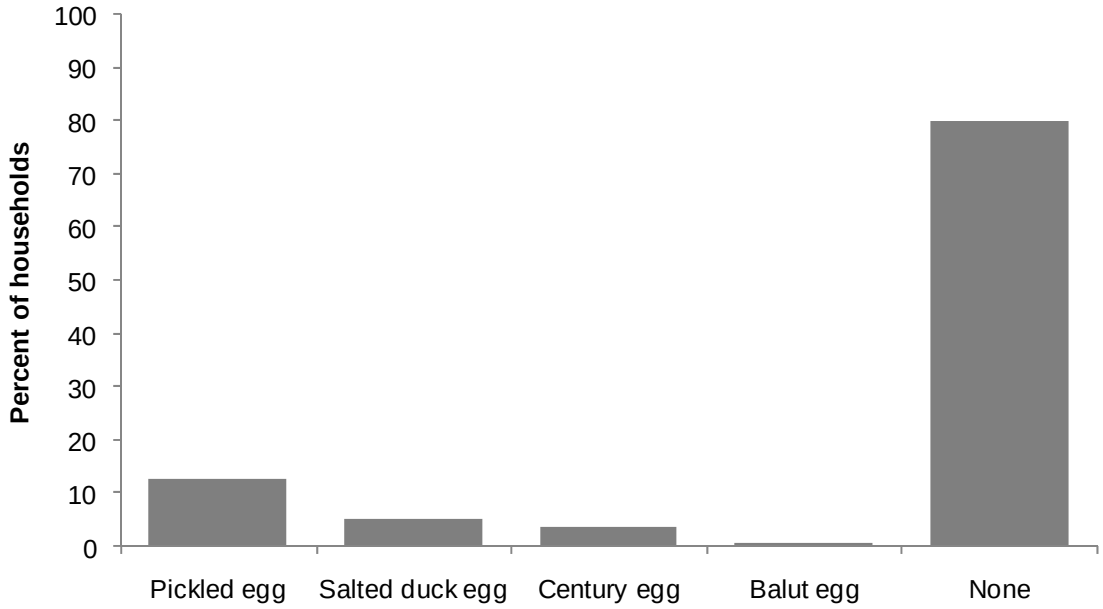

Figure 3. Specialty egg dishes that households have eaten.
Q9. "Which of these egg dishes have you or other people in your household eaten in Australia?"
NB: Multiple responses allowed. Percentages will add to over 100.
N=1635

No significant differences were found between households with and without vulnerable members or households in different locations in their consumption of specialty egg dishes.

Statistically significant differences were found between households with different income levels in their consumption of specialty egg dishes (χ^2 = 8.172, d.f. = 2, $p < .05$). The likelihood of one or more household members having tried one or more of the specialty egg dishes listed in the survey increased with household income. Households in the highest income bracket and the middle income bracket were more likely to have tried one or more of the specialty eggs listed in the survey (21 per cent for both high income households and middle income households) compared to households in the lowest income bracket (15 per cent). Subsequent analysis identified significant differences between low and middle income households (χ^2 = 6.638, d.f. = 1, $p < .05$) and between low and high income households (χ^2 = 5.519, d.f. = 1, $p < .05$).

Statistically significant differences were found between households with different sources of eggs in their consumption of specialty egg dishes (χ^2 = 10.968, d.f. = 2, $p < .05$). The households which were most likely to have tried one or more specialty egg dishes were those who obtain their eggs from farmers/growers markets (26 per cent, compared to 17 per cent of supermarket/other retail store households and 22 per cent of back yard producer/own chickens households). Subsequent analysis identified significant differences between supermarket/other retail store households and farmers/growers market households (χ^2 = 9.231, d.f. = 1, $p < .05$).

Sources and storage of eggs in Australian households

Sources of eggs

Households reported which of the following sources they obtain their eggs from (supermarket, other retail shop/store, farmers or growers markets, back yard producer, your own chickens or other source). Definitions of the possible sources listed above were not provided in the diary instrument, so respondents were free to interpret the terms as they wished. Most households report that they obtain their eggs from a supermarket (81 per cent) or from "other retail shop/store (e.g. fruit & veg shop, butcher, corner shop, etc.)" (18 per cent). Eleven per cent buy their eggs from a farmers market, 9 per cent from a back yard producer and 5 per cent obtain their eggs from their own chickens. (Figure 4).

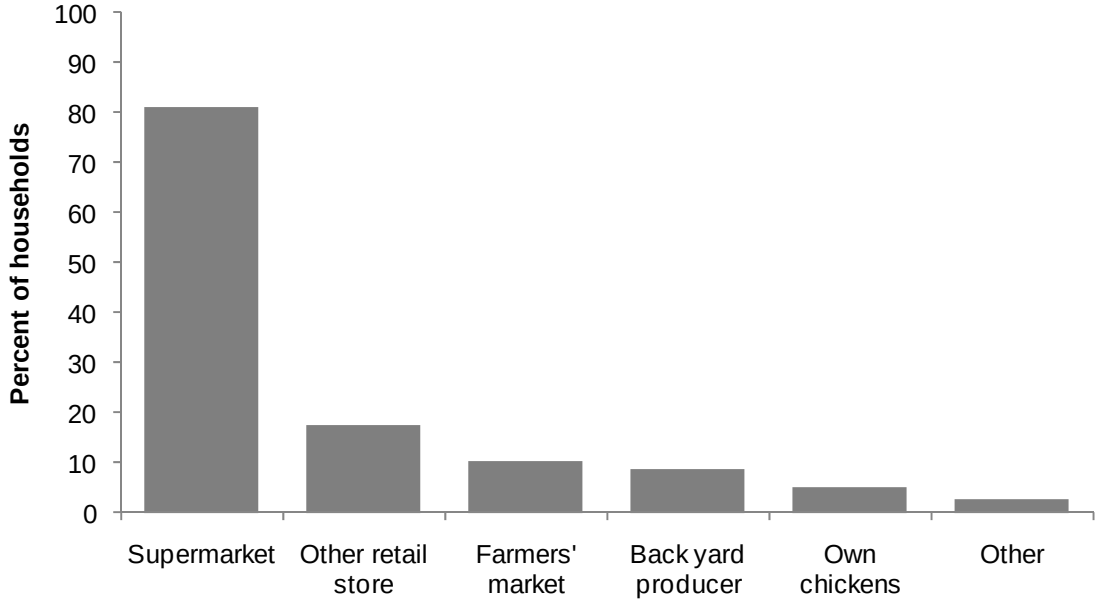

Figure 4. Where households obtain their eggs.
Q9. Day 1 "From where do you usually obtain the eggs your household uses?"
NB: Multiple responses allowed. Percentages will add to over 100.
N=1668

Table 10, below, shows how many options were selected by respondents when answering where they obtain their eggs from. Most households only report having one source of eggs (77 per cent), although 18 per cent reported that they sourced their eggs from two different places and 4 per cent from 3 or more places.

Table 10. Number of sources of eggs for households

	Number	Percent
Can't say	5	0.3
1	1300	77.7
2	307	18.4
3 +	61	3.7
Total	1673	100.0

When analysing for differences between households which had more than one source of eggs, priority was given to "Your own chickens" and "Back yard producers" responses. Any household which selected one of these responses was classified as a back yard producer/own chickens household. Of the remaining households, any that reported that they obtain their eggs from farmers or growers markets were classified as farmers/growers market households. Households which reported obtaining eggs from supermarkets or other retail stores (and which did not fall into one of the groups mentioned above) was classified as a supermarket/other retail store household. Households which reported obtaining eggs from an "other source" or "can't say" were excluded from chi-square analysis unless they had also selected another response category (in which case they were classified using that response category).

No significant differences were found in sources of eggs between households at different income levels and households with and without vulnerable members.

Significant differences were found between households in capital cities and households in country areas in where they source their eggs (χ^2 = 72.848, d.f. = 3, $p < .05$). A higher proportion of urban households obtain their eggs from supermarkets or other retail stores (81 per cent) compared to rural households (67 per cent). Rural households are more likely than urban households to obtain their eggs from back yard producers or their own chickens (23 per cent compared to 8 per cent for urban households).

Egg storage

Almost all households reported that they store their eggs in the fridge (93 per cent) and very few that they store them at room temperature (8 per cent). (Figure 5).

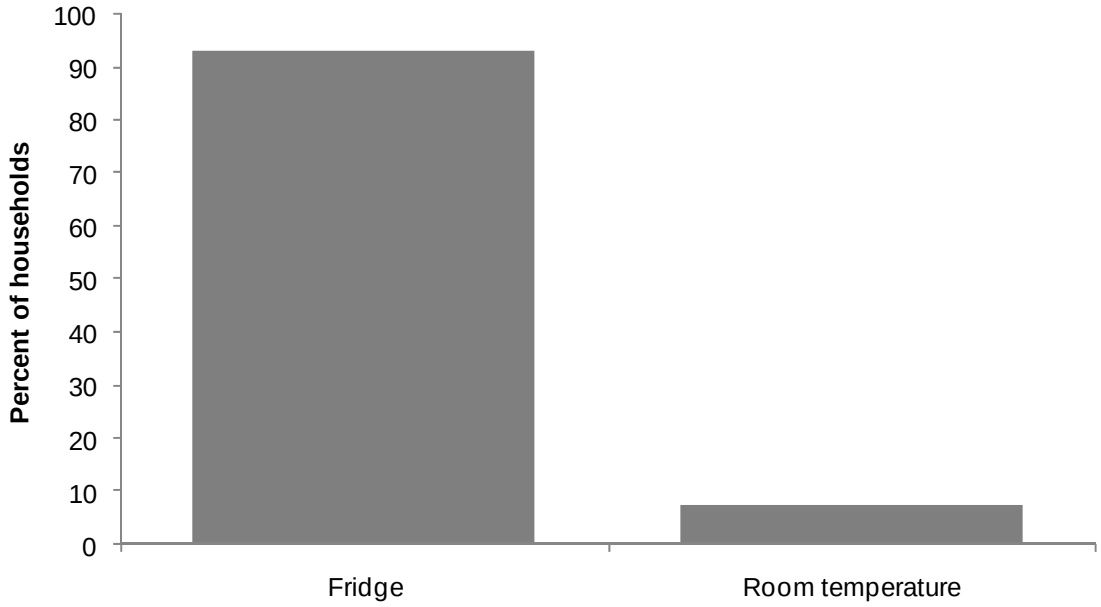

Figure 5. Where households store their eggs.

Q8.Day 1 "How do you usually store eggs?"
NB: Multiple responses allowed. Percentages will add to over 100.
N=1669

No significant differences were found between households with different sources of eggs, households with and without vulnerable members or households in different locations in where they usually store their eggs.

Significant differences were found between households with different income levels in where they store their eggs (χ^2 = 8.990, d.f. = 2, $p < .05$). A higher proportion of households in the highest income bracket store their eggs in the fridge (96 per cent) compared to households in the lowest income bracket (91 per cent). Households in the lowest income bracket were more likely than other households to store eggs at room temperature (9 per cent, compared to 6 per cent of middle income bracket households and 4 per cent of highest income bracket households). Subsequent analysis identified significant differences between low and high income households (χ^2 = 10.591, d.f. = 1, $p < .05$).However, the proportion of households storing eggs in the refrigerator is over 90 per cent in all income brackets.

Food preparation and storage behaviours

Left over meals made from eggs

In the diary, respondents were asked what they did with left over meals made from eggs. The results from these questions are shown below in Figure 6. Most households (71 per cent) store left over meals containing eggs in the fridge, 12 per cent in the freezer and 40 per cent dispose of them, either by feeding them to pets/animals (21 per cent), throwing them away (17 per cent) or giving to someone not living in the household (2 per cent). Very few households (1 per cent) reported that they store left over meals at room temperature.

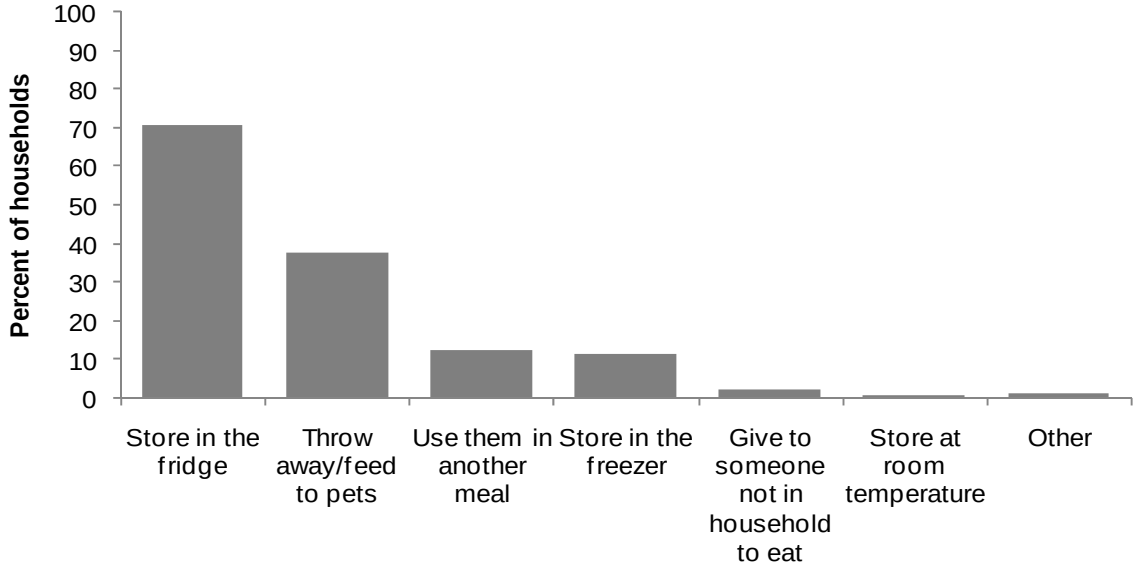

Figure 6. What households do with left over meals made from eggs.

Q11. "What do you usually do with left over meals made from eggs?"
NB: Multiple responses allowed. Percentages will add to over 100.
N=1651

No significant differences were found between households with and without vulnerable members, households in different locations, households with different income levels or households with different sources of eggs.

Left over egg yolks and egg whites

The respondents were asked "If you have left over egg yolks or egg whites after making a dish (e.g. pavlova, mayonnaise), what do you usually do with the left over egg yolks or egg whites?" The results are shown, below, in Figure 7. Most households dispose of left over egg yolks and egg whites, either by throwing them away (26 per cent) or feeding them to pets (18 per cent). Thirty-one per cent use them in another dish that same day and 22 per cent store them in the fridge. Seventeen per cent reported that they don't ever have left over egg yolks or egg whites.

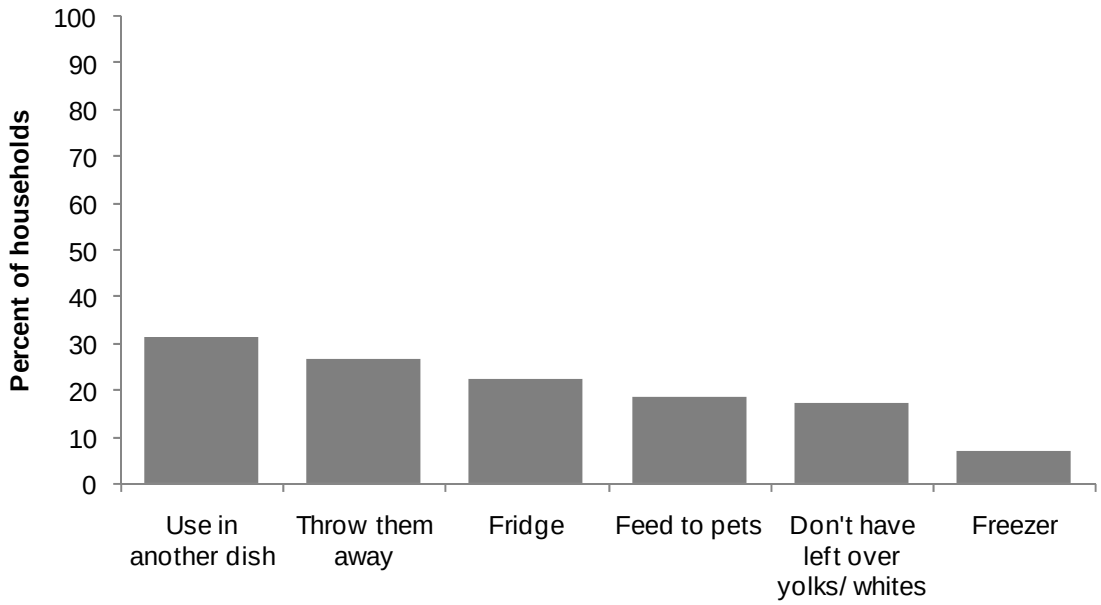

Figure 7. What households do with left over egg yolks and egg whites.
Q12. "If you have left over egg yolks or egg whites after making a dish (e.g. pavlova, mayonnaise), what do you usually do with the left over egg yolks or egg whites?"
NB: Multiple responses allowed. Percentages will add to over 100.
N=1650

No significant differences were found between households with and without vulnerable members and households in different locations.

Significant differences were found between households with different incomes levels (χ^2 = 29.741, d.f. = 2, $p < .05$). A higher proportion of households in the lowest income bracket reported that they would either use the left over egg yolks/whites in another dish the same day or would store them in the fridge or freezer (67 per cent) compared to households in the highest income bracket (48 per cent). Households in the highest income bracket were more likely than lower income households to throw away the eggs (52 per cent, compared to 33 per cent for the lower income households). Subsequent analysis identified significant differences between low and middle income households (χ^2 = 16.821, d.f. = 1, $p < .05$) and between low and high income households (χ^2 = 26.086, d.f. = 1, $p < .05$).

Significant differences also exist between households with different sources of eggs in what they do with left over egg yolks and egg whites (χ^2 = 11.054, d.f. = 2, $p < .05$). Households which obtain eggs from farmers or growers markets were more likely than other households to use left over egg yolks or whites in another dish the same day or to store them in the fridge or freezer for use later on (71 per cent) compared to households which obtain their eggs from supermarkets and other retail stores (56 per cent) or from back yard producers or their own chickens (56 per cent). They were also less likely than supermarket/other retail store and back yard producer/own chicken households to throw away left over yolks and whites (29 per cent, compared to 44 per cent for supermarket/other retail store and back yard producer/own chicken households).

Subsequent analysis identified significant differences between farmers/growers market households and backyard producer/own chicken households (χ^2 = 7.851, d.f. = 1, $p < .05$) and between supermarket/other retail store and farmers/growers market households (χ^2 = 10.745, d.f. = 1, $p < .05$).

Sampling raw batter containing egg

The results from the question regarding sampling raw cake mixes and batter are shown below in Figure 8, below. Over half of households (54 per cent) always or almost always have someone who samples the cake batter or licks the spoon when making cakes. Seventeen per cent of households sometimes have someone sample the batter and 10 per cent never have anyone sample the batter.

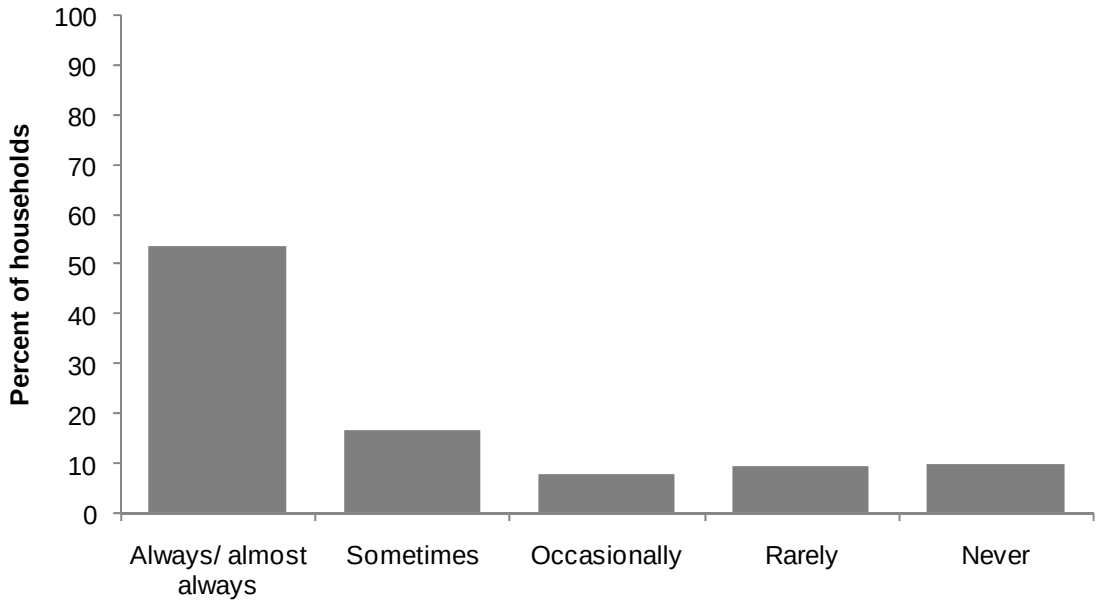

Figure 8. How often someone in the household samples cake batter or licks the bowl.
Q13. "When making cake mixes, batters, etc., how often does anyone in the household sample the mixture before it is cooked, or lick the bowl or spoon of the remaining mixture?"
N=1644

No significant differences were found between households with different sources of eggs or households in different locations.

Significant differences were found between households with different income levels (χ^2 = 23.107, d.f. = 8, $p < .05$). Households in the highest income group were more likely than other households to report always or almost always washing their hands after handling eggs (60 per cent, compared to 50). Subsequent analysis identified significant differences between low and middle income households (χ^2 = 12.101, d.f. = 4, $p < .05$) and between low and high income households (χ^2 = 15.185, d.f. = 4, $p < .05$).

Significant differences were found between households with and without vulnerable members for frequency of sampling raw batter (χ^2 = 17.375, d.f. = 4, $p < .05$). Households with vulnerable members (either a child aged 4 years and under or an adult aged 75 years or more) were more likely than other households to report that they always or almost always sample raw batter (62 per cent compared to 53 per cent). A higher proportion of households with no vulnerable members report that they never sample raw batter (11 per cent) compared to households with vulnerable members (5 per cent).

Egg handling behaviours

Re-use of egg cartons

How often households re-use egg cartons is shown below in Figure 9. Sixteen per cent of households always or almost always re-use egg cartons, and 15 per cent sometimes re-use them. Nineteen per cent rarely re-use egg cartons and 40 per cent never do.

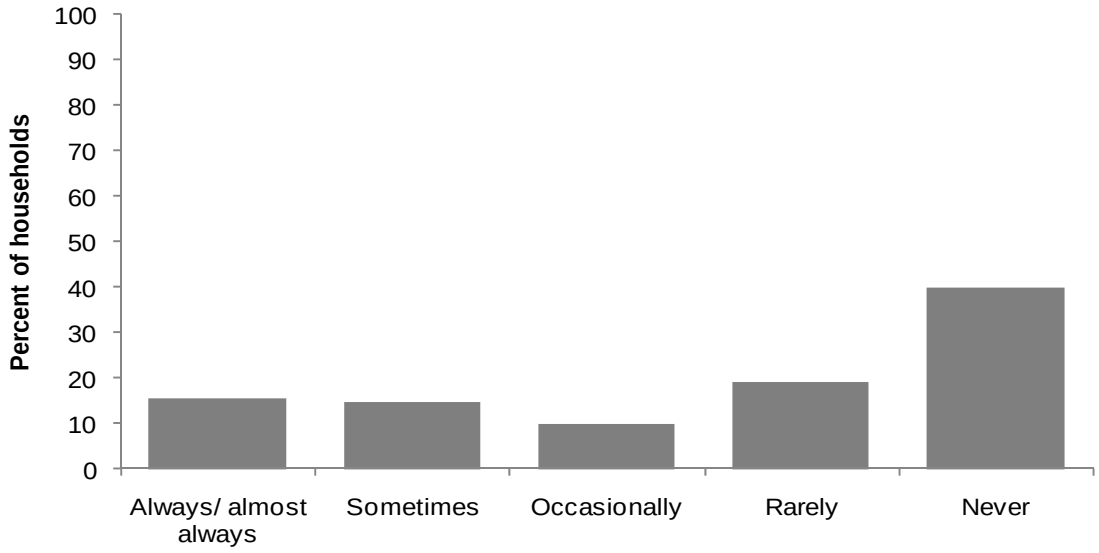

Figure 9. How often the household re-uses egg cartons.
Q14. "How often, if at all, do you re-use egg cartons, that is, you put newly obtained eggs into an egg carton that previously held eggs?"
N=1662

No statistically significant differences were found between households with different income levels or households with and without vulnerable members for this question.

Statistically significant differences were found between households with different sources of eggs (χ^2 = 401.828, d.f. = 8, $p < .05$). Households which obtain their eggs from back yard producers or from their own chickens were more likely than supermarket/other retail store or farmers/growers market buyers to always or almost always re-use egg cartons (55 per cent, compared to 7 per cent for supermarket/other retail store buyers and 22 per cent for farmers/growers market buyers).

A higher proportion of supermarket/other retail store buyers report that they never re-use egg cartons (47 per cent) compared to farmers/growers market buyers (30 per cent) and households which obtain their eggs from back yard producers or their own chickens (9 per cent). Subsequent analysis identified significant differences between farmers/growers market households and backyard producer/own chicken households (χ^2 = 64.316, d.f. = 4, $p < .05$) and supermarket/other retail store and back yard producer/own chicken households (χ^2 = 402.257, d.f. = 4, $p < .05$) and between supermarket/other retail store and farmers/growers market households (χ^2 = 46.056, d.f. = 4, $p < .05$).

Statistically significant differences were found in re-use of egg cartons between households in different locations (χ^2 = 76.766, d.f. = 4, $p < .05$). Households in country areas were more likely to always or almost always re-use egg cartons (23 per cent) compared with households in capital cities (11 per cent). A higher proportion of households from capital cities report that they never re-use egg cartons (47 per cent) compared to country households (29 per cent).

The results of this question may be linked to where households obtain their eggs from, as households in country areas are more likely to obtain their eggs from back yard producers or their own chickens than capital city households.

Leaked eggs

Figure 10, below, shows responses to the question "If an egg has broken and leaked into the carton, which of the following do you do?". Most responses were evenly split between moving all the eggs to another carton or container (35 per cent), removing the broken egg but keeping the rest of the eggs in the same carton (31 per cent) and "I don't have this problem because I check the eggs in the carton before I buy them" (31 per cent). Seven per cent of households dispose of all the eggs that have been soaked in the broken egg, 1 per cent dispose of all the eggs in the carton and 1 per cent chose "Can't say".

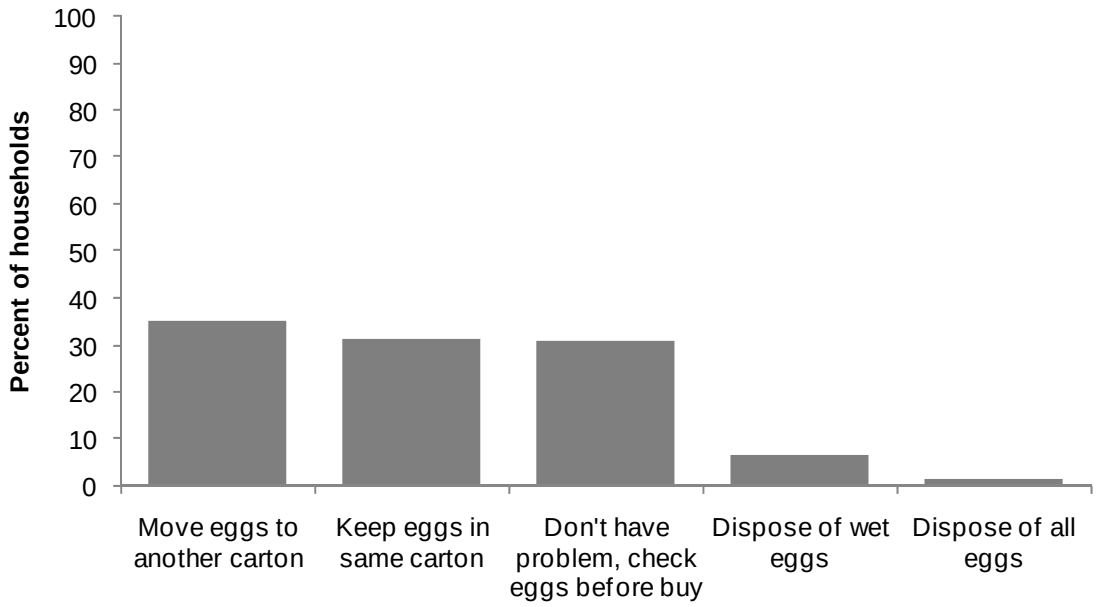

Figure 10. What households do with eggs in a carton with a leaky egg.
Q15. "If an egg has broken and leaked into the carton, which of the following would you do?"
NB: Multiple responses allowed. Percentages will add to over 100.
N=1662

No significant differences were found between households with different levels of income, households with and without vulnerable members or households in different locations in how they manage broken eggs in a carton.

Statistically significant differences were found between households with different sources of eggs (χ^2 = 8.680, d.f. = 2, $p < .05$). A higher proportion of households which obtain their eggs from a back yard producer or from their own chickens report that they would remove the broken egg, but continue to keep the eggs in the same carton (52 per cent) compared to households which obtain eggs from a supermarket/other retail store (45 per cent) or from a farmers/growers market (35 per cent). Households which obtain their eggs from a farmers/growers market were more likely than other households to report that they would move the remaining eggs to another carton or dispose of the eggs (65 per cent, compared to 55 per cent of supermarket/other retail store households and 48 per cent of back yard producer/own chickens households). Subsequent analysis identified significant differences between farmers/growers market households and backyard producer/own chicken households (χ^2 = 8.679, d.f. = 1, $p < .05$) and between supermarket/other retail store and farmers/growers market households (χ^2 = 4.757, d.f. = 1, $p < .05$).

Checking eggs are still good to eat

Responses to the question "How do you decide whether eggs are still good to use or eat?" are shown in Figure 11, below. The most common way that households check their eggs are still good to eat was checking the best before date (49 per cent), followed by cracking them into a separate bowl to check them before using (47 per cent). Thirty one per cent put them in water to see if they float or turn upside down and 17 per cent smell them.

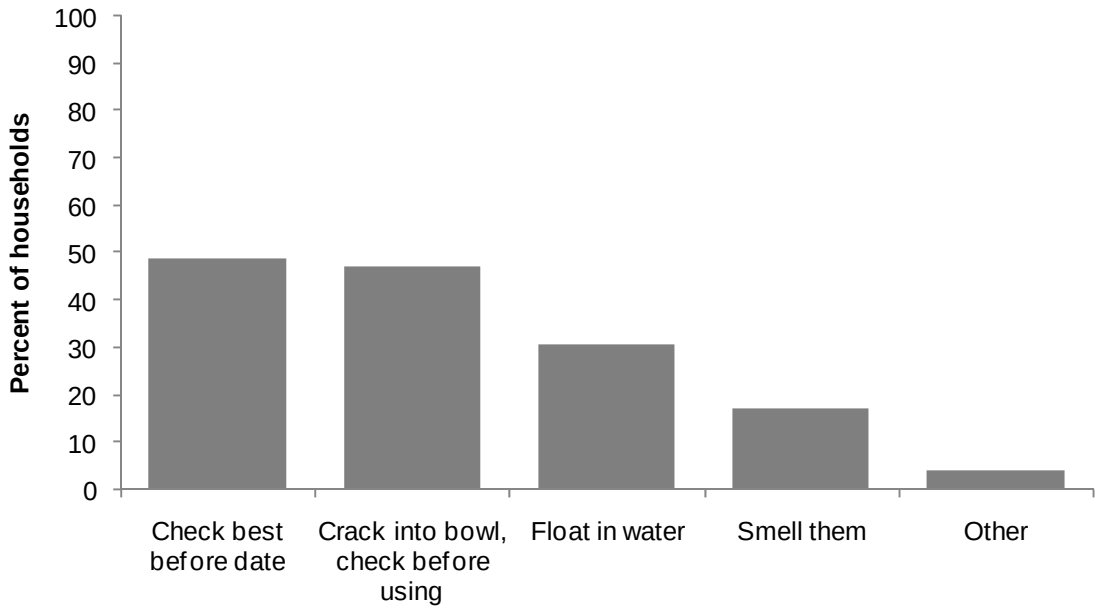

Figure 11. How households check their eggs are still good to eat.
Q16. "How do you decide whether eggs are still good to use or eat?"
NB: Multiple responses allowed. Percentages will add to over 100.
N=1593

Many households selected more than one response for this question. Table 11, below, shows the proportion of households selecting more than one answer when they were asked how they check that eggs are still good to eat or use.

Table 11. Number of checks used by households to establish whether eggs are still good to eat

	Number	Percent
Can't say	87	5.2
1	1015	60.7
2	357	21.3
3	154	9.2
4 +	60	3.6
TOTAL	1673	100.0

Most households (61 per cent) use one check, but a significant proportion of households (22 per cent) use two checks and 13 per cent use three or more checks. Note this doesn't distinguish between a household which uses multiple methods to check one egg and a household which uses multiple checks on different eggs. For example, different members of a household may use different methods for checking whether eggs are still good to eat.

No statistically significant differences were found between households with and without vulnerable members in how they check that eggs are still good to use or eat.

Statistically significant differences were found between households with different income levels in how they check eggs (χ^2 = 10.620, d.f. = 2, $p < .05$). In the highest income bracket, over half reported that they check the best before date (57 per cent). In comparison, less than half (47 per cent) of the lowest income households reported that they check the best before date. Households in the lowest income bracket were the most likely to use another method, that didn't include the best before date, to check eggs (53 per cent, compared to 43 per cent for middle income households and 48 per cent for high income households). Subsequent analysis identified significant differences between low and middle income households (χ^2 = 10.591, d.f. = 1, $p < .05$).

There were statistically significant differences between households with different sources of eggs in how they check that eggs are still good to use or eat (χ^2 = 43.387, d.f. = 2, $p < .05$). A higher proportion of supermarket/other retail store buyers report checking the best before date (57 per cent) compared to households which obtain their eggs from farmers/growers markets (49 per cent) or households with eggs from back yard producers or their own chickens (32 per cent). Households with eggs from back yard producers or their own chickens were more likely than other households to not select checking the best before date as an answer to this question (68 per cent, compared to 43 per cent for supermarket/other retail store households and 51 per cent for farmers/growers market households). These differences may be due to households with eggs from their own chickens not having a best before date to refer to. Also, some back yard producers and egg sellers at farmers/growers markets may not provide best before dates on the eggs they sell. Subsequent analysis identified significant differences between farmers/growers market households and backyard producer/own chicken households (χ^2 = 10.394, d.f. = 1, $p < .05$) and between supermarket/other retail store and back yard/own chicken households (χ^2 = 42.601, d.f. = 1, $p < .05$).

Statistically significant differences were found between households in different locations in how they check their eggs are still good to eat (χ^2 = 12.301, d.f. = 1, $p < .05$). A higher proportion of households in capital cities check the best before date (56 per cent) compared to households in country areas (47 per cent). Households in country areas were more likely than capital city households to use another method and not check the best before date (53 per cent, compared to 44 per cent for capital city households).

Cracked eggs

Figure 12, below, shows the results for the question "If the egg has a small crack, which of the following do you do?". Most households either crack the egg into a separate bowl to check it before using (40 per cent) or do not use the egg (39 per cent). The remaining households either report that they don't have this problem because they check their eggs before they buy them (12 per cent), use the egg (12 per cent) or chose "Can't say" (1 per cent).

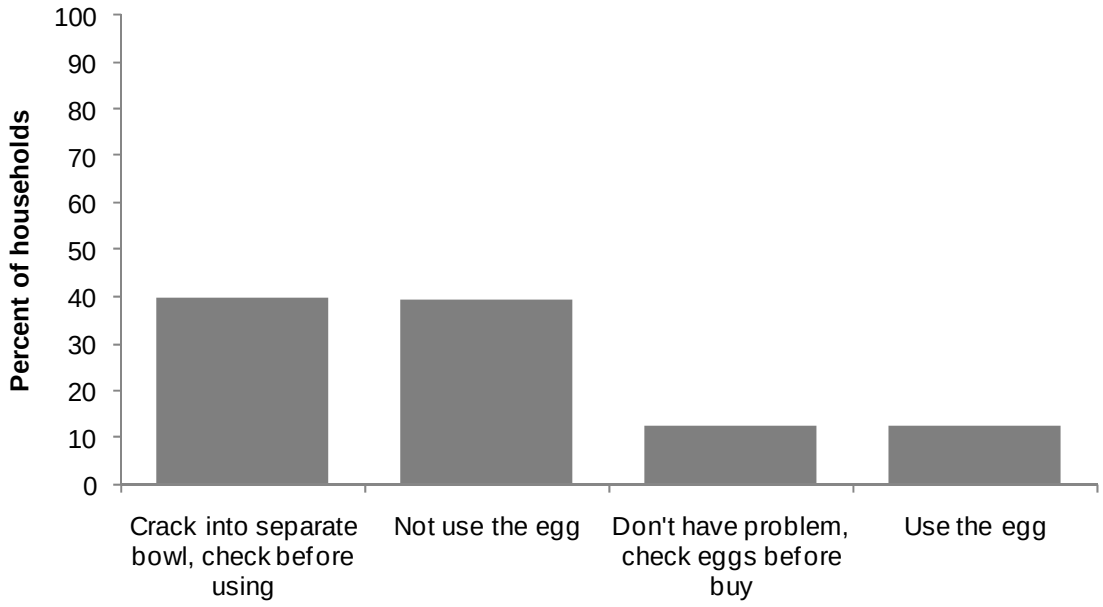

Figure 12. What households do with cracked eggs.
Q17. "If the egg has a small crack, which of the following do you do?"
NB: Multiple responses allowed. Percentages will add to over 100.
N=1653

No statistically significant differences were found between households with different sources of eggs or between households with and without vulnerable members in what they would do with a cracked egg.

Statistically significant differences were found between households with different income levels in how they deal with cracked eggs (χ^2 = 10.620, d.f. = 2, $p < .05$). The proportion of households which reported they would not use the egg increased as household income increased. Households in the highest income bracket were the most likely to report that they would not use the egg (57 per cent) and households in the lowest income bracket were the least likely to (38 per cent). Conversely, the likelihood that the household would check and/or use the egg increased as household income decreased. Households in the lowest income bracket were the most likely to report that they would check the egg first and/or use it (62 per cent) and households in the highest income bracket were the least likely to select these answers (43 per cent). Subsequent analysis identified significant differences between low and middle income households (χ^2 = 5.997, d.f. = 1, $p < .05$), middle and high income households (χ^2 = 8.426, d.f. = 1, $p < .05$) and between low and high income households (χ^2 =, 25.386 d.f. = 1, $p < .05$).

Statistically significant differences were found between households in different locations for what they would do with a cracked egg (χ^2 = 4.068, d.f. = 1, $p < .05$). A higher proportion of households in country areas reported that they wouldn't use a cracked egg (49 per cent) compared to capital city households (43 per cent). Capital city households were more likely to check and/or use the egg than country households (57 per cent, compared to 51 per cent of country households).

Dirty eggs

Figure 13, below, shows what households do with dirty eggs. Most households either wash the egg before using (47 per cent) or wipe the egg (39 per cent). Sixteen per cent use it as it is, 7 per cent report that they don't have this problem because they check their eggs before buying and 3 per cent don't use the egg.

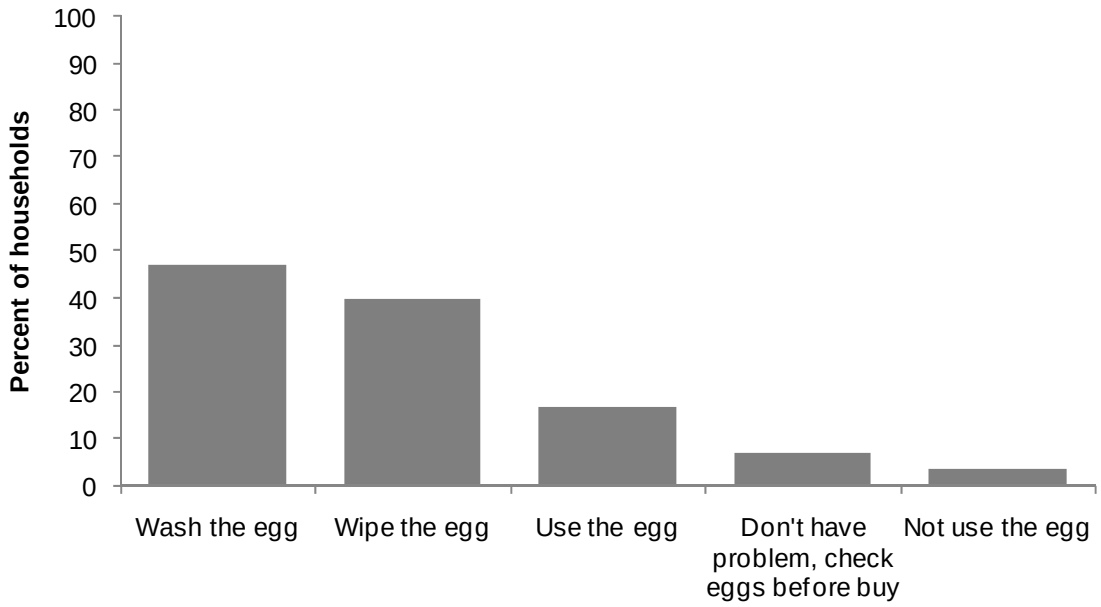

Figure 13. What households do with dirty eggs.
Q18. "If you found an egg with a small amount of dirt on it which of the following would you do?"
NB: Multiple responses allowed. Percentages will add to over 100.
N=1664

No significant differences were found between households with different income levels, households with and without vulnerable members or households in different locations in the methods they use to check eggs.

Statistically significant differences were found between households with different sources of eggs in how they check eggs are still good to eat (χ^2 = 10.363, d.f. = 2, $p < .05$). Households which obtain eggs from a back yard producer or their own chickens and households which obtain eggs from famers/growers markets were more likely to report that they would wash, wipe or use a dirty with the dirt still on it (99 per cent for both groups) compared to 95 per cent of supermarket/other retail store buyers. Subsequent analysis identified significant differences between supermarket/other retail store and back yard/own chicken households (χ^2 = 6.895, d.f. = 1, $p < .05$) and between supermarket/other retail store and farmers/growers market households (χ^2 = 3.863, d.f. = 1, $p < .05$).

Hand washing after handling eggs

The results of the question "How often, on average, do you wash your hands after handling eggs?" are shown, below, in Figure 14. Over half of households (54 per cent) report that they always or almost always wash their hands after handling eggs. Twenty-one per cent of households sometimes wash their hands and 8 per cent occasionally do. Only 11 per cent rarely wash their hands after handling eggs and 4 per cent rarely do.

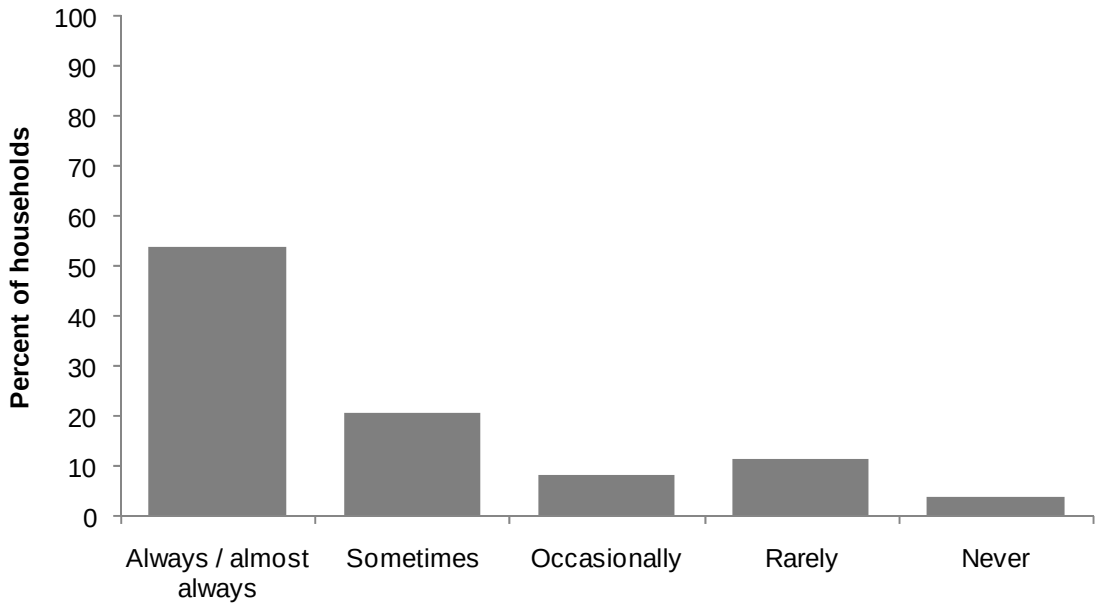

Figure 14. How often households wash their hands after handling eggs.
Q19. "How often, on average, do you wash your hands after handling eggs?"
N=1662

No significant differences were found between households with and without vulnerable members in how often they wash their hands after handling eggs.

Significant differences were found between households of different income levels in hand washing frequency (χ^2 = 18.961, d.f. = 8, $p < .05$). The proportion of households reporting that they always or almost always wash their hands after handling eggs decreased as the level of household income increased. Households in the lowest income bracket were the most likely to report that they always or almost always wash their hands after handling eggs (57 per cent, compared to 53 per cent for middle income households and 50 per cent for high income households). Subsequent analysis identified significant differences between middle and high income households (χ^2 = 10.661, d.f. = 4, $p < .05$) and between low and high income households (χ^2= 13.620 d.f. = 4, $p < .05$).

Significant differences were found between households with different sources of eggs in terms of hand washing (χ^2 = 9.830, d.f. = 4, $p < .05$). Households which source their eggs from back yard producer/own chickens or from farmers/growers market were more likely than supermarket/other retail store households to report that they always or almost always wash their hands after handling eggs (60 per cent of back yard producer/own chicken households, 62 per cent of farmers/growers market households, compared to 53 per cent of supermarket/other retail store households). A higher proportion of households which source their eggs from supermarkets or other retail stores report that they rarely or never wash their hands (17 per cent) compared to farmers/growers market households (13 per cent) and back yard producer/own chicken households (11 per cent). Subsequent analysis identified significant differences between supermarket/other retail store and back yard/own chicken households (χ^2 = 6.449, d.f. = 2, $p < .05$).

Statistically significant differences were found between households in different locations in terms of reported hand washing (χ^2 = 18.452, d.f. = 4, $p < .05$). A higher proportion of households in country areas report that they always or almost always wash their hands after handling eggs (59 per cent) compared to capital city households (53 per cent).

Table 12. Summary of significant differences between groups for behavioural questions

Question	Household income	Source of eggs	Vulnerable HH members	Rural/ urban
How do you usually store your eggs?	✓	×[2]	×	×
From where do you usually obtain the eggs your household uses?	×	N/A	×	✓
Which of these egg dishes have you or other people in the household eaten in Australia	✓	✓[2]	×	×
What do you usually do with left over meals made from eggs?	×	×[2]	×	×
If you have left over egg yolks or egg whites after making a dish (e.g. pavlova, mayonnaise), what do you usually do with the left over egg yolks or egg whites?	✓	✓	×	×
When making cake mixes, batters etc., how often does anyone in the household sample the mixture before it is cooked, or lick the bowl or spoon of the remaining mixture?	✓	×[2]	✓	×
How often, if at all, do you re-use egg cartons, that is, you put newly obtained eggs into an egg carton that previously held eggs?	×	✓[2]	×	✓
If an egg has broken and leaked into the carton, which of the following do you do?	×	✓[2]	×	×

[2] "Other source" excluded from analysis to increase cell counts for chi squared analysis

How do you decide whether eggs are still good to use or eat?	✓	✓[2]	×	✓
If the egg has a small crack, which of the following do you do?	✓	×[2]	×	✓[3]
If you found an egg with a small amount of dirt on it, which of the following would you do?	×	✓[2]	×	×
How often, on average, do you wash your hands after handling eggs?	✓	✓[2,4]	×	✓

[3] Pearson Chi square statistic = .044, Continuity Correction =.05

[4] Original answer categories collapsed down to three to increase cell counts for chi squared analysis

DISCUSSION

Egg consumption

Total egg consumption

Of all eggs consumed, 26 percent were categorised as being 'well cooked'; 71 per cent 'lightly cooked'; and 3 per cent 'raw'. The high proportion of eggs reported as 'lightly cooked' is influenced by the conservative nature of the categories designated for various egg dishes (see Table 6 in Technical Report). For example, an omelette was categorised as 'lightly cooked' although in reality, a proportion of omelettes would be cooked more thoroughly (higher temperature and/or time of cooking). The category of lightly cooked included eggs and egg dishes where the yolk and/or albumen (egg white) remained runny.

When expressed as egg exposure events (any instance an individual consumed egg or a food containing egg), the proportion of exposures to raw egg was five per cent. This increase reflects the multiple serve nature of many uncooked foods containing raw egg, for example egg-based sauces such as mayonnaise.

The reported exposure to raw egg in this quantitative survey was similar to that determined in the AECL Risk Profile of Eggs and Egg Products where, based on expert elicitation, it was estimated that 7.5 per cent of eggs in Australia were consumed raw (Daughtry *et al*., 2005). In this same report, it was estimated that 32.5 per cent of eggs were consumed well cooked (cooked sufficiently to reliably eliminate *Salmonella* spp.).

Specialty egg dishes

Consumption of the specialty egg dishes included in the diary was relatively low. Eighty per cent of households did not have anyone in them who had tried any of the dishes listed. The most common specialty egg dishes which had been tried in Australia were pickled eggs (13 per cent), followed by salted duck eggs (5 per cent).

Households in the highest income group significantly more likely to have tried one of these dishes, 19 per cent of them had tried pickled eggs.

Households which obtained their eggs from their own chickens or from farmers markets were more likely than other households to have tried pickled eggs.

There were no significant differences in specialty egg consumption between country and capital city households and households with and without vulnerable members.

Sources and storage of eggs in Australian households

Sources of eggs

The majority of households in the study (81 per cent) report that they obtain their eggs from a supermarket. This is very similar to the results from the Victorian survey which found that 85 per cent of respondents reported buying their eggs from supermarkets. In this study, 9 per cent of households reported obtaining eggs from back yard producers, compared with 13 per cent of those in the Victoria survey. The number of households obtaining eggs from their chickens was similar between the surveys (4 per cent in the Victorian survey and 5 per cent in this survey).

The only statistically significant difference found between the key groups was between households in different locations. Households in country areas were more likely than capital city households to report that they obtain eggs from back yard producers and their own chickens.

The source of eggs does not necessarily affect the safety of the eggs, although eggs obtained from back yard producers may not carry best before dates.

Storage of eggs

The results from the question "How do you usually store eggs" were positive from a food safety point of view. A very large proportion (93 per cent) of all households reported that they store eggs in the fridge and very few reported storing them at room temperature. The growth of most salmonellae bacteria is prevented at recommended refrigerator temperatures (5°C or less), so storage of eggs (which have a very small risk of being contaminated with *Salmonella*) in the refrigerator is preferable.

These results are very similar to those found in an online study conducted in October 2008 by Auspoll on behalf of the Department of Human Services, Victoria (Auspoll Pty Ltd, 2008). The survey found that 87 per cent of respondents report storing their eggs in the refrigerator (13 per cent of respondents in this survey either stored their eggs in the pantry or on the kitchen bench).

They also correspond with a mail survey conducted in 1999 in Melbourne, Australia (Mitakakis et al., 2004). Respondents were asked "Do you store eggs in the refrigerator?". Eighty-five per cent reported that they always store them in the refrigerator and 4 per cent that they usually store them there.

Egg storage behaviour was similar between households in the different income groups included in the study, however small but statistically significant differences were found. A higher proportion of households in the highest income bracket reported that they store eggs in the refrigerator than households in the lowest income bracket. There were no significant differences between households with different sources of eggs, households with and without vulnerable members and households in different locations.

Interestingly, even though most choose to store eggs in the fridge, the Victorian study found that only 24 per cent of respondents believe that the statement "You are more likely to get ill from eating eggs that are not stored in the fridge" is true. This suggests Australian households may be storing eggs in the fridge for other reasons than food safety, such as because they believe it improves the quality or longevity of the eggs. Alternatively, households may be storing eggs in the fridge out of habit.

Food preparation and storage behaviours

Left over meals made with eggs

Most households store left over meals containing eggs in the fridge or freezer, or dispose of them. Very few (1 per cent) store them at room temperature.

These results are similar to those found in a 1999 telephone survey (Jay et al., 1999a) of Australian households. When asked "Thinking about the last time you had leftover cooked casseroles or other food with meat, chicken or fish, did you...?" 85 per cent of households answered that they would cool the food to room temperature and then refrigerate or freeze it, 14 per cent said that they would put it in the refrigerator or freezer immediately and only 2 per cent answered that they would leave it at room temperature overnight or longer.

No statistically significant differences were found between any of the key groups in their left over meal storage behaviour.

Left over egg yolks and egg whites

Around a third of households in the survey reported that they use left over egg yolks and egg whites in another dish made on the same day, the rest either dispose of left over egg yolk and egg whites or store them in the fridge or freezer.

Households in the lowest income bracket were significantly more likely to report using the left over egg yolks or egg whites in another dish made on the same day or storing them in the fridge or freezer for later use than households in the highest income bracket.

Households which obtain their eggs from a farmers or growers market were more likely to report using left over egg yolk or whites in another dish prepared the same day or storing them in the fridge or freezer for later use than households which obtain their eggs from a back yard producer/own chickens or from a supermarket/other retail store.

Sampling raw batter containing egg

Most households (54 per cent) in the study reported that they always or almost always sample cake mixes or batters before they are cooked or lick the spoon.

The only key groups which for which there were statistically significant differences for this question were households with and without a vulnerable household member.

Households with one or more vulnerable members were more likely to report that someone in the household always or almost always samples raw batter, compared to households with no vulnerable members. However, it is not clear from this result who in the household is sampling the cake batter, it doesn't necessarily indicate that vulnerable household members (people aged 75 years or older and children aged 4 years and under) are more likely to sample raw batter.

Raw cake batters and other similar mixes often contain raw eggs, which may be a higher risk food. Young children are one of the groups most vulnerable to food poisoning, so if they are one of the people in the household sampling the raw cake batter, then this may be of concern. The Victorian study found that most respondents (59 per cent) believed that "It is safe to let kids lick the spoon used to mix batters or biscuit dough containing raw egg" (Auspoll Pty Ltd, 2008). The Victorian study also found that only 37 per cent of respondents believe that "Raw and undercooked eggs can cause food poisoning".

These results are suggest the many Australians are unaware that foods containing raw eggs may pose a health risk and suggests that adults in households with young children may be letting them sample foods such as raw batter, which may pose an increased risk of food poisoning.

The results of this question would be related to how often cakes and other batters are prepared in the household. Households with young children may make batters (such as cake batter) more often, which may have confounded the results. However, information on the frequency with which Australian households prepare cakes and other foods made using batters was not collected in this study. If batters are prepared only a few times each year then the results of this question are of less concern.

Similar results were found in a telephone survey conducted by the United States Food and Drug Administration in 1992-93 (Klontz, Timbo, Fein, & Levy, 1995). When asked if they ever ate foods that contain raw eggs, such as homemade cookie batter, homemade frosting with raw egg, 27 per cent reported that they consume cookie batter.

A similar question, asked in a telephone survey conducted in 2006 in the United States (Lando & Verrill, 2008) found that only 29 per cent of adults recalled eating "Raw, homemade cookie or cake batter?" in the past 12 months. This may indicate that cakes and other foods that require making batters are not frequently prepared in United States households.

If the frequency of making foods with batters is similarly low in Australia then the results of this question are of little concern.

Egg handling behaviours

Re-use of egg cartons

Most households (59 per cent) report that they either never or rarely re-use egg cartons. Households which obtain their eggs from back yard producers or their own chickens were significantly more likely than other households to report always or almost always re-using egg cartons. Also, households in country areas were significantly more likely than capital city households to report always or almost always re-using egg cartons.

These results suggest that some back yard producers of eggs may rely on the people they give or sell their eggs to returning egg cartons for them to be re-used to store new eggs.

Households from country areas are more likely to obtain their eggs from back yard producers or their own chickens than other households, and this may be why they are more likely to always or sometimes re-use egg cartons.

Re-use of egg cartons may result in cross-contamination between eggs if any of the eggs going into the cartons have bacteria on the shell.

The Victorian study did not ask respondents about re-use of egg cartons, however the study did find that when asked where in the fridge they stored eggs, 35 per cent reported storing them out of the carton (either on the fridge door or on the shelf of the fridge) (Auspoll Pty Ltd, 2008). Similarly, 34 per cent of respondents in the survey conducted in New South Wales (NSW FA, 2009) reported that they don't store eggs in their carton.

Re-using egg cartons and storing eggs in other containers or on surfaces which are not regularly cleaned could potentially lead to cross-contamination from other eggs or foods which may carry bacteria.

Leaked eggs

Responses to this question were evenly split between moving all the eggs to another carton or container, removing the broken egg but keeping the rest of the eggs in the same carton and "I don't have this problem because I check the eggs in the carton before I buy them" . Very few households report that they would dispose of all the eggs that have been soaked in the broken egg, or dispose of all the eggs in the carton.

Households which obtain their eggs from back yard producers or their own chickens were more likely than other households to remove the broken egg from the carton but continue to keep the remaining eggs in the same carton. If the remaining eggs which aren't cracked or leaking become soaked in the contents of the leaking egg, this could potentially cause cross-contamination.

Checking eggs are still good to eat

The most common method used by respondents to check that their eggs were still good to eat was checking the best before date. However, almost as many reported that they "crack them into a separate bowl to check them before using". Almost a third of respondents also reported floating eggs to check them and 17 per cent reported smelling them. Over one third of households in the study used two or more different methods to check their eggs.

The respondents in the Victorian study were also asked "How can you tell if an egg is safe to eat" and were given a range of checks they could use (the best before date was not included in this list). Seventy-three per cent of respondents selected "It does not smell bad when cracked", 54 % that "It will not float in water" and 36 per cent that "The yolk is the right colour". This suggests consumers trust a range of methods for checking whether eggs are still good to eat, many of which give no reliable indication of whether the egg is safe to eat.

Also in the Victorian survey, consumers were asked whether they conducted various checks on eggs before they bought them. Forty-nine per cent reported that they would check whether there was a best before date on the carton, and 53 per cent said that they would check what the best before date on the carton is.

In the Victorian study, 44 per cent of respondents reported that if they found an egg had passed the best before date that they would "Check if it was OK and use it anyway". This suggests many only use the best before date as a rough guide and then use some other check to determine whether they will use it or not.

Responses to this question were similar between all of the income groups, however, there were significant differences between households in the different income groups. Households in the lowest income bracket ($40,999 or less) were the least likely to report checking the best before date on eggs. This corresponds with the study of Victorians which found that those with a household income of $20,000 to $40,000 were less likely to report checking the best before date than other households.

Where households obtain their eggs also affected how they checked that they were still good to eat. Most households which bought their eggs from supermarkets and other retail stores used the best before date. Whereas households which obtain eggs from a back yard producer/own chickens were much less likely to. This difference may be due to back yard producers not supplying best before dates with their eggs and best before dates not being available for households obtaining eggs from their own chickens.

Households in country areas and in capital cities differed in their preferred method of checking, the most common response for capital city households was using the best before date, whereas country households were more to use another method to check eggs. This may be because a higher proportion of country households obtain eggs from a back yard producer or their own chickens.

Cracked eggs

When asked what they would do with an egg that has a small crack, most households reported that they would crack the egg into a separate bowl to check it before using. A similar number reported that they would not use the egg.

There were significant differences in what households would do depending on the income group they were in. Lower income households were the most likely to crack the egg into a separate bowl, whereas a higher proportion of high income households reported that they would not use the egg.

Households in different locations responded similarly to this question, however there was a statistically significant difference between their answers. Country households were more likely to report not using the egg than capital city households.

The results from this question differed from those of the Victorian survey. This may be because the question used in Victoria was worded differently "If an egg was cracked would you…?"

The FSANZ survey referred to a "small" crack, whereas it is not clear in the Victorian survey whether the egg has a small crack, a large crack or is cracked open. In response to this question, 63 per cent of respondents said they would "Throw it away" and only 30 per cent would "Check if it was OK, then use it". Only 3 per cent reported that they would "Use it anyway". A similar question was also asked in the recent survey conducted by the New South Wales Food Authority. When asked "If an egg had a cracked shell would you…", 37 per cent said they would "use it" and 28 per cent said they would "check it was OK by breaking the egg, then use it". In the Victorian survey, only 11 per cent of respondents reported that they believe "Cracked eggs are just as safe to eat as eggs without cracks". Overall, the results from both studies suggest the way the question is worded may affect how respondents understand the question and, as a consequence, how they respond.

Of course, for consumers to decide what to do with a cracked egg, they first have to identify that it is indeed cracked. The Victorian survey included a question "When handling and preparing eggs in your kitchen do you check if the egg is cracked?". Eighty-six per cent of respondents claimed that they always check whether the egg is cracked and a further 9 per cent reported that they sometimes do. This suggests that many easily visible cracks are identified on eggs, although consumers may well chose to use the cracked egg regardless.

However, eggs may have small cracks which are not visible to the human eye and which can only be detected using tools such as light boxes which many Australian egg producers use to check for cracks.

These results suggest that many consumers still use eggs when they have small cracks in the shell. This may be of concern given that cracked eggs are more likely to contain bacteria which has migrated into the egg from the shell.

Dirty eggs

When asked what they do with an egg with a small amount of dirt on it, most households reported that they would either wash the egg before using or wipe the egg. Only 3 per cent reported that they would not use the egg.

The only key group for which significant differences were found, was between households which obtain their eggs from different sources. Those which obtain their eggs from a back yard producer or their own chickens were more likely to report that they would either wash or wipe the egg and then use it, or use the egg with the dirt still on it.

In the Victorian survey, only 53 per cent of respondents reported that they check if the egg they are using is clean when handling eggs in their kitchen. Also, when asked "If an egg had a dirty shell would you…?", 51 per cent said they would "Wash it and use it" and 39 per cent said they would "Use it regardless". Four per cent said they would "Only use it in foods that will be well cooked" and only 4 per cent said they would throw it away.

When asked if the following statement was true "Chook poo on the outside of an egg can make the egg unsafe to eat", only 18 per cent agreed that it was true. However, only 28 per cent of respondents said that the information "Never buy or use cracked, damaged or dirty eggs" is new to them. Eighty per cent reported that the advice "Don't wash dirty eggs. The shell becomes more porous when wet, making it easier for harmful bacteria to get in" was new to them.

In the New South Wales survey, 37 per cent of respondents reported that they would use an egg with a dirty shell, and 51 per cent said that they would wash it first and then use it.

These results suggest that although most consumers would not use an egg with dirt still on it, they believe that removing the dirt by washing or wiping the egg will make the egg safe.

Hand washing

Over half of households reported that they always or almost always wash their hands after handling eggs. Around a third of households either sometimes or occasionally wash their hands.

The rate of reported hand washing was high among all income groups, however households in the lowest income bracket were significantly more likely than other households to report that they always or almost always wash their hands after handling eggs.

The Victorian study included a similar question, "When handling and preparing eggs in your kitchen do you wash your hands after you have finished?".

Seventy-six per cent of respondents reported that they always wash their hands after

handling eggs and a further 16 per cent that they sometimes do.

These results were similar to those from a 2006 telephone survey conducted in the United States (Lando & Verrill, 2008). Respondents were asked "After you have cracked open raw eggs, do you usually continue cooking, or do you first rinse your hands with water, or wipe them, or wash them with soap?". Forty-one per cent of respondents reported that they wash their hands with soap and 27 per cent that they rinse or wipe their hands after cracking open raw eggs.

However, self reports regarding hand washing often over estimate how often consumers wash their hands while preparing food (Redmond & Griffith, 2003). This is due to a tendency for consumers to report favourable food handling practices, a form of social desirability bias. For example, Anderson (2002) found in an observational study that although 75 per cent of respondents reported that not washing your hands after handling raw eggs was 'risky behaviour', when they were actually observed 60 per cent of participants failed to wash their hands after handling raw eggs.

The author suggested the differences between self-reported behaviour and observed behaviour may be because people are unaware of their behaviour, they forget what they do when preparing food or because they choose the answer they think is socially desirable (Anderson, 2002).

Similar results were found in an Australian study conducted in Melbourne, Australia in 1997 to 1998 (Jay, Comar, & Govenlock, 1999b). This observational study found that of the households which reported washing their hands after handling raw meat, 47 per cent were found to not follow through with this when observed preparing food in their own kitchen. In addition, 22 per cent of households which reported using soap when washing their hands were observed not doing this.

However, Redmond and Griffith (2003) found in their review that questions about hand washing that related to specific circumstances (such as at a barbecue) tended to obtain lower self-reports of hand washing, which suggests more specific questions may obtain more accurate data on actual hand washing behaviour. The hand washing question used in this study "How often, on average, do you wash your hands after handling eggs?" asked respondents about a particular circumstance in which they might wash their hands, so it may have partly circumvented the tendency of some respondents to report favourable practices.

This suggests that the frequency of hand washing reported in this study may be higher than what actually occurs in Australian households.

CONCLUSION

Of the 89 per cent of individuals who consumed egg (or foods containing egg) over the seven-day survey period, 39 percent of all exposures were categorised as being ‘well cooked’; 56 per cent ‘lightly cooked’; and 5 per cent ‘raw’. These results validate previous estimates on the exposure to raw/uncooked eggs consumed in Australia.

Overall, these findings suggest most Australian households are handling, storing and preparing eggs safely. The majority of Australian households store eggs and left over meals made from eggs in the refrigerator, where bacterial growth is reduced. Few households re-use egg cartons and most of them wash their hands after handling eggs. However, there is room for improvement in the area of cracked and dirty eggs. A large proportion of households would use a cracked egg after checking it and would either wash or wipe a dirty egg and then use it. Only around half of Australian households report using the best before date to check that their eggs are still good to eat.

The main differences which were found between groups related to household income and source of eggs. In some areas (such as hand washing) lower income households reported acting more safely and in others (such as checking best before dates) higher or middle income households performed better. Households which obtain their eggs from their own chickens or from back yard producers report re-using egg cartons more frequently and are less likely to check best before dates. These results were similar for households in country areas, which may be because they are more likely to source eggs from back yard producers or their own chickens. The only significant difference found between households with and without vulnerable members was how often someone in the households sampled raw cake batter when making cakes, etc.

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APPENDIX A

Analysis Tables for Sample description

Data for individuals

Sex of respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	2301	49.8	49.8	49.8
Female	2315	50.2	50.2	100.0
Total	4616	100.0	100.0	

Age of respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
0-4 years	350	7.6	7.6	7.6
5-9 years	272	5.9	5.9	13.5
10-14 years	264	5.7	5.7	19.2
15-17 years	165	3.6	3.6	22.8
18-24 years	393	8.5	8.5	31.3
25-34 years	688	14.9	14.9	46.2
35-44 years	623	13.5	13.5	59.7
45-54 years	591	12.8	12.8	72.5
55-64 years	600	13.0	13.0	85.5
65-74 years	559	12.1	12.1	97.6
75-84 years	101	2.2	2.2	99.8
85 years or more	10	.2	.2	100.0
Total	4616	100.0	100.0	

Region of respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
ACT	69	1.5	1.5	1.5
NSW	1482	32.1	32.1	33.6
VIC	1234	26.7	26.7	60.3
QLD	902	19.5	19.5	79.9
SA	382	8.3	8.3	88.1
WA	445	9.6	9.6	97.8
NT	24	.5	.5	98.3
TAS	78	1.7	1.7	100.0
Total	4616	100.0	100.0	

Location of respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Capital Cities	3322	72.0	72.0	72.0
County Areas	1294	28.0	28.0	100.0
Total	4616	100.0	100.0	

Indigenous status of respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Of Aboriginal or Torres Strait Islander origin	81	1.8	1.8	1.8
Not of indigenous status	4517	97.9	97.9	99.6
Can't Say	18	.4	.4	100.0
Total	4616	100.0	100.0	

Data for households

Household Income (before tax)

	Frequency	Percent	Valid Percent	Cumulative Percent
Less than $21,000	162	9.7	9.7	9.7
$21,000-$40,999	385	23.0	23.0	32.7
$41,000-$60,999	315	18.8	18.8	51.5
$61,000-$80,999	243	14.5	14.5	66.0
$81,000-$100,999	172	10.3	10.3	76.3
$101,000 or more	183	10.9	10.9	87.3
Not stated	213	12.7	12.7	100.0
Total	1673	100.0	100.0	

Household Size

	Frequency	Percent	Valid Percent	Cumulative Percent
1	224	13.4	13.4	13.4
2	686	41.0	41.0	54.4
3	293	17.5	17.5	71.9
4	295	17.6	17.6	89.5
5	115	6.9	6.9	96.4
6	41	2.5	2.5	98.9
7	12	.7	.7	99.6
8	7	.4	.4	100.0
Total	1673	100.0	100.0	

Household includes at least one person Aboriginal or Torres Strait Islander origin

	Frequency	Percent	Valid Percent	Cumulative Percent
HH includes at least one person Aboriginal or Torres Strait Islander	49	2.9	2.9	2.9
HH does not include Indigenous Australian	1624	97.1	97.1	100.0
Total	1673	100.0	100.0	

Household contains a person aged 75 years or more

	Frequency	Percent	Valid Percent	Cumulative Percent
No	1584	94.7	94.7	94.7
Yes	89	5.3	5.3	100.0
Total	1673	100.0	100.0	

Household contains a child aged 4 years or under

	Frequency	Percent	Valid Percent	Cumulative Percent
No	1416	84.6	84.6	84.6
Yes	257	15.4	15.4	100.0
Total	1673	100.0	100.0	