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

INTAKES OF TRANS FATTY ACIDS IN NEW ZEALAND AND AUSTRALIA

REVIEW REPORT - 2009 ASSESSMENT

Executive Summary

In response to a recommendation from the Australia and New Zealand Food Regulation Ministerial Council, FSANZ evaluated whether non-regulatory measures to reduce levels of *trans* fatty acids ('TFA') in the food supply, put in place since 2007, have been effective at reducing TFA intakes. Intakes of TFA have been estimated using the most recent national food consumption data and the results of a binational survey on TFA concentrations in Australian and New Zealand foods.

TFA are present in foods from both natural sources (predominantly ruminant foods such as beef, lamb and dairy foods) and manufacturing practices such as hydrogenation or deodorization of vegetable oils. Concentrations of manufactured TFA in food products can be altered through changes in industry practices.

What has happened to manufactured TFA intakes since 2007?

Since 2007, manufactured TFA intakes in the Australian and New Zealand population have declined by around 25-45%, reflecting changes in industry practice to reduce TFA concentrations in foods manufactured in New Zealand and Australia. In 2009, the mean manufactured TFA intake is estimated at 0.4 g/day or less for Australians and 0.6 g/day or less for New Zealanders. The higher intake estimate for New Zealand largely reflects some differences in TFA levels in edible oil products.

When expressed in terms of total dietary energy intake, this decline in manufactured TFA intake is equivalent to a population average decline of 0.1% of energy. Mean total TFA intake from both ruminant and manufactured sources is now estimated to be 0.5-0.6% of total dietary energy, with more than 90% of Australians and more than 85% of New Zealanders having TFA intakes below 1% of energy. These figures indicate that Australia and New Zealand continue to meet the World Health Organisation (WHO) population goal for TFA intake[1].

TFA intakes from ruminant sources

Around 60% to 75% of TFA intake is derived from ruminant foods in Australia and New Zealand. Intakes of ruminant TFA have essentially remained constant since 2007. Ruminant sources of TFA are not able to be reduced by changes in industry practices, other than through the availability of reduced fat dairy products, trimming of beef and lamb cuts and less use of ruminant ingredients in mixed foods.

Since FSANZ's 2007 review report, improved data on TFA concentrations in beef, lamb and dairy foods have become available. These new data show a higher TFA concentration than

[1] The WHO in 2009 revised its recommendation on TFA intakes, from advising that populations should have TFA intakes below 1% of total energy on average, to advising that the great majority of the population should have TFA intakes below 1% of total energy

the data used in the 2007 report. Therefore estimates of total TFA intake are slightly higher than previously estimated, reflecting greater accuracy in the data used to generate the estimates, rather than changes in the composition of these foods.

Saturated fat intakes

One strategy to reduce manufactured TFA concentrations in foods that could be used by food manufacturers would be to replace fats and oils high in TFA with vegetable fats that are high in saturated fatty acids ('SFA'). As SFA intakes in Australia and New Zealand are already higher than recommended, this would not be desirable. Based on available data, the reductions in manufactured TFA intake found in this study have not been accompanied by increases in SFA intake. Mean SFA intake in Australia remained steady at around 29-32 g/day calculated using both pre- and post-2007 concentration data.

The National Health and Medical Research Council (NHMRC) recommends that TFA and SFA combined contribute no more than 8-10% of energy intake. On average, Australians and New Zealanders consume 14-16% of their energy from TFA and SFA combined, well above the NHMRC guideline. Around 90% or more of Australians and New Zealanders exceed the NHMRC guideline, which is attributable to a high intake of SFA. Even if all manufactured TFA were able to be removed from foods, mean TFA plus SFA intakes would remain above the NHMRC guideline level.

High consumers of TFA

For the small proportion of Australians whose total TFA intake is above 1% of total dietary energy, pastry products, sausages and luncheon meats and creamy style pasta dishes contribute disproportionally to their high TFA intakes. In New Zealand, for consumers whose total TFA intake exceeds 1% of energy, pastry products and creamy style pasta dishes, as well as cheese, popcorn, doughnuts and take away style fish products, make a disproportionate contribution to TFA intake. We did not find evidence of average daily manufactured TFA intakes above 5 grams, as has been reported for some other countries. To achieve such an intake, Australians and New Zealanders would need to consume, for example, more than ten sugared doughnuts or a 500 g tub of edible oil spread each day.

Other comments

This assessment marks the first time FSANZ has been able to estimate intakes using the results of the 2002 New Zealand and 2007 Australian children's national nutrition surveys. The new Australian data provide some opportunity to examine changes in intake for children aged 2-16 years since the 1995 National Nutrition Survey (NNS). Minor increases in intakes of total TFA and SFA, less than 5%, were found for this age group. These very minor changes in eating patterns of Australian children suggest that the older NNS data are still appropriate for assessing TFA intakes in Australian adults and in New Zealanders.

As with all dietary intake assessments, there are some areas of uncertainty that affect the estimates contained in this report. The most important of these is uncertainty associated with the identification and quantification of low levels of the range of TFA that may be found in foods.

A note about terminology

Throughout this report *trans* fatty acids are abbreviated as 'TFA'. This term is equivalent to the term 'trans fat' commonly used in the popular press and other documents.

'Ruminant TFA' refers to those TFA that are likely to arise from the use of ingredients such as beef, lamb and dairy foods, or other naturally occurring non-ruminant TFA (e.g. in poultry). 'Manufactured TFA' refers to those TFA that are likely to arise from the use of oils and fats that have been hydrogenated or deodorised or otherwise contain TFA that have resulted from a food processing step. 'Total' TFA refers to the sum of ruminant plus manufactured TFA. The range of individual *trans* fatty acids is the same in ruminant and manufactured TFA sources, but the proportions of these individual acids differ.

'SFA' is used in this report to refer to all fatty acids that are saturated, that is, they contain no double bonds between adjacent carbon atoms.

Reference to 'pre-2007' intakes means TFA and SFA intakes estimated using concentration data generated on food samples collected before 2007, when FSANZ last estimated TFA intake. Similarly, reference to 'post-2007' intakes means intakes estimated using concentration data generated since 2007. The comparison of intakes pre- and post-2007 is the primary purpose of this report.

Summary of findings against risk assessment questions

Assessment question	Conclusion
Have changes in industry practice reduced manufactured TFA intake?	• Yes, intakes of *trans* fatty acids (TFA) arising from food manufacturing ('manufactured TFA') have decreased by 25-45%. • Mean intakes of manufactured TFA are 0.3-0.4 g/day in Australia and 0.5-0.6 g/day in New Zealand (adults and children respectively).
What are TFA intakes from both manufactured and ruminant sources?	• Mean total TFA intakes are below 2 g/day in both countries and below 4 g/day at the 95th percentile of intake. • Ruminant sources contribute around 60-75% of TFA intake.
Has reformulation of foods to reduce TFA levels led to changes in saturated fat (SFA) intake in Australia?	• No, SFA intakes do not appear to have changed as a result of reformulation to reduce TFA levels.
How do TFA and TFA plus SFA intakes compare to reference health standards?	• More than 85% of the New Zealand and 90% of the Australian population have TFA intakes below 1% of total energy intake. The World Health Organisation recommends that the great majority of the population have TFA intakes below 1% of total energy. • On average, TFAs contribute 0.5-0.6% of energy. • Around 90% or more of Australians and New Zealanders exceeded the NHRMC guideline that intake of SFA and TFA combined should not exceed 10% of total energy intake. • Even if all manufactured TFA were removed from foods, mean intakes of SFA and ruminant-sourced TFA would still exceed the NHMRC guideline.
Have any recent changes in eating patterns changed TFA intakes?	• There appears to be a small increase, around 5%, in total TFA and SFA intakes in Australian children (2-16 years) estimated using the results of the 2007 National Nutrition & Physical Activity Survey, compared to intakes estimated using the 1995 National Nutrition Survey (NNS). • The proportion of Australians and New Zealanders (14 years and above) eating some foods that are TFA sources has stayed largely steady since the 1995 Australian and 1997 New Zealand NNS. Minor changes were noted in those consuming full fat *vs* reduced fat milk, potato crisps, sweet biscuits and yoghurts but these are not large enough to invalidate intake estimates based on 1995, 1997 or 2002 NNS data.
What foods contribute to high total TFA intakes?	• Australia: pastry products, sausages & luncheon meats and creamy style pasta dishes make a greater contribution to total TFA intake in those people whose total TFA intake is above 1% of their total dietary energy intake. New Zealand: pastry products, creamy style pasta dishes, popcorn, cheese and battered deep fried fish products (New Zealand) make disproportionate contributions.

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Purpose of this review

FSANZ has prepared this review to assess whether non-regulatory measures to reduce levels of *trans* fatty acids ('TFA') in the New Zealand and Australian food supply have led to reductions in TFA intake.

FSANZ has drawn on the findings of 2008-09 survey on TFA levels in New Zealand and Australian food (NSW Food Authority, 2009), and the most recent national nutrition survey (NNS) food consumption data for both countries, and compared these with intake estimates produced using earlier TFA concentration data.

Background

FSANZ last reported estimates of *trans* fatty acids ('TFA') intake to the Australia and New Zealand Food Regulation Ministerial Council ('the Ministerial Council') in May 2007. At that time, FSANZ estimated that TFA from both ruminant and manufactured sources contributed, on average, 0.6% and 0.7% of total energy intake in Australia and New Zealand respectively. This was below the World Health Organisation (WHO) goal of TFA contributing no more than 1% of total energy (WHO, 2003) and comparable to, or lower than, reported estimates of TFA contribution to total energy intake estimates from other countries. Around half of TFA intake came from ruminant sources and up to one quarter of intake came from take away foods. Although TFA intake was below the WHO goal, intake of TFA and SFA combined was one and a half times the National Health and Medical Research Council (NHRMC) Acceptable Macronutrient Distribution Range (AMDR) of TFA and SFA contributing no more than 8-10% of energy (NHMRC, 2006), due to higher than desirable intakes of SFA.

The Ministerial Council endorsed the findings of the FSANZ Review Report and the conclusion that immediate regulatory intervention was not required and that non-regulatory measures to further reduce the levels of TFA in the Australian and New Zealand food supply would be the most appropriate action. They also endorsed the report recommendation that a review of non-regulatory measures to reduce TFA in the food supply would commence in early 2009.

Subsequently, in October 2008, the Ministerial Council noted the release of the findings of the 2007 Australian National Children's Nutrition and Physical Activity Survey and asked that FSANZ include a dietary intake assessment based on the latest results from this survey.

What are *trans* fatty acids and what are their health effects?

The 2007 FSANZ review (FSANZ, 2007) provided detailed information on the structure of TFA, their behaviour in foods and their health effects. This report is available from the FSANZ website and the information it contains is not repeated in this report[2].

FSANZ reviewed its 2007 assessment of the health effects of TFA and provided this to the Ministerial Council at its March 2009 meeting (FSANZ, 2009a). This update concluded, as in the 2007 assessment, that the most consistent and robust evidence for an adverse health effect of TFA was on blood lipid profile. TFA appear to raise LDL- and lower HDL-cholesterol, a change associated with an increased risk of cardiovascular disease.

ISC Survey of TFA levels in New Zealand and Australian foods

As part of the Coordinated Survey Plan of the Implementation Sub Committee (ISC) of the Food Regulation Sub Committee (FRSC), agencies of the NSW, WA, SA and New Zealand governments participated in an analytical survey of TFA levels in foods purchased in these areas between September 2008 and April 2009.

A total of 456 samples of takeaway and processed foods were collected from retail outlets and analysed for individual TFA and other fatty acids, and total fat content. Twenty eight percent of samples did not contain detectable levels of TFA, 40% contained levels below 2 g TFA/100 g of fat and 32% contained more than 2 g TFA/100 g fat. Many of this latter group of foods were those that contain both ruminant and manufactured TFAs, such as meat pies and pizzas.

The results of this survey, which have been provided as a separate report to the Ministerial Council from the NSW Food Authority, were provided to FSANZ for the purposes of assessing TFA intake.

Survey of progress on voluntary initiatives to reduce TFA in the food supply

FSANZ provided a report to the Ministerial Council at its March 2009 meeting (FSANZ, 2009b) on progress in voluntary initiatives in Australian to reduce TFA in the food supply. The major findings of this report were:

- The majority of respondents have plans in place to manage TFA levels in their products.
- Several companies reported that no further reductions in TFA levels are possible.
- Companies have implemented a range of activities to reduce TFA levels, including replacement of high TFA oils with new oil blends with very low manufactured TFA levels.
- Several manufacturers have reduced TFA to minimum levels (e.g. less than 0.5 g/100 g food).

[2] The report is available at http://www.foodstandards.gov.au/newsroom/publications/index.cfm#_indexT

Method of estimating TFA intakes

Dietary modelling is the technique of combining data on the consumption of foods with data on the concentration of a chemical (in this case a nutrient) in food to estimate dietary intake of that nutrient. The process of estimating dietary intake of TFA is summarized as:

$$\text{Dietary intake}_{\text{individual}} = \sum_{\text{all foods}} (\text{food consumption} \times \text{TFA concentration})$$

Intake is calculated for each food eaten by each individual in the NNS, summed across all foods for that individual, and population statistics derived from the individuals' intakes. The calculations are conducted using FSANZ's customized dietary modelling software system, DIAMOND.

The specific dietary modelling techniques used in this assessment are slightly different to those used in the previous FSANZ assessment, in 2007. This 2009 assessment uses a more refined approach to assigning foods to particular TFA concentration data (for example separating low and high fat versions of foods and apportioning total measured TFA into TFA derived from ruminant and manufactured sources).

Table 1 sets out the overall dietary modelling approach that was used in this assessment. Appendix 1 provides further detail about the dietary modelling techniques used in this assessment.

Food consumption data used

The most appropriate food consumption data to use to produce nationally representative estimates of TFA intake are national nutrition survey (NNS) data for each country. These data provide quantitative estimates of food consumption derived from 24-hour recalls.

Four sets of NNS data were available for this review:

- 1997 New Zealand NNS covering 4,636 individuals aged 15 years and above ('1997 NZ-NNS')
- 2002 New Zealand children's NNS covering 3,275 children aged 5-14 years ('2002 NZ-NNS')
- 1995 Australian NNS covering 13,858 individuals aged 2 years and above ('1995 AUS-NNS')
- 2007 Australian children's NNS[3] covering 4,487 children aged 2-16 years ('2007 AUS-NNS').

The design of each of these surveys varies somewhat and key attributes of each are set out in Appendix 1. This dietary intake assessment is the first time that FSANZ has used the results of the 2002 New Zealand and 2007 Australian children's NNSs. There was no opportunity to validate the estimates of TFA intakes using the FSANZ modelling program

[3] The 2007 Australian National Children's Nutrition and Physical Activity Survey ('*Kids Eat Kids Play*')

against published analyses of the findings of the 2007 AUS-NNS, however summary statistics for intakes for other nutrients estimated by FSANZ are very similar to those in the published reports.

TFA concentration data used

Three main sources of analytical survey data were used in this report:

- For the assessment of post-2007 TFA intake, data for processed foods were predominantly derived from a survey of 456 individual foods, across more than 30 types of takeaway and processed foods. This ISC survey was conducted by government agencies in NSW, SA, WA and New Zealand in 2008-09 (NSW Food Authority, 2009).
- For the assessment of pre-2007 TFA intake, data for processed foods were derived from surveys conducted by FSANZ and government agencies in NSW, SA and New Zealand between 2002 and 2005, as outlined in the previous report (FSANZ, 2007).
- For other foods (e.g. beef, lamb, dairy, eggs and other minimally processed foods), national food composition table data from Australia (FSANZ, 2008a) and New Zealand (Lesperance et al, 2009) were used, including some as yet unpublished data. These data were generated in analytical programs from 2003 – 2008. For these foods, the same TFA concentration data were used in both the pre- and post-2007 assessment as their fatty acid composition would not have changed markedly through formulation changes.

Data on SFA and energy intakes were taken from the results of the four NNSs used in the assessment. The only exception to this was the comparison of SFA intakes pre- and post-2007, where the analytical data identified above were used to examine whether recent reformulation changes had changed SFA intakes.

Appendix 2 provides further detail on the TFA and SFA concentration data used.

Population groups selected for assessment

Only two age groups were selected for each country, divided according to the age ranges covered in NNSs for each country:

- For Australia, ages 2-16 years and 17 years and above
- For New Zealand, ages 5-15 years and 15 years and above.

These age categories are broader than those used in the previous FSANZ assessment of TFA intake and reflect the finding of that assessment that TFA intake as a percentage of energy intake was largely constant across age groups. This is because TFA intake increased in proportion to food consumption increases, and therefore in proportion to total energy intake increases.

Assessing changes in intake over time

Two different NNSs are available for Australian children aged 2-16 years. If post-2007 TFA concentration data were applied to the consumption data from the 2007 AUS-NNS to calculate current TFA intakes, and compared to intake estimates prepared using 1995 AUS-NNS consumption data and pre-2007 TFA concentration data, it would not be possible to

know whether the results indicated a change in manufacturing practices, food consumption patterns or both. Therefore FSANZ has also calculated a bridging result by applying the post-2007 TFA concentration data to the 1995 consumption data. This allows changes due to manufacturing practices to be separated from changes due to consumption patterns.

Data extracted from the Roy Morgan Single Source database (Roy Morgan Research, 2009) for the time period 2001-2008 have been used to assess changes in adult food consumption patterns for some major food categories that contribute to TFA intake. This database is based on nationally representative samples in both Australia and New Zealand for the population aged 14 years and above in each country who have reported consuming particular foods in the last seven days.

Assumptions and uncertainty associated with the intake assessment

Assumptions

The aim of the dietary intake assessment was to make as realistic an estimate of dietary intake as possible. However, where significant uncertainties in the data exist, assumptions were made that aimed to ensure the assessment did not underestimate TFA intakes.

Assumptions made in the dietary modelling include:

- consumption patterns reported in NNSs represent current food consumption patterns
- where a concentration is assigned to a food group, all foods in that group contain TFA at this concentration
- some foods were assigned a zero concentration of TFA because they contain negligible amounts of total fat
- where a food has a specified TFA concentration, this concentration is carried over to mixed foods where the food has been used as an ingredient e.g. raw beef mince as an ingredient in “beef mince curry with rice”
- there are no changes in TFA concentrations from food preparation or due to cooking
- for the purpose of this assessment, it is assumed that 1 millilitre is equal to 1 gram for all liquid and semi-liquid foods (e.g. milk, yoghurt)
- there is no contribution to TFA intake from dietary supplements or any other sources.

Table 1 Overview of dietary modelling approach for the estimation of TFA intakes in Australia and New Zealand

Assessment question	Dietary modelling approach
Have changes in industry practice reduced manufactured TFA intake?	• Compare manufactured TFA intake using pre- and post-2007 concentration data, keeping consumption data constant • Australian consumption data: 1995 NNS, 2-16 years, 17+ years; 2007 NNS, 2-16 years • New Zealand consumption data: 1997 NNS, 15+ years; 2002 NNS 5-14 years • Identify food groups where greatest changes in contributions to intake have occurred
What are TFA intakes from both manufactured and ruminant sources?	• Report current total TFA intakes using most recent (post-2007) TFA concentration data for each country • Compare intakes to those using pre-2007 data to assess overall effect of industry practice changes on total TFA intakes • Examine proportion of total TFA intake that comes from manufactured and ruminant sources
Has reformulation of foods to reduce TFA levels led to changes in SFA intake in Australia?	• Compare SFA intake using pre- and post-2007 concentration data, keeping consumption data constant • Australian consumption data: 1995 NNS, 2-16 years, 17+ years • New Zealand not assessed quantitatively as pre-2007 SFA data not available
How do TFA and TFA plus SFA intakes compare to reference health standards?	• Use most recent consumption data and most recent (post-2007) TFA concentration data for each country • Examine % contribution of total TFA to total energy and compare to WHO recommendation • Examine % contribution of total TFA plus SFA as % of total energy and compare to NHMRC recommendation
Have any recent changes in eating patterns changed TFA intakes?	• Using post-2007 concentration data only, compare manufactured, ruminant and total TFA intakes assessed with 1995 Australian NNS consumption data to those assessed with 2007 Australian NNS consumption data, 2-16 year olds only • Examine Roy Morgan Single Source database for relevant information on consumption trends, Australia and New Zealand, 14 years and above
What foods contribute to high total TFA intakes?	• Identify the foods that contribute disproportionally to the TFA intakes of those whose total TFA intake is above 1% of total energy intake than to those who intake is below this level, using post-2007 concentration data only, Australia and New Zealand

1995 Australian NNS: 2 day adjusted, not weighted, n=13,858; 2007 Australian NNS: 2 day mean, weighted, n=4,487

1997 New Zealand NNS: 2 day adjusted, not weighted, n=4,636; 2002 New Zealand NNS: 2 day adjusted, weighted, n= 3,275

Uncertainty

There are a number of important sources of uncertainty in this assessment:

- TFA concentration data uncertainty
- Food consumption data uncertainty
- Uncertainty associated with the modelling technique and assumptions used.

TFA concentration data uncertainty

Uncertainty in TFA concentration data is the most significant source of uncertainty in this assessment. There are a number of different TFA that may occur in foods, often in very small amounts, and not all laboratories have the standards of identification necessary to identify and quantify them. This uncertainty in concentration data is most starkly illustrated in the case of data for TFA in beef and lamb. In the 2007 FSANZ assessment, only very limited data were available on TFA levels in beef and lamb. Since this time, newer data have become available that cover more individual TFA than previously (up to ten post-2007 vs four pre-2007). As a result, the TFA concentrations assigned to beef and lamb in this assessment are between two and six times higher than those used previously. Because of this large change in concentrations of ruminant TFA, the pre-2007 intake estimates have been recalculated for this report using the new ruminant food concentrations, recognizing that the changes in concentrations are not the result of any changes to the foods themselves, only of improvements in data quality.

Where TFA concentrations were so low in samples that laboratories could not quantify them, FSANZ had to make assumptions about the true TFA concentration in these foods. A standard approach to the treatment of non-detects was followed, assigning these foods a TFA concentration equivalent to the Limit of Reporting (LOR) for one fatty acid.

In addition, the number of samples included in the ISC survey, although greater than in the pre-2007 data set, is still limited in relation to the wide range of foods available and the variation in their total amount of fat and the types of fats and oils they can contain.

This report contains separate estimates of ruminant TFA and manufactured TFA. The analysis of TFA in a mixed food does not distinguish which TFAs come from ruminant sources (such as from the meat in a meat pie) and which from manufactured sources (such as the fat used in the pie's pastry). Therefore FSANZ has estimated the proportions of each source of TFA based on knowledge of food formulation and recipes for mixed foods.

In preparing TFA concentration data for this assessment, FSANZ has taken an approach that aims to be protective of public health, that is, when there is significant uncertainty in an analytical value, higher rather than lower concentrations are assigned to foods, for example by the use of the mean rather than median concentrations.

Food consumption data uncertainty

Food consumption data uncertainty reflects the common sources of error found in population-based surveys. These can include factors such as survey respondents being unsure of what they have eaten, mis-reporting what they have eaten and under- or over-estimating the amount eaten. The use of a single day of food consumption data (or mean of

two days of data in the case of the 2007 Australian NNS) will lead to a reasonable representation of population mean TFA intakes but will overestimate high levels of intake. For this reason, FSANZ has applied statistical adjustments to more accurately represent habitual high TFA intakes for all NNSs other than the 2007 AUS-NNS, where two days of consumption data were available and adjustments were not needed. Differences in estimates of 95th percentile TFA intake between the 1995 and 2007 AUS-NNSs are likely to be due, at least in part, to methodology differences that FSANZ has not yet had the opportunity to investigate.

The age of the consumption data for all population groups other than Australian children introduces another potential area of uncertainty in intake estimation. However the impact of changes in consumption patterns is specifically assessed in this report and as such is not considered to be a major source of uncertainty.

Uncertainty associated with the modelling technique

The modelling technique used in this assessment applies a small number of concentration data points to represent the thousands of foods reported as consumed in NNNs. For example, a mean TFA concentration for commercially prepared cakes, derived from analysis of seven types of cake, is used to represent the TFA concentration in numerous different types of commercial cakes that were reported as consumed. This is unlikely to have a significant impact on the estimation of population mean TFA intakes because the samples chosen for analysis were broadly representative of those available in Australia and New Zealand. However there will be greater uncertainty in the TFA intakes of the high consumer[4], because the modelling approach used assumes they eat large amounts of foods at a mean TFA concentration for each food, whereas in fact they may habitually eat large amounts of foods that are higher (or lower) in TFA concentration than this mean. This type of uncertainty is encountered in many other dietary exposure assessments, particularly total diet type assessments (FSANZ, 2008b).

The full range of DIAMOND functions for the 2002 NZ-NNS and 2007 AUS-NNS have not yet been developed and therefore FSANZ has had to use a streamlined approach to estimation of TFA intakes from mixed foods, which may overestimate TFA intakes. This is because the in-built DIAMOND 'recipes' for calculating TFA concentration in mixed foods are not yet available and it was necessary to assign TFA concentrations to mixed foods externally to DIAMOND by making generalisations about their composition. An analysis of this 'non-recipe' approach using the 1995 AUS-NNS and 1997 NZ-NNS, for which recipes are available, showed that the streamlined approach produced very similar results for the 1995 AUS-NNS but overestimated TFA intakes by around 15% using the 1997 NZ-NNS.

FSANZ is still exploring the findings of both surveys and identifying limitations of the data in relation to dietary modelling for food regulatory purposes. There has been no opportunity for independent review of the design of the 2007 AUS-NNS compared to that of the 1995 AUS-NNS, and the implications of this for intake assessments. The published findings of the 2007

[4] The high consumer is taken in this report to be someone whose TFA intake is at the 95th percentile of intake, the point at which 95% of the population group will have a lower intake and only 5% will have a higher intake, or whose total TFA intake is above 1% of total energy.

AUS-NNS did not include such a comparison. A comparison of the 1995 AUS-NNS with earlier Australian NNSs (1983 and 1985) found that it was not possible to directly compare the survey findings for a number of reasons, one of which was the different food categorization schemes used (Cook et al, 2001a and 2001b). The food categorization schemes used in the 1995 and 2007 surveys were very similar but other survey design differences may limit the comparisons that can be made.

Table 2 summarises the major sources of uncertainty in this intake assessment but does not consider any uncertainties associated with the setting of the reference health standards used for risk characterization. Overall, the direction of the uncertainties is toward an over-estimate of TFA intakes.

Table 2 Summary of qualitative evaluation of the impact of uncertainties on the TFA intake assessment

Sources of uncertainty	Direction and magnitude*
Uncertainty in analytical results, particularly at low TFA concentrations or in ruminant foods	+++/---
Influence of non-detects in analysis	+/-
Small analytical data set	++/--
Estimation of proportions of measured TFA derived from ruminant or manufactured sources	++/--
Uncertainty in assigning foods to concentration categories and developing TFA concentrations for mixed foods	++
Use of 24 hour food consumption recall data to assess habitual TFA intake	+/-
Age of food consumption data	+/-

* +, ++, +++ represent uncertainty with potential to cause small, medium or large over-estimation of TFA intake
-, --, --- represent uncertainty with potential to cause small, medium or large under-estimation of TFA intake

Results

The results of this dietary intake assessment are presented to address the assessment questions identified in Table 1.

Have changes in industry practice reduced manufactured TFA intake?

FSANZ assessed if changes in industry practice had reduced manufactured TFA intakes by comparing manufactured TFA intakes using pre- and post-2007 concentration data, keeping

food consumption data constant. Table 3 presents manufactured TFA intakes for each of the four population groups, pre- and post-2007.

Mean intakes of manufactured TFA have declined by around 23% in Australian adults and 47% in Australian children (based on the most recent consumption data from 2007) and now average 0.3 and 0.4 g/day respectively. In New Zealand there has been a 32% decline in mean manufactured TFA intakes to 0.5 g/day in adults and a 28% decline in children to 0.6 g/day.

Table 3: Manufactured TFA intakes in Australia and New Zealand, using pre- and post-2007 TFA concentration data

Country	Survey	Age group	Manufactured TFA intake (g/day)			
			Mean		95th percentile	
			Pre-2007	Post-2007	Pre-2007	Post-2007
Australia	**2007 NNS**	2-16 yrs	0.7	0.4	2.1	0.9
	1995 NNS	2-16 yrs	0.5	0.3	1.7	1.1
		17 yrs and above	0.4	0.3	1.5	1.1
New Zealand	**2002 NNS**	5-14 yrs	0.8	0.6	2.2	1.6
	1997 NNS	15 yrs & above	0.7	0.5	2.1	1.6

The higher manufactured TFA intake in New Zealand is likely to reflect higher mean TFA levels in fats and oils analysed in New Zealand compared to those analysed in Australia. The mean manufactured TFA content of margarine spreads in New Zealand post-2007 (0.9 g/100 g) was more than double that of Australian spreads (0.4 g/100 g) because a small proportion of spreads analysed in New Zealand had high TFA concentrations (over 2.5 g/100 g) even though the majority had TFA concentrations comparable to Australian spreads. Fats and oils[5] (specifically identified as such in NNSs) contributed 27% of post-2007 manufactured TFA intake in New Zealand adults but only 22% in Australian adults. However their contribution to New Zealand manufactured TFA intakes was much lower post-2007 than pre-2007 (47%), reflecting a substantial decrease in TFA levels in New Zealand fats and oils over this time. For example the post-2007 TFA concentration in margarine spreads sampled in New Zealand was only around one-fifth that of the pre-2007 content (3.4 vs 0.9 g/100 g).

[5] Includes the contribution of butter, dairy blend and margarine spreads.

Major contributors to intake of manufactured TFA intake in each country are shown in Table 4 and Figures 1-4. Fast and take away foods[6] together contributed around 34% of manufactured TFA intake for Australians and about 42% in New Zealand post-2007. The slightly higher level in New Zealand is likely to be due to higher TFA concentrations found in New Zealand fried take away fish. Pastry and pastry-based foods, mixed dishes prepared with oil, packaged snack foods, biscuits and cakes were other main sources of manufactured TFAs.

Table 4: Sources of manufactured TFA for various population groups, using post-2007 TFA concentration data, showing percentage contribution to intake

Food Groups	Australia			New Zealand	
	2007NNS (2-16yrs)	1995NNS (2-16yrs)	1995NNS (17yrs & above)	2002NNS (5-14yrs)	1997NNS (15yrs & above)
Fast foods (all types)†	33	42	34	43	42
Pastry and pastry based mixed foods	21	31	35	21	19
Biscuits & cakes, all types	15	17	14	16	14
Packaged snack foods & confectioneries	14	10	4	13	4
Meat and poultry mixed dishes*	12	2	2	6	2
Potato chips, hot, fries	10	14	11	12	9
Cereal and cereal products	7	6	6	4	4
Fats and oils (excludes butter)**	6	15	22	9	27
Beverages	5	<1	<1	3	1
Mixed dishes where cereal is a major ingredient	5	3	4	5	2
Soups	2	<1	<1	<1	<1
Savoury sauces and condiments	2	<1	<1	2	<1
Fish, seafood and fish products*	1	<1	1	9	14
Vegetables other than fast food options*	<1	<1	<1	1	2
All other foods[£]	0	0	0	0	0

†Includes TFA from some of the categories listed below, including some pastry and cereal foods, fish products and hot potato chips. Therefore the sum of percentage contributions for each population group will exceed 100%.

*The manufactured TFA in these foods is primarily from the use of oils and fats during preparation

** The apparent differences between the 2007 AUS-NNS and 1995 AUS-NNS, and between the 2002 NZ-NNS and 1997 NZ-NNS is likely to reflect the different approach to dealing with mixed foods via recipes between surveys

[£]A zero contribution to intake may reflect a zero TFA concentration or negligible consumption

[6] In this assessment, 'fast foods' include foods such as burgers, pizza, fried potato and fish products, meat pies and sausage rolls, doughnuts and chicken nuggets.

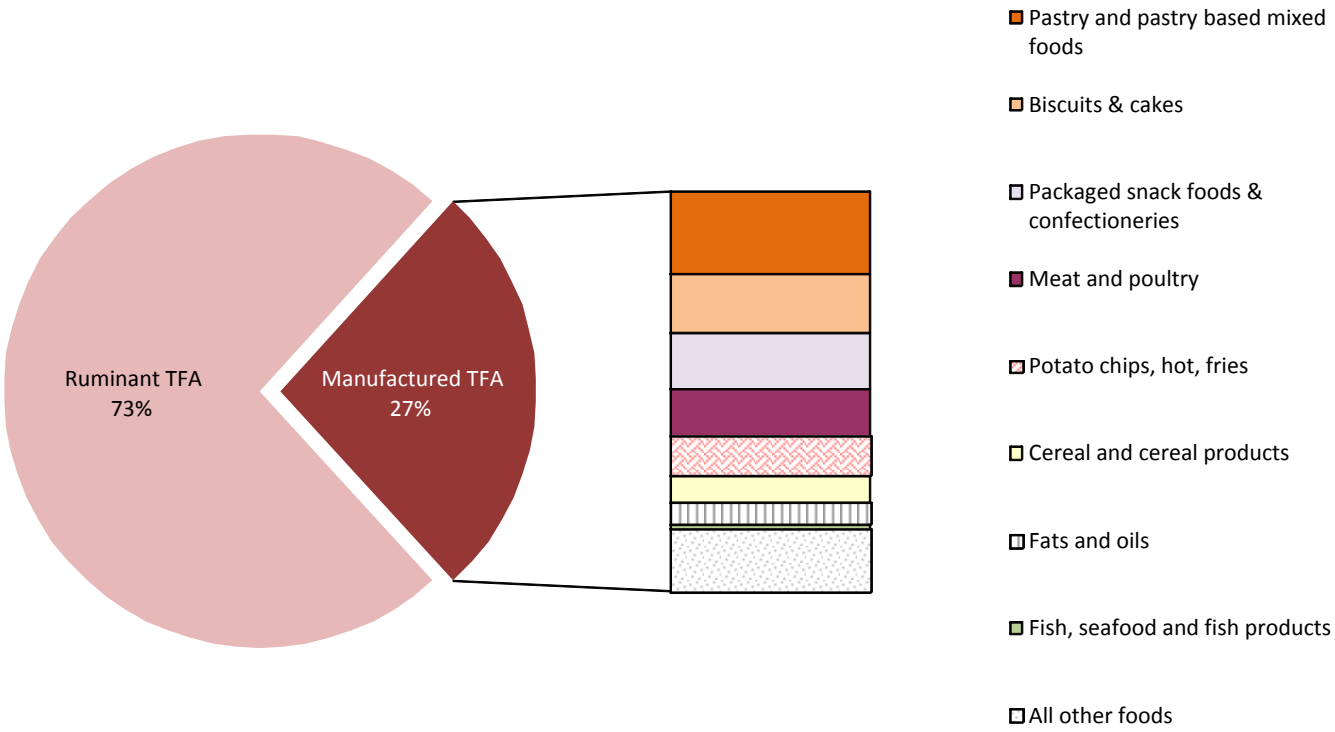

Figure 1: Food groups that contribute to TFA intake – Australian children, 2-16 years, 2007 NNS, post-2007 TFA concentration data

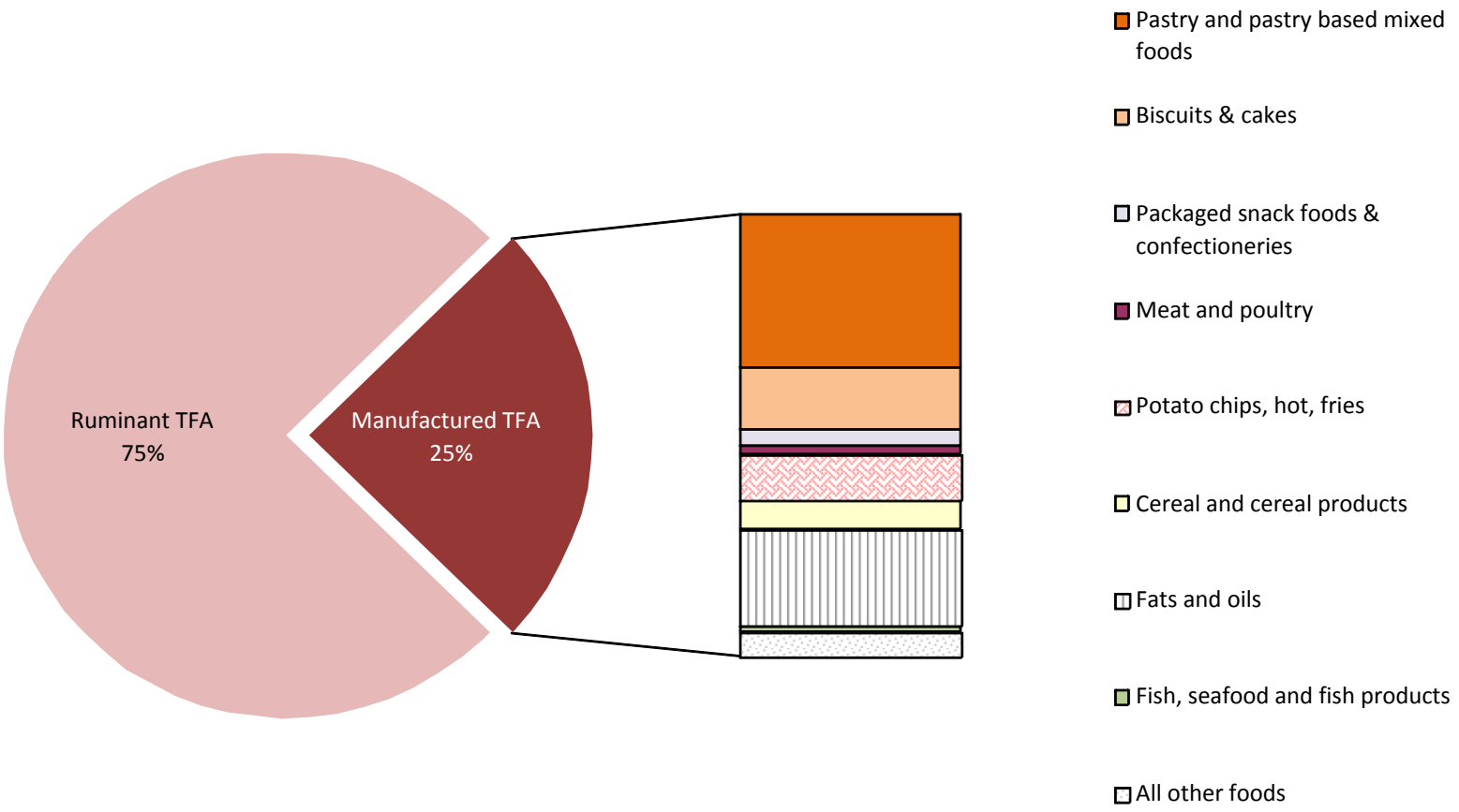

Figure 2: Food groups that contribute to TFA intake – Australian adults, 17 years and above, 1995 NNS post-2007 TFA concentration data

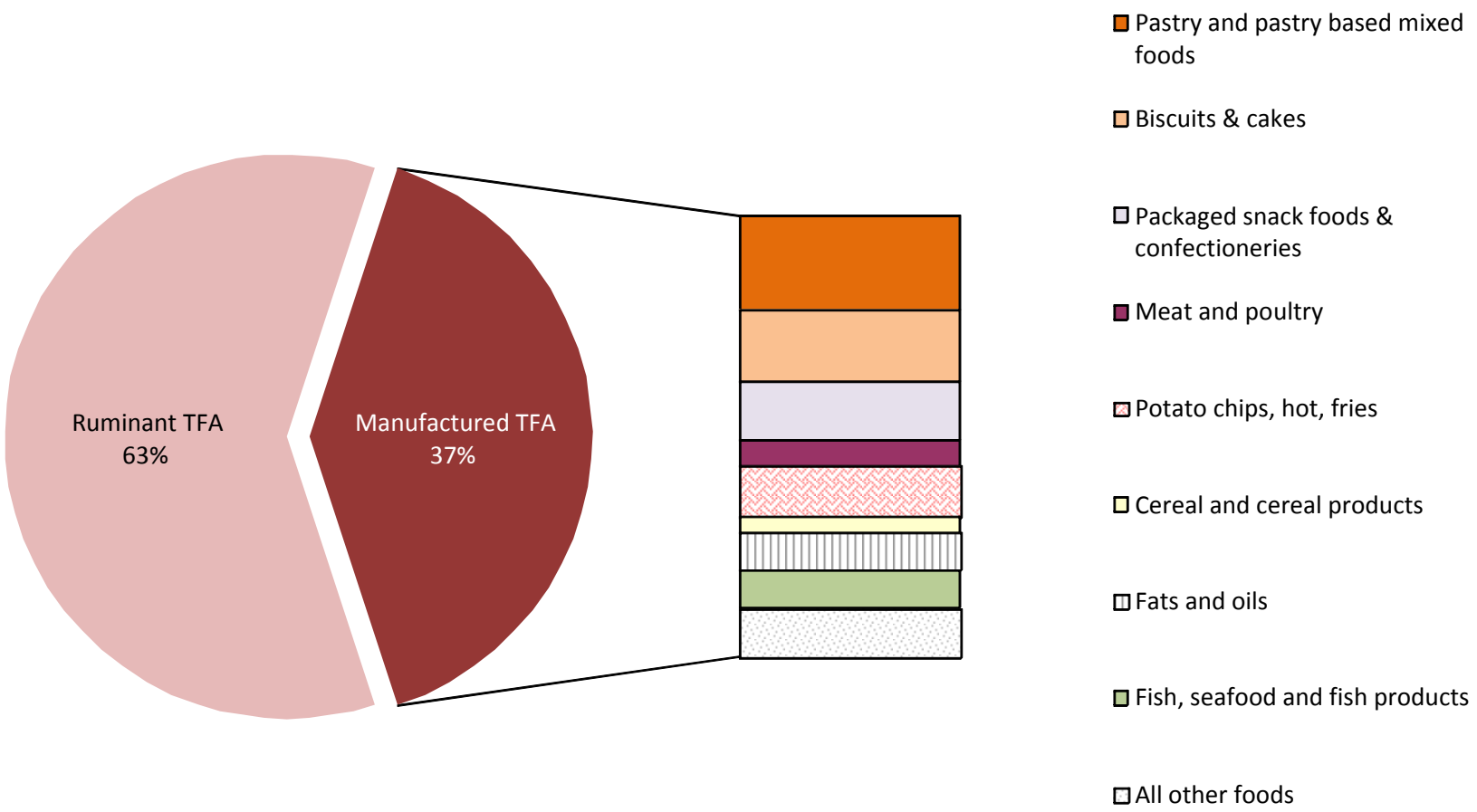

Figure 3: Food groups that contribute to TFA intake – New Zealand children, 5-14 years, 2002 NNS, post-2007 TFA concentration data

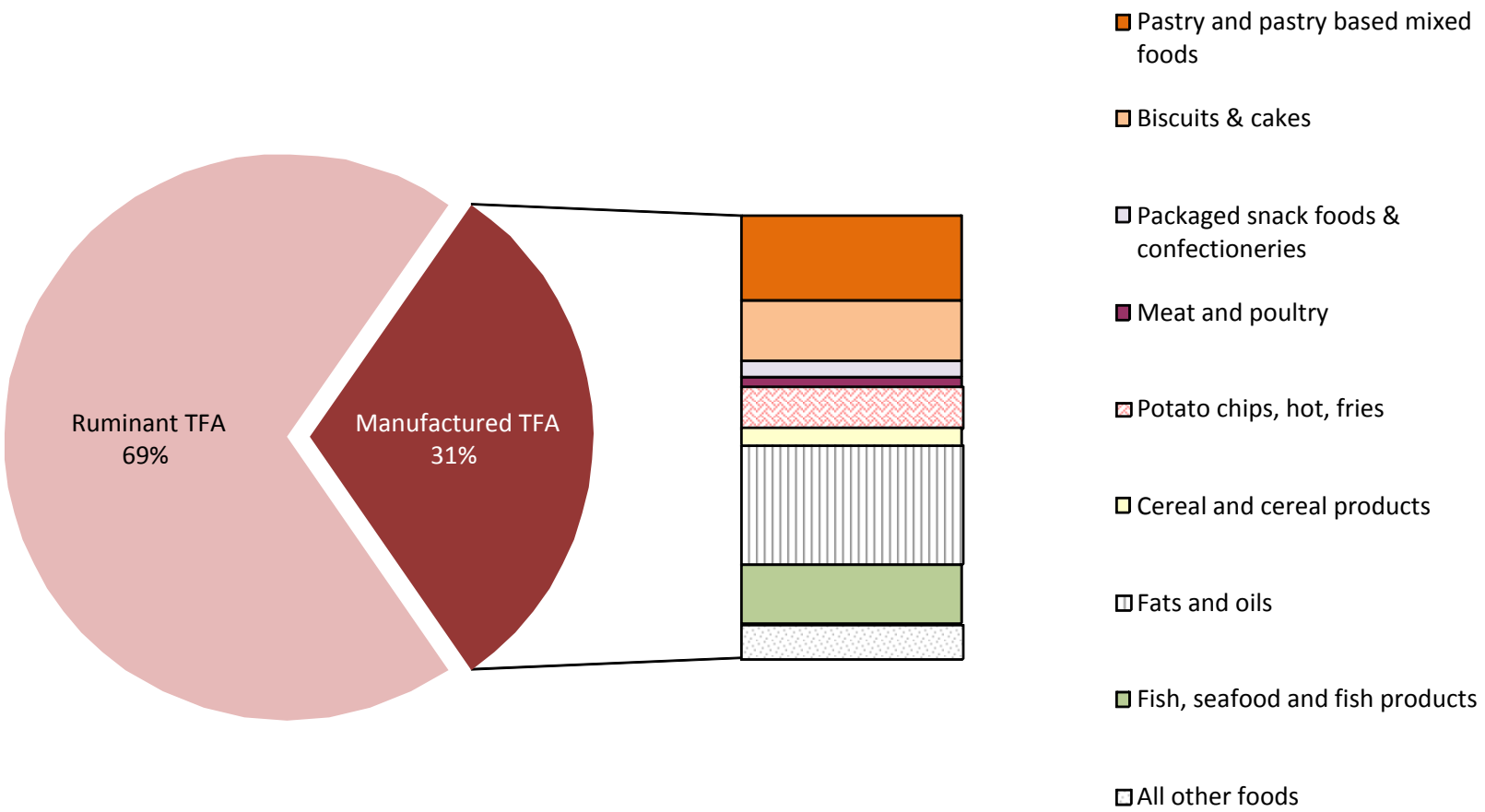

Figure 4: Food groups that contribute to TFA intake – New Zealand adults, 15 years, 1997 NNS, post-2007 TFA concentration data

What are TFA intakes from both ruminant and manufactured sources combined?

FSANZ estimated total TFA intakes in both countries using post-2007 concentration data, as well as the proportion of total TFA intakes that come from ruminant sources compared to manufactured sources. Table 5 presents total, ruminant and manufactured TFA intakes using post-2007 concentration data only. FSANZ also compared total TFA intakes in both countries using pre-2007 and post-2007 (Table 6) to assess the reductions in total TFA intake that have been achieved.

Mean total TFA intakes ranged from 1.3 g/day for Australians to 1.6 g/day for New Zealanders. High consumer intakes were around double this, ranging from 2.7-3.8 g/day (95^{th} percentile of intake). The higher intakes for New Zealanders reflect higher manufactured TFA intakes (as noted earlier) as well as higher ruminant TFA intakes in New Zealand adults.

In both countries, for adults as well as children, ruminant TFAs are the dominant TFA source in our diets, representing 63 to 75% of total TFA intake (see Figures 1-4). Mean ruminant TFA intakes were 1.0 – 1.1 g/day and were highest in New Zealand adults.

Table 6 and Figures 5 and 6 compare total TFA intakes using pre- and post-2007 concentration data, for each country. Total TFA intakes have decreased in both countries by around 10-22%, reflecting the drop in manufactured TFA intakes highlighted earlier. Ruminant TFA intakes are slightly changed, decreasing by 3-6% in Australia and increasing by less than 2% in New Zealand, which is likely to represent minor changes in total fat content in some products post-2007.

When FSANZ last reported TFA intakes to the Ministerial Council, in 2007, total TFA intakes were reported to be slightly lower than reported here using the same pre-2007 TFA concentration data for processed foods (1.2 and 1.6 g/day compared to a range of 1.5-1.6 g/day in Australia and 1.8-1.9 g/day in New Zealand). This is because newer and improved data for TFA levels in ruminant foods have become available. This highlights the effect that changes in analytical techniques can have on estimates of population intakes.

Table 5: TFA intakes (total, ruminant and manufactured) using post-2007 concentration data

Country	Survey	Age groups	Mean intake (g/day)			95th percentile intake (g/day)		
			Total	Ruminant	Manufac-tured	Total	Ruminant	Manufac-tured
Australia	2007 NNS	2-16 yrs	1.4	1.0	0.4	2.7	2.0	0.9
	1995 NNS	2-16 yrs	1.3	1.0	0.3	3.0	2.4	1.1
		17 yrs & above	1.3	1.0	0.3	3.3	2.6	1.1
New Zealand	2002 NNS	5-14 yrs	1.6	1.0	0.6	3.5	2.5	1.6
	1997 NNS	15 yrs & above	1.6	1.1	0.5	3.8	3.0	1.6

Table 6: Total TFA intakes in Australia and New Zealand, using pre- and post-2007 concentration data

Country	Survey	Age group	Total TFA intake (g/day)			
			Mean		95th percentile	
			Pre-2007	Post-2007	Pre-2007	Post-2007
Australia	2007 NNS	2-16 yrs	1.8	1.4	3.8	2.7
	1995 NNS	2-16 yrs	1.6	1.3	3.7	3.0
		17 yrs and above	1.5	1.3	3.7	3.3
New Zealand	2002 NNS	5-14 yrs	1.8	1.6	3.9	3.5
	1997 NNS	15 yrs & above	1.9	1.6	4.1	3.8

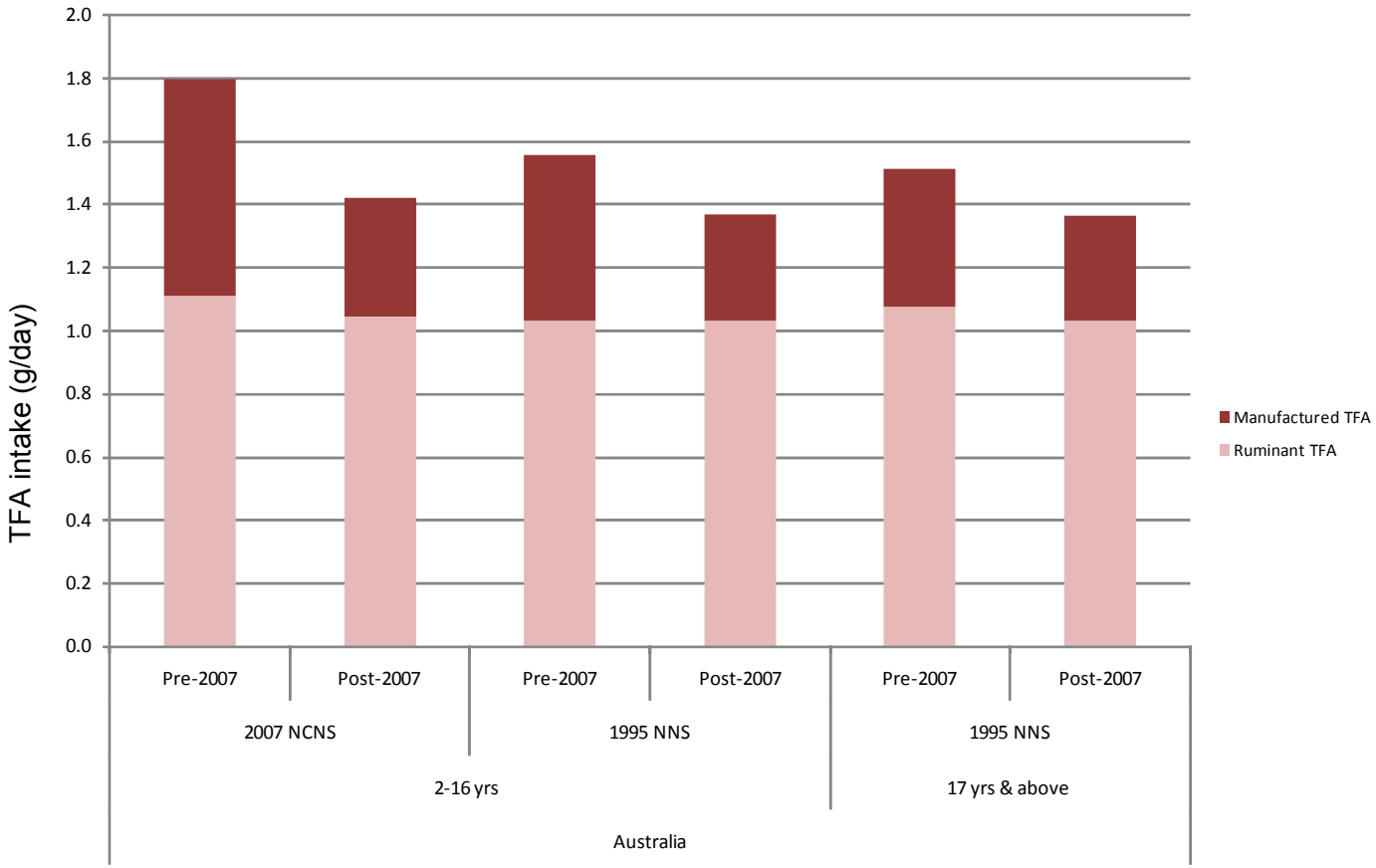

Figure 5: Total, ruminant and manufactured TFA intakes in Australia, estimated using both pre- and post-2007 concentration data

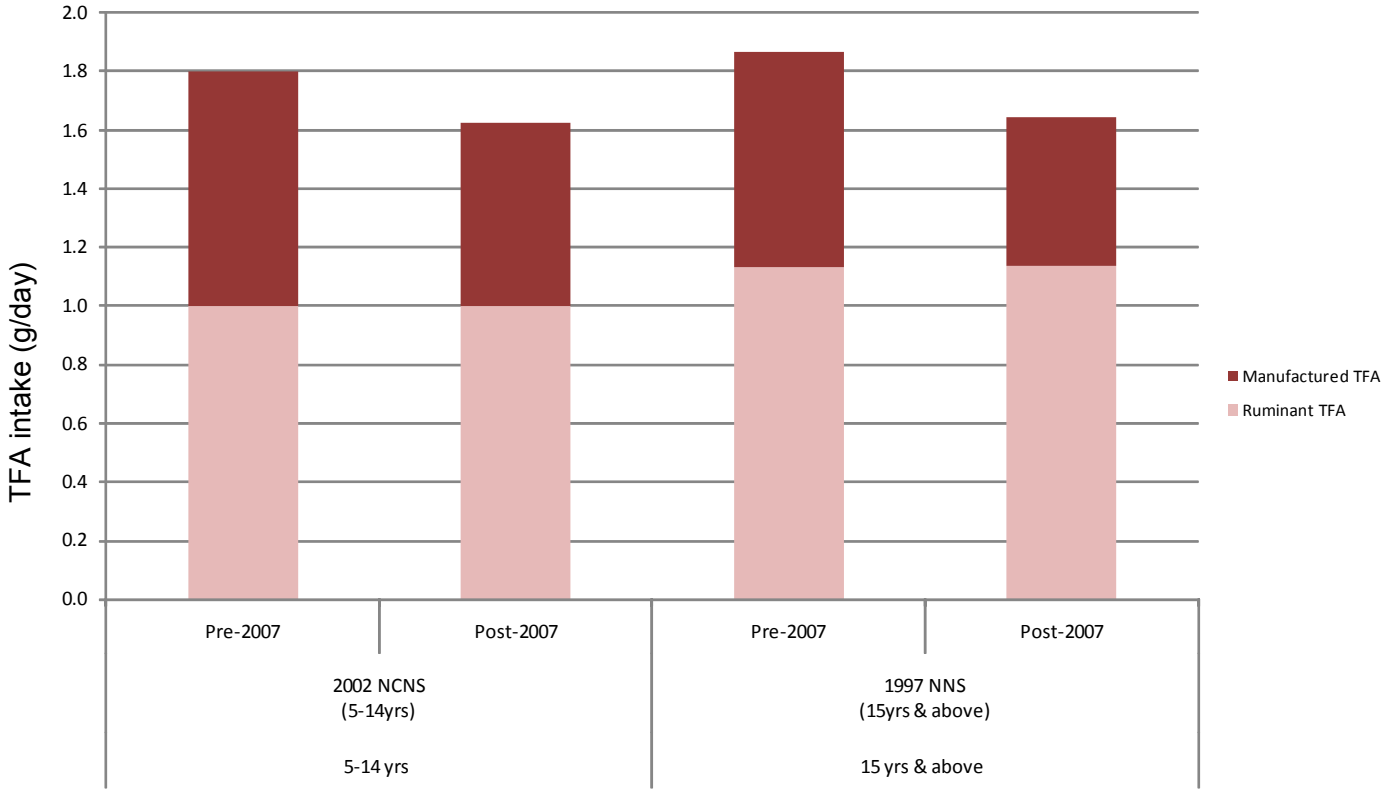

Figure 6: Total, ruminant and manufactured TFA intakes in New Zealand, estimated using both pre- and post-2007 concentration data

Has reformulation of foods to reduce manufactured TFA levels led to changes in saturated fat intake?

FSANZ assessed if the changes to industry practices that have led to reductions in manufactured TFA intake have also led to increases in SFA intake. Table 7 presents SFA intakes for Australians, pre- and post-2007. This analysis was not able to be done for New Zealand as FSANZ did not have all the necessary pre-2007 SFA concentration data.

SFA intake has remained largely constant at 30-32 g/day for 2-16 year olds and 29 g/day for those aged 17 years and above, indicating that reformulation to reduce TFA levels has not led to significant changes in SFA intake. The higher mean SFA intake in children compared to adults is likely to reflect higher consumption of milk.

Major contributors to SFA intake in Australia are shown in Table 8. Dairy products and meats are the major sources of SFA for Australians, together contributing around half of SFA intake. The contribution of dairy foods to SFA intake in children appears lower in 2007 than in 1995, which may reflect a greater use of reduced fat dairy products since 1995.

Although this assessment was not able to be done for New Zealand, it is likely that the same finding of stable SFA intakes would be true there, given the commonality of much of the processed food supply and the broadly similar eating patterns between the two countries. It is noted however that New Zealand SFA intakes are higher on average than Australian intakes, based on published 1995 AUS-NNS and 1997 NZ-NNS findings (McLennan & Podger, 1998b; Ministry of Health, 1999). The results of the ISC survey suggest that SFA levels in the New Zealand samples were generally comparable to those of the Australian samples. A recent Canadian assessment of industry reformulation to reduce TFA levels has found no corresponding increases in SFA concentrations (Ratnayake, L'Abbe and Mozaffarian, 2009).

Table 7: SFA intakes in Australia, pre- and post-2007

Survey	Age group	Saturated Fat intake (g/day)			
		Mean		95th percentile	
		Pre-2007	Post-2007	Pre-2007	Post-2007
2007 NNS	2-16 yrs	31	32	56	58
1995 NNS	2-16 yrs	30	31	62	63
	17 yrs & above	29	29	66	67

Table 8: Major contributions to SFA intake, Australia, showing percentage contribution to intake*

Food Groups	Australia		
	2007 NNS (2-16yrs)	1995 NNS (2-16yrs)	1995 NNS (17yrs & above)
Fast foods, all types†	14	14	12
Dairy products	33	41	31
Meat and poultry mixed dishes*	14	12	17
Mixed dishes where cereal is a major ingredient	9	7	7
Biscuits & cakes, all types	9	10	9
Packaged snack foods & confectioneries	8	8	4
Fats and oils	6	9	15
Pastry and pastry based mixed foods	5	5	6
Cereal and cereal products	4	3	3
Potato chips, hot, fries	4	3	2
All other foods	8	2	6

* Determined using post-2007 analytical survey data

†Includes SFA from some of the categories listed below, including some pastry and cereal foods, fish products and hot potato chips. Therefore the sum of percentage contributions for each population group will exceed 100%.

Comparison of TFA intakes to health recommendations

Health recommendations for TFA intake are expressed as recommended maximum intake as a percentage of total energy intake. Table 9 reports TFA intakes expressed as a percentage of total energy and TFA plus SFA intakes as a percentage of total energy.

Mean TFA intakes were below 1% of total energy for all population groups examined. Around 7% of Australian adults and 5-6% of children exceeded this level. A higher proportion of New Zealanders – around 12% - exceeded this level. However as the streamlined approach used with the 2002 NZ-NNS for dealing with mixed foods may overestimate TFA intake for children, the proportion of New Zealand children who exceed this level may be lower than estimated. Nevertheless, in each country the majority of people have TFA intakes below 1% of total energy and therefore the populations meet the WHO goal that the great majority of a population has TFA intakes below 1% of energy (Uauy et al, 2009).

If the formulation changes observed since 2007 had not taken place, mean TFA intakes in both countries would be approximately 0.7% of energy and a higher proportion (up to 20%) of Australians and New Zealanders would exceed 1% of total energy from TFA.

A much higher proportion, around 90-95% of Australians and 97% of New Zealanders, exceeded the NHMRC AMDR for TFA plus SFA intake as a percentage of energy (see Figure 7). Mean TFA plus SFA intake was 1.4-1.6 times the upper end of the range for this guideline value (8-10% of energy). Even if all manufactured TFA were removed from the food supply, Australians and New Zealanders would still exceed the NHMRC guideline.

Table 9: TFA and TFA plus SFA intakes as a percentage of energy intake using post-2007 concentration data

Country	Survey	Age groups	Energy	Total Trans	Saturated + Trans Fat	Energy	Total Trans	Saturated + Trans Fat
			Mean			95th percentile		
			(kJ)	(% energy)		(kJ)	(% energy)	
Australia	**2007 NNS**	2-16 yrs	8150	0.6	14	12810	1.0	20
	1995 NNS	2-16 yrs	8690	0.6	15	13390	1.1	20
		17 yrs & above	9080	0.5	14	14800	1.1	19
New Zealand	**2002 NNS**	5-14 yrs	8620	0.6	15	13240	1.2	20
	1997 NNS	15 yrs & above	9370	0.6	16	15140	1.2	21

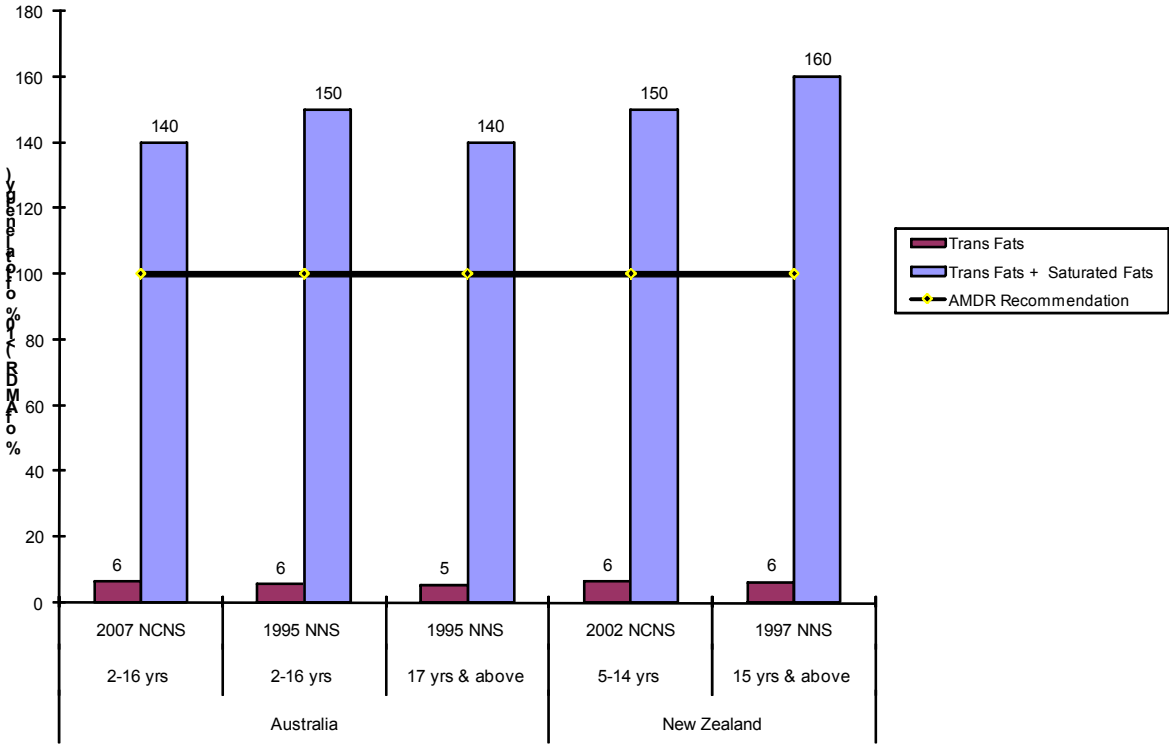

Figure 7: Comparison of mean dietary intakes of energy from TFA and TFA plus SFA as a percentage of the AMDR (NHRMC, 2006) for various population groups

Have any recent changes in eating patterns changed TFA intakes?

The release of the findings of the 2007 AUS-NNS, and their incorporation into DIAMOND, has provided the first opportunity to examine, quantitatively, changes in national eating patterns over the last decade because the same population group (2-16 year olds) was included in the 1995 Australian NNS. The findings of this comparison must be interpreted with caution, however. They provide an overview of 'big picture' changes in food consumption and TFA intake and, as outlined earlier, have been produced without access to the full DIAMOND functionality. This same comparison was not possible for New Zealand children as the 1997 NZ-NNS did not include individuals aged less than 15 years.

Changes in food consumption 1995-2007, Australian children

Table 10 compares consumption of some food groups that are sources of TFA, for Australians aged 2-16 years, in the 1995 AUS-NNS and 2007 AUS-NNS. The most important change in terms of this assessment is a decrease in the proportion of children consuming full fat milk since 1995, and an increase in the proportion consuming reduced fat milk. This trend has been noted previously drawing on other data sources (e.g. in the previous FSANZ assessment of TFA intakes (FSANZ, 2007)). However children still remain more likely to drink full fat milk than reduced fat milk. The proportion of children consuming yoghurt has also increased. These changes in dairy consumption would have no impact on

intake of manufactured TFA but could result in small changes, either increases or decreases, in intake of ruminant TFA.

For the other food groups able to be assessed, the proportion of children consuming these foods has shown little change between 1995 and 2007. However this analysis is incomplete as it is not yet possible to estimate 2007 consumption data for foods when used as ingredients in mixed dishes (e.g. butter on a sandwich) and there has not been opportunity to examine other factors such as changes to survey methodology. The apparent decrease in the proportion of ice cream consumers may simply reflect that the 2007 AUS-NNS was conducted mostly in autumn and winter, a time when ice cream consumption is expected to be lower than in the summer months.

Table 10: Proportion of Australian children 2-16 years consuming some foods that contribute to TFA intake, 1995 vs 2007

Food group	Proportion of population consuming*	
	1995 NNS	2007 NNS
Milk, full fat **	64	57
Milk, reduced fat **	20	26
Yoghurt, all types	8	20
Biscuits, sweet	33	30
Savoury pastries (e.g. meat pies, sausage rolls, quiche)	12	11
Ice cream	31	25
Packaged snacks such as potato crisps & corn chips	29	29

* Based on one day of consumption for both surveys. Statistical analysis not conducted.
** Includes any instance where milk is separately reported to other foods, such as when drunk or included on breakfast cereal, but not when used as an ingredient in foods such as coffee, white sauce etc

Changes in consumption patterns – Australians and New Zealanders 14 years and above

FSANZ used Roy Morgan Research Single Source (Roy Morgan, 2009) market research data to examine time trends in the proportion of those aged 14 years and above who consumed foods from some relevant food categories, for 2001-2008.

The Single Source data show an increase in the proportion of Australians and New Zealanders consuming reduced fat milk between 2001 and 2008 (from 38 to 42% of Australians and from 30 to 42% of New Zealanders). This appears to have been accompanied by a decrease in Australians consuming full fat milk (from 49% to 44%) but not New Zealanders. In both countries, the proportion consuming yoghurt has increased over

this time, consistent with the finding for Australian children based on the comparison of the 1995 and 2007 AUS-NNS data. Spread consumption (including both butter and margarine spreads) has dropped slightly in Australia (from 79% to 75% of the population) but has remained steady in New Zealand at around 80% of the population. Single Source data on the proportion consuming beef and lamb are only available from January 2007 onwards and are of insufficient duration to assess any changes in consumption patterns. However they indicate that ruminant meats are still consumed by the majority of Australians and New Zealanders. Unfortunately there are no Single Source data for take away and fast foods.

These small changes in the proportion of the population consuming some foods indicate there could be small errors in estimates of TFA intake when based on older NNS data but suggest that foods that were key sources of TFA in 1995 and 1997 remain major foods in our diets in 2008-09 and therefore are likely to still be making important contributions to TFA intake. Because the Single Source data do not quantify amounts of foods consumed, it is not possible to estimate the size of any error, but it is unlikely to be greater than the errors associated with sampling and analysis of the foods included in the TFA concentration database.

TFA intakes – Australian children, 1995 vs 2007

To further assess likely changes in TFA intakes, FSANZ compared intake of TFA (total, ruminant and manufactured) and SFA in Australian children estimated with the 2007 AUS-NNS to those estimated for the same age group in 1995. Table 11 compares TFA and SFA intakes between 1995 and 2007 for Australian children, using post-2007 concentration data. Therefore it examines the influence of changing consumption patterns rather than the influence of changing concentrations of TFA in foods.

Total TFA and SFA intakes are slightly higher (around 6%) in 2007 than in 1995, with the greatest increase seen in intakes of manufactured TFA (15% increase). This may reflect a real change in consumption patterns or may be related to the different DIAMOND technique for dealing with mixed foods between surveys. A comparison of high consumer (95^{th} percentile) intakes is not presented because of the different approach to estimating habitual high consumer intakes between the two surveys.

Table 11: TFA & SFA intakes in Australian children 2-16 years, 1995 vs 2007, using post-2007 concentration data

	Mean TFA & SFA intake (g/day)	
	1995 NNS	2007 NNS
Manufactured TFA	0.3	0.4
Ruminant TFA	1.0	1.0
Total TFA	1.3	1.4
SFA	31	32

Considered together with the Single Source data, these TFA and SFA intake data suggest that, despite the age of the 1995 AUS-NNS, 1997 NZ-NNS and 2002 NZ-NNS consumption

data, intake estimates produced from them do not substantially under- or over-estimate TFA intakes.

What foods contribute to high TFA intakes?

Some recent publications have reported high manufactured TFA intakes in individuals within countries where the average national TFA intake is relatively low. For example, Stender et al. (2008) reported that in some countries, population sub-groups may have average daily manufactured TFA intakes above 5 g/day.

FSANZ investigated whether there are particular foods or groups of foods that lead to higher TFA intakes by comparing the food consumption patterns of those people whose total TFA intakes were above 1% of their total energy intakes ('high consumers'), to those whose intakes were below the WHO population goal of 1% of total energy intake.

Table 12 identifies the foods that in this assessment were found to contribute disproportionally to high total TFA intakes. In Australia, there was a trend for pastry products (particularly sausage rolls and quiche), beef sausages, processed luncheon meats and creamy style pasta dishes (typically including both dairy and beef) to contribute a greater proportion of total TFA intakes in high consumers than in the rest of the population. In New Zealand, similar trends were noted for pastry products and creamy style pasta dishes, although cheese, popcorn and battered, fried takeaway fish also contributed disproportionally to high intakes.

For the high consumer group, both their mean total TFA intakes and their total energy intakes are higher than in the rest of the population (see Table 13). However, the numbers of people in each survey in the group with total TFA intakes contributing more than 1% to total energy intakes are small (5-13% population surveyed) and results for these high consumers should be treated with caution.

In this investigation, FSANZ has not found evidence of population sub-groups whose average daily manufactured TFA intake is above 5 grams. As discussed earlier, the 95th percentile of manufactured TFA intake is below 2 g/day in all groups assessed. FSANZ considers it is highly unlikely that there would be any groups with average daily intakes approaching 5 g/day. To achieve such an intake, Australians and New Zealanders would need to consume, for example, more than 1 kg of sweet biscuits, or around five regular size sausage rolls, or ten sugared doughnuts, or a 500 g tub of edible oil spread, or around five pieces of battered fried fish per day.

Table 12: Comparison of foods contributing to total TFA dietary intakes for those with TFA intakes above and below 1% total energy intake, Australia and New Zealand

Food Groups	Differences in percent contribution of foods to total TFA intakes for those with total TFA intakes above or below 1% total energy intake				
	2007 AUS-NNS (2-16yrs)	1995 AUS-NNS (2-16yrs)	1995 AUS-NNS (17yrs & above)	2002 NZ-NNS (5-14yrs)	1997 NZ-NNS (15yrs & above)
Quiche	+	+	+	similar	+
Sausage roll	+	+	+	+	+
Meat pie	+	similar	+	similar	similar
Pies, fruit	similar	+	+	similar	similar
Beef, sausage	similar	+	+	similar	similar
Processed luncheon meats	+	similar	similar	similar	similar
Doughnuts	similar	similar	similar	+	similar
Edible oil spreads	similar	similar	–	–	–
Fish, battered, takeaway or fast food	similar	similar	similar	similar	+
Potato fries & hot chips	similar	–	–	–	similar
Creamy pasta dishes such as lasagne	similar	similar	+	+	similar
Cheese	similar	similar	–	+	+
Milk, full fat	–	–	–	–	–
Milk, low fat	similar	similar	similar	similar	similar
Popcorn	similar	similar	similar	+	similar

+ This food makes a greater contribution to total TFA intake in those with more than 1% of total energy from TFA compared to those with less than 1% total energy from TFA

− This food makes a lesser contribution to total TFA intake in those with more than 1% of total energy from TFA compared to those with less than 1% total energy from TFA

'similar' This food makes a similar contribution (≤2% difference) to total TFA intake in those with more than 1% of total energy from TFA compared to those with less than 1% total energy from TFA

Table 13: Comparison of mean total TFA and energy intakes for those with TFA intakes above and below 1% total energy intake, Australia and New Zealand

Country	Survey	Age group	Total TFA above 1% energy			Total TFA below 1% energy		
				Mean intake			Mean intake	
			% of respondents	Total TFA g/day	Energy kJ/day	% of respondents	Total TFA g/day	Energy kJ/day
Australia	2007 NNS	2-16 yrs	5	2.6	8575	95	1.4	8130
	1995 NNS	2-16 yrs	6	3.1	9980	94	1.2	8608
		17 yrs & above	7	3.4	10425	93	1.2	8983
New Zealand	2002 NNS	5-14 yrs	13	3.3	9848	87	1.3	8439
	1997 NNS	15 yrs & above	11	3.6	10811	89	1.4	9187

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Appendix 1 Dietary modelling technique

Overall approach

For this assessment, FSANZ has used a semi-probabilistic dietary intake assessment technique. This is the most common technique FSANZ uses in dietary exposure assessment. It matches individual food consumption data derived from one of four NNSs – 1995 & 2007 Australian, and 1997 & 2002 New Zealand - with a single point chemical concentration per food or food group, to generate a distribution of individual dietary intakes of TFAs. It is conducted using FSANZ's dietary modelling program DIAMOND.

When individual records of food consumption are used, information can be generated on the distribution of dietary intake in the population in addition to data on mean, median or percentile exposures. This method is particularly useful if a chemical is present in a wide variety of foods, which is the case with TFA.

In this assessment, consumer exposure is not reported separately to respondent exposure as almost every respondent (every person who participates in an NNS) will be a consumer of TFA because of the widespread distribution of fats and TFAs in foods.

Figure A1.1 is a flowchart setting out the major steps in estimating TFA intake.

The DIAMOND program

The DIAMOND program is a custom made, stand alone program mostly used for FSANZ's core work of developing/modifying food regulations. It is also used for many other purposes, for example to conduct the dietary exposure assessments for the Australian Total Diet Survey. DIAMOND stands for **DI**et**A**ry **M**odelling **O**f **N**utritional **D**ata.

Each individual's intake of TFA is calculated using his or her individual food consumption records from the NNS, as set out below. The DIAMOND program multiplies the specified TFA concentration of the food (see Appendix 2 for data on TFA concentrations) by the amount of that food that an individual consumed to estimate the intake of TFA from each food. For any individual in an NNS, their intake of TFA is calculated as:

$$TFA_{mg/day} = \sum_{\text{all foods eaten}} (\text{Consumption amount}_{kg/day} \times \text{TFA concentration}_{mg/kg})$$

Once this has been completed for all of the foods containing TFA, the total amount of TFA consumed from all foods is summed for each individual. Population statistics (mean, median and 95th percentile intakes) are then derived from the individuals' ranked intakes. This process was undertaken separately for each of total, ruminant and manufactured TFA and for SFA (Australia only).

DIAMOND was also used to calculate each individual's intake of TFA expressed as a percentage of energy intake, as follows:

$$TFA_{\%energy} = (TFA_{g/day} * 37_{kJ/g} / \text{energy}_{kJ/day}) * 100$$

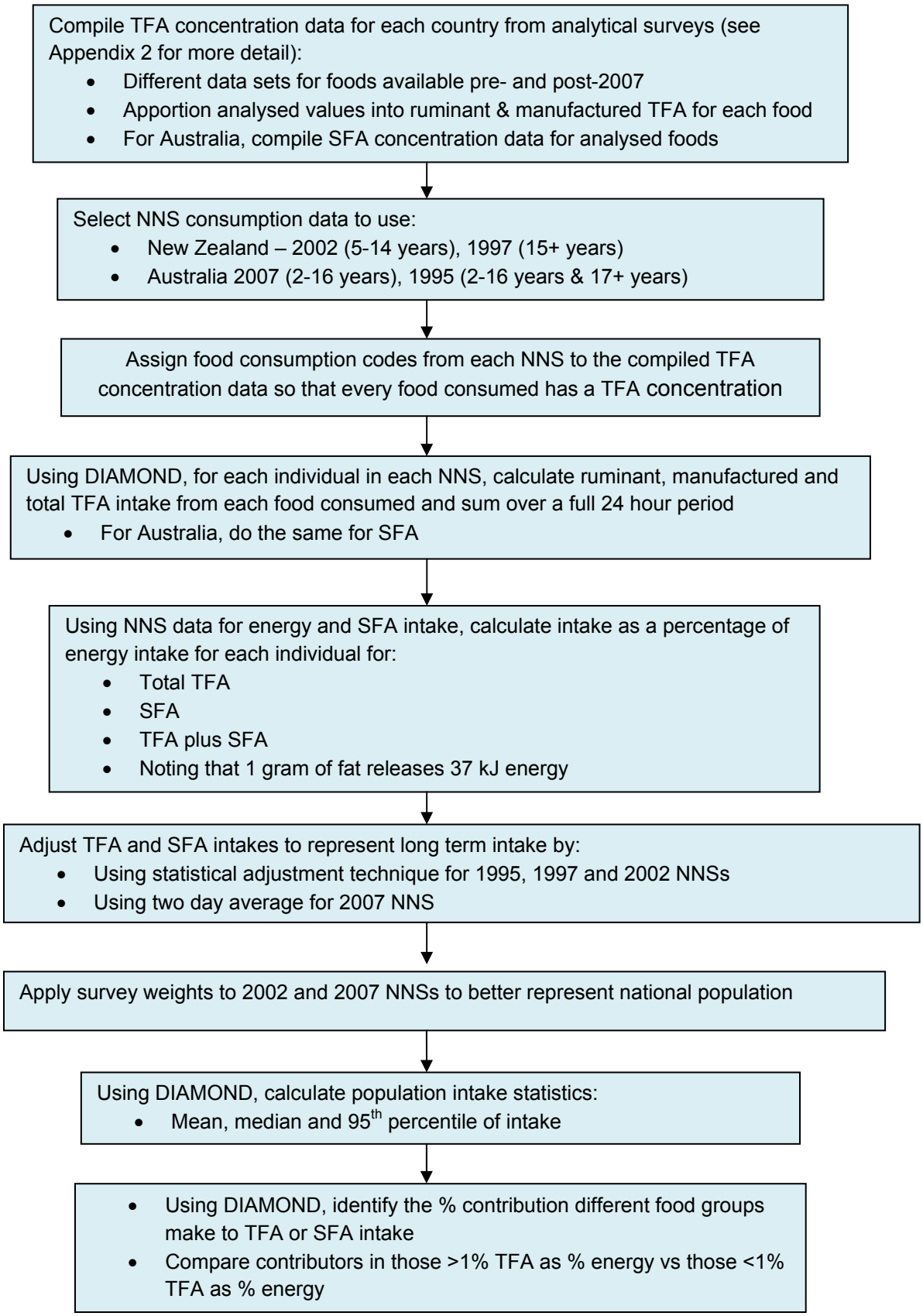

Figure A1.1: Flowchart of the steps in estimating population TFA and SFA intakes

Food consumption data used

Four different NNNs were used as the source of food consumption data for this dietary intake assessment. They were:

- 1997 New Zealand NNS covering 4,636 individuals aged 15 years and above ('1997 NZ-NNS')
- 2002 New Zealand children's NNS covering 3,275 children aged 5-14 years ('2002 NZ-NNS')
- 1995 Australian NNS covering 13,858 individuals aged 2 years and above ('1995 AUS-NNS')
- 2007 Australian children's NNS covering 4,487 children aged 2-16 years ('2007 AUS-NNS').

Table A1.1 sets out some of the key features of each of these surveys that are relevant to this dietary intake assessment. This dietary intake assessment is the first time that FSANZ has used the results of the 2002 New Zealand and 2007 Australian children's NNSs.

FSANZ is still exploring the findings of the 2002 NZ-NNS and the 2007 AUS-NNS and identifying limitations of the data in relation to intake assessments for food regulatory purposes. There has been no opportunity for independent review of the design of the 2007 AUS-NNS compared to that of the 1995 AUS-NNS and the published findings of the 2007 AUS-NNS did not include such a comparison. A comparison of the 1995 AUS-NNS with earlier Australian NNSs (1983 and 1985) found that it was not possible to directly compare the survey findings for a number of reasons, one of which was the different food categorization schemes used (Cook et al, 2001a and 2001b). It is as yet unclear whether the same will be true for the 1995 AUS-NNS and 2007 AUS-NNS.

As this is the first use in DIAMOND of both the 2002 NZ-NNS and 2007 AUS-NNSs, FSANZ has little experience at interpreting assessments produced using these datasets. Therefore there is a potential, albeit small, for errors to have arisen in the modelling process that FSANZ has not identified in the usual data review processes.

Table A1.1 Features of National Nutrition Surveys (NNSs) used in this dietary intake assessment

Feature	Australia		New Zealand	
	1995	2007	1997	2002
Duration	13 months	7 months February - August	12 months	10 months Late February to mid December
Age group (years)	2 years and above	2-16 years	15 years and above	5-14 years
Number of respondents	13,858 total 2,729 aged 2-16 years	4,487	4,636	3,275
Survey method used	1 x 24 hour recall 10% second 24 hour recall	2 x 24 hour recall - all respondents	1 x 24 hour recall 15% second 24 hour recall	1 x 24 hour recall 15% second 24 hour recall
Method of adjusting for long term intake	Statistical adjustment technique described by ABS (Rutishauser, 2000)	Each individual's intake is averaged over two days	Statistical adjustment technique described by ABS (Rutishauser, 2000)	Statistical adjustment technique described by ABS (Rutishauser, 2000)
Method for assigning TFA concentrations to mixed foods	DIAMOND recipes used that are specific to each mixed food	DIAMOND recipes not yet available; indicative TFA concentrations developed for groups of mixed foods	DIAMOND recipes used that are specific to each mixed food	DIAMOND recipes not yet available; indicative TFA concentrations developed for groups of mixed foods
Survey sample structure and use of survey weights	Survey weights not used in DIAMOND as sample broadly representative of total population	Survey weights used in DIAMOND as survey sample was not representative across ages (particularly the large oversampling of 2-3 year olds)	Survey weights not used in DIAMOND. Survey slightly oversampled Maori & Pacific people but not considered significant in terms of intake assessment outcomes	Survey weights used in DIAMOND as survey sample was not representative across ethnic groups (oversampling of Pacific people and, to a lesser extent, Maori)
Dietary supplements	Not included but not relevant to this assessment	Included in survey but not relevant to this assessment	Not included but not relevant to this assessment	Included in survey but not relevant to this assessment

Adjustment for long term intake

Nutrient intake is often highly variable from day to day because people tend to eat a wide range of foods in varying amounts. Therefore in order to estimate habitual or long term nutrient intake it would be preferable to have food consumption data collected over several days. However, collecting food consumption data over a long period of time is expensive and not conducted often. For three of the NNSs used in this assessment, FSANZ only has one 24-hour dietary recall for all survey respondents (and a second 24-hour recall for a subset of respondents), and two 24-hour recalls for all respondents in the 2007 AUS-NNS.

Using one 24-hour food consumption record may capture an unusual eating occasion for an individual that does not describe how they normally eat. This could potentially over- or under-estimate their typical food consumption. It could also exaggerate the reported extremes of food consumption across the survey group – on the day of the survey they may have eaten much more or much less of a food than their usual eating pattern. For example, a survey respondent may have eaten very little on the day of the survey because of illness, or may have eaten much more than usual on the survey day because they attended a party.

In the 1995 Australian and 1997 & 2002 New Zealand NNSs, a subset of respondents completed a second 24-hour recall (10% of respondents in 1995 and 15% in 1997 and 2002). The second day nutrient intake data for these individuals is used in DIAMOND to calculate adjustment factors for specific age groups and specific nutrients. These factors are then applied to each individual's day 1 nutrient intake, to produce an estimate of habitual nutrient intake using the formula below. This is the same technique as was used by the Australian Bureau of Statistics (ABS) to produce the nutrient intake estimates published in the 1995 AUS-NNS (Rutishauser, 2000). This adjustment process is appropriate to use for nutrients, as opposed to other types of food chemicals, because nutrients are widely distributed in foods.

Adjusted nutrient intake = $x + (x_1 - x) * (S_b/S_{obs})$

Where:	x is the group mean nutrient intake for the Day 1 sample
	x_1 is an individual's day 1 nutrient intake
	S_b is the between person standard deviation calculated using day 1 and day 2 intakes for those respondents surveyed twice
	S_{obs} is the group standard deviation for the Day 1 sample

A minimum number (100) of respondents in the second day are needed to generate a statistically valid adjustment factor. FSANZ uses 'collapsed' age groups (2 years and above, males and females separately, 1995 AUS-NNS; 5-14 years 2002 NZ-NNS; 15-34 and 35+ years for 1997 NZ-NNS.

Figure A1.2 illustrates the effect of using this statistical adjustment on the predicted distribution of nutrient intakes and the potential this can have to alter interpretation of a population's nutritional status, that is, the proportion of a population estimated to be above or below a nutrient reference value. Mean adjusted nutrient intakes will not be significantly different from unadjusted mean intakes. However the 95th percentile intake will be lower than the unadjusted 95th percentile intake and the 5th percentile intake will be higher than the unadjusted 5th percentile intake.

In contrast to the use of the above statistical adjustment technique, for the 2007 Australian NNS DIAMOND averaged the Day 1 and Day 2 TFA intake for each respondent. Because the 2007 AUS-NNS data have only very recently been incorporated into DIAMOND, FSANZ has not yet had the opportunity to explore the effect this technique has on the estimated 95th percentile of intake compared to that estimated using the above formula.

To date, percent contributions of foods or food groups to overall nutrient intake have been reported in FSANZ dietary exposure assessments based on day one intakes only as this was the only data available. The impact of having two days of data per respondent on percent contributions of food groups has yet to be investigated by FSANZ.

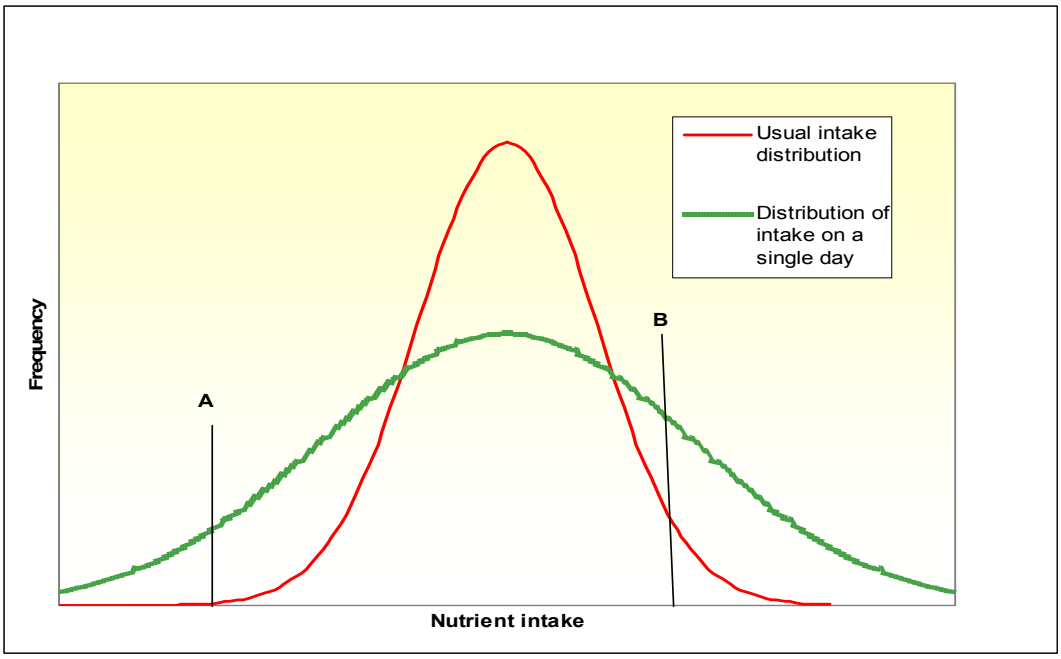

Figure A1.2: Comparison of one day and usual intake distributions of nutrient intakes. Points A and B represent reference values for adequacy (A) and excess (B)

Application of sampling weights

Sampling weights are numerical factors used to take account of a survey respondent's probability of selection in the survey, considering factors relevant to the sampling strategy used in that survey. Typically this may include age, gender and location of residence, and sometimes ethnic origin, income and education level. When NNSs are released, a weight is provided for each individual in the survey that indicates the number of people in the nation that are represented by that one survey respondent. For example, if a respondent were assigned a weight of 200, this would mean that there are 200 people in the whole population who have the same characteristics as this individual, in terms of those factors being accounted for in that particular survey (NSS, 2009).

Sampling weights are only applied in DIAMOND to the data from the 2002 NZ-NNS and 2007 AUS-NNS as these surveys used survey techniques that deliberately over-sampled some sectors of the population. Data from the 1995 AUS-NNS and 1997 NZ-NNS are used unweighted.

DIAMOND first calculates each individual's total intake of TFA using their actual food consumption data. The individual's unweighted intake is then multiplied by the ratio of their survey weight (CHILD_WGT for the 2002 NZ CNS and SAMPWGHT for the 2007 Australian CNS) to the total number of individuals in this population being assessed. From these individual weighted intakes, the weighted mean population exposure is generated. Weighting is applied after all other calculations, including calculation of two-day adjustments to nutrient intake, are undertaken.

Uncertainty in food consumption data

NNS food consumption data do not necessarily provide a fully accurate representation of the actual foods survey respondents have eaten, or the amounts eaten. For example, respondents may not know the type of milk, oil or meat they have eaten, may have eaten a mixed food that contained ingredients they weren't aware of or may not have known how big their cup of coffee was. In all these cases, the survey managers will have made assumptions about what was actually eaten. This introduces random error. Across a whole survey group, which is typically thousands of people, these assumptions may be of no significance in determining population mean food consumption.

The design of a survey can introduce systematic error. For example, inaccurate assignment of serve size data can skew mean estimates of consumption of the relevant food (e.g. if a cup of coffee were assigned a mass of 350 g instead of 250 g, mean coffee consumption would be overestimated). There may also be a tendency for respondents to over-estimate consumption of foods perceived as 'good' and under-estimate consumption of 'bad' foods (FAO/WHO, 2008).

Uncertainty also arises through assigning foods to TFA concentration categories. The modelling technique used in this assessment applies a small number of concentration data points (148) to represent the thousands of foods actually reported as consumed in NNNs. For example, a mean TFA value for commercially prepared cakes, derived from analysis of seven types of cake, is used to represent the TFA level in the many different types of commercial cakes that were reported as consumed. The process of assigning foods to categories is a standard approach used by FSANZ in most dietary exposure assessments. For example, it is the technique used in all recent Australian Total Diet Studies (e.g. see FSANZ, 2008b).

In many FSANZ dietary exposure assessments, where a food is a mixed food (for example a cake filled with cream), DIAMOND draws on in-built 'recipes' to estimate chemical concentration based on the proportions of ingredients. In this case it is not necessary for FSANZ to generate chemical concentrations for such mixed foods. However with the 2002 NZ-NNS and 2007 AUS-NNS, this facility is not yet available. Instead, FSANZ had to manually estimate TFA concentrations for these mixed foods and had to make a number of 'broad brush' generalisations about the composition of groups of foods. To assess the

validity of this streamlined approach, intakes were estimated from the 1995 AUS-NNS and 1997 NZ-NNS both with and without the inbuilt DIAMOND recipes. Mean and 95th percentile population TFA intakes in Australia were found to be very similar (within ±3% of the 'with recipe' value) using either technique but the streamlined approach produced higher TFA intake estimates for New Zealand (around 15% above the 'with recipe' value). This could be attributed to differences in survey methodologies between the Australian and New Zealand NNSs and how the data were compiled for inclusion into DIAMOND. For example, the 1997 NZ-NNS had many more foods with recipes than the 1995 AUS-NNS did.

Appendix 2.
Trans fatty acid concentrations in Australian and New Zealand foods

Purpose
This Appendix presents information on the origin of the TFA concentration data used in the dietary intake assessment.

Analysis of TFA
Analysis of TFA is generally conducted using the same methods used for analysis of other fatty acids. Most commonly, gas chromatography is used following methylation of the fat extracted from the food. Identification and quantification of individual fatty acids relies on the availability of confirmatory standards and may be hampered by the presence of closely related *cis* fatty acids, which are generally present in much larger quantities than TFA. Accurate quantification may require the analyst to alter the chromatographic conditions to enable *trans* and *cis* fatty acids to be clearly separated.

Trans fatty acid levels are generally reported as a percentage of the total fatty acids present in the food. TFA content per 100 g of food can then be calculated taking into account the total fat content of the food. However not all the fat in foods is present as fatty acids, a proportion being glycerol, sterols, waxes and phospholipids. Therefore in food composition tables such as Australia's *NUTTAB* (FSANZ, 2007), a fat factor is applied to the calculated fatty acid content to take account of the presence of other fat classes (Greenfield and Southgate, 2003). In this assessment, a factor of 0.956 was used for all processed foods as the majority of fat in these foods will be derived from added oils or frying fats[7], which contain predominantly triglycerides (glycerol esterified with fatty acids).

Intakes of individual TFA are not estimated in this assessment as it is total TFA that is the relevant parameter for comparison with the Nutrient Reference Values for Australia and New Zealand and World Health Organisation recommendations. Total TFA content was calculated as follows:

TFA content (g/100 g) = TFA (% of total fatty acids)*0.01*fat content*fat factor

There are a considerable number of TFA (including conjugated fatty acids) that can occur in foods, but many analytical studies will not report all of these. A wider range of TFA were reported in the analyses used to conduct this study[8] than in the studies used to support previous FSANZ modelling of TFA intake. Conjugated linoleic acid levels were quantified in

[7] Other fat factors used: milk and milk products 0.945, fatty fish 0.9, lean beef and lamb 0.916, poultry 0.945

[8] Fatty acids reported in studies cited in this assessment included C18:1 9t, C18:1 11t, C18:2 9t,12t w6, C18:2 9c,12t w6, C18:2 9t,12c w6, C18:3 9t,12t,15t w3, C18:3 9c,12t,15t+C18:3 9t,12c,15t w3, C18:3 9c,12c,15t+C18:3 9t,12t,15c w3, C18:3 9c,12t,15c w3, C18:3 9t,12c,15c w3, CLA (undifferentiated)

some, but not all, analyses and have been included in the total TFA concentrations where data were available.

Manufactured vs naturally occurring (ruminant) TFA

The analytical techniques used do not distinguish between the sources of the TFA in a food; that is, they do not tell us how much is naturally occurring and how much comes from the addition of fats and oils containing TFA in processing. Naturally occurring TFA are referred to as 'ruminant TFA' in this assessment although small amounts of TFA may be present in other unprocessed foods, such as poultry meat. Manufactured TFA can occur in foods from the addition of oils to mixed foods, for example the addition of baking shortenings to pastries, cakes and biscuits, or from frying media for fried foods such as potato chips.

To estimate the proportion of TFA from each of these sources, FSANZ apportioned the total measured TFA into either ruminant or manufactured categories depending on the major ingredients in the food. This necessitated some assumptions about the proportions of major ingredients and the type of fats used. For example for single ingredient foods such as meats, fish, eggs and dairy foods, all measured TFA were assumed to be ruminant. For most processed foods, the majority of TFA was assumed to be from manufactured sources, except where the analysed fatty acid composition indicated extensive use of butter (for example in croissants).

Because of the assumptions made in apportioning measured TFA levels, the reported proportions of TFA from ruminant and manufactured sources should be regarded as indicative only.

Sources of TFA data used for the dietary intake assessment

Three main sources of analytical survey data were used in this report:

- For the assessment of post-2007 TFA intake, data for processed foods were predominantly derived from a survey of 456 individual foods, across more than 30 types of takeaway and processed foods. This ISC survey was conducted by government agencies in NSW, SA, WA and New Zealand in 2008-09 (NSW Food Authority, 2009).
- For the assessment of pre-2007 TFA intake, data for processed foods were derived from surveys conducted by FSANZ and government agencies in NSW, SA and New Zealand between 2002 and 2005, as outlined in the previous report (FSANZ, 2007).
- For other foods (e.g. beef, lamb, dairy, eggs and other minimally processed foods), national food composition table data from Australia (FSANZ, 2008a) and New Zealand (Lesperance et al, 2009) were used, including some as yet unpublished data. These data were generated in analytical programs from 2003 – 2008. For these foods, the same TFA concentration data were used in both the pre- and post-2007 assessment as their fatty acid composition would not have changed markedly through formulation changes.

The concentration data sets for Australia and New Zealand are separate but have some overlap. Where analytical data were available from Australia for the same brands of products that are sold in New Zealand, and *vice versa*, data were combined to increase the number of

samples from which the mean TFA concentrations were calculated. New Zealand data available to FSANZ were generated in a somewhat narrower range of foods and focus largely on those food groups expected to be significant contributors to manufactured TFA intakes (spreads, fried foods and baked goods likely to contain hydrogenated fats). Because they did not cover all categories of foods that were analysed in Australia, Australian data were used for New Zealand when no New Zealand data were available.

Table A2.1 provides a summary of the TFA concentration data used in this assessment, by food group.

Sources of SFA data used for the dietary intake assessment

A complete New Zealand analytical data set for SFA concentrations pre-2007 was not available to FSANZ at the time this assessment was undertaken. Therefore FSANZ was not able to investigate the effect of reformulation on SFA intakes for New Zealand.

For Australia, the SFA concentration data used to investigate the effect of reformulation were derived from the same analytical surveys that were used to estimate TFA intake.

For the assessment of SFA plus TFA intakes as a percentage of total energy intake, individual SFA (and energy) intakes reported in each of the four NNSs were used. These data, which predate recent changes to reduce TFA concentrations, are not able to be used to determine whether or not SFA intakes have increased.

Data for foods where analytical data were not available

The analytical data available to FSANZ did not cover all of the many foods available for purchase in Australia and New Zealand. Therefore it was necessary for FSANZ to derive many of the TFA concentration values used in this dietary intake assessment.

For foods that have negligible fat contents, such as water-based beverages and fruits, TFA concentration was assumed to be zero. For some foods, the TFA concentration was imputed from a similar food that had been analysed. For example the total TFA concentration of grains and flours was imputed from bread. For mixed foods, a basic recipe was determined and TFA concentrations calculated on the basis of levels in the ingoing ingredients.

The assumptions made by FSANZ in calculating TFA concentrations in mixed foods from ingoing ingredients are somewhat subjective but aimed to be broadly representative of current food preparation practices while not underestimating TFA concentrations.

Uncertainty in TFA concentration data

There are a number of sources of uncertainty in the analytical data used in this intake assessment:

- Analytical uncertainty, particularly when TFA are present in low concentrations, as found in many Australian and New Zealand foods. Delmonte and Rader (2007) found high relative standard deviation of results within (±10%) and between laboratories (±21%) where trans fats were present at 1% of the total fat in a food.
- Many TFAs were reported as being present below the limit of reporting (LOR) of 0.1% of total fatty acids. Where foods are reported to contain analyte concentrations below the LOR, a numerical value must be assigned to these foods to allow calculation of a

mean total TFA concentrations. In this assessment, samples where the total TFA concentration was <LOR were assigned a total TFA concentration equal the LOR for a single TFA. Therefore in this assessment they were assigned a total TFA concentration of 0.1%.

- Laboratories may not have identified and measured all TFA that may be present in foods. While it is likely that the major TFA have been measured, particularly those derived from hydrogenated oils, some of the naturally occurring TFA may have been omitted from the analysis. This is likely to have been the case with the data used in the previous TFA intake assessment FSANZ conducted.
- Foods are likely to vary in TFA levels and the samples selected may not have been fully representative of this variation. A limited range of foods has been analysed and therefore it is possible that foods high in TFA may be over- or under-represented. In addition, samples collected post-2007 were not necessarily the same brands as were sampled pre-2007 so apparent variation over time may simply reflect brand differences.
- The studies specifically designed to examine manufactured TFA concentrations did not cook samples prior to analysis so any effect of cooking on TFA levels has not been taken into account. However this will not be a significant in terms of most high TFA foods (e.g. biscuits, pastries) which were mostly purchased ready to eat.
- The New Zealand analytical data set was smaller than the Australian and therefore the intake estimates derived from them will have a lesser degree of certainty than the Australian estimates.
- The assumptions made by FSANZ in calculating TFA concentrations in mixed foods from ingoing ingredients introduce a degree of uncertainty. However the main sources of TFA estimated in this assessment are foods for which specific analytical data were available and these values were not affected by recipe assumptions.

Although the same areas of uncertainty apply to the estimated SFA levels, this uncertainty as a proportion of the total estimated SFA intake is likely to be much lower than it is for TFA. This is because SFA are present in much higher concentrations in foods and it is easier to measure their levels.

Table A2.1 Total TFA, ruminant TFA, manufactured TFA and SFA concentrations used in dietary modelling

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
Beverages										
Beverages, water based and alcoholic, including juices, soft drinks, tea and coffee without milk	Aust NZ	3 3	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
Tea and coffee with milk	Aust NZ	2 2	95 95	95 95	0 0	1 820 -	95 95	95 95	0 0	1 820 -
Chocolate beverage base dry mix including cocoa powder, drinking chocolate powder	Aust NZ	1 4	4 870 4 870	0 0	4870 4 870	66 200 -	4 870 4 870	0 0	4870 4 870	66 200 66 200
Chocolate beverages prepared with milk	Aust NZ	2 2	1 310 1 300	870 860	440 440	22 500 -	1 310 1 300	870 860	440 440	22 500 -
Grains, breads, pasta, noodles, breakfast cereals										
Grains, flours, raw or prepared with water	Aust NZ	3 1	180 20	180 20	0 0	3 280 -	180 20	180 20	0 0	3 280 -
Grains, flours, breads & buns (all types other than cheese topped or with garlic butter)	Aust NZ	1 2	180 110	0 0	180 110	3 280 -	180 110	0 0	180 110	3 280 -
Grains cooked with milk (includes porridge prepared with milk)	Aust NZ	2 2	950 900	950 900	0 0	18 000 -	950 900	950 900	0 0	18 000 -
Cheese-topped breads and rolls	Aust NZ	2 2	1 180 2 060	1020 1 960	160 100	25 300 -	1 180 2 060	1020 1 960	160 100	25 300 -
Fruit buns with cream filling	Aust NZ	2 2	1 920 1 870	1 780 1 780	140 90	55 200 -	1 920 1 870	1 780 1 780	140 90	55 200 -
Breads with garlic or herb butter	Aust NZ	2 2	7 620 6 130	7 490 6 050	140 80	164 000 -	7 620 6 130	7 490 6 050	140 80	164 000 -

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
Plain pasta and noodles, cooked (without oil or other ingredients)	Aust NZ	1 4	83 83	83 83	0 0	860 -	83 83	83 83	0 0	860 -
Pasta, cooked in non-creamy sauce	Aust NZ	2 2	340 340	70 70	270 270	9 300 -	340 340	70 70	270 270	9 300 -
Pasta in creamy style sauce, dry mix	Aust NZ	2 (pre) 1 (post) 2 (pre) 1 (post)	2 040 3 920	2 040 3 920	0 0	45 300 -	2 380 2 790	1 190 1 400	1 190 1 400	30 700 -
Pasta in creamy style sauce, prepared from dry mix with milk and margarine spread	Aust NZ	2 2	740 1 420	710 1 080	30 340	16 100 -	820 920	540 580	280 340	13 300 -
Noodle products, ready to eat	Aust NZ	1 1	440 110	0 0	440 110	5 320 -	460 170	0 0	460 170	11 300 -
Breakfast cereals, all types except toasted muesli	Aust NZ	1 4	35 35	35 35	0 0	2 880 -	35 35	35 35	0 0	2 880 -
Toasted muesli	Aust NZ	2 (pre) 1 (post) 4	640 640	210 210	430 430	57 100 -	1 160 1160	380 380	780 780	25 100 25 100
Cakes & biscuits										
Cake, commercial, all types other than muffins or cream filled cakes	Aust NZ	1 1 (pre) 4 (post)	2 280 2 540	340 380	1 940 2 160	44 600 -	1 710 1710	260 260	1 450 1 450	44 600 44 600
Cake, commercial, with cream filling	Aust NZ	2 2	3 600 3 810	2 050 2 080	1 550 1 730	88 200 -	3 140 3 140	1 980 1 980	1 160 1 160	53 600 -
Cake, homemade with butter, all types	Aust NZ	2 2	4 050 3 280	4 050 3 280	0 0	88 800 -	4 050 3 280	4 050 3 280	0 0	88 800 -
Muffin, cake style	Aust	1	6 000	900	5 100	32 900	1 140	170	970	36 700

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
	NZ	4 (pre) 1 (post)	6 000	900	5 100	-	1 050	160	900	-
Cheesecake, all types	Aust NZ	2 2	7 320 9 110	6 880 8 690	440 420	198 000 -	7 250 9 100	6 880 8 690	370 400	191 000 -
Doughnuts	Aust NZ	1 4 (pre) 1 (post)	11 500 11 500	0 0	11 500 11 500	73 800 -	3 320 7 150	0 0	3 320 7 150	82 000 -
Pikelets, scones, cones, waffles	Aust NZ	1 4	640 640	320 320	320 320	6 680 -	210 210	100 100	110 110	6 180 -
Savoury biscuits, regular fat	Aust NZ	1 1	1 700 280	0 0	1 700 280	100 000 -	2 300 1 300	0 0	2 300 1 300	97 000 -
Savoury biscuits, reduced fat, includes crispbreads	Aust NZ	2 2	370 60	0 0	370 60	22 500 -	510 290	0 0	510 290	21 400 -
Rice and corn crackers and cakes (savoury)	Aust NZ	3 (pre) 1 (post) 1	370 60	0 0	370 60	22 500 -	76 80	0 0	76 80	10 100 -
Sweet biscuits, plain and chocolate, commercial	Aust NZ	1 1	2 200 2 100	0 0	2 200 2 100	170 000 -	1 800 2 020	0 0	1 800 2 020	130 000 -
Sweet biscuits, cream filled, commercial	Aust NZ	1 1	4 800 8 640	0 0	4 800 8 640	141 000 -	1 850 4 050	0 0	1 850 4 050	129 000 -
Sweet biscuits, homemade with butter, all types	Aust NZ	2 2	5 000 4 030	5 000 4 030	0 0	153 000 -	5 000 4 030	5 000 4 030	0 0	153 000 -
Pastry products										
Croissants, all types	Aust NZ	1 1 (pre) 4 (post)	3 630 8 540	3 630 8 540	0 0	122 000 -	9 100 9 100	9 100 9 100	0 0	122 000 -

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
Danish pastry	Aust	1	2 640	1 980	660	76 100	5 770	4 330	1 440	88 700
	NZ	4 (pre) 1 (post)	2 640	1 980	660	-	5 160	3 870	1 290	-
Pastry, commercial, all types	Aust	1	13 100	0	13 100	98 800	14 200	0	14 200	77 300
	NZ	1	5 780	0	5 780	-	7 160	0	7 160	-
Fruit pies	Aust	2	5 230	0	5 230	39 500	5 690	0	5 690	30 900
	NZ	2	2 310	0	2 310	-	2 860	0	2 860	-
Quiche, all types	Aust	1 (pre) 2 (post)	7 360	2 950	4 410	106 000	7 120	2 850	4 270	112 000
	NZ	4 (pre) 2 (post)	7 360	2 950	4 410	-	5 000	2 850	2 150	-
Meat pie	Aust	1	3 790	1 250	2 540	82 400	4 480	1 480	3 000	54 000
	NZ	1	4 410	1 460	2 950	-	4 060	1 340	1 340	-
Sausage roll	Aust	1	7 810	2 580	5 230	60 800	8 010	2 640	5 370	70 000
	NZ	1	2 290	760	1 530	-	11 600	3 830	7 770	-
Spring roll	Aust	3 (pre) 1 (post)	7 810	2 580	5 230	60 800	2 000	670	1 400	31 000
	NZ	3	2 290	760	1 530	-	11 600	670	7 770	-
Dumplings, savoury	Aust	3 (pre) 1 (post)	7 810	2 580	5 230	60 800	1 080	360	730	25 700
	NZ	3 (pre) 1 (post)	2 290	760	1 530	-	11 600	670	7 770	-
Cereal-based prepared dishes, including take away style										
Sandwiches, prepared with filling, all types	Aust	2	2 910	2 550	360	68 600	3 010	2 550	460	69 500
	NZ	2	7 700	4 900	2 800	-	5 740	4 900	840	
Hamburgers, with or without cheese	Aust	1	2 030	1 720	320	48 000	2 030	1 720	320	48 000
	NZ	4	2 030	1 720	320	-	2 030	1 720	320	48 000

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
Chicken and fish burgers	Aust	1	120	0	120	22 600	120	0	120	22 600
	NZ	1	530	0	530	-	530	0	530	-
Pizza, all types	Aust	1	1 790	1 430	360	39 000	1 380	1 100	280	129 000
	NZ	1	1 650	1 320	330	-	2 190	1 750	440	-
Lasagne and other prepared pasta dishes	Aust	1 (pre) 2 (post)	7 360	5 240	2 120	31 700	2 590	1 840	740	40 100
	NZ	1 (pre) 2 (post)	2 080	1 480	600	-	3 310	2 570	740	-
Eggs										
Egg, whole	Aust	1	530	530	0	26 500	530	530	0	26 500
	NZ	4	530	530	0	-	530	530	0	-
Egg, yolk	Aust	2	1 330	1 330	0	67 400	1 330	1 330	0	67 400
	NZ	2	1 330	1 330	0	-	1 330	1 330	0	-
Egg, cooked with cheese	Aust	2	2 720	2 720	0	71 700	2 720	2 720	0	71 700
	NZ	2	3 420	3 420	0	-	3 420	3 420	0	-
Fats and oils										
Butter	Aust	1	25 000	25 000	0	538 000	25 000	25 000	0	538 000
	NZ	1	20 160	20 160	0	-	20 160	20 160	0	-
Dairy blend, regular fat	Aust	1 (pre) 2 (post)	32 600	21 800	10 700	262 000	14 700	12 500	2 180	343 000
	NZ	1	21 300	14 300	7 030	-	26 100	17 500	8 610	-
Dairy blend, reduced fat	Aust	2	22 600	15 100	7 460	182 000	10 200	8 670	1 510	238 000
	NZ	2	14 800	9 910	4 880	-	18 100	12 100	5 990	-
Margarine spread, regular fat	Aust	1	3 130	0	3 130	136 000	4 350	0	4 350	147 000
	NZ	1	34 100	0	34 100	-	9 630	0	9 630	-
Margarine spread, reduced fat	Aust	2	2 120	0	2 120	94 200	2 950	0	2 950	102 000

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
	NZ	1	25 200	0	25 200	-	7 860	0	7 860	-
Solid animal fats	Aust	4	7 800	7 800	0	388 000	7 800	7 800	0	388 000
	NZ	1	7 800	7 800	0	-	7 800	7 800	0	-
Oil, vegetable, all types except olive	Aust	1	6 330	0	6 330	202 000	14 800	0	14 800	202 000
	NZ	4	6 330	0	6 330	-	14 800	0	14 800	-
Oil, olive	Aust	1	1 410	0	1 410	163 000	1 460	0	1 460	163 000
	NZ	4	1 410	0	1 410	-	1 460	0	1 460	-
Fish & seafood										
Finfish and shellfish, fresh, not fried	Aust	1	200	200	0	3 350	200	200	0	3 350
	NZ	4	200	200	0	-	200	200	0	-
Finfish and shellfish, cooked with oil	Aust	2	380	190	190	10 300	600	190	410	12 300
	NZ	2	380	190	190	-	600	190	410	-
Finfish and shellfish, mixed dishes	Aust	2	990	830	160	25 300	1 050	830	220	25 800
	NZ	2	3 010	1 300	1 710	-	1 610	1 300	310	-
Tuna, canned	Aust	1	40	40	0	3 220	40	40	0	3 220
	NZ	4	40	40	0	-	40	40	0	-
Salmon, canned, and other canned fish	Aust	1	410	410	0	11 200	410	410	0	11 200
	NZ	4	410	410	0	-	410	410	0	-
Fish and shellfish, battered, deep fried, takeaway, fast food or baked from frozen	Aust	1	1 850	200	1 650	34 400	880	200	680	30 500
	NZ	4 (pre) 1 (post)	1 850	200	1 650	-	5 140	200	4 940	-
Meats & poultry										
Beef, steak or roast, semi-trimmed	Aust	1	3 070	3 070	0	33 400	3 070	3 070	0	33 400
	NZ	1	3 170	3 170	0	-	3 170	3 170	0	-
Beef, steak or roast, cooked with oil	Aust	2	3 110	2 920	190	38 800	3 330	2 920	410	40 900
	NZ	2	3 210	3 010	190	-	3 420	3 010	410	-

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
Beef, mixed dish other than mince	Aust	2	2 250	1 840	390	34 290	2 680	1 840	820	38 300
	NZ	2	2 310	1 900	390	-	2 740	1 900	1 900	-
Beef mince, regular fat	Aust	1	4 040	4 040	0	51 800	4 040	4 040	0	51 800
	NZ	1	3 430	3 430	0	-	3 430	3 430	0	-
Beef mince, regular fat, cooked with oil	Aust	2	4 040	3 840	200	56 400	4 250	3 840	410	58 400
	NZ	2	5020	4020	190	-	5 230	4 820	410	-
Beef mince, regular fat, mixed dish	Aust	2	2 810	2 430	390	45 400	3 240	2 430	820	49 400
	NZ	2	3 430	3 050	390	-	3 860	3 050	820	-
Beef mince, reduced fat	Aust	1	3 000	3 000	0	38 900	3 000	3 000	0	38 900
	NZ	1	2 960	2 960	0	-	2 960	2 960	0	-
Lamb chops, semi-trimmed	Aust	1	5 640	5 640	0	61 000	5 640	5 640	0	61 000
	NZ	1	5 460	5 460	0	-	5 460	5 460	0	-
Lamb, cooked with oil	Aust	2	5 550	5 350	190	65 000	5 770	5 350	410	67 000
	NZ	2	5 380	5 180	190	-	5 590	5 180	410	-
Lamb, mixed dish	Aust	2	3 590	3 380	190	43 700	3 810	3 380	410	45 700
	NZ	2	3 680	3 270	410	-	4 110	3 270	820	-
Pork, steak or roast	Aust	1	360	360	0	27 400	360	360	0	27 400
	NZ	4	360	360	0	-	360	360	0	-
Pork, cooked with oil	Aust	2	540	340	200	33 200	750	340	410	35 200
	NZ	2	540	340	190	-	750	340	410	-
Chicken breast	Aust	1	140	140	0	7 290	140	140	0	7 290
	NZ	1	140	140	0	-	140	140	0	-
Chicken breast, cooked with oil	Aust	2	330	140	190	14 100	540	130	410	16 100
	NZ	2	330	140	190	-	550	150	410	-
Chicken, mixed dish	Aust	2	760	450	320	20 500	1 190	450	740	24 600
	NZ	2	750	440	320	-	520	520	90	-

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
Chicken, dark meat	Aust	1	550	550	0	25 700	550	550	0	25 700
	NZ	1	520	520	0	-	520	520	0	-
Chicken, dark meat, cooked with oil	Aust	2	710	520	190	31 500	930	520	410	33 500
	NZ	2	690	500	190	-	900	500	400	-
Chicken nuggets, fast food	Aust	1	4 620	0	4 620	35 900	1 700	0	1 700	40 800
	NZ	4 (pre) 1 (post)	4 620	0	4 620	-	1 500	0	1 500	-
Beef sausage, including processed luncheon meats	Aust	1	8 460	8 460	0	101 000	8 460	8 460	0	101 000
	NZ	1	4 090	4 090	0	-	4 090	4 090	0	-
Pork sausage	Aust	2	1 240	1 240	0	85 700	1 240	1 240	0	85 700
	NZ	2	1 240	1 240	0	-	1 240	1 240	0	-
Pork, mixed dishes, take away or restaurant	Aust	2 (pre) 1 (post)	740	360	380	24 400	370	220	150	24 300
	NZ	2 (pre) 1 (post)	740	360	380	-	1 960	220	1 740	-
Processed chicken breast	Aust	1	0	0	0	5 320	0	0	0	5 320
	NZ	4	0	0	0	-	0	0	0	-
Ham	Aust	1	140	140	0	8 390	140	140	0	8 390
	NZ	1	460	460	0	-	460	460	0	-
Bacon	Aust	4	1 070	1 070	0	63 900	1 070	1 070	0	63 900
	NZ	1	1 070	1 070	0	-	1 070	1 070	0	-
Dairy foods										
Milk, plain yoghurt & flavoured milk, regular fat (includes infant formula)	Aust	1	1 200	1 200	0	22 900	1 200	1 200	0	22 900
	NZ	1	1 190	1 190	0	-	1 190	1 190	0	-
Milk, reduced fat, plain and flavoured, reduced fat fruit yoghurt	Aust	1	360	360	0	8 100	360	360	0	8 100
	NZ	4	360	360	0	-	360	360	0	-
Milk, skim	Aust	3	0	0	0	770	0	0	0	770

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
	NZ	3	0	0	0	-	0	0	0	-
Milk powder, regular fat	Aust	2	12 000	12 000	0	229 000	12 000	12 000	0	229 000
	NZ	2	11 900	11 900	0	-	11 900	11 900	0	-
Milk powder, skim	Aust	3	360	360	0	570	360	360	0	570
	NZ	3	360	360	0	-	360	360	0	-
Yoghurt, fruit, full fat (includes infant dairy desserts)	Aust	1	630	630	0	21 900	630	630	0	21 900
	NZ	1	1 650	1 650	0	-	1 650	1 650	0	-
Yoghurt, high fat	Aust	2	2 400	2 400	0	45 700	2 400	2 400	0	45 700
	NZ	2	2 380	2 380	0	-	2 380	2 380	0	-
Milkshake, all types	Aust	2	1 110	1 110	0	23 100	1 110	1 110	0	23 100
	NZ	2	950	950	0	-	950	950	0	-
Smoothie, dairy based	Aust	2	600	600	0	11 400	600	600	0	11 400
	NZ	2	600	600	0	-	600	600	0	-
Cheddar cheese, full fat (includes all types of regular fat cheese)	Aust	1	10 200	10 200	0	223 000	10 200	10 200	0	223 000
	NZ	1	19 600	19 600	0	-	19 600	19 600	0	-
Cheddar cheese, reduced fat, including processed cheeses	Aust	1	4 790	4 790	0	103 000	4 790	4 790	0	103 000
	NZ	2	14 600	14 600	0	-	14 600	14 600	0	-
Cheese, brie or camembert	Aust	1	11 500	11 500	0	198 000	11 500	11 500	0	198 000
	NZ	4	11 500	11 500	0	-	11 500	11 500	0	-
Cottage cheese	Aust	4	1 820	1 820	0	34 900	1 820	1 820	0	34 900
	NZ	1	1 820	1 820	0	-	1 820	1 820	0	-
Cream, regular fat, including sour	Aust	1	8 890	8 890	0	263 000	8 890	8 890	0	263 000
	NZ	4	8 890	8 890	0	-	8 890	8 890	0	-
Cream, reduced fat, including sour	Aust	2	4 550	4 550	0	135 000	4 550	4 550	0	135 000
	NZ	2	4 550	4 550	0	-	4 550	4 550	0	-
Ice cream, full fat	Aust	1	2 710	2 710	0	70 600	2 710	2 710	0	70 600

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
	NZ	1	1 200	1 200	0	-	1 200	1 200	0	-
Ice cream, reduced fat	Aust	2	840	840	0	21 900	840	840	0	21 900
	NZ	2	370	370	0	-	370	370	0	-
Nuts & legumes										
Peanut butter & similar	Aust	1	840	840	0	83 300	480	480	0	89 100
	NZ	4 (pre) 1 (post)	840	840	0	-	430	430	0	-
Soy beverages	Aust	1	70	70	0	2 130	70	70	0	2 130
	NZ	1	80	80	0	-	80	80	0	-
Nuts and seeds, all types other than coconut	Aust	3	840	840	0	76 000	480	480	0	76 000
	NZ	3	840	840	0	-	430	430	0	-
Coconut, desiccated	Aust	4	0	0	0	569 000	0	0	0	569 000
	NZ	4	0	0	0	-	0	0	0	-
Coconut liquid extracts	Aust	4	0	0	0	142 000	0	0	0	142 000
	NZ	4	0	0	0	-	0	0	0	-
Packaged snack foods & confectionery										
Extruded snacks	Aust	1	1 000	0	1 000	114 000	1 280	0	1 280	103 000
	NZ	3	800	0	800	-	2 270	0	2 270	-
Potato crisps & corn chips	Aust	1	3 340	0	3 340	123 000	2 710	0	2 710	95 200
	NZ	1	800	0	800	-	2 270	0	2 270	-
Muesli bars	Aust	1	100	0	100	95 000	600	0	600	27 100
	NZ	1	650	0	650	-	600	0	600	-
Breakfast cereal bars	Aust	3 (pre) 1 (post)	100	0 0	100	95 000	5 080	0 0	5 080	46 800
	NZ	3 (pre) 1 (post)	650		650	-	5080		5 080	-

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
Popcorn	Aust	4 (pre) 1 (post)	123 000	0	123 000	152 000	12 200	0	12 200	105 000
	NZ	1	123 000	0	123 000	-	22 500	0	22 500	-
Chocolate, all types	Aust	1	2 650	2 650	0	192 000	2 650	2 650	0	192 000
	NZ	1	2 900	2 900	0	-	2 900	2 900	0	-
Chocolate coated nuts	Aust	2	1 750	1 740	0	134 000	1 750	1 740	0	134 000
	NZ	2	1 850	1 850	0	-	1 850	1 850	0	-
Chocolate coated sugar confectionery	Aust	2	1 320	1 320	0	96 200	1 320	1 320	0	96 200
	NZ	2	1 430	1 430	0	-	1 430	1 430	0	-
Vegetable products										
Potato chips, from fast food outlets	Aust	1	7 090	0	7 090	32 400	930	0	930	32 600
	NZ	1	2 130	0	2 130	-	510	0	510	-
Potato chips, from independent takeaway outlets	Aust	1	4 780	0	4 780	31 400	1 990	0	1 990	38 680
	NZ	1	1 170	0	1 170	-	2 050	0	2 050	-
Potato chips, baked from frozen	Aust	2	2 770	0	2 770	18 100	1 150	0	1 150	22 400
	NZ	2	680	0	680	-	1 190	0	1 190	-
Potato, mashed, homemade	Aust	2	1 530	1 370	160	36 000	1 590	1 370	220	36 500
	NZ	2	2 830	1 130	1 710	-	1 610	1 130	480	-
Falafel, deep fried	Aust	2 (pre) 1 (post)	850	0	850	26 500	670	0	670	17 700
	NZ	2 (pre) 4 (post)	850	0	850	-	670	0	670	-
Vegetable mixed dishes	Aust	2	1 050	890	160	6 680	1 110	890	220	6 680
	NZ	2	3 070	1 360	1 710	-	1 840	1 360	480	-

Food group		Data origin*	Pre-2007 concentration (mg/kg)				Post-2007 concentration (mg/kg)			
			Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †	Total TFA	Ruminant TFA	Manufact-ured TFA	Saturates †
Salads with dressing	Aust	2	360	0	360	6 930	230	0	230	8 180
	NZ	2	360	0	360	-	230	0	230	-
All other vegetables	Aust	3	0	0	0	0	0	0	0	0
	NZ	3	0	0	0	-	0	0	0	-
Soup, from canned or homemade, milk based	Aust	2	1 340	1 020	320	23 700	1 760	1 020	740	27 700
	NZ	2	1 330	1 101	320	-	1 750	1 010	740	-
Soup, from canned or homemade, not milk based	Aust	2	90	20	70	8 990	100	20	80	8 990
	NZ	2	90	20	70	-	100	20	70	-
Soup, instant dry mix	Aust	1	1 250	0	1 250	13 500	2 490	0	2 490	24 600
	NZ	4 (pre) 1 (post)	1 250	0	1 250	-	2 970	0	2 970	-
Soup, prepared from dry mix	Aust	2	250	0	250	2 690	500	0	500	4 920
	NZ	2	250	0	250	-	590	0	590	-
Gravy, prepared	Aust	1	180	0	180	5 330	180	0	180	5 330
	NZ	1	180	0	180	-	180	0	180	5 330
Sauces, savoury	Aust	1	510	0	510	9 730	1 190	0	1 190	16 200
	NZ	4	510	0	510	-	1 190	0	1 190	-
All other foods, contributing negligible amounts of TFA/SFA (includes fruits, plain vegetables, water-based ice confections, negligible fat content foods)	Aust	3	0	0	0	0	0	0	0	0
	NZ	3	0	0	0	-	0	0	0	-

*Key: 1=analysed (total trans only), 2=calculated, 3=imputed, 4=borrowed, and refer to TFA data. Some SFA data marked as borrowed or imputed is derived from NUTTAB (FSANZ, 2006). All ruminant and manufactured TFA concentrations were calculated from the total TFA concentration

† No saturates data prepared for New Zealand; assessment drew on published data from New Zealand NNSs

All values presented in this table are rounded to no more than 3 significant figures.

Appendix 3 Dietary modelling results – TFA & SFA intakes

Table A3.1: Mean TFA and SFA intake (g/day and %energy intake) estimated using pre- & post-2007 concentration data for various population groups

Country	Survey	Age groups	Energy (kJ)	Saturated Fat* (g/day)	Total trans (g/day)		Ruminant trans (g/day)		Manufactured trans (g/day)		Saturated + Trans Fat (g/day)		Total Trans (% energy)		Saturated + Trans Fat (% energy)	
					Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007
Australia	**2007 NNS**	2-16 yrs	8151	31	1.8	1.4	1.1	1.0	0.7	0.4	32	32	0.8	0.6	15	14
	1995 NNS	2-16 yrs	8693	34	1.6	1.3	1.0	1.0	0.5	0.3	35	35	0.6	0.6	15	15
		17 yrs & above	9084	33	1.5	1.3	1.1	1.0	0.4	0.3	34	34	0.6	0.5	14	14
New Zealand	**2002 NNS**	5-14 yrs	8618	34	1.8	1.6	1.0	1.0	0.8	0.6	35	35	0.7	0.6	15	15
	1997 NNS	15 yrs & above	9373	39	1.9	1.6	1.1	1.1	0.7	0.5	40	40	0.7	0.6	16	16

* Data derived from published NNS data not analytical data from the ISC TFA survey

Table A3.2: 95th percentile TFA and SFA intake (g/day and %energy intake) estimated using pre- & post-2007 concentration data for various population groups

Country	Survey	Age groups	Energy (kJ)	Saturated Fat* (g/day)	Total trans (g/day)		Ruminant trans (g/day)		Manufactured trans (g/day)		Saturated + Trans Fat (g/day)		Total Trans (as % energy)		Saturated + Trans Fat (% energy)	
					Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007
Australia	**2007 NCNS**	2-16 yrs	12805	55	3.8	2.7	2.2	2.0	2.1	0.9	58	57	1.5	1.0	20	20
	1995 NNS	2-16 yrs	13386	58	3.7	3.0	2.5	2.4	1.7	1.1	61	61	1.3	1.0	20	20
		17 yrs & above	14795	61	3.7	3.3	2.8	2.6	1.5	1.1	64	63	1.2	1.1	19	19
New Zealand	**2002 NCNS**	5-14 yrs	13235	56	3.9	3.5	2.4	2.5	2.2	1.6	60	59	1.3	1.2	20	20
	1997 NNS	15 yrs & above	15137	68	4.1	3.8	2.9	3.0	2.1	1.6	71	71	1.3	1.2	21	21

* Data derived from published NNS data not analytical data from the ISC TFA survey

Table A3.3: Comparison of mean energy intakes from TFA and SFA with the 2006 AMDR (NHMRC, 2006) for various population groups

Country	Survey	Age group	Mean Intake			% of total energy intake		Intakes as % of AMDR (<10% of total energy)	
						Mean		Mean	
			Energy (kJ.day)	SFA (g/day)	Total TFA (g/day)	TFA	TFA + SFA	TFA	TFA + SFA
Australia	2007 NNS	2-16 yrs	8151	31	1.4	0.6	14	6	140
	1995 NNS	2-16 yrs	8693	34	1.3	0.6	15	6	150
		17 yrs & above	9084	33	1.3	0.5	14	5	140
New Zealand	2002 NNS	5-14 yrs	8618	34	1.6	0.6	15	6	150
	1997 NNS	15 yrs & above	9373	39	1.6	0.6	16	6	160

Table A3.4: Percent contributions of major food groups to TFA, estimated using pre- and post-2007 concentration data for various population groups (calculated from one day of food consumption data only)

A Australian 2007 NNS (2-16yrs)

Food Groups	Total Trans (%)		Ruminant trans (%)		Manufactured trans (%)		Saturated Fat (%)		Saturated + Trans Fat (%)	
	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007
Beverages	2	2	1	1	3	5	2	2	2	2
Biscuits & cakes, all types	8	6	3	2	15	15	10	9	10	9
Cereal and cereal products	3	4	3	3	3	7	4	4	4	4
Dairy products	27	35	45	48	0	0	34	33	34	33
Eggs	<1	<1	<1	<1	0	0	1	1	<1	<1
Fats and oils	5	6	6	5	4	6	6	6	6	6
Fish, seafood and fish products	<1	<1	<1	<1	1	1	<1	<1	<1	<1
Fruit	0	0	0	0	0	0	0	0	0	0
Infant formula and foods	<1	<1	<1	<1	0	0	<1	<1	<1	<1
Meat and poultry	16	19	21	22	9	12	14	14	14	15
Mixed dishes where cereal is a major ingredient	9	6	11	6	6	5	6	9	6	9
Nuts and legumes	<1	<1	<1	<1	0	0	1	1	1	1
Packaged snack foods & confectioneries	13	5	1	1	31	14	10	8	11	8
Pastry and pastry based mixed foods	7	9	4	5	11	21	6	5	6	5
Potato chips, hot, fries	7	4	1	1	15	10	3	4	3	4
Savoury sauces and condiments	<1	<1	0	0	1	2	<1	<1	<1	<1
Soups	<1	1	<1	1	<1	2	1	1	1	1
Sugar products and dishes	0	0	0	0	0	0	0	0	0	0
Vegetables other than fast food options	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

B Australian 1995 NNS (2-16yrs)

Food Groups	Total trans (%)		Ruminant trans (%)		Manufactured trans (%)		Saturated Fat (%)		Saturated + Trans Fat (%)	
	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007
Beverages	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Biscuits & cakes, all types	7	6	2	2	18	17	11	10	10	9
Cereal and cereal products	2	3	2	2	3	6	3	3	3	3
Dairy products	36	42	54	56	0	0	41	41	41	41
Eggs	<1	<1	<1	<1	0	0	<1	<1	<1	<1
Fats and oils	6	7	5	5	7	15	8	9	8	9
Fish, seafood and fish products	<1	<1	<1	<1	1	<1	<1	<1	<1	<1
Fruit	0	0	0	0	0	0	0	0	0	0
Infant formula and foods	<1	<1	<1	<1	0	0	<1	<1	<1	<1
Meat and poultry	16	18	22	23	2	2	12	12	12	12
Mixed dishes where cereal is a major ingredient	6	3	7	4	6	3	3	7	4	7
Nuts and legumes	<1	<1	<1	<1	0	0	1	1	1	1
Packaged snack foods & confectioneries	8	4	2	2	21	10	10	8	10	8
Pastry and pastry based mixed foods	9	12	4	5	19	31	6	5	7	6
Potato chips, hot, fries	7	4	0	0	22	14	3	3	3	3
Savoury sauces and condiments	<1	<1	0	0	<1	<1	<1	<1	<1	<1
Soups	<1	<1	0	0	<1	<1	<1	<1	<1	<1
Sugar products and dishes	0	0	0	0	0	0	0	0	0	0
Vegetables other than fast food options	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

C Australian 1995 NNS (17yrs & above)

Food Groups	Total trans (%)		Ruminant trans (%)		Manufactured trans (%)		Saturated Fat (%)		Saturated + Trans Fat (%)	
	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007
Beverages	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Biscuits & cakes, all types	7	6	3	3	17	14	10	9	10	9
Cereal and cereal products	3	3	2	2	5	6	3	3	3	3
Dairy products	27	30	38	40	0	0	32	31	32	31
Eggs	<1	<1	<1	<1	0	0	1	1	1	1
Fats and oils	11	13	10	10	12	22	14	15	14	15
Fish, seafood and fish products	<1	<1	<1	<1	2	1	<1	<1	<1	<1
Fruit	0	0	0	0	0	0	0	0	0	0
Infant formula and foods	<1	<1	<1	<1	0	0	<1	<1	<1	<1
Meat and poultry	23	25	31	33	2	2	18	17	18	18
Mixed dishes where cereal is a major ingredient	8	4	8	4	9	4	4	7	4	6
Nuts and legumes	<1	<1	<1	<1	0	0	2	2	2	2
Packaged snack foods & confectioneries	3	2	1	1	9	4	5	4	5	4
Pastry and pastry based mixed foods	10	13	4	6	25	35	8	6	8	7
Potato chips, hot, fries	6	3	<1	<1	19	11	2	2	2	3
Savoury sauces and condiments	<1	<1	0	0	<1	<1	<1	<1	<1	<1
Soups	<1	<1	0	0	<1	<1	<1	<1	<1	<1
Sugar products and dishes	0	0	0	0	0	0	0	0	0	0
Vegetables other than fast food options	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

D New Zealand 2002 NNS (5-14yrs)

Food Groups	Total trans (%)		Ruminant trans (%)		Manufactured trans (%)	
	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007
Beverages	1	2	1	<1	2	3
Biscuits & cakes, all types	11	8	4	3	20	16
Cereal and cereal products	3	3	3	3	2	4
Dairy products	25	29	47	46	0	0
Eggs	<1	<1	<1	<1	0	0
Fats and oils	11	5	4	4	20	9
Fish, seafood and fish products	1	4	<1	<1	2	9
Fruit	0	0	0	0	0	0
Infant formula and foods	0	0	0	0	0	0
Meat and poultry	14	15	21	21	4	6
Mixed dishes where cereal is a major ingredient	6	8	8	10	4	5
Nuts and legumes	<1	<1	<1	<1	0	0
Packaged snack foods & confectioneries	10	6	1	1	19	13
Pastry and pastry based mixed foods	8	12	5	7	12	21
Potato chips, hot, fries	6	6	3	3	11	12
Savoury sauces and condiments	<1	<1	0	0	<1	2
Soups	<1	<1	<1	<1	<1	<1
Sugar products and dishes	0	0	0	0	0	0
Vegetables other than fast food options	1	<1	<1	<1	2	1

E New Zealand 1997 NNS (15yrs & above)

Food Groups	Total Trans (%)		Ruminant trans (%)		Manufactured trans (%)	
	Pre-2007	Post-2007	Pre-2007	Post-2007	Pre-2007	Post-2007
Beverages	<1	<1	<1	<1	<1	1
Biscuits & cakes, all types	9	6	3	2	17	14
Cereal and cereal products	2	2	2	1	2	4
Dairy products	26	30	43	43	0	0
Eggs	<1	<1	1	1	0	0
Fats and oils	29	20	16	16	48	27
Fish, seafood and fish products	2	5	<1	<1	3	14
Fruit	0	0	0	0	0	0
Infant formula and foods	0	0	0	0	0	0
Meat and poultry	15	17	24	24	1	2
Mixed dishes where cereal is a major ingredient	2	3	3	4	1	2
Nuts and legumes	<1	<1	<1	<1	0	0
Packaged snack foods & confectioneries	3	2	<1	<1	5	4
Pastry and pastry based mixed foods	8	10	5	6	13	19
Potato chips, hot, fries	2	3	<1	<1	6	9
Savoury sauces and condiments	<1	<1	0	0	<1	<1
Soups	<1	<1	0	0	<1	<1
Sugar products and dishes	0	0	0	0	0	0
Vegetables other than fast food options	<1	<1	<1	<1	2	2

Table A3.5: Percent contributions of major food groups to total TFA dietary intakes for respondents whose total TFA intake is above and below 1% total dietary energy intake for both Australia and New Zealand

A Australia

Food Groups	Total Trans (%)					
	2007 NNS (2-16yrs)		1995 NNS (2-16yrs)		1995 NNS (17yrs & above)	
	Above 1%	Below 1%	Above 1%	Below 1%	Above 1%	Below 1%
Beverages	2	3	<1	<1	<1	<1
Biscuits & cakes, all types	3	6	4	6	3	6
Cereal and cereal products	2	4	1	3	2	4
Dairy products	32	35	31	44	22	32
Eggs	<1	<1	<1	<1	<1	<1
Fats and oils	4	6	4	8	10	13
Fish, seafood and fish products	<1	<1	<1	<1	<1	<1
Fruit	0	0	0	0	0	0
Infant formula and foods	<1	<1	0	<1	<1	<1
Meat and poultry	20	19	23	17	28	24
Mixed dishes where cereal is a major ingredient	5	6	3	4	5	4
Nuts and legumes	<1	<1	<1	<1	<1	<1
Packaged snack foods & confectioneries	3	5	2	4	1	2
Pastry and pastry based mixed foods	23	8	29	9	27	10
Potato chips, hot, fries	2	4	1	4	1	3
Savoury sauces and condiments	<1	<1	<1	<1	<1	<1
Soups	1	1	<1	<1	<1	<1
Sugar products and dishes	0	0	0	0	0	0
Vegetables other than fast food options	<1	<1	<1	<1	<1	<1

B New Zealand

Food Groups	Total Trans (%)			
	2002 NNS (5-14yrs)		1997 NNS (15yrs & above)	
	Above 1%	Below 1%	Above 1%	Below 1%
Beverages	1	2	<1	<1
Biscuits & cakes, all types	7	9	5	6
Cereal and cereal products	2	4	1	3
Dairy products	29	29	35	28
Eggs	<1	<1	<1	<1
Fats and oils	3	6	14	22
Fish, seafood and fish products	4	3	7	4
Fruit	0	0	0	0
Infant formula and foods	0	0	0	0
Meat and poultry	13	16	16	18
Mixed dishes where cereal is a major ingredient	11	7	2	3
Nuts and legumes	<1	<1	<1	<1
Packaged snack foods & confectioneries	6	6	2	2
Pastry and pastry based mixed foods	19	9	15	8
Potato chips, hot, fries	4	7	2	3
Savoury sauces and condiments	<1	<1	<1	<1
Soups	<1	<1	<1	<1
Sugar products and dishes	0	0	0	0
Vegetables other than fast food options	<1	<1	<1	<1

Appendix 4 Trends in the consumption of foods with *trans* fatty acids: 2001 to 2008

Introduction

Purpose

The purpose of this Appendix is to document broad changes in the consumption of selected processed foods that are sources of ruminant and manufactured TFA in the diet of adult Australians and New Zealanders, from 2001 to 2008. These data were used to assess whether the proportions of Australians and New Zealanders that reported consuming foods that are sources of TFA are likely to have increased, decreased or remained stable during the period 2001 to 2008. The specific foods considered were dairy foods (milk, cheese, ice cream and yoghurt), beef and lamb, fat spreads, potato crisps and sweet biscuits.

FSANZ previously conducted such an assessment for the 2007 Review Report on TFA intake in the Australian and New Zealand populations (FSANZ, 2007). In this 2007 review, the proportion of people reporting consumption of major food contributors to TFA intakes in the 1995 AUS-NNS and 1997 NZ-NNS were compared with data from the Roy Morgan Single Source Survey for 2001-2006. While noting that it is not possible to directly compare the results from Single Source to those from national nutrition surveys, due to different survey methods, the following trends were apparent:

- For spreads and milk, the proportion of people consuming these products appears to have remained the same from 1995 to 2006.
- Within the milk category, there was a trend to decreasing consumption of full fat milk and increasing consumption of low or no fat milk.
- For cheese there appeared to be little change from 1995 to 2006.
- For foods such as yoghurt and potato crisps where the proportion reporting consumption of these foods was much higher in the more recent Single Source Survey, it was not possible to determine if this is only because they are occasionally consumed or if food patterns have actually changed in the last ten years.

Data used

The data used in the preparation of this evaluation is the Roy Morgan Research Single Source Survey databases for 2001-2008 (Roy Morgan, 2009). These databases provide information on the proportion of the survey sample who consumed selected foods in the seven days before they were surveyed.

The samples used for the Single Source data collection are representative of both the Australian and New Zealand populations, and are based on the electoral rolls of the respective countries. The surveys are carried out annually, and more than 25,000 Australians and 12,000 New Zealanders aged 14 years and above are interviewed. The interviews are conducted face-to-face with follow-up self-completion surveys also carried out on the population sample.

The survey questionnaires are periodically revised and updated to ensure that the information collected is representative of the foods available on the market. All questions are asked of each respondent.

In Australia and New Zealand, a weighted sample[9] of about 190,812 and 98,213 people representing 16.4 million and 3.2 million people respectively were interviewed during the period January 2001 to December 2008. The sample populations were aged fourteen years and over, and had similar age distributions in both the Australian and New Zealand populations as shown in Table A4.1 below.

Table A4.1: Single Source survey population age distribution, Australia and New Zealand

Age groups (Years)	Australian proportions (%)	New Zealand proportions (%)
14-17	7	7
18-29	19	20
30-49	37	38
50-69	28	27
70+	9	8

The Australian sample was made up of 49% males and 51% females, while the New Zealand sample consisted of 48% men and 52% women.

Where possible, comparative information from the 1995 AUS-NNS and 1997 NZ-NNS is included, usually from the food frequency questionnaires (FFQs) that were completed as part of these surveys, or otherwise from 24-hour recall data where frequency of consumption data are not available. The FFQ data identify those people who eat a particular food daily, weekly, monthly or never and therefore provides similar outputs to the Single Source survey. Neither they nor the Single Source survey quantify the amount of food that has been eaten. However the results from Single Source and NNS FFQs are not directly comparable because of differences in food categorization and other factors. Therefore any differences in consumption patterns identified between the NNSs and Single Source must be regarded as indicative and not definitive.

The proportion of people reporting eating a food in the previous 24 hours, assessed through the 24-hour recall component of NNSs, is not as closely related to the Single Source methodology as a single 24-hour dataset may not capture how a person generally consumes. For major staples such as milk and bread, the estimates of proportion consuming may be similar as most people will eat these foods every day. But for less frequently consumed foods, the proportion who report consuming that food will increase as the duration of the survey increases (IEFS, 1998) because many people will eat very different foods from day to day.

[9] The actual number of people interviewed for the survey was weighted to represent the total population.

Approach to the analysis

Analysis of the data was based on the total population surveyed from 2001 to 2008.
Consumption of the selected food types was assessed by total population and by gender.
For all foods, the pattern of consumption from 2001 to 2008 was considered.
Some analysis of consumption by age group was undertaken but, for brevity, is not tabulated in this report; instead, relevant points are noted within the text.

The foods are reported as they were categorised in the survey questionnaires:

- Regular milk refers to full fat milk. Low fat/ no fat milk refers to milk with low levels of milk fat, and total milk refers to all the forms of milk listed in the questionnaire combined, which includes regular, low fat/ no fat milk and packaged flavoured milk.
- Cheese excludes cheese spreads but does not differentiate between varieties based on levels of fat and does not specify whether it is hard or soft cheese. It also does not cover cheese consumed in mixed dishes, for example pizza.
- Yoghurt as described in this report refers to total yoghurt, which is a combination of fruit or flavoured yoghurt, and natural or plain yoghurt, with no differentiation by fat content.
- Ice cream refers to total ice cream as defined in the questionnaire, which is a combination of ice cream from a tub, single ice creams and icy poles and others referred to generally as ice cream. The Single Source data did not differentitate between full fat ice creams and low fat ice creams and dairy desserts.
- The total sweet biscuits category comprises chocolate coated biscuits, cream/jam filled biscuits, plain sweet biscuits and other forms of sweet biscuits not listed. In the report reference to sweet biscuits implies total sweet biscuits.

The report can only provide information that indicates whether an increased, decreased or unchanged proportion of the population has consumed the foods considered. Changes in the amount of foods consumed cannot be derived from the Single Source data.

Trends in consumption of foods - Australia

Milk consumption in Australia – 2001 to 2008

Total milk

Figure A4.1 shows the proportion of men, women and of the total population that consumed milk over the previous seven days, from 2001 to 2008. It shows that the proportion of men and women that consumed milk (total milk) from 2001 to 2008 changed little, varying from 77 to 82% of the population. The proportion of women that consumed milk during the period was marginally higher than that of men. In the 1995 AUS-NNS, 84% of Australians aged 14 years and above consumed milk (all types), based on 24-hour recall. This compares to around 79% of Australians identified as weekly milk consumers in Single Source over the 2001-2008 time period. While data was collected for differing time periods between the NNS and Single Source survey data (24-hour verses weekly consumption respectively), because

milk is a staple commodity that can be consumed at various times throughout the day, it is expected that the proportion of consumers would be similar whether reported on a daily or weekly basis.

Regular milk

Figure A4.2 shows the proportion of men, women and of the total population that consumed regular milk. The proportion of consumers drinking regular milk over the previous week declined from 49% in 2001 to 44% in 2008. In the 1995 AUS-NNS, 57% of the population had full fat milk, based on 24-hour recall data. Men were more likely, from the Single Source data, to have regular milk than women, but a similar downward trend with time was noted for men and women.

Low fat milk

Figure A4.3 shows the trend in consumption of low fat/no fat milk during 2001-2008. There was a slight increase in the proportion of the total population that consumed low fat milk over the previous seven days, with 42% consuming in 2008 compared to 38% in 2001. A higher proportion of women than men consumed low fat milk in each year during this time period. In the 1995 AUS-NNS, 31% of the population had low or no fat milk. Low fat/no fat milk consumption is more common in older Australians (51% of 50-69 year olds vs 31% of 18-29 year olds in 2008.

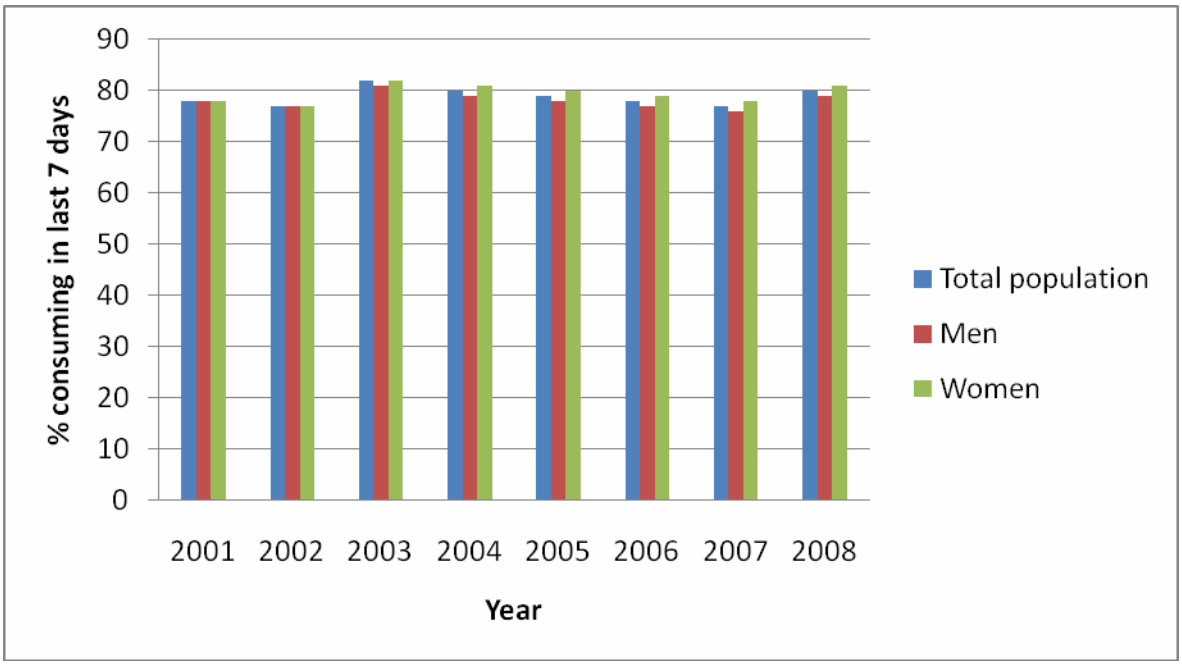

Figure A4.1: Proportion of total Australian population, men and women, who consumed total milk from 2001 to 2008

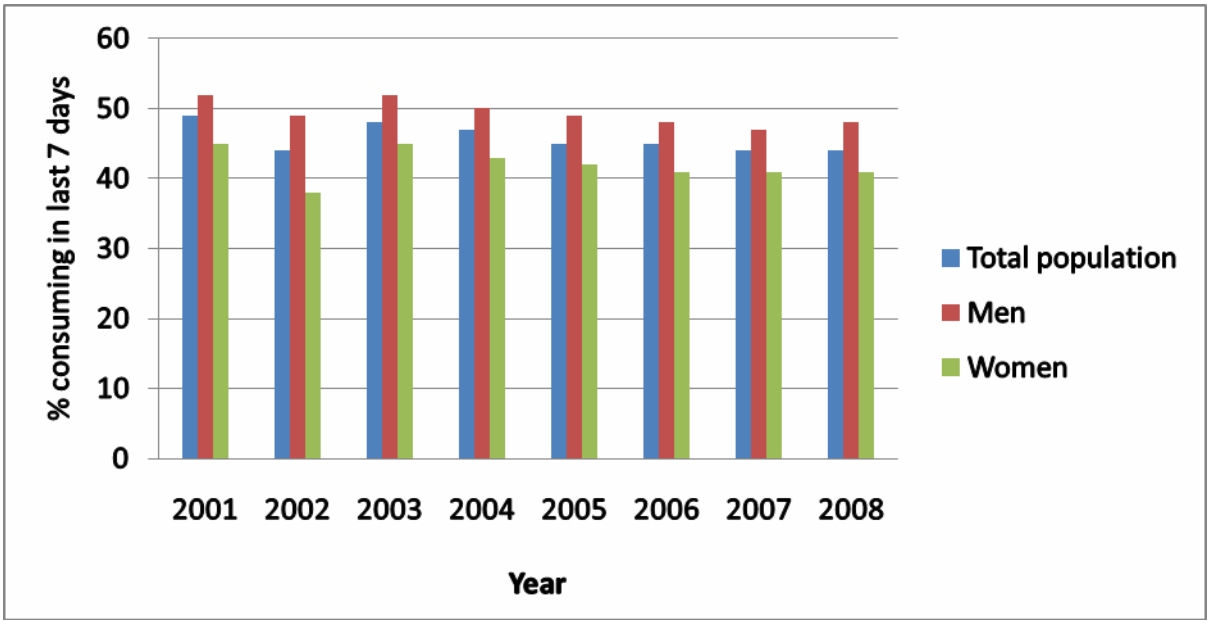

Figure A4.2: Proportion of the Australian population, men and women that consumed regular (full fat milk) from 2001 to 2008

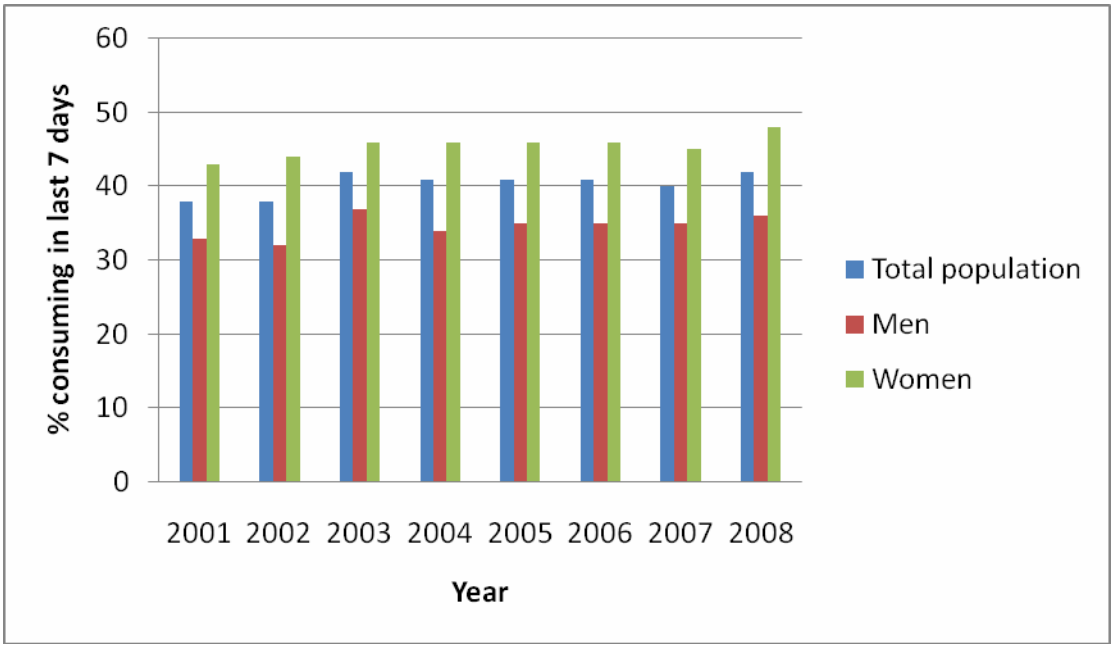

Figure A4.3: Proportion of the Australian population and men and women that consumed low fat/ no fat milk from 2001 to 2008

Ice cream consumption in Australia - 2001 to 2008

The proportion of men, women and total population in Australia that consumed ice cream is shown in figure A4.4. The proportion of Australians that consumed ice cream increased slightly from 2001 (42%) to 2008 (44%). The proportions of men and women who reported consuming ice cream over the previous seven days was similar across the time period although it fluctuated a little between individual years. In the 1995 AUS-NNS, 36% of the population had ice cream at least weekly. This suggests that consumption of all types of ice creams may now be more widespread than in 1995 although this may reflect differences in categorisation. There was also an increase in the proportion of older Australians who reported consuming ice cream over 2001-2008; for example among those aged 50-69 years, the proportion eating ice cream over the previous week rose from 39% to 43%. This could be related to the growing availability of ice creams with reduced amounts of fat.

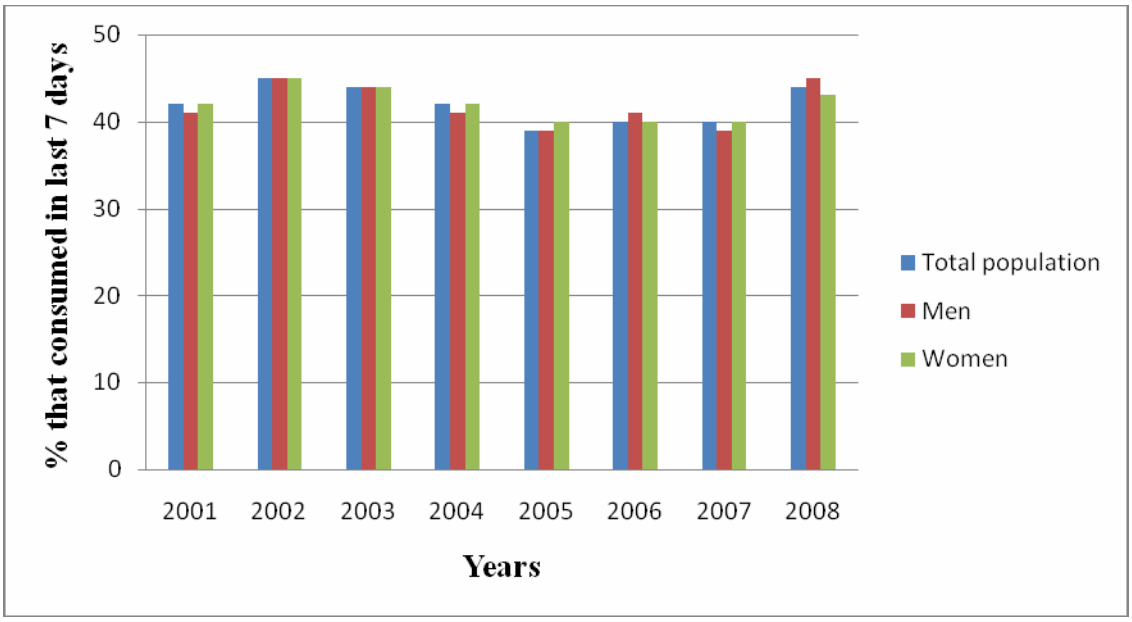

Figure A4.4: Proportion of total population, men and women that consumed total ice cream - 2001 to 2008

Cheese consumption in Australia - 2001 to 2008

Figure A4.5 shows the proportion of men, women and the total population that consumed cheese from 2001 to 2008. A little more than two thirds of the Australian population consumed cheese in the seven days before the survey, in each year from 2001 to 2008, with slightly more women consuming than men. The proportion that consumed cheese fluctuated throughout the period with the proportion in 2008 (69%) being marginally lower than that in 2001 (70%). In the 1995 AUS-NNS, 78% of the population reported consuming cheese weekly. This suggests a slight decrease in the proportion of the population consuming cheese since 1995 although the categorization of cheeses is somewhat different between surveys; Single Source does not include cheese spreads while the 1995 NNS food frequency categorization excluded cottage and ricotta cheeses.

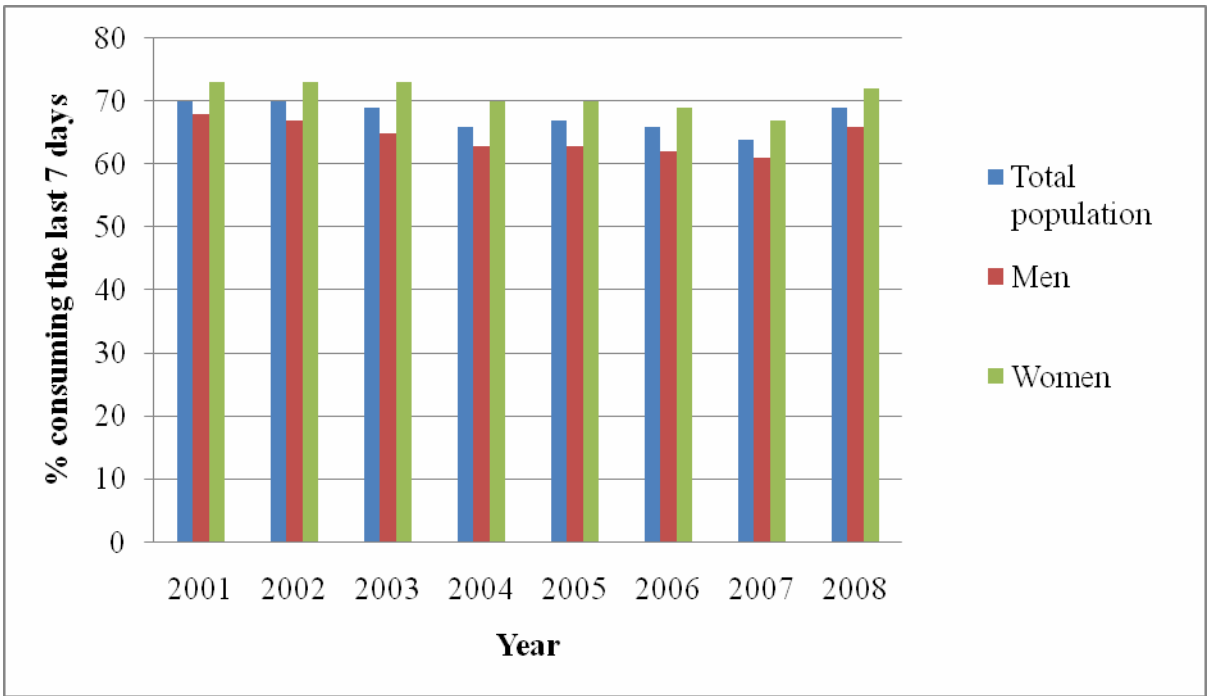

Figure A4.5: Proportion of Australian population that consumed cheese from 2001 to 2008

Yoghurt consumption in Australia – 2001 to 2008

Figure A4.6 shows the proportion of the Australian population, and of men and women, that consumed yoghurt from 2001 to 2008. There was a gradual increase in the proportion of the population consuming yoghurt over the time period 2001 to 2008, from 35% in 2001 to 43% in 2008, with more women consuming than men at each time period. This is higher than the proportion who consumed yoghurt over the previous week in the 1995 NNS (29%).

Fat spreads consumption in Australia – 2001 to 2008

The Single Source survey collected information on the population's consumption of fat spreads. The data combined information on the use of butter, margarine, butter blend and dairy spread into one food category that is referred to as fat spreads. Therefore it is not possible to separate trends in consumption of butter *vs* margarine type spreads.

Figure A4.7 shows that the proportion of men, women and of the total population consuming fat spreads from 2001 to 2008 fluctuated from 74% to 79% of the population, with 78% reporting consumption over the previous seven days in 2008 compared to 79% in 2001. In the 1995 AUS-NNS, 75% of respondents aged 14 years and above consumed spreads. This suggests that fat spreads consumption has stayed relatively constant since 1995.

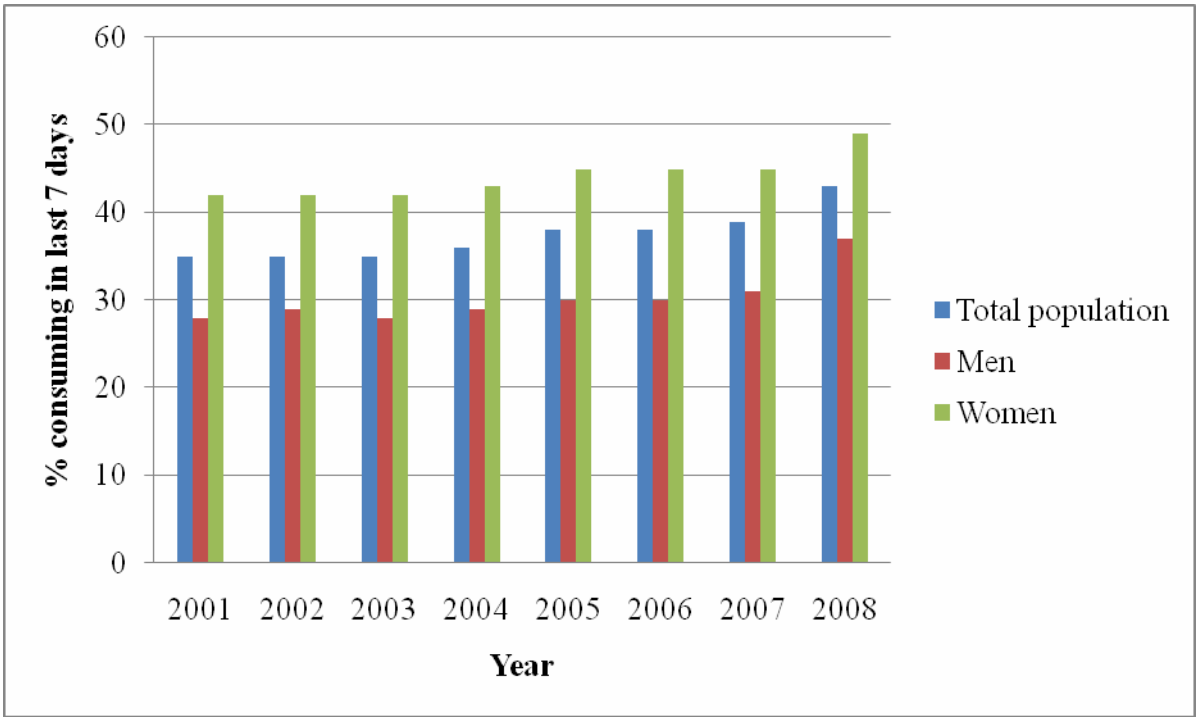

Figure A4.6: Proportion of total population, men and women that consumed yoghurt from 2001 to 2008

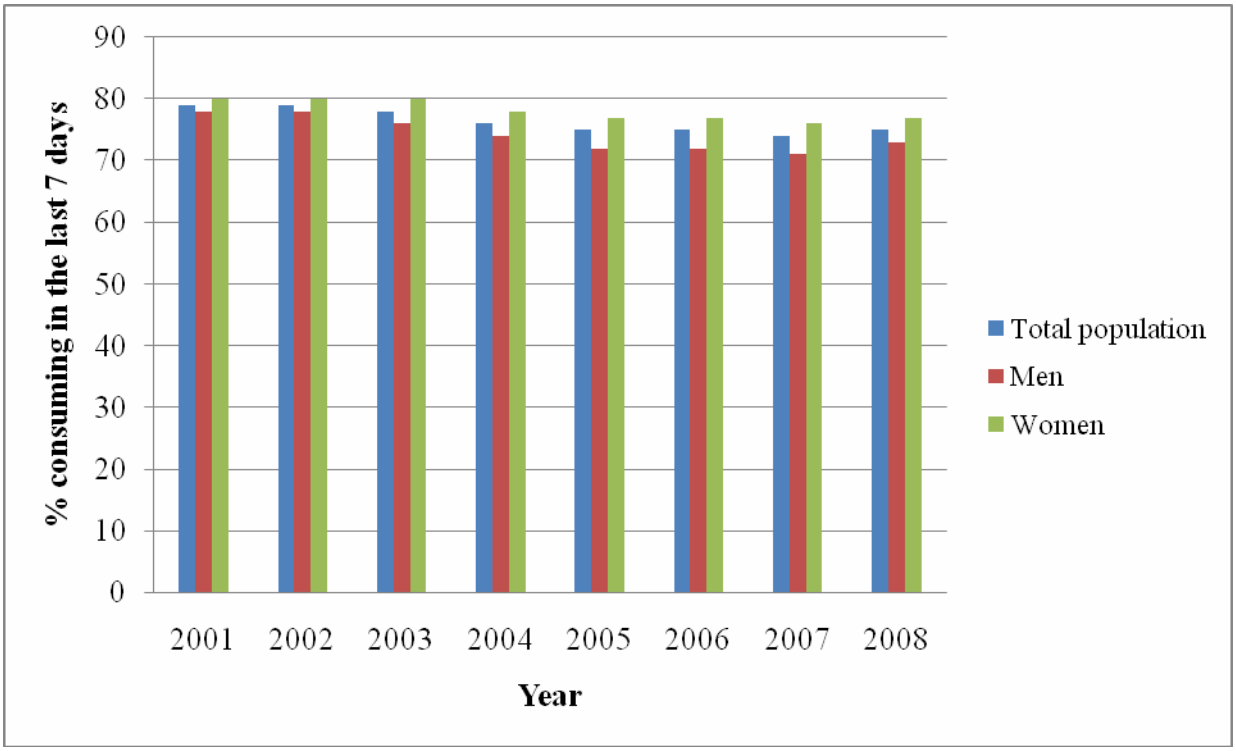

Figure A4.7: Proportion of the Australian population that consumed fat spreads – 2001 to 2008

Sweet biscuit consumption in Australia – 2001 to 2008

Around half of Australians consumed sweet biscuits over the previous seven days from 2001 to 2008, with a gradual decrease from from 53% in 2001 to 44% in 2007, rising to 49% of Australians in 2008. Figure A4.8 shows the trend in sweet biscuit consumption during the period by men, women and the total population. In the 1995 AUS-NNS, 50% of Australians aged 14+ years reported consuming sweet biscuits at least weekly, suggesting a largely steady consumption trend over the period 1995 to 2008. More older Australians consumed sweet biscuits (55% of those aged 70 years and above from 2001-2008) than younger Australians (41% of those aged 18-29 years). Plain sweet biscuits were consumed by more people (30%) than chocolate biscuits (25%) and cream/jam filled biscuits (10%) across 2001-2008.

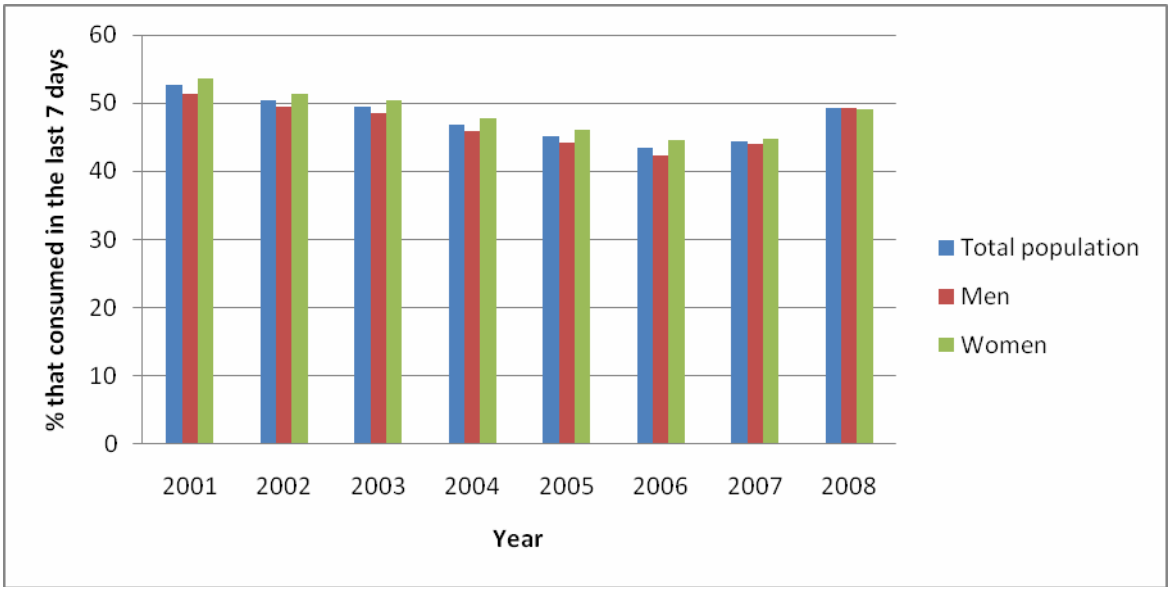

Figure A4.8: Proportion of Australians that consumed sweet biscuits from 2001 to 2008

Potato crisps consumption in Australia - 2001 to 2008

From 2001 to 2008 about 41% of the Australian population consumed potato crisps, with more men consuming (44%) than women (38%) across the time period. Figure A4.9 shows the trend in consumption of potato crisps by men, women and the total population from 2001 to 2008; consumption patterns stayed largely steady over this time with the proportion of consumers in 2008 (43%) slightly higher than in 2001 (42%). In the 1995 AUS-NNS, 29% of Australians aged 14+ years reported eating potato chips weekly, which suggests an increase in the proportion of the population consuming potato crisps each week between 1995 and 2001.

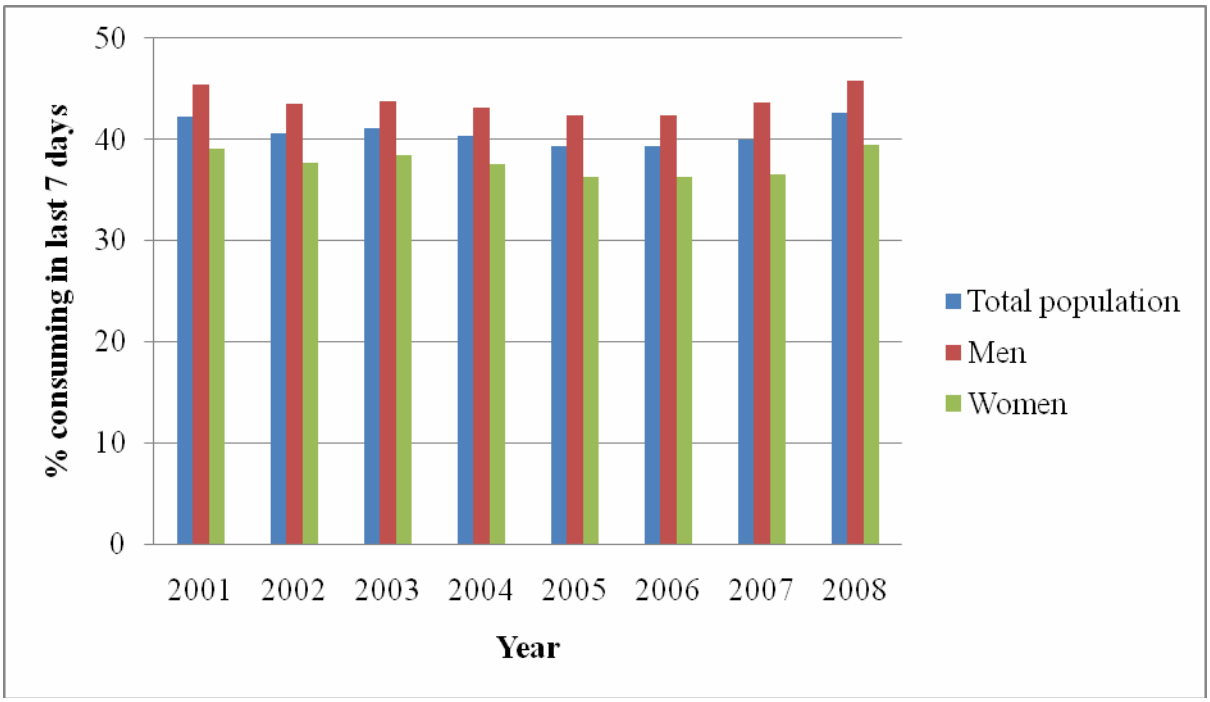

Figure A4.9: Proportion of Australian population that consumed potato crisps from 2001 to 2008

Ruminant meats consumption in Australia – 2007-2008

Information on the proportion of Australians consuming ruminant meats is only available in the Single Source Survey for the periods January-December 2007 and January-March 2008. Overall, 74-76% of Australians reported eating beef in the last seven days, 7-8% ate veal and 34-38% reported consuming mutton and lamb (Table A4.1). On average, men in Australia reported consuming ruminant meats more often than women. By comparison, the proportion consuming all types of meats (including poultry, pork, fish and other meats) was very similar for men and women.

The Roy Morgan Single Source Survey data is of insufficient duration to show any medium to long term trends. However, in the 2007/08 time period the number of consumers that reported consuming ruminant meats in Australia has increased slightly, in particular for mutton and lamb.

In the 1995 AUS-NNS, 70% of Australians 12 years of age and older reported eating beef steak or roast at least once per week; half ate a minced meat dish, a mixed dish containing beef or lamb chops or roast; and about one third ate a mixed dish containing lamb. These Single Source and NNS figures, while not directly comparable, suggest that ruminant meat remain foods that are regularly consumed by the majority of the population.

Table A4.1 Reported frequency in ruminant meat consumption in Australian men and women

	Meats eaten in the last 7 days								
	Women (%)			Men (%)			All (%)		
	2007	2008	Trend	2007	2008	Trend	2007	2008	Trend
Beef	70	74	+4	77	79	+2	74	76	+2
Veal	7	7	±0	8	9	+1	7	8	+1
Mutton and Lamb	33	36	+3	34	39	+5	34	38	+4
Total meats	93	94	+1	92	93	+1	93	93	±0

Trends in consumption of foods in New Zealand

The same definitions of foods groups that were used in Australia applied to the Single Source survey group in New Zealand.

Milk Consumption in New Zealand – 2001 to 2008

Consumption of milk (total milk)

Figure A4.10 shows the pattern of milk (total milk) consumption by men, women and the total population in New Zealand from 2001 to 2008. It shows a general increase in the proportion of the population that consumed milk from 2001 to 2008, with very similar proportions of men and women consuming milk during the period. For example, in 2001 the proportion of the population that consumed milk was 64% while in 2008 it was 76%. There was a noticeable increase in the proportion of the population consuming milk from 2001 to 2003, stabilising from 2004 to 2008. In the 1997 NZ-NNS, 86% of New Zealanders aged 15+ years reported consuming milk (assessed using 24-hour recall data).

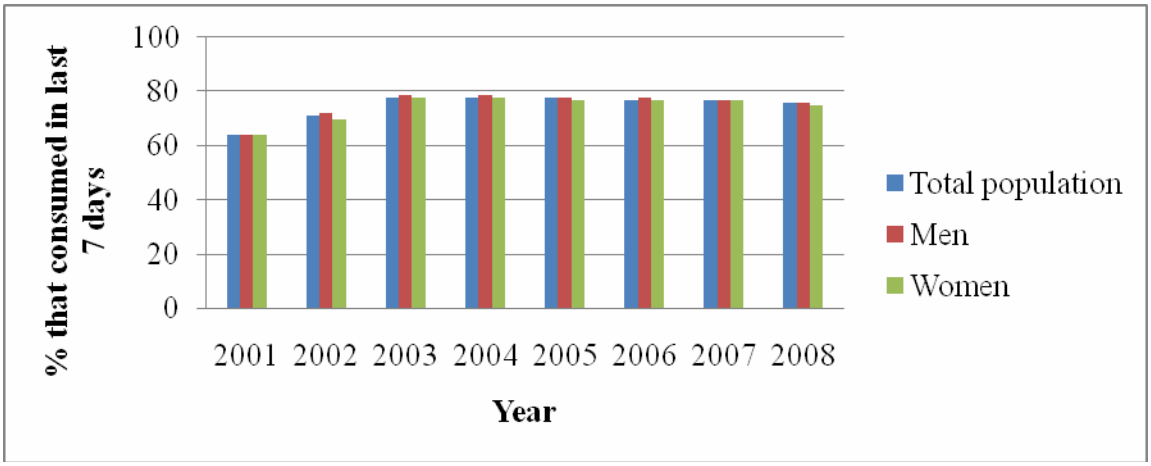

Figure A4.10: Proportion of the New Zealand population and of men and women who consumed milk (total milk) from 2001 to 2008

Consumption of regular milk

The trend in consumption showed an increase in the proportion of the population that consumed regular milk from 2001 (36%) compared to 2008 (43%), although this fluctuated somewhat over the intervening years. This proportion is lower than that estimated from 1997 NZ-NNS, which found that 62% of New Zealanders aged 16+ years reported consuming regular fat milk (24-hour recall data). This suggests a decrease in regular milk consumption between 1997 and 2001 but a steadying of this trend since that time, although it is not possible to definitively conclude this due to the different survey methodologies.

Figure A4.11 shows the proportion of men, women and the total population that consumed regular milk from 2001 to 2008. A higher proportion of men than women consumed regular milk during the period (49% compared to 37% respectively, 2001 to 2008). A higher proportion of young New Zealanders (e.g. 57% of 14-17 year olds in 2008) consumed regular milk than older New Zealanders (e.g. 34% of those aged 50-69 years, 2008).

Consumption of low fat milk

Figure A4.12 shows a steady increase in the proportion of the population that consumed low fat milk in New Zealand from 2001 to 2008, from about 30% in 2001 to about 42% in 2008. In the 1997 NZ-NNS, 36% of New Zealanders aged 16+ years reported consuming low or no fat milk.

At each time period, more women than men consumed low fat milk (e.g. 47% and 36% respectively in 2008) and more older New Zealanders than younger New Zealanders (e.g. 47% of 50-69 year olds compared to 33% of 14-17 year olds in 2008).

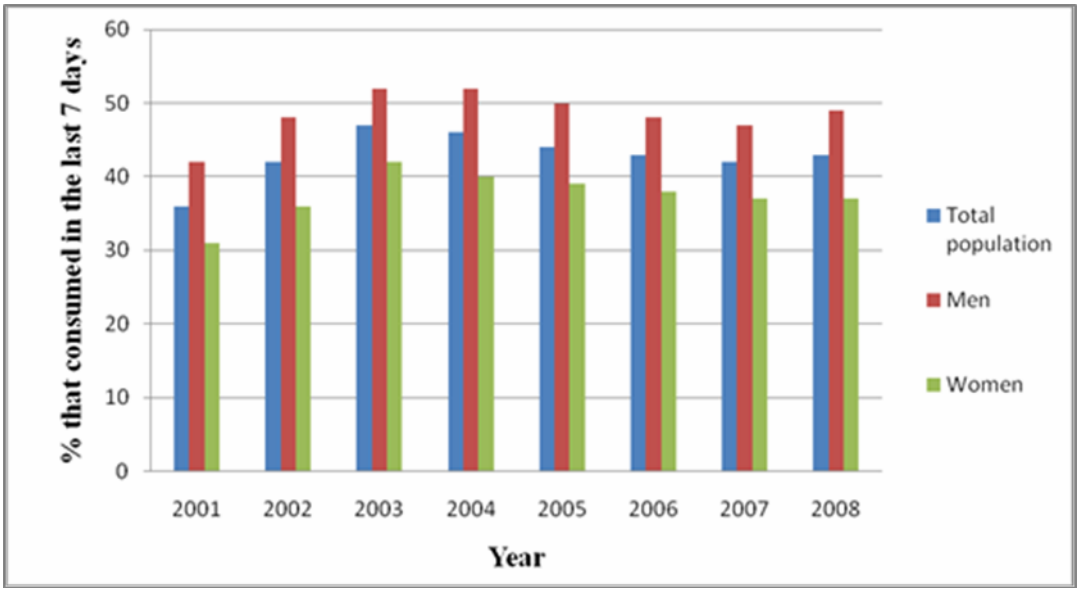

Figure A4.11: Proportion of the New Zealand population and of men and women who consumed regular milk from 2001 to 2008.

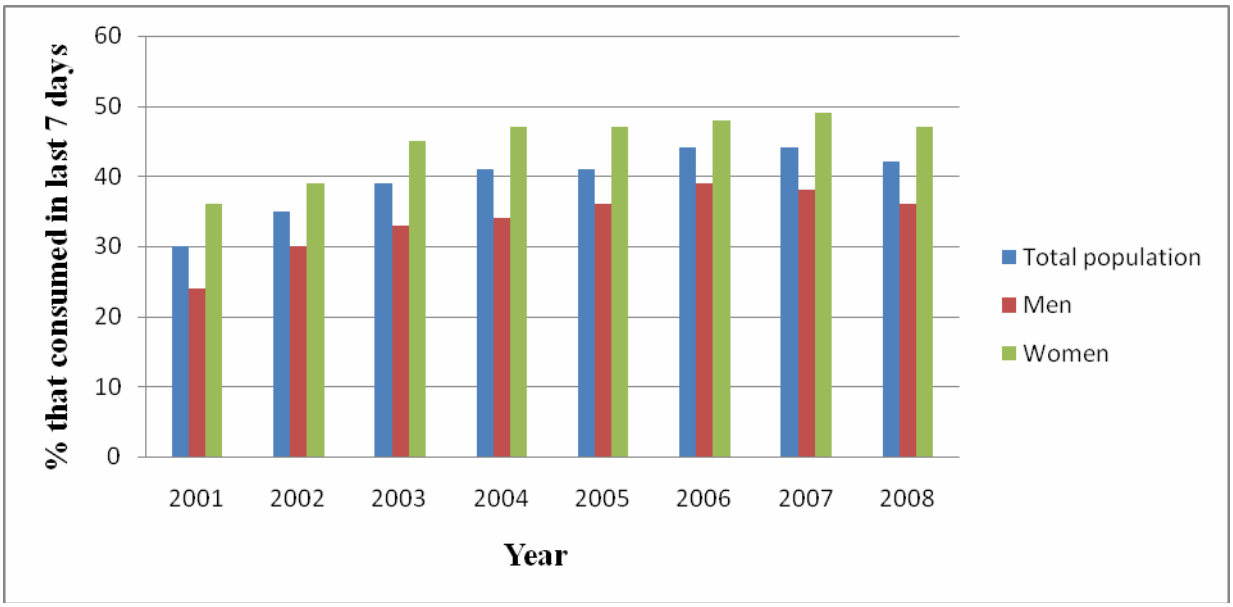

Figure A4.12: Proportion of the New Zealand population and of men and women who consumed low fat/no fat milk from 2001 to 2008

Ice cream consumption in New Zealand – 2001 to 2008

Figure A4.13 shows the trend in consumption of ice cream by men, women and the total population from 2001 to 2008. It is marked by two main characteristics, that is, a marginally higher proportion of men than women consuming ice cream and a slight increase in the proportion of New Zealanders eating ice cream between 2001 (44%) and 2008 (48%). In the 1997 NZ-NNS, 38% of New Zealanders aged 16+ years reported consuming ice cream each week. This suggests an increase in the proportion of New Zealanders who eat ice cream each week sinc e 1997. Ice cream consumption is more common in younger New Zealanders (e.g. 59% of 14-17 year olds in 2008 compared to 45% of 50-59 year olds).

Consumption of cheese in New Zealand 2001 to 2008

About 70% of New Zealanders consumed cheese over the previous week and this remained largely steady between 2001 to 2008. The proportion of men that consumed cheese was lower than the proportion of women. On average, about 75% of women consumed cheese during the period compared to 67% of men. Figure A4.14 shows the proportion of men, women and total population that consumed cheese during the period. In the 1997 NZ-NNS, 33% of New Zealanders aged 16+ years reported consuming cheese on the day of the survey, but this figure would almost certainly be higher if it had been assessed over a seven day period.

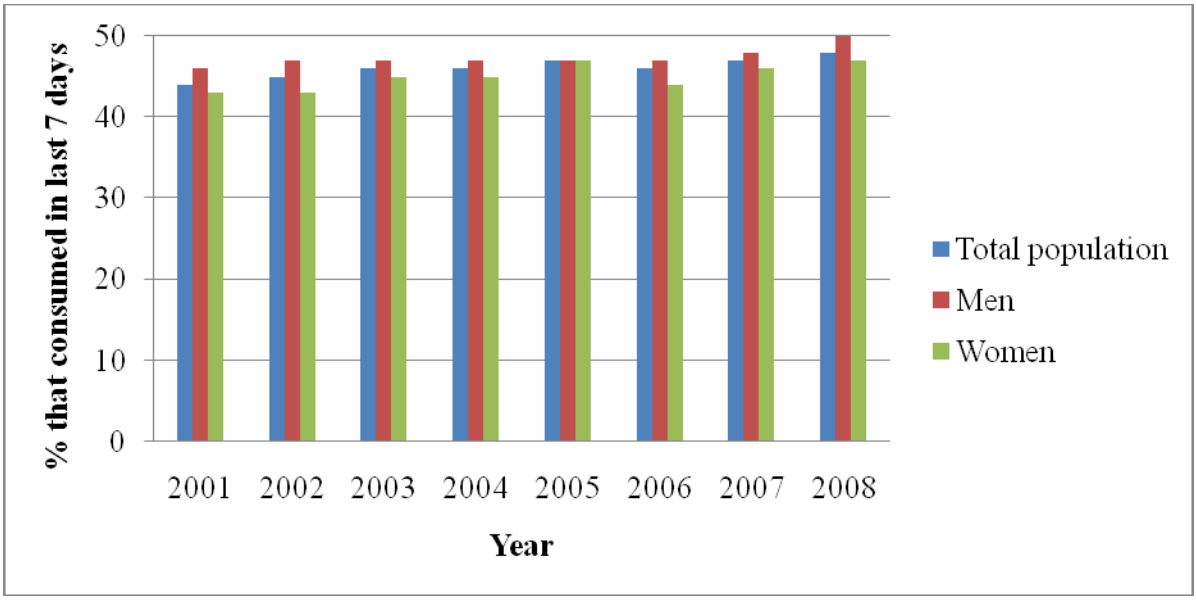

Figure A4.13: Proportion of the New Zealand population and of men and women who consumed ice cream from 2001 to 2008

Consumption of yoghurt in New Zealand – 2001 to 2008

Figure A4.15 shows the trend in yoghurt consumption by the New Zealand population and by men and women, from 2001 to 2008. Over the entire 2001 to 2008 period, about 47% of New Zealanders consumed yoghurt, ranging from 36% in 2001 to 51% in 2008. This compares to 35% of New Zealanders aged 15 years and above who reported consuming yoghurt over the last week, in the 1997 NZ-NNS. More women (about 53%) than men (39%) consumed yoghurt.

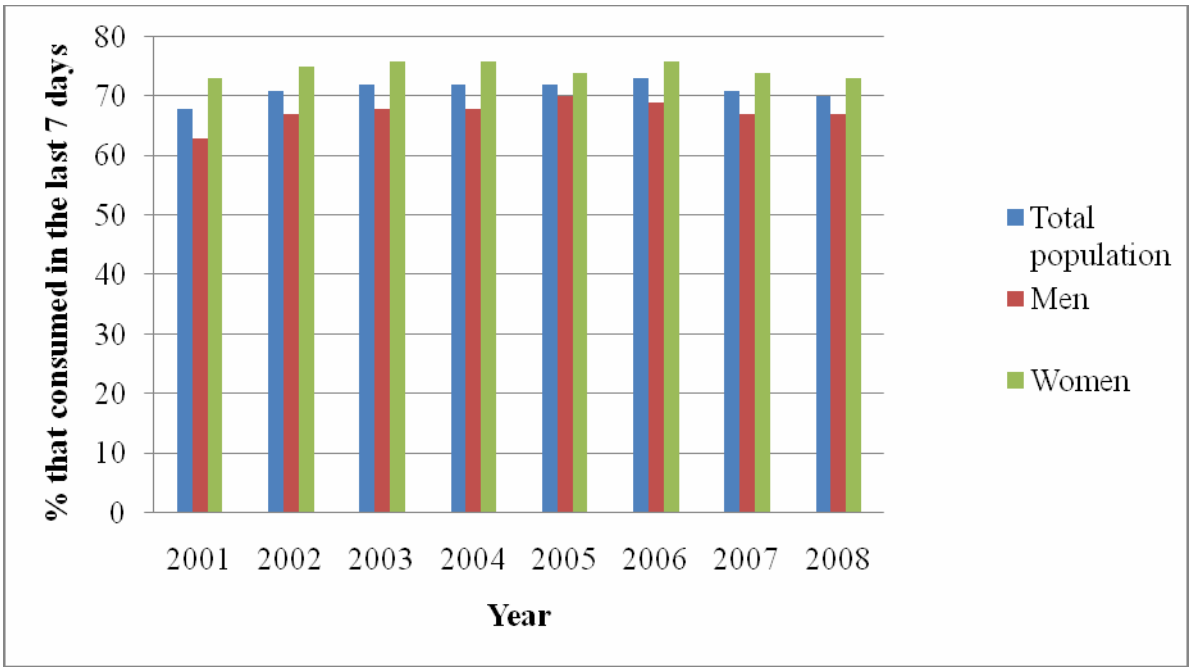

Figure A4.14: Proportion of the New Zealand population and of men and women who consumed cheese from 2001 to 2008

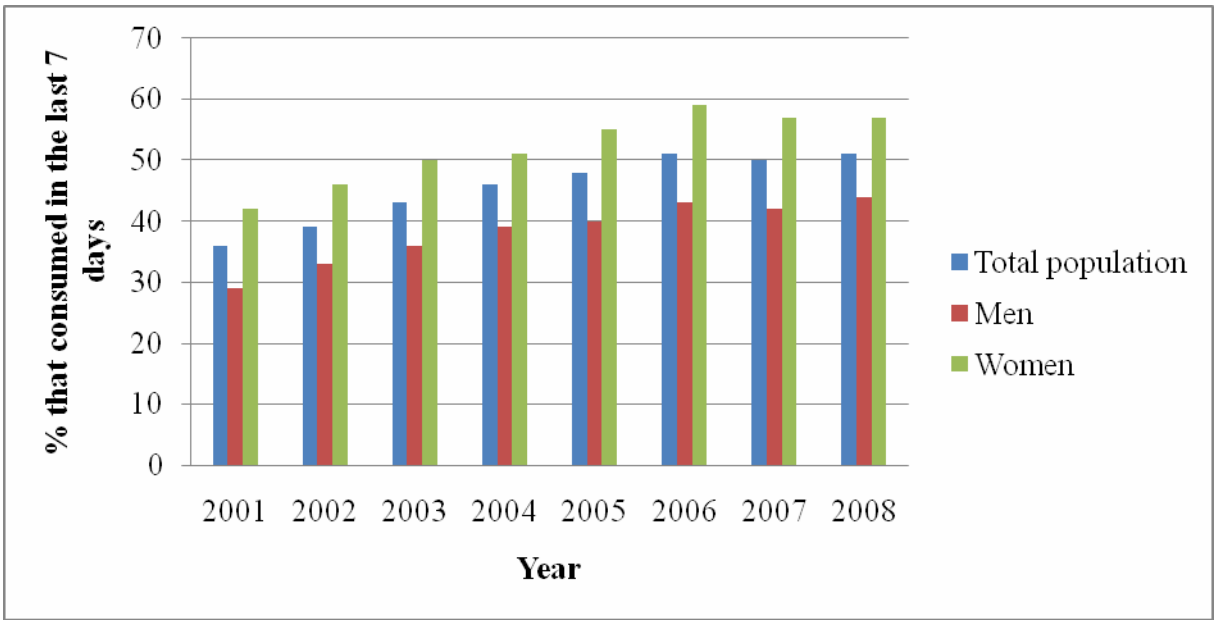

Figure A4.15: Proportion of the New Zealand population and of men and women who consumed yoghurt from 2001 to 2008

Consumption of fat spreads in New Zealand – 2001 to 2008

About 80% of the New Zealand population consumed fat spreads from 2001 to 2008. This is the same as that estimated in the 1997 NZ-NNS over a 24 hour period. Figure A4.16 shows that the proportion of the population that consumed fat spreads was almost stable during the period although there were slight yearly variations. There was little or no difference in the proportion of men and women consuming fat spreads during the period. The age group 14 to 17 years had the lowest mean proportion of persons that consumed fat spreads (69% in 2008), while the 70+ age group had the highest mean proportion during the period (86% in 2008).

Consumption of sweet biscuits in New Zealand – 2001 to 2008

About 60% of the New Zealand population consumed sweet biscuits from 2001 to 2008, with almost the same proportion of men and consuming over this time (Figure A4.17). In the 1997 NZ-NNS, 54% of New Zealanders 15 years and above ate sweet biscuits weekly. This suggests that the proportion of people eating sweet biscuits has been largely steady in New Zealand since 1997. Among younger New Zealanders, sweet biscuit consumption has declined over the 2001-2008 time period, from 75% of 14-17 year olds in 2001 to 61% in 2008, while the opposite was found in New Zealanders aged 70 years and above, where sweet biscuit consumption rose from 62% to 65% of the population.

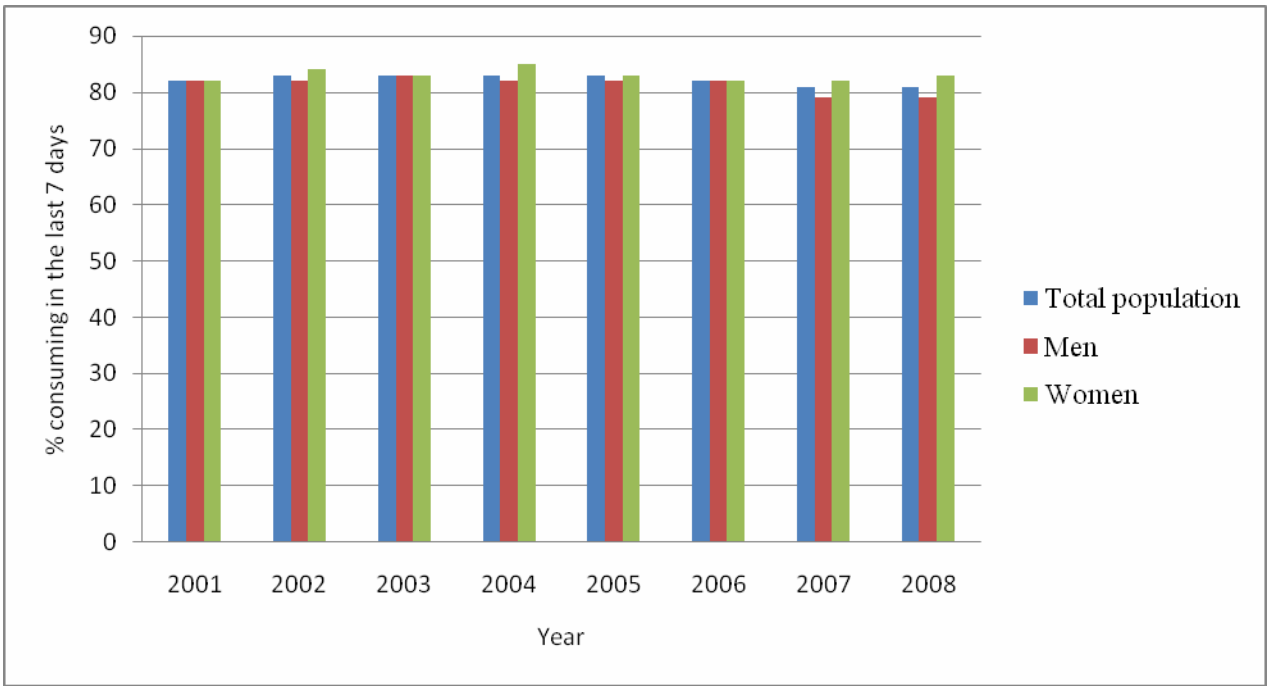

Figure A4.16: Proportion of the New Zealand population and of men and women who consumed fat spreads from 2001 to 2008

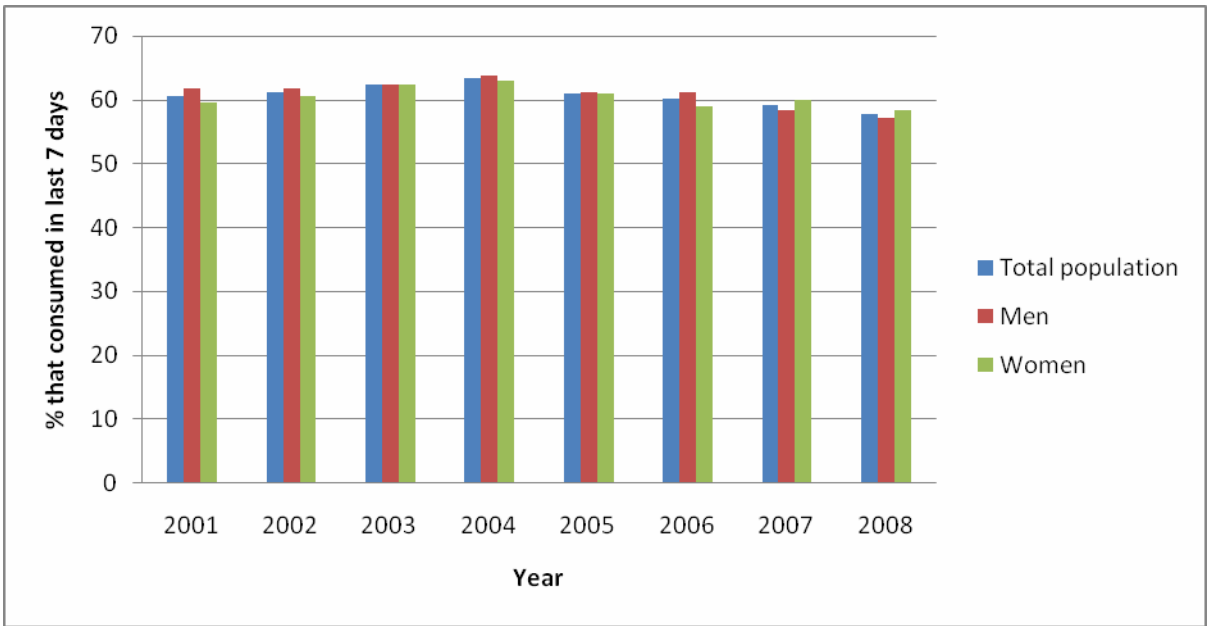

Figure A4.17: Proportion of the New Zealand population and of men and women who consumed sweet biscuits from 2001 to 2008

Consumption of potato crisps in New Zealand – 2001 to 2008

More New Zealanders consumed potato crisps in 2008 (53%) than in 2001 (49%). This compares to a figure of 36% of New Zealanders (15+ years) reporting consuming potato crisps weekly in the 1997 NZ-NNS and suggests that crisp consumption is now more widespread than in 1997. More men (55%) than women (48%) consumed potato crisps, and more younger people than older New Zealanders.

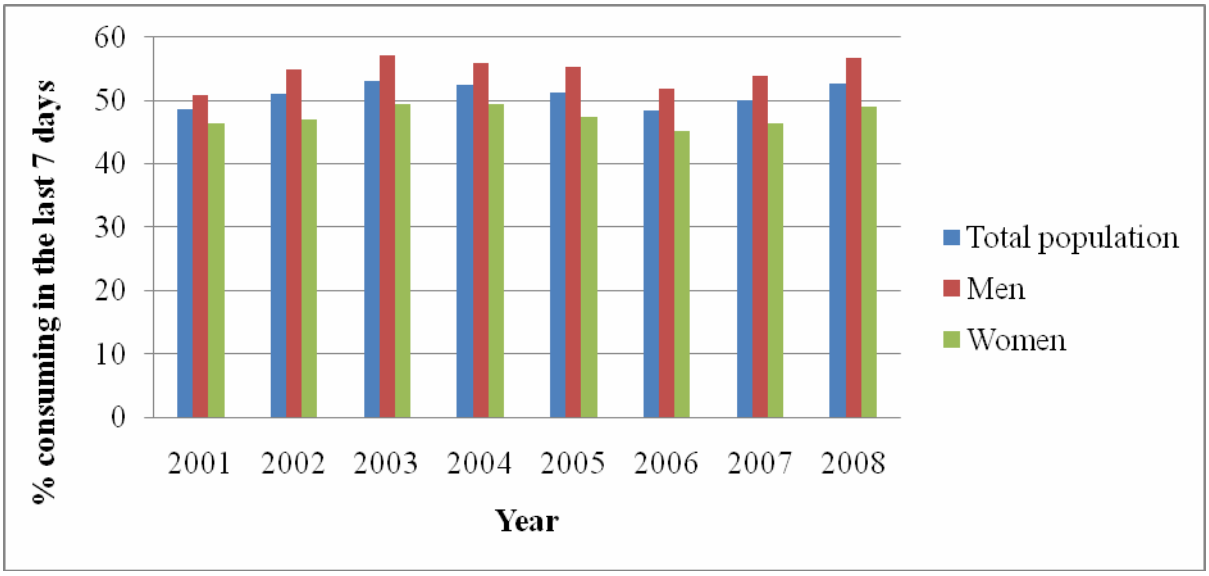

Figure A4.18: Proportion of the New Zealand population and of men and women who consumed potato crisps from 2001 to 2008

Trend in the consumption of ruminant meats – Australia and New Zealand

Information of the consumption patterns from the Roy Morgan Single Source Survey is limited to the periods January- December 2007 and January-March 2008. Overall, 78-79% of New Zealanders reported eating beef in the last seven days, 2% ate veal and 42% reported consuming mutton and lamb (Table A4.2).

On average, more New Zealand men reported consuming ruminant meats than women. By comparison, the proportion of consumers of all types of meats (including poultry, pork, fish and other meats) was very similar for men and women.

The Roy Morgan Single Source Survey data are of insufficient duration to show any medium to long term trends. However, in the 2007/08 time period the number of consumers that reported consuming ruminant meats in New Zealand appears to be stable.

In the 1997 NZ-NNS, around half of New Zealanders aged 15 years and above ate beef and beef mince dishes at least once per week; around one third ate beef or veal mixed dishes; and around one quarter ate lamb or hogget/mutton. These Single Source and NNS figures, while not directly comparable, suggest that ruminant meat consumption is still an important feature of the New Zealand diet.

Table A4.2 Reported frequency in ruminant meat consumption in New Zealand men and women

	Meats eaten in the last 7 days								
	Women (%)			Men (%)			All (%)		
	2007	2008	Trend	2007	2008	Trend	2007	2008	Trend
Beef	77	76	-1	81	80	-1	79	78	-1
Veal	2	2	±0	2	3	+1	2	2	±0
Mutton and Lamb	40	40	±0	44	45	+1	42	42	±0
Total meats	95	95	±0	95	95	±0	95	95	±0

Summary of findings

The major findings of this evaluation are:

- While total milk consumption appears to be fairly stable, the proportion of milk that is low fat has increased in both countries.
- Yoghurt consumption has increased in both countries, as has ice cream although the extent of the increase is not as great.
- The proportion of the population consuming cheese consumption and fat spreads appears largely steady in both countries.
- Slightly fewer Australians appear to now be eating sweet biscuits than in 2001, but consumption has remained steady in New Zealand.
- In both countries, potato crisp consumption appears to have increased slightly (assessed as the proportion of people eating these foods).
- Ruminant meats are still important foods in the diets of Australians and New Zealanders but it is difficult to assess any changes in consumption patterns because of the short time period for which Single Source data are available.