Attachment 1
Agenda Item 3.1

APPENDIX 1

TRANS FATTY ACIDS: CHEMISTRY AND TECHNOLOGY

REVIEW REPORT
TRANS FATTY ACIDS IN THE NEW ZEALAND AND AUSTRALIAN FOOD SUPPLY

1. Chemistry

1.1 Fatty acids

Edible oils (including oils and fats) are esters (a chemical linkage that holds an alcohol and acid group together) of *fatty acids* and glycerol. In food most edible oils occur as *triglycerides*, i.e. three fatty acids are attached to a glycerol backbone (*triacylglycerols*). Fatty acids contain a *carboxyl group* (COOH) and an aliphatic chain of carbon molecules and it is the characteristics of this *carbon chain* that plays a major role in determining the properties of a fat. The carbon chain varies in the number of carbon atoms that make up the chain, and the number and location of *double bonds* in the chain.

Fatty acids can be classified according to the number of double bonds. *Saturated fatty acids* (SFA) have no double bonds, *monounsaturated fatty acids* (MUFA) have one double bond, and *polyunsaturated fatty acids* (PUFA) have two or more double bonds.

Commonly, the unsaturated fatty acids that occur naturally in food have double bonds in a *cis* configuration: the carbon chains on the two sides of the double bond bend towards each other and the hydrogen atoms on the double bond are located on the same side. In the rarer *trans* configuration, the hydrogen atoms on the double bond are opposite each other, rather than oriented in the same direction. The insertion of a cis double bond has a dramatic effect on the shape of the molecule, introducing a 42º kink into an otherwise straight chain (*Figure 1*). However, inserting a *trans* double bond has very little effect (*Figure 2*). This accounts for the different chemical and physical properties of *trans* and *cis* fatty acids, and consequently the properties of the fat, which may also result in a difference in the biological activity of these fatty acids.

The chemical characteristics of unsaturated fatty acids are also partially determined by the position of the double bond in the molecules. Double bonds may be *isolated* (separated within the carbon chain), *conjugated* (separated by one single bond), or *methylene-interrupted* (separated by a CH_2 unit). The location of the double bonds is important to the outcome of manufacturing processes, such as hydrogenation.

Conjugated linoleic acid (CLA) is a collective term for a mixture of positional and geometric isomers of linoleic acid (C18:2), in which the two double bonds are conjugated. The chemistry of CLA is complex, and a variety of isomers have been described in the literature. Briefly, natural products, specifically dairy fats, contain one dominant isomer representing 75-90% of total CLA (c9, t11, sometimes referred to as ‘rumenic’ acid).

The second most prevalent isomer is *trans*-7, *cis* 9 CLA comprising 3-16% of total CLA. There are other isomers that occur in significant concentrations (t9,c11 and t11,c13), and up to 20 more minor CLA isomers. It is increasingly evident that different CLA isomers have distinctly different physiologic and biochemical properties.

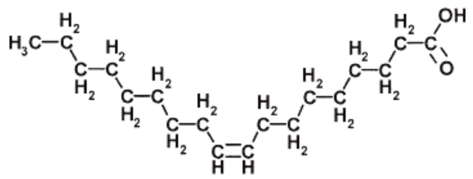

Figure 1 Oleic acid: an 18 carbon *cis* monounsaturated fatty acid

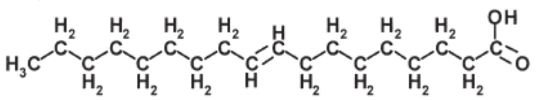

Figure 2 Elaidic acid: an 18 carbon *trans* monounsaturated fatty acid

1.2 Fatty Acid Nomenclature

Fatty acids are often referred to by their common name e.g., 'oleic acid'. Following the Geneva (IUPAC) system of chemical nomenclature, carbon atoms of fatty acid chains are numbered consecutively staring with the carbon of the carboxyl group and continuing to the carbon in the terminal methoxy group. Their systematic name is based on the prefix describing the length of the carbon chain and if appropriate the position of any double bonds, such as '9-octadecenoic acid' for oleic acid.

For convenience, fatty acids are commonly referred to as based on the number of carbons and the number of double bonds in the molecule. For example, the saturated fatty acid palmitic acid is referred to as 'C16:0', the MUFA oleic acid as '18:1', and the triple double bond PUFA linolenic acid as 'C18:3'. In addition, the position of the double bonds can be shown after the symbol 'Δ' or within brackets, for example α-linolenic acid (9, 12, 15-octadecatrienoic acid) can be written as '18:3 Δ 9, 12, 15' or '18:3 (9, 12, 15)'

The status of the double bond can be specified as *cis* or *trans* as an additional prefix to the name, as in '*cis*-9-octadecenoic acid', or given as part of the shorthand: 18:2 (tr9, tr 12) for linolelaidic acid. Common names are frequently used for the better know *trans* fatty acids

A table of some examples of fatty acids along with their common names, designations and sources is given below.

Table 1 Nomenclature and sources of some fatty acids

Systematic Name	**Common Name**	**Chain length**	**Examples of sources**
Butanoic	Butyric	C4:0	Butter
Dodecanoic	Lauric	C12:0	Butter, coconut, lard
Hexadecanoic	Palmitic	C16:0	Cocoa butter, palm oil
Octadecanoic	Stearic	C18:0	Cocoa butter, tallow
9-Octadecenoic	Oleic	C18:1	Olive, canola, peanut
trans-(E)-9-Octadecenoic	Elaidic	C18:1	Hydrogenated oils
trans-11-Octadecenoic	Vaccenic	C18:1	Butterfat
9,12-Octadecadienoic	Linoleic	C18:2	cottonseed, sunflower
9,12,15-Octadecatrienoic	Linolenic	C18:3	Soybean, canola, corn
trans-5,*cis*-9,*cis*-12-Octadecatreanoic	Columbinic	C18:3	Columbine seed oil
5,8,11,14-Eicosatetraenoic	Arachidonic	C20:4	Marine oils

1.3 Regulatory definitions of *trans* fatty acids

The Australian and New Zealand approach closely follows the chemical definition of *trans* configuration in fatty acids, and includes all types of TFA, including ruminant TFA. However, the chemical definition of TFA differs from the regulatory definition used by some countries. Many regulatory definitions, while not specifically excluding ruminant TFA, exclude fatty acids with conjugated bonds from the definition of TFA, even though these acids have double bonds in *trans* configuration. These definitions stem from the view that regulatory definitions adequately identify the fatty acids targeted by the regulation.

When the regulations regarding TFA were developed in the USA, there were a number of requests that certain ruminant TFA should be excluded from the regulatory definition of TFA. Further, there were some suggestions that the definition should be based on functional or metabolic aspects of the fatty acids, and not their actual chemical structure.

For comparison, the following regulatory definitions are used in selected countries:

Australia and New Zealand:
Trans fatty acids means the total number of unsaturated fatty acids where one or more of the double bonds are in the trans configuration and declared as trans fat

Denmark:
Trans fatty acids are defined as the sum of all fatty acid isomers with 14, 16, 18, 20 or 22 carbon atoms and one or more trans double bonds, i.e. C14:1, C16:1, C18:1, C18:2, C18:3, C20:1, C20:2, C22:1, C22:2 fatty acid trans isomers, but only polyunsaturated fatty acids with methylene interrupted double bonds.

Canada:
Trans fatty acids means unsaturated fatty acids that contain one or more isolated or non-conjugated double bonds in a trans-configuration

USA:

Trans fatty acids: unsaturated fatty acids that contain one or more isolated (i.e., nonconjugated) double bonds in a trans configuration

1.4 Sources

Dietary TFA come from two primary sources:

- **manufactured TFA**: industrial, partial hydrogenation of edible oils containing unsaturated fatty acids, formation as a consequence of oil deodorisation and high temperature cooking
- **ruminant TFA**: bacterial transformation of unsaturated fatty acids in the rumen of ruminants.

TFA from both sources are formed by a process of partial hydrogenation of *cis* unsaturated fatty acids; one achieved by microbial activity, the other by an industrial process. The molecules are indistinguishable from each other. The species formed, and the proportion of the species as a percentage of the total fatty acid content, are subject to fluctuation dependent on the substrate and conditions under which the reaction takes place. Sources of human intake of TFA therefore are foods containing manufactured TFA, and beef, mutton, lamb and dairy fat.

The TFA content of manufactured edible oils varies considerably and may be lower than 1% or as high as 60% of their fatty acid content. The majority of TFA formed from partial hydrogenation are *trans* MUFA, whereas PUFA have a greater tendency to isomerise during heating than MUFA. Hydrogenation of fatty acids is discussed in more detail in section 4.5 below.

TFA, including CLA, are formed in low concentrations during biological hydrogenation of fats in stomach of ruminants. Consequently, they are commonly found in meat and dairy products. TFA content of beef and dairy products is comparatively low, generally estimated at 2-5% of fatty acid content. The distribution of TFA isomers in ruminant fats is subject to much variation. For example, the TFA content and isomer distribution in cow's milk for cattle fed corn silage or grass are quite different (*Figure 3*, Couvreur et al., 2006).

There are differences in the relative abundance of individual TFA in ruminant and manufactured TFA. The principle TFA found in the rumen is *trans* vaccenic acid (*trans* 11-octadecenoic acid), which accounts for over 60% of the TFA content of butterfat from cows. In addition, a relatively small quantity of CLA is formed. In manufactured edible oils the predominant TFA is elaidic acid. The difference in the abundance of different species of TFA between manufactured and ruminant fats is thought to be the basis for potential differences (if any) in their effect on human biochemistry. Current analytical techniques cannot reliably distinguish between ruminant and manufactured TFA.

2. *Technology*

The supply of edible oils which are solid or semi-solid at room temperature is determined by price, seasonal availability, animal or vegetable source requirements, and market demand for specific oils. There is great demand for such edible oils, and to meet this demand a process based on the hydrogenation of unsaturated (liquid) edible oils has been in use by the food industry since the early 20th century. It is estimated that worldwide in excess of 4 million tonnes of nutritional edible oils per year are produced by hydrogenation. Sources of partially hydrogenated edible oils in the diet include fried foods, margarines, shortenings, and their products – biscuits and baked goods.

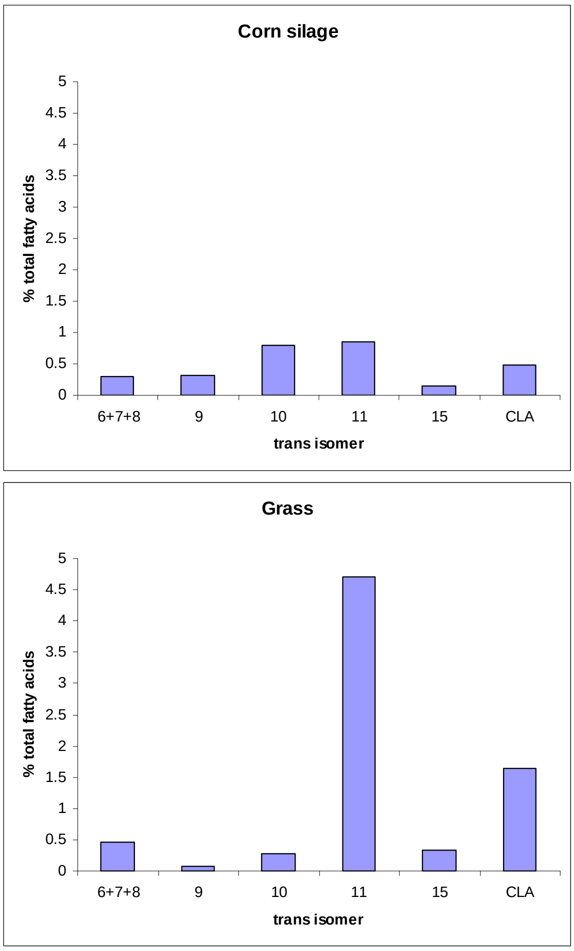

Figure 3 *Trans* fatty acid isomers in cow's milk from cattle fed corn silage or grass (Source: Couvreur *et al*., 2006)

Manufacturing aims to modify edible oils to impart a set of quality parameters, such as oxidative stability, melting point and plasticity. During the process of hydrogenation *trans* MUFA dominate, however, a extensive range of structural variants occur. Small quantities of conjugated TFA are also formed, including the conjugated *trans* linolenic acids (*trans*CLA) commonly found in ruminant fats.

Hydrogenation of edible oils involves the addition of hydrogen to double bonds in the chains of fatty acids in triacylglycerols. In the hydrogenation reaction, gaseous hydrogen, liquid oil and solid catalyst participate under agitation in a closed vessel. The process is of major importance in the edible oils industry since it accomplishes two main objectives:

- it allows the conversion of liquid oils into semi-solid or plastic edible oils more suitable for specific applications, such as in shortenings and margarine.
- it improves the oxidative stability of the oil.

Hydrogenation or hardening causes an increase in the melting points of edible oils. Hydrogenation has great commercial significance in the edible oil industry, as many of the raw materials such as fish oils, soybean oils and others are liquid at room temperature and liable to oxidative deterioration. Hydrogen addition to some, if not all, of the double bonds present in the fatty acids of the triglycerides gives greater stability and a higher melting point to the product. Many of the cooking edible oils and margarines available today contain a proportion of hardened edible oil blended with liquid oil.

By controlling reaction conditions (temperature, pressure, catalyst type and concentration) the processor can make end products having greatly varied chemical and physical characteristics Hydrogenation conditions are said to be selective or non-selective (*Table 2*). A single change in the process parameters with the others held constant, affects the reaction selectivity, extent of *trans* isomer formation and reaction rate. These differences, taken together produce changes in the solid fat index profile of the hydrogenated fat. Because the solid fat index is the key to the properties of the margarine or shortening produced from the hydrogenated fat, there is a strong connection between reaction conditions and final product quality.

Table 2 Hydrogenation conditions

Reaction Parameter	Selective Hydrogenation	Nonselective hydrogenation
Temperature	High	Low
Hydrogen pressure	Low	High
Agitation	Low	High
Catalyst concentration	High	Low
Catalyst type	Selective	Nonselective
Trans-isomer formed	High amount	Low amount
Solid Fat Index Curve shape	Steep	Shallow

Shortenings are anhydrous edible oils (unlike margarines, which contain water) used primarily in baking. By proper selection of *basestocks* almost any desired solid fat index profile can be obtained, according to the requirements of the application. Basestocks are vegetable oils hydrogenated with varying degrees of selectivity, and to different extents, to give edible oils the desired solid fat index profile. A manufacturer has a "stable" of basestocks, from which any shortening on the product line can be made by combining set proportions of certain basestocks.

When triglyceride molecules in a fat form a solid they can pack into three types of stable arrangements: α, β', or β. The major difference between these arrangements lies in the relative orientation of triglyceride pairs when viewed endways. *α Crystals* are random in shape; edible oils with this structure are waxy. *β' Crystals* are shaped like needles; edible oils with this structure are smooth and creamy and preferable for most commercial and domestic applications. *β Crystals* are shaped like blocks; edible oils with this structure are brittle and sandy.

It is important when choosing sources for basestocks to select an oil that will result in β' crystals in the final product. Most vegetable oils are comprised of mainly fatty acids with 18 carbon atoms, and because of this uniformity, the hydrogenated oils form stable β crystals. The crystal habits of the oils affect the textural properties of the shortening or margarine. Oils such as cottonseed palm, tallow and butterfat are stable in the β' form while oils such as canola, coconut, corn, palm kernel, olive, peanut, safflower, sesame, soybean, sunflower and lard are stable in the β form. Hence, the selection of the type of edible oil will affect the texture of the shortening or margarine, so hydrogenation of specific oils is important for the blending of oils for shortenings or margarines.

High stability commercial edible oils are obtained by selective hydrogenation of the base oil. Frying oils are made by hydrogenating oil to reduce most of the PUFA to MUFA. After hydrogenation, the oil is fractionated to remove the high melting triglycerides. The oil remaining has a melting point around room temperature and high oxidative stability. The word 'rancid' refers to off-flavours resulting from oil oxidation. If a fat or oil has a high oxidative stability it has a reduced tendency to develop rancidity.

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APPENDIX 2

DIETARY INTAKE ASSESSMENT REPORT

REVIEW REPORT
TRANS FATTY ACIDS IN THE NEW ZEALAND AND AUSTRALIAN FOOD SUPPLY

Executive Summary

An estimation of the dietary intake of *trans* fatty acids (TFA) for the Australian and New Zealand populations was derived based on recently available concentration data for TFA in foods.

The concentration data for Australia were from laboratory analyses conducted by the New South Wales Food Authority (NSWFA) in 2005, South Australia Health in 2006 and by FSANZ between 2001 and 2006. The food consumption data used for the intake assessment were from the 1995 Australian National Nutrition Survey (NNS). The concentration data for New Zealand were from laboratory analyses conducted by Institute of Environmental Science and Research Limited (ESR) in 2006 and the New Zealand Crop and Food Research Institute from 2002. The food consumption data used for the intake assessment were from the 1997 New Zealand NNS. The intakes were calculated using two days of food consumption data (the second day only on a sub-set of NNS respondents) in order to estimate more usual or longer term nutrient intakes.

The dietary intake assessment was conducted for both the Australian and New Zealand populations; for populations aged 2 years and above, 2 to 4 years, 5 to 12 years, 13 to 19 years, 20 to 44 years, and 45 years and over in Australia; and populations aged 15 years and above, 15–19 years, 20-44 years, and 45 years and above in New Zealand. A dietary intake assessment was also undertaken for New Zealand Maori and Pacific Islanders as a separate group, using the same age groups as for the NZ population as a whole.

Estimated dietary intakes of TFA for the Australian population ranged between 1.2 and 1.6 g/day at the mean level of intake, between 0.5 and 0.6 g/day at the 5th percentile level of intake and between 2.0 and 3.2 g/day at the 95th percentile level of intake. Estimated dietary intakes of TFA for the New Zealand population ranged between 1.6 and 2.0 g/day at the mean level of intake, between 0.9 and 1.0 g/day at the 5th percentile level of intake and between 2.6 and 3.1 g/day at the 95th percentile level of intake. Estimated dietary intakes of TFA for New Zealand Maori and Pacific Islanders were very similar to those for the NZ population as a whole, ranging from 1.6 to 2.1 g/day at the mean level of intake, between 0.7 and 1.1 g/day at the 5th percentile level of intake and between 2.8 and 3.1 g/day at the 95th percentile level of intake. These estimated TFA intakes were comparable to or lower than those reported overseas.

Major contributors to the intake of TFA for Australia were dairy products (26-44%), pastry and pastry based mixed foods (8-17%), fats and oils (8-18%), meat & poultry (9-15%), cereal and cereal products (10-13%) and cereal based mixed foods (6-12%) depending on the population group assessed. Major contributors to the intake of TFA for New Zealand were fats & oils (30-44%), dairy products (19-21%), cereal & cereal based products (9-10%), pastry and pastry based mixed foods (8-11%) and meat & poultry (8-10%) depending on the population group assessed. Major contributors to the intake of TFA for New Zealand Maori and Pacific Islanders were similar to those for the New Zealand population as whole, fats & oils (31-44%), dairy products (18-19%), meat & poultry (8-13%), cereal & cereal based products (8-11%) and pastry and pastry based mixed foods (6-10%) depending on the population group assessed. The higher contribution to total TFA intake from fats and oils for the New Zealand population compared to the Australian population is likely due to the higher TFA levels reported in spreads available in New Zealand.

The proportion of *trans* fatty acid intakes that came from naturally occurring versus manufactured sources was also estimated. Some mixed foods were assumed to contain TFA from both sources. For the Australian population 2 years and above the percent contributions from naturally occurring, manufactured and mixed sources were 60%, 24% and 16% respectively. For the New Zealand population 15 years and above the percent contribution from naturally occurring, manufactured and mixed sources were 41%, 46% and 13% respectively and for New Zealand Maori and Pacific Islander population 15 years and above were 42%, 45% and 13% respectively. Foods derived from ruminants (cattle, sheep), including dairy products were the main sources of naturally occurring TFA in the diet.

The contribution of TFA intake from Take Away foods was estimated. For the Australian population aged 2 years and above, between 8-24% of TFA intake came from Take Away foods. The population group 13-19 years in Australia had the highest proportion of TFA coming from Take Away foods being 13-32%. For the New Zealand population 15 years and above Take Away foods were the source of 3-16% of TFA intake and for the New Zealand Maori and Pacific Islanders between 4-18%.

The contribution of TFA intake from labelled foods was estimated. For the Australian population aged 2 years and above, between 46-84% of TFA intake came from foods that display a Food Label. In New Zealand (15 years and above) the intake of TFA from foods containing a Food Label was between 63-90%, and in the New Zealand Maori and Pacific Islanders population at between 61-86%.

In order to determine whether food consumption patterns have changed markedly since the NNS data were collected and therefore, whether the *trans* fatty acid intakes based on the NNS data are reliable, the proportion of people reporting consumption of major food contributors to TFA intakes in the NNSs were compared with up to date data from the Roy Morgan Single Source Survey for 2001-2006. Data were not available on all relevant foods and results are not directly comparable due to different survey methods, but for two major contributors, spreads and milk, the proportion of people consuming these products appears to have remained the same from 1995 to 2006. However, within the milk category, the Single Source Survey data indicate a trend to decreasing consumption of full fat milk and increasing consumption of low or no fat milk, which may result in decreasing TFA intake from natural sources that was not captured in the dietary intake estimate. For foods such as cheese, although proportions of all age groups who reported consuming cheese in the NNS 24-hour recall were lower than that in the more recent Single Source Survey, the proportion consuming on a weekly basis reported in the NNS Food Frequency Questionnaire (FFQ) were very similar, again indicating 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 is 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. However, as these foods were minor contributors to total TFA intakes, any change may not influence the results a great deal. Unfortunately there are no comparable data for take away foods.

Estimated TFA intakes were compared to a reference health standard in order to determine whether intakes are likely to be a concern to public health and safety. In 2006 Nutrient Reference Values (NRV) were established for fats in the Australian and New Zealand diets, in the form of an Acceptable Macronutrient Distribution Range (AMDR)[♦] such that total fats should contribute between 20-35% of total energy intake, and saturated fats and *trans* fats combined should comprise no more than 10% of total daily energy intake. The percentage of total energy intakes from saturated fats and *trans* fats combined was estimated to be approximately one and a half times the relevant reference health standard (130-170% AMDR). Even if all *trans* fats were removed from the diets, intake of saturated fats would still exceed the AMDR.

In 2003 the World Health Organisation [1] (WHO) set nutrient goals, including one specifically for TFA recommending that TFA contribute less than 1% total daily energy intake. The contributions of TFA intakes to total energy intakes for the Australian population 2 years and above and the New Zealand population 15 years and above were 0.6% total energy intakes and 0.7% total energy intakes respectively, and were therefore below the WHO nutrient goal. These estimates were comparable to, or lower than reported TFA contribution to total energy intakes estimates from other countries.

[♦] AMDR: Acceptable Macronutrient Distribution Range is an estimate of the range of intakes for each macronutrient for individuals (expressed as per cent contribution to energy), which would allow for an adequate intake of all the other nutrients whilst maximising general health outcome.

[1] Joint WHO/FAO Expert Consultation (2003) *Diet, nutrition and the prevention of chronic diseases.*

CONTENTS

1. Background

Given the current interest in TFA by the government and the media, along with the recent availability of TFA concentration data, a dietary intake assessment was deemed necessary in order to estimate the current dietary intake of TFA and the impact of TFA in the food supply on public health and safety.

There are two main groups of fatty acids; saturated and unsaturated fatty acids. *Trans* fatty acids are a type of unsaturated fatty acid that have the potential to impact adversely on health.

Dietary TFA come from two primary sources:

- **manufactured TFA:** industrial, partial hydrogenation of edible oils containing unsaturated fatty acids, formation as a consequence of oil deodorisation and high temperature cooking; and
- **naturally occurring TFA: including ruminant TFA** (occur naturally in the fat of dairy products and meat by bacterial transformation of unsaturated fatty acids in the rumen of ruminants) and other natural sources.

Manufactured TFA can be formed in the chemical process of making semi-solid fats from liquid polyunsaturated fatty acids (partial hydrogenation) for use as edible oil spreads, margarine or as shortening for baking. The hydrogenation of vegetable fats gives these products a longer shelf life.

At present, the Australia New Zealand Food Standards Code ('the Code') does not require manufacturers to label the *trans* fatty acid content of foods unless they make a nutrition claim about cholesterol, saturated, unsaturated or TFA (Standard 1.2.8).

2. Dietary modelling

2.1 What is dietary modelling?

Dietary modelling is a tool used to estimate dietary exposure to food chemicals from the diet as part of the risk assessment process. To estimate dietary exposure to food chemicals, records of what foods people have eaten are required and information on how much of the food chemical is in each food. The accuracy of these exposure estimates depends on the quality of the data used in the dietary models. Sometimes, not all of the data required are available or there is uncertainty about their accuracy so assumptions are made, either about the foods eaten or about chemical levels, based on previous knowledge and experience. The models are generally set up according to international conventions for food chemical dietary exposure estimates. However, each modelling process requires decisions to be made about how to set the model parameters. Different decisions may result in different answers. Therefore, FSANZ documents clearly all such decisions and model assumptions to enable the results to be understood in the context of the data available and so that risk managers can make informed decisions.

2.2 Dietary modelling approach for consideration of the dietary intake of TFA

The dietary intake assessment was conducted using dietary modelling techniques that combine food consumption data with food chemical concentration data to estimate the intake of the food chemical from the diet. The dietary intake assessment was conducted using FSANZ's dietary modelling computer program, DIAMOND.

Dietary intake = food chemical concentration x food consumption

The intake was estimated by combining usual patterns of food consumption, as derived from national nutrition survey (NNS) data, with recently determined concentrations of TFA in food.

A detailed explanation of how the estimated dietary intakes are calculated can be found in Appendix 1.

2.2.1 Dietary survey data

DIAMOND contains dietary survey data for Australia and New Zealand; the 1995 NNS from Australia which surveyed 13,858 people aged 2 years and above, and the 1997 New Zealand NNS that surveyed 4,636 people aged 15 years and above.

Both of these surveys used a 24-hour food recall methodology. A second 24-hour recall was also conducted on a subset of respondents from the NNS for a non-consecutive day. Standard methodologies were used to estimate the intake based on consumption data from the first 24 hour recall (day one), which were then adjusted to estimate 'usual intake' by using consumption information from the second 24 hour recall (day two). Adjusted nutrient intakes were calculated because they better reflect 'usual' daily nutrient intakes and because reference health standards such as the Nutrient Reference Values NRVs are based on usual or long term intakes and it is therefore more appropriate to compare adjusted or 'usual' nutrient intakes with NRVs. For more information on the second day adjusted nutrient intake methodology, refer to Appendix 1.

It is recognised that these survey data have some limitations. For a complete list of limitations see Section 5 *Limitations*.

2.2.2 Additional food consumption data or other relevant data

No further information was required or identified for the purpose of refining the dietary intake estimates for this assessment. However, it should be noted that more comprehensive analytical data on the TFA concentrations in a wider range of foods would improve the accuracy of intake estimates in the future.

The currency of the food consumption data used to estimate intakes of TFA were validated using the Roy Morgan Single Source data. More information on the validation can be found in Appendix 5.

2.2.3 Population groups assessed

A dietary intake assessment was conducted for the population aged 2 years and above for Australia and 15 years and above for New Zealand as a proxy for lifetime intake. The population sub-group considered to be at greatest risk of cardiovascular disease from TFA was identified as those aged 45 years and over and therefore results for this age group are presented separately to the population estimates. A dietary intake assessment was also conducted for younger age groups (2 to 4 years, 5 to 12 years, 13 to 19 years and 20 to 44 years) to obtain dietary intake estimates of TFA for comparative purposes. A dietary intake assessment was also conducted for New Zealand Maori and Pacific Islanders as a separate group, using the same age groups that were used for the NZ population as a whole. It is important to note that while younger age groups have been assessed separately, they are also included in the assessments for the population assessments. Also, the New Zealand population assessments include the Maori and Pacific Islanders that were also assessed separately.

2.3 TFA concentration levels

The concentration data for Australia were from laboratory analyses conducted by the New South Wales Food Authority (NSWFA) in 2005, South Australia Health in 2006 and by FSANZ between 2001 and 2006. The concentration data for New Zealand were from laboratory analyses conducted by Institute of Environmental Science and Research Limited (ESR) in 2006 and Crop and Food Research from 2002.

While the NSW Food Authority data (Soenario, 2005) provided information on concentrations of individual TFA, the FSANZ data did not. Therefore estimated intakes were only calculated for total TFA. A summary of the analytical methods, the foods analysed and the range of concentrations of total TFA determined in each analytical study are shown in Appendix 2.

TFA (total) = mono TFA + poly TFA

Both the Australian and New Zealand datasets were developed using data from foods analysed by gas chromatography. 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[2], which are generally present in much larger quantities than TFA.

Concentrations used in the dietary modelling were means of analysis of up to five single samples or were a single value derived from analysis of a composite sample. The NSW study indicated there can be considerable variation in TFA concentrations between different samples of similar foods. In the case of beef and lamb, the NSW study only provided data for raw meats; raw values were used to represent cooked meats as well.

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[2] In the NSW study, four TFA were quantified: C16:1 (6t) , C18:1 (9t) (elaidic acid), C18:2 (9t, 12t) and C18:3 (9t, 12t, 15t

The foods and concentrations of TFA used in the dietary intake assessment (which were derived from the studies described above) are shown in Appendix 3.

Due to the limited number of analytical values available, individual TFA levels could not be assigned to each food reported in the NNS. Concentrations of TFA found on analysis were therefore assigned to groups of related foods. Individual foods from the NNS data were matched to the most appropriate food group for dietary modelling purposes.

3. Assumptions in the dietary modelling

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 existed, conservative assumptions were generally used to ensure that the dietary intake assessment did not underestimate intake.

Assumptions made in the dietary modelling include:

- Where a concentration is assigned to a food group, all foods in that group contain *trans* fats at the levels specified in Appendix 2, Table A2.1;
- TFA concentrations have not changed since the time of analysis;
- consumption of foods as recorded in the NNS represent current food consumption patterns. (The currency of the food consumption data used to estimate intakes of TFA were validated using the Roy Morgan Single Source data. More information on the validation can be found in Appendix 5.);
- where a food was not included in the intake assessment, it was assumed to contain a zero concentration of TFA;
- 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";
- all mixed foods with recipes in DIAMOND were assumed to be prepared in the home (and not produced commercially). Therefore, if a recipe uses an ingredient that contains TFA, the quantity of TFA from the ingredient will carry-over into the mixed food;
- there are no reductions in TFA concentrations from food preparation or due to cooking; and
- 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).

These assumptions are likely to lead to a conservative estimate for TFA dietary intake.

4. Results

Results are presented for Australia, New Zealand (including Maori and Pacific Islanders) and New Zealand Maori and Pacific Islanders separately. Further details relating to the results presented below can be found in Appendix 4, including estimated dietary intakes, food contributing to dietary intakes (including some methodological explanations) and summary food consumption statistics for each population group derived during the calculation for estimating the dietary intakes.

4.1 Estimated dietary intakes of TFA

The estimated dietary intakes for TFA are shown in Table 1 and Figure 1 (full results in Appendix 4, Table A4.1, including intakes broken down by gender). Due to the dietary intake methodology used and the assumptions made for the purposes of conducting the intake assessment, all respondents in the 1995 NNS and 1997 NNS were consumers of TFA, therefore the results presented are based on all respondents.

Australia:
Estimated dietary intakes of TFA range between 1.2 and 1.6 g/day at the mean level of intake, between 0.5 and 0.6 g/day at the 5th percentile level of intake and between 2.0 and 3.2 g/day at the 95th percentile level of intake, depending on the sub-population group assessed.

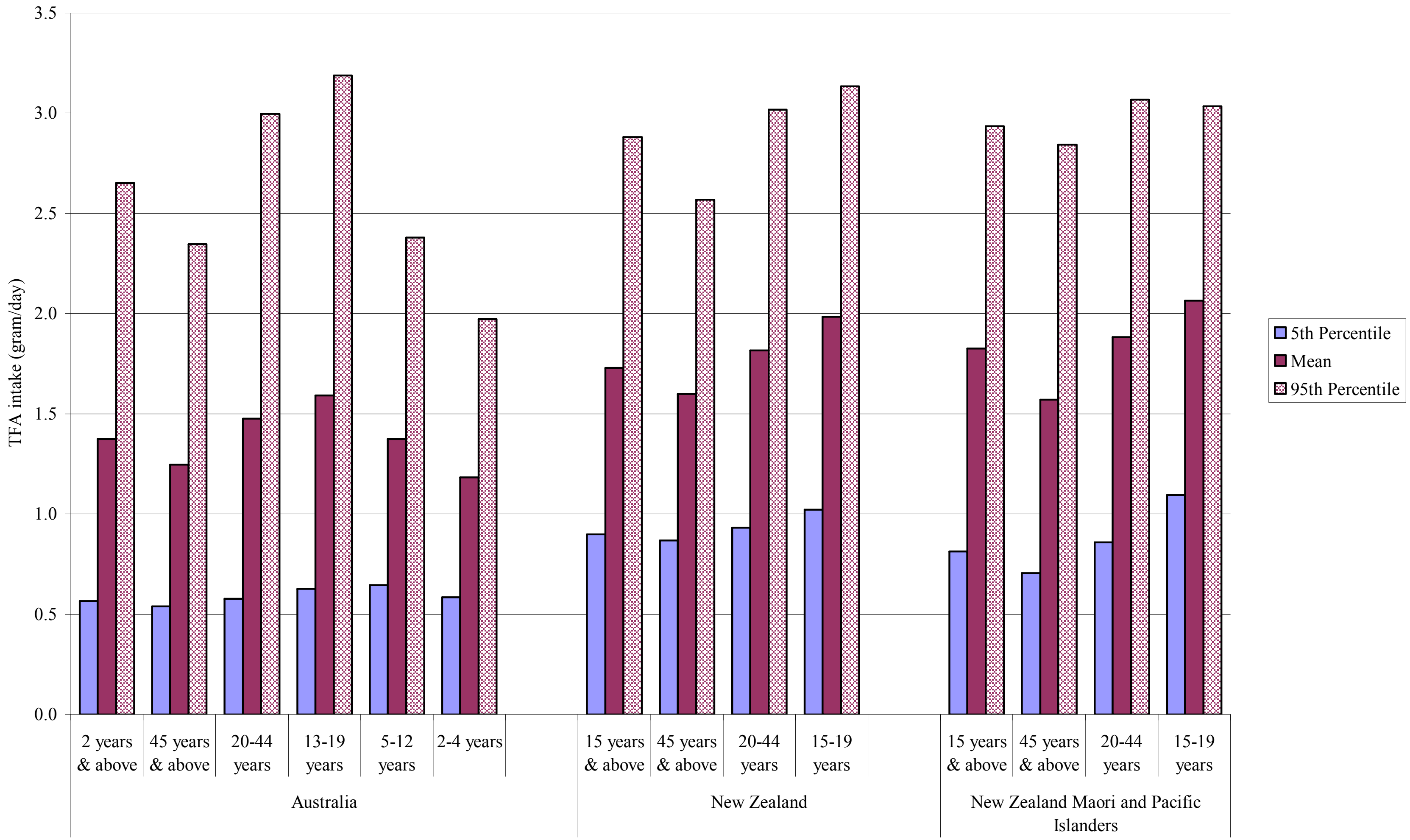
New Zealand:
Estimated dietary intakes of TFA range between 1.6 and 2.0 g/day at the mean level of intake, between 0.9 and 1.0 g/day level of intake at the 5th percentile and between 2.6 and 3.1 g/day at the 95th percentile level of intake, depending on the sub-population group assessed.

New Zealand Maori and Pacific Islanders:
Estimated dietary intakes of TFA were similar to those for the New Zealand population as whole and ranged from 1.6 to 2.1 g/day at the mean level of intake, between 0.7 and 1.1 g/day at the 5th percentile level of intake and between 2.8 and 3.1 g/day at the 95th percentile level of intake, depending on the sub-population group assessed.

Table 1: Estimated 5th, mean and 95th percentile of TFA intakes for various Australian and New Zealand population groups

Country	Population Group	Gender	No. of respondents	*Trans* fatty acid intake (g/day) 5th Percentile	Mean	95th Percentile
Australia	2 years & above	All	13,858	0.6	1.4	2.7
	45 years & above	All	5,266	0.5	1.2	2.3
	20-44 years	All	5,450	0.6	1.5	3.0
	13-19 years	All	1,063	0.6	1.6	3.2
	5-12 years	All	1,496	0.6	1.4	2.4
	2-4 years	All	583	0.6	1.2	2.0
New Zealand	15 years & above	All	4,636	0.9	1.7	2.9
	45 years & above	All	2,072	0.9	1.6	2.6
	20-44 years	All	2,267	0.9	1.8	3.0
	15-19 years	All	297	1.0	2.0	3.1
New Zealand Maori and Pacific Islanders	15 years & above	All	1,011	0.8	1.8	2.9
	45 years & above	All	248	0.7	1.6	2.8
	20-44 years	All	652	0.9	1.9	3.1
	15-19 years	All	111	1.1	2.1	3.0

Figure 1: Estimated Dietary Intakes of Total TFA



4.2 Major contributing food groups to total estimated dietary intakes

An assessment was conducted to determine the percentage contribution of each food group to total TFA intakes. Several other assessments were also conducted to determine contributions of types of foods to total TFA intakes, such as naturally occurring or manufactured sources of TFA, TFA intakes from take away foods and TFA intakes from labelled foods. These assessments were conducted in order to assist in determining appropriate risk management strategies should they be required.

4.2.1 Contribution per food group

The contribution of every food to total TFA intakes was calculated (see Appendix 4, Table A4.2, a. Australia, b. New Zealand and c. New Zealand Maori and Pacific Islanders). Presented below is a summary of contributors by major food group.

Australia:
The major contributors to total TFA dietary intakes are shown in Table 2a and in Figure 2a for all the population groups assessed. The major food groups contributing to total TFA intakes for Australia were dairy products (26-44%), pastry and pastry based mixed foods (8-17%), fats & oils (8-18%), meat & poultry (9-15%) and cereal & cereal products (10-13%) depending on the population group assessed. The same major food groups contributed to TFA intakes in the over 45 year population group, although for this group the proportional contribution of fats and oils was higher than for the population as a whole. It is notable that for young children (2-4 years), dairy products contributed 40% of intake.

New Zealand:
The major contributors to total TFA dietary intakes are shown in Table 2b and in Figure 2b for all the population groups assessed. Major contributors to the intake of TFA for New Zealand were fats & oils (30-44%), dairy products (19-21%), cereal & cereal based products (9-10%), pastry and pastry based mixed foods (8-11%), meat & poultry (8-10%) and cereal based mixed foods (2-7%) depending on the population group.

New Zealand Maori and Pacific Islanders:
The major contributors to total TFA dietary intakes are shown in Table 2c and in Figure 2c for all the population groups assessed, and were similar to those for the New Zealand population as a whole. Major contributors to the intake of TFA for New Zealand Maori and Pacific Islanders were fats & oils (31-44%), dairy products (18-19%), meat & poultry (8-13%), cereal & cereal based products (8-11%), and pastry and pastry based mixed foods (6-10%) depending on the population group assessed.

The higher contribution to total TFA intake from fats and oils for the New Zealand populations compared to the Australian population is likely due to the higher TFA levels reported in spreads available in New Zealand.

Table 2: Contribution of each food group to total TFA dietary intake for different population groups

a. Australian*

Food Name	% Contribution toTFA dietary intake					
	2 yrs & above	45 yrs & above	20-44yrs	13-19yrs	5-12yrs	2-4yrs
Dairy products	29	29	26	28	33	44
Pastry & pastry based mixed foods	14	13	15	17	12	8
Fats and oils	13	18	12	8	8	8
Meat and poultry	13	15	13	10	10	9
Cereal and cereal products	11	12	10	10	13	10
Cereal based mixed foods	9	6	11	12	11	9
Vegetables	7	3	7	10	9	8
Snack foods	1	0	1	2	3	2
Fish, seafood and fish products	1	1	1	1	1	1
Eggs	1	1	1	1	1	1
Nuts and legumes	1	1	1	0	0	0
Sugar/Confectionery	0	0	1	1	1	1
Condiments	0	0	0	0	0	0
Beverages, alcoholic	0	0	0	0	0	0
Infant formula and foods	0	0	0	0	0	0
Beverages, non-alcoholic	0	0	0	0	0	0
Fruit	0	0	0	0	0	0

Total number of respondents for Australia: 2 years and above = 13 858, 45 years and above = 5266, 20-44 years = 5448, 13-19 years = 1065, 5-12 years = 1496, 2-4 years = 583,. Respondents include all members of the survey population whether or not they consumed a food that contains TFA.

* Note: The percent contribution of each food group is based on total TFA intakes for all consumers in the population groups assessed. Therefore the total TFA intakes differ for each population group and each scenario.

b. New Zealand[*]

Food Name	% Contribution to TFA dietary intake			
	15 yrs & above	**45 yrs & above**	**20-44 yrs**	**15-19 yrs**
Fats and oils	38	44	34	30
Dairy products	20	19	21	20
Cereal and cereal products	10	9	10	10
Pastry and Pastry based mixed foods	10	8	10	11
Meat and poultry	9	9	10	8
Cereal based mixed foods	3	2	3	7
Sugar/Confectionery	3	2	3	6
Condiments	2	2	3	3
Snack foods	2	1	3	3
Vegetables	2	1	3	3
Fish, seafood and fish products	2	2	2	1
Eggs	1	1	1	1
Nuts and legumes	0	0	0	0
Beverages, alcoholic	0	0	0	0
Beverages, non-alcoholic	0	0	0	0
Fruit	0	0	0	0
Infant formula and foods	0	0	0	0

Total number of respondents for New Zealand: 15 years and above = 4636, 45 years and above = 2072, 20-44 years = 2267, 15-19 years = 297. Respondents include all members of the survey population whether or not they consumed a food that contains TFA.

[*] Note: The percent contribution of each food group is based on total TFA intakes for all consumers in the population groups assessed. Therefore the total TFA intakes differ for each population group and each scenario.

c. New Zealand Maori and Pacific Islanders*

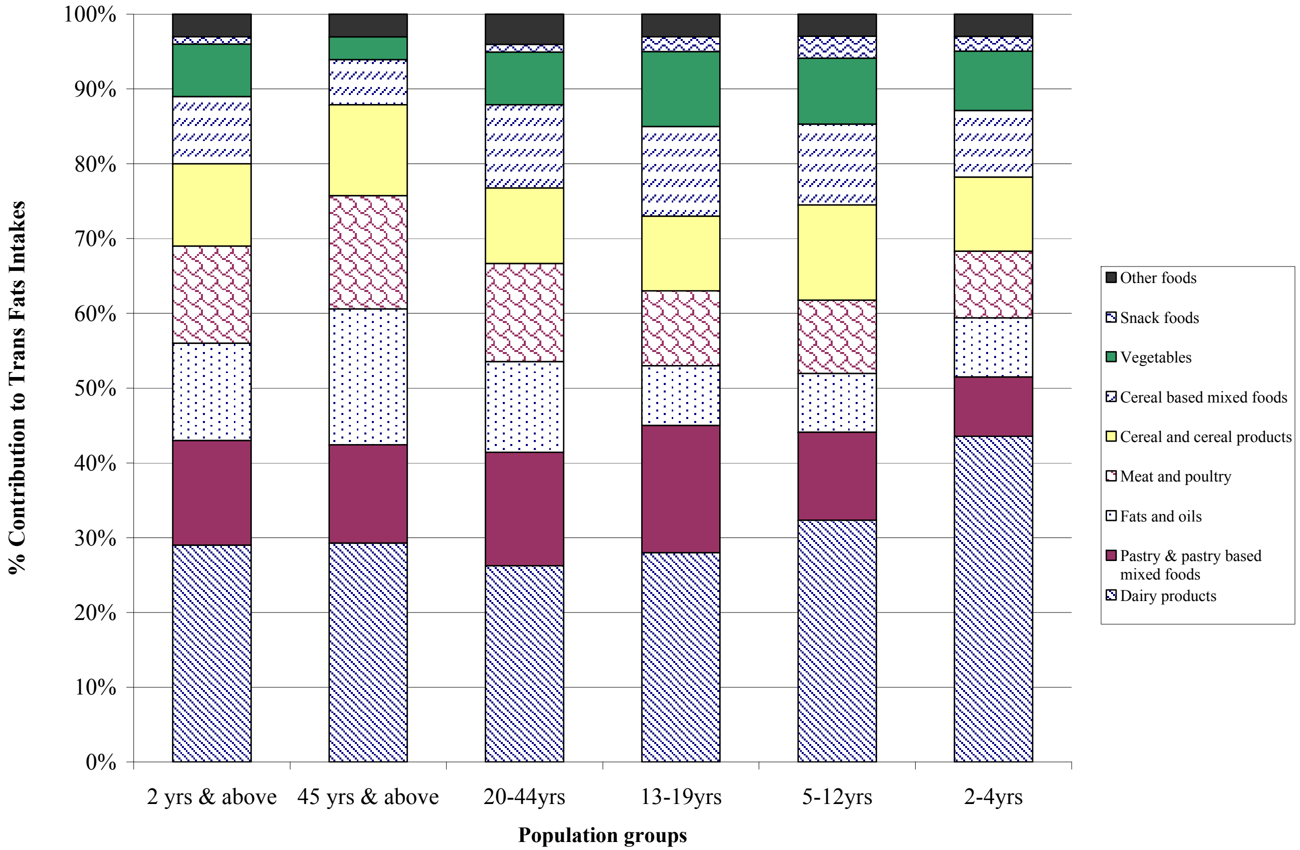
Food Name	% Contribution to TFA dietary intake			
	15 yrs & above	**45 yrs & above**	**20-44 yrs**	**15-19 yrs**
Fats and oils	37	44	35	31
Dairy products	19	19	18	19
Meat and poultry	11	13	10	8
Cereal and cereal products	9	8	9	11
Pastry and Pastry based mixed foods	9	6	9	10
Snack foods	4	0	5	3
Sugar/Confectionery	3	2	3	7
Cereal based mixed foods	3	1	3	4
Vegetables	2	1	2	4
Fish, seafood and fish products	2	3	2	1
Eggs	1	1	1	1
Nuts and legumes	1	1	1	0
Condiments	0	0	0	0
Beverages, alcoholic	0	0	0	0
Beverages, non-alcoholic	0	0	0	0
Fruit	0	0	0	0
Infant formula and foods	0	0	0	0

Total number of respondents for New Zealand: 15 years and above = 1,011, 45 years and above = 248, 20-44 years = 652, 15-19 years = 111. Respondents include all members of the survey population whether or not they consumed a food that contains TFA.

* Note: The percent contribution of each food group is based on total TFA intakes for all consumers in the population groups assessed. Therefore the total TFA intakes differ for each population group and each scenario.

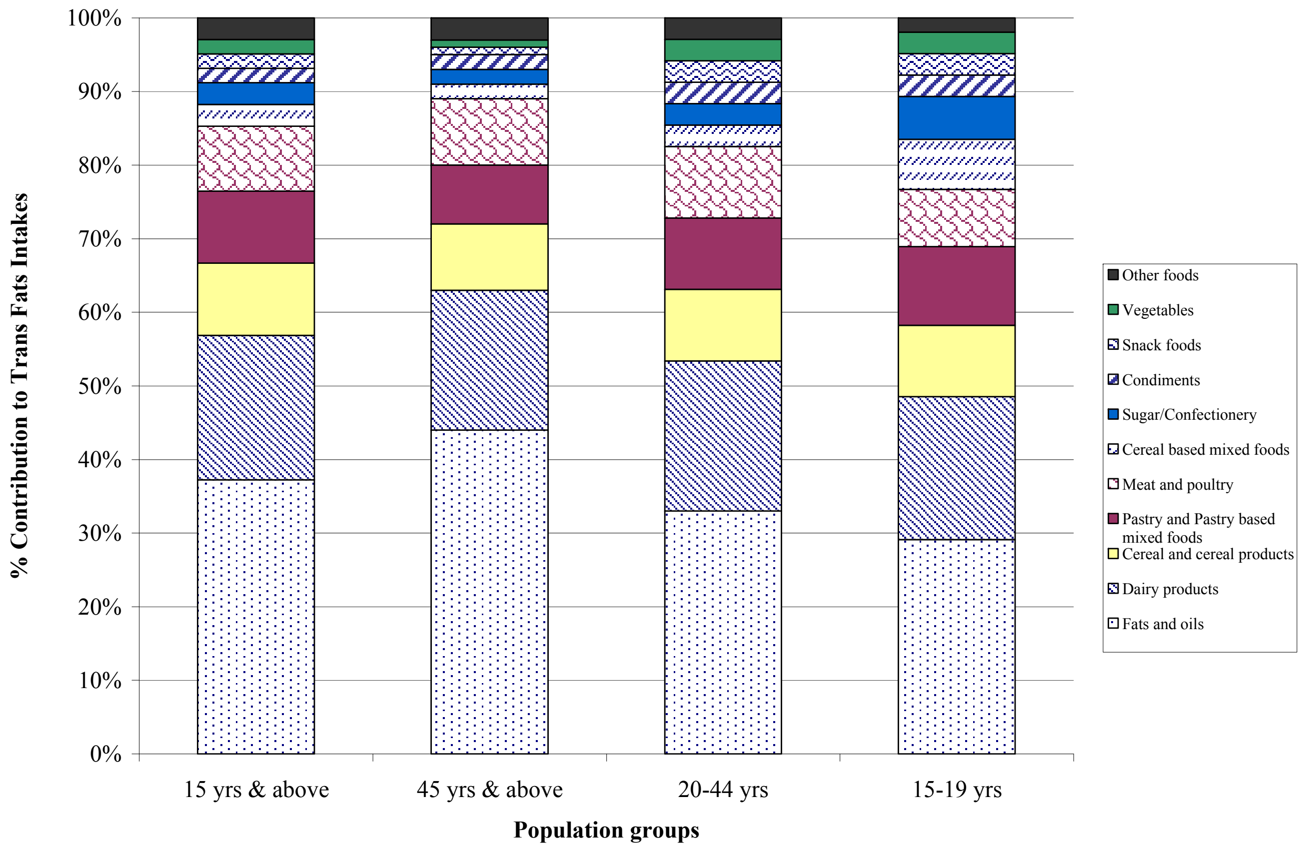
Figure 2: Major contributing food groups to total TFA intakes for different population groups

a. Australia*



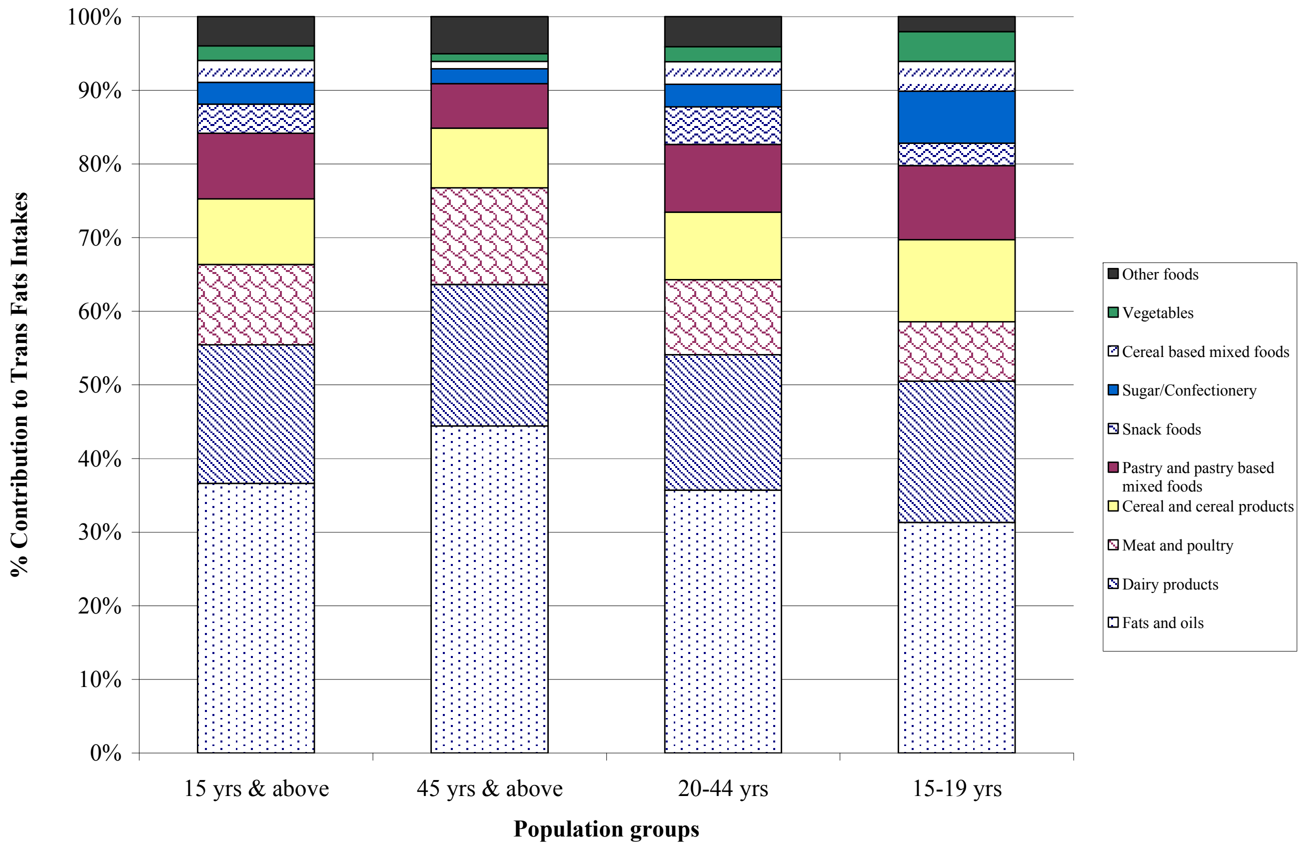
* Note: The percent contribution of each food group is based on total TFA intakes for all consumers in the population groups assessed. Therefore the total TFA intakes differ for each population group and each scenario.

b. New Zealand*



* Note: The percent contribution of each food group is based on total TFA intakes for all consumers in the population groups assessed. Therefore the total TFA intakes differ for each population group and each scenario.

c. New Zealand Maori and Pacific Islanders*



* Note: The percent contribution of each food group is based on total TFA intakes for all consumers in the population groups assessed. Therefore the total TFA intakes differ for each population group and each scenario.

4.2.2 Contribution from naturally occurring TFA versus manufactured TFA

Some TFA in foods is from naturally occurring sources, predominantly from foods derived from ruminants. The proportion of the estimated TFA intakes from naturally occurring versus manufactured sources was determined. For the Australian population aged 2 years and above, 60% of TFA intake came from naturally occurring sources, 24% from manufactured sources and 16% from foods with mixed sources of TFA. For the New Zealand population aged 15 years and above, 41% of TFA intake came from naturally occurring sources, 46% from manufactured sources and 13% from foods with mixed sources of TFA. The contributions for New Zealand Maori and Pacific Islanders are similar to that for the New Zealand population. The contributions to total dietary intakes of TFA for naturally occurring TFA and manufactured TFA are shown in Table 3. The foods classified as containing naturally occurring TFA , manufactured TFA and both naturally occurring TFA and manufactured TFA are shown in Appendix 4, Table A4.3.

Table 3. Percent contributions of naturally occurring TFA and manufactured TFA for different population groups*

a. Australia

	% contribution to TFA intakes					
	2yrs & above	**45yrs & above**	**20-44yrs**	**13-19yrs**	**5-12yrs**	**2-4yrs**
Foods containing naturally occurring TFA only	60	63	59	55	58	67
Foods containing manufactured TFA only	24	21	24	27	29	23
Foods containing both naturally occurring TFA and manufactured TFA	16	16	18	18	13	10

b. New Zealand

	% contribution to TFA intakes			
	15 yrs & above	**45 yrs & above**	**20-44 yrs**	**15-19 yrs**
Foods containing naturally occurring TFA only	41	40	43	41
Foods containing manufactured TFA only	46	48	44	45
Foods containing both naturally occurring TFA and manufactured TFA	13	12	14	13

c. New Zealand Maori and Pacific Islanders

	% contribution to TFA intakes			
	15 yrs & above	**45 yrs & above**	**20-44 yrs**	**15-19 yrs**
Foods containing naturally occurring TFA only	42	46	41	41
Foods containing manufactured TFA only	45	43	46	46
Foods containing both naturally occurring TFA and manufactured TFA	13	10	13	13

* Classification of foods into the three groups was based on the major ingredients, noting that the predominant source of naturally occurring TFA is foods derived from ruminant (cattle or sheep) sources, including dairy products.

4.2.3 Contribution from Take Away foods

A portion of the total TFA intake is derived from Take Away foods. Therefore, another assessment was conducted to determine the proportion of TFA intake that comes from 'Take Away' foods as there is a perception that these types of foods are a major source of TFAs in the diet. This estimate was conducted to determine the impact on total TFA intakes should the Take Away food industry move to reduce TFA levels in their foods.

This assessment was done using the contribution of individual foods to total TFA intakes and reclassifying foods as Take Away or not, to determine the total contribution from Take Away foods. Some foods were difficult to classify as either take away or not. For example, hot chips which may be purchased from a fast food outlet or purchased frozen and oven baked. Therefore, a range of contribution was determined based on a lower bound (or best case, where foods that could be either take away or not were classified as not take away) and an upper bound (or worst case where foods that could be either take away or not were classified as take away foods). A detailed explanation of how this estimate was calculated, and the foods classified as Take Away, can be found in Appendix 4, part 4.4.

The proportion of the estimated TFA intakes from Take Away foods was determined, and is shown in Table 4. For the Australian population aged 2 years and above, between 8-24% of TFA intake came from Take Away foods. The population group 13-19 years in Australia had the highest proportion of TFA coming from Take Away foods being 13-32%. For the New Zealand population 15 years and above Take Away foods were the source of 3-16% of TFA intake and the intake of TFA from Take Away foods for the New Zealand Maori and Pacific Islanders (15 years and above) is similar to that for the New Zealand population being between 4-18%.

The results show that should Take Away food outlets change their foods to decrease TFA content, it will have a small impact on total TFA intakes from all foods. This is supported by the findings FSANZ determined previously that between 30-44% of TFA intake was coming from fats and oils and 19-21% was from dairy products in New Zealand. The major contributors of TFA in Australia were dairy products (26-44%), pastry and mixed foods (8-17%) and fats and oils (8-18%).

Table 4. Percent contributions of TFA intake from Take Away foods for different population groups

	% contribution to TFA intakes					
a. Australia						
	2yrs & above	**45yrs & above**	**20-44yrs**	**13-19yrs**	**5-12yrs**	**2-4yrs**
	8-24	4-18	10-27	13-32	11-23	9-18
b. New Zealand (All)						
	15 yrs & above	**45 yrs & above**	**20-44yrs**	**15-19 yrs**		
	3-16	2-13	4-18	6-18		
c. New Zealand Maori and Pacific Islanders						
	15 yrs & above	**45 yrs & above**	**20-44yrs**	**15-19 yrs**		
	4-18	2-15	4-18	6-20		

4.2.4 Contribution from labelled foods

A portion of the total TFA intake is derived from foods that display a Food Label. Therefore, an additional assessment was to determine the proportion of TFA intakes that could come from labelled foods. This would assist in showing what proportion of TFA intakes could be affected should there be a regulatory option introduced where the labelling of TFA become mandatory in all Nutrition Information Panels (NIP).

This assessment was done using the contribution of individual foods to total TFA intakes and reclassifying foods as labelled or not, to determine the total contribution from labelled foods. Some foods can be purchased with or without a label, such as bread purchased in a supermarket with a plastic wrapper and label, compared to bread bought in a bakery where it may not have a label or nutrition information panel. Again, a range of contribution was determined based on a lower bound (or best case, where foods that could be either labelled or not were assumed to be not labelled) and an upper bound (or worst case where foods that could be either labelled or not were assumed to be labelled). A detailed explanation of how this was calculated, and the foods classified as labelled, can be found in Appendix 4, part 4.5.

The proportion of the estimated TFA intakes from foods that display a Food Label was determined and are shown in Table 5. For the Australian population aged 2 years and above, between 46-84% of TFA intake came from foods that display a Food Label. The population group 15 years and above in New Zealand had the highest intake of TFA from foods containing a Food Label being between 63-90%, and the intake of TFA from foods containing a Food Label was similar in the New Zealand Maori and Pacific Islanders population (15 years and above) at between 61-86%.

The results show that changing food regulations to make all Food Labels display the quantity of TFA in the product has great potential to increase consumer awareness regarding the amounts of TFA they are consuming as up to 92% of current TFA intake in Australia and New Zealand comes from foods that display a Food Label.

Table 5. Percent contributions of TFA intake from foods displaying a Food Label for different population groups

	% contribution to TFA intakes					
a. Australia						
	2yrs & above	**45yrs & above**	**20-44yrs**	**13-19yrs**	**5-12yrs**	**2-4yrs**
	46-84	51-91	43-83	41-82	47-85	57-87
b. New Zealand (All)						
	15 yrs & above	**45 yrs & above**	**20-44 yrs**	**15-19 yrs**		
	63-90	68-92	62-89	58-89		
c. New Zealand Maori and Pacific Islanders						
	15 yrs & above	**45 yrs & above**	**20-44 yrs**	**15-19 yrs**		
	61-86	68-89	59-85	60-89		

5. Limitations of the dietary modelling

5.1 Validity of food consumption data

Dietary modelling based on 1995 Australian and 1997 New Zealand NNS food consumption data provide the best available estimate of actual consumption of foods and the resulting estimated dietary intakes of a nutrient for the population. However, it should be noted that the NNS data do have limitations. These limitations relate to the age of the data and the changes in eating patterns that may have occurred since the data were collected. Generally, consumption of staple foods such as fruit, vegetables, meat, dairy products and cereal products, which make up the majority of most people's diet and are the major contributors to TFA intake, is unlikely to have changed markedly since 1995 as demonstrated by a review of Australian NNSs (Cook *et al*., 2001a; Cook *et al*., 2001b). However, there is some uncertainty associated with the consumption of foods that may have changed in consumption since 1995, or that have been introduced to the market since 1995.

In order to determine whether food consumption patterns have changed markedly since the NNS data were collected and therefore, whether the *trans* fatty acid intakes based on the NNS data are reliable, the proportion of people reporting consumption of major food contributors to TFA intakes in the NNSs were compared with up to date data from the Roy Morgan Single Source Survey for 2001-2006 for the population aged 14 years and above who consumed particular commodities in the last seven days (weekly consumer) in each country. Data were available from the NNS 24-hour recall records for a large number of foods and for a limited number of foods from NNS food frequency (FFQ) surveys.

In this comparison, the age groups used to derive the proportion of each population consuming each commodity were based on ages available that most closely matched the age groups used for the dietary intake assessment. It should be noted that data were not available on all relevant foods and results are not directly comparable due to different survey methods. However, it is expected that for foods likely to be consumed on a daily basis (staples) the results from the NNS 24-hour recall or FFQ data and the Single Source Survey will be similar if food consumption patterns have not changed markedly over the last ten years. In contrast, for foods that are only occasionally consumed, for example potato crisps, the proportion of consumers reported in the NNS is expected to be considerably lower that that reported in the NNS FFQ or Single Source Survey whether or not food consumption patterns have changed as the proportion of consumers captured will increase with each day of the survey period (Institute of European Food Studies, 1998). A comparison of NNS FFQ and Single Source Survey data is therefore a better comparison for occasionally consumed foods and would be expected to give results in the same range if food consumption patterns have not changed markedly between 1995/97 and 2006. Detailed comparisons between the NNS and Single Source Survey data can be found in Appendix 5.

In summary, for two major contributors to TFA dietary intakes that are likely to be consumed on a daily basis, spreads and milk, the proportion of people reporting consuming these products appears to have remained the same from 1995 to 2006 (NNS 24-hour recall data, NNS FFQ data and the more recent Single Source Survey data). However, within the milk category, the Single Source Survey data indicate a trend to decreasing consumption of full fat milk and increasing consumption of low or no fat milk, which may result in decreasing TFA intake from natural sources that was not captured in the dietary intake estimate. For foods such as cheese, although proportions of all age groups who reported consuming cheese in the NNS 24-hour recall were lower than that in the more recent Single Source Survey, the proportion consuming on a weekly basis reported in the NNS food frequency (FFQ) surveys were very similar, again indicating 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 is 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. However, as these foods were minor contributors to total TFA intakes, any change may not influence the results a great deal. Unfortunately there are no comparable data for take away foods.

5.2 Other limitations

Over time, there may be changes to the ways in which manufacturers and retailers make and present foods for sale. Since the data were collected for the NNS, there have been significant changes to the Food Standards Code to allow more innovation in the food industry. As a consequence, another limitation of the dietary modelling is that some of the foods that are currently available in the food supply were either not available or were not as commonly available in 1995 or 1997. In addition there have been product formulation changes to minimise TFA levels in some cases, however these changes will have been captured to a large extent as relatively recent analytical data have been used in the TFA dietary intake estimates.

While the results of NNS's can be used to describe the usual intake of groups of people, they cannot be used to describe the usual intake of an individual (Rutishauser, 2000). In particular, they cannot be used to predict how consumers will change their eating patterns as a result of an external influence such as the availability of a new type of food.

FSANZ does not apply statistical population weights to each individual in the NNS in order to make the data representative of the population. This prevents distortion of actual food consumption amounts that may result in an unrealistic intake estimate.

6. Risk characterisation

Concerns exist about the potential health effects of TFA, particularly those that are derived from partial hydrogenation of vegetable oils. Estimated intakes of TFA were compared to reference health standards in order to determine whether intakes are within recommended guidelines and whether they pose a potential risk to public health and safety.

6.1 Comparison of the estimated dietary intakes with the Australian nutrient reference value

Estimated TFA intakes were compared to a reference health standard in order to determine whether intakes are likely to be a concern to public health and safety. In 2006 Nutrient Reference Values (NRV) (National Health and Medical Research Council, 2006) were established for fats in the Australian and New Zealand diets, in the form of an Acceptable Macronutrient Distribution Range (AMDR)[♦], such that total fats should contribute between 20-35% of total energy intake, and saturated fats and *trans* fats combined should comprise no more than 10% of total daily energy intake.

Estimated intakes of total energy and energy from saturated fats needed to be derived in order to calculate the percent of total energy from TFA alone, and from TFA and saturated fats combined. Estimated intakes of energy and saturated fats were calculated using DIAMOND (which contains *AUSNUT* food composition data) and two 24 hour recall days from the 1995 NNS and 1997 NNS in order to estimate adjusted nutrient intakes better reflecting 'usual' intake. Comparison of intakes with the AMDR is shown in Table 6 and Figure 3.

In comparison with the AMDR, the percentage of total energy intakes from mean intakes of saturated fats and *trans* fats combined were estimated to be approximately one and a half times the reference health standard for both populations (130%-170% AMDR for Australian population groups, 150%-160 % AMDR for New Zealand population groups). The estimated mean intakes from *trans* fats alone are 6% AMDR for all Australian population groups assessed and 7% for all New Zealand population groups, including Maori and Pacific Islanders. Even if all TFA were removed from the Australian and New Zealand diets, the intake of SFA alone would still exceed the AMDR of a maximum of 10% total energy.

While teenage boys have the highest intakes of TFA, their percent of total energy from TFA, or saturated fats combined is the same as other population groups because of their higher overall total energy intakes.

[♦] AMDR: Acceptable Macronutrient Distribution Range is an estimate of the range of intakes for each macronutrient for individuals (expressed as per cent contribution to energy), which would allow for an adequate intake of all the other nutrients whilst maximising general health outcome.

Table 6: Comparison of energy intake from fats with the 2006 AMDR for various population groups

a. Australia

Age group	Mean Intake			% of total energy intake						Intakes as % of AMDR ** (<10% of total energy)					
				5th Percentile		Mean (±SD)*		95th percentile		5th Percentile		Mean (±SD)*		95th percentile	
	Energy (kJ/day)	SFA (g/day)	TFA (g/day)	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA
2 years & above	9,010	33	1.4	0.3	9	0.6±0.2	14±3	1.0	19	3	95	6±2	140±30	10	190
45 years & above	8,300	29	1.2	0.3	9	0.6±0.2	13±3	0.9	18	3	95	6±2	130±25	9	180
20-44 years	9,810	36	1.5	0.3	9	0.6±0.3	14±3	1.0	19	3	90	6±3	140±35	10	190
13-19 years	10,450	40	1.6	0.3	9	0.6±0.3	14±3	1.0	20	3	95	6±3	140±30	10	200
5-12 years	8,420	33	1.4	0.4	12	0.6±0.2	15±2	1.0	19	4	120	6±2	150±25	10	190
2-4 years	6,900	29	1.2	0.4	13	0.6±0.2	17±3	0.9	21	4	130	6±2	170±25	9	210

*Mean % of total energy intakes for TFA and saturated fats (TFA + SFA) have been presented as mean ± standard deviation

** AMDR recommendation is that energy from saturated fats (TFA + SFA combined) should not exceed 10% of total energy intake

Total number of respondents for Australia: 2 years and above = 13 858, 45 years and above = 5266, 20-44 years = 5448, 13-19 years = 1065, 5-12 years = 1496, 2-4 years = 583,. Respondents include all members of the survey population whether or not they consumed a food that contains TFA.

b. New Zealand

Age group	Mean Intake			% of total energy intake						Intakes as % of AMDR ** (<10% of total energy)					
				5th Percentile		Mean (±SD)*		95th percentile		5th Percentile		Mean (±SD)*		95th percentile	
	Energy (kJ/day)	SFA (g/day)	TFA (g/day)	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA
15 years & above	9,430	39	1.7	0.5	11	0.7±0.2	16±3	1.0	21	5	110	7±2	160±30	10	210
45 years & above	8,630	34	1.6	0.5	10	0.7±0.2	15±3	0.9	20	5	100	7±2	150±30	9	200
20-44 years	9,980	42	1.8	0.5	11	0.7±0.2	16±3	0.9	21	5	110	7±2	160±30	9	210
15-19 years	10,870	46	2.0	0.5	12	0.7±0.2	16±3	1.0	21	5	120	7±2	160±25	10	210

*Mean % of total energy intakes for TFA and saturated fats (TFA + SFA) have been presented as mean ± standard deviation

** AMDR recommendation is that energy from saturated fats (TFA + SFA combined) should not exceed 10% of total energy intake

Total number of respondents for New Zealand: 15 years and above = 4636, 45 years and above = 2072, 20-44 years = 2267, 15-19 years = 297. Respondents include all members of the survey population whether or not they consumed a food that contains *trans* fats.

c. New Zealand Maori and Pacific Islanders

Age group	Mean Intake			% of total energy intake						Intakes as % of AMDR ** (<10% of total energy)					
				5th Percentile		Mean (±SD)*		95th percentile		5th Percentile		Mean (±SD)*		95th percentile	
	Energy (kJ/day)	SFA (g/day)	TFA (g/day)	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA	TFA	TFA + SFA
15 years & above	9,860	41	1.8	0.4	11	0.7±0.2	16±3	1.0	21	4	110	7±2	160±30	10	210
45 years & above	9,030	36	1.6	0.4	10	0.7±0.1	15±3	0.9	21	4	100	7±1	150±35	9	210
20-44 years	10,040	42	1.9	0.4	11	0.7±0.2	16±3	1.0	21	4	110	7±2	160±30	10	210
15-19 years	10,640	45	2.1	0.5	12	0.7±0.2	16±3	1.0	22	5	120	7±2	160±30	10	220

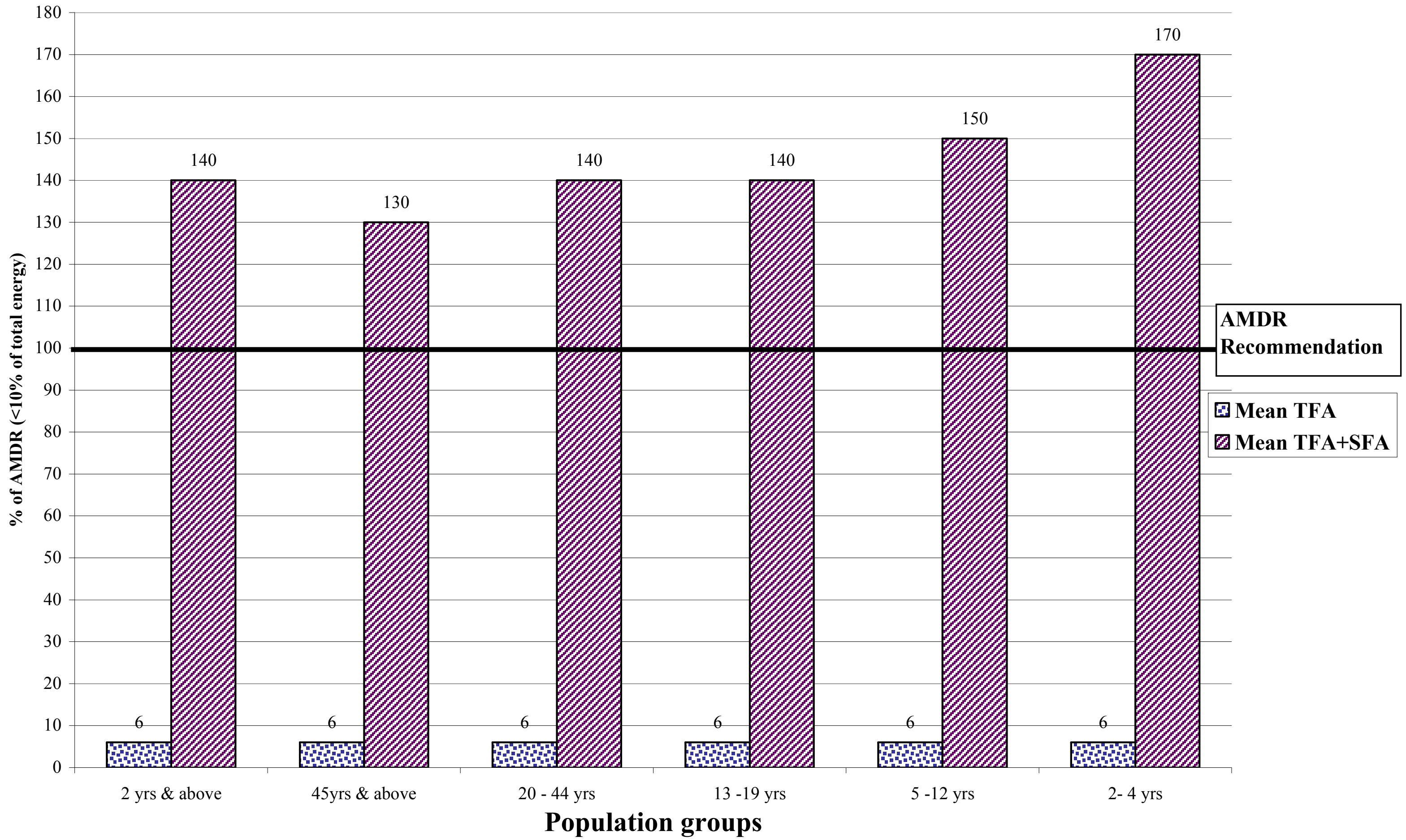
*Mean % of total energy intakes for TFA and saturated fats (TFA + SFA) have been presented as mean ± standard deviation

** AMDR recommendation is that energy from saturated fats (TFA + SFA combined) should not exceed 10% of total energy intake

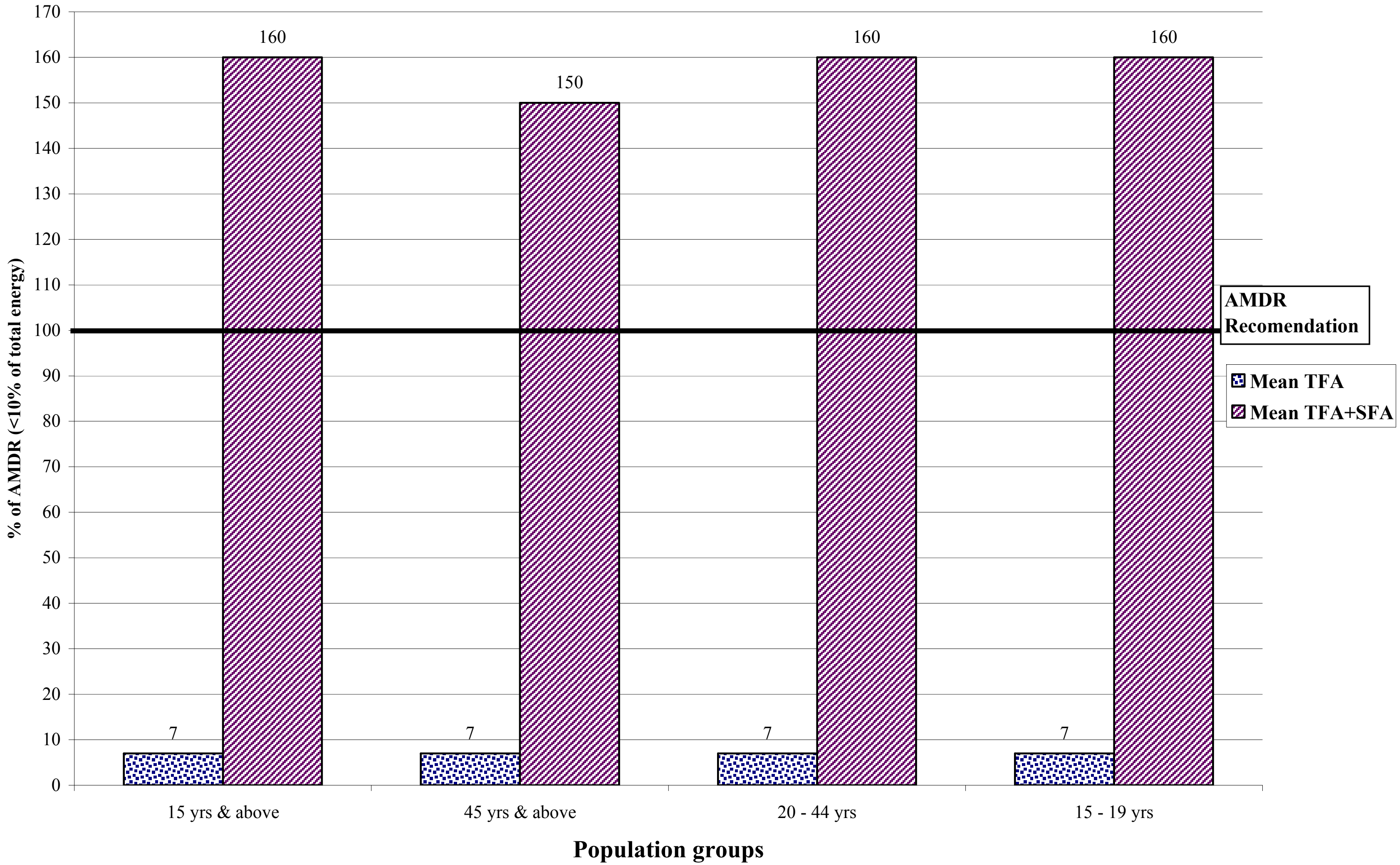
Total number of respondents for New Zealand: 15 years and above = 1,011, 45 years and above = 248, 20-44 years = 652, 15-19 years = 111. Respondents include all members of the survey population whether or not they consumed a food that contains *trans* fat

Figure 3: Comparison of mean dietary intakes of energy from fats as a percentage of the AMDR recommendation for various population groups

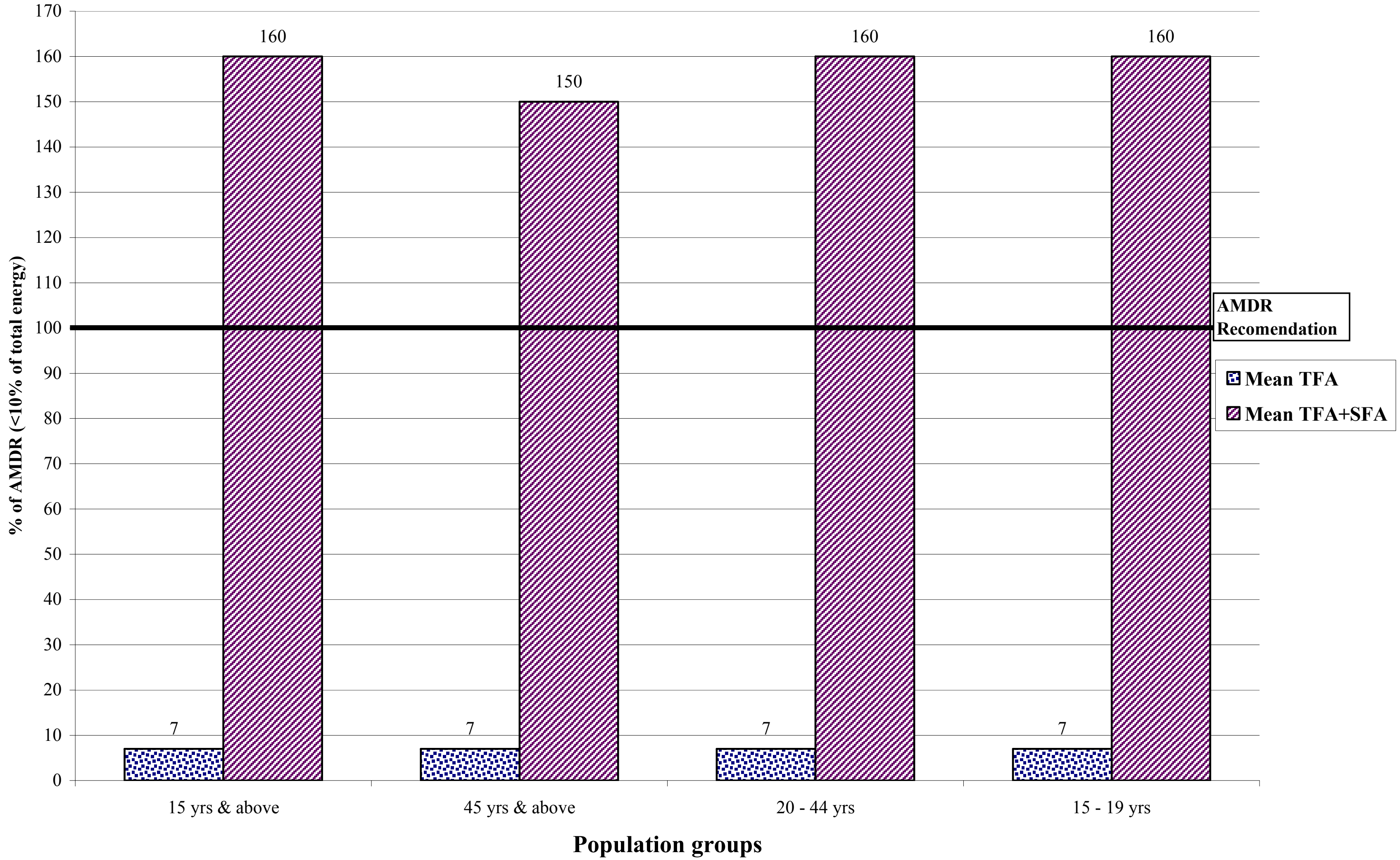
a. Australia



b. New Zealand



c. New Zealand Maori and Pacific Islanders



6.2 Comparison of estimated dietary intakes with WHO nutrient goal

In 2003 the World Health Organisation (WHO) set nutrient goals, including one specifically recommending that TFA contribute less than 1% total daily energy intake (Joint WHO/FAO Expert Consultation, 2003), noting that total energy from fat of at least 20% is consistent with good health. Appendix 6, Table A6.1 lists the ranges of population nutrient intake goals for different dietary fats.

7. Comparison of TFA intakes for Australia with international estimates

The estimated dietary intakes of TFA were compared to those reported for other countries. These estimates for the USA and Europe and the source from which they were obtained are listed in Appendix 7, Table A7.1. The estimated dietary intakes of TFA, as compared to international estimates are shown in Table 7 and are also compared to the WHO TFA nutrient goal in Figure 4.

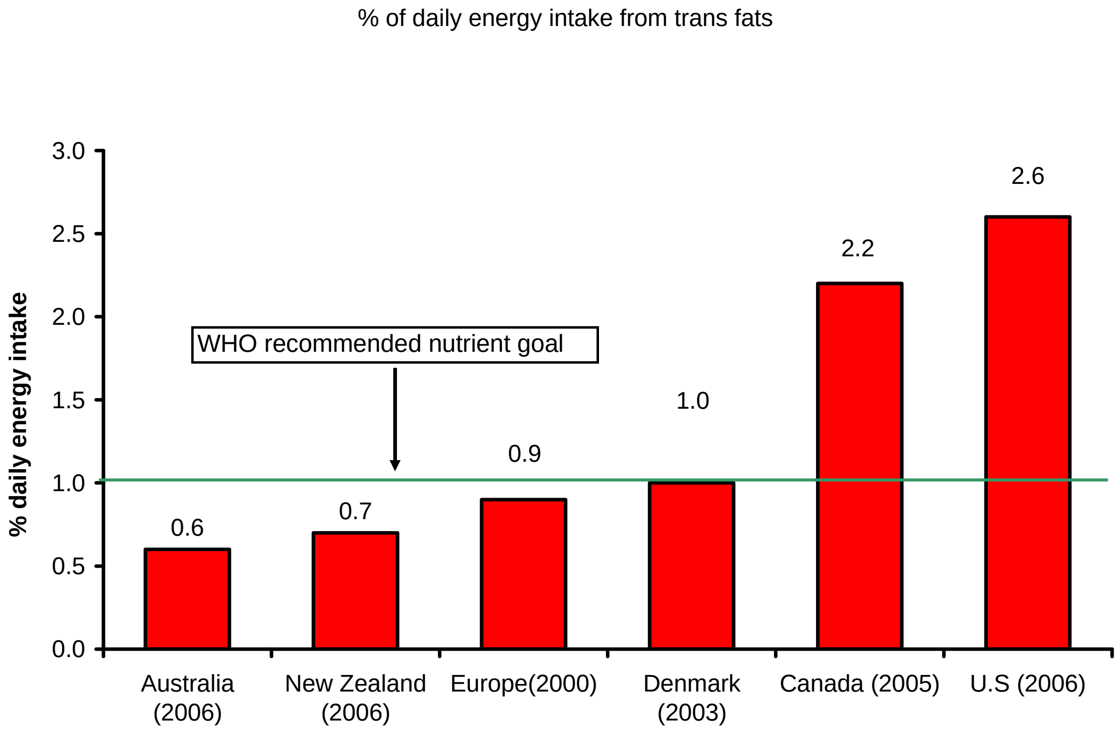
Table 7: Summary of estimated dietary intakes of TFA

	Australia (FSANZ) 2006	NZ (FSANZ) 2006	NZ 1996	Denmark 2003	USA 1997-2006	Europe 2000	Canada 1995-2005
Number of studies	1	1	1	1	3	2	4
Mean TFA intake range (g/day)	1 - 2	2	4	3	1 - 13	1 - 3	1 - 25
% total energy intake per day	0.6	0.7	1.5	1	2.6	1 - 2	2.2

The above comparison should be interpreted with caution as different studies may have included different TFA, used different analytical methods and different approaches to estimating intakes. While these estimates may not be directly comparable, it appears that TFA intakes as estimated by FSANZ in Australia and New Zealand are similar to, or less than, intakes in other countries.

Intakes estimated by FSANZ for New Zealand are lower than those previously estimated for New Zealand. This could be attributed to the different methodologies used, different foods included and possibly different composition of foods between 1996 and 2006.

Figure 4: Percentage of daily energy intake from TFA



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Appendix 1

How were the estimated dietary TFA intakes calculated?

TFA intakes were calculated for each individual in the NNSs using their individual food consumption records from the dietary survey. The DIAMOND program multiplies the specified concentration of TFA for an individual food by the amount of the food that an individual consumed in order to estimate the intake of TFA from each food. Once this has been completed for all of the foods specified to contain TFA, the total amount of TFA consumed from all foods is summed for each individual. Adjusted nutrient intakes are first calculated (see below) and population statistics (such as mean intakes) are then derived from the individuals' ranked intakes.

Adjusted nutrient intakes, which better reflect 'usual' daily nutrient intakes, were calculated because NRVs are based on usual or long term intakes and it is therefore more appropriate to compare adjusted or 'usual' nutrient intakes with NRVs.

1.1 Calculating adjusted intakes

To calculate usual daily nutrient intakes, more than one day of food consumption data is required. Information for a second (non-consecutive) day of food consumption was collected from approximately 10% of Australian 1995 NNS respondents and 15% of New Zealand 1997 NNS respondents. In order to calculate an estimate of more usual nutrient intakes using both days of food consumption data, an adjustment is made to each respondent's TFA intake, based on the first day of food consumption data from the NNS. The adjustment takes into account several pieces of data, including each person's day one nutrient intake, the mean nutrient intake from the group on day one, the standard deviation from the day one sample and the between person standard deviation from the day two sample. This calculation is described in Figure A1.1 below. For more information on the methodology of adjusting for second day intakes, see the Technical Paper on the National Nutrition Survey: Confidentialised Unit Record File (Australian Bureau of Statistics, 1998).

Figure A1. 1: Calculating adjusted nutrient intakes

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

Where: x is the group mean for the Day 1 sample

x_1 is the individual's day 1 intake

S_b is the between person standard deviation; and

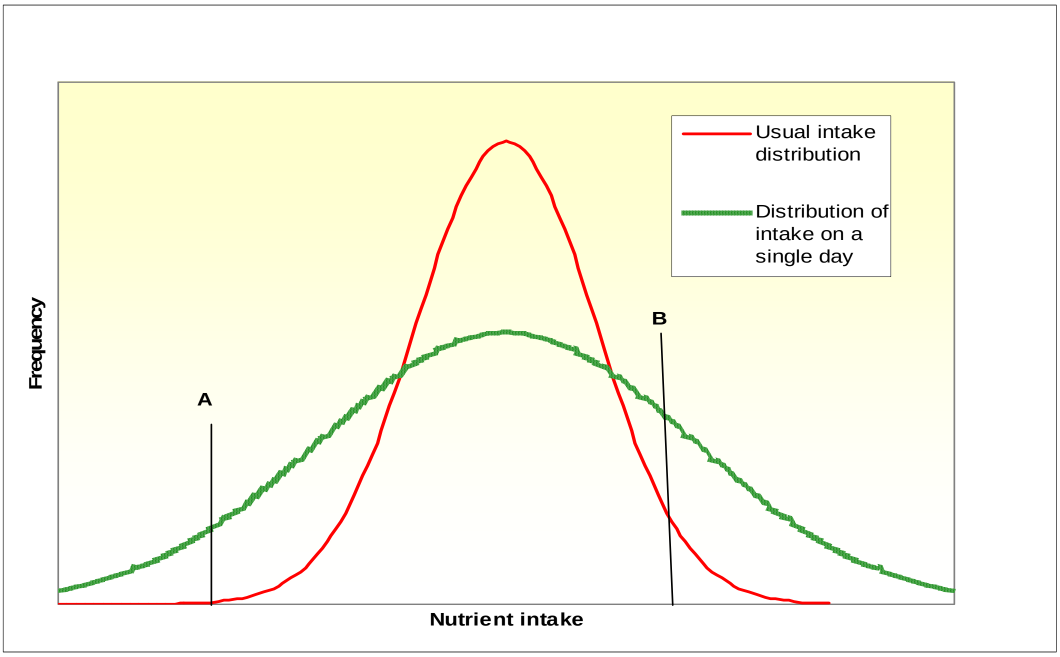
S_{obs} is the group standard deviation for the Day 1 sample

Source: (Australian Bureau of Statistics, 1998)

1.2 Comparison of one day and usual intake distributions

The range of intakes from respondents is broader based on a single day of food consumption data than the range of usual intakes (Figure A1.2) as the latter removes the variation in day to day intakes within each person and the variation between each person.

Figure A1.2: Comparison of one day and usual intake distributions



Using adjusted intakes provides better information for risk characterisation purposes. Use of adjusted (or usual) nutrient intakes will have little or no impact on estimated mean nutrient intakes, but would result in an estimated 95th percentile intake that is lower than the 95th percentile intake from a single day only, or a 5th percentile intake that is higher than the 5th percentile intake based on day one intakes only.

1.2.1 Comparison of intakes with NRVs

Comparison of intakes, based on a single day of food consumption data, with NRVs would result in a larger proportion of the population having intakes below a specified level (e.g. Figure A1.2, point A), which may overestimate the level of deficiency or inadequate intakes. A broader distribution from a single day of data also means a greater proportion of a population would exceed an upper cut off level, such as an upper level (e.g. Figure A1.2, point B), which overestimates the level of risk to this group of the population. In order for the percent of energy from *trans* fats and the percent of energy from TFA plus saturated fat to be derived, estimated intakes of energy and saturated fats were derived using DIAMOND and the second day adjusted nutrient intake model. The concentration data for energy and saturated fat used in DIAMOND were from *AUSNUT* (ANZFA, 1999).

1.3 How were the percent contributors calculated?

Percentage contributions of each food group to total estimated TFA intakes are calculated by summing the intakes for a food group from each individual in the population group who consumed a food from that group and dividing this by the sum of the intakes of all individuals from all food groups containing TFA, and multiplying this by 100. These calculations were done using the day 1 24-hour recall data.

Appendix 2

Trans fatty acid concentrations in Australian and New Zealand foods

2.1 Purpose

This Appendix presents detailed information on the analysis of TFA in Australian and New Zealand foods in recent years and provides background information on the origin of the data used in the dietary intake assessment.

2.2 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 although in some laboratories, the mass of TFA may be measured directly rather than as a percentage of total fat. When TFA are reported as a percentage of total fatty acids, TFA content per 100 g can 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 *AUSNUT* (ANZFA, 1999), a fat factor is applied to the calculated fatty acid content to take account of the presence of other fat classes. For example, for fats and oils which contain predominantly triglycerides (glycerol esterified with fatty acids), a factor of 0.956 is recommended; in contrast a factor of 0.83 is recommended for eggs, reflecting their higher proportion of phospholipids and sterols (Greenfield and Southgate, 2003). In this intake assessment, a factor of 0.956 was used for most foods as the majority of analysed foods contained a high proportion of fat derived from added oils or frying fats[3], and TFA content was calculated as follows:

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

The use of a fat factor to account for the proportion of fat that is not fatty acids is in contrast to the presentation of data in many published studies of TFA intake, including that by the NSW Food Authority (2006). The use of a fat factor in the estimation of TFA content will result in intake estimates approximately 5% lower than in these published studies. Saturated fat levels used in this intake assessment have also been estimated using a fat factor.

In this intake assessment, only total TFA are reported as this was the common method of expression across the available studies. Total TFA is also the value that is referred to in the Nutrient Reference Values for Australia and New Zealand.

The limit of reporting of fatty acid levels, as a percentage of total fatty acids, is generally 0.1%. Therefore foods may be reported as containing no measurable levels of TFA but still

[3] Other fat factors used: milk and milk products 0.945, fatty fish 0.9, white fish 0.7, poultry 0.945

contain very low levels that cannot be quantified at present. These levels are not taken into account in this intake assessment.

2.3 Sources of TFA data used for the dietary intake assessment – Australia and New Zealand

For the purposes of this dietary exposure assessment, five sources of concentration data were used for modelling:

- Analytical data generated by the NSW Food Authority in a 2005 study of over 250 samples of 50 different food types.
- FSANZ data generated in analytical surveys of nutrients in Australian foods conducted since 2001, for approximately 65 samples of around 50 different foods.
- Data from the South Australian Department of Health (Eckert and Jenkins, 2006) for hot potato chips from two fast food chains (16 samples in total).
- For New Zealand foods, analytical data generated in 2006 by the Institute of Environmental Science and Research Ltd (ESR) for 47 samples across 10 food categories (Lake *et al*., 2006).
- Data generated by New Zealand's Crop & Food Research since 2002 (Crop & Food Research, 2006) for approximately 190 samples of around 60 different food types.

The NSW Food Authority study was the most comprehensive of the data sets available. Generally, five single samples were analysed for each type of food (e.g. five types of potato crisps). Samples surveyed were collected in Sydney and included not only major staple foods such as breads, milk, eggs, fish and meats, but also a considerable number of foods that were considered likely to contain significant levels of TFA (e.g. deep fried foods, pastry products). The survey results on their own, therefore, do not give a representative picture of TFA levels across all Australian foods. TFA reported in this study were C16:1 (6t), C18:1 (9t) (elaidic acid), C18:2 (9t, 12t) and C18:3 (9t, 12t, 15t). Conjugated linoleic acid levels were not quantified.

Data that FSANZ has generated since 2001 have not, unlike the NSW study, been collected as part of a specific study of TFA, but have been incidental to other nutrient analysis programs. Samples from these studies were primarily collected in Melbourne although some have been collected in other states. Most of the FSANZ values are from a single analysis of a composite sample of between 5 and 10 purchases, although in the case of edible oil spreads, ten individual samples were purchased across the nation and analysed individually. Data from the FSANZ analyses have been reported simply as total TFA (g/100 g). Fatty acids analysed include those reported for NSW samples. Categories of foods analysed include edible oil spreads, hot potato chips from fast food outlets, potato crisps, eggs, bread, some cakes, peanut butter, soup mixes, some dairy foods (milk, butter, dairy blend, some cheeses and yoghurts), fresh fish, pastry, tofu and chicken. As with the NSW study, these values on their own do not give a representative picture of TFA levels across a broad range of Australian foods.

The South Australian Department of Health study ((Eckert and Jenkins, 2006) was a pilot study of TFA levels in chicken nuggets and hot potato fries from two fast food chains (eight individual samples of each food type).

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 TFA intakes (spreads, ruminant foods, fried foods and baked goods likely to contain hydrogenated fats). Most of the samples analysed were New Zealand manufactured foods. Therefore the available New Zealand data does not fully represent the New Zealand food supply as a whole. The same TFA as were reported in the NSW study were quantified in the study by (Lake *et al*., 2006).

Because the analytical values determined in the above studies were generated at a time when the Australian and New Zealand food industry is moving to reduce TFA levels, they may no longer reflect TFA levels found in late 2006.

2.4 Trans fatty acid concentrations found in Australian and New Zealand foods

Table A2.1 provides a summary of findings across the data sets, expressed on a per 100 g food and per 100 g fat basis. Because foods, with the exception of oils, are not 100% fat, values expressed on a per 100 g food basis will be lower than per 100 g fat. Some foods may have a relatively high TFA content on a fat basis but, because they have a relatively low total fat content, will have a low TFA content when expressed on a per 100 g food basis. For example, 2% of the fatty acids in some canned, brined pink salmon samples were TFA, but because these fish have a low total fat content, around 4.5%, their total TFA content per 100 g fish is low (approximately 0.1 g/100 g).

As the above example of pink salmon shows, TFA are not restricted to foods containing significant proportions of industrially produced oils and fats, or where the fat source is of ruminant origin. Both the NSW and FSANZ data show that TFA can occur in unprocessed foods such as chicken, fish and eggs, and in low fat foods such as pastas, buns and breads. *Trans* fatty acid levels tended to be lower in these foods, both on a fat basis and a mass basis, than in those foods generally considered to be sources of TFA.

Ruminant fats contain significant levels of TFA, with milk, yoghurt, cream and ice cream containing around 2% of fatty acids as TFA. Higher levels were found in Australian butter (5% of fatty acids) and some cheeses. Beef and lamb both also contained significant TFA levels.

A wide range of TFA levels was found in edible oil spreads produced from vegetable oils. Of the 14 samples purchased in Australia, only one contained a TFA level above Danish maximum requirements (2 g TFA per 100 g fat)**.** This sample contained around 2 g TFA per 100 g (approximately 3.5% of total fatty acids). All of the remaining analysed spreads would also be able to claim to be TFA free under Danish requirements (less than 1 g TFA/100 g fat). In contrast, of the 16 vegetable oil spreads purchased in New Zealand, 13 contained TFA levels above the Danish maximum and only three would be able to claim to be ‘TFA free’. These differences between Australian and New Zealand spreads may in part reflect the age of some of the New Zealand data, with half the New Zealand values being generated in 2002, which may pre-date moves by manufacturers to reduce TFA levels. Dairy blends, which are edible oil spreads containing a mixture of butter and vegetable oils, contained significant TFA levels which is to be expected given that they contain butter.

Hot potato chips and fries contain widely varying levels of TFA, which will reflect the composition of the frying oil used, since potatoes contain negligible natural fats. The South Australian study (Eckert and Jenkins, 2006) indicates clearly the effect that choice of frying oil has on TFA levels. The frying fat selected by KFC produced fries with a markedly lower

TFA level than the frying fat selected by McDonalds restaurants (less than 2% of total fatty acids vs 8% respectively) but with a substantially higher saturated fat content (51% vs 8% respectively). The TFA levels found in this study are comparable to levels found in a FSANZ 2006 analytical program and in the NSW Food Authority study where the same foods were analysed.

Wijesundera *et al*. (2006) reported TFA levels in hot potato fries and wedges, potato crisps, edible oil spreads, cooking fats, biscuits, cakes and breads purchased in Melbourne in June 2006. Their findings are generally in line with the findings of the NSW Food Authority study and those of FSANZ. For hot potato chips and fries, TFA levels ranged from 0.2 – 1.5 g/100 g food (1 – 9.5 % of fat). For edible oil spreads, 11 out of 15 samples were formulated with oils that contained less than 1% TFA, compared to 10 out of 10 in the FSANZ study and 3 out of 4 in the NSW study. While some of the foods selected in this study would have been prohibited from sale under Danish regulations (more than 2 g TFA per 100 g fat), almost one-quarter would qualify to be labelled as 'TFA free' under these Danish regulations (less than 1 g TFA/100 g fat).

2.5 Comparison of levels found in Australian and New Zealand foods with levels reported overseas

Trans fatty acid levels found in the studies cited above tend to be at or below levels reported overseas for comparable foods. This is particularly evident for edible oil spreads purchased in Australia, but also for some baked goods and potato products.

Mozaffarian *et al*. (2006) reported total TFA contents for a range of US foods that contained hydrogenated fats or oils. TFA levels were generally far higher than found in similar Australian and New Zealand foods. For example, soft margarines were reported to contain between 5 and 15% TFA (as a percentage of total fat) compared to a maximum of 7% in New Zealand spreads. French fries were reported to contain up to 36% TFA, compared to a maximum of 10% in Australian fries. Cakes and sweet biscuits in the US were reported to contain 14 – 26% TFA, compared to a 10% maximum in Australia and New Zealand. Muesli and breakfast bars contained up to 18% *trans* compared to a maximum of 0.8%. The only Australian and New Zealand foods with comparable TFA levels to those reported in the US were doughnuts (25% in the US cf 22% in one Australian sample), New Zealand popcorn imported from the US (11% vs 48%) and chocolate bars (2% vs 3% in one New Zealand milk chocolate sample).

Canadian analyses of baked goods (Health Canada, 2005) also demonstrate TFA levels that are comparable to, or higher than, those found in the Australian and New Zealand foods analysed. For example, a range of sweet cakes and pastries contained up to 30% of fat as TFA, although many also contained TFA levels of 1% or less. Edible oil spreads made with non-hydrogenated oils contained around 1% TFA whereas those made with partially hydrogenated oils contained around 20% TFA.

Comparisons of TFA levels in foods of different countries need to be interpreted carefully as samples may have been collected at different time points and for different purposes, for example as with the Mozaffarian *et al*. (2006) study of foods produced with partially hydrogenated vegetable oils. Different definitions of TFA may have been used and different analytical techniques.

Table A2.1. Summary of mean (and range) total TFA levels found in three studies

	NSW Food Authority (and SA Dept Health)			FSANZ			New Zealand ESR & Crop & Food Research		
	No.	g/100 g food	g/100 g fat	No.	g/100 g food	g/100 g fat	No.	g/100 g food	g/100 g fat
Fats & oils									
Edible oil spreads	4	0.7 (0.2 – 2.0)	1.1 (0.3 – 3.3)	10	0.2 (0 – 0.3)	0.25 (0 – 0.4)	8	3.7 (3.3 – 4.3)	6.0 (5.4 – 6.6)
Dairy blend	1	2.1	3.0	3	3.4	4.5 (4.2 – 5.3)	4	1.9 (1.5 – 2.3)	3.0 (2.6 – 3.4)
Oils – used for deep frying	12	3.3 (0.4 – 7.9)	3.3 (0.4 – 7.9)						
Butter				3	4.1 (3.8 – 4.4)	5.1 (4.8 – 5.5)	4	1.5 (0.6 – 2.4)	2.2 (0.6 – 3.5)
Oils – canola and olive	10	0.4 (0.2 – 0.8)	0.4 (0.2 – 0.8)				8	1.4 (0.2 – 2.7)	1.4 (0.2 – 2.7)
Fried foods									
Hot potato chips & fries	12 NSW	0.8 (0.2 – 1.5)	4.7 (0.5 – 9.5)	2	0.5 (0.15 – 0.9)	3.5 (1.5 – 5.5)	2	0.1 (0.03 – 0.2)	0.6 (0.2 – 1.1)
	16 SA	0.8 (0.1 – 1.5)	5.0 (1.0 – 8.9)						
Fish, deep fried	7	0.1 (0.1 – 0.7)	1.9 (0.8 – 3.3)	2	0.2 (0.2 – 0.2)	1.8 (1.7 – 1.9)			
Chicken nuggets	16 SA	0.7 (0.1 – 1.4)	3.7 (0.6 – 7.9)				13	0.1 (0 – 0.2)	0.5 (0.1 – 1.2)
Potato crisps, corn chips, extruded snacks	10	0.7 (0.1 – 1.7)	2.1 (0.7 – 5.6)	1	0.1	0.2	3	0.1 (0 – 0.1)	0.2 (0 – 0.4)
Donuts	5	1.4 (0 – 5.4)	6.4 (9 – 22.4)						
Bakery fat products									
Pastry & croissants	10	0.5 (0.1 – 1.3)	2.5 (0.4 – 6.0)	1	1.8	11.4	10	0.6 (0 – 1.2)	2.8 (0 – 5.8)
Pastry products such as quiche, spinach & cheese pie, danish	10	0.5 (0.2 – 1.2)	3.0 (1.6 – 9.7)	1	2.1	12.7			
Meat pies and sausage rolls	10	0.6 (0.2 – 1.0)	4.7 (1.5 – 9.3)				3	0.6 (0.6 – 0.6)	5.6 (4.8 – 6.7)
Biscuits, inc cream filled	20	0.3 (0.1 – 1.3)	1.3 (0.3 – 6.7)				27	0.4 (0 – 1.9)	1.9 (0 – 10.0)
Cakes	5	0.2 (0.1 – 0.2)	1.0 (0.4 – 1.1)	9	0.4 (0 – 0.7)	2.1 (0 – 3.1)	3	0.2 (0.1 – 0.2)	1.8 (0.8 – 3.1)
Ruminant products									
Milk, full fat, plain and flavoured	10	0.05 (0 – 0.1)	1.8 (0 – 3.2)	5	0.1 (0.05 – 0.15)	2.8 (1.2 - 3.4)	1	0.1	3.2
Cheese, cottage	5			3	0.2 (0.15 – 0.2)	4.9 (4.3 – 5.3)			
Cheese, cheddar, natural & processed	5	0.7 (0.7 – 0.8) (natural)	2.1 (2.0 – 2.2)	3	0.8 (0.8 – 0.9) (processed)	3.7 (3.5 – 3.9)	2	0.3 (0.2 – 0.3)	1.9 (1.5 – 2.3)

	NSW Food Authority (and SA Dept Health)			FSANZ			New Zealand ESR & Crop & Food Research		
	No.	g/100 g food	g/100 g fat	No.	g/100 g food	g/100 g fat	No.	g/100 g food	g/100 g fat
Cream	5	0.9 (0.7 – 1.2)	2.2 (2.1 – 2.3)				1	0.1	1.6
Yoghurt	5	0.05 (0 – 0.1)	1.7 (9 – 3.6)	1	0.1	2.7	6	0.02 (0 – 0.1)	1.1 (1.0 – 1.7)
Ice cream	5	0.2 (0.1 – 0.3)	1.7 (1.1 – 1.9)				4	0.1 (0 – 0.4)	1.4 (0.2 – 4.4)
Burgers, beef	21	0.1 (0 – 0.2)	0.9 (0 – 3.3)						
Beef, raw	5	0.1 (0.0 – 0.1)	1.4 (0 – 2.4)				6	0.1 (0 – 0.1)	1.0 (0.2 – 3.8)
Beef sausages, raw or cooked	5	0.3 (0.1 – 0.4)	1.4 (0.4 – 1.9)					0.4 (0.1 – 0.9)	2.6 (0.4 – 5.5)
Lamb, raw	5	0.4 (0.2 – 1.0)	2.5 (1.2 – 4.4)				16	0.1 (0 – 0.1)	1.0 (0.2 – 1.2)
Other foods									
Pizza, all types	5	0.2 (0.1 – 0.3)	2.4 (1.1 – 3.4)				5	0.1 (0.1 – 0.2)	2.2 (1.7 – 2.5)
Chicken, raw thigh or BBQ	5	0.1 (0.1 – 0.1)	1.2 (1.0 – 1.4)	1	0.2 (BBQ incl skin)	2.2			
Fish, fresh and canned	15	0.03 (0 – 0.1)	2.5 (0 – 2.1)	7	0.15 (0 – 0.3)	1.7 (0 – 2.1)			
Eggs	5	0.1 (0.1 – 0.1)	1.1 (0.8 – 1.5)	1	0.04	0.4			
Soy products	5	0.0 (0.0 – 0.0)	0.0 (0.0 – 0.0)	2	0.05 (0 – 0.1)	1.6 (0 – 3.2)	2	0.01 (0 – 0.01)	0.4 (0.2 – 0.6)
Bread, all types	5	0.0 (0.0 – 0.0)	0.0 (0.0 – 0.0)	8	0.01 (0.01 – 0.03)	0.4 (0.1 – 0.7)	8	0.01 (0 – 0.02)	0.2 (0 – 0.3)
Chocolate	5	0.1 (0.1 – 0.1)	0.3 (0.3 – 0.3)				6	0.3 (0 – 0.9)	0.9 (0 – 3.4)
Pasta and noodles	5	0.05 (0 – 0.2)	0.8 (0 – 4.0)	2	0.02 (0 – 0.04)	0.3 (0 – 0.6)			
Muesli bars	5	0.0 (0.0 – 0.0)	0.0 (0.0 – 0.0)				5	0.02 (0 – 0.04)	0.4 (0 – 0.8)
Peanut butter				1	0.08	0.17	4	0.2 (0.2 – 0.2)	0.4 (0.4 – 0.4)

Appendix 3

TFA concentrations used in the dietary intake assessment

3.1 Concentrations used in the dietary intake assessment

Because of the limited number of analytical values available, individual TFA levels could not be assigned to each food reported in the NNNs[4]. Concentrations of TFA found on analysis were therefore assigned to groups of related foods. Individual foods from the NNSs were matched to the most appropriate food group for dietary modelling purposes.

The NSW study is the most comprehensive of the Australian data sources available to FSANZ at the time the dietary modelling was conducted and therefore these data have been used in preference for Australia. FSANZ data were used where they were for a food not analysed in the NSW study (e.g. tofu, some cakes, some dairy foods), or to supplement the pool of data available for foods that are major contributors to TFA intakes (e.g. edible oil spreads and hot potato chips/fries).

New Zealand analytical data were used for New Zealand intake estimates, where these data were available. Where no New Zealand data were held for some food categories, Australian data were used instead.

3.2 Data limitations

There are a number of important limitations with the data on TFA levels available for this dietary exposure assessment:

- A limited range of foods has been analysed and therefore it is possible that there may be foods high in TFA that have been overlooked. Conversely, the choice of foods for analysis may have exaggerated TFA intakes where high TFA foods have been used to represent foods that are actually low in TFA.

- There appears to be substantial variation in TFA levels in some food groups and therefore the choice of foods included in an analysed sample may result in skewed mean levels that are not representative of the overall food group. Edible oil spreads are an illustration of this effect, where in the NSW study, one in four of the samples analysed had a markedly higher level of TFA than the other three samples. In the FSANZ data set on spreads samples, all brands selected were relatively low in the TFA but this sample did not include the brand found in NSW to be high in TFA.

- The NSW study 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 (chips, spreads, pastries) which were mostly purchased ready to eat.

- The New Zealand 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.

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[4] For example, there are approximately 4500 individual foods included in the 1995 Australian NNS and 5900 in the 1997 New Zealand NNS.

Table A3. 1: Summary of TFA levels in Australian foods used in the dietary intake assessment

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Beverages, alcoholic			
Beer	All "beers", any type	Imputed zero	0
Wine & cider	All wines, any type including de-alcoholised and non-alcoholic wines, port, sherry, wine coolers, cider, rice wine	Imputed zero	0
All other alcoholic beverages	All types EXCEPT: Liqueur Advocaat	Imputed zero	0
	'Liqueur Advocaat'	Estimated from proportion of egg yolk	140
	28410301 Cream based coffee flavour	Estimated from proportion of cream	890
	28410401 Cream based other flavour	Estimated from proportion of cream	890
Beverages, non-alcoholic			
Water, bottled still	Includes all non-domestic water	Imputed zero	0
Water, tap	Includes all domestic water (including water in beverages and water used in cooking)	Imputed zero	0
Juices, juice drinks, cordials	All fruit and vegetable juices and drinks, cordials and cordial bases plus infant juices.	Imputed zero	0
Tea & coffee	All "tea" including herbal teas, except where the tea contains milk	Imputed zero	0
	All "coffee" including coffee replacements, except where they contain milk	Imputed zero	0
Soft drink	All soft drinks, flavoured mineral waters & electrolyte drinks	Imputed zero	0

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Cereal and cereal products			
Grains, flours	All unprocessed cereal grains, flours and brans. Includes those cooked in water. Plus rice cakes and flavoured rice mixes.	Imputed zero	0
Bread, multigrain	Includes all mixed grain and rye breads but does not include rolls	Analysed	130
Bread roll, multigrain	Includes all mixed grain and rye bread rolls other than cheese and/or cheese & bacon topped rolls	Analysed	40
Bread, white	All "regular breads, and rolls" (except white fibre increased), "english-style muffins", "crumpets", "white flat breads", "bread-based stuffings", "tortilla" and "corn bread" and damper. Excluding all multigrain and wholemeal breads and bread products	Analysed	150
Bread, white, fibre increased	Include bread roll, white, fibre increased	Analysed	170
Bread roll, white	Includes all white rolls and bagels other than cheese and/or cheese & bacon topped rolls	Analysed	280
Bread, wholemeal	All wholemeal breads other than cheese or cheese & bacon topped breads. Includes wholemeal flat breads.	Analysed	190
Bread rolls, wholemeal	All wholemeal bread rolls and bagels other than cheese or cheese & bacon topped bread rolls.	Analysed	50
Cheese topped breads	All types of breads (white, grain, wholemeal and muffins) topped with, or containing, cheese	Estimated based on 10% cheddar cheese, 90% white bread	930
Other breads	Any other breads not already mentioned, other than fruit breads	White bread value	150

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Fruit buns	All breads and buns containing dried fruit, whether as rolls or loaves, iced or uniced, white or wholemeal plus sweet buns and muffins	Analysed	640
Pasta, plain	All types of cooked and uncooked pasta including spinach pasta & egg pasta. Does not include filled pastas.	Analysed	170
Noodles	All types of noodles, cooked and uncooked, other than "noodle instant"	Analysed	0
Instant noodles	All types, cooked and uncooked	Analysed	440
Cake, plain	All types of cakes plain or flavoured, iced and uniced, except for chocolate cakes, sponge cakes, cheesecakes, lamingtons, sweet muffins or carrot cake. Includes homemade and commercial products and cakes made from mixes. Includes slices, other than chocolate or fruit.	Analysed	4180
Cake, chocolate	All types of chocolate cake including rich cakes, black forest cake, iced or uniced, including chocolate layer cakes and cakes made from mixes. Includes chocolate slices and brownies.	Analysed	1630
Cake, sponge	All plain or iced sponges, including lamingtons, but excluding sponge cakes filled with cream. Includes sponges made from mixes.	Analysed	0
Cake, sponge, filled	All filled sponges or filled lamingtons	Estimated based on 20% cream	1780
Cake, fruit, dark	All types of fruit cake, light or dark, including sultana cake. Includes fruit slices.	Analysed	2990
Cake, carrot, iced		Analysed	2610
Cheesecake		Analysed	6960
Doughnuts	Doughnuts, all types including yeast or cake, filled or unfilled, iced or uniced,	Analysed	11540

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Scones, fruit	All types of scones and rock cakes and dumplings	Analysed	2170
Muffin, cake style	All types	Analysed	6000
Pikelet	All types of pikelets, pancakes or crepes plus waffles	Analysed	640
Croissant	All types of croissants. Includes vol au vent case, unfilled.	Analysed	3630
Pastry, shortcrust	Home made and commercial plain shortcrust pastry and wholemeal pastry	Analysed	7170
Pastry, puff, made with butter	Home made and commercial puff shortcrust pastry plus spring roll pastry	Analysed	19000
Savoury biscuits	All types	Analysed	1670
Sweet biscuits, filled	All sweet biscuits that are identified as being "cream filled"	Analysed	4800
Sweet biscuits, chocolate	All sweet biscuits that are chocolate coated or that contain chocolate chips. Note that cream filled chocolate biscuits should be included under filled sweet biscuits	Analysed	1810
Shortbread	All sweet biscuits other than those that are identified as being "cream filled" or "chocolate", homemade or commercial	Analysed	2550
Breakfast cereal, all types	All breakfast cereals, except toasted mueslis	Imputed zero	0
Toasted muesli	All toasted mueslis, but does not include natural/untoasted muesli or porridge/cooked oats	Estimated based on 16% fat content, assuming two thirds of this is from oil (10%) with remainder from oats and nuts	640
Hamburger, chain, with cheese	All chain hamburgers with cheese as an ingredient, or cheeseburgers	Analysed	640
Hamburger, chain, without cheese	All chain hamburgers that do not list cheese as an ingredient	Analysed	570
Hamburger, with cheese, purchased from independent retailers		Analysed	1150

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Chicken burger	All chicken burgers, fish burgers & chicken nuggets	Analysed	120
Cereal based mixed foods			
Pizza, supreme	All types of pizza, regardless of topping or place of production	Analysed	1790
Lasagne	Lasagne, cannelloni, pasta in sauce, all types, plus noodles with sauce	Analysed	7360
Pastry based mixed foods			
Meat pie	All foods identified as "pie, meat" or "pie, pork" or "pie, steak" or "pie, chicken" or cornish pasties	Analysed	3790
Sausage roll	Any foods identified as "sausage roll" or "pastry roll with meat" All ‘Chiko-type' rolls, dim sims and spring rolls with meat	Analysed	7810
Spinach & cheese pastry	Any spinach triangles, pastry rolls with vegetables or cheese, or cheese and/or vegetable vol au vents	Analysed	22000
Quiche	Any food described as quiche or egg and bacon pie	Analysed	7360
Danish pastry	All types of sweet pastries or pies other than croissants. Includes fruit pies	Analysed	2640
Eggs			
Egg, whole, raw	All whole egg foods including boiled, fried, scrambled & poached eggs	Analysed	1070
Egg, white, raw	Cooked and raw egg white	Analysed	0
Egg, yolk, raw		Estimated based on 40% egg yolk in a whole egg	2680
Fats and oils			
Butter, regular	All "dairy" butter	Analysed	41980

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Dairy blend (not reduced fat)	All "full fat dairy" blends	Analysed	32550
Dairy blend (reduced fat)	All dairy blends that are marked as being reduced or low in fat	Estimated based on 72% fat content in analysed full fat dairy blend, adjusted to a fat content of 50% in reduced fat spread	22600
Edible oil spread, regular	All spreads or margarines that are not labelled as containing dairy/butter and that are not marked as 50% or less fat	Analysed	3132
Edible oil spread, 50% or less fat	Any spread or margarine that is labelled as containing 50% or less fat or oil	Estimated based on 67% fat content in analysed edible oil spread, adjusted to a fat content of 50% in reduced fat spread	2290
Oil, canola	All foods that are "oils" other than olive oil	Analysed	6330
Oil, olive	Olive oil only	Analysed	1410
Solid fats	Bacon fat, dripping, lard, solid fats	Imputed from bacon	1070
Fish, seafood and fish products			
Fish, fillets	All fin fish, raw, steamed, baked, grilled, floured, excluding canned, crumbed oven baked fin fish and battered takeaway fin fish	Analysed	200
Fish, battered, takeaway	All finfish, excluding canned, that are purchased battered and fried or that are cooked with batter or crumb coating, whether commercial or home prepared. Includes crumbed or battered oven baked fish and fish fingers.	Analysed	2050
Seafood extender/surimi	Not battered and fried. Including fish stick and seafood stick	Analysed	0
Tuna, canned	All types of canned tuna, drained or undrained	Analysed	40

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Salmon, canned	All types of canned salmon, drained or undrained	Analysed	410
Canned & smoked fish	Any type of canned fish other than salmon or tuna. Any type of smoked fish	Imputed from canned salmon	410
Calamari, crumbed, fried	Any type of battered or crumbed calamari, prawn, squid, oyster, scallop	Analysed	1640
Crustacea and molluscs	All raw, steamed, grilled prawns, crabs, lobster, mussels, squid that are not cooked with batter or coating	Imputed from fish fillets	200
Fruit			
All types of fruit	All cooking methods, including canned or dried	Imputed zero	0
Meat and poultry			
Beef, steak	All types of raw & cooked beef, lean only or lean and fat, other than beef mince. Includes cattle offal.	Analysed (NSW)	510
Beef mince, raw	All types of raw beef mince	Analysed (NSW)	1500
Lamb chops	All types of raw and cooked lamb, lean only or lean and fat, including offal	Analysed (NSW)	2830
Pork	All raw and cooked pork other than bacon and ham, including offal. Also includes kangaroo, rabbit and venison	Imputed from beef	510
Chicken, thigh, raw	All raw chicken and other poultry or game, including offal	Analysed (NSW)	690
Chicken, barbecued	All cooked chicken and other poultry or game, including offal	Analysed	2000
Beef, sausage, raw	All beef, pork, lamb or chicken sausages, plus frankfurters/hot dogs, raw or cooked.	Analysed	2840
Processed low fat chicken breast	All processed poultry meats	Analysed	0

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Bacon, raw	All hams and bacons, raw and cooked. All luncheon/processed meats other than chicken or turkey.	Analysed	1070
Processed luncheon meats	Higher fat processed meats such as salami, devon, meat pastes, plus spam.	Estimated from bacon, adjusted for increased fat content (~11% in analysed bacon, 33% in salamis and devon)	3210
Dairy products			
Cheese, cheddar, full fat	All ripened cheeses, regular fat content, other than brie or camembert. Does not include processed cheese or cottage cheese.	Analysed	6810
Cheese, cheddar, reduced fat		Estimated based on reduction in fat from 32.5% in regular cheddar to 24%	5000
Cheese, brie		Analysed	13000
Cheese, camembert		Analysed	10000
Cheese, cottage	All unripened cheeses (including ricotta, feta & cream cheese)	Analysed	1820
Cheese, processed, cheddar type	All processed cheeses & cheese spreads, cheese-based dips other than cream cheese	Analysed	8400
Cream, pure (not thickened)	All regular fat 'cream' including thickened, and whipped, including sour cream and sour cream based dips	Analysed	8890
Cream, reduced fat	All reduced or low fat creams including sour cream	Estimated based on reduction in fat from 35% in regular cream to 18%	4550
Ice Cream, full fat, vanilla	All ice creams including all flavours in tubs, sticks or bars. Excludes tofu based ice confection and any water based ice confections	Analysed	1900

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Milk, full fat	Includes all 'full fat' non flavoured dairy milks and all plain full fat yoghurts, plus tea/coffee made with milk	Analysed	760
Milk, modified, low fat	Includes all low or reduced fat non flavoured dairy milks and reduced or low fat plain yoghurts	Estimated based on reduction in fat from 4.1% to 1.5% in reduced fat milk	280
Milk, skim	All skim milk or skim milk yoghurt (including fruit skim yoghurt), or skim flavoured milk	Imputed zero	0
Milk, powder, whole, dry	All full fat milk powders, incl infants formula	Used dehydration factor of 10 from liquid full fat milk	7600
Milk, powder, low fat, dry	All low fat or skim milk powders, incl soy powders (whole fat and infants)	Used dehydration factor of 10 from liquid reduced fat milk	2800
Chocolate flavoured milk, full fat	All regular fat flavoured milks	Analysed	620
Flavoured milk, reduced fat	All reduced fat flavoured milks	Estimated based on reduction in fat from 3.1% to 1.5% in reduced fat milk	300
Yoghurt, fruit, full fat	Includes all "full fat" fruit & flavoured (including fruit, nuts and muesli) yoghurts	Analysed	630
Yoghurt, fruit, reduced fat	All reduced or low fat fruit or flavoured yoghurts	Estimated based on reduction in fat from 3.4% to 1% in reduced fat yoghurt	190
Infant formula and foods			
Infant cereal, mixed	All infant cereal	Imputed zero	0

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Infant Dessert, dairy based	All dairy based infant desserts	Imputed from fruit yoghurt regular fat	630
Infant Dessert, fruit	All fruit based infant foods	Imputed zero	0
Infant Dinner, containing meat, chicken or fish	All infant based savoury meals	Imputed from beef	510
Infant formula, cow's milk based	All "infant formula".	Imputed from full fat milk	760
Nuts and legumes			
Peanut butter	All tree nuts, seeds, all peanuts, other than roasted (with oil) peanut butter	Analysed	840
Soy milk	All soy milks, regardless of fat content	Analysed	90
Tofu	All tofu including tofu based ice confection, bean curd, soy cheese	Analysed	0
Vegetarian sausages	All vegetarian burgers, meat substitutes, vegetarian sausages or loaves	Analysed	1000
Roasted nuts and seeds	Any nuts or seeds identified as being oil roasted	Estimated from peanut butter (90%) and canola oil (10%)	1400
Snack foods			
Corn chips	All corn chips including popcorn and taco shells	Analysed	2150
Extruded cheese snacks	All snack products other than corn chips and potato crisps	Analysed	1000
Potato crisps	All potato crisps	Analysed	4525
Muesli bars	All types of muesli bars	Analysed	100
Sugar/Confectionery			

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Sugar, white	All "sugar, honey and syrups", "jam and lemon spreads, chocolate spreads" (except "chocolate spreads") "dishes and products other than confectionery where sugar is the major component", "other confectionary", toppings, jellies.	Imputed zero	0
Water based ice confections	Ice blocks, gelato	Imputed zero	0
Chocolate, all types	Milk, dark and white chocolate and all confectionery containing chocolate. Includes chocolate spreads	Analysed	840
Vegetables			
Potato chips, fries from fast food outlets	All types of "potato chips, hot, fries" including "from frozen", except where it is indicated they are made with animal fat	Analysed	7085
Potato chips, from independent outlets	All other types of potato chips, hot, including frozen chips, wedges and hash browns	Analysed	2470
All other vegetables	Every other vegetable, canned, raw or cooked, including pulses	Imputed zero	0
Condiments			
Tomato Sauce	All "pickles, chutneys and relishes" plus tomato salsa (except apple sauce).	Imputed zero	0
	Savoury sauces	Imputed zero	0
	Plus tomato sauce, tomato style sauce, and tomato based pasta sauces without meat, and vinegar.	Imputed zero	0
Soups, instant dry mix	All soup dry mixes, sauce dry mixes	Analysed	1250
Spices	All "salt", pepper, spices, artificial sweeteners	Imputed zero	0
Negligible amount items #	Miscellaneous items unsuited to any particular category e.g. yeast/beef extracts and powders	Imputed zero	0

include cocoa powder, beverage flavourings, yeast, gelatine and beef extracts

Table A3. 2: Summary of TFA levels in New Zealand foods used in the dietary intake assessment

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Beverages, alcoholic			
Beer	All "beers", any type	Imputed zero	0
Wine & cider	All wines, any type including de-alcoholised and non-alcoholic wines, port, sherry, wine coolers, cider, rice wine	Imputed zero	0
All other alcoholic beverages	All types EXCEPT: Liqueur Advocaat	Imputed zero	0
	'Liqueur Advocaat'	Estimated from proportion of egg yolk	140
	28410301 Cream based coffee flavour	Estimated from proportion of cream (Aust)	890
	28410401 Cream based other flavour	Estimated from proportion of cream (Aust)	890
Beverages, non-alcoholic			
Water, bottled still	Includes all non-domestic water	Imputed zero	0
Water, tap	Includes all domestic water (including water in beverages and water used in cooking)	Imputed zero	0
Juices, juice drinks, cordials	All fruit and vegetable juices and drinks, cordials and cordial bases plus infant juices.	Imputed zero	0
Tea & coffee	All "tea" including herbal teas, except where the tea contains milk	Imputed zero	0
	All "coffee" including coffee replacements, except where they contain milk	Imputed zero	0
Soft drink	All soft drinks, flavoured mineral waters & electrolyte drinks	Imputed zero	0
Cereal and cereal products			
Grains, flours, germ and bran	All unprocessed cereal grains, flours and brans. Includes those cooked in water. Plus rice cakes and flavoured rice mixes.	Analysed (NZ)	22

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Bread, multigrain	Includes all mixed grain and rye breads but does not include rolls	Analysed (NZ)	114
Bread roll, multigrain	Includes all mixed grain and rye bread rolls other than cheese and/or cheese & bacon topped rolls	Imputed from analysed value for multigrain breads	114
Bread, white	All “regular breads, and rolls” (except white fibre increased), “english-style muffins”, “crumpets”, “white flat breads”, “bread-based stuffings”, "tortilla" and "corn bread" and damper. Excluding all multigrain and wholemeal breads and bread products	Imputed from analysed value for multigrain breads	114
Bread, white, fibre increased	Include bread roll, white, fibre increased	Imputed from analysed value for multigrain breads	114
Bread roll, white	Includes all white rolls and bagels other than cheese and/or cheese & bacon topped rolls	Imputed from analysed value for multigrain breads	114
Bread, wholemeal	All wholemeal breads other than cheese or cheese & bacon topped breads. Includes wholemeal flat breads.	Imputed from analysed value for multigrain breads	114
Bread rolls, wholemeal	All wholemeal bread rolls and bagels other than cheese or cheese & bacon topped bread rolls.	Imputed from analysed value for multigrain breads	114
Cheese topped breads	All types of breads (white, grain, wholemeal and muffins) topped with, or containing, cheese	Estimated based on 10% cheddar cheese, 90% white bread	785
Fruit buns, fruit breads	All breads containing dried fruit, whether as rolls or loaves, iced or uniced, white or wholemeal plus sweet buns and muffins	Analysed (Aust)	640
Other breads	Any other breads not already mentioned, other than fruit breads	Imputed from analysed value for multigrain breads	114
Pasta, plain	All types of cooked and uncooked pasta including spinach pasta & egg pasta. Does not include filled pastas.	Analysed (Aust)	170
Noodles	All types of noodles, cooked and uncooked, other than "noodle instant"	Imputed pasta plain	170
Instant noodles	All types, cooked and uncooked	Analysed (NZ)	110

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Cake, plain	All types of cakes plain or flavoured, iced and uniced, except for chocolate cakes, sponge cakes, cheesecakes, lamingtons, sweet muffins or carrot cake. Includes homemade and commercial products and cakes made from mixes. Includes slices, other than chocolate or fruit.	Analysed (NZ)	1460
Cake, chocolate	All types of chocolate cake including rich cakes, black forest cake, iced or uniced, including chocolate layer cakes and cakes made from mixes. Includes chocolate slices and brownies.	Analysed (Aust)	1630
Cake, sponge	All plain or iced sponges, including lamingtons, but excluding sponge cakes filled with cream. Includes sponges made from mixes.	Analysed (Aust)	0
Cake, sponge, filled	All filled sponges or filled lamingtons	Analysed (NZ)	2115
Cake, fruit, dark	All types of fruit cake, light or dark, including sultana cake. Includes fruit slices.	Analysed (Aust)	2990
Cake, carrot, iced		Analysed (Aust)	2610
Cheesecake		Analysed (Aust)	6960
Doughnuts	Doughnuts, all types including yeast or cake, filled or unfilled, iced or uniced,	Analysed (Aust)	11540
Scones, fruit	All types of scones and rock cakes and dumplings	Analysed (Aust)	2170
Muffin, cake style	All types	Analysed (Aust)	6000
Pikelet	All types of pikelets, pancakes or crepes plus waffles	Analysed (Aust)	640
Croissant	All types of croissants. Includes vol au vent case, unfilled.	Analysed (NZ)	8540
Pastry, shortcrust	Home made and commercial plain shortcrust pastry and wholemeal pastry	Analysed (NZ)	4369
Pastry, puff	Home made and commercial puff shortcrust pastry plus spring roll pastry	Analysed (NZ)	7194
Pastry, filo		Analysed (NZ)	0

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Savoury biscuits	All types	Analysed (NZ)	282
Sweet biscuits, filled	All sweet biscuits that are identified as being "cream filled"	Analysed (NZ)	8644
Sweet biscuits, chocolate	All sweet biscuits that are chocolate coated or that contain chocolate chips. Note that cream filled chocolate biscuits should be included under filled sweet biscuits	Analysed (NZ)	1692
Sweet biscuits, other	All sweet biscuits other than those that are identified as being "cream filled" or "chocolate", homemade or commercial. Includes shortbread	Analysed (NZ)	2499
Breakfast cereal, all types	All breakfast cereals, except toasted mueslis	Imputed zero	0
Toasted muesli	All toasted mueslis, but don't include natural/untoasted muesli or porridge/cooked oats	Imputed from muesli bars	654
Hamburger, chain, with cheese	All chain hamburgers with cheese as an ingredient, or cheeseburgers	Analysed (Aust)	640
Hamburger, chain, without cheese	All chain hamburgers that do not list cheese as an ingredient	Imputed from chicken nuggets	533
Hamburger, with cheese, purchased from independent retailers		Analysed (Aust)	1150
Chicken burger	All chicken burgers, fish burgers & chicken nuggets	Analysed (NZ)	533
Cereal based mixed foods			
Pizza, supreme	All types of pizza, regardless of topping or place of production	Analysed (NZ)	1652
Lasagne	Lasagne, cannelloni, pasta in sauce, all types, plus noodles with sauce	Analysed (NZ)	2083

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Pastry based mixed foods			
Meat pie	All foods identified as "pie, meat" or "pie, pork" or "pie, steak" or "pie, chicken" or cornish pasties	Analysed (NZ)	4411
Sausage roll	Any foods identified as "sausage roll" or "pastry roll with meat" All ‘Chiko-type' rolls, dim sims and spring rolls with meat	Analysed (NZ)	2287
Spinach & cheese pastry	Any spinach triangles, pastry rolls with vegetables or cheese, or cheese and/or vegetable vol au vents	Analysed (Aust)	22000
Quiche	Any food described as quiche or egg and bacon pie	Analysed (Aust)	7360
Danish pastry	All types of sweet pastries or pies other than croissants. Includes fruit pies	Analysed (Aust)	2640
Eggs			
Egg, whole, raw	All whole egg foods including boiled, fried, scrambled & poached eggs	Analysed (Aust)	1070
Egg, white, raw	Cooked and raw egg white	Analysed (Aust)	0
Egg, yolk, raw		Estimated based on 40% egg yolk in a whole egg	2680
Fats and oils			
Butter, regular	All "dairy" butter	Analysed (NZ)	15344
Dairy blend (not reduced fat)	All "full fat dairy" blends	Analysed (NZ)	21294
Dairy blend (reduced fat)	All dairy blends that are marked as being reduced or low in fat	Estimated based on 63% fat content in analysed dairy blends, adjusted to a fat content of 50% in reduced fat dairy blend	16900

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Edible oil spread, regular	All spreads or margarines that are not labelled as containing dairy/butter and that are not marked as 50% or less fat	Analysed (NZ)	34147
Edible oil spread, 50% or less fat	Any spread or margarine that is labelled as containing 50% or less fat or oil	Estimated based on 68% fat content in analysed edible oil spreads, adjusted to a fat content of 50% in reduced fat spread (NZ)	25220
Oil, canola & other types	All foods that are "oils" other than olive oil	Analysed (NZ)	14403
Oil, olive	Olive oil only	Analysed (Aust)	1410
Solid fats, EXCLUDING Vegetable shortenings	Bacon fat, dripping, lard, solid fats	Analysed (NZ)	7800
Vegetable shortening		Analysed (NZ)	10131
Fish, seafood and fish products			
Fish, fillets	All fin fish, raw, steamed, baked, grilled, floured, excluding canned, crumbed oven baked fin fish and battered takeaway fin fish	Analysed (Aust)	200
Fish, battered, takeaway	All finfish, excluding canned, that are purchased battered and fried or that are cooked with batter or crumb coating, whether commercial or home prepared. Includes crumbed or battered oven baked fish and fish fingers.	Analysed (Aust)	2050
Seafood extender/surimi	Not battered and fried. Including fish stick and seafood stick	Analysed (Aust)	0
Tuna, canned	All types of canned tuna, drained or undrained	Analysed (Aust)	40
Salmon, canned	All types of canned salmon, drained or undrained	Analysed (Aust)	410

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Canned & smoked fish	Any type of canned fish other than salmon or tuna. Any type of smoked fish	Imputed from canned salmon (Aust)	410
Calamari, crumbed, fried	Any type of battered or crumbed calamari, prawn, squid, oyster, scallop	Analysed (Aust)	1640
Crustacea and molluscs	All raw, steamed, grilled prawns, crabs, lobster, mussels, squid that are not cooked with batter or coating	Imputed from fish fillets (Aust)	200
Fruit			
All types of fruit	All cooking methods, including canned or dried	Imputed zero	0
Meat and poultry			
Beef, raw and cooked	All types of raw & cooked beef, lean only or lean and fat, other than beef mince. Includes cattle offal.	Analysed (NZ)	845
Beef mince, raw	All types of raw and cooked beef mince	Analysed (NZ)	230
Lamb chops, raw	All types of raw and cooked lamb, lean only or lean and fat, including offal	Analysed (NZ)	773
Pork	All raw and cooked pork other than bacon and ham, including offal. Also includes kangaroo, rabbit and venison	Imputed from ham (NZ)	455
Chicken, thigh, raw	All raw chicken and other poultry or game, including offal	Analysed (NSW)	690
Chicken, barbecued	All cooked chicken and other poultry or game, including offal	Analysed (Aust)	2000
Sausage, raw and cooked	All beef, pork, lamb or chicken sausages, plus frankfurters/hot dogs, raw or cooked.	Analysed (NZ)	4094
Processed chicken breast	All processed poultry meats	Analysed (Aust)	0

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Ham, raw	All hams and bacons, raw and cooked. All luncheon/processed meats other than chicken or turkey.	Analysed (NZ)	455
Processed luncheon meats	Higher fat processed meats such as salami, devon, meat pastes, plus spam.	Imputed from sausages	4094
Dairy products			
Cheese, cheddar, full fat	All ripened cheeses, regular fat content, other than brie or camembert. Does not include processed cheese or cottage cheese.	Analysed (Aust)	6810
Cheese, cheddar, reduced fat		Estimated based on reduction in fat from 32.5% in regular cheddar to 24% (Aust)	5000
Cheese, brie		Analysed (Aust)	13000
Cheese, camembert		Analysed (Aust)	10000
Cheese, reduced fat cream	All unripened cheeses (including ricotta, feta & cream cheese)	Analysed (NZ)	2450
Cheese, processed, cheddar type	All processed cheeses & cheese spreads, cheese-based dips other than cream cheese	Analysed (NZ)	2660
Cream, pure (not thickened)	All regular fat 'cream' including thickened, and whipped, including sour cream and sour cream based dips	Estimated from reduced fat cream based on increase in fat from 10% in sour light cream to 35% in pure cream	5565
Cream, reduced fat sour	All reduced or low fat creams including sour cream	Analysed (NZ)	1590
Ice Cream, various flavours	All ice creams including all flavours in tubs, sticks or bars. Excludes tofu based ice confection and any water based ice confections	Analysed (NZ)	1196
Milk, full fat	Includes all 'full fat' non flavoured dairy milks and all plain full fat yoghurts, plus tea/coffee made with milk	Analysed (NZ)	1190

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Milk, modified, low fat	Includes all low or reduced fat non flavoured dairy milks and reduced or low fat plain yoghurts	Estimated based on reduction in fat from 3.7% to 1.5% in reduced fat milk	482
Milk, skim	All skim milk or skim milk yoghurt (including fruit skim yoghurt), or skim flavoured milk	Imputed zero	0
Milk, powder, whole, dry	All full fat milk powders, incl infants formula	Used dehydration factor of 10 (Aust)	7600
Milk, powder, low fat, dry	All low fat or skim milk powders, incl soy powders (whole fat and infants)	Used dehydration factor of 10 (Aust)	2800
Chocolate flavoured milk, full fat	All regular fat flavoured milks	Analysed (Aust)	620
Flavoured milk, reduced fat	All reduced fat flavoured milks	Estimated based on reduction in fat from 3.1% to 1.5% in reduced fat milk (Aust)	300
Yoghurt, fruit, full fat	Includes all "full fat" fruit & flavoured (including fruit, nuts and muesli) yoghurts	Analysed (NZ)	507
Yoghurt, fruit, reduced fat	All reduced or low fat fruit or flavoured yoghurts	Analysed (NZ)	45
Infant formula and foods			
Infant cereal, mixed	All infant cereal	Imputed zero	0
Infant Dessert, dairy based	All dairy based infant desserts	Imputed from fruit yoghurt regular fat	507
Infant Dessert, fruit	All fruit based infant foods	Imputed zero	0
Infant Dinner, containing meat, chicken or fish	All infant based savoury meals	Imputed from beef	845
Infant formula, cow's milk based	All "infant formula".	Imputed from full fat milk	1190

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Nuts and legumes			
Peanut butter	All tree nuts, seeds, all peanuts, other than roasted (with oil) peanut butter	Analysed (NZ)	1830
Soy milk	All soy milks, regardless of fat content	Analysed (NZ)	80
Tofu	All tofu including tofu based ice confection, bean curd, soy cheese	Analysed (Aust)	0
Vegetarian sausages	All vegetarian burgers, meat substitutes, vegetarian sausages or loaves	Analysed (Aust)	1000
Roasted nuts and seeds	Any nuts or seeds identified as being oil roasted	Imputed from peanut butter	1830
Snack foods			
Corn chips	All corn chips including taco shells	Imputed from potato crisps	803
Popcorn		Analysed (NZ)	122850
Extruded cheese snacks	All snack products other than corn chips and potato crisps	Imputed from potato crisps	803
Potato crisps	All potato crisps	Analysed (NZ)	803
Muesli bars	All types of muesli bars	Analysed (NZ)	653
Sugar/Confectionery			
Sugar, white	All “sugar, honey and syrups”, "jam and lemon spreads, chocolate spreads" (except "chocolate spreads") “dishes and products other than confectionery where sugar is the major component”, "other confectionary", toppings, jellies.	Imputed zero	0
Water based ice confections	Ice blocks, gelato	Imputed zero	0

Food Category	NNS Foods Represented	Notes on Data compilation	*Trans* fatty acid total mg/kg
Chocolate, all types	Milk, dark and white chocolate and all confectionery containing chocolate. Includes chocolate spreads	Analysed (NZ)	2867
Vegetables			
Potato chips, fries from fast food outlets	All types of "potato chips, hot, fries" including "from frozen", except where it is indicated they are made with animal fat	Analysed (NZ)	2126
Potato chips, from independent outlets	All other types of potato chips, hot, including frozen chips, wedges and hash browns	Analysed (NZ)	1166
All other vegetables	Every other vegetable, canned, raw or cooked, including pulses	Imputed zero	0
Condiments			
Tomato Sauce	All "pickles, chutneys and relishes" plus tomato salsa (except apple sauce).	Imputed zero	0
	Savoury sauces	Analysed (NZ)	3527
	Plus tomato sauce, tomato style sauce, and tomato based pasta sauces without meat, and vinegar.	Imputed zero	0
Soups, instant dry mix	All soup dry mixes, sauce dry mixes	Analysed (Aust)	1250
Spices	All "salt", pepper, spices, artificial sweeteners	Imputed zero	0
Negligible amount items #	Miscellaneous items unsuited to any particular category e.g. yeast/beef extracts and powders	Imputed zero	0

include cocoa powder, beverage flavourings, yeast, gelatine and beef extracts

Appendix 4

Complete information on dietary intake assessment results

4.1 Estimated dietary intakes

Estimated intakes for TFA, including intakes by gender split are shown in Table A4.1.

Table A4. 1: Estimated mean, 5th and 95th percentile dietary intakes of TFA for various Australian and New Zealand population groups

a. Australia

Population Group	Gender	No. of respondents	*Trans* fatty acid intakes (g/day)		
			5th Percentile	Mean	95th Percentile
2 years & above	All	13,858	0.6	1.4	2.7
	M	6,616	1.0	1.6	2.9
	F	7,242	0.5	1.2	2.4
45 years & above	All	5,266	0.5	1.2	2.3
	M	2,456	0.9	1.5	2.5
	F	2,810	0.5	1.0	2.1
20-44 years	All	5450	0.6	1.5	3.0
	M	2566	1.0	1.7	3.2
	F	2884	0.5	1.2	2.6
13-19 years	All	1063	0.6	1.6	3.2
	M	550	1.1	1.8	3.2
	F	513	0.6	1.4	3.2
5-12 years	All	1496	0.6	1.4	2.4
	M	760	1.0	1.5	2.5
	F	736	0.6	1.2	2.2
2-4 years	All	583	0.6	1.2	2.0
	M	284	1.0	1.3	1.9
	F	299	0.5	1.1	2.1

Total number of respondents for Australia: 2 years and above = 13 858, 45 years and above = 5266, 20-44 years = 5448, 13-19 years = 1065, 5-12 years = 1496, 2-4 years = 583,. Respondents include all members of the survey population whether or not they consumed a food that contains TFA.

b. New Zealand

Population Group	Gender	No. of respondents	*Trans* fatty acid intakes (g/day) 5th Percentile	Mean	95th Percentile
15 years & above	All	4,636	0.9	1.7	2.9
	M	1,927	1.4	2.1	3.1
	F	2,709	0.8	1.5	2.4
45 years & above	All	2,072	0.9	1.6	2.6
	M	914	1.3	1.9	2.9
	F	1,158	0.8	1.4	2.1
20-44 years	All	2,267	0.9	1.8	3.0
	M	879	1.4	2.3	3.4
	F	1,388	0.9	1.5	2.5
15-19 years	All	297	1.0	2.0	3.1
	M	134	1.6	2.3	3.5
	F	163	0.9	1.7	2.7

Total number of respondents for New Zealand: 15 years and above = 4636, 45 years and above = 2072, 20-44 years = 2267, 15-19 years = 297. Respondents include all members of the survey population whether or not they consumed a food that contains TFA.

c. New Zealand Maori and Pacific Islanders

Population Group	Gender	No. of respondents	*Trans* fatty acid intakes (g/day) 5th Percentile	Mean	95th Percentile
15 years & above	All	1,011	0.8	1.8	2.9
	M	384	1.2	2.2	3.1
	F	627	0.7	1.6	2.8
45 years & above	All	248	0.7	1.6	2.8
	M	126	1.1	1.8	2.9
	F	122	0.6	1.4	2.6
20-44 years	All	652	0.9	1.9	3.1
	M	213	1.4	2.3	3.1
	F	439	0.8	1.7	2.8
15-19 years	All	111	1.1	2.1	3.0
	M	45	2.2	2.4	2.8
	F	66	1.0	1.8	3.1

Total number of respondents for New Zealand: 15 years and above = 1,011, 45 years and above = 248, 20-44 years = 652, 15-19 years = 111. Respondents include all members of the survey population whether or not they consumed a food that contains TFA.

4.2 Percent contributions of individual foods to total TFA intakes

Percent contributions are shown in the tables below for major food groups, food sub-groups and individual foods.

Table A4. 2: Percentage contributors to total TFA dietary intakes for Australia and New Zealand for different population groups (* Major foods groups; **Sub food groups; NC – not consumed)

a. Australia

	Food name	2yrs & above		45yrs & above		20-44yrs		13-19yrs	
		No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Populat gro Contribu (≥1
*	**Beverages, alcoholic**		<1		<1		<1		
	Beer	1837	0	849	0	938	0	45	0
	Wine & cider	1884	0	1044	0	801	0	30	0
	All other alcoholic beverages	665	0	337	0	299	0	28	0
	Liqueur Advocaat	1	<1	1	<1	.	NC	.	NC
	Cream based coffee flavour	27	<1	10	<1	16	<1	1	<1
	Cream based other flavour	4	<1	1	<1	3	<1	.	NC
*	**Beverages, non-alcoholic**		0		0		0		
	Water, bottled still	20	0	5	0	8	0	2	0
	Water, tap	11668	0	4422	0	4520	0	903	0
	Juices, juice drinks, cordials	6470	0	1948	0	2329	0	654	0
	Tea & coffee	9881	0	5033	0	4398	0	278	0
	Soft drink	4600	0	1169	0	2172	0	550	0
*	**Cereal and cereal products**		11		12		10		
**	**Breads and grains**		2		2		2		
	Grains, flours	4989	0	2092	0	1969	0	323	0
	Bread, multigrain	1884	<1	1018	<1	644	<1	74	<1
	Bread roll, multigrain	111	<1	44	<1	53	<1	8	<1
	Bread, white	6688	<1	2186	<1	2681	<1	575	<1
	Bread, white, fibre increased	672	<1	225	<1	225	<1	42	<1
	Bread roll, white	2269	<1	697	<1	1043	<1	240	<1
	Bread, wholemeal	2649	<1	1474	<1	804	<1	103	<1
	Bread rolls, wholemeal	358	<1	139	<1	177	<1	21	<1
	Cheese topped breads	175	<1	60	<1	79	<1	15	<1

	Food name	2yrs & above		45yrs & above		20-44yrs		13-19yrs	
		No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Populat gro Contribut (≥1
	Other breads	1	<1	1	<1	.	NC	.	NC
	Fruit buns	550	<1	229	<1	214	<1	34	<1
	Pasta, plain	1356	<1	397	<1	624	<1	104	<1
	Noodles	174	0	59	0	85	0	14	0
	Instant noodles	318	<1	46	<1	124	<1	41	<1
	Breakfast cereal, all types	5929	0	2418	0	1836	0	462	0
	Toasted muesli	200	<1	94	<1	61	<1	12	<1
**	**Cakes**		6		6		6		
	Cake, plain	544	1	254	1	198	<1	20	<1
	Cake, chocolate	425	<1	149	<1	165	<1	43	<1
	Cake, sponge	259	0	101	0	93	0	12	0
	Cake, sponge, filled	298	<1	131	<1	92	<1	28	<1
	Cake, fruit, dark	555	<1	311	1	160	<1	33	<1
	Cake, carrot, iced	87	<1	40	<1	38	<1	5	<1
	Cheesecake	202	<1	82	<1	88	<1	9	<1
	Doughnuts	264	2	58	1	98	1	36	3
	Scones, fruit	278	<1	148	<1	100	<1	8	<1
	Muffin, cake style	138	<1	43	<1	66	<1	12	<1
	Pikelet	164	<1	47	<1	71	<1	11	<1
**	**Biscuits**		3		3		2		
	Savoury biscuits	2199	<1	965	<1	668	<1	139	<1
	Sweet biscuits, filled	901	<1	322	<1	325	<1	68	<1
	Sweet biscuits, chocolate	678	<1	203	<1	265	<1	58	<1
	Shortbread	2352	<1	1080	1	674	<1	121	<1
*	**Cereal based mixed foods**		9		6		11		
	Hamburger, chain, with cheese	274	<1	34	<1	160	<1	34	<1
	Hamburger, chain, without cheese	58	<1	6	<1	27	<1	10	<1
	Hamburger, with cheese, purchased from independent retailers	.	NC	.	NC	.	NC	.	NC
	Chicken burger	282	<1	28	<1	134	<1	48	<1
	Pizza, supreme	710	1	119	<1	348	2	91	2
	Lasagne	544	8	138	6	235	9	60	9
*	**Pastry and pastry based mixed foods**		14		13		15		
	Croissant	111	<1	30	<1	52	<1	11	<1

	Food name	2yrs & above		45yrs & above		20-44yrs		13-19yrs	
		No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Populat gro Contribut (≥1
	Danish pastry	703	2	296	2	283	2	57	1
	Pastry, shortcrust	56	<1	20	<1	22	<1	9	<1
	Pastry, puff	49	<1	20	<1	19	<1	.	NC
	Meat pie	898	4	265	4	415	4	91	4
	Sausage roll	638	4	121	2	301	4	91	7
	Spinach & cheese pastry	149	3	43	3	83	3	14	3
	Quiche	145	1	61	1	66	1	5	<1
*	**Eggs**		1		1		1		
	Egg, whole, raw	2478	<1	967	<1	1052	<1	173	<1
	Egg, white, raw	50	0	13	0	23	0	6	0
	Egg, yolk, raw	1677	<1	622	<1	759	<1	140	<1
*	**Fats and oils**		13		18		12		
**	**Spreads**		12		17		11		
	Butter, regular	2007	7	834	10	832	7	111	4
	Dairy blend (not reduced fat)	816	2	325	3	344	2	45	1
	Dairy blend (reduced fat)	308	<1	126	<1	118	<1	18	<1
	Edible oil spread, regular	8233	2	3265	3	2983	2	628	2
	Edible oil spread, 50% or less fat	141	<1	59	<1	54	<1	9	<1
	Solid fats	2534	<1	932	<1	1089	<1	200	<1
**	**Oils**		1		1		1		
	Oil, canola	3451	1	1079	1	1408	1	307	<1
	Oil, olive	263	<1	129	<1	101	<1	16	<1
*	**Fish, seafood and fish products**		1		1		1		
	Fish, fillets	393	<1	189	<1	158	<1	20	<1
	Fish, battered, takeaway	473	<1	173	<1	199	<1	31	<1
	Seafood extender/surimi	46	0	20	0	18	0	3	0
	Tuna, canned	288	<1	103	<1	135	<1	15	<1
	Salmon, canned	178	<1	108	<1	57	<1	5	<1
	Canned & smoked fish	304	<1	182	<1	103	<1	8	<1
	Calamari, crumbed, fried	132	<1	46	<1	63	<1	11	<1
	Crustacea and molluscs	389	<1	175	<1	173	<1	19	<1
*	**Fruit**		0		0		0		
	All types of fruit	8307	0	3663	0	2780	0	487	0

	Food name	2yrs & above		45yrs & above		20-44yrs		13-19yrs	
		No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Populat gro Contribut (≥1
*	**Meat and poultry**		13		15		13		
	Beef, steak, raw	3505	1	1486	1	1464	1	226	<1
	Beef mince, raw	998	1	311	1	427	1	94	<1
	Lamb chops, raw	1469	3	724	4	492	2	91	2
	Pork	897	<1	386	<1	362	<1	51	<1
	Chicken, thigh, raw	1510	<1	641	<1	615	<1	104	<1
	Chicken, barbecued	2455	3	880	4	1111	4	197	3
	Beef, sausage, raw	1507	3	517	3	536	2	132	2
	Processed chicken breast	154	0	48	0	68	0	16	0
	Bacon, raw	3028	<1	1171	<1	1337	<1	193	<1
	Processed luncheon meats	818	<1	326	<1	286	<1	51	<1
*	**Dairy products**		29		29		26		
**	**Cheese**		8		8		8		
	Cheese, cheddar, full fat	4065	5	1471	5	1779	6	312	5
	Cheese, cheddar, reduced fat	467	<1	195	<1	198	<1	28	<1
	Cheese, brie	33	<1	18	<1	15	<1	.	NC
	Cheese, camembert	57	<1	27	<1	29	<1	1	<1
	Cheese, cottage	530	<1	243	<1	213	<1	25	<1
	Cheese, processed, cheddar type	1387	2	466	2	494	2	99	2
**	**Cream**		6		7		6		
	Cream, pure (not thickened)	1435	3	643	4	599	3	86	2
	Cream, reduced fat	129	<1	61	<1	51	<1	6	<1
	Ice Cream, full fat, vanilla	2444	3	775	2	787	2	266	5
**	**Milk, full fat**		12		11		10		
	Milk, full fat	8444	9	2992	8	3449	8	558	9
	Milk, powder, whole, dry	1518	2	388	3	491	1	171	1
	Chocolate flavoured milk, full fat	593	<1	85	<1	295	1	86	1
**	**Milk, low fat**		2		3		2		
	Milk, modified, low fat	3898	2	1824	2	1531	1	238	1
	Milk, skim	969	0	595	0	308	0	27	0
	Milk, powder, low fat, dry	302	<1	136	1	77	<1	14	<1
	Flavoured milk, reduced fat	292	<1	108	<1	101	<1	23	<1
**	**Yoghurt**		1		<1		<1		

	Food name	2yrs & above		45yrs & above		20-44yrs		13-19yrs	
		No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Populat gro Contribut (≥1
	Yoghurt, fruit, full fat	663	<1	187	<1	165	<1	55	<1
	Yoghurt, fruit, reduced fat	632	<1	292	<1	235	<1	36	<1
*	**Infant formula and foods**		<1		<1		<1		
	Infant cereal, mixed	2	0	1	0	1	0	.	NC
	Infant Dessert, dairy based	11	<1	.	NC	4	<1	.	NC
	Infant Dessert, fruit	19	0	2	0	5	0	.	NC
	Infant Dinner, containing meat, chicken or fish	2	<1	.	NC	1	<1	.	NC
	Infant formula, cow's milk based	3	<1	1	<1	.	NC	1	<1
*	**Nuts and legumes**		1		1		1		
	Peanut butter	1927	<1	636	<1	798	<1	116	<1
	Soy milk	297	<1	144	<1	99	<1	7	<1
	Tofu	85	0	22	0	52	0	3	0
	Vegetarian sausages	111	<1	30	<1	61	<1	6	<1
	Roasted nuts and seeds	336	<1	167	<1	136	<1	9	<1
*	**Snack foods**		1		<1		1		
	Corn chips	461	<1	43	<1	217	<1	63	<1
	Extruded cheese snacks	394	<1	27	<1	135	<1	69	<1
	Potato crisps	989	1	105	<1	356	<1	163	2
	Muesli bars	671	<1	71	<1	173	<1	90	<1
*	**Sugar/Confectionery**		<1		<1		1		
	Sugar, white	10361	0	4042	0	4002	0	714	0
	Water based ice confections	340	0	18	0	62	0	50	0
	Chocolate, all types	2377	<1	583	<1	959	<1	272	<1
*	**Vegetables**		7		3		7		
**	**Potato chips, hot, fries**		7		3		7		
	Potato chips, fries from fast food outlets	769	4	104	1	373	4	113	7
	Potato chips, from independent outlets	1353	3	337	2	623	3	149	4
**	**All other vegetables**		0		0		0		
	All other vegetables	11495	0	4738	0	4566	0	784	0
*	**Condiments**		<1		<1		<1		
	Tomato Sauce	6336	0	2260	0	2665	0	547	0
	Soups, instant dry mix	1383	<1	623	<1	553	<1	83	<1
	Spices	2968	0	1431	0	1175	0	174	0

Food name	2yrs & above		45yrs & above		20-44yrs		13-19yrs	
	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Populat… gro… Contribut… (≥1…
Negligible amount items #	3845	0	1196	0	1341	0	382	0

* Major foods groups
**Sub food groups
NC – not consumed
include cocoa powder, beverage flavourings, yeast, gelatine and beef extracts

b. New Zealand

	Food name	15 yrs & above		45 yrs & above		20-44 yrs		15-19 yrs	
		No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*
*	**Beverages, alcoholic**		<1		<1		<1		0
	Beer	582	0	265	0	297	0	20	0
	Wine & cider	651	0	352	0	287	0	12	0
	All other alcoholic beverages	320	0	185	0	128	0	7	0
	Liqueur Advocaat	.	NC	.	NC	.	NC	.	NC
	Cream based coffee flavour	.	NC	.	NC	.	NC	.	NC
	Cream based other flavour	7	<1	3	<1	4	<1	.	NC
*	**Beverages, non-alcoholic**		0		0		0		0
	Water, bottled still	.	NC	.	NC	.	NC	.	NC
	Water, tap	3985	0	1790	0	1956	0	239	0
	Juices, juice drinks, cordials	1312	0	490	0	705	0	117	0
	Tea & coffee	3979	0	1948	0	1891	0	140	0
	Soft drink	1298	0	396	0	748	0	154	0
*	**Cereal and cereal products**		10		9		10		10
**	**Breads & grains**		1		1		1		2
	Grains, flours	1958	<1	899	<1	944	<1	115	<1
	Bread, multigrain	1078	<1	629	<1	416	<1	33	<1
	Bread roll, multigrain	17	<1	5	<1	10	<1	2	<1
	Bread, white	2023	<1	821	<1	1057	<1	145	<1
	Bread, white, fibre increased	213	<1	83	<1	118	<1	12	<1
	Bread roll, white	641	<1	251	<1	335	<1	55	<1
	Bread, wholemeal	903	<1	544	<1	333	<1	26	<1
	Bread rolls, wholemeal	63	<1	21	<1	38	<1	4	<1

	Food name	15 yrs & above		45 yrs & above		20-44 yrs		15-19 yrs	
		No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*
	Cheese topped breads	132	<1	39	<1	82	<1	11	<1
	Other breads	26	<1	12	<1	14	<1	.	NC
	Fruit buns, fruit breads	210	<1	109	<1	86	<1	15	<1
	Pasta, plain	308	<1	105	<1	182	<1	21	<1
	Noodles	150	<1	47	<1	91	<1	12	<1
	Instant noodles	115	<1	26	<1	73	<1	16	<1
	Breakfast cereal, all types	1891	0	1044	0	752	0	95	0
	Toasted muesli	108	<1	57	<1	47	<1	4	<1
**	**Cakes**		6		6		7		7
	Cake, plain	162	<1	85	<1	68	<1	9	<1
	Cake, chocolate	186	<1	67	<1	101	<1	18	<1
	Cake, sponge	45	0	26	0	18	0	1	0
	Cake, sponge, filled	111	<1	55	<1	51	<1	5	<1
	Cake, fruit, dark	359	<1	224	1	128	<1	7	<1
	Cake, carrot, iced	23	<1	11	<1	11	<1	1	<1
	Cheesecake	44	<1	16	<1	26	<1	2	<1
	Doughnuts	62	1	15	<1	39	2	8	3
	Scones, fruit	159	<1	98	<1	58	<1	3	<1
	Muffin, cake style	189	2	89	2	92	2	8	2
	Pikelet	140	<1	57	<1	70	<1	13	<1
**	**Biscuits**		2		2		2		1
	Savoury biscuits	584	<1	341	<1	226	<1	17	<1
	Sweet biscuits, filled	153	<1	76	<1	70	<1	7	<1
	Sweet biscuits, chocolate	551	<1	224	<1	280	<1	47	<1
	Shortbread	877	<1	526	1	339	<1	12	<1
*	**Cereal based mixed foods**		3		2		3		7
	Hamburger, chain, with cheese	114	<1	12	<1	82	<1	20	<1
	Hamburger, chain, without cheese	68	<1	7	<1	52	<1	9	<1
	Hamburger, with cheese, purchased from independent retailers	31	<1	8	<1	21	<1	2	<1
	Chicken burger	36	<1	11	<1	21	<1	4	<1
	Pizza, supreme	181	<1	56	<1	102	<1	23	1
	Lasagne	261	2	83	<1	143	2	35	5
*	**Pastry and Pastry based mixed foods**		10		8		10		11
	Croissant	36	<1	13	<1	21	<1	2	<1
	Danish pastry	158	<1	77	<1	74	<1	7	<1

	Food name	15 yrs & above			45 yrs & above			20-44 yrs			15-19 yrs		
		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*	
	Pastry, shortcrust	9	<1		4	<1		4	<1		1	<1	
	Pastry, puff	24	<1		8	<1		15	<1		1	<1	
	Pastry, filo	18	0		6	0		12	0		.	NC	
	Meat pie with cheese	443	5		145	4		254	6		44	8	
	Sausage roll	110	<1		35	<1		64	<1		11	<1	
	Spinach & cheese pastry	8	<1		1	<1		7	<1		.	NC	
	Quiche	119	2		51	3		64	2		4	1	
*	**Eggs**			1			1			1			1
	Egg, whole, raw	1475	<1		661	1		743	<1		71	<1	
	Egg, white, raw	72	0		25	0		42	0		5	0	
	Egg, yolk, raw	501	<1		197	<1		271	<1		33	<1	
*	**Fats and oils**			38			44			34			30
**	**Spreads**			34			41			30			26
	Butter, regular	1953	7		889	8		970	7		94	6	
	Dairy blend (not reduced fat)	182	<1		86	1		87	<1		9	<1	
	Dairy blend (reduced fat)	6	<1		2	<1		4	<1		.	NC	
	Edible oil spread, regular	2684	23		1317	29		1222	20		145	19	
	Edible oil spread, 50% or less fat	175	<1		96	1		69	<1		10	<1	
	Solid fats, excluding veg shortening	1217	1		574	1		562	1		81	1	
	Vegetable shortening	13	<1		9	<1		4	<1		.	NC	
**	**oils**			4			3			4			4
	Oil, canola	1694	4		679	3		912	4		103	4	
	Oil, olive	188	<1		83	<1		96	<1		9	<1	
*	**Fish, seafood and fish products**			2			2			2			1
	Fish, fillets	213	<1		105	<1		100	<1		8	<1	
	Fish, battered, takeaway	349	2		140	1		187	2		22	1	
	Seafood extender/surimi	12	0		4	0		7	0		1	0	
	Tuna, canned	92	<1		38	<1		49	<1		5	<1	
	Salmon, canned	140	<1		88	<1		52	<1		.	NC	
	Canned & smoked fish	118	<1		59	<1		58	<1		1	<1	
	Calamari, crumbed, fried	56	<1		25	<1		29	<1		2	<1	
	Crustacea and molluscs	146	<1		67	<1		76	<1		3	<1	
*	**Fruit**			0			0			0			0
	All types of fruit	2890	0		1461	0		1287	0		142	0	
*	**Meat and poultry**			9			9			10			8
	Beef, steak, raw	1274	2		635	2		578	2		61	1	

	Food name	15 yrs & above		45 yrs & above		20-44 yrs		15-19 yrs	
		No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*
	Beef mince, raw	420	<1	175	<1	224	<1	21	<1
	Lamb chops, raw	530	<1	261	<1	240	<1	29	<1
	Pork	391	<1	162	<1	205	<1	24	<1
	Chicken, thigh, raw	218	<1	93	<1	105	<1	20	<1
	Chicken, barbecued	893	3	361	3	480	3	52	2
	Beef, sausage, raw	493	3	193	3	259	3	41	3
	Processed chicken breast	43	0	18	0	21	0	4	0
	Ham, raw	956	<1	425	<1	478	<1	53	<1
	Processed luncheon meats	292	<1	112	<1	165	<1	15	<1
*	**Dairy products**		20		19		21		20
**	**Cheese**		5		4		5		4
	Cheese, cheddar, full fat	797	2	298	2	449	3	50	2
	Cheese, cheddar, reduced fat	855	2	407	2	410	2	38	1
	Cheese, brie	35	<1	18	<1	17	<1	.	NC
	Cheese, camembert	36	<1	13	<1	23	<1	.	NC
	Cheese, cottage	137	<1	64	<1	73	<1	.	NC
	Cheese, processed, cheddar type	166	<1	77	<1	79	<1	10	<1
**	**Cream**		3		3		3		3
	Cream, pure (not thickened)	600	2	311	2	262	2	27	2
	Cream, reduced fat sour	37	<1	18	<1	19	<1	.	NC
	Ice Cream, full fat, vanilla	636	<1	265	<1	321	<1	50	1
**	**Milk full fat**		12		11		12		12
	Milk, full fat	3284	12	1417	11	1676	12	191	12
	Milk, powder, whole, dry	43	<1	15	<1	25	<1	3	<1
	Chocolate flavoured milk, full fat	81	<1	16	<1	51	<1	14	<1
**	**Milk low fat**		1		1		1		<1
	Milk, modified, low fat	511	<1	265	<1	223	<1	23	<1
	Milk, skim	1160	0	636	0	480	0	44	0
	Milk, powder, low fat, dry	72	<1	36	<1	34	<1	2	<1
	Flavoured milk, reduced fat	4	<1	.	NC	1	<1	3	<1
**	**Yoghurt**		<1		<1		<1		<1
	Yoghurt, fruit, full fat	103	<1	42	<1	52	<1	9	<1
	Yoghurt, fruit, reduced fat	242	<1	121	<1	103	<1	18	<1
*	**Infant formula and foods**		0		0		0		0
	Infant cereal, mixed	.	NC	.	NC	.	NC	.	NC
	Infant Dessert, dairy based	.	NC	.	NC	.	NC	.	NC

	Food name	15 yrs & above		45 yrs & above		20-44 yrs		15-19 yrs	
		No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*
	Infant Dessert, fruit	1	0	.	NC	1	0	.	NC
	Infant Dinner, containing meat, chicken or fish	.	NC	.	NC	.	NC	.	NC
	Infant formula, cow's milk based	.	NC	.	NC	.	NC	.	NC
*	**Nuts and legumes**		<1		<1		<1		<1
	Peanut butter	589	<1	225	<1	316	<1	48	<1
	Soy milk	50	<1	34	<1	16	<1	.	NC
	Tofu	16	0	3	0	12	0	1	0
	Vegetarian sausages	6	<1	3	<1	3	<1	.	NC
	Roasted nuts and seeds	78	<1	44	<1	29	<1	5	<1
*	**Snack foods**		2		1		3		3
	Corn chips	72	<1	8	<1	46	<1	18	<1
	Popcorn	28	2	8	<1	17	3	3	3
	Extruded cheese snacks	88	<1	11	<1	53	<1	24	<1
	Potato crisps	279	<1	59	<1	175	<1	45	<1
	Muesli bars	150	<1	40	<1	102	<1	8	<1
*	**Sugar/Confectionery**		3		2		3		6
	Sugar, white	3654	0	1676	0	1758	0	220	0
	Water based ice confections	25	0	9	0	11	0	5	0
	Chocolate, all types	1082	3	396	2	585	3	101	6
*	**Vegetables**		2		1		3		3
**	**Potato chips, hot, fries**		2		1		3		3
	Potato chips, fries from fast food outlets	218	<1	39	<1	149	<1	30	1
	Potato chips, from independent outlets	637	1	221	1	362	2	54	2
**	**All other vegetables**		0		0		0		0
	All other vegetables	4049	0	1912	0	1906	0	231	0
*	**Condiments**		<1		<1		<1		<1
	Tomato Sauce	2750	<1	1185	<1	1383	<1	182	<1
	Soups, instant dry mix	87	<1	39	<1	47	<1	1	<1
	Spices	2463	0	1235	0	1099	0	129	0
	Negligible amount items #	119	0	58	0	58	0	3	0

* Major foods groups
**Sub food groups
NC – not consumed
include cocoa powder, beverage flavourings, yeast, gelatine and beef extracts

c. New Zealand Maori and Pacific Islanders

	Food name	15 yrs & above		45 yrs & above		20-44 yrs		15-19 yrs	
		No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*
*	**Beverages, alcoholic**		<1		<1		0		0
	Beer	96	0	31	0	57	0	8	0
	Wine & cider	70	0	22	0	46	0	2	0
	All other alcoholic beverages	40	0	14	0	22	0	4	0
	Liqueur Advocaat	.	NC	.	NC	.	NC	.	NC
	Cream based coffee flavour	.	NC	.	NC	.	NC	.	NC
	Cream based other flavour	1	<1	1	<1	.	NC	.	NC
*	**Beverages, non-alcoholic**		0		0		0		0
	Water, bottled still	.	NC	.	NC	.	NC	.	NC
	Water, tap	853	0	211	0	560	0	82	0
	Juices, juice drinks, cordials	274	0	44	0	192	0	38	0
	Tea & coffee	762	0	211	0	496	0	55	0
	Soft drink	332	0	57	0	214	0	61	0
*	**Cereal and cereal products**		9		8		9		11
**	**Breads & grains**		1		1		1		2
	Grains, flours	390	<1	82	<1	266	<1	42	<1
	Bread, multigrain	104	<1	35	<1	64	<1	5	<1
	Bread roll, multigrain	.	NC	.	NC	.	NC	.	NC
	Bread, white	514	<1	120	<1	341	<1	53	<1
	Bread, white, fibre increased	38	<1	9	<1	25	<1	4	<1
	Bread roll, white	122	<1	26	<1	75	<1	21	<1
	Bread, wholemeal	115	<1	40	<1	67	<1	8	<1
	Bread rolls, wholemeal	10	<1	2	<1	7	<1	1	<1
	Cheese topped breads	14	<1	1	<1	11	<1	2	<1
	Other breads	2	<1	.	NC	2	<1	.	NC
	Fruit buns, fruit breads	20	<1	6	<1	9	<1	5	<1
	Pasta, plain	57	<1	12	<1	40	<1	5	<1
	Noodles	48	<1	9	<1	36	<1	3	<1
	Instant noodles	39	<1	7	<1	28	<1	4	<1
	Breakfast cereal, all types	313	0	95	0	189	0	29	0
	Toasted muesli	5	<1	.	NC	5	<1	.	NC
**	**Cakes**		6		5		7		7
	Cake, plain	15	<1	7	<1	4	<1	4	<1
	Cake, chocolate	21	<1	1	<1	19	<1	1	<1
	Cake, sponge	10	0	3	0	6	0	1	0

Food name	15 yrs & above		45 yrs & above		20-44 yrs		15-19 yrs	
	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*	No of consumers	Population groups % Contributors (≥1%)*
Cake, sponge, filled	20	<1	7	<1	12	<1	1	<1
Cake, fruit, dark	32	<1	11	<1	20	<1	1	<1
Cake, carrot, iced	2	<1	.	NC	2	<1	.	NC
Cheesecake	11	<1	2	<1	8	<1	1	<1
Doughnuts	18	2	3	2	11	2	4	5
Scones, fruit	26	<1	6	<1	18	<1	2	<1
Muffin, cake style	22	1	3	<1	17	1	2	<1
Pikelet	32	<1	9	<1	19	<1	4	<1
** **Biscuits**		1		2		1		2
Savoury biscuits	64	<1	23	<1	39	<1	2	<1
Sweet biscuits, filled	21	<1	2	<1	16	<1	3	<1
Sweet biscuits, chocolate	92	<1	17	<1	60	<1	15	<1
Shortbread	84	<1	37	1	44	<1	3	<1
* **Cereal based mixed foods**		3		1		3		4
Hamburger, chain, with cheese	37	<1	4	<1	26	<1	7	<1
Hamburger, chain, without cheese	15	<1	1	<1	13	<1	1	<1
Hamburger, with cheese, purchased from independent retailers	10	<1	1	<1	7	<1	2	<1
Chicken burger	7	<1	.	NC	5	<1	2	<1
Pizza, supreme	35	<1	6	<1	22	<1	7	1
Lasagne	53	1	7	<1	38	2	8	2
* **Pastry and Pastry based mixed foods**		9		6		9		10
Croissant	7	<1	.	NC	7	<1	.	NC
Danish pastry	29	<1	8	<1	20	<1	1	<1
Pastry, shortcrust	3	<1	.	NC	2	<1	1	<1
Pastry, puff	3	<1	1	<1	2	<1	.	NC
Pastry, filo	3	0	1	0	2	0	.	NC
Meat pie with cheese	112	6	14	4	79	6	19	9
Sausage roll	30	<1	4	<1	19	<1	7	2
Spinach & cheese pastry	1	<1	.	NC	1	<1	.	NC
Quiche	20	1	3	1	17	2	.	NC
* **Eggs**		1		1		1		1
Egg, whole, raw	316	1	71	1	218	1	27	<1
Egg, white, raw	19	0	4	0	11	0	4	0
Egg, yolk, raw	93	<1	17	<1	63	<1	13	<1

	Food name	15 yrs & above			45 yrs & above			20-44 yrs			15-19 yrs		
		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*	
*	**Fats and oils**			37			44			35			31
**	**Spreads**			33			41			32			28
	Butter, regular	407	8		108	10		259	8		40	8	
	Dairy blend (not reduced fat)	33	<1		9	1		20	<1		4	<1	
	Dairy blend (reduced fat)	1	<1		.	NC		1	<1		.	NC	
	Edible oil spread, regular	529	23		127	27		347	22		55	19	
	Edible oil spread, 50% or less fat	17	<1		6	<1		10	<1		1	<1	
	Solid fats, excluding veg shortening	252	1		56	1		173	1		23	<1	
	Vegetable shortening	2	<1		1	<1		1	<1		.	NC	
**	**oils**			3			3			3			3
	Oil, canola	337	3		77	3		224	3		36	3	
	Oil, olive	15	<1		4	<1		8	<1		3	<1	
*	**Fish, seafood and fish products**			2			3			2			1
	Fish, fillets	71	<1		30	<1		38	<1		3	<1	
	Fish, battered, takeaway	90	2		17	2		62	2		11	1	
	Seafood extender/surimi	6	0		1	0		5	0		.	NC	
	Tuna, canned	15	<1		4	<1		10	<1		1	<1	
	Salmon, canned	21	<1		12	<1		9	<1		.	NC	
	Canned & smoked fish	22	<1		8	<1		14	<1		.	NC	
	Calamari, crumbed, fried	13	<1		2	<1		11	<1		.	NC	
	Crustacea and molluscs	44	<1		16	<1		28	<1		.	NC	
*	**Fruit**			0			0			0			0
	All types of fruit	510	0		139	0		325	0		46	0	
*	**Meat and poultry**			11			13			10			8
	Beef, steak, raw	296	2		95	3		177	2		24	1	
	Beef mince, raw	75	<1		12	<1		55	<1		8	<1	
	Lamb chops, raw	124	<1		32	<1		82	<1		10	<1	
	Pork	100	<1		26	<1		65	<1		9	<1	
	Chicken, thigh, raw	54	<1		12	<1		34	<1		8	<1	
	Chicken, barbecued	237	4		59	5		153	4		25	2	
	Beef, sausage, raw	115	3		25	3		74	3		16	3	
	Processed chicken breast	5	0		1	0		3	0		1	0	
	Ham, raw	172	<1		36	<1		119	<1		17	<1	
	Processed luncheon meats	45	<1		9	<1		32	<1		4	<1	
*	**Dairy products**			19			19			18			19
**	**Cheese**			3			2			3			3

	Food name	15 yrs & above			45 yrs & above			20-44 yrs			15-19 yrs		
		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*	
	Cheese, cheddar, full fat	103	1		17	<1		66	1		20	2	
	Cheese, cheddar, reduced fat	112	1		22	1		82	1		8	1	
	Cheese, brie	2	<1		.	NC		2	<1		.	NC	
	Cheese, camembert	4	<1		.	NC		4	<1		.	NC	
	Cheese, cottage	13	<1		4	<1		9	<1		.	NC	
	Cheese, processed, cheddar type	19	<1		3	<1		13	<1		3	<1	
**	**Cream**			3			3			2			4
	Cream, pure (not thickened)	104	2		29	2		65	2		10	2	
	Cream, reduced fat sour	4	<1		3	<1		1	<1		.	NC	
	Ice Cream, full fat, vanilla	113	<1		24	<1		75	<1		14	2	
**	**Milk full fat**			13			14			13			12
	Milk, full fat	762	12		183	13		501	12		78	11	
	Milk, powder, whole, dry	7	<1		2	<1		4	<1		1	<1	
	Chocolate flavoured milk, full fat	29	<1		2	<1		21	<1		6	<1	
**	**Milk low fat**			<1			1			<1			<1
	Milk, modified, low fat	67	<1		23	<1		39	<1		5	<1	
	Milk, skim	111	0		36	0		66	0		9	0	
	Milk, powder, low fat, dry	7	<1		2	<1		5	<1		.	NC	
	Flavoured milk, reduced fat	.	NC		.	NC		.	NC		.	NC	
**	**Yoghurt**			<1			<1			<1			<1
	Yoghurt, fruit, full fat	14	<1		4	<1		9	<1		1	<1	
	Yoghurt, fruit, reduced fat	17	<1		2	<1		11	<1		4	<1	
*	**Infant formula and foods**			0			0			0			0
	Infant cereal, mixed	.	NC		.	NC		.	NC		.	NC	
	Infant Dessert, dairy based	.	NC		.	NC		.	NC		.	NC	
	Infant Dessert, fruit	.	NC		.	NC		.	NC		.	NC	
	Infant Dinner, containing meat, chicken or fish	.	NC		.	NC		.	NC		.	NC	
	Infant formula, cow's milk based	.	NC		.	NC		.	NC		.	NC	
*	**Nuts and legumes**			1			1			1			<1
	Peanut butter	120	<1		27	<1		74	<1		19	<1	
	Soy milk	7	<1		4	<1		3	<1		.	NC	
	Tofu	4	0		.	NC		3	0		1	0	
	Vegetarian sausages	.	NC		.	NC		.	NC		.	NC	
	Roasted nuts and seeds	10	<1		3	<1		6	<1		1	<1	
*	**Snack foods**			4			<1			5			3

	Food name	15 yrs & above			45 yrs & above			20-44 yrs			15-19 yrs		
		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*		No of consumers	Population groups % Contributors (≥1%)*	
	Corn chips	15	<1		1	<1		7	<1		7	<1	
	Popcorn	7	4		.	NC		5	5		2	2	
	Extruded cheese snacks	27	<1		2	<1		17	<1		8	<1	
	Potato crisps	68	<1		5	<1		48	<1		15	<1	
	Muesli bars	16	<1		.	NC		13	<1		3	<1	
*	**Sugar/Confectionery**			3			2			3			7
	Sugar, white	779	0		199	0		497	0		83	0	
	Water based ice confections	6	0		2	0		3	0		1	0	
	Chocolate, all types	204	3		35	2		134	3		35	7	
*	**Vegetables**			2			1			2			4
**	**Potato chips, hot, fries**			2			1			2			4
	Potato chips, fries from fast food outlets	66	<1		5	<1		46	<1		15	2	
	Potato chips, from independent outlets	151	1		24	<1		108	2		19	2	
**	**All other vegetables**			0			0			0			0
	All other vegetables	818	0		216	0		522	0		80	0	
*	**Condiments**			<1			<1			<1			0
	Tomato Sauce	491	<1		107	0		326	<1		58	0	
	Soups, instant dry mix	13	<1		4	<1		9	<1		.	NC	
	Spices	475	0		122	0		303	0		50	0	
	Negligible amount items #	14	0		2	0		11	0		1	0	

* Major foods groups
**Sub food groups
NC – not consumed
include cocoa powder, beverage flavourings, yeast, gelatine and beef extracts

4.3 Contribution from 'Naturally occurring' versus 'manufactured' sources

In order to determine what proportion of the estimated intakes come from naturally occurring versus manufactured sources, the contribution from each source was determined. Before this could be done, each food included in the dietary intake assessment had to be classified accordingly. Table A4.3 shows how each food was classified. Some foods were determined as containing mixtures of both naturally occurring and manufactured sources.

Table A4. 3: Foods classified as from manufactured TFA versus naturally occurring TFA

Foods classified as sources of "Naturally occurring TFA"	**"Manufactured TFA"**	**Both "naturally occurring TFA" and "manufactured TFA"**
Liqueur Advocaat	Bread, multigrain	Cheese topped breads
Cream based Liqueur coffee flavour	Bread roll, multigrain	Cheesecake
Cream based Liqueur other flavour	Bread, white	Meat pie
Hamburger, chain, with cheese	Bread, white, fibre increased	Sausage roll
Hamburger, chain, without cheese	Bread roll, white	Spinach & cheese pastry
Hamburger, with cheese, purchased from independent retailers	Bread, wholemeal	Quiche
Pizza, supreme	Bread rolls, wholemeal	Dairy blend (not reduced fat)
Lasagne	Other breads	Dairy blend (reduced fat)
Egg, whole, raw	Fruit buns	Solid fats
Egg, white, raw	Pasta, plain	Fish, battered, takeaway
Egg, yolk, raw	Noodles	Calamari, crumbed, fried
Butter, regular	Instant noodles	Roasted nuts and seeds
Fish, fillets	Breakfast cereal, all types	
Tuna, canned	Toasted muesli	
Salmon, canned	Cake, plain	
Canned & smoked fish	Cake, chocolate	
Crustacea and molluscs	Cake, sponge	
Beef, steak, raw	Cake, sponge, filled	
Beef mince, raw	Cake, fruit, dark	
Lamb chops, raw	Cake, carrot, iced	
Pork	Doughnuts	
Chicken, thigh, raw	Scones, fruit	
Chicken, barbecued	Muffin, cake style	
Beef, sausage, raw	Pikelet	
Processed chicken breast	Savoury biscuits	
Bacon, raw	Sweet biscuits, filled	
Processed luncheon meats	Sweet biscuits, chocolate	
Cheese, cheddar, full fat	Shortbread	
Cheese, cheddar, reduced fat	Chicken burger	
Cheese, brie	Croissant	
Cheese, camembert	Danish pastry	
Cheese, cottage	Pastry, shortcrust	
Cheese, processed, cheddar type	Pastry, puff	

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Foods classified as sources of "Naturally occurring TFA"	"Manufactured TFA"	Both "naturally occurring TFA" and "manufactured TFA"
Cream, pure (not thickened)	Edible oil spread, regular	
Cream, reduced fat	Edible oil spread, 50% or less fat	
Ice Cream, full fat, vanilla	Oil, canola	
Milk, full fat	Oil, olive	
Milk, powder, whole, dry	Vegetarian sausages	
Chocolate flavoured milk, full fat	Corn chips	
Milk, modified, low fat	Extruded cheese snacks	
Milk, skim	Potato crisps	
Milk, powder, low fat, dry	Muesli bars	
Flavoured milk, reduced fat	Chocolate, all types	
Yoghurt, fruit, full fat	Potato chips, fries from fast food outlets	
Yoghurt, fruit, reduced fat	Potato chips, from independent outlets	
Infant Dessert, dairy based	Soups, instant dry mix	
Infant Dinner, containing meat, chicken or fish		
Infant formula, cow's milk based		
Peanut butter		
Soy milk		

4.4 Contribution from take away foods

4.4.1 How the proportion of TFA intake from Take Away foods was calculated

In order to determine what proportion of the estimated TFA intake come from Take Away foods, 128 foods were classified as being either Take Away or not, through assigning a yes or no classification to each food. Take away foods were generally defined as being those from fast food or chain outlets or the local Take Away shop and covers foods that are commonly associated with being 'Take Away' foods such as deep fried chips, other deep fried foods and hamburgers.

A Lower Bound (or best case) and Upper Bound (or worst case) estimate of contribution to TFA intakes was determined to account for the great variation of products available on the market and for the variety of sources of these products. A Lower Bound YES classification indicated these foods are always classified as Take Away foods (therefore having an Upper Bound yes as well). An Upper Bound YES response indicated these foods may be at times classified as Take Away foods (therefore having a Lower Bound no classification). Of the 128 foods assessed, 17 were able to be classified as Take Away foods (Upper Bound yes) although only 7 of these were always regarded as Take Away food (Lower Bound yes).

An example of a food that was not considered to be a Take Away at all includes 'Bread Roll, multigrain' as this food is not generally bought from a food outlet for immediate consumption or prepared and cooked with high fat methods associated with Take Away foods. An example of a food that was classified as always being a Take Away food is 'Hamburger, chain with cheese'. It is considered that this food is always bought from a food outlet for immediate consumption and potentially prepared with high fat cooking methods. These examples differ from the foods 'Meat Pie' or 'Pizza' which may be bought from a food outlet for immediate consumption and therefore considered a Take Away food or bought frozen and heated at home at a later time, or alternatively cooked fresh.

Some assumptions had to be made when classifying whether a food was 'Take Away' or not, and whether it was always a Take Away food. For example, 'hot chips' were assumed to be mostly consumed by the majority of the population in the Take Away form (as opposed to home oven baked) and therefore this food was classified as always being a Take Away food. There was uncertainty regarding whether certain foods should be considered to be Take Away foods, such as in the case with doughnuts which are part of a larger category termed 'Cakes' and whilst often cooked using high fat methods, do not fit the commonly understood definition of a 'Take Away' food. This food may be considered a Take Away food in some instances as it may be purchased at a food outlet for immediate consumption, although as the other foods in this category were not considered to be Take Away foods, the same logic was applied.

Table A4.4 shows how foods were classified as Take Away foods for the purpose of determining their contribution to TFA intakes. If a food included in the TFA intake assessment is not listed in the table, it is assumed in all cases to not be a Take Away food.

Table A4.4. Foods classified as Take Away foods

Lower Bound (best case)*	Upper Bound (worst case)**
Hamburger, chain, with cheese	Hamburger, chain, with cheese
Hamburger, chain, without cheese	Hamburger, chain, without cheese
Hamburger, with cheese, purchased from independent retailers	Hamburger, with cheese, purchased from independent retailers
Chicken burger	Chicken burger
Pizza, supreme	Pizza, supreme
Potato chips, fries from fast food outlets	Meat pie
Potato chips, from independent outlets	Sausage roll
	Spinach & cheese pastry
	Quiche
	Fish, fillets
	Fish, battered, takeaway
	Seafood extender/surimi
	Calamari, crumbed, fried
	Crustacea and molluscs
	Chicken, barbecued
	Potato chips, fries from fast food outlets
	Potato chips, from independent outlets

* Assumes these foods are always a Take Away food.
** Some of these foods (i.e. those not listed in the first column) are assumed to only sometimes be a Take Away food.

4.5 Contribution from labelled foods

4.5.1 How the proportion of TFA intake from the Take Away foods was calculated

In order to determine what proportion of the estimated intakes of TFA came from foods displaying a Food Label, 128 foods were classified as either displaying a Food Label or not by assigning a yes or no classification to each food. Foods displaying a Food Label were generally defined as those that were packaged and cover foods that are commonly bought from the supermarket or general store and include foods such as breads, bottled drinks and cereals.

A Lower Bound (or best case) and Upper Bound (or worst case) estimated contribution to TFA intakes was determined to account for the great variation of products available on the market and for the variety of sources of these products. A Lower Bound YES classification indicated these foods are always classified as having a Food Label (therefore having an Upper Bound yes as well). An Upper Bound YES response indicated these foods may be at times classified as displaying a Food Label (therefore having a Lower Bound no classification). Of the 128 foods assessed, 105 were able to be classified as displaying a Food Label (Upper Bound yes) although only 60 of these were always regarded as having a Food Label (Lower Bound yes).

An example of a food that was not considered to display a Food Label at all includes 'Hamburger, chain with cheese' as this food is in the majority of cases bought from a food outlet without packaging or displaying a NIP. An example of a food that was classified as always displaying a Food Label includes 'Pasta, Plain' as this food is thought to almost always be bought in a package containing this information. These examples differ from the foods 'Savoury biscuits' and 'Bread, multigrain' which may be purchased in a package, such as from the supermarket, and therefore considered to display a Food Label, or be unpackaged such as in the case of a bakery purchase or cooked fresh. Some foods display labels although they are not required to have an ingredients list or Nutrition Information Panel. Such examples of foods include 'Water, bottled still' and would therefore not declare the presence of TFA via a NIP.

Table A4.5 shows how foods were classified as displaying a Food Label for the purpose of determining their contribution to TFA intakes. If a food is included in the TFA intake assessment it is not listed in the table, it is assumed in all cases not to be a food displaying a Food Label.

Table A4.5. Foods classified as displaying a Food Label

Lower Bound (best case)*	Upper Bound (worst case)**
Water, bottled still#	Water, bottled still#
Grains, flours	Juices, juice drinks, cordials
Pasta, plain	Soft drink
Noodles	Grains, flours
Instant noodles	Bread, multigrain
Breakfast cereal, all types	Bread roll, multigrain
Toasted muesli	Bread, white

Appendix 4

Lower Bound (best case)*	Upper Bound (worst case)**
Pastry, shortcrust	Bread, white, fibre increased
Pastry, puff	Bread roll, white
Egg, whole, raw	Bread, wholemeal
Egg, white, raw	Bread rolls, wholemeal
Egg, yolk, raw	Cheese topped breads
Butter, regular	Other breads
Dairy blend (not reduced fat)	Fruit buns
Dairy blend (reduced fat)	Pasta, plain
Edible oil spread, regular	Noodles
Edible oil spread, 50% or less fat	Instant noodles
Solid fats	Breakfast cereal, all types
Oil, canola	Toasted muesli
Oil, olive	Cake, plain
Tuna, canned	Cake, chocolate
Salmon, canned	Cake, sponge
Canned & smoked fish	Cake, sponge, filled
Cheese, cheddar, full fat	Cake, fruit, dark
Cheese, cheddar, reduced fat	Cake, carrot, iced
Cheese, brie	Cheesecake
Cheese, camembert	Doughnuts
Cheese, cottage	Scones, fruit
Cheese, processed, cheddar type	Muffin, cake style
Cream, pure (not thickened)	Pikelet
Cream, reduced fat	Savoury biscuits
Ice Cream, full fat, vanilla	Sweet biscuits, filled
Milk, full fat	Sweet biscuits, chocolate
Milk, powder, whole, dry	Shortbread
Chocolate flavoured milk, full fat	Pizza, supreme
Milk, modified, low fat	Lasagne
Milk, skim	Croissant
Milk, powder, low fat, dry	Danish pastry
Flavoured milk, reduced fat	Pastry, shortcrust
Yoghurt, fruit, full fat	Pastry, puff
Yoghurt, fruit, reduced fat	Meat pie
Infant cereal, mixed	Sausage roll
Infant Dessert, dairy based	Spinach & cheese pastry
Infant Dessert, fruit	Quiche
Infant Dinner, containing meat, chicken or fish	Egg, whole, raw
Infant formula, cow's milk based	Egg, white, raw
Peanut butter	Egg, yolk, raw
Soy milk	Butter, regular
Tofu	Dairy blend (not reduced fat)
Vegetarian sausages	Dairy blend (reduced fat)
Corn chips	Edible oil spread, regular
Extruded cheese snacks	Edible oil spread, 50% or less fat
Potato crisps	Solid fats

Appendix 4

Lower Bound (best case)*	Upper Bound (worst case)**
Muesli bars	Oil, canola
Sugar, white	Oil, olive
Water based ice confections	Fish, fillets
Chocolate, all types	Fish, battered, takeaway
Tomato Sauce	Seafood extender/surimi
Soups, instant dry mix	Tuna, canned
Negligible amount items (include cocoa powder, beverage flavourings, yeast, gelatine and beef extracts)	Salmon, canned
	Canned & smoked fish
	Calamari, crumbed, fried
	Crustacea and molluscs
	Beef, sausage, raw
	Processed chicken breast
	Bacon, raw
	Processed luncheon meats
	Cheese, cheddar, full fat
	Cheese, cheddar, reduced fat
	Cheese, brie
	Cheese, camembert
	Cheese, cottage
	Cheese, processed, cheddar type
	Cream, pure (not thickened)
	Cream, reduced fat
	Ice Cream, full fat, vanilla
	Milk, full fat
	Milk, powder, whole, dry
	Chocolate flavoured milk, full fat
	Milk, modified, low fat
	Milk, skim
	Milk, powder, low fat, dry
	Flavoured milk, reduced fat
	Yoghurt, fruit, full fat
	Yoghurt, fruit, reduced fat
	Infant cereal, mixed
	Infant Dessert, dairy based
	Infant Dessert, fruit
	Infant Dinner, containing meat, chicken or fish
	Infant formula, cow's milk based
	Peanut butter
	Soy milk
	Tofu
	Vegetarian sausages
	Roasted nuts and seeds
	Corn chips
	Extruded cheese snacks
	Potato crisps

Appendix 4

Lower Bound (best case)*	Upper Bound (worst case)**
	Muesli bars
	Sugar, white
	Water based ice confections
	Chocolate, all types
	Tomato Sauce
	Soups, instant dry mix
	Negligible amount items include cocoa powder, beverage flavourings, yeast, gelatine and beef extracts

It has a label but it is not required to have ingredients list or NIP.
* Assumes these foods are always displaying a Food Label.
** Some of these foods (i.e. those not listed in the first column) are assumed to only sometimes display a Food Label.

4.6 Summary food consumption data

From each intake assessment, summary food consumption data are produced. Shown in the tables below are the summary food consumption data for major food groups derived for each population group assessed.

Table A4. 6: Mean daily consumption figures of each food group for Australia and New Zealand for consumers*[φ] *only

a. Australia

Food groups	**Population group**					
	Mean daily consumption (g/day)					
	2 yrs & above	**45 yrs & above**	**20-44yrs**	**13-19yrs**	**5-12yrs**	**2-4yrs**
Beverages, non-alcoholic	1886	1948	2147	1763	1178	932
Dairy products	319	278	307	409	393	439
Cereal and cereal products	231	205	263	264	217	156
Beverages, alcoholic	205	232	281	80	0	0
Other vegetables	194	240	201	143	94	64
Fruit	144	174	125	111	134	151
Meat and poultry	109	108	129	109	69	47
Sugar/Confectionary	32	28	30	44	46	29
Pastry based mixed meals	30	24	36	45	25	12
Condiments	23	20	28	28	18	11
Cereal based mixed meals	23	12	31	37	27	14
Vegetables (potato chips)	21	11	26	40	26	17
Fats and oils	16	18	17	15	12	8
Fish, seafood and fish products	15	18	17	12	7	5
Nuts and legumes	13	13	15	6	9	17
Eggs	9	9	10	8	6	5
Snack foods	7	2	7	15	17	11
Infant formula and foods	0	0	0	0	0	2

Total number of respondents for Australia: 2 years and above = 13 858, 45 years and above = 5266, 20-44 years = 5448, 13-19 years = 1065, 5-12 years = 1496, 2-4 years = 583,. Respondents include all members of the survey population whether or not they consumed a food that contains TFA.

b. New Zealand

Food groups	Population group			
	Mean daily consumption (g/day)			
	15 yrs & above	45 yrs & above	20-44 yrs	15-19 yrs
Beverages, non-alcoholic	1722	1623	1832	1568
Condiments	322	341	311	282
Vegetables	303	325	289	259
Dairy products	297	279	309	333
Cereal and cereal products	250	216	275	305
Beverages, alcoholic	208	202	227	98
Fruit	158	169	150	135
Meat and poultry	118	110	127	112
Sugar/Confectionery	42	36	44	73
Pastry and Pastry based mixed foods	35	28	40	51
Cereal based mixed foods	33	15	42	90
Fish, seafood and fish products	30	29	32	17
Fats and oils	30	30	30	28
Eggs	17	16	18	12
Nuts and legumes	7	7	7	4
Snack foods	7	3	9	17
Infant formula and foods	0	0	0	0

Total number of respondents for New Zealand: 15 years and above = 4636, 45 years and above = 2072, 20-44 years = 2267, 15-19 years = 297. Respondents include all members of the survey population whether or not they consumed a food that contains *trans* fats.

c. New Zealand Maori and Pacific Islanders

Food groups	Population group			
	Mean daily consumption (g/day)			
	15 yrs & above	45 yrs & above	20-44 yrs	15-19 yrs
Vegetables	298	329	300	223
Dairy products	269	239	277	295
Cereal and cereal products	260	221	270	288
Beverages, alcoholic	245	292	244	142
Fruit	157	151	164	128
Meat and poultry	143	150	147	109
Sugar/Confectionery	45	36	43	79
Fish, seafood and fish products	41	55	40	17
Pastry and Pastry based mixed foods	37	22	39	54
Cereal based mixed foods	37	15	40	63
Fats and oils	31	30	31	29
Eggs	21	18	24	14
Condiments	18	10	20	24
Nuts and legumes	8	10	8	5
Snack foods	7	1	8	17
Infant formula and foods	0	0	0	0
Vegetables	298	329	300	223

Total number of respondents for New Zealand: 15 years and above = 1,011, 45 years and above = 248, 20-44 years = 652, 15-19 years = 111. Respondents include all members of the survey population whether or not they consumed a food that contains *trans* fats.

Appendix 5

Comparison of proportion of people consuming different foods between the 1995 and 1997 NNS and Roy Morgan Research Single Source Survey data

In order to determine whether food consumption patterns have changed markedly since the NNS data were collected and therefore, whether the *trans* fatty acid intakes based on the NNS data are reliable, the proportion of people reporting consumption of major food contributors to TFA intakes in the NNSs were compared with up to date data from the Roy Morgan Single Source Survey for 2001-2006 for the population aged 14 years and above who consumed particular commodities in the last seven days (weekly consumer) in each country.

The 1995 Australian and 1997 New Zealand NNS data outlines the proportion of survey participants who consumed particular commodities in the last 24-hours (daily consumer). It is possible to include data for numerous varieties of the commodity, for example, the number of people consuming one or more of white sliced bread, foccacia, English muffins, can be calculated to provide one figure for bread consumers.

For some commodities, the 1995 Australian NNS also collected data on the frequency of consumption during the previous 12 months via a food frequency questionnaire (FFQ). Data are available for the population aged 12 years and above and 19 years and above. In many instances, data are limited in that commodities were restricted to single varieties only i.e. white bread, toast or rolls rather than total bread consumption that combined all varieties. For the purposes of comparison with the Roy Morgan Single Source data, the proportion of the population with weekly consumption, figures of 1-6 times/day and 1-6+ times/day were summed (weekly consumer).

For some commodities, the 1997 New Zealand NNS also collected data on the frequency of consumption over the previous 12 months via a food frequency questionnaire (FFQ), with the proportion of the population consuming foods weekly used for this assessment. Data are available for various age and gender sub-groups. Again, commodities were generally restricted to single varieties.

In this comparison study, the age groups used to derive the proportion of each population consuming each commodity were based on ages available that most closely matched the age groups used for the dietary intake assessment. It should be noted that data were not available on all relevant foods and results are not directly comparable due to different survey methods.

It is expected that for foods likely to be consumed on a daily basis (staples) the results from the NNS 24-hour recall or FFQ data and the Single Source Survey will be similar if food consumption patterns have not changed markedly over the last ten years. In contrast, for foods that are only occasionally consumed, for example potato crisps, the proportion of consumers reported in the NNS is expected to be considerably lower that that reported in the NNS FFQ or Single Source Survey whether or not food consumption patterns have changed as the proportion of consumers captured will increase with each day of the survey period (Institute of European Food Studies, 1998). A comparison of NNS FFQ and Single Source Survey data is therefore a better comparison for occasionally consumed foods and would be expected to give results in the same range if food consumption patterns have not changed markedly between 1995/97 and 2006.

5.1 Australia

Milk

With reference to Table A5.1; from 1995-2006:

- The proportion of the population who consumed milk (full, low/no fat) has remained fairly stable for the population aged 16-19 years (increase of 3%), while consumption for the remaining population has decreased slightly (between 6%-10%). In 2006, approximately 80% of the population consumed milk in the last seven days.
- With the exception of the population aged 14-19 years, the consumption of full fat milk has decreased by between 20% and 30%.
- The proportion of the population who consumed low/no fat milk has increased by between 20% and 40%.
- While data was collected for differing time periods between the NNS and Single Source survey data (24-hour verses weekly consumption respectively), due to milk being 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.

When assessing milk consumption from 2001 to 2006 only (Figure A5.1, Figure A5.2, Figure A5.3 and Table A5.2, Table A5.3, and Table A5.4):

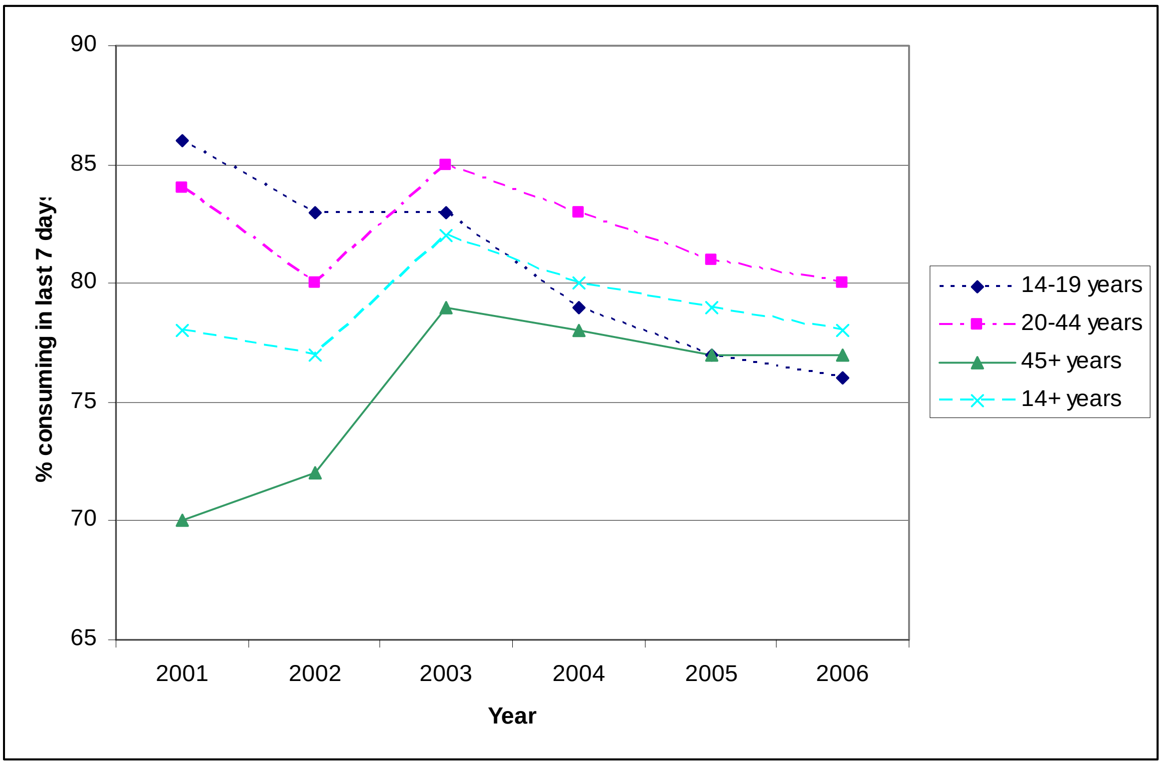
- Change in milk (full, low/no fat) consumption ranged from a decrease of 12% for the population aged 14-19 years, to an increase of 10% for the population aged 45 years and above. There was no change for the population aged 14 years and above. The average annual change ranged from -2% to 2%.
- Change in full fat milk consumption ranged from a decrease of 17% for the population aged 14-19 year to an increase of 3% for the population aged 45 years and above. The average annual change ranged from -4% to 1%.
- Change in low/no fat milk consumption ranged from a decrease of 3% for the population aged 20-44 years to an increase of 17% for the population aged 45 years and above. The average annual change ranged from -1% to 3%.

Table A5.1: Proportion of the Australian population of various age groups who consumed milk from various surveys

Age (years)	Year	Survey	Sample size	All milk (%)	Milk type: Full fat (%)	Milk type: Low/no fat (%)
14-19	1995	NNS (24-hour)	869	74	53	23
	2001	Roy Morgan	2061	86	65	28
	2002	Roy Morgan	2023	83	60	26
	2003	Roy Morgan	1907	83	61	28
	2004	Roy Morgan	1600	79	60	24
	2005	Roy Morgan	1316	77	57	24
	2006	Roy Morgan	786	76	54	28
20-44	1995	NNS (24-hour)	5450	85	62	29
	2001	Roy Morgan	10309	84	57	38
	2002	Roy Morgan	9799	80	49	37
	2003	Roy Morgan	9147	85	55	38
	2004	Roy Morgan	8787	83	53	38
	2005	Roy Morgan	7553	81	50	38
	2006	Roy Morgan	4177	80	50	37
45+	1995	NNS (24-hour)	5266	86	53	35
	2001	Roy Morgan	13828	70	37	41
	2002	Roy Morgan	13899	72	35	42
	2003	Roy Morgan	13824	79	40	48
	2004	Roy Morgan	14129	78	38	47
	2005	Roy Morgan	13559	77	38	47
	2006	Roy Morgan	7492	77	38	48
14+	1995	NNS (24-hour)	11585	84	57	31
	2001	Roy Morgan	26198	78	49	38
	2002	Roy Morgan	25721	77	44	38
	2003	Roy Morgan	24878	82	48	42
	2004	Roy Morgan	24516	80	47	41
	2005	Roy Morgan	22428	79	45	41
	2006	Roy Morgan	12455	78	45	41

Notes:
1. Data from the NNS for "all milk" pertains to full, low and no fat plain and flavoured dairy and non-dairy milk.
2. Data from Roy Morgan for "all milk" pertains to full, low and no fat plain and flavoured milk.
3. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from April-Dec. For 2006, data is from Jan-June.
4. Data from the NNS pertains to % who consumed in 24-hour recall.

Figure A5.1: Proportion of the Australian population of various age groups who consumed milk (full, low/no fat) in the last 7 days



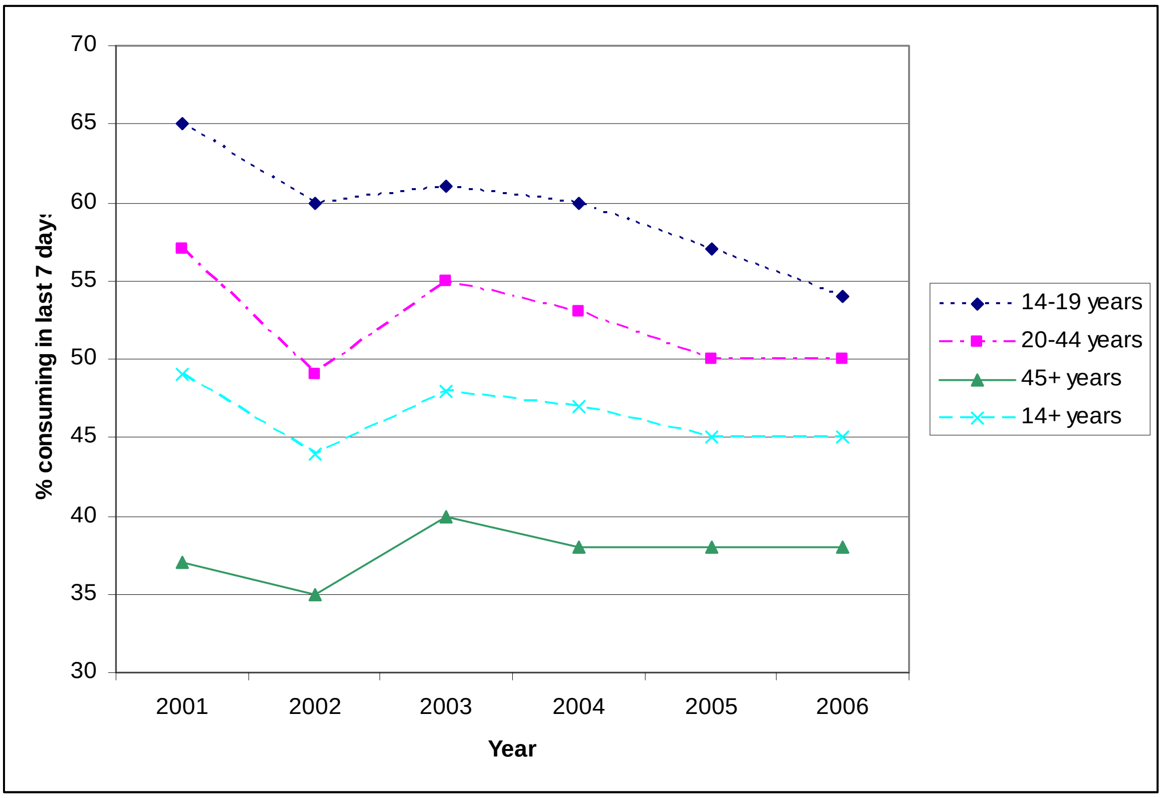
Source: Roy Morgan Single Source

Notes:
1. Data pertains to full, low and no fat plain and flavoured milk.
2. For 2001, data is from April-Dec. For 2006, data is from Jan-June.

Table A5.2: Change in milk consumption (full, low/no fat) for the various Australian age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
14-19	-12	-2
20-44	-5	-1
45+	10	2
14+	0	0

Figure A5.2: Proportion of the Australian population of various age groups who consumed full fat milk in the last 7 days



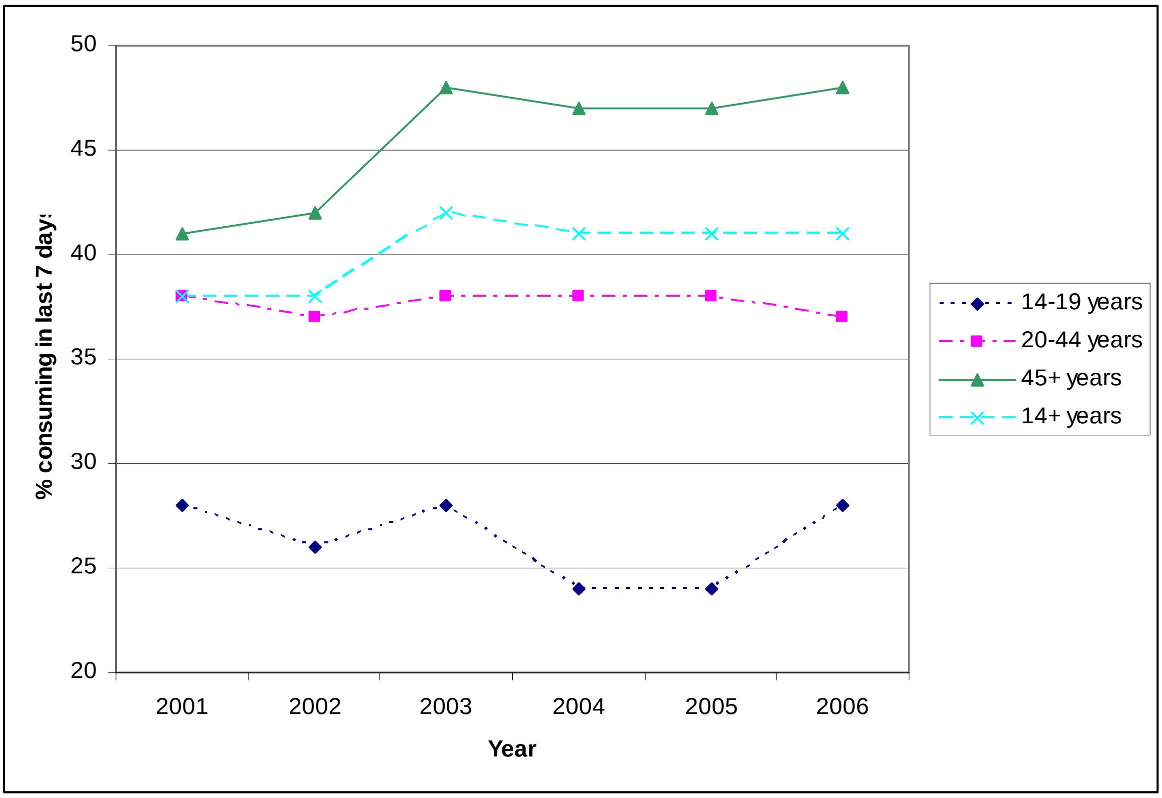
Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from April-Dec. For 2006, data is from Jan-June.

Table A5.3: Change in full fat milk consumption for the various Australian age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
14-19	-17	-4
20-44	-12	-3
45+	3	1
14+	-8	-2

Figure A5.3: Proportion of the Australian population of various age groups who consumed low/no fat milk in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from April-Dec. For 2006, data is from Jan-June.

Table A5.4: Change in low/no fat milk consumption for the various Australian age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
14-19	0	0
20-44	-3	-1
45+	17	3
14+	8	2

Fat spreads

With reference to Table A5.5 from 1995-2006:

- The proportion of the population who consumed fat spreads has remained stable at 70%-80%.
- While data was collected for differing time periods (24-hour verses weekly consumption), due to fat spreads being 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.

When assessing fat spread consumption from 2001 to 2006 only (Figure A5.4 and Table A5.6):

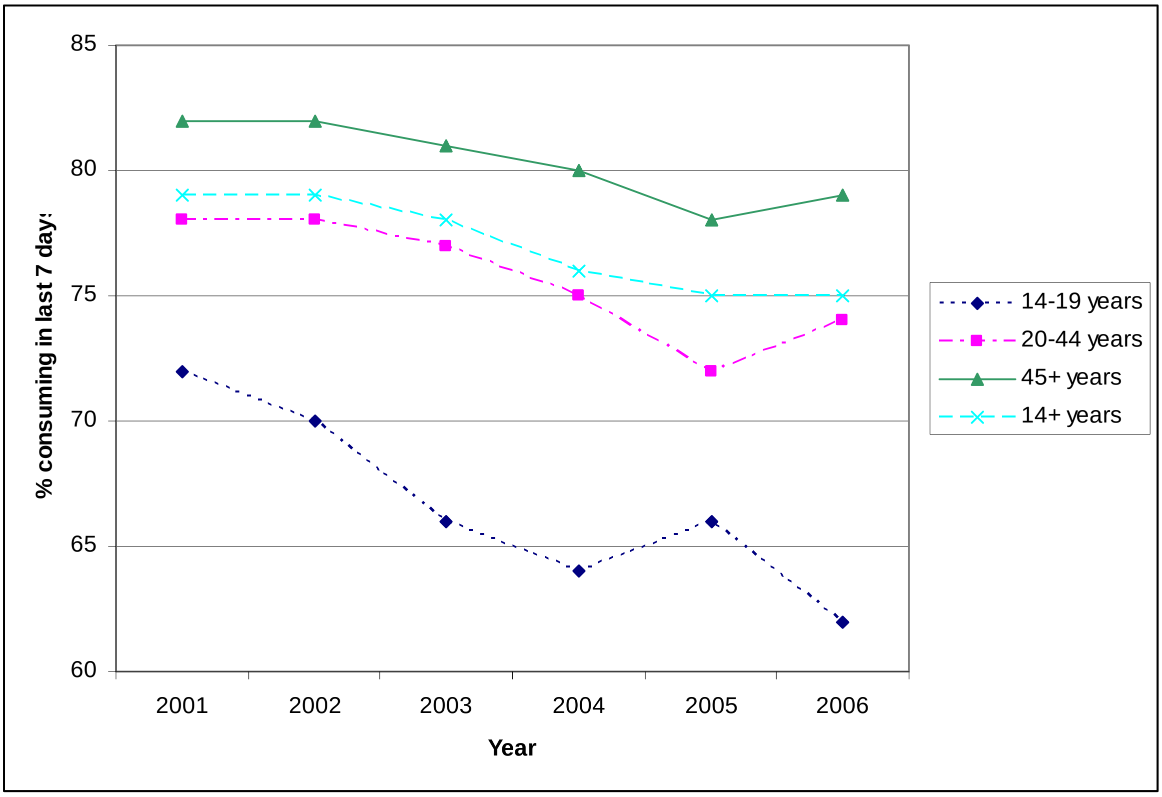
- The consumption of fat spreads has decreased for all population groups. The highest was a decrease of 14% for the population aged 14-19 years. There was an average annual decrease within the range of 3% to 1%.

Table A5.5: Proportion of the Australian population of various age groups who consumed fat spreads from various surveys

Age (years)	Year	Survey	Sample size	Fat spreads (%)
14-19	1995	NNS (24-hour)	869	69
	2001	Roy Morgan	2061	72
	2002	Roy Morgan	2023	70
	2003	Roy Morgan	1907	66
	2004	Roy Morgan	1600	64
	2005	Roy Morgan	1316	66
	2006	Roy Morgan	786	62
20-44	1995	NNS (24-hour)	5450	71
	2001	Roy Morgan	10309	78
	2002	Roy Morgan	9799	78
	2003	Roy Morgan	9147	77
	2004	Roy Morgan	8787	75
	2005	Roy Morgan	7553	72
	2006	Roy Morgan	4177	74
45+	1995	NNS (24-hour)	5266	79
	2001	Roy Morgan	13828	82
	2002	Roy Morgan	13899	82
	2003	Roy Morgan	13824	81
	2004	Roy Morgan	14129	80
	2005	Roy Morgan	13559	78
	2006	Roy Morgan	7492	79
14+	1995	NNS (24-hour)	11585	75
	2001	Roy Morgan	26198	79
	2002	Roy Morgan	25721	79
	2003	Roy Morgan	24878	78
	2004	Roy Morgan	24516	76
	2005	Roy Morgan	22428	75
	2006	Roy Morgan	12455	75

Notes:
1. Data from the NNS pertains to butter and margarine.
2. Data from Roy Morgan pertains to butter, margarine and other spreads.
3. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from July-Dec. For 2006, data is from Jan-June.
4. Data from the NNS pertains to % who consumed in 24-hour recall.

Figure A5.4: Proportion of the Australian population of various age groups who consumed fat spreads in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from July-Dec. For 2006, data is from Jan-June.

Table A5.6: Change in fat spread consumption for the various Australian age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
14-19	-14	-3
20-44	-5	-1
45+	-4	-1
14+	-5	-1

Potato crisps

With reference to Table A5.7; from 1995-2006:

- The proportion of the population who consumed potato crisps (excluding 19 and 20 years and above) has increased considerably (between 270% and 1350%). The increase may be attributed to the fact that data in the NNS and Single Source Survey were collected for differing time periods. The population may choose to consume potato crisps only on certain days of the week, which was not detected in the 24-recall of the NNS. Over a weekly period however, the number of consumers of potato crisps is likely to increase, as reflected in the Single Source Survey data.
- Upon comparison of the FFQ component of the NNS for the population aged 19 years and above with data from the Single Source Survey for the population aged 20 years and above, the proportion who consumed a range of savoury crisps has increased by approximately 50%, to 45%.

When assessing potato crisp consumption from 2001 to 2006 only (Figure A5.5 and Table A5.8):

- The consumption of potato crisps has decreased for all population groups. The highest was a decrease of 16% for the population aged 14-19 years. There was an average annual decrease within the range of 4% to 1%.

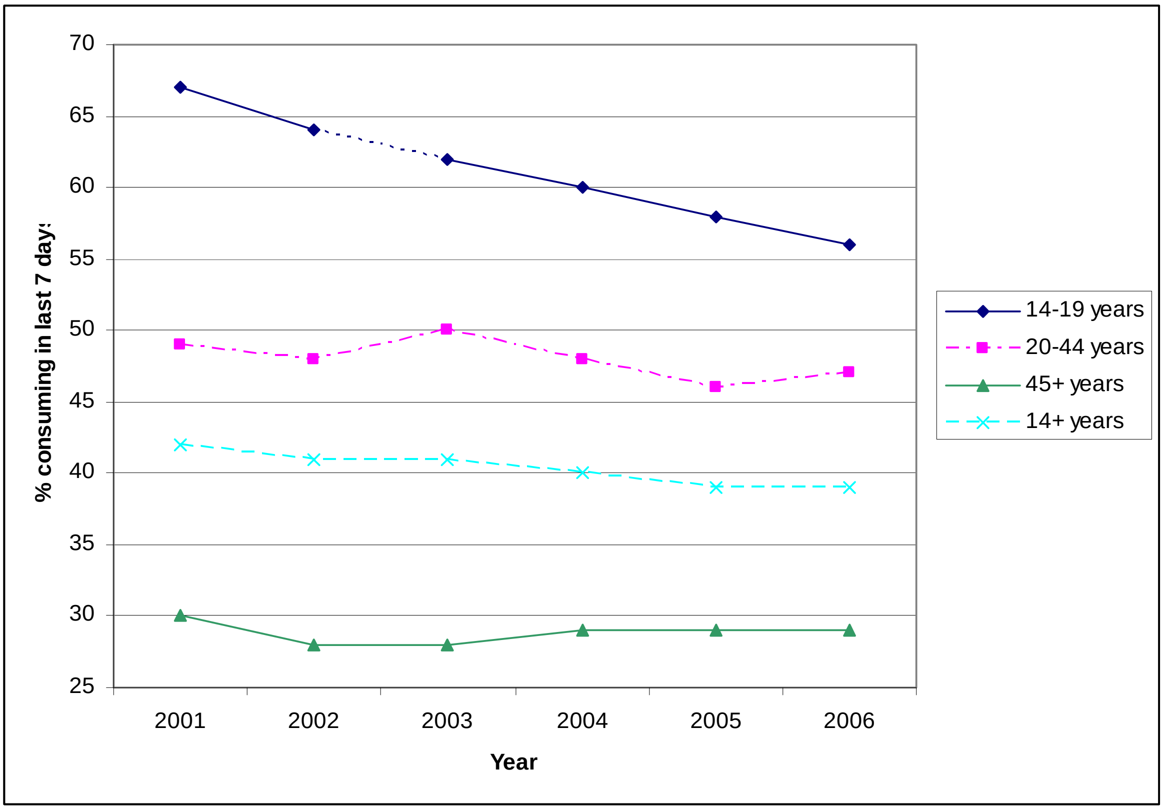
Table A5.7: Proportion of the Australian population of various age groups who consumed potato crisps from various surveys

Age (years)	Year	Survey	Sample size	Potato crisps (%)
14-19	1995	NNS (24-hour)	869	15
	2001	Roy Morgan	2061	67
	2002	Roy Morgan	2023	64
	2003	Roy Morgan	1907	62
	2004	Roy Morgan	1600	60
	2005	Roy Morgan	1316	58
	2006	Roy Morgan	786	56
20-44	1995	NNS (24-hour)	5450	7
	2001	Roy Morgan	10309	49
	2002	Roy Morgan	9799	48
	2003	Roy Morgan	9147	50
	2004	Roy Morgan	8787	48
	2005	Roy Morgan	7553	46
	2006	Roy Morgan	4177	47
45+	1995	NNS (24-hour)	5266	2
	2001	Roy Morgan	13828	30
	2002	Roy Morgan	13899	28
	2003	Roy Morgan	13824	28
	2004	Roy Morgan	14129	29
	2005	Roy Morgan	13559	29
	2006	Roy Morgan	7492	29
14+	1995	NNS (24-hour)	11585	5
	2001	Roy Morgan	26198	42
	2002	Roy Morgan	25721	41
	2003	Roy Morgan	24878	41
	2004	Roy Morgan	24516	40
	2005	Roy Morgan	22428	39
	2006	Roy Morgan	12455	39
19+	1995	NNS (FFQ)	unk	29
20+	2001	Roy Morgan	24137	49
	2002	Roy Morgan	23698	47
	2003	Roy Morgan	22971	48
	2004	Roy Morgan	22916	46
	2005	Roy Morgan	21112	46
	2006	Roy Morgan	11669	45

Notes:

1. Data from the NNS (24-hour) pertains to potato crisps.
2. Data from Roy Morgan (excluding those aged 20 years and above) pertains to potato crisps.
3. Data from Roy Morgan for 20+ years pertains to potato crisps, corn chips, twisties, cheezels etc.
4. Data from the NNS (FFQ) pertains to potato crisps, corn chips, twisties, cheezels etc.
5. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from July-Dec. For 2006, data is from Jan-June.
6. Data from the NNS (24-hour) pertains to % who consumed in 24-hour recall.
7. Data from the NNS (FFQ) pertains to frequency of consumption during the previous 12 months. Figures of 1-6 times/wk and 1-6+ times/day were combined to produce weekly consumer figures.

Figure A5.5: Proportion of the Australian population of various age groups who consumed potato crisps in the last 7 days



Source: Roy Morgan Single Source

Notes:

1. For 2001, data is from July-Dec. For 2006, data is from Jan-June.

Table A5.8: Change in potato crisp consumption for the various Australian age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
14-19	-16	-4
20-44	-4	-1
45+	-3	-1
14+	-7	-2

Ice cream

With reference to Table A5.9; from 1995-2006:

- The proportion of the population who consumed ice cream (excluding 19 and 20 years and above) has increased by between 90% and 175%. The increase may be attributed to the fact that data in the NNS and Single Source Survey were collected for differing time periods. The population may choose to consume ice cream only on certain days of the week, which was not detected in the 24-recall of the NNS. Over a weekly period however, the number of consumers of ice cream is likely to increase, as reflected in the Single Source Survey data.
- Upon comparison of the FFQ component of the NNS for the population aged 19 years and above with data from the Single Source Survey for the population aged 20 years and above, the proportion that consumed ice cream has remained fairly stable at around 40%. As data from both of these surveys measured consumption on a weekly basis, greater confidence can be placed in this comparison.

When assessing ice cream consumption from 2001 to 2006 only (Figure A5.6 and Table A5.10):

- Change in ice cream consumption ranged from a decrease of 16% for the population aged 14-19 years, to an increase of 10% for the population aged 45 years and above. There was an increase of 2% for the population aged 14 years and above. The average annual change ranged from -4% to 2%.

Table A5.9: Proportion of the Australian population of various age groups who consumed ice cream from various surveys

Age (years)	Year	Survey	Sample size	Ice cream (%)
14-19	1995	NNS (24-hour)	869	24
	2001	Roy Morgan	2061	55
	2002	Roy Morgan	2023	50
	2003	Roy Morgan	1907	48
	2004	Roy Morgan	1600	45
	2005	Roy Morgan	1316	43
	2006	Roy Morgan	786	46
20-44	1995	NNS (24-hour)	5450	15
	2001	Roy Morgan	10309	41
	2002	Roy Morgan	9799	43
	2003	Roy Morgan	9147	43
	2004	Roy Morgan	8787	41
	2005	Roy Morgan	7553	39
	2006	Roy Morgan	4177	41
45+	1995	NNS (24-hour)	5266	16
	2001	Roy Morgan	13828	39
	2002	Roy Morgan	13899	45
	2003	Roy Morgan	13824	44
	2004	Roy Morgan	14129	42
	2005	Roy Morgan	13559	39
	2006	Roy Morgan	7492	43
14+	1995	NNS (24-hour)	11585	16
	2001	Roy Morgan	26198	42
	2002	Roy Morgan	25721	45
	2003	Roy Morgan	24878	44
	2004	Roy Morgan	24516	42
	2005	Roy Morgan	22428	39
	2006	Roy Morgan	12455	43
19+	1995	NNS (FFQ)	unk	36
20+	2001	Roy Morgan	24137	40
	2002	Roy Morgan	23698	44
	2003	Roy Morgan	22971	44
	2004	Roy Morgan	22916	41
	2005	Roy Morgan	21112	39
	2006	Roy Morgan	11669	42

Notes:

1. Data from the NNS (24-hour) pertains to ice cream and ice confection in a tub and on a stick, frozen dairy desserts and soy-based ice confection.
2. Data from Roy Morgan pertains to ice cream from a tub and on a stick.
3. Data from the NNS (FFQ) pertains to “ice cream”.
4. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from July-Dec. For 2006, data is from Jan-June.
5. Data from the NNS (24-hour) pertains to % who consumed in 24-hour recall.
6. Data from the NNS (FFQ) pertains to frequency of consumption during the previous 12 months. Figures of 1-6 times/wk and 1-6+ times/day were combined to produce weekly consumer figures.

Figure A5.6: Proportion of the Australian population of various age groups who consumed ice cream in the last 7 days

Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from July-Dec. For 2006, data is from Jan-June.

Table A5.10: Change in ice cream consumption for the various Australian age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
14-19	-16	-4
20-44	0	0
45+	10	2
14+	2	1
20+	5	1

Cheese

With reference to Table A5.11 ; from 1995-2006:

- The proportion of the population who consumed cheese (excluding 19 and 20 years and above) has increased by between 40% and 70%. The increase may be partly attributed to the fact that data in the NNS and Single Source Survey were collected for differing time periods. The population may choose to consume cheese only on certain days of the week, which was not detected in the 24-recall of the NNS. Over a weekly period however, they are consumers of cheese as reflected in the Single Source Survey data.
- Upon comparison of the FFQ component of the NNS for the population aged 19 years and above with data from the Single Source Survey for the population aged 20 years and above, the proportion who consumed cheese has decreased slightly (13%) to 68%. As data from both of these surveys measured consumption on a weekly basis, greater confidence can be placed in this comparison. However, the NNS (FFQ) did not include cottage or ricotta cheese.

When assessing cheese consumption from 2001-2006 only (Figure A5.7 and Table A5.12):

- The consumption of cheese has decreased for all population groups. The highest was a decrease of 15% for the population aged 14-19 years. There was an average annual decrease within the range of 3% to 1%.

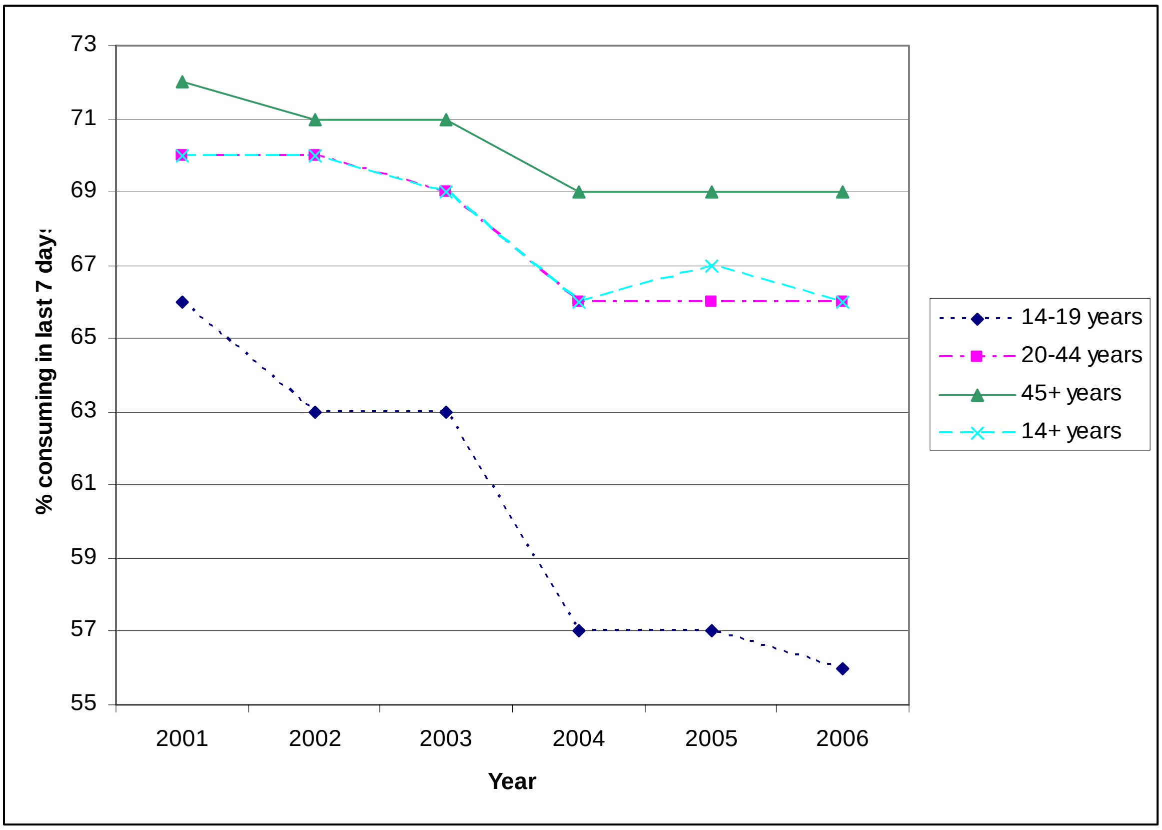
Table A5.11: Proportion of the Australian population of various age groups who consumed cheese from various surveys

Age (years)	Year	Survey	Sample size	Cheese (%)
14-19	1995	NNS (24-hour)	869	40
	2001	Roy Morgan	2061	66
	2002	Roy Morgan	2023	63
	2003	Roy Morgan	1907	63
	2004	Roy Morgan	1600	57
	2005	Roy Morgan	1316	57
	2006	Roy Morgan	786	56
20-44	1995	NNS (24-hour)	5450	43
	2001	Roy Morgan	10309	70
	2002	Roy Morgan	9799	70
	2003	Roy Morgan	9147	69
	2004	Roy Morgan	8787	66
	2005	Roy Morgan	7553	66
	2006	Roy Morgan	4177	66
45+	1995	NNS (24-hour)	5266	40
	2001	Roy Morgan	13828	72
	2002	Roy Morgan	13899	71
	2003	Roy Morgan	13824	71
	2004	Roy Morgan	14129	69
	2005	Roy Morgan	13559	69
	2006	Roy Morgan	7492	69
14+	1995	NNS (24-hour)	11585	42
	2001	Roy Morgan	26198	70
	2002	Roy Morgan	25721	70
	2003	Roy Morgan	24878	69
	2004	Roy Morgan	24516	66
	2005	Roy Morgan	22428	67
	2006	Roy Morgan	12455	66
19+	1995	NNS (FFQ)	unk	78
20+	2001	Roy Morgan	24137	71
	2002	Roy Morgan	23698	71
	2003	Roy Morgan	22971	70
	2004	Roy Morgan	22916	68
	2005	Roy Morgan	21112	68
	2006	Roy Morgan	11669	68

Notes:

1. Data from the NNS (24-hour) pertains to dairy and non-dairy cheeses.
2. Data from Roy Morgan pertains to all cheese (excluding spread).
3. Data from the NNS (FFQ) pertains to cheddar and other cheeses (excluding cottage or ricotta).
4. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from July-Dec. For 2006, data is from Jan-June.
5. Data from the NNS (24-hour) pertains to % who consumed in 24-hour recall.
6. Data from the NNS (FFQ) pertains to frequency of consumption during the previous 12 months. Figures of 1-6 times/wk and 1-6+ times/day were combined to produce weekly consumer figures.

Figure A5.7: Proportion of the Australian population of various age groups who consumed cheese in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from July-Dec. For 2006, data is from Jan-June.

Table A5.12: Change in cheese consumption for the various Australian age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
14-19	-15	-3
20-44	-6	-1
45+	-4	-1
14+	-6	-1

Yoghurt

With reference to Table A5.13; from 1995-2006:

- The proportion of the population who consumed all yoghurt (excluding 19 and 20 years and above) has increased considerably (between 250% to 340%). The increase may be attributed to the fact that data in the NNS and Single Source Survey were collected for differing time periods. The population may choose to consume yoghurt only on certain days of the week, which was not detected in the 24-recall of the NNS. Over a weekly period however, they are consumers of yoghurt as reflected in the Single Source Survey data.
- Upon comparison of the FFQ component of the NNS for the population aged 19 years and above with data from the Single Source Survey for the population aged 20 years and above, the proportion who consumed yoghurt has increased slightly (34%) to 39%. As data from both of these surveys measured consumption on a weekly basis, greater confidence can be placed in this comparison.

When assessing yoghurt consumption from 2001-2006 only (Figure A5.8 and Table A5.14):

- Change in yoghurt consumption range from a decrease of 7% for the population aged 14-19 years, to an increase of 11% for populations aged 20 years and above and 45 years and above. There was an increase of 9% for the population aged 14 years and above. The average annual change ranged from -1% to 2%.

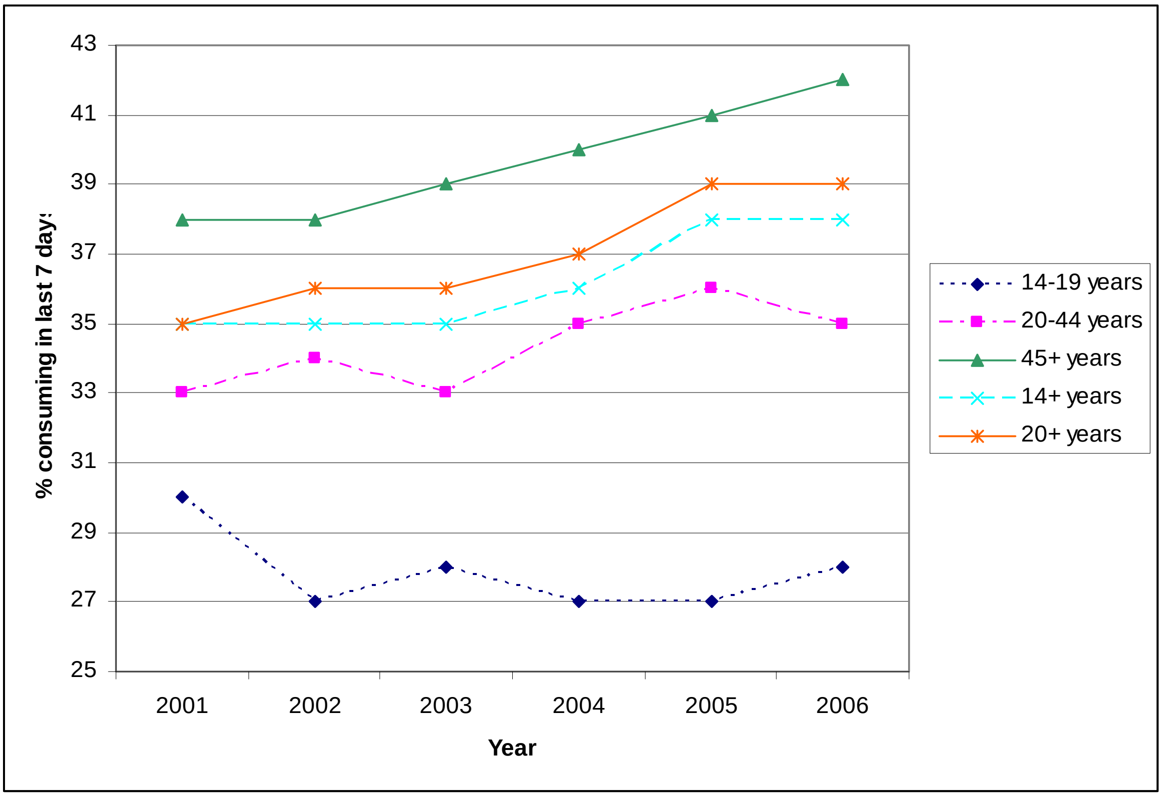
Table A5.13: Proportion of the Australian population of various age groups who consumed yoghurt from various surveys

Age (years)	Year	Survey	Sample size	Yoghurt (%)
14-19	1995	NNS (24-hour)	869	8
	2001	Roy Morgan	2061	30
	2002	Roy Morgan	2023	27
	2003	Roy Morgan	1907	28
	2004	Roy Morgan	1600	27
	2005	Roy Morgan	1316	27
	2006	Roy Morgan	786	28
20-44	1995	NNS (24-hour)	5450	8
	2001	Roy Morgan	10309	33
	2002	Roy Morgan	9799	34
	2003	Roy Morgan	9147	33
	2004	Roy Morgan	8787	35
	2005	Roy Morgan	7553	36
	2006	Roy Morgan	4177	35
45+	1995	NNS (24-hour)	5266	11
	2001	Roy Morgan	13828	38
	2002	Roy Morgan	13899	38
	2003	Roy Morgan	13824	39
	2004	Roy Morgan	14129	40
	2005	Roy Morgan	13559	41
	2006	Roy Morgan	7492	42
14+	1995	NNS (24-hour)	11585	9
	2001	Roy Morgan	26198	35
	2002	Roy Morgan	25721	35
	2003	Roy Morgan	24878	35
	2004	Roy Morgan	24516	36
	2005	Roy Morgan	22428	38
	2006	Roy Morgan	12455	38
19+	1995	NNS (FFQ)	unk	29
20+	2001	Roy Morgan	24137	35
	2002	Roy Morgan	23698	36
	2003	Roy Morgan	22971	36
	2004	Roy Morgan	22916	37
	2005	Roy Morgan	21112	39
	2006	Roy Morgan	11669	39

Notes:

1. Data from the NNS (24-hour) pertains to fruit, flavoured, natural and plain yoghurt.
2. Data from Roy Morgan pertains to fruit, flavoured, natural and plain yoghurt.
3. Data from the NNS (FFQ) pertains to “yoghurt”.
4. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from July-Dec. For 2006, data is from Jan-June.
5. Data from the NNS (24-hour) pertains to % who consumed in 24-hour recall.
6. Data from the NNS (FFQ) pertains to frequency of consumption during the previous 12 months. Figures of 1-6 times/wk and 1-6+ times/day were combined to produce weekly consumer figures.

Figure A5.8: Proportion of the Australian population of various age groups who consumed yoghurt in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from July-Dec. For 2006, data is from Jan-June.

Table A5.14: Change in yoghurt consumption for the various Australian age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
14-19	-7	-1
20-44	6	1
45+	11	2
14+	9	2
20+	11	2

Sweet biscuits

With reference to Table A5.15; from 1995-2006:

- The proportion of the population who consumed all sweet biscuits (excluding 19 and 20 years and above) was higher by approximately 50% in the Single Source Survey. The increase may be partly attributed to the fact that data in the NNS and Single Source Survey were collected for differing time periods. The population may choose to consume sweet biscuits only on certain days of the week, which was not detected in the 24-recall of the NNS. Over a weekly period however, the number of consumers of sweet biscuits is likely to increase, as reflected in the Single Source Survey data.
- Upon comparison of the FFQ component of the NNS for the population aged 19 years and above with data from the Single Source Survey an for the population aged 20 years and above, the proportion who consumed plain sweet biscuits has *decreased* by 85%, to 27%. As data from both of these surveys measured consumption on a weekly basis, greater confidence can be placed in this comparison.

When assessing sweet biscuit consumption from 2001-2006 only (Figure A5.9 and Table A5.16):

- The consumption of all sweet biscuits decreased for all population groups. The highest was a decrease of 26% for the population aged 14-19 years. There was an average annual decrease within the range of 4% to 6%.

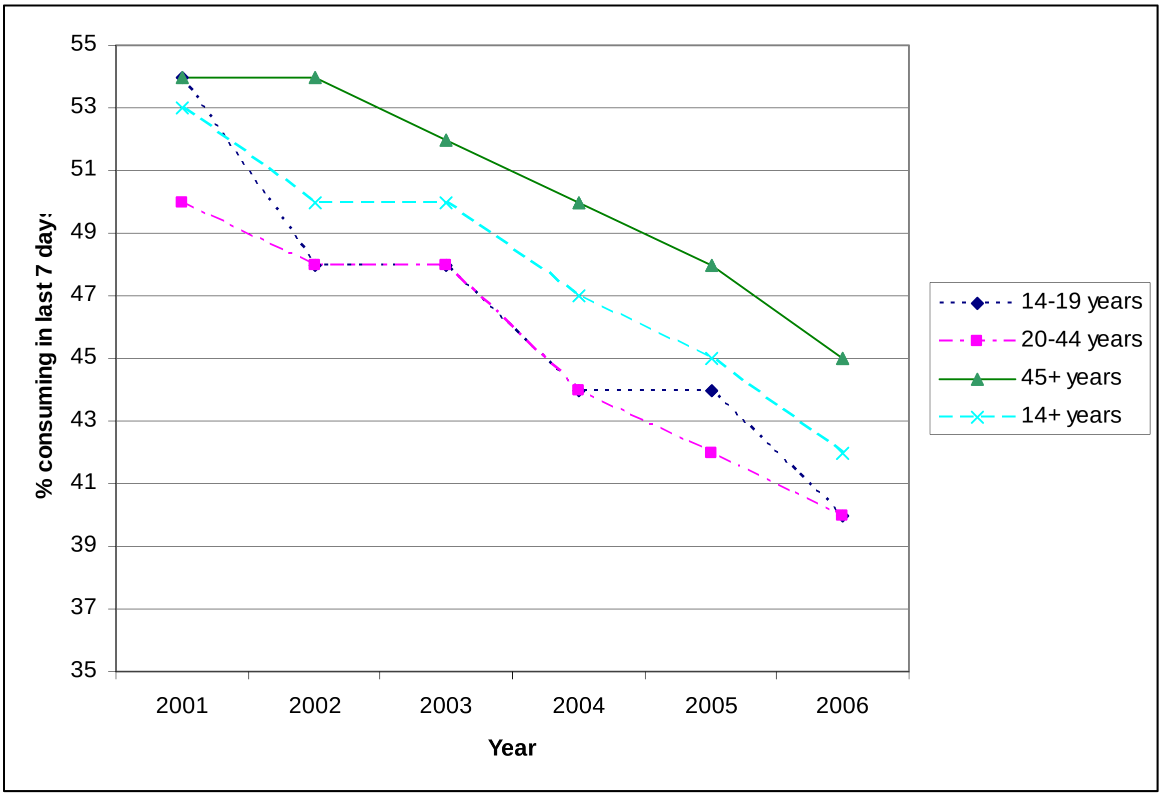
Table A5.15: Proportion of the Australian population of various age groups who consumed sweet biscuits from various surveys

Age (years)	Year	Survey	Sample size	Biscuit type: Total sweet biscuits (%)	Plain (%)
14-19	1995	NNS (24-hour)	869	20	
	2001	Roy Morgan	2061	54	31
	2002	Roy Morgan	2023	48	26
	2003	Roy Morgan	1907	48	25
	2004	Roy Morgan	1600	44	22
	2005	Roy Morgan	1316	44	24
	2006	Roy Morgan	786	40	21
20-44	1995	NNS (24-hour)	5450	21	
	2001	Roy Morgan	10309	50	29
	2002	Roy Morgan	9799	48	28
	2003	Roy Morgan	9147	48	27
	2004	Roy Morgan	8787	44	25
	2005	Roy Morgan	7553	42	24
	2006	Roy Morgan	4177	40	23
45+	1995	NNS (24-hour)	5266	28	
	2001	Roy Morgan	13828	54	39
	2002	Roy Morgan	13899	54	39
	2003	Roy Morgan	13824	52	37
	2004	Roy Morgan	14129	50	35
	2005	Roy Morgan	13559	48	34
	2006	Roy Morgan	7492	45	31
14+	1995	NNS (24-hour)	11585	24	
	2001	Roy Morgan	26198	53	34
	2002	Roy Morgan	25721	50	33
	2003	Roy Morgan	24878	50	31
	2004	Roy Morgan	24516	47	29
	2005	Roy Morgan	22428	45	29
	2006	Roy Morgan	12455	42	26
19+	1995	NNS (FFQ)			50
20+	2001	Roy Morgan	24137	52	34
	2002	Roy Morgan	23698	51	34
	2003	Roy Morgan	22971	50	32
	2004	Roy Morgan	22916	47	30
	2005	Roy Morgan	21112	45	29
	2006	Roy Morgan	11669	43	27

Notes:

1. Data from the NNS (24-hour) for “total sweet biscuits” pertains to all sweet biscuits (excluding when used to make a cake/slice).
2. Data from Roy Morgan for “total sweet biscuits” includes choc coated, cream/jam filled and plain.
3. Data from the NNS (FFQ) pertains to plain sweet biscuits only.
4. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from July-Dec. For 2006, data is from Jan-June.
5. Data from the NNS (24-hour) pertains to % who consumed in 24-hour recall.
6. Data from the NNS (FFQ) pertains to frequency of consumption during the previous 12 months. Figures of 1-6 times/wk and 1-6+ times/day were combined to produce weekly consumer figures.

Figure A5.9: Proportion of the Australian population of various age groups who consumed total sweet biscuits in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from July-Dec. For 2006, data is from Jan-June.

Table A5.16: Change in total sweet biscuit consumption for the various Australian age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
14-19	-26	-6
20-44	-20	-4
45+	-17	-4
14+	-21	-5
20+	-17	-4

5.2 New Zealand

Milk

With reference to Table A5.17: from 1995-2006:

- The proportion of the population who consumed milk (all types) has increased slightly for the population aged 16-19 years (4%), while consumption for the remaining population has decreased slightly (between 7%-10%). In 2006, approximately 80% of the population consumed milk in the last seven days.
- With the exception of the population aged 14-19 years, the consumption of full fat milk has decreased by between 25% and 30%.
- While data was collected for differing time periods (24-hour verses weekly consumption), due to milk being a fairly 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.

When assessing milk consumption from 2001 to 2006 only (Figure A5.10, Figure A5.11, Figure A5.12 and Table A5.18, Table A5.19 and Table A5. 20):

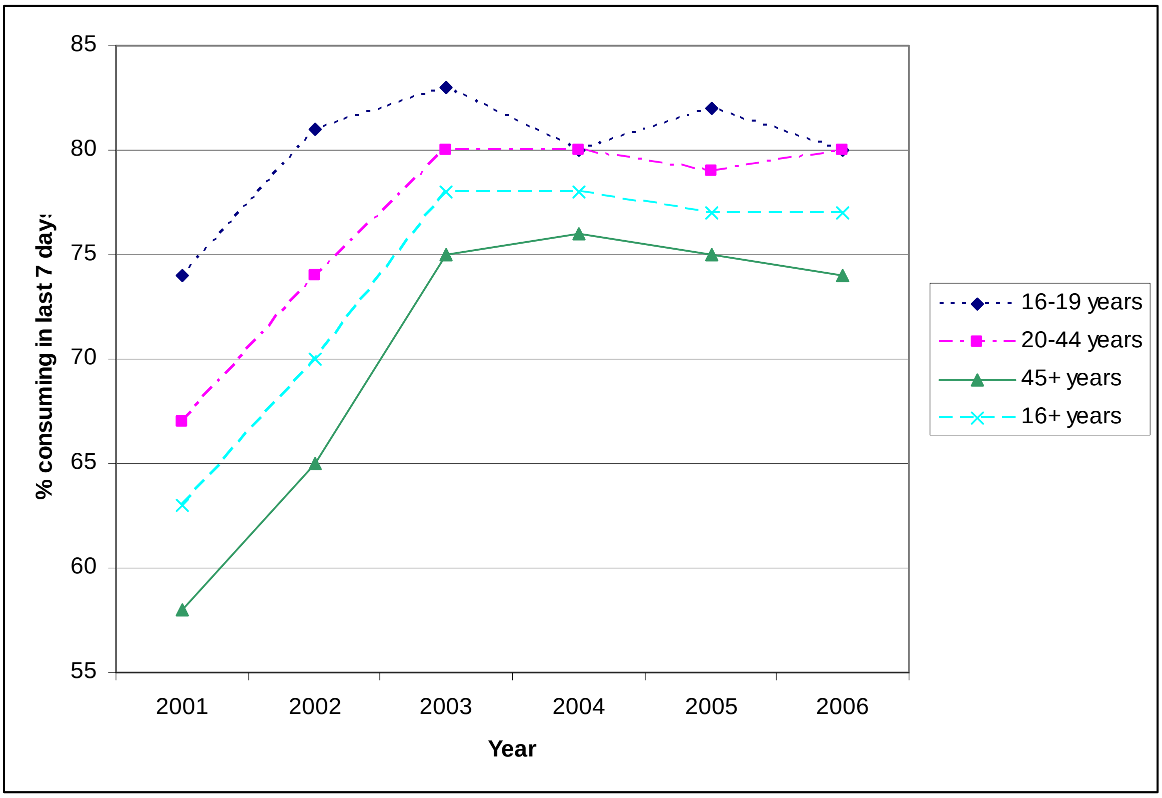
- The consumption of milk (full, low/no fat) has increased for all population groups, with a range of 8% to 28%. The average annual change ranged from an increase of 2% to 5%.
- The consumption of full fat milk has increased for all population groups, with a range of 12% to 36%. The average annual change ranged from an increase of 2% to 6%.
- The consumption of low/no fat milk has increased for all population groups, with a range of 31% to 56%. The average annual change ranged from an increase of 6% to 9%.

Table A5.17: Proportion of the New Zealand population of various age groups who consumed milk from various surveys

Age (years)	Year	Survey	Sample size	All milk (%)	Milk type: Full fat (%)	Low/no fat (%)
16-19	1997	NNS (24-hour)	224	77	59	27
	2001	Roy Morgan	635	74	53	21
	2002	Roy Morgan	648	81	61	23
	2003	Roy Morgan	688	83	64	26
	2004	Roy Morgan	719	80	57	28
	2005	Roy Morgan	597	82	61	26
	2006	Roy Morgan	332	80	61	32
20-44	1997	NNS (24-hour)	2267	86	66	32
	2001	Roy Morgan	5620	67	43	27
	2002	Roy Morgan	2697	74	47	32
	2003	Roy Morgan	5333	80	52	35
	2004	Roy Morgan	5185	80	52	37
	2005	Roy Morgan	5179	79	49	40
	2006	Roy Morgan	2461	80	48	42
45+	1997	NNS (24-hour)	2072	87	57	43
	2001	Roy Morgan	6546	58	25	36
	2002	Roy Morgan	5974	65	30	41
	2003	Roy Morgan	6255	75	36	46
	2004	Roy Morgan	6190	76	35	48
	2005	Roy Morgan	6230	75	35	47
	2006	Roy Morgan	2942	74	34	47
16+	1997	NNS (24-hour)	4563	86	62	36
	2001	Roy Morgan	12801	63	36	31
	2002	Roy Morgan	12319	70	41	35
	2003	Roy Morgan	12276	78	46	40
	2004	Roy Morgan	12094	78	45	41
	2005	Roy Morgan	12006	77	44	42
	2006	Roy Morgan	5735	77	43	44

Notes:
1. Data from the NNS for “all milk” pertains to full, low and no fat plain and flavoured dairy and non-dairy milk.
2. Data from Roy Morgan for “all milk” pertains to full, low and no fat plain and flavoured milk.
3. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from May-Dec. For 2006, data is from Jan-June.
4. Data from the NNS pertains to % who consumed in 24-hour recall.

Figure A5.10: Proportion of the New Zealand population of various age groups who consumed milk (full, low/no fat) in the last 7 days



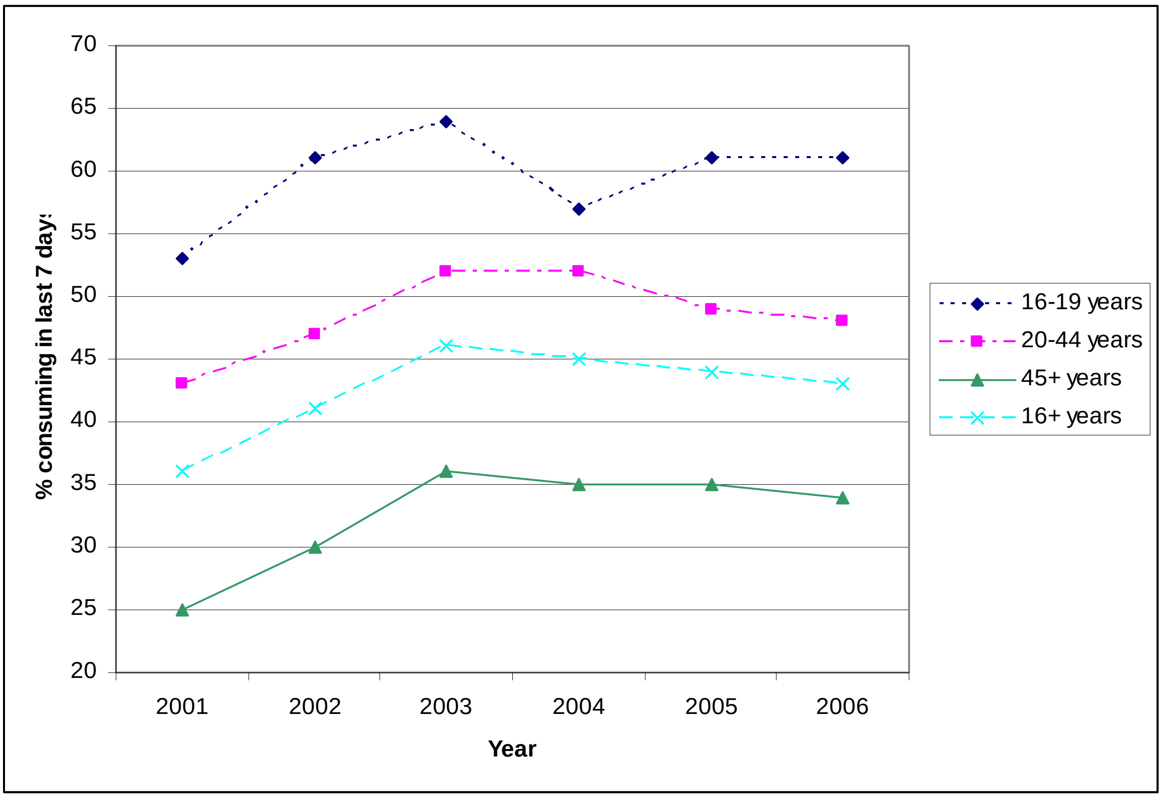
Source: Roy Morgan Single Source

Notes:
1. Data pertains to full, low and no fat plain and flavoured milk.
2. For 2001, data is from May-Dec. For 2006, data is from Jan-June.

Table A5.18: Change in milk consumption (full, low/no fat) for the various New Zealand age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
16-19	8	2
20-44	19	4
45+	28	5
16+	22	4

Figure A5.11: Proportion of the New Zealand population of various age groups who consumed full fat milk in the last 7 days



Source: Roy Morgan Single Source

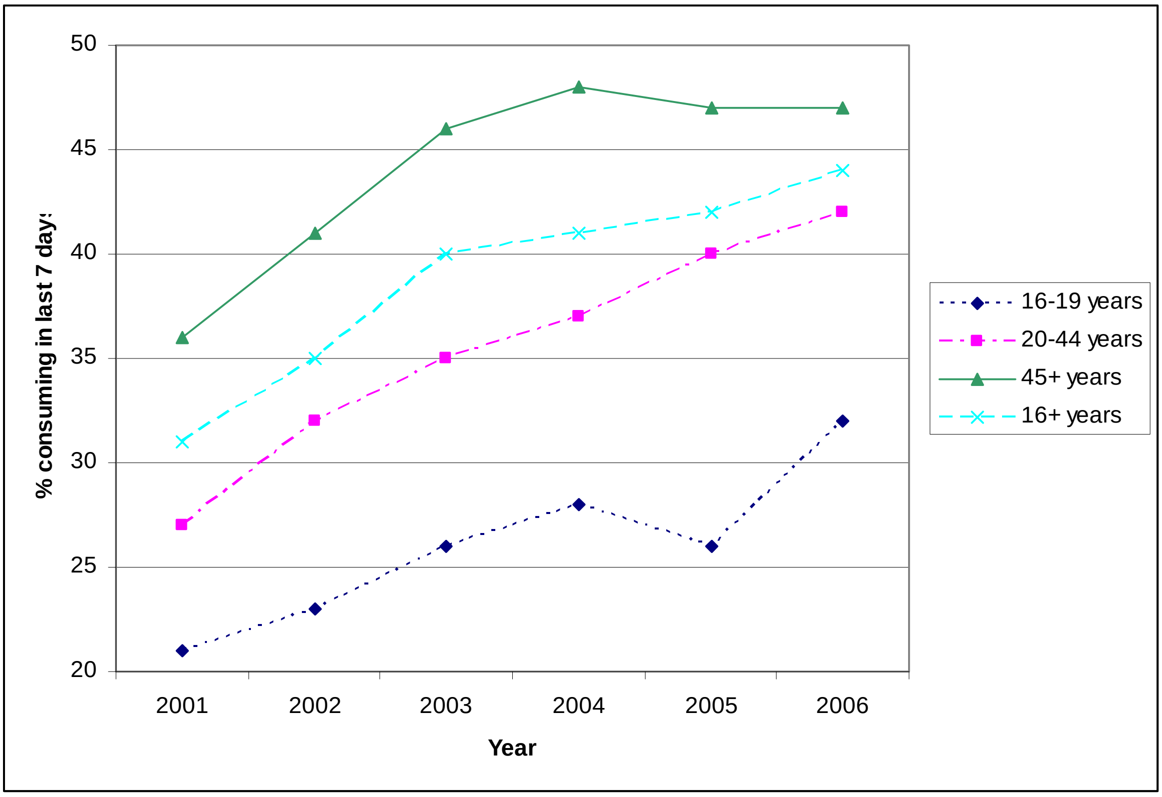
Notes:

1. For 2001, data is from May-Dec. For 2006, data is from Jan-June.

Table A5.19: Change in full fat milk consumption for various New Zealand age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
16-19	15	3
20-44	12	2
45+	36	6
16+	19	4

Figure A5.12: Proportion of the New Zealand population of various age groups who consumed low/no fat milk in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from May-Dec. For 2006, data is from Jan-June.

Table A5. 20: Change in low/no fat milk consumption for various New Zealand age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
16-19	52	9
20-44	56	9
45+	31	6
16+	42	7

Fat spreads

With reference to Table A5.21; from 1995-2006:

- With the exception of the population aged 16-19 years, the proportion who consumed fat spreads has remained stable at around 80%. The proportion of the population aged 16-19 years who consumed fat spreads has increased by 25%.
- While data was collected for differing time periods (24-hour verses weekly consumption), due to fat spreads being a fairly 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.

When assessing fat spread consumption from 2001 to 2006 only (Figure A5.13 and Table A5.22):

- There was very little change in fat spread consumption, ranging from -2% to 4%. The average annual change ranged from -1% to 1%.

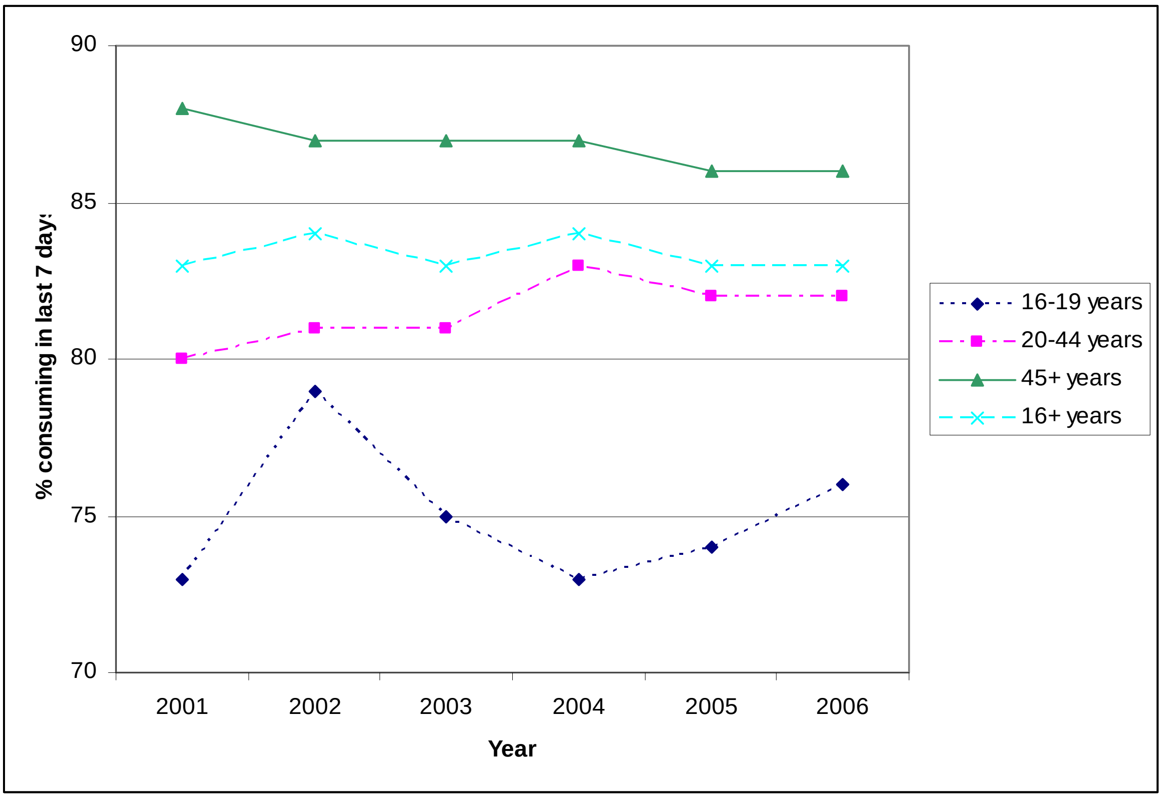
Table A5.21: Proportion of the New Zealand population of various age groups who consumed fat spreads from various surveys

Age (years)	Year	Survey	Sample size	Fat spreads (%)
16-19	1997	NNS (24-hour)	224	61
	2001	Roy Morgan	635	73
	2002	Roy Morgan	648	79
	2003	Roy Morgan	688	75
	2004	Roy Morgan	719	73
	2005	Roy Morgan	597	74
	2006	Roy Morgan	332	76
20-44	1997	NNS (24-hour)	2267	76
	2001	Roy Morgan	5620	80
	2002	Roy Morgan	5697	81
	2003	Roy Morgan	5333	81
	2004	Roy Morgan	5185	83
	2005	Roy Morgan	5179	82
	2006	Roy Morgan	2461	82
45+	1997	NNS (24-hour)	2072	86
	2001	Roy Morgan	6546	88
	2002	Roy Morgan	5974	87
	2003	Roy Morgan	6255	87
	2004	Roy Morgan	6190	87
	2005	Roy Morgan	6230	86
	2006	Roy Morgan	2942	86
15+	1997	NNS (24-hour)	4563	80
16+	2001	Roy Morgan	12801	83
	2002	Roy Morgan	12319	84
	2003	Roy Morgan	12276	83
	2004	Roy Morgan	12094	84
	2005	Roy Morgan	12006	83
	2006	Roy Morgan	5735	83

Notes:

1. Data from the NNS pertains to butter and margarine.
2. Data from Roy Morgan pertains to butter, margarine and other spreads.
3. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.
4. Data from the NNS pertains to % who consumed in 24-hour recall.

Figure A5.13: Proportion of the New Zealand population of various age groups who consumed fat spreads in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.

Table A5.22: Change in fat spread consumption for various New Zealand age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
16-19	4	1
20-44	3	1
45+	-2	-1
16+	0	0

Potato crisps

With reference to Table A5.23; from 1995-2006:

- With the exception of the population aged 15-18 years (16-19 years), there was an increase in the proportion of the population who consumed potato crisps by between 15% and 65%.
- As data from both surveys in Table A5.23 measured consumption on a weekly basis, a relatively high amount of confidence can be placed in the comparison of results

When assessing potato crisp consumption from 2001 to 2006 only (Figure A5.14 and Table A5.24):

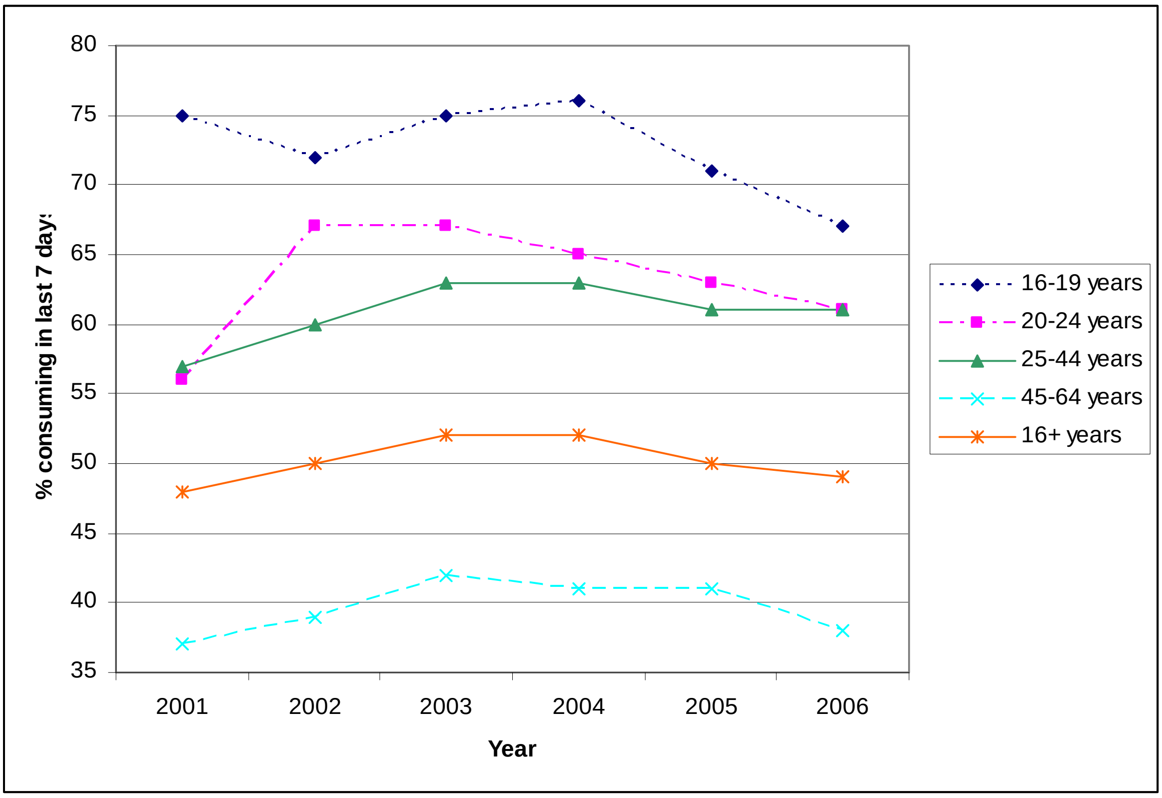
- With the exception of the population aged 16-19 years, the consumption of potato crisps has increased slightly, ranging from 2% to 9%. For the population aged 16-19 years, consumption has decreased by 11%. The average annual change ranged from -2% to 2%.

Table A5.23: Proportion of the New Zealand population of various age groups who consumed potato crisps from various surveys

Age (years)	Year	Survey	Sample size	Potato crisps (%)
15-18	1997	NNS (FFQ)	unk	69
16-19	2001	Roy Morgan	635	75
	2002	Roy Morgan	648	72
	2003	Roy Morgan	688	75
	2004	Roy Morgan	719	76
	2005	Roy Morgan	597	71
	2006	Roy Morgan	332	67
19-24	1997	NNS (FFQ)	unk	54
20-24	2001	Roy Morgan	633	56
	2002	Roy Morgan	670	67
	2003	Roy Morgan	660	67
	2004	Roy Morgan	599	65
	2005	Roy Morgan	595	63
	2006	Roy Morgan	270	61
25-44	1997	NNS (FFQ)	unk	41
	2001	Roy Morgan	4987	57
	2002	Roy Morgan	5027	60
	2003	Roy Morgan	4673	63
	2004	Roy Morgan	4586	63
	2005	Roy Morgan	4584	61
	2006	Roy Morgan	2191	61
45-64	1997	NNS (FFQ)	unk	23
	2001	Roy Morgan	4490	37
	2002	Roy Morgan	4126	39
	2003	Roy Morgan	4233	42
	2004	Roy Morgan	4339	41
	2005	Roy Morgan	4224	41
	2006	Roy Morgan	1990	38
15+	1997	NNS (FFQ)	unk	36
16+	2001	Roy Morgan	12801	48
	2002	Roy Morgan	12319	50
	2003	Roy Morgan	12276	52
	2004	Roy Morgan	12094	52
	2005	Roy Morgan	12006	50
	2006	Roy Morgan	5735	49

Notes:
1. Data from the NNS (FFQ) pertains to “potato crisps”.
2. Data from Roy Morgan pertains to “potato crisps”.
3. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.
4. Data from the NNS (FFQ) pertains to % consuming at least once a week in the previous 12 months.

Figure A5.14: Proportion of the New Zealand population of various age groups who consumed potato crisps in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.

Table A5.24: Change in potato crisp consumption for various New Zealand age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
16-19	-11	-2
20-24	9	2
25-44	7	1
45-64	3	1
16+	2	0

Ice cream

With reference to Table A5.25; from 1995-2006:

- With the exception of the population aged 15-18 years (16-19 years), there was an increase in the proportion of the population who consumed ice cream by between 15% and 50%. Consumption for the population aged 15-18 years (16-19 years) has remained stable at around 50%.
- As data from both surveys in Table A5.25 measured consumption on a weekly basis, a relatively high amount of confidence can be placed in the results obtained.

When assessing ice cream consumption from 2001-2006 only (Figure A5.15 and Table A5.26):

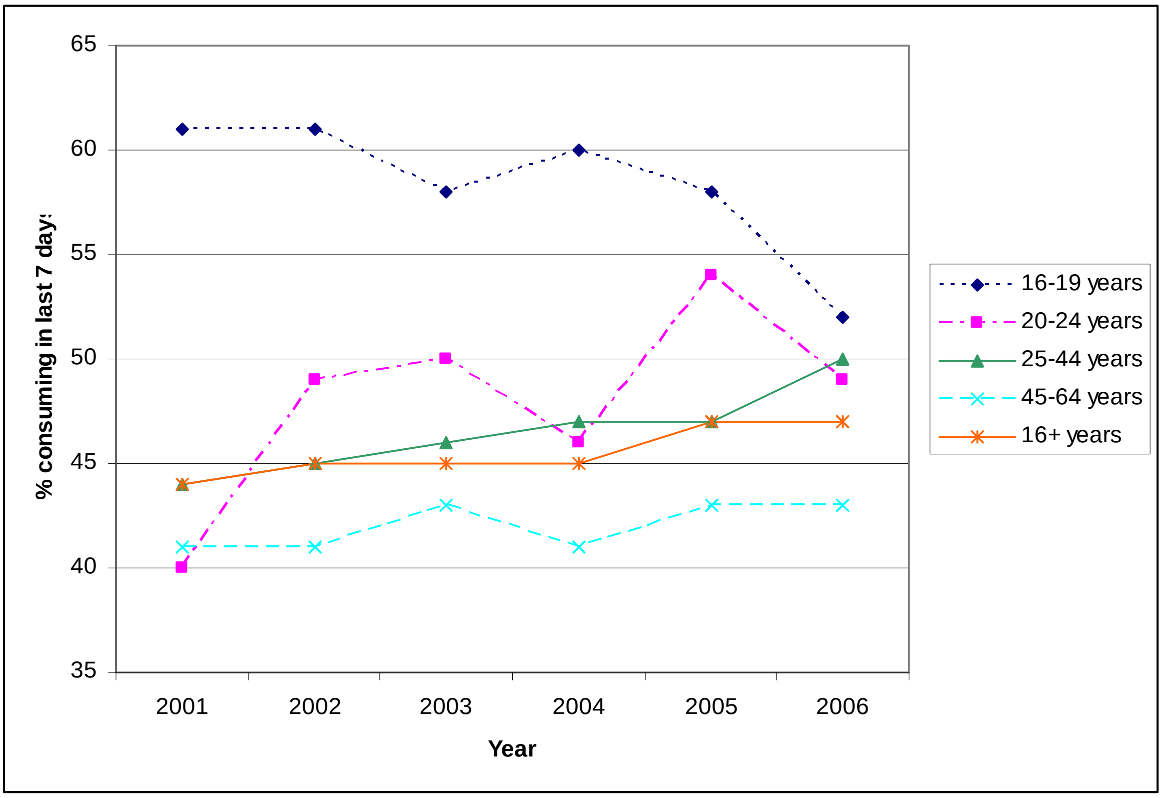
- The consumption of ice cream has decreased by 15% for the population aged 16-19 years. For the remaining population groups, consumption has increased by between 5% and 23%. The average annual change ranged from -3% to 4%.

Table A5.25: Proportion of the New Zealand population of various age groups who consumed ice cream from various surveys

Age (years)	Year	Survey	Sample size	Ice cream (%)
15-18	1997	NNS (FFQ)	unk	53
16-19	2001	Roy Morgan	635	61
	2002	Roy Morgan	648	61
	2003	Roy Morgan	688	58
	2004	Roy Morgan	719	60
	2005	Roy Morgan	597	58
	2006	Roy Morgan	332	52
19-24	1997	NNS (FFQ)	unk	33
20-24	2001	Roy Morgan	633	40
	2002	Roy Morgan	670	49
	2003	Roy Morgan	660	50
	2004	Roy Morgan	599	46
	2005	Roy Morgan	595	54
	2006	Roy Morgan	270	49
25-44	1997	NNS (FFQ)	unk	34
	2001	Roy Morgan	4987	44
	2002	Roy Morgan	5027	45
	2003	Roy Morgan	4673	46
	2004	Roy Morgan	4586	47
	2005	Roy Morgan	4584	47
	2006	Roy Morgan	2191	50
45-64	1997	NNS (FFQ)	unk	38
	2001	Roy Morgan	4490	41
	2002	Roy Morgan	4126	41
	2003	Roy Morgan	4233	43
	2004	Roy Morgan	4339	41
	2005	Roy Morgan	4224	43
	2006	Roy Morgan	1990	43
15+	1997	NNS (FFQ)	unk	38
16+	2001	Roy Morgan	12801	44
	2002	Roy Morgan	12319	45
	2003	Roy Morgan	12276	45
	2004	Roy Morgan	12094	45
	2005	Roy Morgan	12006	47
	2006	Roy Morgan	5735	47

Notes:
1. Data from the NNS (FFQ) pertains to "ice cream".
2. Data from Roy Morgan pertains to ice cream from a tub and on a stick.
3. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.
4. Data from the NNS (FFQ) pertains to % consuming at least once a week in the previous 12 months.

Figure A5.15: Proportion of the New Zealand population of various age groups who consumed ice cream in the last 7 days



Source: Roy Morgan Single Source

Notes:

1. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.

Table A5.26: Change in ice cream consumption for various New Zealand age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
16-19	-15	-3
20-24	23	4
25-44	14	3
45-64	5	1
16+	7	1

Cheese

With reference to Table A5.27 in Appendix 5; from 1995-2006:

- The proportion of the population who consumed cheese increased by between 115% and 155%. The increase may be attributed to the fact that data in the NNS and Single Source Survey were collected for differing time periods. The population may choose to consume cheese only on certain days of the week, which was not detected in the 24-recall of the NNS. Over a weekly period however, the number of consumers of cheese is likely to increase, as reflected in the Single Source Survey data.

When assessing cheese consumption from 2001-2006 only (Figure A5.16 and Table A5.28):

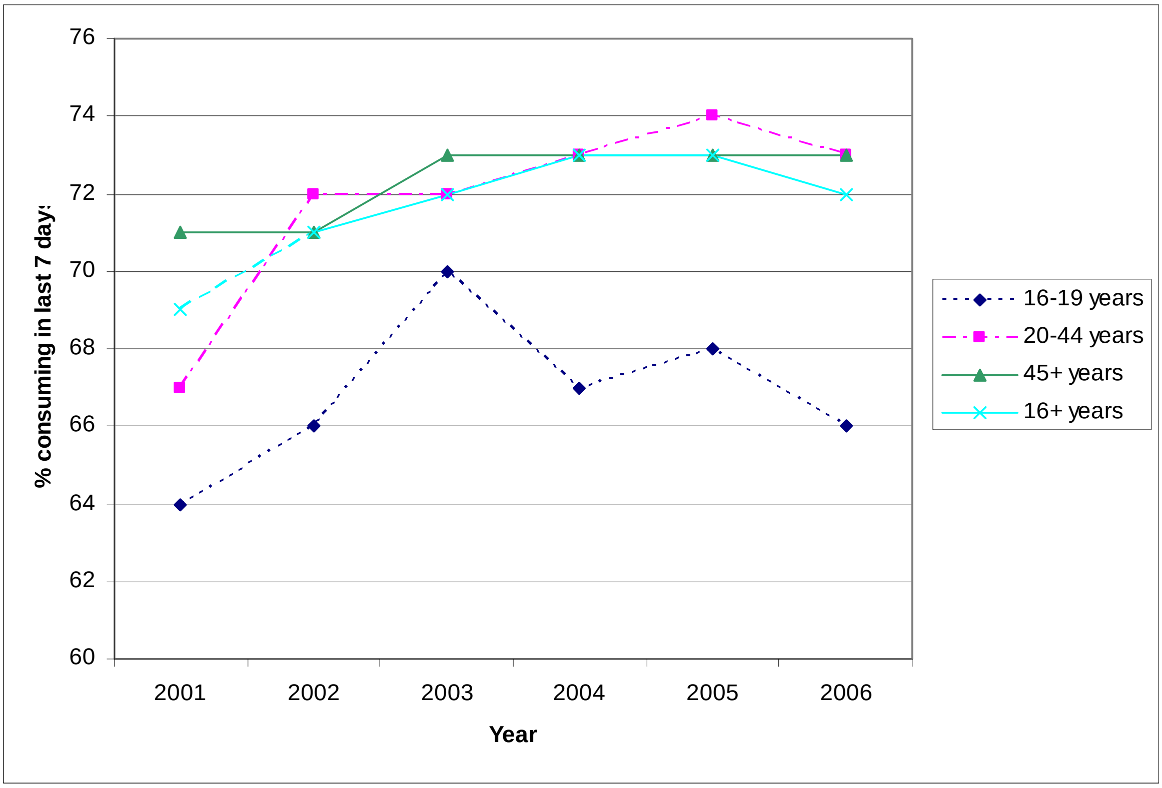
- The consumption of cheese has increased slightly for all population groups, ranging from 3% to 9%. The average annual change ranged from 1% to 3%.

Table A5.27: Proportion of the New Zealand population of various age groups who consumed cheese from various surveys

Age (years)	Year	Survey	Sample size	Cheese (%)
16-19	1997	NNS (24-hour)	224	26
	2001	Roy Morgan	635	64
	2002	Roy Morgan	648	66
	2003	Roy Morgan	688	70
	2004	Roy Morgan	719	67
	2005	Roy Morgan	597	68
	2006	Roy Morgan	332	66
20-44	1997	NNS (24-hour)	2267	34
	2001	Roy Morgan	5620	67
	2002	Roy Morgan	5697	72
	2003	Roy Morgan	5333	72
	2004	Roy Morgan	5185	73
	2005	Roy Morgan	5179	74
	2006	Roy Morgan	2461	73
45+	1997	NNS (24-hour)	2072	33
	2001	Roy Morgan	6546	71
	2002	Roy Morgan	5974	71
	2003	Roy Morgan	6255	73
	2004	Roy Morgan	6190	73
	2005	Roy Morgan	6230	73
	2006	Roy Morgan	2942	73
16+	1997	NNS (24-hour)	4563	33
	2001	Roy Morgan	12801	69
	2002	Roy Morgan	12319	71
	2003	Roy Morgan	12276	72
	2004	Roy Morgan	12094	73
	2005	Roy Morgan	12006	73
	2006	Roy Morgan	5735	72

Notes:
1. Data from the NNS pertains to dairy and non-dairy cheeses.
2. Data from Roy Morgan pertains to all cheese (excluding spread).
3. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.
4. Data from the NNS pertains to % who consumed in 24-hour recall.

Figure A5.16: Proportion of the New Zealand population of various age groups who consumed cheese in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.

Table A5.28: Change in cheese consumption for various New Zealand age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
16-19	3	1
20-44	9	3
45+	3	1
16+	4	1

Yoghurt

With reference to Table A5.29: from 1995-2006:

- There was an increase in the proportion of the population who consumed yoghurt by between 15% and 60%.
- As data from both surveys Table A5.29 measured consumption on a weekly basis, a relatively high amount of confidence can be placed in the results obtained.

When assessing yoghurt consumption from 2001-2006 only (Figure A5.17 and Table A5.30):

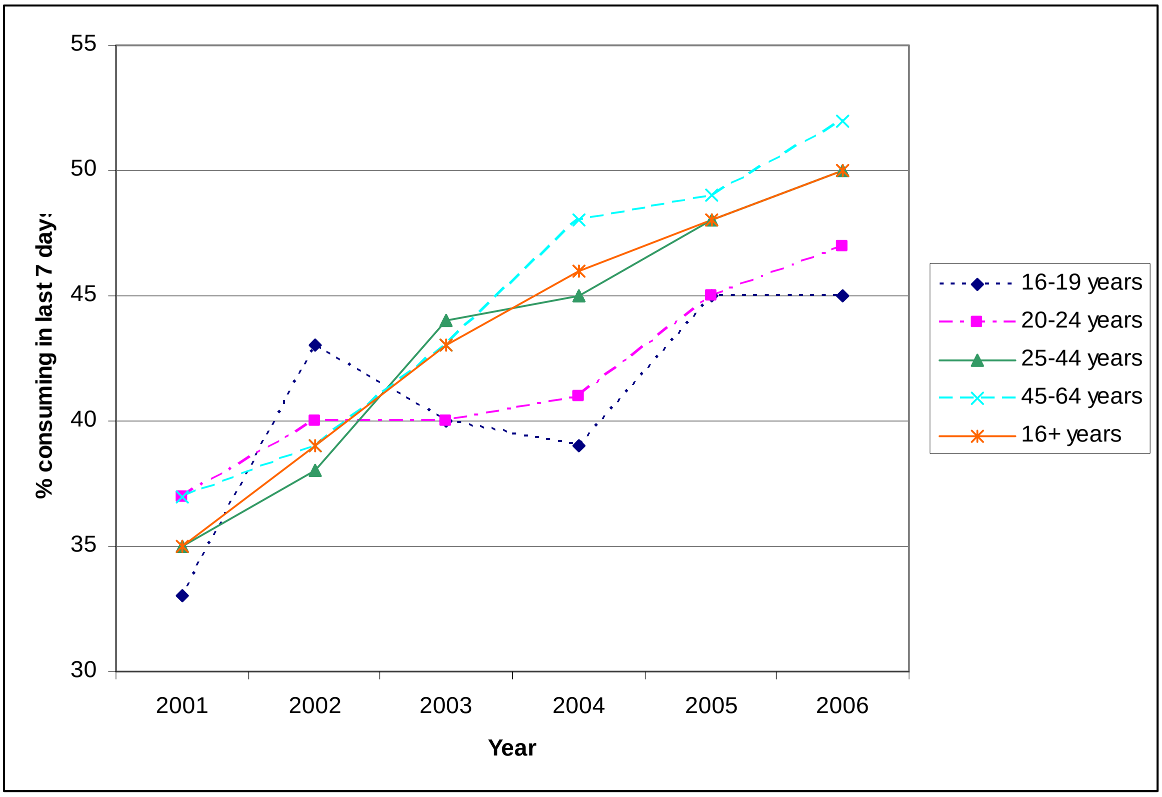
- The consumption of yoghurt has increased quite considerably for all population groups, ranging from 27% to 43%. The average annual change ranged from 5% to 7%.

Table A5.29: Proportion of the New Zealand population of various age groups who consumed yoghurt from various surveys

Age (years)	Year	Survey	Sample size	Yoghurt (%)
15-18	1997	NNS (FFQ)	unk	40
16-19	2001	Roy Morgan	635	33
	2002	Roy Morgan	648	43
	2003	Roy Morgan	688	40
	2004	Roy Morgan	719	39
	2005	Roy Morgan	597	45
	2006	Roy Morgan	332	45
19-24	1997	NNS (FFQ)	unk	37
20-24	2001	Roy Morgan	633	37
	2002	Roy Morgan	670	40
	2003	Roy Morgan	660	40
	2004	Roy Morgan	599	41
	2005	Roy Morgan	595	45
	2006	Roy Morgan	270	47
25-44	1997	NNS (FFQ)	unk	36
	2001	Roy Morgan	4987	35
	2002	Roy Morgan	5027	38
	2003	Roy Morgan	4673	44
	2004	Roy Morgan	4586	45
	2005	Roy Morgan	4584	48
	2006	Roy Morgan	2191	50
45-64	1997	NNS (FFQ)	unk	33
	2001	Roy Morgan	4490	37
	2002	Roy Morgan	4126	39
	2003	Roy Morgan	4233	43
	2004	Roy Morgan	4339	48
	2005	Roy Morgan	4224	49
	2006	Roy Morgan	1990	52
15+	1997	NNS (FFQ)	unk	35
16+	2001	Roy Morgan	12801	35
	2002	Roy Morgan	12319	39
	2003	Roy Morgan	12276	43
	2004	Roy Morgan	12094	46
	2005	Roy Morgan	12006	48
	2006	Roy Morgan	5735	50

Notes:
1. Data from the NNS (FFQ) pertains to "yoghurt"
2. Data from Roy Morgan pertains to fruit, flavoured, natural and plain yoghurt.
3. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.
4. Data from the NNS (FFQ) pertains to % consuming at least once a week in the previous 12 months.

Figure A5.17: Proportion of the New Zealand population of various age groups who consumed yoghurt in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.

Table A5.30: Change in cheese consumption for various New Zealand age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
16-19	36	6
20-24	27	5
25-44	43	7
45-64	41	7
16+	43	7

Sweet biscuits

With reference to Table A5.31; from 1995-2006:

- There was a decrease in the proportion of the population who consumed plain sweet biscuits by between 30% and 40%.
- As data from both surveys in Table A5.31 measured consumption on a weekly basis, a relatively high amount of confidence can be placed in the results obtained.

When assessing plain sweet biscuit consumption from 2004-2006 only (Figure A5.18 Table A5.32):

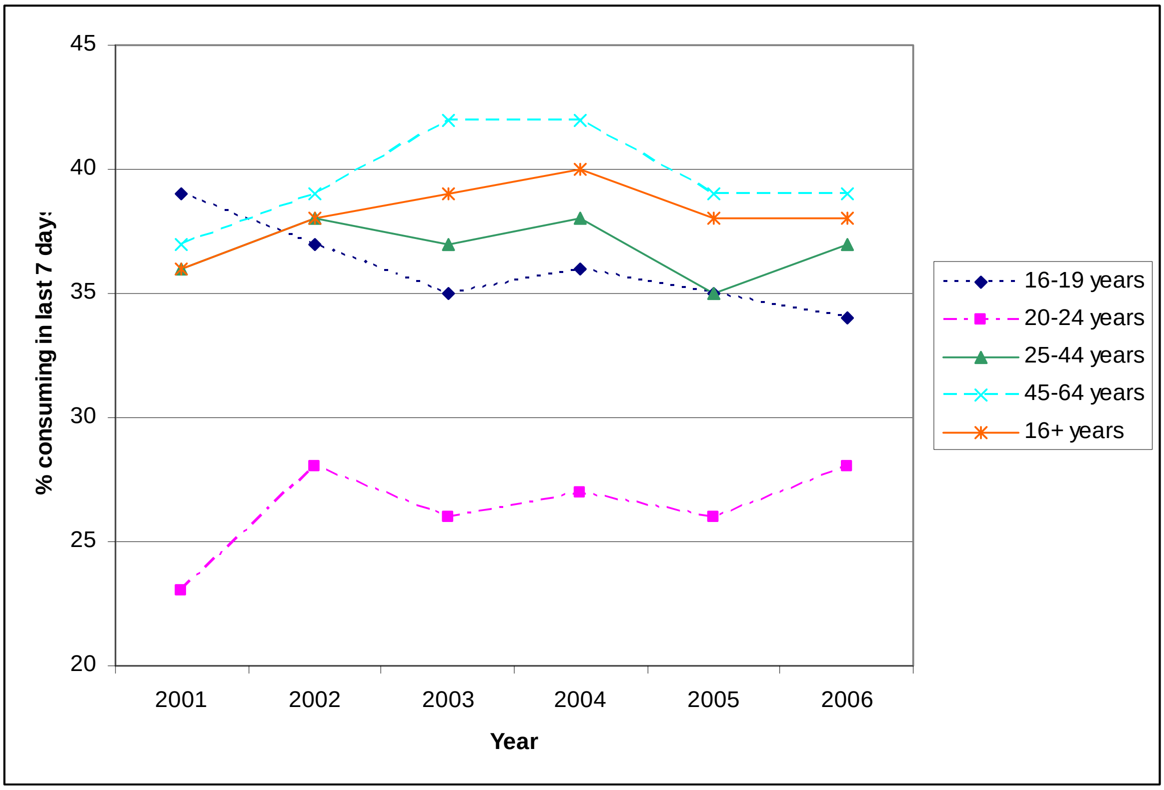
- The change in consumption of plain sweet biscuits varied between the population groups. There was a 13% decrease for the population aged 16-19 years; whereas there was a 22% increase for the population aged 20-24 years. There was a 6% increase for the population aged 16 years and above. The average annual change ranged from -3% to 4%.

Table A5.31: Proportion of the New Zealand population of various age groups who consumed plain sweet biscuits from various surveys

Age (years)	Year	Survey	Sample size	Plain sweet biscuits (%)
15-18	1997	NNS (FFQ)	unk	58
16-19	2001	Roy Morgan	635	39
	2002	Roy Morgan	648	37
	2003	Roy Morgan	688	35
	2004	Roy Morgan	719	36
	2005	Roy Morgan	597	35
	2006	Roy Morgan	332	34
19-24	1997	NNS (FFQ)	unk	43
20-24	2001	Roy Morgan	633	23
	2002	Roy Morgan	670	28
	2003	Roy Morgan	660	26
	2004	Roy Morgan	599	27
	2005	Roy Morgan	595	26
	2006	Roy Morgan	270	28
25-44	1997	NNS (FFQ)	unk	52
	2001	Roy Morgan	4987	36
	2002	Roy Morgan	5027	38
	2003	Roy Morgan	4673	37
	2004	Roy Morgan	4586	38
	2005	Roy Morgan	4584	35
	2006	Roy Morgan	2191	37
45-64	1997	NNS (FFQ)	unk	56
	2001	Roy Morgan	4490	37
	2002	Roy Morgan	4126	39
	2003	Roy Morgan	4233	42
	2004	Roy Morgan	4339	42
	2005	Roy Morgan	4224	39
	2006	Roy Morgan	1990	39
15+	1997	NNS (FFQ)	unk	54
16+	2001	Roy Morgan	12801	36
	2002	Roy Morgan	12319	38
	2003	Roy Morgan	12276	39
	2004	Roy Morgan	12094	40
	2005	Roy Morgan	12006	38
	2006	Roy Morgan	5735	38

Notes:
1. Data from the NNS (FFQ) pertains to plain sweet biscuits only.
2. Data from Roy Morgan pertains to plain sweet biscuits only.
3. Data from Roy Morgan pertains to % who consumed in last 7 days. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.
4. Data from the NNS (FFQ) pertains to % consuming at least once a week in the previous 12 months.

Figure A5.18: Proportion of the New Zealand population of various age groups who consumed plain sweet biscuits in the last 7 days



Source: Roy Morgan Single Source

Notes:
1. For 2001, data is from Aug-Dec. For 2006, data is from Jan-June.

Table A5.32: Change in plain sweet biscuit consumption for various New Zealand age group populations from 2001 to 2006

Age (years)	% change (2001-2006)	Average annual change (%)
16-19	-13	-3
20-24	22	4
25-44	3	1
45-64	5	1
16+	6	1

Appendix 6

World Health Organisation Nutrient Goals and disease specific recommendations

Table A6.1 Ranges of population nutrient intake goal relating to fat intakes (WHO 2003)

Dietary factor		Goal (% of total energy, unless otherwise stated)
Total fat		15-30%
	Saturated fatty acids	<10%
	Polyunsaturated fatty acids (PUFAs)	6-10%
	n-6 Polyunsaturated fatty acids (PUFAs)	5-8%
	n-3 Polyunsaturated fatty acids (PUFAs)	1-3%
	TFA	<1%
	Monounsaturated fatty acids (MUFAs)	By difference [a]

[a] this is calculated as total fat – (saturated fatty acids + poly saturated fatty acids + TFA)

Excerpt from the Joint WHO/FAO Expert Consultation on Diet, nutrition and the prevention of chronic disease (Joint WHO/FAO Expert Consultation, 2003).

Section 5.4.5 Disease-specific recommendations:
Dietary intakes of fats strongly influences the risk of cardiovascular diseases such as coronary heart diseases such as coronary heart disease and stroke, through effect on blood lipids, thrombosis, blood pressure, arterial (endothelial) function, arrythmogenesis and inflammation. However, the qualitative composition of fats in the diet has a significant role to play in modifying this risk.

The evidence shows that intake of saturated fatty acids is directly related to cardiovascular risk. The traditional target is to restrict the intake of saturated fatty acids to less than 7% for high risk groups. Within these limits, intake of foods rich in myristic and palmitic acids should be replaced by fats with a lower content of these particular fatty acids.

Not all saturated fats have similar metabolic effects; those with 12-16 carbons in the fatty acids chain have a greater effect on raising LDL cholesterol. As populations progress in the nutrition transition and energy excess becomes a potential problem, restricting certain fatty acids becomes progressively more relevant to ensuring cardiovascular health.

To promote cardiovascular health, diets should provide a very low intake of TFA (hydrogenated oils and fats). In practice, this implies an intake of less than 1% daily energy intake.

While there is no evidence to directly link the quality of daily fat intake to an increased risk of CVD, total fat consumption should be limited to enable the goals of reduced intake of saturated and TFA to be met easily in most population and to avoid the potential problems of undesirable weight gain that may arise from unrestricted fat intake.

These dietary goals can be met by limiting the intake of fat from dairy and meat sources, avoiding the use of hydrogenated oils and fats in cooking and manufacture of food products, using appropriate edible vegetable oils in small amounts, and ensuring a regular intake of fish (one to two times per week) or plant sources of α-linolenic acid. Preference should be given to food preparation practices that employ non-frying methods.

International estimates of TFA intakes

Table A7. 1: International estimates of TFA intakes

Country	Mean dietary intake	% of energy/fat	Comments	Reference
USA	5.8 g/day	2.6% energy intake/day*	All pop'n 20 yrs+	(American Heart Association, 2006)
	2.6 g/day to 12.8 g/day		High intake estimates based on food disappearance statistics and therefore less robust than other estimates	(Lichtenstein, 1997)
	2.24 g/day males 1.78 g/day females	5% of total fat intake	A 1996 study involving 27 females and 24 men aged 51-78 years, determined using a food frequency questionnaire	(Lemaitre *et al*., 1998)
Australia	1.2 to 1.6 g/day	0.6% of total energy intake*		(Food Standards Australia New Zealand, 2006b)
New Zealand	4.1 g/day males 2.5 g/day females	4% of total fat intake 1.5% of total energy intake 3.8% of total fat intake 1.4% of total energy intake	Sources of fat in New Zealand diet were identified from published Life in New Zealand (LINZ) tables (Horwath, 1991) and from LINZ survey (Wilson et al., 1995)	(Lake and Thomson, 1996)
	1.6 to 2.0 g/day	0.7% of total energy intake*		(Food Standards Australia New Zealand, 2006a)
Europe	2.4 g/day males 2.0 g/day females	0.87% of total energy intake* 0.95% of total energy intake*	Cross-sectional study in eight European countries, involving 327 men and 299 women aged 50-65 years	(van de Vijver *et al*., 2000)

Country	Mean dietary intake	% of energy/fat	Comments	Reference
		0.5-2.1% of total energy intake - males 0.8-1.9% of total energy intake - females	Mean daily intakes for 14 different countries in the EU (excluding Ireland)	(Foods standards Authority of Ireland Website, 2006)
United Kingdom	5.6 g/day males 4 g/day females	No estimate provided	Using data from the 1986/87 Dietary and Nutritional Survey of British Adults (7-day weighed dietary record), involving 1087 males and 1110 females aged 16-64 years excluding pregnant women	(Food Standards Agency Website, 1987)
Canada	8.4 g/day	No estimate provided	Estimates were determined on the basis of fat and calories intakes reported in the 1990 Nova Scotia Dietary Survey along with the assumption that trans fatty acids were 10.4% of the total dietary fat. Estimates ranged from 5.2 g/day for elderly women to 12.5 g/d for young men	(Ratnayake and Chen 1995)
	1.4 to 25.4 g/day	No estimate provided		(Innis *et al* 1999)

Country	**Mean dietary intake**	**% of energy/fat**	**Comments**	**Reference**
	3.8 to 3.4 g/day	No estimate provided	Cross-sectional prospective study of healthy, pregnant women in Vancouver, Canada, values for trans fat intake that were somewhat less than the previous estimates for the Canadian diet. Values of 3.8 and 3.4 g/d person were reported for women in the first semester and third semester, respectively.	(Innis 2002)
	4.9 g/day	2.2% energy intake/day*	From dietary intake data from nutrition surveys conducted in Ontario, Manitoba, British Columbia and Quebec. Values for various age groups and sexes are given in the Task Force Report	(Health Canada 2005)
Denmark	2.6 g/day males and females 19-64 years (approximately half from ruminant fat)	1.0% energy intake/day*	National food consumption data matched with laboratory analysis of major foods	(Stender and Dyerberg, 2003)

*% daily energy intake from TFA used to compare to WHO TFA goal

APPENDIX 3

RISK ASSESSMENT

REVIEW REPORT
TRANS FATTY ACIDS IN THE NEW ZEALAND AND AUSTRALIAN FOOD SUPPLY

1. *Key Risk Assessment Questions of the Review*

There are six key questions requiring investigation as part of this review:

1. What is the relationship between TFA intake, biomarkers of disease, and outcomes of public health significance?
2. Are there differences in health effects according to ruminant or manufactured TFA?
3. Compared to the health impact of TFA, what is the impact of SFA on biomarkers and outcomes of CHD?
4. What are the present intakes and dietary sources of TFA in Australia and New Zealand? Are there population groups with intakes of TFA well above average levels in the general population? Which sectors of the food industry are the major contributors to TFA in the Australian and New Zealand diets?
5. What is the potential reduction in TFA intake in Australia and New Zealand?
6. What is the potential reduction in health risk from such a reduction in TFA intake?

2. *Summary*

A risk assessment of the dietary intake of TFA for the Australian and New Zealand populations was undertaken based on the estimated dietary intake.

There has been much debate in the literature regarding the link between dietary intake of TFA and adverse health outcomes. The most consistent and robust evidence linking TFA intake with an adverse health outcome is its adverse effect on blood lipid profile, specifically TFA appear to raise LDL levels. A small number of cohort studies also show an association with TFA intake and risk of heart disease. A joint review was undertaken by the FAO/WHO of dietary factors associated with cardiovascular disease, a collective term for diseases of the heart and arteries that includes CHD. The evidence for an adverse effect of TFA intake on risk for cardiovascular disease led the authors of the report to recommend population nutrient intake goals of less than 1% energy from TFA (Anon, 2003). Mean TFA intakes in Australia and New Zealand are below 1% intake, but this does not preclude the possibility of health benefits from further reductions in intake particularly in people with intakes above the mean.

The effect of TFA on blood lipids was given as a primary scientific reason in Danish, Canadian and U.S. reviews to support reducing population TFA intakes, resulting in regulatory action in these countries. Pre-regulation TFA intakes in North America were considerably higher than current estimates in Australia and New Zealand, however, Denmark took action to reduce TFA in the Danish food supply with mean TFA intakes of 1% dietary energy (Stender and Dyerberg, 2003), a level much closer to intakes in Australia and New Zealand (*Figure 7*).

Arguments have been put forward to suggest that ruminant-derived TFA may have differential health effects compared with TFA formed during the manufacturing of partially hydrogenated edible oils. However, the profile of the TFA content of ruminant fat is related to the diet of the animals (see Appendix 1). Further, the TFA profile of partially hydrogenated vegetable oil is also likely to vary between countries owing to preference for different oils. Therefore, while it is reasonable to presume that studies showing differential effects of individual TFA are comparable between countries, the relevance of studies of fatty acid mixtures (e.g. butter versus margarine) between countries is more uncertain. In the absence of any definitive evidence for differential effects on heart disease risk factors, the recommendation to reduce saturated fat intake, and hence animal fats including ruminant-derived TFA, is still relevant.

The evidence base that could be used to compare the effect on biomarkers or health outcomes of consuming ruminant or manufactured TFA is inadequate to allow firm conclusions to be made. The North American Institute of Medicine cautioned against trying to eliminate TFA from diets by avoiding meat and dairy foods because this would have undesirable effects on other dietary components (2002).

Evidence for TFA having a more adverse effect on blood lipids compared with SFA on an equal energy basis is compelling. This is consistent with data from a prospective cohort study showing that replacement of 2% energy from TFA with *cis*-unsaturated fatty acids was equivalent, in terms of CHD risk reduction, with replacement of 5% energy from SFA with *cis*-unsaturated fatty acids (Hu et al., 1997).

Dietary intakes of TFA including ruminant and industrial sources are approximately 0.6% and 0.7% of dietary energy intake in Australia and New Zealand, respectively (*Figure 7*). There is the potential for reducing TFA intakes from manufactured edible oils which account for approximately one-third and one-half of total TFA intakes in Australia and New Zealand, respectively (*Table 1*). Replacing high fat dairy foods with low fat alternatives would also reduce TFA intake as a consequence.

Dietary intakes of TFA from both ruminant and manufactured sources combined are approximately 0.6% and 0.7% of dietary energy intake in Australia and New Zealand, respectively. Whether intakes of this magnitude are associated with excess risk of CHD are unknown because the Australian and New Zealand intakes occur at the lower end of the TFA intake distribution found to be associated with CHD events in prospective studies (Ascherio *et al*., 1996; Pietinen *et al*., 1997; Oomen *et al*., 2001; Oh *et al*., 2005; Xu *et al*., 2006). The Institute of Medicine took the view that there is a positive linear trend between TFA intake and total and LDL cholesterol concentration, and therefore an increased risk of CHD (Institute of Medicine, 2002). This seemed reasonable given that the mean TFA intakes in North America are around 2 – 3% of dietary energy, a range over which changes in blood lipids have been found (Judd *et al*., 1994; Judd *et al*., 1998; Lichtenstein *et al*., 1999). However, there is a paucity of evidence to show that blood lipids change with reductions in TFA intakes of 0.3 – 0.4% energy, ie: reductions in TFA intake potentially achievable in Australia and New Zealand.

Nevertheless, there may be a health benefit if TFA intakes in Australia and New Zealand were reduced. Although it has been suggested that TFA are adversely associated with some forms of cancer, type 2 diabetes, age-related macular degeneration, and early development, the most comprehensive evidence in support of a health benefit is a possible reduction in CHD events.

The benefit would be greatest if partially hydrogenated vegetable oils were largely replaced in the food supply using carbohydrate or *cis* unsaturated fatty acids as alternative energy sources.

Replacing carbohydrate in the diet with an isoenergetic amount of TFA adversely raises total and LDL-C concentrations. The evidence from dietary intervention trials, summarised in a systematic review, is consistent and compelling (Mensink *et al*., 2003). Replacement of *cis* fatty acids with isoenergetic amounts of TFA adversely raises the LDL:HDL cholesterol ratio. In a systematic review, a linear dose-response between percentage energy intake from TFA and change in LDL:HDL cholesterol was found with no evidence of a diminishing or threshold effect (Ascherio *et al*., 1999). The evidence for a dose-response effect is consistent, at least for TFA intakes in excess of 3% energy intake.

Because of the uncertainty as to whether the blood lipid dose-response effect occurs at low levels of TFA intake, and because associations with CHD incidence are unknown at low intakes, it is not possible to estimate the true extent of disease risk reduction that would occur in Australia and New Zealand if the TFA ingestion in the populations was reduced below already low intakes.

3. *Risk Assessment*

What is the relationship between TFA intake, biomarkers of disease, and outcomes of public health significance?

An adverse effect on blood lipids is regarded as a primary mechanism whereby TFA increases CHD risk. The evidence from eight dietary intervention trials, summarised in a systematic review, is consistent (Mensink *et al*., 2003): exchanging carbohydrate in the diet with an equal amount of energy predominantly from manufactured *trans* monounsaturated fatty acids raises total and LDL-cholesterol but has no effect on HDL-cholesterol concentrations. In a more recent meta-analysis that included data from 12 studies, exchanging *cis* mono- and poly-unsaturated fatty acids with TFA was found to raise LDL and lower HDL cholesterol concentrations (Mozaffarian *et al*., 2006). Ascherio et al examined the effect of exchanging *cis* unsaturated fatty acids for isoenergetic amounts of TFA on LDL:HDL cholesterol ratio. In a systematic review of dietary intervention studies, a linear dose-response between percentage energy intake from TFA and change in LDL:HDL cholesterol was found with no evidence of a diminishing or threshold effect (Ascherio *et al*., 1999). The evidence for this effect is compelling, at least for TFA intakes in excess of 3% energy intake.

Most of the dietary comparisons involved fatty acid exchanges of greater than 2% energy. Two studies examined the effects on blood lipids when TFA was exchanged at energy intakes between 1 and 2% (Judd *et al*., 1998; Tricon *et al*., 2006). The results were consistent with the studies using higher levels of intakes, but it is also possible that there is a threshold of TFA intake below which total and LDL cholesterol concentrations, and the LDL:HDL cholesterol ratio are unaffected. Thus, there is limited evidence for a dose-response between changes in blood lipid concentrations and TFA intakes at low levels. Greater confidence in the nature of the dose-response would be gained if it could be confirmed from other studies that changes in blood lipids occurred with small changes in TFA intakes.

Prospective studies provide the strongest epidemiological evidence relating TFA intake to risk of CHD. Three out of five studies show increasing incidence of CHD, defined as a non-fatal myocardial infarction or death due to CHD, with increasing TFA intakes (Pietinen *et al.,* 1997; Oomen *et al.,* 2001; Oh *et al.,* 2005). A pooled analysis of the Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study (Pietinen *et al*., 1997); The Zutphen Elderly Study (Oomen *et al*., 2001); The Nurses Health Study (Oh *et al*., 2005); and The Health Professionals Follow-up Study (Ascherio *et al*., 1996), showed that substitution of 2% energy from carbohydrates with 2% energy from TFA is associated with a 23% increased risk of CHD (relative risk 1.23; 95% confidence interval 1.11, 1.37) (Mozaffarian *et al*., 2006). In one of the trials, the Alpha-tocopherol Beta-carotene Cancer Prevention Study, the relative risk of CHD was only elevated in men whose median intake of TFA was more than 2% of daily energy intake (RR 1.43; 95% CI: 1.12, 1.84) (Pietinen *et al*., 1997). The authors suggested that there may be a level of TFA intake below which there is no elevated risk. If a threshold does exist, the level of intake at which this might occur is not clear. An increased risk of CHD was found in women consuming less than 2% daily energy as TFA in the Nurses Health Study (Oh *et al*., 2005). In the Health Professionals Follow-up Study, an elevated risk of fatal CHD was found in men consuming a median intake of TFA of 2.2 g compared with a comparison group whose mean intake was 1.5 g TFA per day (RR 1.63; 95% CI: 1.01, 2.62) (Ascherio *et al*., 1996). Based on the mean energy intake of men in the study, intakes of 1.5 and 2.2 g TFA would correspond to proportional intakes of daily energy of 0.7% and 1%, respectively. No study has included a comparison group comprising people who consumed zero TFA.

The findings of one cohort study, published after the meta-analysis, did not show an increased incidence of CHD with increasing intakes of TFA (Xu *et al*., 2006). Participants were 2938 American Indians enrolled into the Strong Heart Study. It is unlikely that the range of intake in this study was too narrow for an effect to be seen because the median intakes of TFA among people in the lowest or above the highest quartile of intake were 0.9% and 3.9% of energy respectively. This is larger than the 2% difference used by Mozzafarian et al as the basis for calculation in their meta-analysis (Mozaffarian *et al.,* 2006). The reason for the lack of association between TFA intake and CHD incidence in this trial, when other studies found an effect, is unknown. It is likely that inclusion of the Strong Heart Study in a pooled analysis, such as that conducted by Mozzafarian et al., would have little effect on the risk estimates because of the small sample size compared with some of the other cohort studies. Thus, the conclusion reached by Mozzafarian and colleagues that the weight of evidence from prospective studies suggests a detrimental effect of TFA intake on CHD would stand. However, explaining inconsistencies in outcomes among the studies is important.

Some evidence for adverse effects of TFA intake on health other than CHD has been reported. A positive relationship between TFA intake and risk of developing type 2 diabetes was found in one prospective cohort study, with no association found in two other studies (Salmeron *et al*., 2001; Meyer *et al*., 2001; van Dam *et al*., 2002). Associations between dietary intake of TFA and breast cancer have either been adverse or neutral (Voorrips *et al*., 2002; Kim *et al*., 2006). Infants are exposed to TFA *in utero* at concentrations reflecting maternal TFA intake (Innis, 2006). However, the evidence base that could be used to examine effects of TFA exposure in early life is limited. TFA intake was found to be associated with age-related macular degeneration during follow-up in 261 elderly North American patients already diagnosed with the condition (Seddon *et al*., 2003). In the Blue Mountains Eye Study in Australia, TFA intake was found to be negatively associated with incident age-related maculopathy (Chua *et al*., 2006).

To date, the most consistent and extensive dataset linking TFA intake with an adverse health outcome is its association with CHD morbidity and mortality.

Are there differences in health effects according to ruminant or manufactured TFA?

Individual *trans* fatty acids present in the milk and meat of ruminant animals are largely the same as those produced in the industrial process of partial hydrogenation, although the two sources are likely to differ in their fatty acid profiles. The predominant TFA in both sources are *trans* octadecanoic acids (C18:1t). Typically, ruminant TFA has a large proportion of *trans* vaccenic acid (C18:1 Δ11t) whereas partially hydrogenated vegetable oils contain C18:1t isomers with a more even distribution in the range C18:1 Δ6-14.

The data examining whether ruminant-derived TFA have a similar or different effect on blood lipids than do manufactured TFA is sparse. This is partly due to the variable nature of the proportion and type of TFA and further compounded by the studies showing that the TFA profile of dairy fat depends on how the animals are fed. Hence it would be possible that studies conducted in different countries could find apparently conflicting results owing to differences in animal husbandry.

In Australia, adipose tissue *trans* vaccenic acid, found in both manufactured and ruminant fats, was an independent predictor of myocardial infarction (Clifton *et al.,* 2004). Trans 18:2 fatty acids found in small amounts in non-hydrogenated refined oils, partially hydrogenated oils, and dairy are associated with higher risks of fatal ischaemic heart disease and sudden cardiac death (Lemaitre *et al*., 2002; Lemaitre *et al*., 2006). Mixtures of conjugated linoleic acid (CLA: for example 18:2 cis-9,trans-11 and trans-10,cis-12), present in small amounts in ruminant fats, have been used in supplementation trials. Doses of CLA well in excess of those found in a typical diet were found to have beneficial, neutral, or adverse effects on various biomarkers (Kelley *et al*., 2001; Benito *et al*., 2001; Noone *et al*., 2002; Riserus *et al*., 2002; Riserus *et al*., 2004). Associations between usual dietary intakes of CLA and breast cancer are contradictory (Aro *et al*., 2000; Voorrips *et al*., 2002; Rissanen *et al*., 2003).

Epidemiological studies show that associations with risk of CHD are not different for total, manufactured or ruminant-derived TFA intakes up to 2.5 g per day (Weggemans *et al*., 2004). Ruminant-derived TFA intakes are not normally consumed in excess of this amount. The mean (SD) intake of ruminant TFA by adults in the Zutphen Elderly Study was 0.7% (0.2), corresponding to an absolute intake of around 1.7 g per day (Oomen *et al*., 2001). In the Alpha-tocopherol Beta-carotene Cancer Prevention Study, 90% of the participants consumed less than 2.5 g per day TFA of animal origin (Pietinen *et al.,* 1997).

Compared to the health impact of TFA, what is the impact of SFA on biomarkers and outcomes of coronary heart disease?

TFA and SFA both have an adverse effect on blood lipids by raising total and LDL cholesterol concentrations (Mensink *et al.,* 2003). Currently, the best estimate is that replacement of 1% energy from carbohydrates with 1% energy from SFA or TFA raise total cholesterol concentrations by 0.036 mmol/L (95% CI: 0.029, 0.043) and 0.040 mmol/L (0.020, 0.060), respectively. Thus, the magnitude of change of total cholesterol concentrations is similar whether SFA or TFA replace dietary energy from carbohydrates. On the other hand, replacing carbohydrate with individual SFA tends to raise HDL cholesterol, whereas TFA have no effect. A consequence of this differential effect on cholesterol fractions is that TFA tends to adversely raise the total:HDL and LDL:HDL ratios compared with SFA. Based on the results of a systematic review, it was estimated that the LDL:HDL cholesterol ratio was raised approximately twice as much by TFA than by SFA on an equal energy basis (Ascherio *et al.,* 1999). Nevertheless, there is limited data that directly compares the effect of TFA and SFA within the same study. Where direct comparisons have been made between TFA and SFA, there is heterogeneity in the size of the difference in the LDL:HDL cholesterol ratio. However, data from the studies included in the meta-analysis were consistent in showing a more adverse effect on the ratio when TFA were consumed compared to when SFA were consumed (Mensink and Katan, 1990; Zock and Katan, 1992; Nestel *et al*., 1992; Judd *et al.,* 1994; Sundram *et al*., 1997).

TFA raise lipoprotein(a) concentrations when substituted for SFA (Mensink and Katan 1990; Nestel *et al.,* 1992; Almendingen *et al*., 1995; Sundram *et al.,* 1997; Aro *et al*., 1997; Clevidence *et al*., 1997; Lichtenstein *et al.,* 1999). TFA also raise fasting triacylglycerol concentrations more so than SFA (Mensink and Katan 1990; Zock and Katan 1992; Nestel *et al.,* 1992; Lichtenstein *et al*., 1993; Judd *et al.,* 1994; Sundram *et al.,* 1997; Lichtenstein *et al.,* 1999).

Only one study has compared the effect of TFA and SFA on heart disease outcomes. In the Nurses Health Study, replacing 5% of energy from SFA with energy from *cis* unsaturated fatty acids was associated with a 42% lower risk of CHD, compared with a 53% lower risk if 2% TFA were replaced in the same way. In this study, lowering TFA intake had a greater effect on reducing risk of CHD than SFA on a per gram basis (Hu *et al.,* 1997).

Thus, there is compelling evidence that TFA have a more adverse effect on blood lipids and lipoproteins compared with SFA on an equal energy basis. The only prospective cohort study examining this effect also reports that per gram, TFA is a more potent risk factor for CHD than SFA.

What are the present intakes and dietary sources of TFA in Australia and New Zealand? Are there population groups with intakes of TFA well above average levels in the general population? Which sectors of the food industry are the major contributors to TFA in the Australian and New Zealand diets?

The percentage total energy intake from TFA in New Zealand adults aged 15 y and above is 0.7%. This proportional intake is consistent among the age brackets of 15 – 19 y, 20 – 44 y, and 45 y and above. The mean TFA intake of Māori and Pacific Island people (a combined group analysis) was also estimated to be 0.7% of energy.

In Australia, the percentage total energy intake from TFA is 0.6% for age groups 2 – 4 y, 5 – 12 y, 13 – 19 y, 20 – 44 y, and 45 y and above. The current best estimate of absolute TFA intakes in Australia and New Zealand are shown in *Table A 1*.

Table A 1 Intakes of TFA

	Mean intake (g per day)	
Age	Australia	New Zealand
13 – 19 y (AUS) 15 – 19 (NZ)	1.6	2.0
20 – 44 y	1.5	1.8
45 y or older	1.2	1.6

Source: Appendix 4 of Attachment 2 of this report

TFA intakes tended to be lower in Australia than in New Zealand. In both countries there was a trend for mean TFA intakes to be highest through the teenage years and declining into adulthood. The Australian survey included data for young children. The mean TFA intakes for 2 – 4 and 5 – 12 year olds were 1.1 and 1.4 g per day, respectively.

In Australia, 24% of dietary TFA were attributed solely to foods containing manufactured TFA. Some 16% of TFA came from foods containing a mixture of manufactured and naturally-occurring TFA, for example cheesecake. The remainder (60%) was of non-manufactured origin that included TFA from ruminant sources (dairy and meat from ruminant animals), and TFA from non-ruminant sources (eg: eggs, chicken, pork). In New Zealand, the proportions of manufactured, mixed source, and non-manufactured TFAs were 46%, 13%, and 41%, respectively.

A reasonable estimate for the intake of manufactured TFA in Australia is around one third total TFA (ie: 0.2% energy), and around one half total TFA in New Zealand (ie: 0.35%).

Quantitatively, the mean amounts of TFA derived from dairy and meat are similar between Australia and New Zealand at around 0.6 – 0.7 g per day among age groups 15 y and above. Major sources of non-ruminant TFA are fats and oils, baked products, snack foods and confectionery.

There are limitations to the methods used to determine dietary TFA intakes in Australia and New Zealand including underreporting associated with 24-hour recalls (Gibson, 2005) and a limitation on the numbers of foods analysed for their TFA contents. Assumptions used in TFA intake estimates are discussed in Attachment 2.

What is the potential reduction in TFA intake in Australia and New Zealand?

The potential for reducing TFA intakes from manufactured sources would be approximately one-third and one-half of total TFA intakes in Australia and New Zealand, respectively. Complete removal of TFA of manufactured origin could not be achieved because some TFA formation occurs during the industrial process of oil deodorization. Some TFA formation is also likely to occur during high temperature cooking with vegetable oils containing polyunsaturated fatty acids. Reductions in intakes of ruminant sources of TFA could be achieved if people chose low fat dairy products and lean meats.

What is the potential reduction in health risk from such a reduction in TFA intake?

The most convincing evidence for health benefits associated with reducing TFA intake is for a reduction in preventable CHD events. There may be added advantages to reducing TFA in the food supply if definitive evidence linking TFA with diabetes, cancer or early development were to emerge.

The potential for reducing CHD events has been calculated using pooled data from four major prospective studies. Two of these studies, the Health Professionals Follow-up Study and the Nurses Health Study (Ascherio *et al.,* 1996; Oh *et al.,* 2005) were carried out in North America, whilst the other two studies took place in Finland (The Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study) (Pietinen *et al.,* 1997) and Holland (The Zutphen Elderly Study) (Oomen *et al.,* 2001). It was estimated that replacement of 1% energy from TFA with carbohydrate would reduce preventable CHD events by around 10% (Mozaffarian *et al*., 2006). This estimate was increased somewhat if TFA were replaced with *cis* unsaturated fatty acids. The findings of one cohort study, published after the meta-analysis, did not show an increased incidence of CHD with increasing intakes of TFA and its inclusion in the meta-analysis would have tended to lessen the estimate (Xu *et al*., 2006).

Even so, using data from these prospective studies to estimate benefits of reduced TFA intakes in Australia and New Zealand requires certain assumptions to be made. One difference is that TFA intakes in Australia and New Zealand are generally lower than those found in the North American and European cohorts. Thus, an extrapolation of the Mozzafarian et al data would be required using assumptions that there is a linear relationship between relative risk of CHD and TFA intake and that there is no threshold below which TFA pose no risk. Thus, estimates of CHD reduction would be speculative because of the lack of direct evidence relating CHD events to relatively small reductions in TFA intakes.

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