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Original Article

Trans fatty acids in the New Zealand food supply

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Abstract

Adverse health effects from the consumption of *trans* fatty acids (TFA) have led to efforts to decrease the consumption of these lipids. There is a need for up to date information on TFA levels in foods to support decision-making by regulators on labelling and health claims. This paper reports the results from a 2006 survey of New Zealand manufactured food items for fatty acid content, including TFA, determined using gas chromatography. The TFA levels in snack bars, margarines/table spreads, biscuits and cakes, pies and pastries were all below 10 g/100 g fatty acids (less than 3.5 g/100 g product). Also reported are results from a 1998 survey of margarines and table spreads which are compared with those from a previously published 1996 survey conducted by the same organisation. The conclusion is that the TFA content of foods in New Zealand has declined over the previous decade, with a likely decrease in consumption of these lipids by New Zealanders.

Keywords: *Trans* fatty acids; New Zealand foods; Food composition analysis; Regulation; Health claims; Partially hydrogenated vegetable oil; Margarine; Table spread; Shortening; Convenience foods; Snacks; Commercial baked goods

1. Introduction

Trans fatty acids (TFA) are produced from the naturally occurring "*cis*" unsaturated form by heating liquid vegetable oils in the presence of metal catalysts and hydrogen. Like hydrogenation (addition of hydrogen across a double bond to make it saturated), this process can also cause isomerisation of *cis* double bonds into the *trans* form. Such partially hydrogenated vegetable oils are attractive to the food industry because of their longer shelf life, oxidative stability, and semi-solidity at room temperature (Mozaffarian et al., 2006). TFA are commonly found in commercial baked goods, shortenings, some margarines and table spreads, and industrial cooking oils.

However, foods that are high in *trans* or saturated fatty acids are associated with an increased risk of cardiovascular disease and diabetes (Mozaffarian et al., 2006). TFA are also associated with markers of systemic inflammation in women, which may be involved in the pathogenesis of coronary artery disease (Mozaffarian et al., 2004).

Associations with adverse health effects have led to efforts to decrease the intake of TFA by consumers, including labelling of food products for TFA content, most recently in the United States and Canada (Department of Health, Canada, 2003; Food and Drug Administration, U.S.A., 2003). Food Standards Australia New Zealand (FSANZ) is currently considering the issue of dietary TFA in Australia and New Zealand. Previous studies in both New Zealand and Australia indicate that products with a high TFA content are not commonly found in processed foods within these countries (Noakes and Nestel, 1994; Lake et al., 1996). In order to estimate intakes and support decision-making regarding risk management, there is a need to continue to assess the content of *trans* fats in the food available in New Zealand. The purpose of the study reported here was to perform analyses, and thereby provide more up-to-date information on TFA levels currently found in New Zealand-manufactured foods. These data are compared with results from surveys in 1995 of a variety of foods (Lake et al., 1996), and in 1998 of margarines and table spreads (Lake et al., 1998), to determine how the level of *trans* fats in manufactured foods in New Zealand has changed over the past decade.

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2. Materials and methods

2.1. Sample selection

The focus of the current survey was predominantly on manufactured baked goods, including pastries, pies, biscuits, cakes, snack foods, chocolate (which may contain vegetable fats), and a few table spreads for which label data were not available. Specific sample selection was assisted by a number of supermarket visits to review product labels of potential samples, ensuring that these were selected to include the major manufacturers of each food group type and that they would be available throughout New Zealand. Certain food groups were excluded from the survey. These included products that had been recently examined, such as deep-frying fats (Morley-John et al., 2005) and margarines/table spreads for which a collation of label claims had been published (Consumer, 2005). The following samples were selected:

- *Biscuits and cakes*: Cakes (2 samples, including filled raspberry lamington and non-iced lollie cake); sweet biscuits (5, including plain and chocolate varieties); cracker biscuits (4).
- *Fats and oils*: Margarines and table spreads (6, including reduced fat and butter/vegetable oil blends).
- *Chocolate*: Milk and dark chocolate varieties (4, made from combinations of cocoa butter, vegetable fat, milk, cream, or milk powder).
- *Snack bars*: Muesli varieties, chocolate snack bar, and cookie bar (6).
- *Pies and pastry*: Sweet and savoury pastry types (7) and pies with both sweet and savoury fillings (3).
- *Partially cooked frozen potato chips/wedges*: (3, all of which claimed to be cooked in animal fat).

2.2. Analyses

Sample packages of up to 1 kg were purchased and samples homogenised in a blender before subsampling.

2.2.1. Moisture

Analysis of duplicate samples from a homogenised food sample was carried out by drying at 103 ± 2 °C for 2 h. Drying was repeated, at hourly intervals, until successive weighings differed by less than 0.1% (AOAC, 1995, Official Methods 920.39, 945.16, 948.22).

2.2.2. Fat extraction

Lipid extraction was performed using Soxhlet extraction (based on modified AOAC, 1995, Official Methods 920.39, 945.16, 948.22). Approximately 16 g of accurately weighed sample was placed in a cellulose extraction thimble (Whatman Catalogue No. 2800308) after homogenisation in a domestic food blender (Breville). The sample was dried overnight in a 102 °C moisture oven. The samples were mixed with sand (Merck 1.07711.5000) if the consistency of the matrix was such that it would form a tough crust upon drying. The thimbles were placed in a Soxhlet extraction apparatus and extracted with 200 mL of 1:1 diethyl ether/petroleum ether (40–60 °C bp) for approximately 8 h. The solvent was evaporated on a water bath and the samples were then stored in a desiccator.

For table spreads, the sample was acidified with dilute hydrochloric acid, partly dissolved in ethanol, and then heated in a water bath (70–80 °C) for 30 min. The mixture was cooled by the addition of ethanol and water and then extracted twice with a diethyl ether and petroleum ether (40–60 °C bp) mixture (1:1). Solvent extracts were combined and evaporated on a water bath, and then dried at 102 °C. The fat content was calculated by difference (AOAC, 1995, Official Methods 992.06). The fat was then placed in a 20 mL capacity vial, the air was replaced with nitrogen gas (BOC Nitrogen, Oxygen Free G152) and the vial sealed and stored at 5 °C in the dark until analysed.

2.2.3. Preparation of fatty acid methyl esters

The lipids were then esterified according to the method described by Bannon et al. (1982) and the British Standard Methods of Analysis of Fats and Fatty Oils, BS 684: section 2.35 1980. Fat extracts were melted on a water bath and approximately 400 mg transferred to a 50 mL volumetric flask, and 5 mL of freshly prepared 0.5 M methanolic potassium hydroxide added, followed by 5 mL of diethyl ether. The volumetric flask was then placed on a water bath and the solution refluxed for 2 min.

Iso-octane (4 mL) was added, followed by 20 mL of saturated sodium chloride solution and the mixture shaken for 15 s. Total 300 μL of the upper organic phase was then transferred to a crimp-top vial and further iso-octane (1 mL) added. The vial was then sealed and kept at 5 °C until analysis.

2.3. Gas chromatographic analysis

Analysis of fatty acid methyl ester was carried out on a Shimadzu QP2010 gas chromatograph mass spectrometer (GCMS) with a CTC CombiPAL automatic injector and a SP2560 capillary column (100 m × 0.25 mm I.D., 0.2 μM film thickness; Supelco, Bellefonte, PA). The injection volume was 1 μL with a split ratio of 50:1. The injector temperature was 225 °C. The carrier gas was high purity helium with a column flow rate of 0.5 mL/min. The column temperature was programmed from 150 to 200 °C at 1 °C/min, and then held at 200 °C for 40 min. The mass spectrometer was set to SCAN mode, 35–500 m/z. The total ion count was analysed.

Following analysis, chromatogram peaks were assigned manually, on the basis of comparison with reference standards and the integrated peak areas used to assign percentage composition. Analysis was performed according to the American Oil Chemists Society (AOCS, 1989, Official Methods Ce 1-62 and Ce 1f-96).

2.4. Quality control

For fatty acid methyl ester analyses, the following standards were used to confirm retention times for peak identification, as well as to confirm that peak areas reflected actual composition of these mixtures: AOCS (Champaign, Illinois, USA) TFA standards #1 and #2; AOCS Animal Fat Reference #3 and AOCS Olive Oil Reference #8, reference standards #87 and #68D from Nu-Chek (Elysian, Minnesota, USA); and reference standards K108, K110 and K3000 from Alltech (Deerfield, Illinois, USA). Fatty acid composition results were generally within 1 g/100 g of stated values. AOCS Proficiency Programme TFA standards #1 and #2 from an interlaboratory trial were derivatised and chromatographed alongside each batch of samples. Results for mean (standard deviation) total TFA content were: #1 interlaboratory result 20.34 (2.72) g/100 g, batch result 20.78 (1.34) g/100 g; #2 interlaboratory result 15.21 (4.69) g/100 g, batch result 14.25 (0.82) g/100 g. Two of the food samples analysed for this study were sent to the Division of Analytical Laboratories (DAL), Western Sydney Area Health Service, Australia. Results for TFA content agreed to within one standard deviation of the interlaboratory variation seen in the AOCS interlaboratory trial results.

Total 25 of the 40 samples in the 2006 survey were analysed in duplicate; fatty acid composition results generally agreed to within 1 g/100 g.

3. Results

The results for moisture, fat content, and fatty acid composition, derived from foods selected for the 2005–2006 study are given in Table 1.

The results for fatty acid composition of margarines, table spreads, blends, and butters in 1998 (Lake et al., 1998) (analysed using the same analytical method as this survey) are given in Table 2.

4. Discussion

TFA levels in the selection of New Zealand-made foods sampled were on average below 10 g/100 g fatty acids (under 3.5 g/100 g product). Taken together these results suggest that partially hydrogenated fats are sparingly used by the food manufacturing and baking industries in New Zealand. For some products e.g. the partially cooked chips/wedges that claimed to be cooked in animal fat, and the pies, there will be a contribution from naturally occurring TFA. Up to 5 g TFA/100 g fatty acids for ruminant meat and milk fat would be expected (Stender and Dyerberg, 2003). The *trans* fat content of the two snack bars analysed in 1995 (Lake and Thomson, 1996) was considerably higher (17.9% and 25%) than in the similar products analysed in the current survey. However, as only one of the products was identical in both surveys, comparative data are limited.

The TFA content of margarines and table spreads in New Zealand appears to have declined significantly over the past decade. In 1995 the mean margarine TFA content was 14.9 g/100 g fatty acids (Lake et al., 1996). In 1998 two separate groups of margarines could be identified, one having up to 1 g/100 g fatty acids TFA, and the other having a mean of 14.5 g/100 g fatty acids. Results from this 2006 survey, augmented by label data collated by Consumer (2005) magazine, indicate that the higher TFA content group of margarines have undergone a formulation change to reduce their TFA content to no more than 8 g/100 g fatty acids. Margarine products and formulations change regularly, but where products with the same brand name could be compared between the 1998 and 2006 information, the TFA content had declined by approximately half. Although comparisons cannot be made between brands, New Zealand table spread products appear to have lower TFA content than similar products available in U.S.A. (Mozaffarian et al., 2006).

A single sample of French fries from a national fast food chain analysed in this study had a low TFA content (0.3%). A nationally representative selection of 148 fast food outlets was sampled in New Zealand during 1998–1999 to analyse total fat and TFA content obtained from selected deep fat fryers (Morley-John et al., 2005). The study found that the TFA content of the fats had a range of 0.5–36.1% and that most outlets (82%) were using tallow-based products with a mean TFA content of 5.11%. Similar results were obtained from an Australian study where the major commercial fats used in Australia were palm oil and tallow (3% TFA) (Noakes and Nestel, 1994).

Previous studies in Australia and New Zealand have estimated the average daily intake of TFA to be between 2.7 and 5.1 g/day, with margarines making the greatest individual contribution (Mansour and Sinclair, 1993; Lake and Thomson, 1996). These levels are similar to those reported in U.K. (Institute of Food Science and Technology, 2004), but lower than the intake of TFA in the American diet, which was estimated to be 13.3 g/day in 1990 (Enig et al., 1990), falling to 5.8 g/day in 2003 (Food and Drug Administration, U.S.A., 2003). Since 2003, the Danish Government has prohibited the sale of foods containing >2% industrially produced TFA (Stender and Dyerberg, 2003). The Canadian and American Governments have ruled that TFA levels should be included on food labels from 2003 (Department of Health, Canada, 2003) and 2006, respectively (Food and Drug Administration, U.S.A., 2003). Currently there is no such legislation in Australia or New Zealand, although since 2006 the National Heart Foundation of New Zealand and the Australian National Heart Foundation has issued the 'Tick' as a stamp of approval on margarines and table spreads containing less than 1% TFA. New regulations regarding health claims for TFA and saturated fats are being considered for introduction in 2007 to encourage the food industry to develop healthier products and assist Australian and New Zealand consumers in making

Table 1
Analytical results for moisture and fat content and fatty acid composition (g/100 g of total fatty acids) for selected New Zealand foods 2006

Number of samples	Biscuits and cakes 11		Margarines/spreads 6		Chocolate 4		Snack bars 6		Pies and pastry 10		Partially cooked chips/wedges 3	
	Range	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)
Total *trans* content (g/100 g total fatty acids)	ND–3.5	1.1 (1.2)	2.7–6.9	5.3 (1.6)	ND–3.4	1.3 (1.5)	ND–0.8	0.5 (0.3)	2.1–7.1	4.3 (1.7)	0–5.2	2.9 (2.6)
Fat content (g/100 g)	15.8–27.6	21.1 (3.65)	58.9–72.1	64.9 (4.6)	28.0–36.5	32.9 (3.9)	0.5–20.5	12.8 (7.8)	9.0–22.7	16.8 (4.9)	3.5–4.5	3.8 (0.6)
Moisture content (g/100 g)	1.6–20.3	6.3 (6.7)	25.8–38.8	31.6 (4.4)	0.8–1.4	1.1 (0.3)	5.5–15.8	8.1 (3.9)	16.7–50.9	35.9 (12.0)	68.6–69.5	69.5 (1.0)
C6:0	ND–0.7	0.2 (0.3)	ND–0.7	0.3 (0.40	ND–0.4	0.2 (0.2)	ND–0.3	0.1 (0.2)	ND–0.3	ND (0.1)	–	ND
C8:0	ND–2.3	0.6 (0.8)	ND–0.7	0.2 (0.3)	ND–0.3	0.1 (0.1)	ND–3.6	2.5 (2.0)	ND–1.4	0.3 (0.4)	–	ND
C10:0	ND–2.3	0.8 (0.9)	ND–1.8	0.5 (0.8)	ND–0.7	0.5 (0.3)	0.1–4.1	2.5 (1.8)	ND–3.2	0.7 (1.0)	ND–0.2	0.1 (0.1)
C12:0	0.3–20.0	7.5 (8.8)	ND–2.3	0.8 (1.0)	0.5–0.8	0.7 (0.1)	0.2–43.9	25.2 (20.3)	0.4–4.4	1.3 (1.3)	ND–0.8	0.4 (0.4)
C13:0	–	ND	–	ND	ND–0.1	ND	–	ND	–	ND	–	ND
C14:0	0.9–9.4	5.1 (3.9)	0.3–7.3	2.4 (3.1)	0.4–3.2	2.3 (1.3)	1.0–19.1	11.4 (8.3)	3.5–14.3	5.2 (3.5)	ND–2.8	1.6 (1.4)
C14:1c	ND–0.6	0.1 (0.2)	ND–0.4	0.1 (0.2)	ND–0.2	0.1 (0.1)	–	ND	0.2–0.7	0.4 (0.1)	ND–0.4	0.2 (0.2)
C15:0	ND–0.9	0.2 (0.4)	ND–0.8	0.2 (0.3)	ND–0.3	0.2 (0.2)	–	ND	0.5–1.5	0.7 (0.3)	ND–0.6	0.3 (0.3)
C16:0	24.8–56.0	38.0 (8.9)	11.3–25.3	16.0 (6.0)	25.1–30.8	27.3 (2.4)	9.0–37.3	19.3 (11.7)	2.9–46.1	29.7 (11.8)	4.7–24.7	16.4 (10.4)
C16:1c	ND–2.1	0.4 (0.7)	ND–1.4	0.4 (0.5)	ND–0.6	0.2 (0.3)	ND–0.2	ND (0.1)	ND–2.5	1.5 (0.9)	0.2–2.7	1.6 (1.3)
C16:1t	ND–0.5	0.1 (0.2)	ND–0.4	0.1 (0.2)	ND–0.5	0.2 (0.2)	–	ND	ND–0.6	0.3 (0.3)	–	ND
C17:0	ND–0.9	0.2 (0.3)	ND–0.2	ND (0.1)	0.2–0.4	0.3 (0.1)	ND–0.2	ND (0.1)	ND–1.9	1.1 (0.7)	ND–0.8	0.3 (0.5)
C18:0	4.3–22.5	9.7 (6.7)	5.0–10.7	6.6 (2.1)	29.4–37.5	32.6 (3.6)	3.5–13.1	10.4 (4.2)	15.1–30.6	22.9 (4.9)	2.7–21.8	13.3 (9.7)
C18:1c (oleate)	1.8–41.0	28.6 (12.3)	31.3–50.1	42.1 (7.7)	29.3–32.3	30.5 (1.4)	1.9–45.1	18.5 (18.6)	14.5–46.8	28.8 (9.2)	37.7–64.2	49.3 (13.5)
C18:1t[a]	ND–3.0	0.9 (1.1)	1.6–6.9	4.9 (2.1)	ND–3.1	1.1 (1.4)	ND–0.8	0.4 (0.4)	1.7–6.5	3.7 (1.6)	ND–4.5	2.5 (2.3)
C18:1c (vaccenate)	ND–1.0	0.4 (0.5)	1.4–5.3	3.1 (1.3)	–	ND	–	ND	ND–1.4	0.2 (0.5)	–	ND
C18:2c	1.6–11.2	6.6 (3.4)	6.3–37.6	16.1 (10.1)	2.1–0 2.5	2.3 (0.2)	1.4–27.0	9.3 (9.9)	ND–5.1	2.1 (1.8)	2.1–18.9	9.2 (8.7)
C18:2t	ND–0.2	ND (0.1)	ND–0.5	0.1 (0.1)	ND–0.1	ND (0.1)	ND–0.4	0.1 (0.2)	ND–0.9	0.4 (0.3)	ND–0.7	0.4 (0.4)
C18:3c (gamma linolenate)	ND–0.2	ND (0.1)	–	ND	ND–0.3	0.2 (0.2)	ND–0.3	0.1 (0.1)	ND–1.3	0.3 (0.5)	0.6–8.4	3.8 (4.1)
C18:3c (linolenate)	ND–0.5	0.1 (0.2)	1.9–7.4	4.8 (2.5)	ND–0.4	0.1 (0.2)	ND–0.5	0.1 (0.2)	ND–1.0	0.2 (0.4)	–	ND
C18:3t[b]	–	ND	ND–0.9	0.2 (0.3)	–	ND	–	ND	–	ND	–	ND
C19:0	–	ND	–	ND	–	ND	–	ND	–	ND	–	ND
C20:0	ND–0.6	0.3 (0.2)	0.3–0.5	0.4 (0.1)	0.8–1.2	1.0 (0.2)	ND–0.5	0.2 (0.2)	ND–0.3	0.2 (0.1)	0.2–0.7	0.4 (0.3)
C20:1c	ND–0.1	ND	ND–0.8	0.3 (0.3)	ND–0.3	0.1 (0.1)	–	ND	–	ND	–	ND
C22:0	ND–0.2	ND (0.1)	ND–0.4	0.1 (0.1)	ND–0.2	0.1 (0.1)	–	ND	–	ND	ND–0.2	0.1 (0.1)

ND, not detected (detection limit 0.1 g/100 g fatty acids).
c = cis.
t = *trans*.
[a]Includes all C18:1 positional isomers.
[b]Includes c/c/t, c/t/c and t/c/c isomers.

Table 2
Analytical results for fatty acid composition (g/100 g of total fatty acids) of margarines, table spreads, blends, and butters in New Zealand 1998 (Lake et al., 1998)

Number of samples	Margarines and table spreads (low *trans*) 8		Margarines and table spreads 16		Margarine/butter blends 5		Butters 3	
	Range	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)
Total *trans* content (g/100 g total fatty acids)	ND–1.1	0.3 (0.5)	12.0–18.2	14.5 (1.8)	8.5–11.8	10.6 (1.6)	5.8–7.9	6.9 (1.0)
Fat content (g/100 g)	64.4–77.8	71.6 (5.0)	61.5–85.0	77.7 (7.2)	55.5–83.6	67.9 (13.1)	82.4–82.9	82.6 (0.3)
Moisture content (g/100 g)	20.2–32.2	25.2 (4.6)	15.0–38.3	20.2 (7.9)	15.3–41.6	28.7 (12.4)	15.5–15.8	15.7 (0.2)
C8:0	ND–0.3	0.1 (0.1)	ND	ND	0.2–0.4	0.3 (0.1)	0.4–0.8	0.7 (0.2)
C10:0	ND–0.4	0.2 (0.1)	ND–0.1	ND	0.6–1.4	1.0 (0.3)	1.4–2.0	1.7 (0.3)
C12:0	1.9–5.9	4.2 (1.1)	ND–1.0	0.3 (0.3)	1.4–2.2	1.7 (0.4)	2.1–3.2	2.5 (0.6)
C14:0	1.2–2.1	1.7 (0.3)	ND–0.5	0.3 (0.2)	4.2–6.4	5.4 (0.8)	7.9–11.2	9.4 (1.7)
C14:1c	ND	ND	ND	ND	0.2–0.5	0.4 (0.1)	0.5–0.7	0.6 (0.1)
C15:0	ND	ND	ND	ND	0.5–0.6	0.6 (0.1)	1.0–1.2	1.1 (0.1)
C16:0	10.2–12.0	11.1 (0.7)	9.4–14.1	12.1 (1.4)	20.7–24.5	22.4 (1.6)	28.6–36.5	31.8 (4.2)
C16:1c	ND–0.3	0.1 (0.1)	ND–0.2	0.1 (0.1)	0.1–1.0	0.7 (0.3)	1.6–2.0	1.8 (0.2)
C17:0	ND–0.1	ND	ND–0.1	0.1 (0.1)	0.4–0.4	0.4 (0.0)	0.7–0.9	0.8 (0.1)
C18:0	7.3–9.2	8.3 (0.6)	4.4–7.7	5.7 (0.9)	7.8–9.9	9.0 (0.9)	13.1–17.0	15.1 (1.9)
C18:1c[a,b]	27.2–56.4	35.8 (10.6)	20.2–46.0	25.2 (8.1)	20.3–37.8	26.9 (7.9)	22.3–27.9	24.9 (2.8)
C18:1t[b]	ND–0.3	0.1 (0.1)	9.6–15.8	12.3 (1.8)	5.9–9.5	8.3 (1.6)	4.5–6.1	5.2 (0.8)
C18:2c	10.5–41.9	32.7 (12.1)	19.0–43.8	37.5 (6.7)	10.1–21.5	17.7 (4.8)	1.2–1.3	1.3 (0.1)
C18:2t	ND–0.4	0.1 (0.1)	0.6–1.7	1.3 (0.3)	1.1–1.9	1.6 (0.3)	1.3–1.9	1.7 (0.3)
C18:3c[c,d]	2.2–5.2	2.8 (1.0)	0.2–4.2	1.8 (1.1)	1.2–3.4	2.0 (0.8)	1.1–1.2	1.1 (0.1)
C18:3t	ND–0.6	0.1 (0.3)	0.3–2.1	0.8 (0.5)	0.2–1.6	0.7 (0.5)	ND	ND
C20:0, C22:0, C24:0	0.5–1.2	1.0 (0.2)	0.4–1.2	1.0 (0.2)	0.2–0.8	0.6 (0.2)	ND–0.4	0.2 (0.2)
Others	ND–4.1	1.7 (1.4)	0.1–3.9	1.6 (1.2)	0.0–0.7	0.2 (0.3)	0	0

ND, not detected (detection limit 0.1 g/100 g fatty acids).
c = cis.
t = *trans*.
[a]Includes methyl oleate and methyl vaccenate.
[b]Includes all C18:1 positional isomers.
[c]Includes c/c/t, c/t/c and t/c/c isomers.
[d]Includes methyl gamma linolenate and methyl linolenate.

food choices (http://www.foodstandards.gov.au/newsroom/factsheets/factsheets2006/transfattyacids24oct3388.cfm). The health claim proposed is that food 'low in TFA and saturated fat can reduce the risk of heart disease'.

Comparisons with earlier results need to be made cautiously, as all the surveys include only a subset of the wide variety of products on the market. Additionally, analytical methods for determining TFA levels in foods may differ between surveys. Declines in the TFA content of New Zealand foods between 1995, 1998 and the present 2006 survey are, however, suggested by results for snack bars, margarines/table spreads, and butter/vegetable oils blends. Consequently, it seems reasonable to conclude that the intake of TFA by New Zealanders has also declined over the same period. Nevertheless, it is desirable that the intake of TFA should be managed or reduced as part of a public health strategy to reduce fat intake in general.

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