NSW Food Authority

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Trans fatty acids survey

May 2008

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Trans fatty acids survey

A survey to determine the level of *trans* fatty acids in a range of Australian processed and takeaway foods

May 2008

This report should be read in conjunction with the Food Standards Australia New Zealand review report entitled
"TRANS FATTY ACIDS IN THE NEW ZEALAND AND AUSTRALIAN FOOD SUPPLY"

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Executive summary

There is evidence that *trans* fatty acids (TFA) increase low-density lipoprotein ('bad') cholesterol and decrease high-density lipoprotein ('good') cholesterol. These are known risk factors for chronic heart disease. However there is less evidence of a clear linkage between TFA and the risk of heart disease.

Some international agencies recently introduced regulatory risk management strategies to address the issue of TFA in the food supply. In 2006, the US Food and Drug Administration mandated TFA labelling in the nutrition information panel, whilst in 2004, Denmark introduced a limit of not more than 2 g of TFA per 100 g of fats or oil in the product as sold to the final consumer, with some exemptions for animal fats. In Australia and New Zealand, manufacturers are not required to label TFA unless nutrient content claims are made about the cholesterol content or fatty acid profile of the food.

The aim of the survey was to determine the proportion of TFA in a representative range of Australian processed and takeaway foods. During 2005, a total of 250 samples from a range of different food categories were tested for TFA. The range of food categories included in the survey consists of: takeaway foods, dairy products, eggs, soy milk, meat products, fish, bakery products, fats and oils; pasta and snack foods.

Of the 250 food products tested, one brand of donuts had the highest concentration of TFA at 28.6%. Quiche, takeaway potato chips, sausage rolls and a range of shelf stable cakes also had very high concentrations of TFA at 10.2, 9.9, 9.8 respectively and an average of 9.6%. However the results showed that overall, concentrations of TFA in a range of processed and takeaway foods were relatively low. A majority of products tested (65%) had undetectable level of TFA or TFA concentrations below 2%.

In late 2006 and early 2007, eleven products were re-tested and there appeared to be a reduction in the TFA content over time, except for one edible oil spread and donuts sample.

Overall, 63% of products from both surveys had undetectable level of TFA or TFA concentrations below the 2% legal limit introduced in Denmark in 2004. Omitting those products which are known to contain naturally occurring *trans* fatty acids or have the potential to include ingredients containing TFA, the level of compliance against the Danish legal limit would increase to approximately 87%.

The survey results were provided to Food Standards Australia New Zealand (FSANZ) for their review of TFA in the Australian and New Zealand food supply. FSANZ's assessment, the report for which is available at www.foodstandards.gov.au, showed that the contribution of TFA to energy intakes of Australians was comparable to, or lower than, estimates of intakes from other countries and below the recommendation of the World Health Organization of 1%. FSANZ advised that a national non-regulatory approach to reduce levels of TFA in foods would be the most appropriate risk management strategy.

In early 2009, FSANZ will commence a review of the outcome of non-regulatory measures to reduce TFA in the food supply and assess the need to consider regulatory action commensurate with the ongoing risk posed by TFA intakes. To support this review, the NSW Food Authority will conduct another survey of TFA levels in food commencing in the latter part of 2008.

Introduction

Fatty acids can be classified according to the number of double bonds in the molecule's carbon chain. 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. Unlike the common *cis* fatty acid form which has hydrogen atoms attached to the carbons on the same side of the double bond causing the molecule to bend, *trans* fatty acids (TFA) have hydrogen atoms attached to the carbons on opposite sides of the double bond (Figure 1) (IFST, 2007). *Trans* fatty acid molecules stay straight at the double bond and thus behave biologically like saturated rather than unsaturated fatty acids. There is evidence that TFA increase low-density lipoprotein ('bad') cholesterol and decrease high-density lipoprotein ('good') cholesterol. Increases in bad cholesterol and decreases in good cholesterol are strongly associated with an increased risk for coronary heart disease (EFSA, 2004; Stender & Dyerberg, 2003; US FDA, 2005).

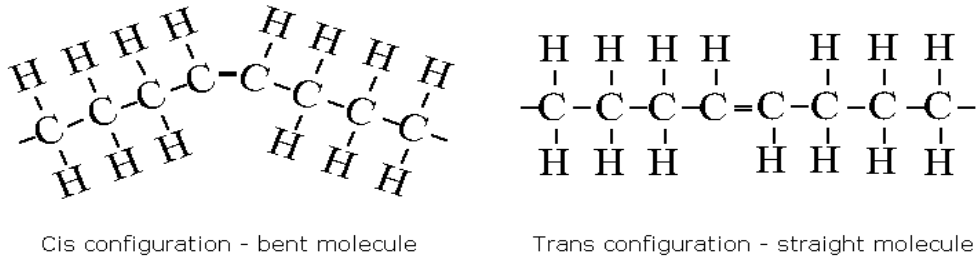

Figure 1: Structure of a *cis* and *trans* fatty acid molecule

Trans fatty acids originate from several sources. *Trans* fatty acids are formed naturally by bacteria in the first stomach of ruminant animals such as cows and sheep and are present in the milk and meat of these animals (Sommerfeld, 1983). The latest reports stated that moderate intake of naturally-occuring *trans* fatty acids have neutral effects on plasma lipids and are perfectly safe as part of a healthy diet (Motard-Belanger *et al*, 2008 & Chardigny *et al*, 2008).

Trans fatty acids are also formed when vegetable oils high in polyunsaturated fatty acids are converted into solid fats; a process known as partial hydrogenation. TFA which are derived from foods containing hydrogenated or 'hardened' fats can be found in cakes and biscuits and other processed foods, and in takeaway meals. *Trans* fatty acids can also be formed during heating and frying of oils at extreme temperatures (EFSA, 2004; IFST, 2007; Stender & Dyerberg, 2003).

Reductions in TFA can be achieved by modifying the conditions during the hydrogenation process or by using interesterification. There is clear evidence that in the United Kingdom and elsewhere in Europe, industry has responded positively to various recommendations to reduce levels of TFA. Reductions have been effected in major brands of margarine in the United Kingdom. For example, some soft margarines had 8-12% TFA in 1994 and now have less than 1% (IFST, 2007). Levels of TFA in Australian-branded margarines are also reportedly low, although some may still contain 5-8% TFA. The Australian Consumers' Association has conducted a limited survey to estimate the amount of TFA in our foods, however it is unknown whether Australia has had a similar reduction in TFA to that in Europe (Choice, 2005).

In January 2004, the Danish food authorities adopted legislation which introduced a limit of not more than 2 g of TFA per 100 g of fats or oil in the food product as sold to the final consumer, with some exemptions for animal fats (Danish Ministry of Food Agriculture and Fisheries,

2008). No other country has regulated such a limit. In July 2003, the US Food and Drug Administration issued a regulation requiring manufacturers to list TFA on the nutrition label of foods and some dietary supplements. This regulation took effect on 1 January 2006 (US FDA, 2003).

In Australia, under the current Australia New Zealand Food Standards Code, manufacturers are not required to label TFA unless a nutrient content claim is made on the packaging about cholesterol, SFA, MUFA, PUFA, TFA, or omega-3, omega-6 or omega-9 fatty acids. Voluntary labelling of TFA is permitted and many margarine and edible oil spread manufacturers in Australia and New Zealand do voluntarily label their products.

The aim of the survey on TFA was to determine the proportion of TFA in a representative range of Australian processed and takeaway foods. The survey results were provided to FSANZ for their review of TFA in the Australian and New Zealand food supply. The purpose of the FSANZ review was to estimate dietary intakes of TFA for the Australian and New Zealand populations, and to advise on appropriate risk management strategies to address the issue of TFA in the food supply. FSANZ's assessment, the report for which is available at www.foodstandards.gov.au, showed that the contribution of TFA to energy intakes of Australians was comparable to, or lower than, estimates of intakes from other countries and below the recommendation of the World Health Organization of 1%. FSANZ advised that a national non-regulatory approach to reduce levels of TFA in foods would be the most appropriate risk management strategy.

Materials and methods

In May to October 2005, a total of 250 samples from different food categories were tested for TFA. Samples were collected from a range of supermarkets and takeaway shops. Products from a range of different food categories were included in the survey:

- Dairy products eg milk, cream, yoghurt, cheese and ice cream
- Meat and meat products eg beef, lamb, chicken, bacon, meat pies, sausage rolls, fish and eggs
- Soy milk
- Bakery products eg bread, croissants, donuts, pastry, quiche, custard Danish, sweet and savoury biscuits and chocolate cake
- Takeaway foods eg hamburgers, potato chips, pizza and fried fish
- Fats and oils
- Confectionery
- Pasta
- Snack foods eg muesli bars, potato crisps, corn chips and chocolate

Five different products from each of the food categories were tested. The exception to this was takeaway foods and the oil used to deep-fry takeaway potato chips. Five samples of each of the takeaway foods and oils were tested and their results are reported as an average of the five samples.

In November 2006 to March 2007, additional analyses of 114 samples from twelve different categories were undertaken. Eleven foods previously known to contain a high level of TFA were tested again to determine whether there had been any change in the TFA levels over time. Products tested include:

- Takeaway foods eg potato chips and chicken nuggets
- Processed foods eg frozen chips, frozen chicken nuggets and frozen fish products (cooked before testing)
- Snack foods eg rice crackers, potato crisps
- Bakery products eg donuts, biscuit and shelf-stable cakes (excluding those with milk or butter as part of the ingredients)
- Fats and oils eg margarine and salad dressings

Tests were conducted by the General Chemistry Laboratory at the Division of Analytical Laboratories (DAL) in Lidcombe. The *trans* fatty acids were quantified using a DAL in-house method, based on AOCS method Ce 1f-96. Natural fats, whether from animal or vegetable sources, are triglycerides. Triglycerides are saponified by methanolic potassium hydroxide to liberate fatty acids which then are esterified in the presence of boron trifluoride to produce fatty acids methyl esters. Methyl esters of fatty acids that have 4 – 24 carbon atoms are separated, identified (using reference standard) and determined by gas chromatography (pers. Comm., DAL). The total percentage of *trans* fatty acids are the sum of C18:1t; C18:2t; C18:3t fatty acids of the total fatty acids in the sample. The detection limit of this method is 0.1%.

Results

2005

Products with no detectable levels of TFA (Limit of Detection is 0.1%)

Of the foods tested, 39 (19.3%) did not contain any detectable levels of TFA (Table 1A). These products included:

- Milk
- Yoghurt
- Beef
- Fish
- Soy milk
- Takeaway, burger
- Pasta
- Bread
- Donuts
- Muesli bars

Products with less than 2% TFA

133 (46%) of foods had TFA concentrations below the 2% legal limit that was introduced in Denmark in 2004 (Table 2A). Products from the following food categories had TFA concentrations less than 2%:

- Ice-cream*
- Beef*
- Sausages*
- Lamb*
- Chicken
- Bacon
- Fish
- Meat pies*
- Quiche*
- Eggs
- Takeaway burger and fish fillet
- Sweet and savoury biscuits
- Croissants
- Donuts
- Pastry
- Potato crisps
- Corn chips
- Chocolate
- Fats and oils

Products with greater than 2% TFA

TFA levels above 2% were found in 70 (34.7%) food products (Table 3A). However, 46% of these products were derived from ruminant fats (eg cheese, cream). Such products would be excluded from the 2% limit imposed in Denmark. A number of other products such as sausage rolls and quiche also include naturally occuring TFA from animal fats, as well as TFA from hydrogenated fats. The analyses in this survey did not differentiate between naturally occuring TFA, and TFA derived from hydrogenated fats.

Products from the following food categories had TFA concentrations greater than 2%:

- Milk*
- Cream*
- Yoghurt*
- Cheese*
- Ice-cream*
- Beef*
- Lamb*
- Fish
- Meat pies*
- Sausage rolls*
- Quiche*
- Takeaway potato chips
- Pasta
- Sweet biscuits
- Croissants
- Donuts
- Pastry
- Custard Danish
- Potato crisps
- Fats and oils

* Product likely to contain natural *trans* fatty acids

One donut sample had the highest concentration of TFA at 23.5%. Other products that had very high concentrations of TFA included quiche at 10.2%, takeaway potato chips at 9.9%, and sausage rolls at 9.8%.

2006/07

Products with no detectable levels of TFA (Limit of Detection is 0.1%)

Of the foods tested, 14 (16.2%) did not contain any detectable levels of TFA (Table 1B). These products were from the following food categories:

- Rice snacks
- Potato crisps
- Margarine
- Potato chips
- Donuts batter

Products with less than 2% TFA

36 (41.9%) products had TFA concentrations below the 2% (Table 2B). These products included:

- Rice snacks
- Potato crisps
- Crackers
- Salad dressings
- Margarine
- Potato chips
- Chicken nuggets
- Donuts

Products with greater than 2% TFA

TFA levels above 2% were found in 36 (41.9%) food products (Table 3B). None of these products contain ruminant fats and it would be expected that the TFA originated from hydrogenated fats. Products from the following food categories had TFA concentrations greater than 2%:

- Potato crisps
- Biscuits
- Margarine
- Shelf stable cakes
- Potato chips
- Chicken nuggets
- Donuts
- Processed fish

Again, a donut sample had the highest concentration of TFA at an average of 28.6 ± 5.4%. Other products that had very high concentrations of TFA included another donut sample (average of 8.9%) and samples of shelf stable cakes with an average of 9.6% (range from 2.9 to 23.5%).

The number of products containing TFA at the level of greater than 2% were higher in 2006/07 than in 2005 as the latter survey was targetted to test foods that were previously found to contain higher level of fats.

Risk management strategies to reduce levels of TFA in foods

FSANZ's report on TFA in the New Zealand and Australian food supply advised that at this time, a national non-regulatory approach to reduce levels of TFA in foods would be the most appropriate risk management strategy. This has resulted in the establishment of the Australia New Zealand Collaboration on Trans Fats and the Quick Service Restaurant Roundtable. A follow-up national survey is proposed to be conducted in 2008/09 to assess the effectiveness of the non-regulatory initiatives that have been implemented. If sufficient progress is not made to reduce levels of TFA in foods, regulatory action will be considered.

Change in fatty acid profile in selected food products from 2005 to 2006/07

Eleven foods previously known to contain a high level of TFA from the 2005 survey were selected for testing again in 2006/07 (Table 4A).

There was a reduction in the concentration of TFA in potato crisps from 2005 to 2006/07 (range from 45.5% to 78% reduction). No apparent trends in changes to the concentration of SFA, MUFA or PUFA were observed. A complete assessment of the change in fatty acid profile over time was not possible as some data were not available for two of the four potato crisp varieties that were tested in 2006/07.

There was a reduction in the total fat content and TFA concentration of takeaway potato chips from 2005 to 2006/07. However, a slight increase is noticed in the SFA and MUFA content, 2.9% and 4.3% respectively. The non-chocolate cream biscuit also showed a significant reduction in its TFA content.

Four of the edible oil spreads were also re-tested and a reduction of TFA in three of the products was observed (range from 30 to 100% reduction) with only a slight increase in the SFA content. One oil spread did show a 57% increase in TFA and 11.3% increase in SFA despite a reduction in total fat content (reduced by 12%). It is important to remember that the fatty acid content is calculated per 100g of total fat in foods, which means that reduction in total fat might in fact increase the percentage of the fatty acids.

One donut product was re-tested and showed no change in total fat content, although an increase in the concentration of TFA was noticed as well as a decrease in the SFA, MUFA and PUFA content.

Conclusions

The results of the survey showed that TFA concentrations in Australian processed and takeaway foods were generally low. Overall, approximately 63% of products from both surveys had undetectable level of TFA or TFA concentrations below the 2% legal limit introduced in Denmark in 2004. Omitting those products which are known to contain naturally occurring *trans* fatty acids, just over 82% of products would be below the Danish legal limit. If a further assessment on the products based on potential use of ingredients containing TFA, the level of compliance against the Danish legal limit would further increase to approximately 87%.

One brand of donuts had the highest concentration of TFA at 28.6%. Quiche, takeaway potato chips, sausage rolls and a range of shelf stable cakes also had very high concentrations of TFA at 10.2, 9.9, 9.8 respectively and an average of 9.6%.

Of the products with TFA concentrations greater than 2%, 46% were products derived from ruminant fats and naturally contain TFA.

Eleven products that were tested in both parts of the surveys show a reduction in the TFA content over time, except for one of the edible oil spreads and a donut sample.

The survey results were provided to FSANZ for their review of TFA in the New Zealand and Australian food supply. FSANZ's assessment, the report for which is available at www.foodstandards.gov.au, showed that the contribution of TFA to energy intakes of Australians was comparable to, or lower than, estimates of intakes from other countries and below the recommendation of the World Health Organization of 1%.

In early 2009, FSANZ will commence a review of the outcome of non-regulatory measures to reduce TFA in the food supply and assess the need to consider regulatory action commensurate with the ongoing risk posed by TFA intakes. To support this review, the NSW Food Authority will conduct another survey of TFA levels in food commencing in the latter part of 2008.

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Appendix

For Tables 1A-4A the percentage of TFA in the product is calculated from determining the g of trans fats / 100 g of total fats or oil in the product.

***Table 1A: Food products with no detectable level of TFA* (LOD 0.1%) in 2005**

Beef steak - trimmed external fat	Canned tuna in brine	Pasta
Beef steak - trimmed external fat	Donuts	Soy milk (full fat)
Bread, white (w/ omega)	Milk full fat	Soy milk (full fat)
Bread, white (w/ omega)	Milk full fat	Soy milk (full fat)
Bread, white (w/ omega)	Milk, flavoured	Soy milk (full fat)
Bread, white (w/ omega)	Muesli bars	Soy milk (full fat)
Bread, white (w/ omega)	Muesli bars	Take-away chicken burger[1]
Canned pink salmon in brine	Muesli bars	White fish fillets
Canned pink salmon in brine	Muesli bars	White fish fillets
Canned tuna in brine	Muesli bars	White fish fillets
Canned tuna in brine	Pasta	White fish fillets
Canned tuna in brine	Pasta	Yoghurt fruit (full fat)
Canned tuna in brine	Pasta	Yoghurt fruit (full fat)

[1] Mean value of five analyses

***Table 1B: Food products with no detectable levels of TFA* (LOD 0.1%) in 2006/07**

Donut batter	Potato crisps	Rice cracker
Margarine	Potato crisps	Rice cracker
Frozen potato chips	Potato crisps	Rice cracker
Frozen potato chips	Rice cracker	Rice cracker
Frozen potato chips	Rice cracker	

Table 2A: Food products with less than 2% trans fatty acids in 2005

Product name	%TFA per total fat	Product name	%TFA per total fat
Olive oil	0.21	Bacon (rind removed)	0.98
Olive oil	0.22	Chicken thighs	1.01
Olive oil	0.22	Bacon (rind removed)	1.04
Olive oil	0.22	Bacon (rind removed)	1.06
Olive oil	0.22	Shortbread biscuits	1.06
Chocolate	0.27	Chocolate cake	1.10
Margarine, regular non olive oil based	0.28	Potato crisps, plain	1.12
Margarine, regular non olive oil based	0.29	Eggs	1.15
Chocolate	0.30	Ice-cream	1.15
Chocolate	0.32	Chocolate cake	1.16
Chocolate biscuits	0.33	Chicken thighs	1.18
Chocolate	0.34	Eggs	1.18
Chocolate	0.34	Bacon (rind removed)	1.19
Chocolate biscuits	0.36	Cream biscuit (non-chocolate)	1.20
Chocolate biscuits	0.36	Corn chips	1.21
Savoury biscuits	0.37	Chocolate cake	1.24
Biscuits	0.37	Chicken thighs	1.27
Corn chips	0.40	Lamb chops (tail removed)	1.27
Savoury biscuits	0.40	Eggs	1.30
Cream biscuit (non-chocolate)	0.41	Chicken thighs	1.32
Shortcrust pastry	0.41	Shortbread biscuits	1.34
Cream biscuit (non-chocolate)	0.41	Beef mince	1.39
Margarine, regular non olive oil based	0.43	Beef mince	1.40
Beef sausages	0.45	Beef mince	1.47
Chocolate biscuits	0.46	Chicken thighs	1.47
Chocolate cake	0.48	Canned pink salmon in brine	1.52
Take-away beef burger[1]	0.49	Cream biscuit (non-chocolate)	1.52
Donuts	0.62	Beef sausages	1.54
Canola oil	0.65	Meat pies	1.55
Canola oil	0.65	Croissant	1.63
Canola oil	0.65	Beef mince	1.64
Canola oil	0.65	Ice-cream	1.64
Corn chips	0.70	Quiche	1.65
Corn chips	0.70	Savoury biscuits	1.67
Canola oil	0.76	Chocolate cake	1.68
Shortbread biscuits	0.78	Beef sausages	1.69
Savoury biscuits	0.82	Shortcrust pastry	1.77
Take-away beef burger[1]	0.83	Croissant	1.79
Take-away frying oil[1]	0.84	Take-away beef burger[1]	1.79
Take-away frying oil[1]	0.84	Take-away fried fish[1]	1.83
Corn chips	0.86	Custard Danish	1.87
Bacon (rind removed)	0.87	Ice-cream	1.92
Savoury biscuits	0.90	Beef sausages	1.93
Donuts	0.92	Take-away beef burger[1]	1.94
Shortbread biscuits	0.96	Beef sausages	1.96
Eggs	0.97	Quiche	1.98
Shortbread biscuits	0.98		

[1] Mean value of five analyses

Table 2B: Food products with less than 2% trans fatty acids in 2006/07

Product name	%TFA per total fat	Product name	%TFA per total fat
Margarine	0.14	Chicken nuggets	0.90
Salad dressing	0.14	Chicken nuggets	0.98
Margarine	0.28	Potato crisps	0.98
Salad dressing	0.29	Potato crisps	1.14
Chicken flavoured snacks	0.32	Frozen potato chips	1.15
Snack	0.35	Potato crisps	1.17
Cheese flavoured snacks	0.38	Potato crisps	1.31
Crackers	0.40	Frozen potato chips	1.33
Crackers	0.43	Chicken nuggets	1.38
Shelf stable cakes	0.46	Potato crisps	1.47
Chicken nuggets	0.51	Rice products	1.49
Chicken nuggets	0.54	Rice crackers	1.49
Chicken nuggets	0.55	Frozen potato chips	1.75
Potato crisps	0.58	Take-away potato chips[1]	1.76
Margarine	0.82	Potato crisps	1.76
Salad dressing	0.85	Take-away chicken nuggets[1]	1.87
Chicken nuggets	0.87	Frozen potato chips	1.89
Potato crisps	0.87	Frozen potato chips	1.99

Table 3A: Food products with trans fatty acids greater than 2% in 2005

Product name	%TFA per total fat	Product name	%TFA per total fat
Cream (full fat)	2.02	Canned pink salmon in brine	2.33
Ice-cream	2.03	Cheese	2.33
Custard Danish	2.05	Eggs	2.38
Ice-cream	2.05	Lamb chops (tail removed)	2.38
Custard Danish	2.07	Beef steak - trimmed external fat	2.44
Canned pink salmon in brine	2.08	Cream (full fat)	2.45
Milk full fat	2.08	Take-away potato chips[1]	2.47
Croissant	2.09	Milk full fat	2.50
Beef mince	2.13	Milk full fat	2.50
Cheese	2.13	Yoghurt fruit (full fat)	2.50
Croissant	2.13	Beef steak - trimmed external fat	2.56
Lamb chops (tail removed)	2.13	Milk, flavoured	2.56
Cheese	2.14	Take-away pizza[1]	2.59
Custard Danish	2.21	Lamb chops (tail removed)	2.61
Cream (full fat)	2.22	Cream (full fat)	2.63
Cheese	2.22	Custard Danish	2.67
Cream (full fat)	2.23	Potato crisps, plain	2.70
Cheese	2.27	White fish fillets	2.70
Beef steak - trimmed external fat	2.27	Meat pies	2.84
Milk, flavoured	2.86	Potato crisps, plain	4.32
Milk, flavoured	2.86	Pasta	4.35
Yoghurt fruit (full fat)	2.86	Sausage rolls	4.44
Croissant	3.03	Lamb chops (tail removed)	4.69

[1] Mean value of five analyses

Product name	%TFA per total fat	Product name	%TFA per total fat
Margarine, regular non olive oil based	3.17	Shortcrust pastry	5.29
Quiche	3.24	Potato crisps, plain	5.90
Meat pies	3.36	Shortcrust pastry	6.36
Meat pies	3.40	Take-away frying oil[1]	6.68
Milk, flavoured	3.45	Cream biscuit (non-chocolate)	7.07
Margarine, regular non olive oil based	3.72	Take-away potato chips[1]	7.35
Yoghurt fruit (full fat)	3.85	Sausage rolls	7.75
Quiche	4.02	Sausage rolls	7.87
Meat pies	4.03	Donuts	8.43
Potato crisps, plain	4.13	Sausage rolls	9.80
Shortcrust pastry	4.21	Quiche	10.24
Sausage rolls	4.29	Donuts	23.53

Table 3B: Food products with trans fatty acids greater than 2% in 2006/07

Product name	%TFA per total fat	Product name	%TFA per total fat
Potato crisps	2.03	Donuts	4.08
Take-away potato chips[1]	2.15	Frozen fish	4.35
Frozen potato chips	2.22	Potato crisps	4.38
Frozen potato chips	2.35	Potato crisps	4.40
Frozen fish	2.42	Frozen fish	4.88
Frozen fish	2.86	Biscuits	5.08
Frozen potato chips	2.86	Margarine	5.82
Shelf stable cakes	2.90	Frozen potato chips	7.03
Take-away chicken nuggets[1]	3.10	Donuts	8.91
Frozen fish	3.45	Frozen fish	10.00
Shelf stable cakes	3.45	Shelf stable cakes	10.74
Frozen fish	3.53	Shelf stable cakes	12.00
Shelf stable cakes	3.56	Shelf stable cakes	12.50
Frozen fish	3.60	Shelf stable cakes	14.15
Frozen fish	3.77	Potato crisps	16.89
Frozen fish	3.85	Donut batter	21.54
Frozen fish	4.00	Shelf stable cakes	23.47
Shelf stable cakes	4.02	Donuts	28.59

[1] Mean value of five analyses

Table 4A: Total fat and fatty acid content (% variation) in potato crisps, takeaway potato chips and donuts from 2005 to 2006/07

Product	Total fat[1]	TFA[2]	SFA[2]	MUFA[2]	PUFA[2]
Potato crisps, product a	-7.3	-72.1	2.0	-	-
Potato crisps, product b	1.5	-78.0	-30.4	42.9	29.1
Potato crisps, product c	-0.3	-78.0	2.9	6.5	-58.9
Potato crisps, product d	-3.1	-45.5	-1.3	-	-
Takeaway potato chips, product a	-16.9	-70.8	2.9	4.3	-5.8
Edible oil spread, product a	-11.7	56.8	11.3	-	-
Edible oil spread, product b	1.7	-66.7	12.7	-3.0	-5.1
Edible oil spread, product c	1.9	-30.0	5.9	-0.6	-4.0
Edible oil spread, product d	2.4	-100	3.7	2.9	-4.0
Biscuit, cream, non chocolate, product a	-0.5	-28.2	9.8	-	-
Donuts, product 4	0	21.7	-5.1	-37.3	-51.3

[1] g per 100 g of food
[2] g per 100 g of total fat

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