Trans Fatty Acid Survey of Fast Foods in Ireland

(2008)

Executive Summary

Trans fatty acids (TFA) are the geometrical isomers of monounsaturated (MUFA) and polyunsaturated (PUFA) fatty acids having at least one non-conjugated, (interrupted by at least one methylene group), carbon-carbon double bond in the *trans* configuration rather than the more common *cis* configuration. The *trans* configuration has an effect on the functional and physiochemical properties of these fatty acids which in turn effects their metabolism in humans. High levels of TFA are a public health concern due to some evidence associating TFA with coronary heart disease (CHD). High levels of saturated fat (SAT) are also a concern given the priority in reducing SAT fat as a measure for reducing CHD risk in the Irish population.

In 2008, the Food Safety Authority of Ireland (FSAI) commissioned a study of the fat profiles of fast-foods sold on the Irish market. This study is reported here. One hundred and fifty samples of fast food were collected from 12 restaurants and analysed for total fat content and fatty acid profile including TFA. The samples comprised a cross-section of fast-food products which would be expected to contain industrial TFA (I-TFA) present as a result of the manufacturing processes or ingredients and those which would contain TFA from natural sources. However, the contribution naturally occurring TFA (i.e. from sources of animal origin) make to overall levels of TFA in fast-foods was not the focus of the current survey.

Similar to the findings of a previous FSAI survey examining levels of TFA in retail products, levels of TFA in fast-foods in Ireland were found to be low. 77% (115/150) of samples were low in TFA having $\leq$ 2% TFA as of percentage of total fat. Just over 23% (35/150) of fast-food products surveyed had high levels of TFA. Of the 23% of products with high levels of TFA, beef burgers products make up the highest proportion of this total with 60% (21/35) of the samples having greater than 2% TFA (as % of total Fat). However, the highest level of TFA was found in a portion of fish and chips which provided 0.6g of TFA per/100g or 4.8% of total fat. However, taken together the results of the current survey suggest that in majority of the products produced and prepared by fast-food outlets in Ireland the use of ingredients containing I-TFA has been modified, limited or reduced.

The low levels of TFA observed in the current survey corroborate industry commitments to reduce levels of TFA in fast-foods in Ireland. However, there are some indications that the industries efforts to reformulate fast-foods and reduce TFA levels may result in increased levels of SAT. Over 34% of surveyed products had high levels of SAT fat with some outlets having over half of their surveyed menus high in SAT fats. While industry efforts to reduce consumption of TFA are welcome, the increasing use of alternatives such as SAT fats is of concern.

For the majority of fast-food products in the current survey, some ingredients were of animal origin e.g. beef, lamb and cheese and as such it would be expected that a contribution to the total level of TFA would come from these sources in addition to I-TFA if present. However, it was not possible to calculate the relative contributions naturally occurring and I-TFA make to the recorded total levels of TFA in the current survey. As indicated in a previous FSAI survey, the current survey showed that it was not reliable to use TFA profiles to distinguish between naturally occurring TFA and I-TFA.

Many international fast-food chains in recent times have also indicated the removal or their intention to remove or limit TFA in products and in particular in cooking oils (e.g. hydrogenated oils) used in preparation of fast-foods. However, while some of the fast-food outlets make claims about the nature of the cooking oils they use specific details of cooking oils from the outlets surveyed was only available from one outlet.

Based on product weights from the current survey, portions of fast-foods from established national and international fast-food chains were often smaller than those from the more traditional chip-shop. The larger portion size of fast-foods from these traditional chip shops often resulted in high levels of TFA, SAT and total fat from these products per/portion in comparison to similar products from national and international fast-food chains. As such portion control is an important consideration in controlling intakes of TFA and other fat such as SAT in the Irish diet.

In conclusion the results of the survey indicate that in general low levels of TFA are present in the surveyed fast-food menu items. A high of 0.6 grams TFA per 100 grams of product was recorded, with the highest overall levels in burger products that contained cheese and onion rings. Lower levels ranging from 0.2 - 0.5 grams TFA per 100 grams of product were found in burgers with and without cheese, sausages, processed chicken, battered fish products, pizzas, fries, cheesecake, kebabs and breakfast sandwiches. Many products were found to contain either non detectable levels or levels at the reporting limit for TFA and these products included vegetable burgers and various desserts. However, levels of total fat and SAT fats in many surveyed products are high and public concerns over the health effects of TFA have become the focus of much debate while perhaps ignoring the public health issues concerning high levels of SAT and total fat in fast-food products.

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Abbreviations

Guideline Daily Amount(s)	GDA
Saturated Fatty Acids	SAT
Monounsaturated Fatty Acid(s)	MUFA
Polyunsaturated Fatty Acid(s)	PUFA
Trans Fatty Acid(s)	TFA
Industrial Trans Fatty Acid(s)	I-TFA
The European Food Safety Authority	EFSA
The Food Safety Authority of Ireland	FSAI
Low Density Lipoprotein Cholesterol	LDL-C
High Density Lipoprotein Cholesterol	HDL-C
Coronary Heart Disease	CHD
European Union	EU
World Health Organisation	WHO
Conjugated Linoleic Acid	CLA
Scientific Advisory Committee on Nutrition	SACN
Irish Heart Foundation	IHF
Confederation of the Food and Drink Industries	CIAA
Food and Drink Industry Ireland	FDII
Her Majesty's Stationery Office	HMSO
Irish Universities Nutrition Alliance	IUNA

Objective

To examine the fat profile of Irish fast-foods and to provide these data to the European Commission as part of their work on nutritional labelling legislation.

1. Background

Trans fatty acids (TFA) are the geometrical isomers of monounsaturated (MUFA) and polyunsaturated (PUFA) fatty acids having at least one non-conjugated, (interrupted by at least one methylene group), carbon-carbon double bond in the *trans* configuration rather than the more common *cis* configuration (Codex, 1985; Rogers et al., 2001; EFSA, 2004; Kodali, 2005). The *trans* configuration has an effect on the functional and physiochemical properties of these fatty acids which in turn effects their metabolism in humans. Further information on TFA is available in a previous FSAI report on TFA in retail products (FSAI, 2008).

2. Sample Preparation and Analysis

2.1 Sample Collection and Preparation

One hundred and fifty (n=150) fast-food menu items were collected from 12 Irish fast-food outlets and marked with a product description and FSAI code. No original product manufacturer labels were supplied. The samples were then packaged into insulated polystyrene boxes and transported under refrigeration to Bodycote Lawlabs in Birmingham, United Kingdom for analysis. The samples were defrosted and prepared for analysis by thoroughly blending in a laboratory food processor using an established procedure in the laboratory. Each prepared sample was then transferred into three separate sample pots and each of the pots were registered individually into the laboratory information management system, assigned a unique laboratory serial number, to match the product description and the FSAI code.

2.2 Sample Analysis

Each of the analyses for total fat and fatty acid profile was conducted using the following methods of analysis:

1. Determination of Total Fat in Foodstuffs By Nuclear Magnetic Resonance (NMR) using The CEM Smart Trac Rapid Fat Analysis System
2. The Characterisation of Cis and Trans Isomer and High Chain Length Fatty Acids in Foodstuffs by Gas Chromatographic Separation of Methyl Esters.

Individual fatty acids were detected at a concentration of 0.1% in the extracted fat, equating to a limit of quantification of 0.1g/100g. The laboratory Bodycote Lawlabs, LawLabs House, 121 Shady Lane, Great Barr, Birmingham B44 9ET) holds UKAS accreditation for the methods of analysis, UKAS Testing No. 0730 (Annex 1).

2.3 Quality Control Measures

Bodycote Health Science laboratories operate a unified quality control and assurance protocol to ensure that the results they produce are accurate and reliable. For the total fat procedure, each batch of twenty samples included an internal reference material that has been validated across the laboratories. In addition to this material a certified reference meat sample were analysed on a daily basis. For the fatty acid profile, a combination of validated internal reference fish oil and certified reference beef/pig oil was analysed with each batch of twenty samples. This ensured that the full range of fatty acids typically contained in food was monitored. In performing the analyses, all control results were within the validated tolerances for acceptance of the analytical sample results.

2.4 Results of Analysis

The results of analysis were provided to FSAI in the form of an Excel spread sheet. The average results were reported per product type to include the % total fat, the % SAT, the % cis-MUFA, the % trans-MUFA, the % cis-cis PUFA and the % cis-trans PUFA in the product and with respect to the categories of fatty acids, in the fat. The spread sheet also provided the raw data which includes the % of individual fatty acids in the fat of each product analysed.

3. Results and Discussion

3.1 Reporting of Results

As a basis for indicating high and low concentrations of total fat, SAT and TFA in the current report, the following classifications were used (CIAA, 2009; Danish Government, 2003; FDII, 2007; HMSO, 1991; IHF, 2007; Rayner et al., 2003; SACN, 2006 & 2007) However, the classifications are arbitrary and used only for reporting purposes in the current survey. Other classifications may be applied to the current data:

- **Low Fat** = Less than 50% of the 70g Guideline Daily Amount (GDA) for an average adult
- **High Fat** = Greater than 50% of the 70g GDA for an average adult
- **Low SAT** = Less than 50% of the 20g GDA for an average adult
- **High SAT** = Greater than 50% of the 20g GDA for an average adult
- **Low TFA** = $\leq$ 2% of total fat in the product
- **High TFA** = $\geq$ 2% of total fat in the product

Results were provided based on the following major fast-food categories:

- French Fries and Related Side Dishes
- Beef Burgers
- Chicken Burgers
- Chicken Products

- Vegetable and Fish Burgers
- Fish and Chips
- Kebabs
- Pizza
- Breakfast Products
- Desserts

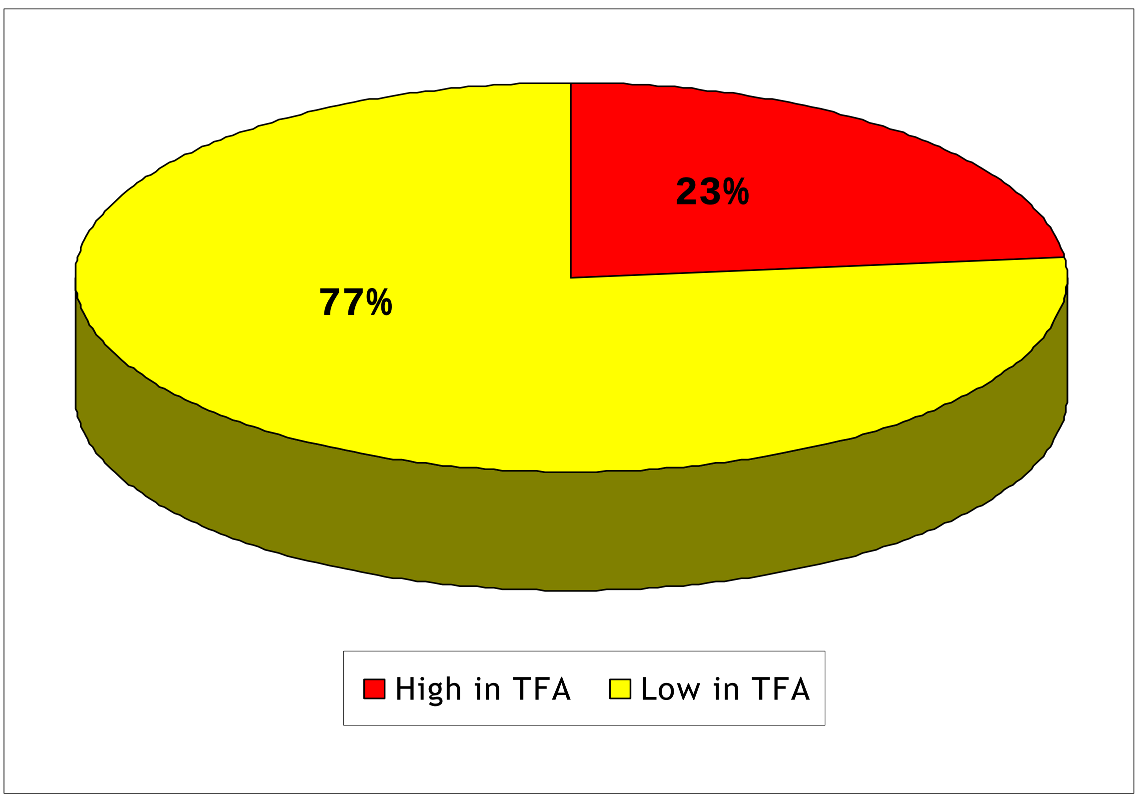
3.2 General Results

The results presented in this report relate solely to the individual products tested and do not necessarily reflect the general status of the products sampled. One hundred and fifty (n=150) fast-food menu items from 12 Irish fast-food outlets were analysed in triplicate for total fat content and fatty acid profile including TFA (Section 2.1). The samples comprised a cross-section of fast-food menu items which may contain I-TFA as a result of the manufacturing processes (e.g. fried food) or ingredients (e.g. hydrogenated oil) and those which would naturally contain TFA (e.g. dairy and meat products of ruminant animals).

3.2.1 Trans Fatty Acids

Results indicate that in general concentrations of TFA in surveyed fast-food menus items are low, with approximately 77% (115/150) of samples having ≤ 2% TFA as a percentage of total fat (Figure 1).

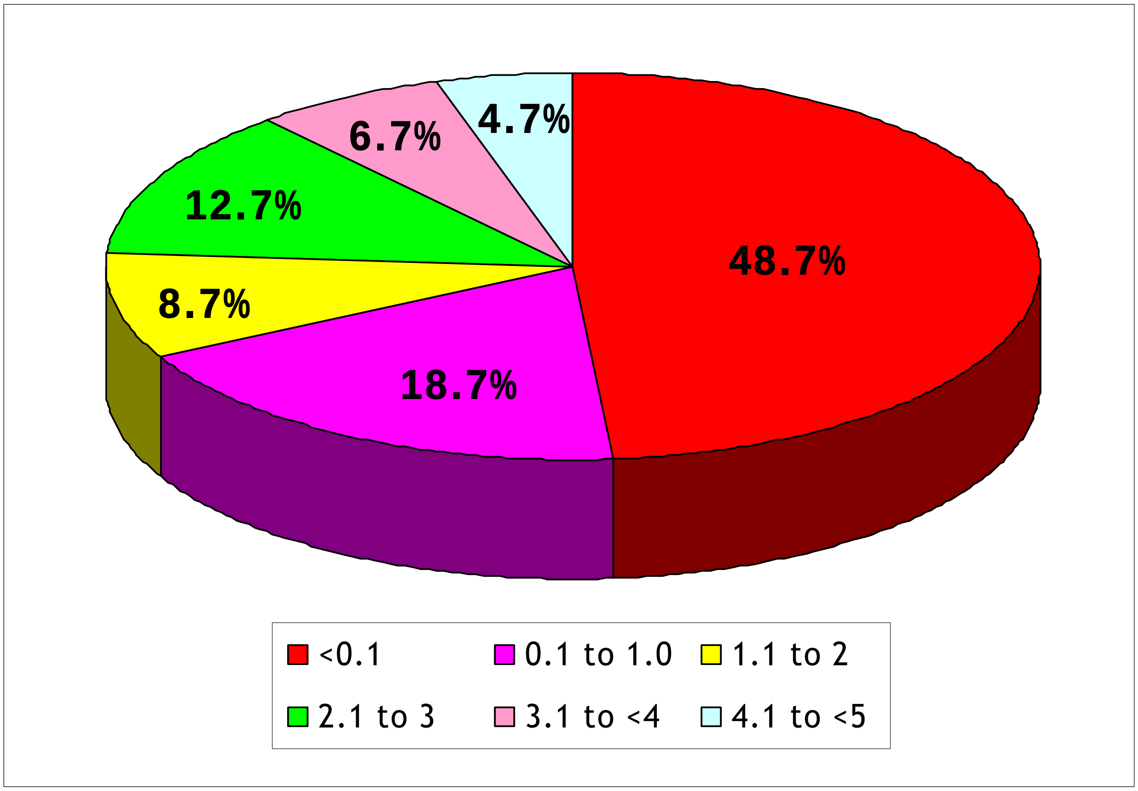
Figure 1 General Levels of TFA in Surveyed Fast-Food Menu Items [a]



[a] As a percentage of total fat Content

Twenty-three percent (35/150) of samples were high in TFA (i.e. ≥ 2% TFA as a percentage of total fat). However, the number of samples high in TFA (i.e. ≥ 2% TFA as a percentage of total fat) varied among the 12 fast-food outlets surveyed. Just under 49% of samples had < 0.1% TFA per/100g which was the limit of detection for TFA (Figure 2).

Figure 2 Specific Levels of TFA in Surveyed Fast-Food Menu Items [a]



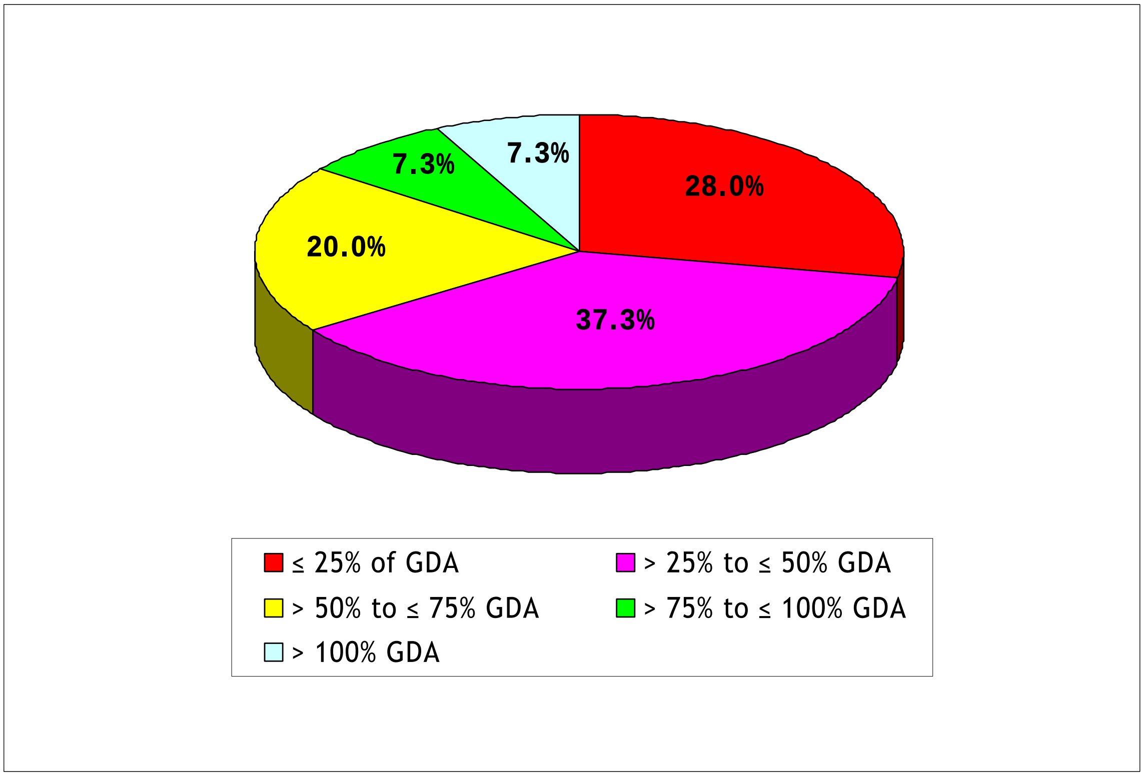
[a] As a Percentage of Total Fat

Of the six TFA isomers characterised the most commonly identified were Elaidic Acid (C18:1), Vaccenic Acid (C18:1), Palmitelaidic Acid (C16:1), Linolelaidic Acid (C18:2) and Brassidic Acid (C22:1). As in the previous survey of retail products (FSAI, 2008) Petroselaidic Acid was not isolated from any of the samples surveyed. While it is possible that intake of TFA from hydrogenated fats may be associated with increased risk of coronary heart disease (CHD), it is not yet clear how specific TFA isomers vary in their biological activity and mechanisms of action. Evidence suggests that TFA from different sources, as well as individual isomers within these subgroups, elicit differential biological effects, both favorable and adverse (Gebauer et al. 2007).

3.2.2 Saturated Fatty Acids

Levels of saturated fatty acids (SAT) were high (i.e. > 50% of the 20g GDA for an average adult) in 34.7% (52/150) of samples on per/portion basis (Figure 3). However, on a 100g basis only 4.6% (7/150) were high in SAT.

Figure 3 Levels of SAT per-Portion of Surveyed Fast-Food Menu Items [a-d]



[a] The GDA for SAT for an average adult is 20g. Values for samples > 50% (i.e. 10g) of GDA are high in SAT; [b] Numbers of menu items sampled varied between restaurants; [c] Results are based on actual rather than listed product weight to calculate SAT per/portion except were indicated; [d] Pizza products are based on a 200g portion of pizza.

Overall products normally, but not exclusively associated with traditional fish & chip shops such as onion rings and battered sausages had the highest levels of SAT fats (Table 1).

Table 1 Highest Levels of SAT per/100g by Fast-Food Menu Item

Product	**SAT** *(g/100g)*
Onion Rings	**13.3**
Cheesecake 1	**12.9**
Battered Sausages	**12.0**
Battered Sausages	**11.9**
Sausages	**10.8**
Sausages	**7.6**
Quarter Pounder 2 [a]	**7.3**
Breakfast Roll 3 [b]	**7.2**
Meat Pizza 1	**6.8**
Quarter Pounder 3	**5.3**
Meat Pizza 5	**5.3**
Chicken Wrap 2	**4.7**

[a] With cheese

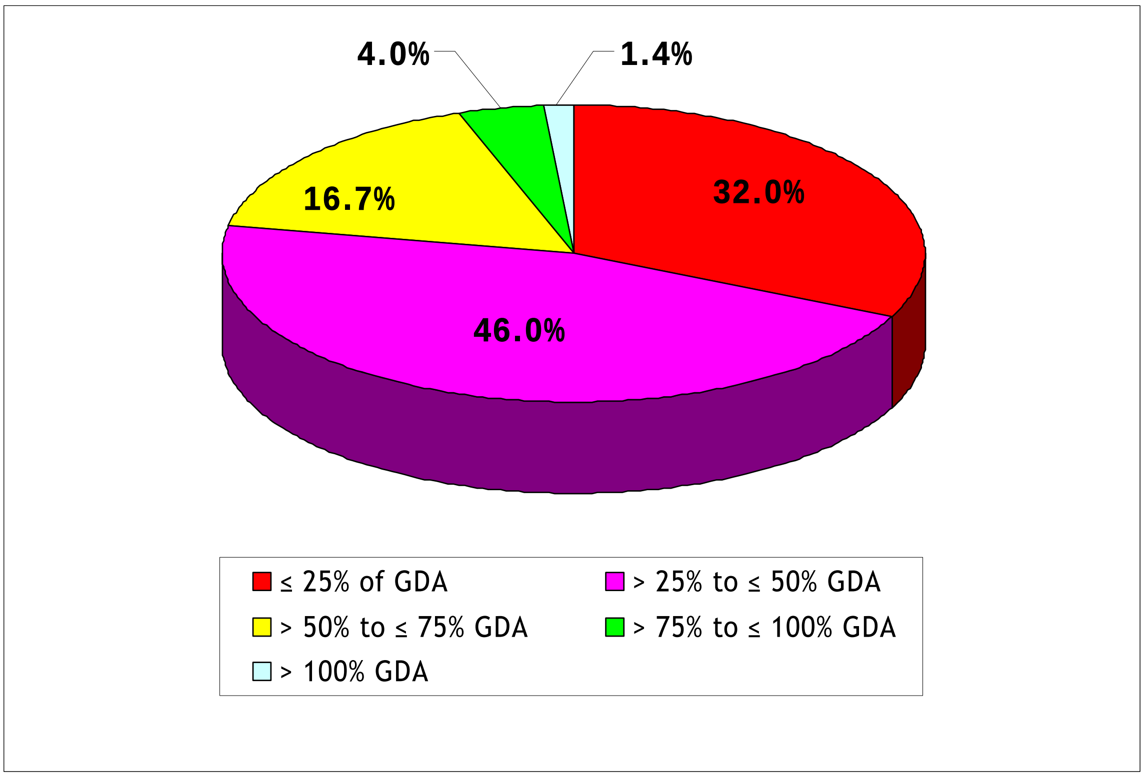
[b] With bacon, sausage, black pudding, egg & cheese (No Tomato Ketchup)

3.2.3 Total Fat

While higher SAT and TFA intakes are associated with an increased risk of atherosclerosis (Merchant et al. 2008) and are the major dietary factors in relation to reducing levels of blood cholesterol, there is evidence to suggest that levels of total fat should also be considered. Intake of fat is conducive to weight gain and to an increased tendency for clots to form in the blood (Heitmann et al. 1995; HMSO, 1994).

Levels of total fat were high (i.e. > 50% of the 70g GDA for an average adult) in 22% (33/150) of samples on per/portion basis (Figure 4). However, on a 100g basis no products sampled were high in total fat (i.e. > 50% of the 70g GDA for an average adult.

Figure 4 Levels of Total Fat per-Portion of Surveyed Fast-Food Menu Items [a-d]



[a] The GDA for fat for an average adult is 70g. Values for samples > 50% (i.e. 35g) of GDA are high in fat; [b] Numbers of menu items sampled varied between outlets; [c] Results are based on actual rather than listed product weight to calculate SAT per/portion except were indicated; [d] Pizza products are based on a 200g portion of pizza.

Overall products normally, but not exclusively associated with traditional fish & chip shops such as battered sausages and onion rings had the highest levels of fat (Table 2).

Table 2 Highest Levels of Total Fat per/100g by Fast-Food Menu Item

Product	Total Fat *(g/100g)*
Battered Sausages	**29.2**
Sausages	**28.9**
Battered Sausages	**28.1**
Hash Brown 2	**25.3**
Onion Rings	**24.6**
Battered Sausages	**22.7**
Breaded Chicken Product 9	**21.6**
Chicken Burger 1	**20.6**
Garlic Bread 1	**19.1**
Beef Burger 1 [a]	**17.5**
Breakfast Sandwich 9 [b]	**15.6**
Garlic Bread 2 [c]	**12.1**

[a] With cheese & bacon

[b] Beef pattie with bacon, egg, grilled tomato & sauce

[c] Topped with Mozzarella cheese and tomato sauce

3.3 Selected Product Analysis

3.3.1 French Fries

Ten samples of French fries/chips and four potato wedges were collected. Levels of TFA in 85.7% (12/14) of samples were low i.e. $\leq$ 2% of total fat in the product. Levels of total fat per/100g varied between a low of 5% in potato wedge products to a high of 15.4% in French fries.

Levels of total fat per/100g were generally higher in thin and narrow fries in comparison to short and broad chips and potato wedge products. Typically fries which are thin and narrow provide a greater surface area for fat adsorption than fries which are short and broad. This in turn can result in these fries absorbing more fat during the cooking process. The total fat content of chips decreases when there is less surface area available for oil absorption in relation to chip volume (Mehta & Swinburn, 2001). In addition, the variety of potato used to make chips will also influence the absorption of fat by the chips as they fry due predominately to the moisture content of the potato (Mellema, 2003). However, data regarding the varieties of potatoes was not available for the current survey from any of the fast-food outlets.

There was less variance in levels of SAT per/100g between samples of fries. Variance in levels of SAT while associated with the variety of potato used and physical characteristics of chips (e.g. surface area) is also associated with the type of oil used to fry the chips. The type of oil would also influence the levels of MUFA, PUF and TFA. Analysis of those fast-food outlets that provided ingredient declarations indicated that hydrogenated oils were not used as an ingredient in fries or to prepare fries. Some restaurants also claimed that all there products including fries were free of TFA.

3.3.2 Onion Rings

A wide variety of side dishes were available from the fast-food outlets surveyed. However, not all products could be sampled in the current survey. Side dishes such as onion rings were sampled from a variety of restaurants. Seven samples of onion rings were sampled with 42.9% (3/7) of samples having high levels of TFA. The highest level of TFA was 3% (as a % of total fat). Levels of total fat and SAT were high in some samples. On a per portion basis 57.1% (4/7) of samples were high in total fat and 71.4% (5/7) high in SAT.

3.3.3 Sausages and Sausage Products *(Regular & Battered Varieties)*

Nine sausage products were sampled comprising 5 regular pork sausages and 4 battered pork sausage products. None of the 9 sausage products were high in TFA (Table 3).

Table 3 Grams of Total Fat, SAT and TFA in Regular and Battered Sausages

Product	FAT	SAT	TFA [c]	FAT	SAT	TFA
	Grams Per/100g			Grams Per/Portion [d]		
Sample 114 [a]	27.3	10.4	0.2 (0.7)	25.9	9.9	0.2
Sample 102 [a]	28.9	10.8	0.2 (0.7)	47.1 [e]	17.6 [f]	0.3
Sample 121 [a]	22.1	7.6	0.2 (0.9)	40.7 [e]	14 [f]	0.4
Sample 124 [a]	23.0	8.6	0.2 (0.9)	23.5	8.8	0.2
Sample 127 [a]	21.5	7.6	0.1 (0.5)	11.4	4	0.1
Sample 131 [b]	29.2	12.0	0.3 (1.0)	33.9	13.9 [f]	0.3
Sample 130 [b]	28.1	11.9	0.4 (1.4)	28.1	11.9 [f]	0.4
Sample 128 [b]	19.6	8.2	0.2 (1.0)	52.7 [e]	22.1 [g]	0.5
Sample 126 [b]	22.7	7.3	0.1 (0.4)	13.8	4.5	0.1

[a] Regular pork sausages
[b] Battered pork sausages
[c] Values in parenthesis as a percentage of total fat
[d] Grams per/portion calculated from the mean weight of three samples as sold
[e] Greater than 50% of the 70g GDA for total fat for an average adult
[f] Greater than 50% of the 20g GDA for SAT fat for an average adult
[g] Greater than the 20g GDA for SAT fat for an average adult

However, on a per portion basis 40% (2/5) of regular sausages and 25% (1/4) of battered sausage was high in total fat. Five samples were high in SAT, 2 regular sausages and 3 battered sausages. 33.3% (3/9) of samples were high in total fat and SAT (Table 3).

3.3.4 Beef Burgers *(Including Cheeseburgers & Hamburgers)*

Eight of the 12 fast-food outlets provided a beef burger or range of beef burger products for sale on the days of sample collections. Twenty three beef burger products were sampled including 3 hamburger products. Beef burgers would be expected to naturally contain TFA from beef or I-TFA from their ingredients or processing. 91.3% (21/23) of beef burger products sampled contained high levels of TFA (as % of total fat) with the highest level of 4.2% (Table 4). Of the 23.3% (35/150) of products with high levels of TFA sampled in the current survey, beef burgers products make up the highest proportion of this total with 60% (21/35) of the samples having greater than 2% TFA (as % of total Fat).

Table 4 Levels of TFA in Beef Burger Products [a]

Product	TFA (g/100g)	TFA (% of Total Fat)	TFA (g/Portion) [e]
Double Burger 1 [b]	0.2	1.3	0.7
Quarter Pounder 1 [b]	0.3	1.9	0.8
Double Burger 2	0.3	2.2	1.1
Beef Burger 1 [c]	0.4	2.3	1.2
Beef Burger 2 [b]	0.3	2.4	0.8
Hamburger 1	0.2	2.5	0.2
Cheeseburger 1 [c]	0.5	2.6	1.5
Beef Burger 3	0.3	2.6	0.9
Cheeseburger 2 [b]	0.3	2.8	0.3
Beef Burger 4 [b]	0.4	2.8	0.7
Double Burger 3 [b]	0.4	2.9	0.7
Cheeseburger 3 [b]	0.3	2.9	0.3
Beef Burger 5 [d]	0.4	3.2	0.7
Hamburger 2	0.3	3.3	0.3
Beef Burger 6 [c]	0.5	3.3	1.2
Beef Burger 7	0.3	3.3	0.4
Beef Burger 8 [b]	0.5	3.7	1.2
Beef Burger 9	0.3	3.8	0.4
Beef Burger 10	0.3	3.9	0.3
Quarter Pounder 2 [b]	0.6	4.1	1.0
Cheeseburger 4 [b]	0.6	4.1	0.7
Quarter Pounder 3	0.5	4.1	0.9
Hamburger 3	0.5	4.2	0.5

[a] Four outlets had no beef burger option and/or availability of these products on the days of sampling

[b] With cheese

[c] With cheese & bacon

[d] With Chorizo

[e] Calculated from the mean weight (grams) of three samples per product as sold

Over 91% (21/23) of the beef burger products sampled had high levels of TFA (i.e. ≥2% of total fat in the product). 43.5% (10/23) of the beef burgers products sampled included cheese which may have contributed towards levels of TFA found in the products (i.e. 8/10 beef burger products with cheese had a high level of TFA) (Table 4). On a per portion basis the levels of TFA in products were markedly different from the levels as a percentage of total fat. Levels of total fat ranged from a low of 7.7 g/100g in beef burger 10 to a high of 19.4 g/100g in cheeseburger 1 (Table 5).

Table 5 Grams of Total Fat and SAT in Beef Burger Products

Product	**Fat** *(Per/100g)*	**Fat** *(Per/Burger)* [d]	**SAT** *(Per/100g)*	**SAT** *(Per/Burger)* [d]
Beef Burger 10	7.7	8.2	3.4	3.6
Beef Burger 9	7.9	10.5	3.1	4.1
Hamburger 1	7.9	7.7	3.1	3.0
Hamburger 2	9.0	8.7	4	3.9
Beef Burger 7	9.1	11.7	3.7	4.8
Cheeseburger 3 [a]	10.2	11.0	5.6	6.0
Cheeseburger 2 [a]	10.8	11.9	5.2	5.7
Beef Burger 3	11.7	33.3	4.3	12.3
Hamburger 3	11.9	12.1	4.9	5.0
Quarter Pounder 3	12.1	22.0	5.3	9.6
Beef Burger 2 [a]	12.3	34.4	4.8	13.4
Beef Burger 5 [b]	12.4	22.6	5.4	9.8
Beef Burger 8 [a]	13.5	33.2	5.2	12.8
Double Burger 3 [a]	13.7	22.5	6.2	10.2
Double Burger 2	13.8	48.6	4.7	16.5
Beef Burger 4 [a]	14.1	24.3	4.7	8.1
Cheeseburger 4 [a]	14.7	16.0	6.4	7.0
Quarter Pounder 2 [a]	14.8	25.3	7.3	12.5
Beef Burger 6 [c]	15.1	35.3	6.3	14.7
Double Burger 1 [a]	15.5	56.4	5.9	21.5
Quarter Pounder 1 [a]	15.7	41.9	5.5	14.7
Beef Burger 1 [c]	17.5	50.8	7.2	20.9
Cheeseburger 1 [c]	19.4	59.6	9.1	27.9

[a] With cheese
[b] With Chorizo
[c] With Cheese & Bacon
[d] Calculated from the mean weight (grams) of three samples per product as sold

SAT fats ranged from a low of 3.1g/100g in beef burger 9 and hamburger 1 to a high of 9.1g/100g in cheeseburger 1 (Table 5). However, the levels of total fat and SAT on a per portion basis were markedly different from the levels per/100g. On a per portion basis 26% (6/23) were high in fat while 47.8% (11/23) were high in SAT. Cheeseburger 1 provided the highest levels of total fat and SAT at 59.6g and 27.9g, respectively on a per portion basis (Table 5).

Many of the beef burger products are also sold as part of a meal and/or with fries and a beverage of choice. In this context levels of TFA, SAT and total fat would be expected to be higher on a per portion basis (Table 6).

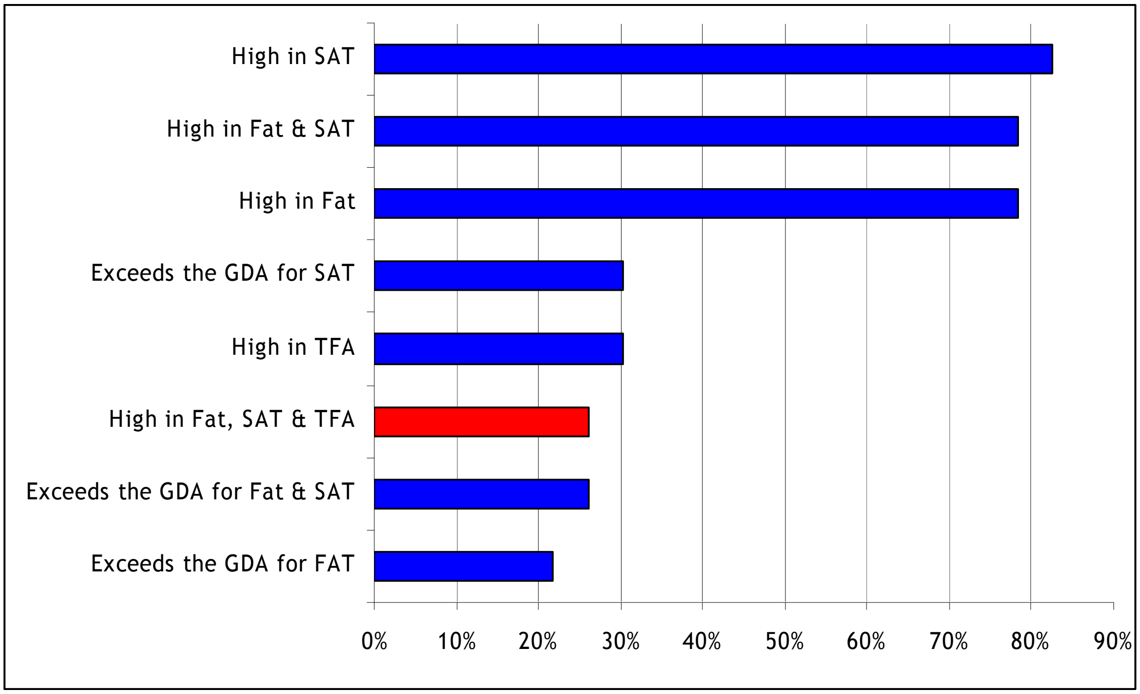
Table 6 Grams of Total Fat, SAT and TFA in Beef Burger Meals

Product	TFA [d]	SAT	Total Fat
	Grams Per Portion [e]		
Double Burger 1 [a] & Large Fries	0.8	30.8	80.6
Quarter Pounder 1 [a] & Chips	0.9	31.5	71.7
Double Burger 2 & Large Fries	1.2	25.8	72.8
Beef Burger 1 [b] & Large Fries	1.3	23.0	72.2
Beef Burger 2 [a] & Large Fries	0.9	22.7	58.6
Hamburger 1 & Large Fries	0.3	8.0	21.4
Cheeseburger 1 [b] & Large Fries	1.6	37.2	83.8
Beef Burger 3 & Regular Fries	1.0	16.6	54.3
Cheeseburger 2 [a] & Large Fries	0.4	7.8	33.3
Beef Burger 4 [a] & Large Fries	0.8	13.1	38.0
Double Burger 3 [a] & Large Fries	0.8	12.3	43.9
Cheeseburger 3 [a] & Large Fries	0.4	11.0	24.7
Beef Burger 5 [c] & Large Fries	0.8	19.1	46.8
Hamburger 2 & Large Fries	0.4	6.0	30.1
Beef Burger 6 [b] & Large Fries	1.3	16.8	56.7
Beef Burger 7 & Regular Fries	0.9	13.7	29.0
Beef Burger 8 [a] & Large Fries	1.3	14.9	54.6
Beef Burger 9 & Chips	1.3 (3.2%)	20.6	40.5
Beef Burger 10 & Regular Fries	0.3	7.2	26.5
Quarter Pounder 2 [a] & Chips	1.1	14.6	46.7
Cheeseburger 4 [a] & Large Fries	0.8	16.3	40.2
Quarter Pounder 3 & Large Fries	0.9	13.2	40.3
Hamburger 3 & Large Fries	0.6	14.3	36.3

[a] With cheese
[b] With Cheese & Bacon
[c] With Chorizo
[d] Values in parenthesis as a percentage of total fat
[e] Calculated from the mean weight (grams) of three samples per product as sold

The highest levels of TFA (as a percentage of total fat) on a per portion basis were from beef burger 9 and chips providing 3.2% TFA (Table 6). However, the highest levels of TFA, SAT and total fat on a grams per portion basis were from cheeseburger 1 and large fries providing 1.6g, 37.2g and 83.8g respectively of TFA, SAT and total fat per portion (Table 6). The lowest levels of TFA, SAT and total fat were typically in the hamburger and cheeseburger meals (Table 6) and predominately related to the small portion sizes of the burgers in these meals compared to other products. Overall levels of TFA, SAT and total fat in beef burger and fries meals were high. 26.1% (6/23) of beef burger meals were high in TFA, SAT and total fat (Figure 5).

Figure 5 Levels of Total Fat, SAT and TFA in Beef Burger Meals [a]



[a] See Section 3.1 for explanation of high and low values

3.3.5 Chicken Burgers

Ten of the 12 fast-food outlets provided a chicken or range of chicken burger products for sale on the days of sample collections. Twelve chicken burger products were sampled. All 12 chicken burger products contained low levels of TFA ($\leq$2% as % of Total fat). None of the chicken burger products sampled included cheese as a component or ingredient.

Levels of total fat ranged from a low of 9.3 g/100g in chicken burger 12 to a high of 20.6 g/100g in chicken burger 1. SAT fats ranged from a low of 1.4g/100g in chicken burger 8 to a high of 3.7g/100g in chicken burgers 4 and 5 (Table 7).

Table 7 Grams of Total Fat and SAT in Chicken Burger Products [a]

Product	Fat *(Per/100g)*	Fat *(Per/Burger)* [b]	SAT *(Per/100g)*	SAT *(Per/Burger)* [b]
Chicken Burger 1	20.6	44.1	3.4	7.3
Chicken Burger 2	16.5	35.3	3.4	7.3
Chicken Burger 3	15.8	39.0	3.4	8.4
Chicken Burger 4	15.1	31.7	3.7	7.8
Chicken Burger 5	14.6	33.9	3.7	8.6
Chicken Burger 6	12.5	21.3	2.1	3.6
Chicken Burger 7	12.3	22.0	1.9	3.4
Chicken Burger 8	12.3	25.5	1.4	2.9
Chicken Burger 9	10.4	19.9	2.3	4.4
Chicken Burger 10	9.7	15.3	2.7	4.3
Chicken Burger 11	9.6	28.5	2.7	8.0
Chicken Burger 12	9.3	16.3	1.9	3.3

[a] Two outlets had no chicken burger option and/or availability of these products on the days of sampling

[b] Calculated from the mean weight (grams) of three samples per product as sold

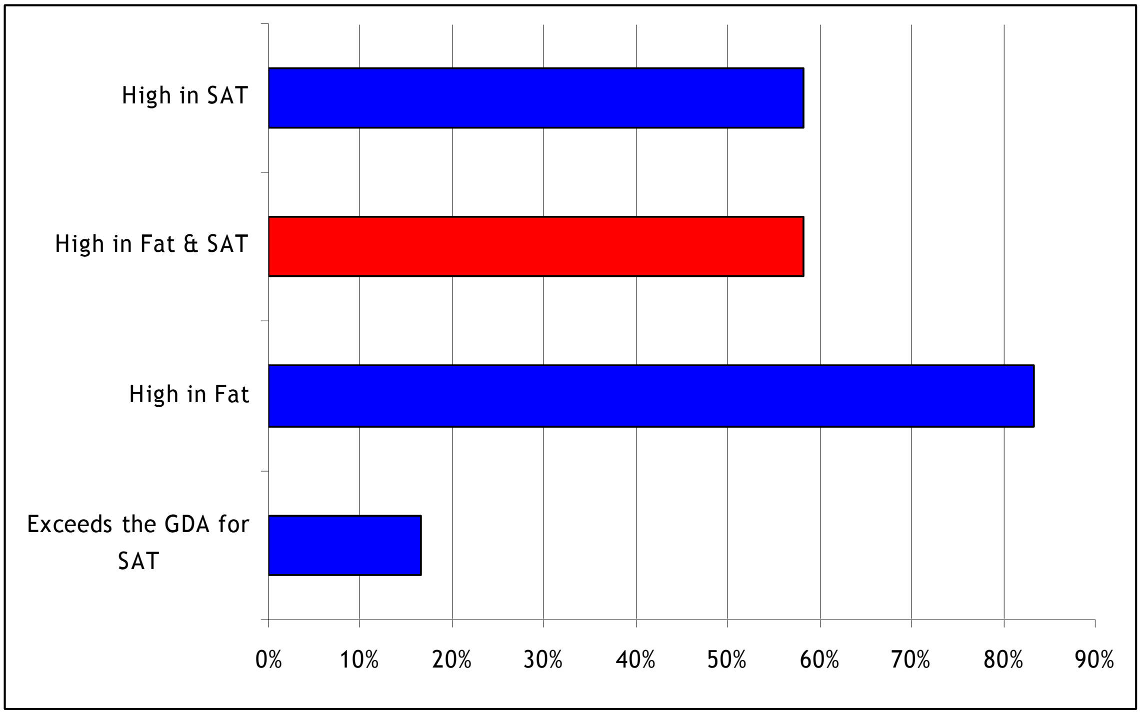
However, the levels of total fat and SAT on a per portion basis were markedly different from the levels per/100g. On a per portion basis 25% (3/12) of chicken burgers were high in fat while no products were high in SAT (Table 7). As with beef burgers, many of the chicken burgers were sold as part of a meal and/or with fries and a beverage of choice. In this context levels of TFA, SAT and total fat would be expected to be higher on a per portion basis (Table 8).

Table 8 Grams of Total Fat, SAT and TFA in Chicken Burger Meals

Product	TFA	SAT	Total Fat
	Grams Per Portion		
Chicken Burger 1 & Regular Fries	0.1	10.9	62.4
Chicken Burger 2 & Chips	0.2	24.1	65.1
Chicken Burger 3 & Chips	1.0	24.9	69.0
Chicken Burger 4 & Chips	0.6	16.7	49.0
Chicken Burger 5 & Chips	0.2	13.2	60.1
Chicken Burger 6 & Large Fries	0.1	8.6	35.0
Chicken Burger 7 & Large Fries	0.1	12.7	46.2
Chicken Burger 8 & Regular Fries	0.1	6.5	43.8
Chicken Burger 9 & Regular Fries	0.2	7.4	31.9
Chicken Burger 10 & Large Fries	0.1	6.4	36.7
Chicken Burger 11 & Regular Fries	0.4	12.3	49.5
Chicken Burger 12 & Regular Fries	0.2	6.3	28.3

Overall levels of TFA were low in the chicken burger and fries meals with no products having a high level of TFA ($\geq$2% TFA as a percentage of total fat) on a per portion basis (Table 8). However, 58.3% (7/12) of the chicken burger meals were high in SAT and total fat on a per portion basis (Figure 6).

Figure 6 Levels of Total Fat, SAT and TFA in Chicken Burger Meals [a]



[a] See Section 3.1 for explanation of high and low values

3.3.6 Other Chicken Products

In the current survey 16 chicken products *(excluding kebabs, chicken burgers & pizza)* were sampled from nine fast-food outlets. These products included chicken nuggets, chicken strips, chicken pieces and chicken wraps. Levels of TFA were low in 93.7% (15/16) of chicken products, with only chicken nuggets 4 having a high level of TFA of 3.4% of total fat (Table 9).

Table 9 Grams of Total Fat, SAT and TFA per/100g

Product	FAT	SAT	TFA [e]
	Grams Per/100g		
Chicken Nuggets 1	13.5	2.2	<0.1
Chicken Nuggets 2	16.3	5.1	<0.1
Chicken Nuggets 3	15.9	7.3	0.3 (1.9%)
Chicken Nuggets 4	17.5	8.1	0.6 (3.4%)
Breaded Chicken Product 1	11.1	3.5	< 0.1
Breaded Chicken Product 2	13.9	3.8	<0.1
Breaded Chicken Product 3	11.1	2.0	<0.1
Breaded Chicken Product 4	12.9	2.9	<0.1
Breaded Chicken Product 5	11.5	3.5	<0.1
Breaded Chicken Product 6	10.3	4.4	<0.1
Breaded Chicken Product 7 [a]	14.5	2.7	<0.1
Breaded Chicken Product 8 [a]	13.8	3.7	0.1 (0.7%)
Breaded Chicken Product 9 [a]	21.6	4.3	0.1 (0.5%)
Chicken Wrap 1 [a-b]	13.5	3.1	<0.1
Chicken Wrap 2 [a, c]	18.2	4.7	<0.1
Chicken Wrap 3 [d]	16.3	3.3	<0.1

[a] Only available at one outlet
[b] Tortilla wrap product with cheese
[c] Tortilla wrap product with cheese, bacon, chicken and ranch dressing
[d] Tortilla wrap product without cheese
[e] Values in parenthesis as a percentage of total fat

On a per portion basis levels of total fat and SAT were generally low. Only 12.5% (2/16) of samples were high in total fat and SAT with the highest levels of total fat and SAT in chicken wrap 2 and chicken nuggets 4 (Table 10).

Table 10 Grams of Total Fat, SAT and TFA per/Portion

Product	FAT	SAT	TFA
	Grams Per/Portion		
Chicken Nuggets 1 *(Portion of 6)*	13.8	2.2	<0.1
Chicken Nuggets 2 *(Portion of 3)*	16	5	<0.1
Chicken Nuggets 3 *(Portion of 6)*	18.9	8.7	0.4
Chicken Nuggets 4 *(Portion of 6)*	35.5	16.4	1.2
Breaded Chicken Product 1	12.8	4	<0.1
Breaded Chicken Product 2	18.6	5.1	<0.1
Breaded Chicken Product 3	19.1	3.4	<0.1
Breaded Chicken Product 4	12.9	2.9	<0.1
Breaded Chicken Product 5	12.5	3.8	<0.1
Breaded Chicken Product 6	12.9	5.5	<0.1
Breaded Chicken Product 7	14.8	2.8	<0.1
Breaded Chicken Product 8	21.3	5.7	0.2
Breaded Chicken Product 9 *(Portion of 3)*	26.6	5.3	0.1
Chicken Wrap 1	29.2	6.7	<0.1
Chicken Wrap 2	44.8	11.6	<0.1
Chicken Wrap 3	33.90	6.86	<0.1

3.3.7 Vegetable and Fish Burgers

Seven vegetable (i.e. veggie) burgers and 3 fish based burgers were sampled during the survey from eight outlets. All 10 products sampled contained low levels of TFA ($\leq$2% as % of Total fat) with the highest level of 1.4% in veggie burger 3. Levels of total fat ranged from a low of 10.6 g/100g in fish burger 3 to a high of 17.2 g/100g in the veggie burger 1. SAT fats ranged from a low of 2.7g/100g in veggie burger 2 to a high of 6.4g/100g in veggie burger 6 (Table 11).

Table 11 Grams of Total Fat and SAT in Veggie & Fish Burger Products

Product	Fat *(100g)*	Fat *(Burger)* [a]	SAT *(100g)*	SAT *(Burger)* [a]
Veggie Burger 1	17.2	29.9	3.8	6.6
Veggie Burger 2	16.4	29.5	2.7	4.9
Veggie Burger 3	14.7	32.6	3.2	7.1
Veggie Burger 4	12.7	33.0	3.6	9.4
Veggie Burger 5	12.4	21.6	3.2	5.6
Veggie Burger 6 [b]	12.1	25.5	6.4	13.5
Veggie Burger 7 [b]	11.0	25.0	3.8	8.6
Fish Burger 1 [b]	14.1	27.2	3.6	6.9
Fish Burger 2	10.7	14.9	2.9	4.0
Fish Burger 3 [b]	10.6	34.2	3.4	11.0

[a] Calculated from the mean weight (grams) of three samples per product as sold
[b] Includes cheese

However, the levels of total fat and SAT on a per portion basis (i.e. per burger) were markedly different from the levels per/100g. Fish burger 3 while lowest in total fat on a 100g basis was the highest on a per portion basis with 34.2g of fat. Veggie burger 6 provided the highest level of SAT, with 13.5g per burger (Table 11). Both fish burger 3 and veggie burger 6 were high in SAT (>50% of the 20g GDA for an average adult) on a per portion basis (Table 11).

When the veggie or fish burgers were sold as part of a meal with fries levels of TFA, SAT and total fat were higher on a per portion basis (Table 12).

Table 12 Grams of Total Fat, SAT and TFA in Veggie & Fish Burger Meals

Product	TFA [a]	SAT	Total Fat
	Grams Per Portion [b]		
Veggie Burger 1	0.1	10.2	48.2
Veggie Burger 2	0.1	9.9	43.2
Veggie Burger 3	1.3 (2.1%)	23.6	62.6
Veggie Burger 4	0.2	14.0	59.2
Veggie Burger 5	0.6	14.5	38.9
Veggie Burger 6 [c]	0.1	22.8	49.7
Veggie Burger 7 [c]	0.1	17.9	49.2
Fish Burger 1 [c]	0.3	11.9	40.9
Fish Burger 2	0.1	6.1	36.3
Fish Burger 3 [c]	0.4	15.3	55.2

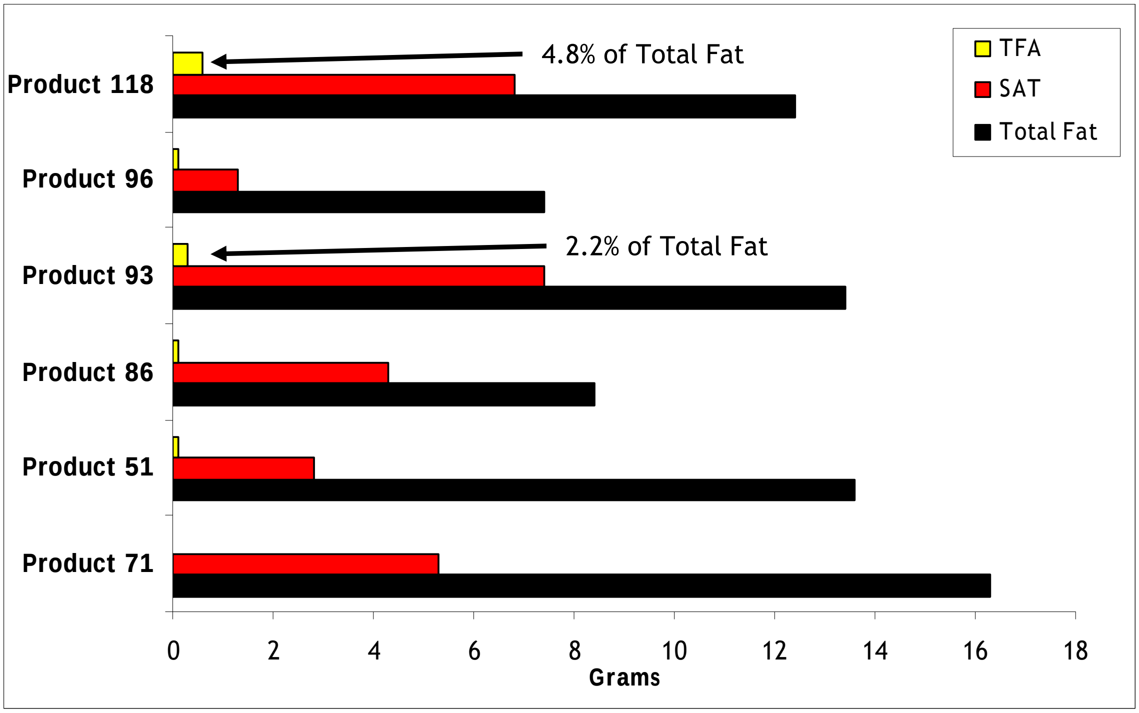
[a] Values in parenthesis as a percentage of total fat
[b] Calculated from the mean weight (grams) of three samples per product as sold
[c] Includes cheese

Veggie burger 2 and chips had the highest levels of TFA, SAT and total fat on a per portion basis of 1.3g (≈ to 2.1% of total fat), 23.6g and 62.6g respectively. Overall 80% (8/10) of the veggie and fish burgers meals were high in total fat (>50% of the 70g GDA for an average adult) and SAT (>50% of the 20g GDA for an average adult) (Table 12).

3.3.8 Fish & Chips

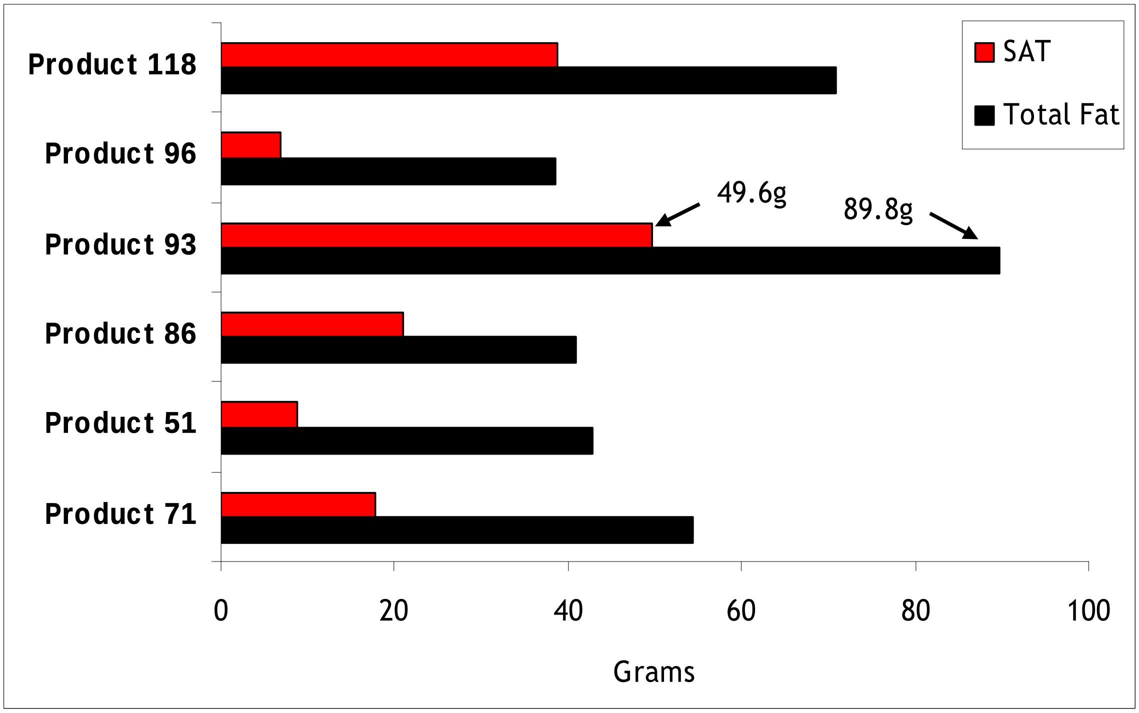
Six fish and chip products were collected in the survey. Levels of TFA were high in two products with levels of 4.8% of total fat (≈ 0.6g/100g) and 2.2% of total fat (≈ 0.3g/100g), respectively (Figure 7). Levels of total fat ranged from a low of 7.4 g/100g to a high of 16.3 g/100g. SAT fats ranged from a low of 1.3g/100g to a high of 7.4g/100g (Figure 7).

Figure 7 Grams *(per/100g)* of Total Fat, SAT and TFA in Fish & Chip Meals



On a per portion basis (i.e. per fish & chip meal as sold) the levels of TFA, total fat and SAT were markedly different from the levels per/100g. All samples were high in fat with the highest providing 89.8g of fat per portion (Figure 8). Levels of SAT were also high in 66.6% (4/6) of samples with the highest providing 49.6g of SAT per portion (Figure 8).

Figure 8 Grams *(per/portion)* of Total Fat and SAT in Fish & Chip Meals [a]



[a] Grams per/portion calculated from the mean weight of three samples as sold

However, there was great variation between samples in terms of the portion sizes of fish and chips provided, which contributed towards the high levels of fat and SAT in some samples. In general portion sizes were larger in some products than others (Table 13).

Table 13 Variation of Fish & Chip Portion Sizes

Product	**Cod** *(g)*	**Chips** *(g)*	**Total** *(g)*
Product 118	321	250	571
Product 93	262	408	670
Product 86	241	246	487
Product 51	165	150	315
Product 96	156	364	520
Product 71	125	209	334

3.3.9 Kebabs

Only one outlet provided kebabs as a menu option. Four different kebabs were sampled as part of the current survey. Levels of TFA were high in lamb kebabs providing 2.7% TFA as a percentage of total fat (Table 14).

Table 14 Grams of Total Fat, SAT and TFA in Kebabs

Product	FAT	SAT	TFA [d]	FAT	SAT	TFA
	Grams Per/100g			Grams Per/Portion		
Veggie Kebab [a]	11.1	2.7	<0.1	36.6	8.9	< 0.1
Chicken Kebab [b-c]	19.5	2.5	<0.1	58.5	7.5	< 0.1
Beef Kebab [b]	4.2	0.8	<0.1	12.9	2.5	< 0.1
Lamb Kebab [b]	14.6	4.3	0.4 (2.7%)	48.9	14.4	1.3

[a] With cheese
[b] No cheese
[c] Breaded chicken used in kebab
[d] Values in parenthesis as a percentage of total fat

Levels of total fat ranged from a low of 4.2 g/100g in the beef kebab to a high of 19.5 g/100g in the chicken kebab. SAT fats ranged from a low of 0.8g/100g again in the beef kebab to a high of 4.3g/100g in the lamb kebab. On a per portion basis 75% (3/4) were high in fat (>50% of 70g GDA for an average adult) and one sample, the lamb kebab was high in total fat, SAT and TFA (Table 14).

3.3.10 Pizza *(including Garlic Bread)*

Three of the 12 fast-food outlets surveyed provided pizza as a menu option. However, the variety of pizzas available from two outlets was extensive. One offered at least 13 pizza varieties and another at least 14 with various combinations of bases and toppings within each pizza variety available to consumers.

A total of 13 pizzas were sampled together with two samples of garlic bread, which often accompany pizza based meals. 38.5% (5/13) of pizza sampled had high levels of TFA (≥2% of total fat) with the highest level in the Hawaiian pizza 2, with 3.3% TFA (as % of total fat). However, levels of TFA were ≥1% in all pizza products surveyed (Table 15).

Table 15 Grams *(per/100g)* of Total Fat, SAT and TFA in Pizza

Pizza Variety	Total Fat	SAT	TFA [j]
	Grams Per/100g		
Hawaiian Pizza 1 [a]	9.2	4.7	0.1 (1.1%)
Hawaiian Pizza 2 [b]	9.2	4.6	0.3 (3.3%)
Hawaiian Pizza 3 [c]	7.2	3.4	0.1 (1.4%)
Margarita Pizza 1	10.7	5.2	0.3 (2.8%)
Margarita Pizza 2 [b]	9.6	5.5	0.2 (2.1%)
Margarita Pizza 3	8.3	4.5	0.1 (1.2%)
Meat Pizza 1 [d]	13.9	6.8	0.3 (2.2%)
Meat Pizza 2 [e]	10	4.3	0.1 (1.0%)
Meat Pizza 3 [a]	9.8	4.6	0.1 (1.0%)
Supreme Pizza 1 [a-b]	12.5	5.9	0.2 (1.6%)
Supreme Pizza 2 [f]	11.8	6.3	0.2 (1.7%)
Meat Pizza 4 [g]	12.9	6.1	0.3 (2.3%)
Meat Pizza 5 [h]	11.2	5.3	0.2 (1.8%)
Garlic Bread 1	19.1	5.4	0.1 (0.5%)
Garlic Bread 2 [i]	12.1	4.2	0.1 (0.8%)

[a] Includes ham as a meat ingredient
[b] No data available from outlet on ingredients & pizza composition
[c] Includes ham & bacon as meat ingredients
[d] Includes pepperoni as a meat ingredient composed of beef, pork & beef fat
[e] Includes smoky bacon & sausage as meat ingredients
[f] Includes pepperoni and beef as meat ingredients
[g] Includes pork, ham, pepperoni & beef as meat ingredients
[h] Includes pepperoni, ham, ground beef & sausage as meat ingredients
[i] Includes cheese and a tomato based sauce
[j] Values in parenthesis as a percentage of total fat

All the pizzas surveyed had mozzarella cheese as an ingredient which contributes towards the recorded levels of TFA. In relation to pizza, levels of total fat ranged from a high of 13.9 g/100g in meat pizza 1 to a low of 7.2 g/100g in Hawaiian pizza 3. Levels of SAT ranged from a high of 6.8g/100g again in meat pizza 1 to a low of 3.4g/100g in Hawaiian pizza 3 (Table 15).

Differences in what the restaurants recommended as a portion size for a specific pizza made it difficult to draw comparisons on levels of total fat and SAT per portion. However, on per pizza as sold basis, 92.3% (12/13) were high in SAT with the highest being meat pizza 1 with 18.8 grams of SAT. Levels of total fat were only high in 15.4% (2/13) of samples with the highest in meat pizza 4 with 39.6 grams of fat.

Two garlic bread products were also sampled (Table 15). Both of these products were low in TFA (as % of total fat), SAT and total fat.

3.3.11 Breakfast Products

Not all fast-food outlets surveyed had a breakfast menu and in the case of those which did not all products were sampled or available on the day of sampling. Fourteen breakfast products were sampled from four outlets. All 14 breakfast products contained low levels of TFA (≤ 2% of Total fat) (Table 16).

Table 16 Levels of TFA in Breakfast Products

Product	TFA (g/100g)	TFA (g/Portion) [a]	TFA (% of Fat)
Breakfast Sandwich 1 [b]	0.1	0.2	1.0
Breakfast Sandwich 2 [b]	0.1	0.1	1.0
Breakfast Sandwich 3	0.1	0.1	1.4
Hash Brown 1	< 0.1	< 0.1	< 0.1
Hash Brown 2	0.1	0.1	0.4
Breakfast Sandwich 4 [c]	0.1	0.2	0.7
Breakfast Sandwich 5 [c]	0.1	0.2	0.8
Breakfast Sandwich 6 [c]	0.2	0.2	1.6
Breakfast Sandwich 7 [c]	0.2	0.5	1.2
Breakfast Roll 1	0.1	0.3	0.9
Breakfast Roll 2	0.1	0.2	1.0
Breakfast Sandwich 8	0.1	0.3	1.0
Breakfast Roll 3 [d]	0.1	0.3	0.7
Breakfast Sandwich 9 [e]	0.2	0.7	1.3

[a] Grams per/portion calculated from mean weight of three samples per product as sold
[b] Includes cheese & butter
[c] No Ketchup
[d] Breakfast roll with bacon, sausage, black pudding, egg & cheese (no tomato ketchup)
[e] Beef pattie with bacon, egg, grilled tomato & sauce

Levels of total fat ranged from a low of 7.2g/100g in breakfast sandwich 3 to a high of 25.3 g/100g in hash brown 2. SAT fats ranged from a low of 1.4g/100g in hash brown 1 to a high of 7.7g/100g in hash brown 2 (Table 17).

Table 17 Grams of Total Fat and SAT in Breakfast Products

Product	Fat *(100g)*	Fat *(Portion)* [a]	SAT *(100g)*	SAT *(Portion)* [a]
Breakfast Sandwich 1 [b]	10.4	17.3	4.0	6.6
Breakfast Sandwich 2 [b]	10.2	13.5	4.2	5.5
Breakfast Sandwich 3	7.2	8.7	3.2	3.9
Hash Brown 1	13.4	14.7	1.4	1.5
Hash Brown 2	25.3	28.8	7.7	8.8
Breakfast Sandwich 4 [c]	15.2	23	4.4	6.6
Breakfast Sandwich 5 [c]	12.8	30.5	4.3	10.2
Breakfast Sandwich 6 [c]	12.3	14	4.2	4.8
Breakfast Sandwich 7 [c]	16.8	44	6.3	16.5
Breakfast Roll 1	11.2	31.1	4.2	11.7
Breakfast Roll 2	9.9	22.6	3.7	8.4
Breakfast Sandwich 8	10.3	28.2	3.9	10.7
Breakfast Roll 3 [d]	14.4	39.2	7.2	19.6
Breakfast Sandwich 9 [e]	15.6	51.3	5.8	19.1

[a] Grams per/portion calculated from mean weight of three samples per product as sold
[b] Includes cheese & butter
[c] No Ketchup
[d] Breakfast roll with bacon, sausage, black pudding, egg & cheese (no tomato ketchup)
[e] Beef pattie with bacon, egg, grilled tomato & sauce

3.3.12 Desserts

Ten dessert products were sampled from two, with five products from each outlet. All 10 desserts contained low levels of TFA (≤2% as % of Total fat) (Table 18).

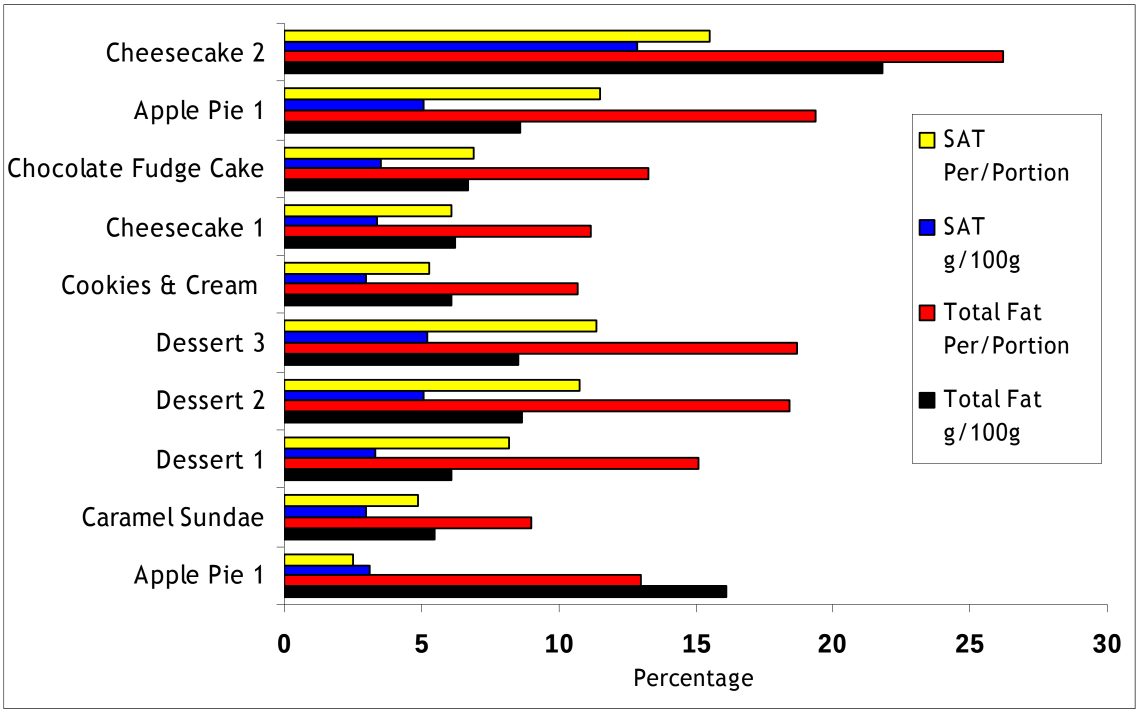
Table 18 Levels of TFA in Dessert Products

Product	TFA *(g/100g)*	TFA *(g/Portion)* [a]	TFA *(% of Fat)*
Apple Pie 1	0.1	<0.1	0.6
Caramel Sundae	0.1	0.2	1.8
Dessert 1	0.1	0.2	1.6
Dessert 2	0.1	0.2	1.1
Dessert 3	0.1	0.2	1.2
Cookies & Cream	0.1	0.2	1.6
Cheesecake 1 [b]	0.1	0.2	1.6
Chocolate Fudge Cake	0.1	0.2	1.5
Apple Pie 2 [c]	0.1	0.2	1.2
Cheesecake 2 [b]	0.3	0.4	1.4

[a] Grams per/portion calculated from mean weight of three samples per product as sold
[b] Strawberry flavoured
[c] With ice-cream

Levels of total fat ranged from a low of 5.5g/100g in the caramel sundae to a high of 21.8 g/100g in the cheesecake 2. SAT fats ranged from a low of 3.0g/100g in the caramel sundae and cookies and cream to a high of 12.9g/100g in cheesecake 2 (Figure 9).

Figure 9 Grams of Total Fat and SAT in Dessert Products



4. Provision of Nutritional Information

The provision of nutritional information is currently not a legal requirement unless a claim is made. In relation the fast-food outlets sampled in the current survey there was variation in terms of the information and level of information provided to customers (Table 19).

Table 19 Provision of Nutritional and Ingredients Information [a]

Fast-Food Outlet	On Product	In Store	On Website [b]	Per 100g	Per Portion	On Product	In Store	On Website
	Nutritional Information					**Ingredient Information**		
Outlet A [c]	No	No	**Yes**	No	**Yes**	No	No	**Yes**
Outlet B [d]	No	No	**Yes**	**Yes**	**Yes**	No	No	**Yes**
Outlet C [e]	No	No	No	No	No	No	No	No
Outlet D [f]	No	No	No	No	No	No	No	No
Outlet E [g]	No	No	No	No	No	No	No	No
Outlet F [h]	No	No	**Yes**	No	**Yes**	No	No	No
Outlet K [i]	No	No	No	No	No	No	No	No
Outlet L [j]	No	No	**Yes**	No [k]	**Yes**	No	No	**Yes**
Outlets G-J	No	No	No	No	No	No	No	No

[a] Information available on the days of sampling

[b] All websites last accessed Oct 30th 2008

[c] Outlet A provide an Irish based website with nutritional information on Energy, Protein, Fat, SAT, CHO, Sugars, Salt & Fibre. Allergens information is also provided

[d] Outlet B provide a UK & Ireland website with nutritional information on Energy, Protein, Fat, SAT, CHO, Sugars, Sodium & Fibre. Allergens information is also provided

[e] Outlet C provide an Irish based website with no nutritional, ingredient or allergens information

[f] Outlet D provide an Irish based website with no nutritional, ingredient or allergens

[g] Outlet E provide an Irish based website with no nutritional, ingredient or allergens

[h] Outlet F provide a UK based website with nutritional information on Energy, Protein, Fat, SAT, CHO, Sugars, Sodium & Salt Equivalent. Allergens information is also provided

[i] Outlet K provide an Irish based website with no nutritional, ingredient or allergens information. Nutritional, ingredient and allergens information is available on outlet K UK website

[j] Outlet L provides an Irish based website with nutritional information on Energy, Protein, Fat, SAT, MUFA, PUFA, CHO, Sugars, Sodium & Fibre. Allergens and ingredient information is also provided

[k] Some products have nutritional data per/100g provided

None of the fast-food outlets provided nutritional information either in-store or on the product packs. Only four outlets provided nutritional information through their respective websites (Table 19). In relation to this nutritional information only one outlet provided nutritional information per/100g and per portion. The absence of nutritional data per/100g makes comparisons between products difficult. None of the major Irish owned outlets provided nutritional, ingredient or allergens information in any format (i.e. in-store, on pack, website) to consumers. In relation to TFA no outlet provided nutritional information in relation to levels in products.

5. Discussion

High levels of TFA are a public health concern due to some evidence associating TFA with CHD (EFSA, 2004; Crupkin & Zambelli, 2008). High levels of SAT fat are also a concern given the priority in reducing SAT fat as a measure for reducing CHD risk in the Irish population (IHF, 2007). The current FSAI survey is the first survey of TFA in Irish fast-foods and as such comparative analysis of the data is limited. However, levels of TFA in fast-foods in Ireland are low (≤2% TFA as of percentage of total fat) (FSAI, 2008).

Just over 23% (35/150) of fast-food products surveyed had high levels of TFA. Of this 23.3% of products with high levels of TFA, beef burger products (Table 4) make up the highest proportion of the total with 60% (21/35) of the samples having greater than 2% TFA (as % of total Fat). However, taken together the results of the current survey suggest that in the majority of the products produced and prepared by fast-food outlets in Ireland the use of ingredients containing I-TFA has been modified, limited or reduced.

Many international fast-food chains in recent times have also indicated the removal or their intention to remove or limit TFA in products and in particular in cooking oils (e.g. hydrogenated oils) used in preparation of fast-foods. For example, if taken in comparison to the results of a 2004-2005 study of I-TFA in fast-foods from McDonalds in the United Kingdom (UK), the current results suggest a decrease in TFA in French fries and chicken nuggets from 16% and 13% respectively, to levels ≤ 0.1% (Stender et al., 2006). The current survey results also mirror reductions in TFA identified in McDonald French fries from the Netherlands in 2006 (Katan, 2006).However, while some of the fast-food outlets make claims about the nature of the cooking oils they use specific details of cooking oils from the outlets surveyed was only available from one outlet.

The contribution naturally occurring TFA (i.e. from sources of animal origin) make to overall levels of TFA in fast-foods was not the focus of the current survey. However, it's important to note that foods of animal origin that naturally contain TFA are important sources of nutrients e.g. protein, iron and calcium, in the Irish diet. A recent survey of Irish food consumption indicates that butter (14.5%), cheeses (10.9%) and whole milk (6.4%) were the greatest contributors to total TFA intakes in the Irish diet (IUNA, 2008). In a previous FSAI survey, average TFA levels of 1.7g/100g (≈ 9% TFA as % of total fat) and 1.8g/100g (≈ 5.7% TFA as % of total fat) for lamb and Irish cheddar cheese respectively, were recorded (FSAI, 2008). For the majority of fast-food products in the current survey, some ingredients were of animal origin e.g. beef, lamb and cheese and as such it would be expected that a contribution to the total level of TFA would come from these sources in addition to I-TFA if present. However, it was not possible to calculate the relative contributions naturally occurring and I-TFA make to the recorded total levels of TFA in the current survey.

At present, there are no methods of analysis applicable to a wide range of foods that can distinguish absolutely between natural TFA and I-TFA in foods. This is because there is overlap in the TFA isomer profiles found in fats of animal origin (e.g. dairy products, beef, lamb) and those found in products containing I-TFA from ingredients such as hydrogenated oils. Some products in the current survey with ingredients of animal origin had a higher ratio of vaccenic acid to elaidic acid as expected. However, this was not a consistent finding across all samples containing ingredients of animal origin. The current survey like the previous (FSAI, 2008) indicates that it is not reliable to use TFA isomer profiles to distinguish between natural TFA and I-TFA.

A functional challenge faced by the fast-food industry relative to decreasing the TFA content of their products is the quality of the products they produce (Nielsen, 2006). Manufacturers of fast-foods must consider the functional properties of the products they produce if TFA are to be reduced or removed (Loh, 2005). In some instances when TFA levels are reduced the SAT content may increase with subsequent effects on functional properties such as oxidative stability and shelf-life (Gebauer et al. 2007). For example, oils that are not hydrogenated are less stable and are more susceptible to oxidation than hydrogenated oils (Gebauer et al. 2007). However, food manufacturers are producing oils (e.g. high-oleic sunflower, canola and safflower oils, palm kernel oil etc.) which are naturally stable and can be incorporated into fast-food products (Loh, 2005). One international fast-food company for example, uses vegetable oil, which is a blend of high oleic sunflower oil, high oleic rapeseed oil and rapeseed oil.

The low levels of TFA in the current survey corroborate industry commitments to reduce levels of TFA in fast-foods in Ireland. However, there are some indications that the industry's efforts to reformulate fast-foods and reduce TFA levels may result in increased levels of SAT. Over 34% of surveyed products had high levels of SAT fat with some outlets having over half of their surveyed menus high in SAT fats. While industry efforts to reduce consumption of TFA are welcome, the increasing use of alternatives such as SAT fats is of concern. Irish research (Joyce et al, 2008) has indicated that total and SAT fat intakes in Irish adults are above UK recommendations (HMSO, 1991). In 2007, the UK Scientific Advisory Committee on Nutrition (SCAN) reported that further reductions in intakes of TFA in the diet could have detrimental impacts on the lipid profile of diets and intakes of animal based products (SACN, 2007). Evidence from a recent Irish survey of food consumption suggests future public health actions should focus on reducing total and SAT fat intakes and not specifically on reducing TFA intakes (IUNA, 2008).

For the purposes of the current survey, levels of TFA in fast-foods should be read in conjunction with SAT when commenting on their effects on serum LDL-C and the perceived increased risk for CHD. SAT and TFA raise total cholesterol and LDL-C and are known to increase the risk of CHD, while dietary MUFA and PUFA play important roles in maintaining cardiovascular health (IHF, 2007).

Based on product weights from the current survey, portions of fast-foods from established national and international fast-food chains were often smaller than those from the more traditional chip-shop. The larger portion size of fast-foods from these traditional chip shops often resulted in high levels of TFA, SAT and total fat from these products per/portion in comparison to similar products from national and international fast-food chains. As such portion control is an important consideration in controlling intakes of TFA and other fat such as SAT in the Irish diet (Church, 2008).

In conclusion the results of the survey indicate that in general low levels of TFA are present in the surveyed fast-food menu items. A high of 0.6 grams TFA per 100 grams of product was recorded, with the highest overall levels in burger products that contained cheese and onion rings. Lower levels ranging from 0.2 - 0.5 grams TFA per 100 grams of product were found in burgers with and without cheese, sausages, processed chicken, battered fish products, pizzas, fries, cheesecake, kebabs and breakfast sandwiches. Many products were found to contain either non detectable levels or levels at the reporting limit for TFA and these products included vegetable burgers and various desserts. However, levels of total fat and SAT fats in many surveyed products are high and public concerns over the health effects of TFA have become the focus of much debate while perhaps ignoring the public health issues concerning high levels of SAT and total fat in fast-food products.

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Annex 1 Accreditations and Experience of Testing Laboratory

The following information was provided to the FSAI:

1. Proof and details of current scope of laboratory accreditation *(i.e. United Kingdom Accreditation Service –Accreditation Certificate - Testing Laboratory Number 0730 – Bodycote LawLabs - Issued 16/02/2007)*. Schedule of Accreditation issued by United Kingdom Accreditation Service to Bodycote LawLabs - Issued 25/07/2007 - Testing Laboratory Number 0730

2. Proof of participation in external proficiency tests and inter-laboratory comparison schemes *(i.e. FAPAS Proficiency Test Order Confirmation for 2007-2008 and z-scores from FAPAS Oils & Fats Report 1461 for saturates, monounsaturates, polyunsaturates and total TFA; FAPAS Proficiency Test 0153- August-September 2007 Report. Laboratory 44* 1 *is Bodycote LawLabs using CEM Smart Trac Rapid Fat Analysis System using accredited method AM195/IHM/C)*

3. Full details of analysis methodology including information on the limits of detection (LOD) and quantitation (LOQ), use of internal standards and certified reference materials, method performance details etc. Validation data which was submitted as part of Bodycote LawLabs extension to scope for UKAS accreditation in July 2007 for AM195, total fat by NMR

4. Proof of practical experience in analysing food samples for total fat content, fatty acid profile and in particular TFA profiles.