Danish data on *trans* fatty acids in foods
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This report is written by The Ministry of Food, Agriculture and Fisheries of Denmark and The Danish Technical University, National Food Institute in 2014

Photo: Colourbox

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ISBN 978-87-93147-02-7
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BACKGROUND

Trans fatty acids (TFA) occur naturally in dairy products and fats from ruminants as a result of bacterial bio hydrogenation.

In addition, TFA are formed industrially by partial hydrogenation of unsaturated fatty acids from vegetable and marine oils. The aim of this hydrogenation is to produce fats with improved oxidative and thermal stability as well as modified physical properties (e.g. raised solid fat contents and melting points). Industrially produced trans fatty acids (IP-TFA) can represent up to 60 g per 100 g fat in certain food samples, whereas the level of ruminant trans fatty acids (R-TFA) is only up to 6 g per 100 g fat in e.g. dairy products and ruminant meat\(^1\),\(^2\),\(^3\).

Danish legislation

In 2002, Denmark notified a Danish regulation introducing protection measures concerning TFA in foods (Order No. 161 of 11 March 2003)\(^4\). The order introduced a maximum level of 2 g TFA per 100 g of edible oils and fats of vegetable origin, thus applying to IP-TFA, only.

In June 2003 Denmark introduced these protection measures concerning TFA in food. As of 1 January 2004 the level of IP-TFA in oils and fats intended for the consumer must not exceed 2 g per 100 g of fat. The rules do not apply to naturally occurring content of TFA in animal fats (beef and milk – R-TFA).

The measure covers all oils and fats for use in foodstuffs placed on the Danish market.

Originally, products labeled with “free from TFA” could not contain more than 1 g IP-TFA per 100 g fat. This was abandoned by the Order No. 312 of 26 March 2010\(^5\).

\(^3\) S. Stender, J. Dyerberg, A. Bysted, T. Leth, A. Astrup: A trans world journey. Atheroscler Suppl. 2006, 7, 47-52.
\(^4\) Annex 1.
\(^5\) Annex 2.
Scientific background

The scientific background for the Danish regulation in 2004 was a risk assessment\(^6\) requested by the Danish Veterinary and Food Administration and carried out by the National Nutritional Council on the basis of the international scientific studies carried out in this area. Furthermore, a number of international organizations, including the World Health Organization (WHO)\(^7\) and The European Food Safety Authority (EFSA) Panel on Dietetic Products, Nutrition, and Allergies\(^8\), recommend, that the intake of TFA should be limited as much as possible. Accordingly, the Nordic Nutrition Recommendations 2012\(^9\) stated that the intake of TFA should be kept as low as possible.

The scientific results, which have been confirmed in several more recent scientific studies as well as in opinions by international scientific bodies, are summarised here.

**IP-TFA and saturated fatty acids (SFA) and relationship to cardiovascular disease**

The detrimental health effects of TFA have been extensively discussed since the early 1990s where among others; Willett et al.\(^10\)

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published the first results from the Nurses Health Study. It is now well-established in the scientific literature that intake of IP-TFA is associated with increased risk of developing cardiovascular disease, whereas the effects of R-TFA are still debated\textsuperscript{12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23}.

A number of studies\textsuperscript{17, 20, 24, 25} indicate that IP-TFA are more harmful than SFA.

EFSA concluded\textsuperscript{9} that, gram for gram, TFA may cause more damage to the heart than SFA. TFA not only boost the level of Low Density Lipoprotein (LDL) cholesterol, as SFA do, but they also reduce the amount of High Density Lipoprotein (HDL) cholesterol, which helps stop arteries clogging. Hydrogenation also destroys some of the cis poly- and monounsaturated fats (PUFA and MUFA) in vegetable oils that help lower LDL cholesterol.

Partly replacing SFA with PUFA and MUFA (oleic acid) from vegetable dietary sources (e.g., olive or rapeseed oils) is an effective way of lowering LDL-cholesterol concentration. Replacement of SFA or TFA with PUFA or MUFA decreases the LDL/HDL-cholesterol ratio. Replacing SFA and TFA with PUFA reduces the risk, for example, of coronary heart disease, and replacement of SFA and TFA with MUFA from vegetable dietary sources (e.g., olive or rapeseed oils) has similar effects\textsuperscript{10}.

Intake of IP-TFA in dangerous doses from fast food

Studies have shown that it is possible to have a frequent intake of foods, which contain IP-TFA in quantities that would increase the risk of cardiovascular disease.


Opinion of the Scientific Panel on Dietetic Products, Nutrition and Allergies on a request from the Commission related to the presence of trans fatty acids in foods and the effect on human health of the consumption of trans fatty acids, 8 July 2004.

significantly\textsuperscript{26, 27}. A Danish study published in the New England Journal of Medicine in 2006\textsuperscript{27} reveals that average consumption ignores a sizeable percentage of the European population eating IP-TFA in dangerous doses in fast food. Underlining the gravity of this, it was estimated that intake of 5 g IP-TFA corresponding to 2 E\% is associated with a 23 \% increase in the risk\textsuperscript{20}.

**Other adverse effects and no beneficial health effects from dietary TFA**

Scientific bodies have been unable to establish a safe upper level for TFA. In contrary various studies have shown possible adverse health effects not only related to cardiovascular disease, but also in other areas (cancer, diabetes, and deleterious effects on foetuses and newborns) although the indications are not conclusive\textsuperscript{28, 29, 30, 31}.

TFA are not required in the diet and there is no known benefit (health- or other) from dietary TFA. Furthermore, TFA are not synthesised in the human body.

**Reduction of IP-TFA in foods is possible**

IP-TFA present in biscuits, cakes, cookies, pastries, pies, cereal bars, microwave popcorn, fast foods, etc. can be reduced or even eliminated relatively easily\textsuperscript{32}. SFA, which are now an integrated part of a large number of products can also be reduced by carefully selecting the type of oil used, but cannot be completely eliminated. Thus, it is possible to reduce the content of IP-TFA to less than 1 g IP-TFA per 100 g fat\textsuperscript{32}.

Small amounts of IP-TFA are formed during refining, particularly in the last refining stage i.e. during deodorization\textsuperscript{33}. The levels depend among other things on temperature and heating time. At high temperatures and long heating times, quantities below 5 g IP-TFA per 100 g fat can be formed\textsuperscript{34, 35}. At more optimal operation conditions, the content in refined oils can be reduced to below 2 g IP-TFA per 100 g fat\textsuperscript{36, 37, 38, 39, 40}.

**Distinction between IP-TFA and R-TFA**

For control purposes, it is possible in analyses of the content of total TFA in food products to estimate the contributions of IP-TFA and R-TFA, respectively, based on the level of butyric acid (C4:0). It is not technically possible to remove R-TFA from meat and dairy products. However, R-TFA are not present in the diet in such quantities as to present a health risk.

**THE INTRODUCTION OF DANISH LEGISLATION**

**Market development and consequences for the industry**

It is the impression that there was no increase in the price levels of relevant food categories as a result of the TFA rules in the years following the introduction of the Danish TFA Order. Also, the product supply on the Danish market appeared not to be affected by this new legislation.

The Danish industry did not complain that they suffered financial losses, as a result of the introduction of legislation restricting the use of IP-TFA in foods on the Danish market. On the contrary, producers developed new methods of production, improving the production process and in some cases without substituting TFA with SFA, following the introduction of the Danish legislation.

Thus, it appears that the economic consequences for the industry in Denmark following the introduction of the TFA Order have been limited.

**CONTENT OF TFA IN FOODS IN DENMARK**

**IP-TFA in foods on the Danish market**

The content of TFA has been monitored in foods on the Danish market for the last 30 years.

In margarines and shortenings, the level of IP-TFA has gradually declined. In 1999, there was practically no IP-TFA left in margarines. However, due to difficulties with development of alternatives with similar properties, IP-TFA was present in shortenings until 2004.

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Very important, the IP-TFA content was generally reduced in margarines and shortenings without increasing the amount of SFA, but with an increased level of MUFA.

The TRANSFAIR Study from 1995 was designed to estimate the intake of TFA all over Europe. The highest amounts in Danish foods were found in frying fat and French fries from the two large burger chains as well as in popcorn and in various types of cakes, cookies, biscuits, and Danish pastry.

Danish surveys - analysis of IP-TFA in foods in Denmark
The Danish Veterinary and Food Administration in collaboration with the National Food Institute, Technical University of Denmark carried out a number of surveys of the content of TFA in foods on the Danish market before and after the Danish regulation was introduced 1 January 2004.

Products were selectively collected on the basis of existing knowledge about, which food categories would typically contain IP-TFA. Corrections were made from the contribution of R-TFA from fat in milk. It was presumed that the mean content of butyric acid in fat from milk is 3.6% and that the mean content of R-TFA in fat from milk is 6%.

Food samples were collected in 2002-3, 2004-5, 2006-7, 2010 and 2012-13.

Results
The desired effect of the Danish regulation is clear from the results. Most of the products complied with the regulation already in 2004-5 (Figure 1). In following years (2006-7, 2010 and 2012-13) only occasional transgressions have been found.

Thus, the surveys demonstrate a continually decrease in the number of products, which do not comply with the Danish maximum limit for TFA.

The content of IP-TFA in products, which did not comply with the Danish TFA Order, varied from 3 to 54 g IP-TFA per 100 g of fat (see Figure 2 A-E).

Figure 2 A-E expresses only samples containing more than 2 g IP-TFA per 100 g fat.

In 2002-3 a total of 65 products out of 253 analysed products (26 %) contained more than 2 g IP-TFA per 100 g fat. 14 out of

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Figure 2.A-E
Food products from the five campaigns with more than 2 g IP-TFA per 100 g of fat.
The levels are expressed in g IP-TFA per 100 g fat for comparison with the content specified in the Danish Order. The numbers at the X-axes represent sample numbers.
253 products (5%) contained more than 20 g IP-TFA per 100 g fat and 6 out of 253 products (2.4%) contained more than 40 g IP-TFA per 100 g. In the following surveys only a few products were found to contain more than 20 g IP-TFA per 100 g fat.

Exceeding levels of IP-TFA were typically found in cakes, biscuits, cookies, waffles, microwave popcorn, French fries and deep fried potatoes as well as in some types of candy, in particular caramel (see Table 1).

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<tbody>
<tr>
<td>Chocolate and confectionery products</td>
<td>2 (43)</td>
<td>1 (11)</td>
<td>0 (1)</td>
<td>1 (11)</td>
<td>0 (2)</td>
</tr>
<tr>
<td>Sweets</td>
<td>8 (19)</td>
<td>0 (15)</td>
<td>0 (2)</td>
<td>1 (8)</td>
<td>0 (2)</td>
</tr>
<tr>
<td>Cakes</td>
<td>14 (63)</td>
<td>1 (21)</td>
<td>1 (5)</td>
<td>0 (27)</td>
<td>0 (18)</td>
</tr>
<tr>
<td>Cookies</td>
<td>22 (49)</td>
<td>8 (40)</td>
<td>1 (15)</td>
<td>3 (19)</td>
<td>2 (30)</td>
</tr>
<tr>
<td>Biscuits</td>
<td>3 (26)</td>
<td>0 (7)</td>
<td>0 (1)</td>
<td>0 (2)</td>
<td>4 (18)</td>
</tr>
<tr>
<td>Fruit spread</td>
<td>2 (2)</td>
<td>0 (2)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Microwave oven popcorn</td>
<td>2 (17)</td>
<td>0 (6)</td>
<td>1 (1)</td>
<td>0 (5)</td>
<td>0 (4)</td>
</tr>
<tr>
<td>French fries and frozen potatoes</td>
<td>8 (23)</td>
<td>3 (23)</td>
<td>1 (12)</td>
<td>0 (13)</td>
<td>0 (10)</td>
</tr>
<tr>
<td>Fast food (tortilla, taco, pie, spring roll)</td>
<td>1 (7)</td>
<td>4 (7)</td>
<td>0 (5)</td>
<td>1 (7)</td>
<td>0 (4)</td>
</tr>
<tr>
<td>Ice cream and catering products</td>
<td>3 (4)</td>
<td>0 (10)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Margarines, shortenings and frying oils</td>
<td>0 (0)</td>
<td>0 (6)</td>
<td>0 (3)</td>
<td>1 (4)</td>
<td>0 (7)</td>
</tr>
<tr>
<td>Total</td>
<td>65 (253)</td>
<td>17 (148)</td>
<td>4 (45)</td>
<td>7 (96)</td>
<td>6 (95)</td>
</tr>
</tbody>
</table>

It was the experience that the industry either reduced the level of IP-TFA in products found to contain too high levels or replaced the products with alternative products.

**Replacement of TFA with other fats**

Generally, it is important to compare the fatty acid profiles before and after reduction in the content of IP-TFA in foods to evaluate the beneficial effects of the elimination.

SFA are the most obvious choice of fatty acids to substitute IP-TFA due to the similar functionality associated with the melting point of these fatty acid groups. However, on the proportion of the individual SFA e.g. stearic acid versus the shorter chain SFA from e.g. coconut fat, which affect cholesterol levels differently 17, 25, 50.

Replacement with MUFA is preferred over PUFA because PUFA are more susceptible to oxidation, especially after frying, than MUFA and SFA.

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**Investigating fatty acid profiles in Danish surveys**

In order to investigate the overall effect of substitution, the entire fatty acid profile must be considered. That is exactly what was done with the results from the five surveys of the content of TFA in foods on the Danish market.

Paired samples (defined as samples included in two of the five investigations and with higher levels of IP-TFA in the first determination than in the second) were identified and the fatty acid profiles of these products were compared.

**Results**

In more than two thirds of the products (e.g. sweets, cakes and cookies as well as fast food such as pie and tortilla), IP-TFA were mainly substituted with SFA as expected (see Figure 3).

In some cases, the SFA source was coconut fat increasing the content of the lower-molecular-weight fatty acids, e.g. lauric acid, whereas in other cases, palm oil was added instead of partially hydrogenated oils, increasing the content of palmitic acid. The texture/crispness of most of these products is very essential and therefore the properties of the substituted fat must be almost equal to those of the replaced fat.

On the contrary, most French Fries and frozen potatoes products were enriched in MUFA, resulting in significantly healthier products.

The levels of IP-TFA in fried products from the big burger chains are particular important in relation to intake of IP-TFA due to their widespread use.

The adjustments were made relative quickly for e.g. frying oils and ready to eat French fries whereas certain baking applications apparently needed more time to adjust. The demand for longer time to eliminate TFA from baking products was probably due to difficulties in finding alternative fats with usable properties as well as the existence of many small and medium-sized baking companies in contrast to the big burger chains.

It is important to notice that a lot of new fat alternatives have been developed during recent years e.g. mixtures of complete hydrogenated fats and unhydrogenated fats (instead of partial hydrogenation of the fats)\(^{51}\), enzymatic interesterification (more specific than chemical interesterification)\(^{52, 53}\), and emulsifier-liquid oil blends\(^{54}\).

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INTAKE OF IP-TFA IN DENMARK


Estimation of the IP-TFA content in foods and IP-TFA intake

Five surveys of the content of TFA in foods on the Danish market were carried out as described in a previous section.

In order to find the TFA content in foods in years without analytical results, a linear decrease in TFA content from e.g. 1995 to 2002-03 was assumed and the content for each year reduced proportionally to the years between 1995 and 2002.

Three calculations have been carried out:
1) A calculation with the average of the content in all the samples including zero from 2002-03, 2004-05, 2006-07, and 2010.

2) A calculation with the average of the content in all the samples with a content of TFA called worst case. It is assumed that people in many cases will have considerable brand loyalty, which the worst case calculation to some extent can compensate for.

3) A calculation with the highest of the content in all the samples called worst worst case. It is assumed that people in many cases will have considerable brand loyalty, which this case calculation to some extent can compensate for.

Estimations of the intake of IP-TFA were done on basis of the dietary intake registered by DANSDA57 for the populations 2000-02, 2003-04 and 2005-08 using the Gies-system58.

A special database for the IP-TFA content of the foods used in the Gies-systems recipes, the standard recipes for calculation dietary intake, were developed based on the work described above, and intake of IP-TFA were calculated for each population.

Dietary intake of IP-TFA related to age and gender

In the period 2000 to 2008 the average intake of IP-TFA decreased in all age groups of the Danish population (Table 2).

The intake is highest among adolescents 10-17 years of age. The intake in the average calculations ranges from 0.19-0.30 g/day in 2000-02, 0.11-0.14 g/day in 2003-04 and 0.01-0.03 g/day in 2005-08.

In both average and worst case calculations (Table 3) the intake in 2005-2008 has decreased to a tenth of the level in 2000-2002 in most age groups.


57 DANSDA (Danish National Survey of Diet and physical Activity)
58 Gies: General Intake Estimation System, an in-house developed software for calculation intake of compounds on basis of dietary registration, recipes and compound content databases.
Table 2
Intake (g/day) of IP-TFA (average (Avg), standard deviation (SD), 5th (P5) and 95th percentile (P95)), calculated as average intake for three age groups and gender

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<td>Avg</td>
<td>SD</td>
<td>P5</td>
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<td>Avg</td>
<td>SD</td>
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<td>Avg</td>
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<td>4-9 years of age</td>
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<tr>
<td>Male (n=256)</td>
<td>0.21</td>
<td>0.25</td>
<td>0.73</td>
<td>0.14</td>
<td>0.17</td>
<td>0.50</td>
<td>0.02</td>
<td>0.03</td>
<td>0.08</td>
</tr>
<tr>
<td>Female (n=234)</td>
<td>0.23</td>
<td>0.29</td>
<td>0.78</td>
<td>0.13</td>
<td>0.14</td>
<td>0.37</td>
<td>0.01</td>
<td>0.02</td>
<td>0.07</td>
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<td>10-17 years of age</td>
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<tr>
<td>Male (n=231)</td>
<td>0.29</td>
<td>0.74</td>
<td>0.84</td>
<td>0.15</td>
<td>0.25</td>
<td>0.43</td>
<td>0.02</td>
<td>0.04</td>
<td>0.13</td>
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<tr>
<td>Female (n=248)</td>
<td>0.30</td>
<td>0.47</td>
<td>0.97</td>
<td>0.16</td>
<td>0.24</td>
<td>0.83</td>
<td>0.02</td>
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<td>0.07</td>
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<td>18-75 years of age</td>
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<tr>
<td>Male (n=1467)</td>
<td>0.21</td>
<td>0.30</td>
<td>0.78</td>
<td>0.13</td>
<td>0.20</td>
<td>0.49</td>
<td>0.03</td>
<td>0.04</td>
<td>0.10</td>
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<tr>
<td>Female (n=1684)</td>
<td>0.19</td>
<td>0.39</td>
<td>0.70</td>
<td>0.11</td>
<td>0.19</td>
<td>0.46</td>
<td>0.02</td>
<td>0.03</td>
<td>0.08</td>
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Table 3
Intake (g/day) of IP-TFA (average (Avg), standard deviation (SD), 5th (P5) and 95th percentile (P95)), calculated as worst case intake for three age groups and gender

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<td>Avg</td>
<td>SD</td>
<td>P5</td>
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<td>Avg</td>
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<td>4-9 years of age</td>
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<tr>
<td>Male (n=256)</td>
<td>0.30</td>
<td>0.35</td>
<td>0.101</td>
<td>0.27</td>
<td>0.31</td>
<td>0.85</td>
<td>0.02</td>
<td>0.04</td>
<td>0.09</td>
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<tr>
<td>Female (n=234)</td>
<td>0.32</td>
<td>0.40</td>
<td>0.101</td>
<td>0.25</td>
<td>0.30</td>
<td>1.07</td>
<td>0.02</td>
<td>0.02</td>
<td>0.07</td>
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<tr>
<td>10-17 years of age</td>
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<tr>
<td>Male (n=231)</td>
<td>0.41</td>
<td>0.79</td>
<td>0.122</td>
<td>0.26</td>
<td>0.46</td>
<td>0.78</td>
<td>0.02</td>
<td>0.05</td>
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<tr>
<td>Female (n=248)</td>
<td>0.43</td>
<td>0.58</td>
<td>0.147</td>
<td>0.23</td>
<td>0.32</td>
<td>0.86</td>
<td>0.02</td>
<td>0.03</td>
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<td>18-75 years of age</td>
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<tr>
<td>Male (n=1467)</td>
<td>0.35</td>
<td>0.46</td>
<td>0.121</td>
<td>0.30</td>
<td>0.40</td>
<td>1.08</td>
<td>0.03</td>
<td>0.04</td>
<td>0.11</td>
</tr>
<tr>
<td>Female (n=1684)</td>
<td>0.30</td>
<td>0.47</td>
<td>0.108</td>
<td>0.24</td>
<td>0.31</td>
<td>0.83</td>
<td>0.02</td>
<td>0.03</td>
<td>0.09</td>
</tr>
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</table>
In all age groups the 5th percentile shows a zero intake both in the average and worst case calculations, whereas the 95th percentile with worst case calculations shows an intake of 1.22-1.47 g/day in 2000-2002 among adolescents and the 95th percentile decreases to 0.07-0.13 g/day in 2005-08.

The worst worst case calculations show as expected the highest intakes (Table 4). The intake has a range from 0.51-0.77 g/day in 2000-2002 and decreases to 0.06-0.12 g/day in 2005-2008.

Table 4
Intake (g/day) of IP-TFA (average (Avg), standard deviation (SD), 5th (P5) and 95th percentile (P95)), calculated as worst worst case intake for three age groups and gender

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<tbody>
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<td></td>
<td>Avg</td>
<td>SD</td>
<td>P5</td>
<td>P95</td>
<td>Avg</td>
<td>SD</td>
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<td>Avg</td>
<td>SD</td>
<td>P5</td>
<td>P95</td>
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<td>&lt; 0.05</td>
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Figure 4
Average intake (g/day) of IP-TFA for three age groups and gender
The 95th percentile shows an intake of 2.4 g/day for the adolescents 10-17 years of age in 2000-2002, whereas the 95th percentile intake of children and adults is just below 2 g/day.

Figure 4 shows a significant decrease in average intake of IP-TFA over time among the three age groups and by gender as calculated on the basis of the Danish National Surveys of Diet and Physical Activity 2000-2002, 2003-2004 and 2005-2008.

The current average intake of IP-TFA and even the 95th percentile do not constitute a health problem in Denmark. However, the present results show that without the Danish regulation, it would have been possible that certain population groups with eating habits including frequent consumption of fast food, French fries, microwave popcorn, chocolate bars and the like would have daily intakes of IP-TFA well above average levels in the general population.

ESTIMATE OF THE CONSEQUENCES FOR HEALTH STATUS

In 2004 the Danish Nutrition Council recommended on the basis of the existing scientific knowledge about the relationship between the intake of IP-TFA and the risk of developing cardiovascular disease that IP-TFA should not be used in foods and that the use of IP-TFA in foods should be phased out as soon as possible.

Studies have shown that it is possible to have a frequent intake of foods, which contain IP-TFA in quantities that would increase the risk of cardiovascular disease significantly. Stressing the severity of this, it was estimated that intake of 5 g IP-TFA corresponding to 2 E% is associated with a 23% increase in the risk of cardiovascular disease.
The detrimental health effects of TFA have been extensively discussed since the early 1990s. It is now well-established in the scientific literature that intake of IP-TFA is associated with increased risk of developing cardiovascular disease. Also, it has been documented that a frequent intake of foods, which contain IP-TFA in quantities that would significantly increase the risk of cardiovascular disease, is possible. Furthermore, TFA causes more adverse effects to the heart gram for gram than SFA and there is no known benefit (health- or other) from dietary TFA.

Since 2004 the level of IP-TFA in oils and fats intended for the consumer has been restricted by law in Denmark. The level of IP-TFA must not exceed 2 g per 100 g of fat.

It appears that the economic consequences for the industry in Denmark following the introduction of the TFA Order and the effect on market supply and product prize levels have been limited.

The Danish authorities have analyzed the content of IP-TFA in selected foods on the Danish market every second year since 2000 and results show that the Danish regulation have had the desired effect. In fact, IP-TFA disappeared from fast food, sweets, biscuits, fruit spread, and catering products as well as from margarines and shortenings after the Danish regulation was introduced.

Accordingly, there was a significant decrease in average intake of IP-TFA after the regulation, corresponding to about a tenth of the level prior to the regulation in most age groups of the Danish population.

In conclusion, the Danish investigations demonstrate that the content of IP-TFA in foods on the Danish market has been reduced to a level without significance for the intake of TFA in Denmark and without significance to the possible adverse health effects from IP-TFA.
ANNEX 1 ORDER ON THE CONTENT OF TRANS FATTY ACIDS

1. ------IND- 2002 0216 DK- EN- ------ 20020619 ---- PROJET

Order No. 160 of 11 March 2003

**Courtesy translation**

Order on the content of *trans* fatty acids in oils and fats etc.

The following is laid down pursuant to Section 13, Section 55, subsection 2 and Section 78 subsection 3 of Act No 471 of 1 July 1998 on foodstuffs etc. (Foodstuffs Act):

**Chapter 1**

**Scope**

**Section 1.** This Order applies to oils and fats, including emulsions with fat as the continuous phase which, either alone or as part of processed foodstuffs, are intended, or are likely, to be consumed by humans.

**Subsection 2.** The Order does not apply to the naturally occurring content of trans fatty acids in animal fats or products governed under other legislation.

**Subsection 3.** The Order only applies to products sold to the final consumer.

**Section 2.** It is prohibited to sell the oils and fats covered by the Order to consumers if they contain a higher level of the trans fatty acids defined in the Annex than that stated in Section 3.

**Section 3.** As from 1 June 2003, the content of trans fatty acids in the oils and fats covered by this Order must not exceed 2 grams per 100 grams of oil or fat, cf. however subsection 2.

**Subsection 2.** From 1 June 2003 until 31 December 2003 the oils and fats covered by this Order and included in processed foodstuffs which also contain ingredients other than oils and fats and which are produced by the foodstuffs industry, in retail outlets, catering establishments, restaurants, institutions, bakeries etc. may, however, contain up to 5 grams of trans fatty acids per 100 grams of oil or fat.

**Section 4.** In products which are claimed to be “free from trans fatty acids”, the content of trans fatty acids in the finished product shall be less than 1 gram per 100 grams of the individual oil or fat.
Chapter 2

Penalty provisions etc.

Section 5. A fine shall be imposed on anyone who contravenes Section 2 or Section 4 of this Order.

Subsection 2. The penalty may increase to imprisonment for up to two years if the contravention was committed wilfully or through gross negligence, and the contravention
1) caused damage to health or led to the risk thereof, or
2) resulted in, or was intended to result in, financial gain for the perpetrator themselves or for others, including as a result of savings made.

Subsection 3. Criminal liability may be incurred by companies etc. (legal entities) in accordance with the rules of Chapter 5 of the Penal Code.

Section 6. This Order shall enter into force on 31 March 2003.

Subsection 2. Products manufactured before this Order has entered into force, as well as products manufactured within the periods stated in Section 3(2), may be sold until expiry of the best before date.

Definition of trans fatty acids

For the purposes of this Order, trans fatty acids are defined as the sum of all fatty acid isomers with 14, 16, 18, 20 or 22 carbon atoms and one or more trans double bonds, i.e. C14:1, C16:1, C18:1, C18:2, C18:3, C20:1, C20:2, C22:1, C22:2 fatty acid trans isomers, but only polyunsaturated fatty acids with methylene interrupted double bonds.
ANNEX 2 AMENDMENT TO DANISH ORDER ON TRANS FATTY ACIDS

Bekendtgørelse om ændring af bekendtgørelse om om indhold af transfedtsyrer i olier og fedtstoffer m.v.

§ 1

I bekendtgørelse nr. 160 af 11. marts 2003 om indhold af transfedtsyrer i olier og fedtstoffer m.v., som ændret ved bekendtgørelse nr. 1477 af 14. december 2006, foretages følgende ændringer:

1. § 4 ophæves.

2. I § 5 udgår »og § 4 «.

§ 2

Denne bekendtgørelse træder i kraft d. 1. maj 2010.

Fødevarestyrelsen, den 26. marts 2010
Esben Egede Rasmussen