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TRANSforming the food supply

Report of the Trans Fat Task Force Submitted to the Minister of Health

June 2006

The Trans Fat Task Force was formed in early 2005 to provide the Minister of Health with concrete recommendations and strategies to effectively eliminate or reduce processed trans fats in Canadian foods to the lowest level possible. This multi-stakeholder Task Force was co-chaired by Health Canada and Heart and Stroke Foundation of Canada.

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June 12, 2006

The Honourable Tony Clement
Minister`s Office – Health Canada
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Dear Minister,

As Co-Chairs of the Trans Fat Task Force, we are very pleased to submit to you the Final Report of the Trans Fat Task Force entitled "TRANSforming the Food Supply — Report of the Trans Fat Task Force". The Task Force was formed in early 2005 with a mandate to provide the Minister of Health with concrete recommendations and strategies to effectively eliminate processed trans fats in the Canadian food supply.

We would like to acknowledge the diligence, expertise and commitment of all members of the Task Force in preparing the recommendations contained in this report. In presenting this report to you, the Task Force has attempted to address all of the components of its mandate and to deal with the many issues inherent in such a complex subject. While the Task Force recognizes that the full impact of its recommendations on business and trade could not be assessed in the course of its mandate, an initial assessment is provided.

An interim report, as called for in our terms of reference, was submitted to Health Canada in the summer of 2005.

Our final report is being submitted later than originally anticipated and, indeed, later than mandated. While the federal election accounts for some of this delay we also acknowledge our own responsibility for deciding that the process to arrive at the recommendations needed to be as comprehensive and as evidence-based as possible. We thus take full responsibility for deciding to take the time necessary to try to achieve this end. We also took the time to reach a consensus on the final recommendations from a broad multi-sectoral membership composed of individuals from the food manufacturing and food service sectors, federal government representatives from a number of different departments and

agencies, professional associations, academia, consumer groups, population health experts and oilseed producers and processors. While our terms of reference allowed for the submission of minority reports from Task Force members we are pleased to confirm that to our knowledge, none will be forthcoming.

We would also like the acknowledge the tremendous amount of work, dedication, expertise and support we received from the Task Force Secretariat, specifically that of Ms. Lydia Dumais and Dr. Nimal Ratnayake as well as the supportive work of the health policy staff of the Heart and Stroke Foundation of Canada.

We very much look forward to the public release of the report later this month. We trust we have provided your government with a strong basis on which to proceed and are anxious to receive your response.

In closing we would like to personally thank you for the opportunity to serve as Co-Chairs of this Task Force and to commend the government for establishing this unique partnership between a government department and a voluntary sector organization to bring forward important public policy recommendations.

Sincerely,

Dr. Mary R. L'Abbé, Co-chair

Director, Bureau of Nutritional Sciences
Canada

Ms. Sally Brown, Co-chair

CEO, Heart and Stroke Foundation Health
of Canada

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Executive Summary

This document represents the final report of the Trans Fat Task Force to the federal Minister of Health. The Task Force was formed in early 2005, following passage of an opposition motion in the House of Commons in November 2004. The motion called on Health Canada and the Heart and Stroke Foundation of Canada to co-chair a multi-stakeholder task force with a mandate to develop recommendations and strategies "to effectively eliminate or reduce processed[1] trans fats in Canadian foods to the lowest level possible."

What Are Trans Fats?

Industrially produced trans fats are formed during partial hydrogenation, a process used by the food industry to harden and stabilize liquid vegetable oils. Among other advantages, this process maintains the taste and smell characteristics of oils enabling a longer shelf life for final food products.

The majority of the trans fats in our diet are industrially produced and are typically found in foods made with partially hydrogenated oil, primarily baked and fried foods. The trans fat content of some of these foods may be as high as 45% of the total fat in the product.

Trans fats also occur naturally. They are found at low levels (generally 2–5% of fat content) in ruminant-based foods such as dairy products and beef, although the level in lamb may be as high as 8%.

Health Concerns and International Response

There is a significant and growing body of evidence linking trans fats to coronary heart disease indicating trans fats may do even more harm than saturated fats. Metabolic studies, for instance, show that trans fats increase blood levels of LDL ("bad") cholesterol and decrease blood levels of HDL ("good") cholesterol. Both effects are strongly associated with increased coronary heart disease. Saturated fats are thought to be less damaging because they elevate both the "bad" and "good" types of cholesterol. Epidemiological data also point to a greater risk of coronary heart disease from increases in dietary trans fats than from increases in dietary saturated fats.

In 2002, the Panel on Macronutrients of the U.S. National Academies of Science, Institute of Medicine, recommended that trans fat consumption be as low as possible while ensuring a nutritionally adequate diet. The Panel did not set a safe upper limit because the evidence suggests that any rise in trans fat intake increases coronary heart disease risk. Subsequently, in 2003, the World Health Organization recommended that trans fat intake be limited to less than 1% of overall energy intake — a limit regarded by that body as a practical level of intake consistent with public health goals.

Governments have started to take notice. In 2003, Denmark became the first country to set an upper limit on the percentage of industrially produced trans fat in foods, limiting trans fats

[1] The terms "processed trans fats" and "industrially produced trans fats" are used interchangeably in the report. The former term was used in the Parliamentary motion, but most experts and Task Force members preferred the latter.

from sources other than meats and dairy products to a maximum of 2% of total fat in each food item. In 2005, Canada became the first country to regulate the mandatory labelling of trans fats on prepackaged foods. And, in 2006, the United States introduced the mandatory declaration of trans fats in foods containing 0.5 grams or more per serving.

Situation in Canada

In Canada, scientists raised concerns about the detrimental effects of trans fats and the levels in the Canadian diet as far back as 1990. However, the use of partially hydrogenated oils continued to increase. By the mid-1990s, researchers estimated that Canadians had one of the highest intakes of trans fats in the world.

Today, the situation is much improved. Mandatory nutrition labelling and heightened consumer awareness have prompted food manufacturers to reduce or eliminate trans fats from many processed foods sold in grocery stores. For example, almost all bread products and salad dressings are now free of trans fats. Significant progress has also been achieved in certain food categories such as french fries and snack foods.

Despite the good news, however, many other foods — including some varieties of baked goods, oriental noodles, snack puddings, liquid coffee whiteners, microwave popcorn, toaster pastries, hard margarines and shortenings — still contain high amounts of trans fats. There is also evidence that consumer awareness and labelling alone will not result in reformulation of all processed foods with higher trans fat content as this change may present additional challenges and costs to some manufacturers.

Voluntary guidelines for providing nutrition information to consumers have recently been developed by the restaurant and food service sector. However, it is difficult to gauge the impact of this voluntary action on trans fat intake.

Task Force Approach

To ensure that its recommendations would be based on the best available evidence, the Task Force collected information from a variety of sources. Studies commissioned by Agriculture and Agri-Food Canada, a review of available alternatives to partially hydrogenated fats and oils by the Expert Committee on Fats, Oils and Other Lipids, a targeted scan of processed foods sold in grocery stores and a public consultation with the food industry enabled the Task Force to assess the feasibility of reducing the use of processed trans fats. The Task Force also commissioned a comprehensive scientific literature review and sought advice from internationally recognized experts on the health implications of substituting other fatty acids for trans fats.

The work of the Task Force was also informed by a modelling initiative undertaken by Health Canada to demonstrate the effect of limiting the trans fat content of foods on the total dietary intake of trans fats, as well as by expert opinion on the outcomes of the Danish and Canadian regulatory approaches to date.

The Choice of a Regulated Approach

Taking all the evidence into consideration, the Task Force agreed to a regulatory approach to effectively eliminate trans fat in all processed foods or reduce it to the lowest possible level. Factors influencing the decision included:

- The need to target the full range of food products;
- The Danish experience with regulation;
- The lessons learned from nutrition labelling and other related initiatives;
- The need to send a consistent and strong signal to seed growers and oil producers to invest in healthier alternatives; and
- The fact that benefits would accrue even to people who do not read labels, including vulnerable groups with lower incomes and/or lower literacy skills, who have a higher risk of coronary heart disease.

Designing the Regulations

Once the decision to recommend a regulatory approach had been taken, the Task Force considered a number of factors in setting the appropriate regulatory limits for Canada including:

- The evidence on the health effects of trans fats and the fact that trans fats have no intrinsic health value above their caloric value;
- Current dietary recommendations regarding trans fats (including the World Health Organization's recommendation that trans fat intake of daily diets should be 1% of energy intake or less);
- The unavoidable presence of trans fats in typical diets (including naturally occurring and industrially produced);
- Comments from a Danish scientific expert that similar overall health benefits would have been achieved in Denmark if the legislated level of trans fat had been slightly higher; and
- The desire to find a level that would permit the use of a range of healthier alternatives.

The Task Force also took into account two of its working principles — feasibility and sustainability — as well as the desire to simplify compliance and enforcement.

Recommendations

Given the dietary patterns of Canadians, including the amount of food consumed outside the home, the Task Force felt that it was important to find a solution that would encompass both manufactured foods and foods prepared in retail and food service establishments (e.g. in restaurants, food service operations and some grocery store bakeries and outlets). For practical reasons, however, the Task Force decided to limit the trans fat content of manufactured foods on a *finished product* or *output* basis and the content of foods prepared on site in retail and food service establishments on an *ingredient* or *input* basis.

The recommended regulations apply equally to all foods, domestic or imported, as per other Food and Drug Regulations. They do not apply to ingredients sold to food manufacturers as, in this case, limits would be set on a *finished product* or *output* basis.

The Task Force recommends that:

> Foods purchased by retailers or food service establishments from a manufacturer for direct sale to consumers be regulated on a finished product or *output* basis and foods prepared on site by retailers or food service establishments be regulated on an ingredient or *input* basis.

In setting the recommended limits, the Task Force decided to explore a dual approach: a lower limit for vegetable oils and soft, spreadable tub-type margarines and a higher limit for all other foods containing industrially produced trans fats.

Setting a limit for "all other foods" was the more challenging task. This is because some foods contain both naturally occurring and industrially produced trans fats and there is no officially accepted analytical method for determining the amounts of each type of trans fat. Ultimately, the Task Force decided to set a limit that would be low enough to ensure a significant reduction in industrially produced trans fat and also have a limited impact on amounts of naturally occurring trans fats.

The recommendations thus focus primarily on the elimination of industrially produced trans fats but are expressed as limits on the total amount of trans fats in foods. An advantage of this approach is that it is consistent with that used for the Canadian nutrition labelling regulations, which apply to both industrially produced and naturally occurring trans fats.

The Task Force recommends that:

> For all vegetable oils and soft, spreadable (tub-type) margarines sold to consumers or for use as an ingredient in the preparation of foods on site by retailers or food service establishments, the total trans fat content be limited by regulation to 2% of total fat content.
>
> For all other foods purchased by a retail or food service establishment for sale to consumers or for use as an ingredient in the preparation of foods on site, the total trans fat content be limited by regulation to 5% of total fat content. This limit does not apply to food products for which the fat originates exclusively from ruminant meat or dairy products.

The modelling carried out for the Task Force indicates that, with an upper limit of 5% on the trans fat content of all foods that are significant sources of industrially produced trans fats, the average trans fat intake of Canadians should decrease by at least 55%. In addition, most of the industrially produced trans fats would be removed from the Canadian diet, and about half of the remaining trans fat intake would be of naturally occurring trans fats. At this level, the average daily intake of trans fats for all age groups would represent less than 1% of energy intake, consistent with current dietary recommendations. A lower limit would not provide a significant additional decrease in average trans fat intake, but it would increase the effort and challenge for industry.

The Task Force felt the implementation of its recommendations should be staged to reflect the challenges to the food industry and to optimize public health benefits. For example, for certain oil uses (especially frying) adjustments can be made quickly. However, small businesses and certain baking applications may need more time to adjust.

The Task Force therefore recommends a "2 + 2" approach, allowing up to two years to develop regulations and up to two years for implementation such that:

> Regulations be finalized by June 2008.
>
> A basic phase-in period be set at one year from the date of entry into force of the final regulations.
>
> Extended phase-in periods be specified for certain applications (e.g. baking) and for small and medium-sized firms, recognizing that in most cases the transition could be made within two years of the date of entry into force of the final regulations.

Size, complexity of the operation, number of products and availability of alternatives should be factored in when deciding timelines and any extensions. These can best be determined through the business impact test, which is a normal government procedure when regulations are drafted.

To maximize the health benefit to Canadians, the Task Force further recommends that:

> The Government of Canada and all concerned food industry associations urge companies affected to use the most healthful oils for their food applications. (A list of more healthful alternatives for a variety of food applications can be found in appendix 14 of the report.)

The Task Force also recommends a number of incentives for industry and other key players to meet the following objectives:

- Facilitate the reformulation of food products with healthier trans fat alternatives;
- Help the food industry communicate the healthier nature of its products to consumers;
- Help small and medium-sized enterprises prepare for compliance; and
- Enhance the capacity of the Canadian agri-food industry to take a leadership role in this area.

Further, the Task Force recommends that the Government of Canada, in consultation and cooperation with public health experts and appropriate voluntary agencies, explore a number of measures to enhance public understanding of the new food labels, raise awareness of the health effects of the various types of fatty acids, ensure that fat consumption is properly understood in the context of a more healthful diet.

Finally, the Task Force recommends that, in order to expand the availability of evidence and fill identified research gaps, the Government of Canada encourage the relevant federal granting councils and/or federal departments to support research on trans fats in the areas of clinical nutrition, food and agriculture, and population and public health, beginning with the issues set out in this report. The Government should help ensure that the research results are transferred to relevant decision-makers.

Anticipated Impact

The proposed regulations, broad-based industry incentives and research will:

- Significantly improve the heart health of Canadians and save lives;
- Reduce the average daily intake of trans fats by Canadians of all age groups to less than 1% of energy intake, consistent with current dietary recommendations;
- Ensure that all Canadians, particularly those at the highest consumption levels, benefit from the virtual elimination of industrially produced trans fats;
- Provide an approach that is feasible and consistent with Canada's approach to nutrition labelling;
- Promote the development of alternative supplies of more healthful alternatives to trans fats; and
- Help level the playing field for all players in the food industry that must effectively eliminate industrially produced trans fats from their products.

1.0 Introduction

This document represents the final report of the Trans Fat Task Force to the federal Minister of Health. The Task Force was formed in early 2005, following passage of an opposition day motion, by a vote of 193 to 73, in the House of Commons in November 2004.[1] The motion, sponsored by the New Democratic Party, called on Health Canada and the Heart and Stroke Foundation of Canada to co-chair a multi-stakeholder task force whose mandate would be "to provide the Minister of Health with concrete recommendations and strategies to effectively eliminate or reduce processed trans fats in Canadian foods to the lowest level possible." (See Appendix 1 for the Task Force Terms of Reference.)

The members of the Task Force were selected by its co-chairs based on nominations requested from a wide range of groups with a stake in the trans fat issue. The membership included individuals from the food manufacturing and food service sectors, the federal government, health non-governmental organizations, professional associations, academia, consumer groups, and oilseed producers and processors. (See Appendix 2 for a complete list of Task Force members.) Members were selected for their knowledge of subject areas relevant to the trans fat issue and were not expected to represent or defend their organizations' positions regarding the proposed recommendations.

In presenting its recommendations, the Task Force was asked to provide:

- An overview of the health implications of identified trans fat alternatives through an assessment of the health benefits and risks of each alternative;
- An evaluation of the ability of alternatives to meet quality and consumer acceptability needs for various product applications;
- An evaluation of the implications of each alternative for the food supply chain (e.g. seed growers, oil processors/suppliers, distributors, manufacturers, retailers, restaurant and food service operators, and consumers);
- The appropriate minimum level of trans fat achievable in foods in Canada;
- An appropriate phase-in period, taking into account the time required to increase the supply of alternatives to meet demand and the time required to reformulate food products; and
- An assessment of the trade implications of the proposed Canadian strategy on food imports and exports.

In May 2005, the Task Force co-chairs appeared before the House of Commons Standing Committee on Health to provide parliamentarians with an update on the Task Force's work. In the late summer of 2005, the Task Force provided an interim report to the Minister of Health, as per its terms of reference, that focused on public education, labelling, and possible immediate opportunities for the food service and food manufacturing industries to effectively eliminate trans fats.

[1] "Pursuant to Order made Thursday, November 18, 2004, the House proceeded to the taking of the deferred recorded division on the motion of Mr. Martin (Winnipeg Centre), seconded by Mr. Comartin (Windsor–Tecumseh), — That, in the opinion of this House, the federal government should acknowledge processed trans fatty acids are harmful fats, which are significantly more likely to cause heart disease than saturated fats; And that this House hasten the development of replacements to processed trans fats by urging the government to enact regulation, or if necessary legislation within one year, guided by the findings of a multi-stakeholder Task Force, including the Heart and Stroke Foundation of Canada and following the consultation process with scientists and the industry currently underway; Therefore, this House calls on the government to enact regulation, or if necessary present legislation that effectively eliminates processed trans fats, by limiting the processed trans fat content of any food product sold in Canada to the lowest level possible." [Canada. Parliament. House of Commons. *Journals of the House of Commons*. 38th Parliament, 1st session, No. 30, November 23, 2004. (Available online: <http://www.parl.gc.ca/38/1/parlbus/chambus/house/journals/030_2004-11-23/030Votes-E.HTML>]

2.0 Context

Industrially produced trans fats[2] — or trans fatty acids — are formed during partial hydrogenation, a process used by the food industry to impart hardness and stability to liquid vegetable oils such as soybean and canola oils. Among other advantages, this process maintains the taste and smell characteristics of oils, enabling a longer shelf life for the final food products.

The majority of the trans fats in our diet are industrially produced and typically found in foods made with partially hydrogenated oil. These foods are predominantly baked and fried goods such as crackers, cookies, doughnuts, pastries, muffins, croissants, french fries and breaded foods. The trans fat content of certain types of these foods may be as high as 45% of the total fat in the product, although levels of trans fat in other varieties of these foods have been reduced considerably in recent years due to the efforts of a number of companies. (See Appendix 3.)

Trans fats are also found at low levels (generally 2–5% of fat content) in ruminant-based foods such as dairy products and beef, and the level in lamb may be as high as 8%. These trans fats are from "natural sources," that is, the trans fat from a ruminant animal (e.g. cow, sheep or goat) is produced by the normal action of bacteria in the animal's intestinal tract.

There is a significant and growing body of evidence linking trans fats to coronary heart disease and indicating they may do even more harm than saturated fats. Metabolic studies, for instance, show that trans fats increase blood levels of LDL ("bad") cholesterol and decrease blood levels of HDL ("good") cholesterol. Both effects are strongly associated with increased coronary heart disease. Saturated fats are thought to be less damaging because they elevate both the "bad" and "good" types of cholesterol. Epidemiological data cited by the Danish Nutrition Council also point to a greater risk of coronary heart disease from increases in dietary trans fats than from increases in dietary saturated fats.[3]

In 2002, the Panel on Macronutrients of the U.S. National Academies' Institute of Medicine recommended that trans fat consumption be as low as possible while ensuring a nutritionally adequate diet.[4] The Panel members did not set a safe upper limit because the evidence suggests that any rise in trans fat intake increases coronary heart disease risk. They also acknowledged that trans fats are unavoidable in ordinary diets. Subsequently, in 2003, the World Health Organization advised that trans fat intake be limited to less than 1% of overall energy intake — a limit regarded by that body as a practical level of intake consistent with public health goals.[5]

In Canada, scientists raised concerns about the detrimental effects of trans fats and their levels in the Canadian diet as far back as 1990, recommending that these levels not increase.[6] The warnings led to the development of a number of margarine products with low trans fat levels, targeted to health-conscious consumers. However, while some

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2 The terms "processed trans fats" and "industrially produced trans fats" are used interchangeably in this report. The former term was used in the parliamentary motion, but most experts and Task Force members prefer the latter term.

3 S. Stender and J. Dyerberg, *The Influence of Trans Fatty Acids on Health* (Danish Nutrition Council, 4th ed., 2003).

4 Institute of Medicine, *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* (Washington, D.C.: National Academies Press, 2002).

5 World Health Organization (WHO), *Diet, Nutrition and the Prevention of Chronic Diseases*, WHO Technical Series Report 916 (Geneva, 2003). The WHO also recommended limiting intakes of saturated fats to less than 10% of daily energy intake, recognizing that not all saturated fats have similar metabolic effects.

6 Health and Welfare Canada, *Nutrition Recommendation – The Report of the Scientific Review Committee* (Ottawa, 1990).

progress was being made in the margarine sector, the use of partially hydrogenated oils continued to increase in other categories of processed foods. By the mid-1990s, using both dietary intake data and analysis of human tissue samples, researchers estimated that Canadians had one of the highest intakes of trans fats in the world.

In recognition of this increase and the impacts on the health of Canadians, Canada became the first country to regulate the mandatory labelling of trans fats on prepackaged foods.[7] Canadian labelling regulations were promulgated on December 12, 2002, and became mandatory on December 12, 2005. (See Appendix 4.) For small companies (annual food sales of less than $1 million), the requirement to implement the regulations was extended to 2007. As a result of the labelling legislation, as well as mounting consumer concerns about trans fats, many companies have been working to reduce trans fat levels in their products. However, more needs to be done if industrially produced trans fats are to be effectively eliminated from processed foods in Canada.

Other countries have also responded to the evidence linking trans fats and coronary heart disease. In January 2006, for example, the United States introduced the mandatory declaration of trans fats in foods containing levels of 0.5 grams or more per serving. Meanwhile, Denmark has adopted a very different approach. Rather than impose labelling requirements, Denmark became the first country to set an upper limit on the percentage of industrially produced trans fat in foods. In March 2003, acting on recommendations from the Danish Nutrition Council, the Danish Veterinary and Food Administration introduced an Executive Order limiting trans fats from sources other than meats and dairy products to a maximum of 2% of total fat in each food item, with a phased-in implementation from June 2003 to January 2004.

The Danish approach was based on the assumption that ending the use of industrially produced trans fats would have no negative impact on either health or the quality of food. The Danish Nutrition Council was also the first health authority to consider basing its recommendations on a possible difference between the health effects of naturally occurring and industrially produced trans fats — though it acknowledged that the assumption of any difference in health effects was based on very little data.

In Canada, the Danish experience led some groups to argue that a government-imposed ban would hasten the reduction of trans fats in the Canadian diet and affect a broader range of foods than nutrition labelling. This viewpoint, coupled with heightened awareness of the dangers of trans fats among the Canadian public — the proportion of Canadians reporting awareness surged from 45% in 1998 to 79% in 2005 (see Appendix 5) — formed a favourable background for political action and prompted the introduction of the trans fat motion in the House of Commons in November 2004.

[7] The Nutrition Facts table on the label must declare the trans fat content of food along with the content of 12 other nutrients. In Canada, a declaration of "0 grams" of trans fat may be made on the label if the trans fat content is less than 0.2 grams per serving; the limit for mandatory declaration in the United States is 0.5 grams.

3.0 Methodology

3.1 Principles and Criteria

Four key principles were developed by the Task Force as a framework for the development of its final recommendations:

1) There will be a significant net health benefit to Canadians through food consumption.[8]

2) Recommendations must be feasible and sustainable.

3) Recommendations will be based on the best available evidence and current state of knowledge, and built on learnings from previous experiences (e.g. with nutrition labelling).

4) Solutions will be multi-faceted, comprehensive, integrated and multi-sectoral.

In addition, several criteria were used to further refine the framework and assess the recommendations. (See Appendix 6.)

3.2 Literature Review

The Task Force commissioned a literature review from Dr. Bruce McDonald (Task Force secretary) to help inform the discussion among Task Force members and the scientific experts attending the public consultation held on November 2, 2005. The review documented the available scientific evidence on the health effects of trans fats and identified gaps and key issues to be raised during the consultation. (See Appendix 7 for an executive summary of the literature review and the full reference list.)

3.3 Task Force Meetings and Public Consultations

The Task Force held three full-day, face-to-face meetings (on April 1, June 14 and November 3, 2005) and five teleconferences (on March 9, October 13, November 21 and December 9, 2005, and May 2 to 4, 2006). In addition, members communicated via numerous email exchanges and secure website postings, and engaged in one-on-one telephone conversations with the Task Force co-chairs. (The work of the Task Force was limited during the January–February 2006 federal election period as per government policy.) Drafts of the final report were circulated for comments by members on January 20, March 3 and April 26. During the course of its work, the Task Force also held two public consultations, one with industry and another, as mentioned above, with scientific experts.

3.3.1 Consultation with Industry

The objective of this consultation was to build a better understanding of industry issues and concerns pertaining to the reduction and effective elimination of industrially produced trans fats. Industry stakeholders were offered an opportunity to present their points of view in writing or at a public meeting held in Ottawa on June 13, 2005. An open invitation to the meeting was sent out to a variety of industry representatives, and 12 appeared in person before the Task Force.

[8] The Task Force spent some time debating the merits of adding the word "significant" to this principle, as it was defined differently by individual members. However, the intent is as follows: that any public policy change that brings with it market distortions and costs should not be undertaken unless the benefits are significant enough to warrant the change. There was a concern that if trans fats were simply replaced by saturates, the net health benefit, while positive, might not be all that significant given the negative health effects of saturates. The Task Force unanimously agreed that its work should seek to ensure that healthier alternatives to trans fats would minimize the replacement of trans fats by saturated fats.

Written feedback was invited through a questionnaire posted on Health Canada's website a few weeks before the meeting. The questionnaire outlined key information gaps identified by the Task Force in the early stages of its work and posed questions to industry to find out:

- What has it done to reduce trans fats?
- What problems is it facing?
- What are the potential implications of trans fat reduction?
- What are the current and future trans fat alternatives?
- What are the timelines for trans fat reduction and/or elimination in product lines?

Food manufacturers, retailers and oilseed producers and processors, as well as other industry representatives, provided feedback. (Appendix 8 provides the full questionnaire and a summary of the presentations.)

3.3.2 Consultation with Scientific Experts

On November 2, 2005, the Task Force held consultations in Ottawa to hear from internationally recognized scientists on the following issues:

- The health implications of alternatives to the use of partially hydrogenated oils; and
- The population health implications of potential policies for reducing the consumption of trans fats.

Eight experts from Canada and around the world appeared before the Task Force in person or via video conference. As well, a number of written submissions were received from experts who were unable to attend. The experts were provided with a copy of the literature review and a series of questions in advance to guide their presentations at the meeting. (See Appendix 9 for the questions.) The questions can be summarized as follows:

- What is the relative importance of various biomarkers as they relate to the impact of dietary fat on coronary heart disease risk?
- Would the replacement of partially hydrogenated oils by other types of fats have positive effects on coronary heart disease risk?
- To what extent should the impact of trans fat intake on non-cardiovascular chronic diseases influence recommendations on trans fats?
- Should the ratio of linoleic (omega-6) to alpha-linolenic (omega-3) acid be considered when proposing trans fat alternatives?
- Are there any instances where trans fats could be replaced by saturated fats?
- Should the fact that different saturates may have different effects on coronary heart disease risk influence recommendations regarding the replacement of trans fats by saturated fats?
- Would there still be an overall net health benefit to Canadians if partially hydrogenated oils were effectively eliminated from our food supply but were replaced, in some instances, with butter and tropical oils?
- How could the Task Force's recommendations meet the public health policy goals of reducing the risk of chronic disease, especially among the most disadvantaged subgroups of the population?

3.4 Interim Report

In its terms of reference, the Task Force was mandated to prepare an interim report that would focus on public education, labelling, and possible immediate opportunities for the food service and food manufacturing sectors to reduce trans fats. The interim report was completed in July 2005 and publicly released, along with the Government of Canada's accompanying official response, on August 31, 2005. (See Appendix 10.)

3.5 Situation in the Canadian Marketplace

In June 2005, Health Canada and Food & Consumer Products of Canada conducted a targeted scan of processed foods sold in Canadian grocery stores to gain a better understanding of changes in the use of partially hydrogenated oils in food products. Based on the ACNielsen food classification system, 20 food categories recognized as significant sources of trans fat (using Health Canada data[9]) were selected as potential categories where changes may be happening. Detailed laboratory analysis of the fatty acid com position was carried out for two of these food categories, margarines and granola bars, while label information on fat ingredients and fatty acid composition was collected for foods from the 18 other categories. The label information was used to identify low trans fat food products, which were then sampled and analyzed for further determination of their fatty acid composition. (See Appendix 3.)

3.6 Impact of Modifying the Trans Fat Content of Foods on Dietary Intakes

At the request of the Task Force, Health Canada evaluated the overall effect on the dietary intake of trans fat of restricting the trans fat content of foods according to various scenarios. (See Appendix 11.) Dietary intake data from nutrition surveys conducted in Ontario, Manitoba, British Columbia and Quebec in the late 1990s were used in constructing and evaluating the scenarios. However, baseline food composition values for trans fats were made as current as possible by integrating the latest Health Canada files for food composition. Despite some uncertainty in this modelling exercise, the Task Force is confident that it was based on the best data available and that the results are reasonably indicative of the potential impact of the Task Force's recommendations on the trans fat intake of Canadians.

3.7 Agriculture and Agri-Food Canada Studies

The results of two studies commissioned by Agriculture and Agri-Food Canada in 2005 were provided to the Task Force to contribute to its understanding of the issues:

- "Food Industry Perspective on Eliminating Trans Fats in Food Products"; and
- "Methods & Opportunities for Reducing or Eliminating Trans Fats in Foods."

The results of these studies are summarized in Appendix 12.

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[9] Data compiled from federal and provincial nutrition surveys (1990 to 1999) with an update from the dynamic food composition survey database for trans fat.

3.8 Analysis of Alternative Oils and Fats

At the request of the Task Force, the Expert Committee on Fats, Oils and Other Lipids, a subcommittee of the Canadian Agri-Food Research Council, undertook a grid analysis of the different types of oils and fats that could be substituted for partially hydrogenated vegetable oils. The objective was to develop an overview of the physical and chemical properties of the various oils and fats, by food application. (See Appendix 13.)

The grid developed by the Expert Committee focused on availability and functionality. It predicted what fats and oils would likely be used by Canadian food manufacturers, retailers and food service operators in the next few years if the use of partially hydrogenated vegetable oils were eliminated or decreased to very low levels. The grid does not include high-stearate vegetable oil varieties as an alternative since they were not expected to be readily available in the next few years. The grid provides the projected fatty acid profiles of the various zero to low trans fat shortening and margarine alternatives that were identified for the application categories listed.

3.9 Table of Recommended Healthier Alternatives to Trans Fats

The grid developed by the Expert Committee enabled the Task Force to assess the health benefits and health risks of each alternative. Healthier alternatives identified for the various food applications and the criteria used to assess them are presented in the table entitled "Health Assessment of Existing and Potential Alternatives to the Use of Partially Hydrogenated Oils and Fats." (See Appendix 14.)

4.0 Summary of Results

4.1 Evidence

4.1.1 Expert Opinion — Nutrition Health

As indicated in section 3.2, the Task Force commissioned a literature review to help inform its consultation with scientists. The review enabled the Task Force to develop pertinent questions that were then provided to internationally recognized lipid experts for their consideration and recommendations. (The experts' responses, including references to the questions, are presented in Appendix 9.) Below is a summary of the key learnings.

Biomarkers

All of the consulted experts agreed that there is sufficient evidence to consider the total/HDL cholesterol ratio as the primary biomarker for assessing the effects of dietary fats on coronary heart disease. A marker of inflammation such as C-reactive protein might be a stronger biomarker; however, there is currently a lack of data on the effects of dietary fats on plasma levels of this biomarker.

Effect on serum cholesterol and lipoprotein levels of replacing partially hydrogenated oils with oils rich in monounsaturated fats

There was general consensus that replacing partially hydrogenated oils (containing both trans and saturated fats) with oils high in cis-monounsaturated fatty acids[10] would have positive effects on lipoproteins and coronary heart disease risk. The reduction in risk would, however, depend on baseline trans and saturated fat intakes.

Polyunsaturated fatty acids, including alpha-linolenic (omega-3) and linoleic (omega-6) acids,[11] are also important components of a cholesterol-lowering and more healthful diet. However, the benefits depend to some degree on consuming an appropriate balance of these fatty acids. Comments from the Expert Committee on Fats, Oils and Other Lipids suggest that, while changes to the diet to reduce trans fats are not likely to alter current intakes of omega-3 polyunsaturated fatty acids, these changes may potentially increase the intake of omega-6 polyunsaturated fatty acids to undesirable levels. Thus the use of oils high in cis-monounsaturated fatty acids rather than omega-6 polyunsaturated fatty acids should be considered when choosing substitutes for trans and saturated fats in food products. The goal should be to replace, as much as possible, trans and saturated fats with monounsaturated fats and maintain adequate intakes and a proper balance of omega-6 and omega-3 polyunsaturated fatty acids.

Comparison of trans fats and saturated fats on risk factors for coronary heart disease

There is evidence from both metabolic and epidemiological studies that saturated fats (at least those from dairy products and meat) increase the risk of coronary heart disease. However, there was general consensus among the experts that trans fat is a more important isk factor than saturated fat for coronary heart disease.

Some manufacturers have already succeeded in eliminating most of the trans fats without increasing saturated fats by using cis-monounsaturated fats in certain food categories. In

[10] Cis-monounsaturated fatty acids are fatty acids that have one carbon–carbon double bond in the cis configuration. Oleic acid is the cis-monounsaturated fatty acid most commonly found in foods. Examples of high-oleic oils are canola and olive oils.

[11] Cis-polyunsaturated fatty acids are fatty acids that have two or more carbon–carbon double bonds in the cis configuration. The vast majority of polyunsaturated fat in the diet is linoleic acid, an omega-6 fatty acid that is especially abundant in soybean and sunflower oils. Oily fish represent the richest source of omega-3 fatty acids. Flax seed, canola and soybean oils also contain relatively high levels of omega-3 polyunsaturated fatty acids in the form of linolenic acid.

Europe, the transition from partially hydrogenated frying oils to frying oils and margarines high in cis-monounsaturated fats and low in saturated and trans fats shows that replacing trans fats in fast food, spreads and cooking oils or fats is feasible.

The primary product category that may require the use of a hard fat is baked goods, although this does not apply to every food within this category. At present, the only viable alternative to partially hydrogenated fats in baked goods appears to be fats and oils containing a significant proportion of saturated fatty acids. However, the use of saturates in baked goods should not lead to an overall increase in saturated fat intake as the use of saturates plus trans fats in other categories has been decreasing.

Research from both prospective cohort studies and metabolic studies found that high intakes of trans fat (5.7–11% of energy intake) are more harmful to health than high intakes of saturated fat (14–20% of energy intake), whether the outcomes measured are coronary heart disease events themselves or cholesterol-related biomarkers of such risk. However, no research has been done to determine whether trans fats are more harmful than saturated fats at low levels of intake (1–3% of energy intake).

Relative effects of different types of saturated fats on coronary heart disease risk

Evidence to date on the relative effects of individual saturated fatty acids is sparse. The few randomized metabolic studies that do exist suggest that different saturated fats have varying effects on the total/HDL cholesterol ratio, depending on their individual effects on levels of LDL and HDL cholesterol. Lauric, myristic and palmitic acids, for example, appear to raise LDL cholesterol, while stearic acid either has no effect or slightly reduces LDL cholesterol. All four saturated fatty acids increase HDL cholesterol to different extents, which could be interpreted as counterbalancing their effects on LDL cholesterol. However, while low HDL levels have been linked to increased risk of coronary heart disease, it is not known whether increases in HDL, resulting from saturated fat consumption, have a protective effect.

There is currently no scientific agreement on the relative health effects of saturated fatty acids from plant sources, whether they are derived from natural fats or fully hydrogenated fats.[12] Data are also lacking on the relative effects of liquid oils interesterified[13] with saturated fats or fats high in saturated fatty acids on the risk factors for coronary heart disease. Thus experts consider it prudent to ensure that substitutes for partially hydrogenated oil not lead to large increases in the intake of saturated fats, whether they are derived from natural fats or fully hydrogenated fats.

Net health benefit of replacing partially hydrogenated oils, in some instances, with solid dietary fats that are high in saturated fats

All the invited experts, including those providing written feedback, agreed that butter and other animal fats are not a good replacement for partially hydrogenated oils. Butter has been shown to have a greater adverse effect on the total/HDL cholesterol ratio than all the other solid dietary fats (e.g. palm oil, palm kernel oil and coconut oil) as well as margarines and shortenings with low to moderate levels of trans fats.

[12] As mentioned previously, the manufacturing of some foods requires the use of hard fats high in saturated fatty acids. These hard fats can be obtained synthetically by the full hydrogenation of liquid oils high in monounsaturated and polyunsaturated fatty acids into fats high in stearic acid with a trans fatty acid content between 1% and 2% of total fat.

[13] Interesterification is a process used by oil processors to rearrange or redistribute fatty acids within and among fat (triacylglycerol) molecules. This process can be used as an alternative to partial hydrogenation to increase the hardness and stability of oil blends.

4.1.2 Key Health Learnings

- Metabolic and epidemiologic studies consistently show that trans fats are more harmful than any other type of fat.
- Metabolic studies have demonstrated that trans fats not only elevate LDL ("bad") cholesterol but also decrease HDL ("good") cholesterol.
- Replacing trans fats with saturated fats has some positive effect on health, but the benefits are greater when trans fats are replaced by cis-monounsaturates and cis-polyunsaturates.
- Both adequate intakes and a proper balance of omega-6 and omega-3 polyunsaturated fatty acids are needed to lower coronary heart disease risk.

4.1.3 Social and Economic Determinants of Health

The Task Force also considered the government's ability to affect population health in light of social and economic determinants of consumer behaviour. One expert used the results of a study on margarine consumption to demonstrate that product claims can push up prices, and that regulations governing nutrition labelling or product claims, for example, are not sufficient to significantly reduce the trans fat intake of all Canadians, particularly those in low socio-economic groups. This expert felt that more direct interventions by government are required.

To maximize the population health impact of government intervention, this expert proposed the following two principles:

- Reductions in the trans fat content of particular classes of foods (e.g. margarine) should be applied across the board, that is, to generic, low-cost products as well as premium brands. Changes in product formulation that are restricted to higher-end products will not alter the health risks associated with trans fat consumption among more price-sensitive consumers (e.g. low-income households).
- Reductions in the trans fat content of energy-dense snack foods, baked goods and commercially fried foods should be accompanied by initiatives to shift consumption patterns toward healthier alternatives (e.g. fruits, vegetables and whole grains).

4.2 Situation in the Canadian Marketplace

4.2.1 Availability of Healthier Alternatives

In preparing its recommendations, the Task Force was mandated to provide:

- An overview of the health implications of identified trans fat alternatives through an assessment of the health benefits and risks of each alternative; and
- An evaluation of the ability of alternatives to meet quality and consumer acceptance needs for various product applications.

The Task Force selected four criteria to help identify healthier substitutes for partially hydrogenated vegetable oils (as defined in Appendix 14): health, availability, functionality and cost. Health and availability were "screen" criteria that had to be met by all of the alternatives being considered. More healthful alternatives were then identified for all broad application categories and grouped in the table in Appendix 14.

For frying oils, for example, the Task Force identified as healthier alternatives the new varieties of vegetable oils that are high in oleic acid or low in alpha-linolenic acid (omega-3). These oils offer greater stability under conditions such as repeated use for frying and heating to high temperatures.

For the harder fats used in margarines and shortenings, the Task Force favoured products prepared by the interesterification of highly saturated oils or fully hydrogenated oils with different proportions of non-hydrogenated liquid vegetable oils.

In this context, it is worth mentioning that, during its presentations to the Task Force on June 13, 2005, the food industry proposed reduced trans hydrogenation as one new approach to developing low trans fat alternatives. This oil process, which is not yet fully developed, may hold some promise, and the resulting oil could be considered a healthier alternative in the future once Health Canada has assessed its safety.

The Task Force recognized that, while the switch to healthier oils may be straightforward for some applications, it may be challenging for certain other applications and may necessitate some investment in research and development. Areas for further research include the use of high-oleic and low-linolenic (omega-3) oils, the blending of less stable oils with more stable oils, and changes to the processing and packaging of foods.

In this assessment, the Task Force did not eliminate alternatives based on cost. However, it recognizes that, at least in these early stages of the transition, there may be significant costs associated with the use of less traditional alternatives if changes require modifying processing and packaging methods and buying new equipment.

The greatest challenges and costs are likely to arise when seeking the "perfect" alternative, that is, one that not only offers a better fatty acid profile but also matches the original product for taste, texture, appearance and shelf life. If the use of the healthier substitutes listed in Appendix 14 lessens consumer acceptance of the reformulated food, manufacturers may be tempted to choose some of the less healthful alternatives listed in Appendix 13.

Ensuring an appropriate phase-in period would give industry time to address challenges associated with the use of healthier alternatives and enable it to spread the cost of the transition over time.

4.2.2 Impact on Seed Growers and Oil Processors

According to preliminary studies commissioned by Agriculture and Agri-Food Canada and industry presentations made to the Task Force, reducing the dietary intake of trans fats could have a negative impact on Canadian production and processing of canola and soybean oils. This is because some of these oils are partially

hydrogenated and thus contain trans fats. Removal of these oils from the market could decrease vegetable oil processing in Canada and potentially weaken oilseed production; however, the extent of any negative impact is not clear and could be offset by increased international demand for vegetable oil.[14]

On the positive side, major strides have been made in developing new oilseed varieties (e.g. high-oleic canola) with traits that enable the manufacture of vegetable oils that have greater oxidative stability and longer shelf life. For many applications, this increased degree of oxidative stability enables the use of such oils without the need for hydrogenation. Producers of these new varieties were optimistic regarding future Canadian production capacity and stressed the importance of strong and consistent market signals to keep this trend moving forward.

4.2.3 Fat Composition of Foods Sold at Retail

A targeted national scan of processed foods sold primarily in grocery stores, conducted by Health Canada and Food & Consumer Products of Canada in June 2005, confirmed the Task Force's assumption that the use of alternatives to trans fats was increasing rapidly, although more so in some food categories than in others. Almost all bread products and salad dressings were free of trans fats. Significant progress had also been achieved in certain food categories such as french fries and chips. However, some varieties of baked goods, oriental noodles, snack puddings, liquid coffee whiteners, microwave popcorn, toaster pastries, hard margarines and shortenings still contained high amounts of trans fats. (See Appendix 3.) It was also noted that new and reformulated products with minimal amounts of trans fat were appearing on the market on a regular basis.

In many instances, partially hydrogenated oils had been replaced by oils rich in monounsaturated and polyunsaturated fatty acids — fats that have been identified as healthier alternatives to oils and fats rich in saturated fatty acids. However, alternatives rich in polyunsaturated fatty acids are more prone to lipid oxidation and do not possess the functional characteristics (e.g. an appropriate melting point) needed in processing certain food products. In fact, it was noted that in some food categories (e.g. cookies, snack puddings, crackers, granola bars, oriental noodles and liquid coffee whiteners), partially hydrogenated oils had sometimes been replaced by oils in which 50–100% of total fat was saturated fat.

While these high saturated fat alternatives are still less harmful to health than oils containing high amounts of trans fatty acids, they do not contribute to the goal of reducing coronary heart disease risk and achieving the Task Force's objective of "significant net health benefit." That said, even in some of the more problematic food categories (e.g. crackers and other snack foods), the Task Force noted innovative products that have incorporated more healthful alternative oils. This finding can be attributed to targeted research and development efforts by industry — efforts that should be encouraged.

The Task Force's consultations revealed some concerns regarding the use of trans fats in baby and toddler foods (i.e. foods for children under

[14] Ontario Soybean Growers, *Annual Report 2005* (2005); Canola Council of Canada, Canadian Canola Industry: Market Statistics (December 14, 2005).

two years of age). It seems that increased awareness has already sparked actions by industry,[15] and the Task Force did not devote time to discussing this issue.

In summary, there is good evidence that growing consumer awareness and mandatory nutrition labelling have motivated industry to reduce or eliminate trans fat from many processed foods sold in grocery stores. However, there is also evidence that these factors alone will not result in reformulation of all processed foods, and that some products with higher trans fat content are likely to remain unchanged in the absence of a regulated limit. These include products where it is more difficult for manufacturers to generate an adequate return on the investment required for reformulation. Examples of such products are low-cost foods (oriental noodles), foods consumed for reasons other than nutritional value (cakes and pastries) and foods for which nutrient information is not easily accessible (nachos sold in movie theatres).

4.2.4 Restaurant and Food Service Industry

The Task Force noted that data[16] from federal and provincial surveys suggest that 22% of the average trans fat intake of Canadian adults (and as much as 31% in the case of males aged 19 to 30 years) is provided by foods consumed away from home, often in fast food restaurants and other food service environments. Accordingly, the Task Force felt it was important to address the question of trans fats found in foods in the restaurant and food service sector.

The challenge for the Task Force was to identify mechanisms that could encourage the move away from trans fats in this sector of the food industry. The Task Force considered regulated nutrition labelling and claims, which are useful in the prepackaged sector of the food industry but not as well suited to foods provided by restaurants and other food service operations. Labelling is difficult in this sector because the food is generally not packaged, menus and menu boards offer limited space for nutrition information, food is often customized to order, and preparation is not always standardized. For example, the trans fat content of a large serving of french fries can vary from 0.3 grams to 8 grams, depending on the outlet and the oil used for frying.

Nevertheless, voluntary guidelines for providing nutrition information to consumers have been recently developed by the Canadian Restaurant and Foodservices Association. More than 25 major restaurant chains, representing about 38% of all chain establishments, have committed to participating in the Association's Nutrition Information Program and to providing information on the nutrient content of their products through pamphlets, tray liners and websites. When fully implemented, this initiative will enable consumers who obtain the information to reduce their intake of trans fats.

The restaurant and food service sector has made some progress in reducing the trans fat content of its products. Certain restaurant chains have succeeded in removing trans fat from foods such as french fries, onion rings, chicken strips, battered fish, gravies and salad dressings. In Quebec,

[15] Children under two years of age need a high-fat diet with sufficient amounts of essential fatty acids for proper growth and development. To avoid unduly restricting fat intake because of concerns related to types of fat, Health Canada made it optional to list saturated fat, trans fat and cholesterol on baby and toddler food labels. Recent analysis of baby and toddler foods, including teething biscuits, by Health Canada has shown that the trans fat content of infant foods is minimal (less than 1% of total fat). Beef and lamb preparations and products containing dairy fat contain higher amounts, consistent with the levels that occur naturally in the meat and dairy ingredients.

[16] Data compiled by Health Canada from federal and provincial nutrition surveys (1990 to 1999), with an update from the dynamic food composition survey database for trans fat.

one restaurant chain of 25 outlets appears to have succeeded in eliminating industrially produced trans fat from all 216 of its menu items. With the support of its suppliers, and by developing new products in its central kitchen, this chain took nine months to reformulate or eliminate the 48 items that contained industrially produced trans fat.

Despite the progress, however, it is difficult to get a sense of the extent and depth of these changes in the overall restaurant and food service sector.

4.3 The Danish Model

4.3.1 Description

The Danish government and Danish margarine producers have been world leaders in decreasing the level of industrially produced trans fats in foods. For example, as a result of the Danish Nutrition Council's 1994 report on the effects of trans fats on health, margarine producers agreed to voluntarily reduce the processed trans fat content of their products. In 2001, the Danish Nutrition Council concluded that this action had had a significant impact on Danish trans fat intake. However, there were still concerns about a subgroup in the population that continued to have a high intake of industrially produced trans fats from items such as french fries, microwave popcorn, chocolate bars and fast food.

In 2003, in response to recommendations from the Danish Nutrition Council, the Danish government prohibited the use in foods of oils containing more than 2% of industrially produced trans fat by 2004. Recent analyses of foods that have traditionally been significant sources of industrially produced trans fats clearly demonstrate that these trans fats have been virtually eliminated from foods in Denmark. As well, the analyses showed that international fast food chains, while continuing to sell foods with high levels of industrially produced trans fats in other countries, had reduced the amount of these trans fats in foods sold in Denmark.

4.3.2 Lessons Learned from the Danish Experience

A few salient points can be drawn from the Danish experience:

- According to Danish authorities, the regulations had no noticeable effect on the availability, price or quality (i.e. taste and shelf life) of foods previously containing high amounts of industrially produced trans fats.
- Trans fats were eliminated from margarines without increasing the amount of saturated fats and often with an increase in monounsaturated fats. (The same change has been observed in soft margarines sold in Canada.)
- Although concerns about trans fats had been voiced since 1994, and although margarine producers did take steps to reduce the industrially produced trans fat content of their products, it was only after regulations came into effect that processed trans fats were virtually eliminated from the Danish food supply.
- Multinational restaurant chains continued their operations in Denmark.

- In response to a question from the Task Force on November 2, 2005, Dr. Steen Stender of the University of Copenhagen agreed that the health benefit would probably have been just as significant if a higher limit on industrially produced trans fat, such as 4–5%, had been specified — such a limit would have been equally effective in eliminating foods that are significant sources of industrially produced trans fats from the Danish diet. A higher limit would also have made it unnecessary to discriminate between naturally occurring and industrially produced trans fats in foods.

4.4 Impact of Modifying the Trans Fat Content of Foods on Dietary Intakes

From its deliberations and review of material, the Task Force concluded that the Danish approach — a 2% limit on the industrially produced trans fat content of oils or fats used in foods — would not be the most appropriate course for Canada. A higher limit, which included all sources of trans fat, would be more feasible to implement and could still yield a significant health benefit to the Canadian population.

Before making its final recommendation regarding a limit on the trans fat content of foods, the Task Force asked Health Canada to model the impact of a variety of potential recommendations and limits on trans fat in foods and the resultant intakes across the Canadian population, grouped by age and sex. (See Appendix 11.)

The first step was to estimate the current baseline intake of trans fat for the Canadian population, taking into consideration as much as possible the changes that had occurred in the trans fat content of processed foods since the dietary intake data were collected in the late 1990s. This modelling indicated that the baseline average daily consumption of trans fats for the Canadian population would range between 3 and 9 grams. This range reflects lower intakes than previously estimated (5 to 13 grams).[17] However, it is consistent with the increased availability of "trans fat free" foods on the market during the last year.

Next, three scenarios were developed to assess the impact on dietary intake of limits on the trans fat content of foods. In all three scenarios, the trans fat content of all oils, breads and salad dressings sold at retail was set at a maximum of 2% of total fat, while the trans fat content of foods containing only naturally occurring trans fat was not limited. Where the scenarios differed was in the maximum allowed trans fat content of all other foods, which was set at 3%, 4% and 5% of total fat respectively.

If an upper limit of 5% on trans fats were applied to all foods that are significant sources of industrially produced trans fats, the average trans fat intake of Canadians would decrease by at least 55%. Most of the industrially produced trans fats would be removed from the Canadian diet, and about half of the remaining trans fat intake would be of naturally occurring trans fats. At this level, the average daily intake of trans fats for all age groups would represent less than 1% of energy intake, consistent with the recommendations of the World Health Organization.

[17] W.M.N. Ratnayake and Z.Y. Chen, Chapter 3 in *Development and Processing of Vegetable Oils for Human Nutrition*, edited by R. Przybylski and B.E. McDonald (Champaign, IL: AOCS Press, 1995).

If an upper limit of 4% were applied, the modelling indicates that the average trans fat intake would decrease by an additional 2–3%. In reality, much of this additional reduction would also happen with a 5% limit since most products, once reformulated, would contain smaller amounts than the regulated limit. (See Appendix 3). A reduction of the upper limit to 3% would have even less of an impact.

The recommendations that the Task Force sets out in section 6.0 of this report are provided in the context of an overall, balanced diet as described in *Canada's Food Guide to Healthy Eating*.[18] Consequently, throughout its deliberations, the Task Force has been concerned that consumption of saturated fats should not increase significantly as a result of limitations on trans fats.

There is no reason to believe that limiting trans fat intake would cause the intake of saturated fats to increase above the current combined intake of trans and saturated fats. The targeted scan of the food supply completed by Health Canada and Food & Consumer Products of Canada for the Task Force suggests an improvement in the fatty acid profile of key food categories such as margarines and snack foods, which should largely compensate for increased levels of saturated fats in a few food categories.

In each of the following food categories, analysis of foods demonstrated that partially hydrogenated fats had been replaced mostly by cis-mono- and cis-polyunsaturated fats: breads, margarines, shortening, breaded meats, granola bars, french fries, crackers, chips and nachos. These food categories represent a major portion of the foods identified as key sources of trans fats in the 1990s.

In some food categories such as cookies and oriental noodles, the amount of saturated fat was generally higher in the reformulated products; however, the amount was mostly lower than the combined amount of saturated and trans fats found in products that still contained partially hydrogenated fats.

A minority of "trans fat free" products had a saturated fat content above the combined trans and saturated fat content of similar products containing partially hydrogenated fats (e.g. a sandwich cookie, a liquid coffee whitener and a snack pudding). However, even then, it was sometimes possible to find other products in the same food category with a better fatty acid profile. Clearly, some manufacturers have been able to reformulate with healthier alternatives without increasing saturated fats. These data show that for a large number of food categories it is feasible to replace partially hydrogenated oils with healthier alternatives.

4.5 Trade Aspects of Regulating the Trans Fat Content of Foods

As part of its mandate, the Task Force was asked to assess the trade implications of its recommendations. Although this topic was raised in a number of discussions, the Task Force did not possess the expertise to explore it thoroughly. The issue was addressed primarily through advice from government officials responsible for international programs and international trade policy.

The Task Force was advised that mandating a limit on the trans fat content of foods would not conflict with Canada's international obligations

[18] Health Canada, *Canada's Food Guide to Healthy Eating*, 1992 (currently being revised).

under World Trade Organization agreements, in particular the Agreement on Technical Barriers to Trade. This is because Canada can claim that limiting the amount of trans fats in the Canadian diet is necessary to fulfill the legitimate objective of protecting human health. Canada's position is supported by internationally recognized scientific organizations such as the Institute of Medicine of the U.S. National Academies, the World Health Organization and the Danish Nutrition Council, which agree that the intake of trans fats should be as low as possible. Canada's position is also supported by the fact that other jurisdictions have adopted measures to limit the consumption of trans fats.

If the Task Force's recommendations for regulating the trans fat content of foods are implemented, it is expected that many companies will have to develop or reformulate their products for sale in Canada. However, it is clear that reducing dietary trans fat is a pressing issue in both Canada and the United States, as well as in many other countries. Products developed to meet the Canadian regulatory limits will be marketable in these other countries. The regulation may even give Canadian firms a marketing advantage.

Although the proposed regulation does not conflict with Canada's international trade obligations, it will clearly have some effect on trade. Thus it will be important for Canada to notify its key trading partners and members of the World Trade Organization and provide them with reasonable time to comment. Consideration of the comments received should allow for a comprehensive assessment of the trade implications of the Task Force's recommendations.

The federal government must also pursue discussions with Canada's main trading partner, the United States, to address existing and potential differences as recommended in the Task Force's interim report. (See Appendix 10.) For example, the U.S. approach has been to require the amount of trans fat in foods to be disclosed on the label, but it has placed no limits on trans fat content. Nevertheless, many companies selling in the American market have already reformulated their products to contain less than 0.5 grams of trans fat per serving. At this level they are not required to disclose the trans fat content, even if it is greater than 5% of the total fat content. If a regulatory maximum of 5% of total fat is established for the trans fat content of foods in Canada, companies would no longer be able to sell some of these recently reformulated products in Canada.

5.0 Discussion and Analysis

5.1 Voluntary Guidelines or Regulations?

The Task Force considered which approach to reducing the trans fat content of foods — voluntary guidelines or regulations — would be more effective in improving the health of all Canadians? In making its decision, the Task Force was influenced by the regulatory experience of Denmark, Canada's experience with nutrition labelling regulations, advice received on the social determinants of population health, the members' desire to target the full range of food products, and a request from the edible oil industry for a strong and consistent signal regarding the need for healthier alternatives.

The Danish experience showed that, despite the efforts of Danish margarine producers, it was only after regulations came into effect that processed trans fats were virtually eliminated from the food supply.

Canada has had a similar experience with labelling. Although voluntary nutrition labelling began in the late 1980s (supported by a variety of non-regulatory incentives), it was only after regulations came into effect that labels became universal and their content and look were standardized. The regulations transformed the former patchwork of content and styles into a public health tool that improved the ability of Canadians to make informed food choices.

With the introduction of mandatory nutrition labelling for prepackaged foods, voluntary programs encouraging more nutrition information in fast food restaurants, and the various food industry initiatives to reduce the level of trans fats in foods sold in Canada, it is now possible for health-conscious Canadians to choose a diet low in trans and saturated fats. However, lowering their dietary intake of these fats will continue to be a chore for Canadians unless information on trans fat content is readily available. For example, the targeted scan of processed foods sold at retail found that the nachos and dip sauces from a movie theatre had some of the highest levels of trans fats noted. (See Appendix 3.)

In addition, there are food products whose taste, cost and convenience are more important marketing features and determinants of consumer choice than their nutritional characteristics may be. For these products, nutrition labelling and a voluntary limit on fatty acid composition would likely have little impact, particularly if the change required some compromise on these selling characteristics.

Voluntary guidelines also provide little incentive to change the nutritional characteristics of a product if it cannot be claimed that the resulting food is healthier. Foods whose trans fat content has been reduced must also be low in saturated fat in order to carry a "trans fat free" claim.[19] For many pastries and some snack foods, "trans fat free" claims will not be permitted on reformulated products because the alternative to partially hydrogenated oil generally contains moderate to high amounts of saturated fats. These foods are unlikely to be reformulated unless regulations are promulgated.

[19] In order to carry a "trans fat free" claim, a food must contain less than 0.2 grams of trans fat per serving, as stated on the label, and as per a reference amount specified in the regulations:

- less than 0.2 grams of trans fat; and
- 2 grams or less of saturated fats and trans fats combined (15% or less energy from the sum of saturated fats and trans fats).

Evidence presented to the Task Force concerning margarines also suggests that claims tend to be applied only to high-end products, which are less accessible to price-sensitive consumers. A regulated approach will affect all foods and thus benefit all consumers regardless of their socio-economic status.

All these considerations point away from voluntary compliance and toward regulations limiting the trans fat content of foods as being most effective at the population level. Benefits would accrue even to people who do not read labels, including those with lower incomes or lower literacy skills. As these groups are at a higher than average risk of coronary heart disease, this intervention would better support Canada's national health objectives.

The regulatory approach would also provide a clear signal all along the food supply chain and reduce the uncertainty experienced by the food and edible oil industry. In addition, it would help create a more level playing field for all players.

5.2 Finished Products or Ingredients?

5.2.1 Manufactured Foods

The Task Force concluded that a limit on the trans fat content of the finished product or *output*, rather than its ingredients, would ensure a more level playing field for domestic and foreign manufacturers of processed foods.

5.2.2 Foods Prepared On-Site in Retail and Food Service Establishments

The Task Force tried to determine whether a similar regulation could be applied to foods prepared on-site in retail and food service establishments. In this case, a regulatory limit on the finished product would have to be implemented by thousands of individual businesses, including retail bakeries, grocery stores, restaurants, fast food outlets and food service operations. These establishments are not necessarily in a position to analyze their finished products. Their recipes, menus and product lines often change frequently, and testing every product would be logistically difficult and costly. It would be easier for these establishments (and for regulatory enforcement personnel) if they could rely on a supply of ingredients already formulated to be in compliance with trans fat limits. Thus to simplify compliance and enforcement at the retail and food service level, the Task Force believes it would be better to regulate the trans fat content of ingredients or *inputs*. A regulatory limit on the trans fat content of inputs would shift the regulatory burden up the food supply chain and simplify compliance and enforcement by vastly reducing the number of players involved. Multinational restaurant chains might need to modify some of their menu items for their Canadian operations, as they did in Denmark.

5.3 Choosing the Limits

The Task Force had numerous discussions regarding what level it should recommend as the maximum limit for the trans fat content of foods in Canada. The many factors considered in making this decision are summarized below.

Evidence regarding the serious health effects of trans fats

Evidence on the adverse health effects of trans fats from both observational epidemiology and metabolic studies are consistent and, combined, form a sufficient basis for concluding that trans fats increase the risk of heart disease. It has been estimated that a decrease in trans fat intake of 2% of energy would reduce coronary heart disease risk by 5% or more.

Current dietary recommendations regarding trans fats

There is no physiological requirement for trans fats — they have no intrinsic health value above their caloric value — and therefore their intake should be as low as possible.[20] As stated above, the World Health Organization recommends that the trans fat intake of daily diets should be less than 1% of energy intake.

The unavoidable presence of trans fats in typical diets

The majority of trans fat in foods is industrially produced through the partial hydrogenation of vegetable oils. However, small amounts of trans fats (generally 2–5% of the fat content) are naturally present in dairy products and in meat from cows, sheep and other ruminants, and the trans fat content of lamb may be as high as 8%. These trans fats are formed through biohydrogenation, that is, bacterial transformation of monounsaturated and polyunsaturated fats in the animals' digestive tracts. It is also difficult to avoid the formation of very small amounts of trans fats (0.2–1% of total fat) during the refining of vegetable oils or when using oils for deep frying at high temperatures over long periods.

Industrially produced trans fats versus total trans fats

To date only a few studies have attempted to differentiate between the effects on coronary heart disease risk of industrially produced and naturally occurring trans fats and the data are too scarce to be conclusive.

That said, it should be noted that Canadians' total dietary intake of trans fats has increased dramatically in the past 30 to 40 years because of the proliferation of partially hydrogenated canola and soybean oils and their use in food manufacturing. According to the modelling of trans fat intake conducted by Health Canada, just reversing this trend would reduce trans fat intake to within current dietary recommendations.

The reduction of industrially produced trans fats from processed food, coupled with consumer adherence to dietary guidelines (such as *Canada's Food Guide to Healthy Eating*) that emphasize the consumption of lower-fat dairy products and leaner meats, would result in reduced intake of both industrially produced and naturally occurring trans fats as well as saturated fats.

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[20] Institute of Medicine, *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* (Washington, D.C.: National Academies Press, 2002).

Current definition and methodology used for declaring trans fats on product labels

The definition of trans fatty acids[21] and the methodology for declaring trans fats on product labels that are being accepted internationally are based on the total amount of trans fats, as defined under Codex, American and Canadian nutrition labelling regulations, not just on industrially produced trans fats.

The contribution of low-fat foods to trans fat intake

The Task Force briefly discussed whether low-fat foods should be exempted from a trans fat limit; however, it was felt that low-fat foods do not warrant special treatment because they may contribute significantly to trans fat intake. For example, the consumption of six servings of low-fat foods containing 0.5 grams of industrially produced trans fats would result in an intake of 3 grams of trans fat. This would exceed 1% of overall energy intake.

The trans fat content of healthier alternatives or Innovation in oil processing to produce healthier alternatives

Innovations in oil processing have increased the ability of industry to produce oils and soft, spreadable (tub-type) margarines that contain about 1% (or slightly more) of total fat as trans fat.

The Task Force also wanted to allow use of all available healthier alternatives, including fully hydrogenated oils interesterified with liquid oils. This contributed to the Task Force's decision to choose a higher limit on the trans fat content of foods than the limit set in Denmark.

In addition, for some food applications a harder fat is needed. It is possible to produce hard margarines and shortenings containing less than 2% of trans fat by using palm and palm kernel stearin instead of partially hydrogenated oil made from canola or soybean oils. However, other alternatives available in the North American market such as margarines and shortenings made using fully hydrogenated canola and soybean oils contain between 2% and 4% of industrially produced trans fats. (See Appendices 13 and 14.)

The impact of various limits on dietary intake of trans fat

The results of the modelling in section 4.4 indicate that if a 2% limit applied to vegetable oils and soft, spreadable margarines and a 5% limit to all other foods, the average trans fat intake would decrease by at least 55% and that most of the industrially produced trans fats would be removed from the Canadian diet.

While some Task Force members wished to set a limit on the trans fat content of foods other than vegetable oils and soft, spreadable margarines at a lower level than 5%, the results of the modelling demonstrated the limited additional decrease of trans intake that would occur from imposing a limit lower than 5%. This analysis was supported by the Task Force assessment of the Danish experience and by comments during the consultations by the Danish scientific expert.

Furthermore, according to the Task Force analysis, it would not be easy to apply a lower limit than 5% to foods that contain both industrially produced and naturally occurring trans fats.

[21] Trans fatty acids are isomers of monounsaturated and polyunsaturated fats that contain one or more isolated or non-conjugated (interrupted by at least one methylene group, i.e. CH2) double bonds in the trans configuration (that is, the hydrogen atoms linked to the carbon atoms on both sides of the double bond have an opposite position with respect to the double bond). Canada, *Food and Drug Regulations*. In the cis configuration, these hydrogen atoms are on the same side of the double bond.

Feasibility and sustainability

While the Task Force was mandated to develop strategies for limiting processed trans fats to the "lowest level possible", it was conscious early in the process of the principles of feasibility and sustainability. There was also a desire to simplify compliance and enforcement, ensure a level playing field between the food manufacturing and food service sectors, and make the recommendations clear and easier to understand. All these factors led the Task Force away from recommending limits with multiple levels or a lower limit with various exceptions.

5.4 Research Gaps

One of the key principles guiding the work of the Task Force was that recommendations would be based on the best available evidence and the current state of knowledge. (See Appendix 6.) The Task Force believes that the strength of the current evidence is sufficient to support its recommendations. It recognizes, however, that the current state of knowledge is limited in certain respects. In the coming years it will be important to support research in a number of areas, including but not limited to the following:

5.4.1 Clinical Nutrition Research

- Validating the biomarkers that could be used to assess the impact of different fatty acids on coronary heart disease risk, and examining some of the new markers of inflammation and endothelial integrity and homeostasis.
- Distinguishing between naturally occurring and industrially produced trans fatty acids with respect to their relative impact on the biomarkers of coronary heart disease risk.
- Examining the relative health risks posed by trans fats and saturated fats at low levels of trans fat intake (1–3% energy intake).
- Distinguishing between individual saturated fatty acids with respect to their relative impact on the biomarkers of coronary heart disease risk, in particular at levels of intake at which significant risk can occur.
- Distinguishing between synthetic and naturally occurring fat molecules, particularly triglycerides of high saturated fat content, with respect to the relative impact of the position of fatty acids on the biomarkers of coronary heart disease risk.
- Examining the safety and nutritional properties of novel oils.

5.4.2 Food and Agriculture Research

- Developing more cost-effective and standardized methods for analyzing the fatty acid content of foods in a manner that differentiates among the various trans fatty acids, including distinguishing between their plant or animal origin.
- Determining and monitoring average levels of trans fats and the factors influencing their distribution in Canadian ruminant meat and dairy products produced using different feeding regimes (e.g. grass-fed vs. grain-fed).[22]

[22] Recent research has shown that care practices and choices of feed for ruminants can have a significant impact on the amount and type of trans fat in the meat and milk fat from ruminants. It will be important to determine the health effect of practices which increase naturally occurring trans fat before these practices become widespread.

- Determining and monitoring the impact of reducing trans fat on levels of individual saturated fatty acids and levels of alpha-linolenic (omega-3) and linoleic (omega-6) acids in the Canadian food supply.
- Conducting further research and development in the area of interesterification and hydrogenation, and conducting studies on the safety and trans fat content of the resulting novel fats. Areas for study include chemical and enzymatic processes, and control of these processes.
- Continuing the development of new methods and technologies, including packaging technologies, that would enable more "trans fat free" food products to be produced by the food industry.
- Increasing the range and levels of saturated fatty acids in certain oilseed varieties, and identifying and developing possible new Canadian sources of saturated fats that can be used to produce interesterified fats and oils.

5.4.3 Population and Public Health Research

- Designing effective messages, targeted to key groups, about the consumption of different types of fat.
- Characterizing the fatty acid intake of Canadians, including trans fats from plants and animals, over time.
- Determining the impact of a reduction in trans fat intake on levels of saturated fats, alpha-linolenic acid (omega-3) and linoleic acid (omega-6) in the Canadian diet.
- Identifying the population subgroups at greatest risk of consuming high levels of trans fats, and evaluating their fatty acid intake after implementation of the regulations.
- Assessing the impact of social and economic factors on consumer choices and consumption of different types of fat.
- Identifying ways to shift consumption patterns toward healthier foods (e.g. fruits, vegetables, whole grains and healthier oils).

6.0 Recommendations

The Trans Fat Task Force has developed the following recommendations in response to the clear mandate provided by the Minister of Health, as well as other considerations arising during the course of its work and discussed in the previous section.

The recommendations are arranged in two parts: those that will ensure consumer protection and those that will support consumer awareness and public education. The recommendations for an appropriate regulatory framework are in boldface.

6.1 Consumer Protection

6.1.1 Regulations

The Task Force considered a range of voluntary and regulatory options, and members agreed to a regulatory approach. Among the factors considered were the Danish experience, lessons learned from nutrition labelling and other related initiatives, the need to target the full range of food products, and the need to send a strong and consistent signal to seed growers and oil producers to invest in healthier alternatives.

Application of the Regulations

The goal of the Task Force, given the dietary patterns of Canadians (including the amount of food consumed outside the home), was to find a solution that would encompass all foods sold to consumers in retail and food service establishments (e.g. in grocery stores, restaurants, fast food outlets and food service operations), whether purchased from a manufacturer or prepared on-site.

To simplify compliance and enforcement, the Trans Fat Task Force recommends that:

> Foods purchased by retailers or food service establishments from a manufacturer for direct sale to consumers be regulated on a finished product or *output* basis, and foods prepared on-site by retailers or food service establishments be regulated on an ingredient or *input* basis.

Enforcement of a regulation limiting the industrially produced trans fat content of all manufactured foods purchased by a retail or food service establishment would best be carried out on a finished product or *output* basis, as the Canadian Food Inspection Agency already has responsibility for inspecting manufacturing plants and stocks of imported products. The same desire to simplify enforcement would support the regulation of foods prepared on-site by retail or food service establishments on an ingredient or *input* basis.

Regulatory Limits

The following recommendations recognize the progress achieved by the edible oil industry and all of the considerations mentioned in section 5.3. The dietary intake modelling conducted by Health Canada indicated that the cumulative effect of these recommendations would result in an average daily trans fat intake by all age and gender groups of less than 1% of energy intake, as recommended by the World Health Organization.

The recommendations focus primarily on the elimination of industrially produced trans fats but

are expressed as limits on the total amount of trans fats in foods, since there are no officially accepted analytical methods for distinguishing between the amounts of naturally occurring and industrially produced trans fats in foods. This approach would ensure consistency with the Canadian nutrition labelling regulations, which came into force in December 2005.

For all vegetable oils and soft, spreadable (tub-type) margarines purchased by a retail or food service establishment for sale to consumers or for use as an ingredient in the preparation of foods on-site, the Trans Fat Task Force recommends that:

> The total trans fat content be limited by regulation to 2% of total fat content.

For all other foods purchased by a retail or food service establishment for sale to consumers or for use as an ingredient in the preparation of foods on-site, the Trans Fat Task Force recommends that:

> The total trans fat content be limited by regulation to 5% of total fat content.

This limit does not apply to food products for which the fat originates exclusively from ruminant meat or dairy products.

This set of regulations has been developed to apply equally to all foods, domestic or imported, purchased by a retail or food service establishment in Canada, as per other food and drug regulations. These regulations do not apply to ingredients sold to food manufacturers, as limits have already been set for the finished products they sell to a retail or food service establishment.

Timing for Compliance

New product development is an expensive process. To comply with the new regulations, some enterprises may need to replace or reformulate more than 25% of their products, and this figure could be as high as 100% in some baking enterprises. The significant upfront costs likely mean that some enterprises, particularly small businesses, may have difficulty with a sudden transition to a market where the amount of trans fat is limited. If some firms are given a longer period for compliance, as happened when the nutrition labelling legislation was introduced, they will be able to spread out the cost of developing new products.

The Trans Fat Task Force recommends that timelines be staged to reflect legitimate challenges to implementation and to optimize public health benefits. Adjustments can be made quickly for certain oil uses (especially frying), but small businesses and certain baking applications may need more time to adjust. The Task Force estimates that it would take 12 to 18 months to develop a sufficient supply of high-oleic oils to respond to clear food service demand, expressed through signed contracts.

Some members of the Task Force also pointed out the need to avoid a situation where competition for a limited supply of the available alternatives drives up costs, hurting both industry and consumers.

An enterprise's size, the complexity of the operation, the number of products and the availability of alternatives must all be factored in when deciding timelines and extensions. These considerations were beyond the Task Force's analytical capacity.

The compliance timelines for different types of enterprises should be determined through the business impact test, which is a standard government procedure when regulations are drafted.

Based on these considerations, the Task Force proposed a "2 + 2" approach: two years to develop regulations and up to two years for implementation.

The Trans Fat Task Force recommends that:

> Draft regulations be published in the *Canada Gazette, Part I*, by June 2007;
>
> Regulations be finalized and published in the *Canada Gazette, Part II*, by June 2008;
>
> A basic phase-in period be set at one year from the date of entry into force of the final regulations;
>
> Extended phase-in periods be specified for certain applications (e.g. baking) and for small and medium-sized firms based on demonstrated need, recognizing that in most cases the transition could be made within two years of the date of entry into force of the final regulations, and that only in very special cases or applications would the phase-in period exceed two years.

Choice of Alternatives

The Trans Fat Task Force recommends that:

> The Government of Canada and all concerned food industry associations urge companies affected to use the most healthful oils for their food applications (as identified in Appendix 14) when reformulating foods.

The recommendations that the Task Force sets out in this report are provided in the context of an overall, balanced diet as described in *Canada's Food Guide to Healthy Eating*. Throughout its deliberations the Task Force has kept in mind that consumption of saturated fats should not increase significantly as a result of limitations on trans fats.

Companies should be encouraged to:

- Use oils that are high in monounsaturated fatty acids as primary alternatives to partially hydrogenated vegetable oils for frying purposes; these oils are known for their moderate to high oxidative stability and their contribution to lowering the total/HDL cholesterol ratio and coronary heart disease risk.
- Select oils that are both high in omega-3 polyunsaturated fatty acids and high to moderate in omega-6 polyunsaturated fatty acids (such as canola and soybean oil) as primary sources of vegetable oils in margarines; this measure would improve the ratio of omega-6 to omega-3 fatty acids and lower coronary heart disease risk.

- Choose oils that are moderate in omega-3 and omega-6 polyunsaturated fatty acids in shortenings used in baking and food processing; this measure would also improve the ratio of omega-6 to omega-3 fatty acids and lower coronary heart disease risk.

6.1.2 Incentives

To facilitate the reformulation of food products with healthier trans fat alternatives in accordance with the recommendations in this report, the Trans Fat Task Force recommends that the Government of Canada:[23]

- Explore means to support efforts to develop new trans fat alternatives and help offset the cost of food product reformulation;
- As a priority, actively encourage Canadian research and development facilities to work with industry to develop new oilseed varieties and new trans fat alternatives;
- Facilitate and encourage access to the Scientific Research and Experimental Development Program offered by the Canada Revenue Agency.

To help the food industry communicate the healthier nature of its products to consumers, the Trans Fat Task Force recommends that the Government of Canada:

- Explore the possibility of allowing "trans fat free" claims that are more appropriate for the food service sector.

To help small and medium-sized enterprises prepare for compliance with new regulations, the Trans Fat Task Force recommends that the Government of Canada:

- Develop an effective outreach program aimed at small companies to communicate the changes, encourage early action and provide links to technical assistance.

To enhance the capacity of the Canadian agri-food industry to take a leadership role in this area, the Trans Fat Task Force recommends that the Government of Canada:

- Continue to collaborate with industry in developing new opportunities for the production of canola and other oilseeds.

6.1.3 Research

To fill identified research gaps, including those outlined in section 5.4 of this report, and expand the availability of research results, the Trans Fat Task Force recommends that the Government of Canada:

- Encourage the relevant federal granting councils and federal departments to support research into the issue of trans fats, which would include but not be limited to the key areas outlined in section 5.4, and to ensure that the results of this research are transferred to the relevant policy-makers.

[23] These recommendations are to be considered in conjunction with those that appeared in the Task Force's interim report. (See Appendix 10.)

6.2 Consumer Awareness and Public Education

In addition to the recommendations contained under "Guidance to Consumers" in its interim report (see Appendix 10), the Trans Fat Task Force recommends that the Government of Canada:

- Mount a public awareness campaign, in conjunction with appropriate voluntary agencies, on how to read the new labels, with a particular focus on serving sizes and reference amounts;
- Review and as appropriate revise its messaging with respect to fat consumption in order to more clearly communicate the effects of consuming not only processed trans fats but also other types of fatty acids and to provide consumers with advice;
- Cooperate with organizations and groups that work closely with consumers, particularly low-income consumers, to raise awareness of the health effects of the various types of fatty acids and to offer practical guidance regarding purchasing and dietary habits;
- Move forward on the federal/provincial/territorial Healthy Living Strategy[24] in order to ensure that fat consumption is properly understood in the context of a more healthful diet and physical activity.

[24] The Integrated Pan-Canadian Healthy Living Strategy, approved by Federal, Provincial and Territorial Ministers of Health, provides a conceptual framework for sustained action based on Healthy Living. It envisions a healthy nation in which all Canadians experience the conditions that support the attainment of good health. The goals of the Strategy are to improve overall health outcomes and to reduce health disparities.

7.0 Summary and Conclusions

This report concludes the work of the Trans Fat Task Force. It outlines the methodologies, process, considerations and evidence used by the Task Force in arriving at recommendations to effectively eliminate or significantly reduce processed trans fats in the Canadian diet.

The Task Force consisted of a diverse group of scientific experts, industry stakeholders and public health advocates. While the Task Force members had different stakes in the trans fat issue, all agreed on the negative health effects of trans fats and the need to work together to improve the overall health and well-being of Canadians.

The Task Force noted the impressive progress made by some segments of the food industry in reducing the amount of processed trans fats in foods sold in Canada. However, it was agreed that a regulatory approach would ensure that the trans fats in all processed foods are effectively eliminated or reduced to the lowest levels possible.

In presenting this report, the Task Force has attempted to address all the components of its mandate and to deal with all the issues inherent in such a complex subject. Some issues, such as the international trade implications of regulations, were beyond the expertise of the Task Force members and will need to be dealt with through the normal course of the regulatory development process.

The recommendations in the report illustrate the efforts of the Task Force to find consensus on a challenging and important public health issue. The recommendations also reflect a "made in Canada" solution. While the Danish experience may have motivated action in Canada, the Task Force decided on a uniquely Canadian approach that takes into account the Canadian marketplace, dietary patterns, existing mechanisms such as mandatory labelling and a strong desire to foster the development and use of healthier alternatives to trans fats without relying extensively on saturated fats.

The proposed regulations, broad-based industry incentives and research will:

- Significantly improve the heart health of Canadians and save lives;
- Reduce the average daily intake of trans fats by Canadians of all age groups to less than 1% of energy intake, consistent with current dietary recommendations;
- Ensure that all Canadians, particularly those at the highest consumption levels benefit from the virtual elimination of industrially produced trans fats;
- Provide an approach that is feasible and consistent with Canada's approach to nutrition labelling;
- Promote the development of alternative supplies of more healthful alternatives to trans fats; and
- Help level the playing field for all players in the food industry that must effectively eliminate industrially produced trans fats from their products.

Appendix 1

Final Terms of Reference Task Force on Trans Fat

Purpose

To develop recommendations and strategies to effectively eliminate or reduce processed trans fats in Canadian foods to the lowest level possible.

Mandate of the Task Force

The role of the Task Force will be to provide the Minister of Health with concrete recommendations and strategies to effectively eliminate or reduce processed trans fats in Canadian foods to the lowest level possible by:

- providing by the Spring of 2005 guidance for the food processing and food service industries on interim actions to effectively eliminate or reduce processed trans fats in Canadian foods to the lowest level possible;
- making recommendations by the Spring of 2005 regarding public education and labelling in order to enable consumers to play a role in reducing their own trans fats intake;
- providing recommendations within one year for the introduction and widespread use of healthy alternatives to trans fat-containing oils and fats in order to achieve the objective of effectively eliminating or reducing processed trans fats in Canadian foods to the lowest level possible;
- providing recommendations within one year for an appropriate regulatory framework to achieve the effective elimination of processed trans fat and to support minimizing the content of all trans fat in foods in Canada.

In preparing its recommendations, the Task Force will provide:

- an overview of the health implications of identified alternatives through an assessment of the health benefits and risks of each alternative;
- an evaluation of the ability of alternatives to meet quality and consumer acceptability needs for various product applications;
- an evaluation of the implications of each trans fat alternative on the food supply chain (e.g. seed growers, oil processors/suppliers, distributors, manufacturers, retailers and consumers);
- the appropriate minimum level of trans fat achievable in foods in Canada;
- the appropriate phase-in period taking into account the time required to increase the supply of alternatives to meet demand and the time required to reformulate food products;
- an assessment of the trade implications of the proposed Canadian strategy on food imports/exports.

Guiding Priciples

- Openness, transparency, accountability;
- Balanced representation and inclusiveness;
- Credible, scientific, evidence-based analyses, information and recommendations;
- Adherence to sound principles of risk analysis;
- Practical, feasible recommendations and solutions that are capable of improving public health and that at the same time do not compromise the nutritional quality and safety of Canadian foods;
- Consensus based, but providing opportunities for minority opinions to be expressed and reported;
- Full consideration given to all input to fully characterize the implications of all recommendations.

Reporting

- By the Spring of 2005, provide the Minister of Health with recommendations regarding public education, labelling and any possible immediate opportunities for the food service and food processing industry to reduce trans fats in foods.
- Within one year, provide the Minister of Health with recommendations for both an appropriate regulatory framework and for the introduction and widespread use of healthy alternatives to achieve the objective of reducing trans fat content in foods sold in Canada to the lowest levels possible.

Membership

The membership of the Task Force will be a multisectoral group of knowledgeable individuals capable of providing advice and assistance to the Minister of Health on effectively eliminating or reducing processed trans fats in Canadian foods to the lowest level possible. The membership will follow the principle of inclusiveness but will be of a size that will not impede its effectiveness. It will incorporate a balanced perspective from a wide range of interested external parties with participation from the food processing and food service industry, government, health and consumer interest associations and academia.

Roles and Responsibilities

(a) The roles and responsibilities of the Co-chairs (HSFC and HC) are to:

- Facilitate the multi-stakeholder process consistent with the Terms of Reference for the Task Force;
- Develop a broad outline of the process for collaboration, including a process for receiving input, information and other materials from a range of stakeholders for the consideration by the Task Force in developing its recommendations;
- Establish a decision-making model for consideration and endorsement by the Task Force;
- Identify and agree on the broad composition of the Task Force, including the maximum number of members and the range of interests and expertise to be reflected;

- Ensure broad stakeholder input into the process recognizing the wide range of interested parties;
- Work together to realize the goal by keeping the process on track, on timeline and within established budget;
- Jointly represent the Task Force by providing updates to the Standing Committee on Health and others as needed.

(b) The roles and responsibilities of the Task Force members:

- Work together to realize the mandate of the Task Force to develop recommendations and strategies, including a regualtory framework, to effectively eliminate or reduce processed trans fats in Canadian foods to the lowest level possible within a reasonable and feasible time-frame, for presentation to the Minister of Health;
- Participate on working groups or subcommittees of the Task Force as needed;
- Participate through written, electronic and telephone interaction or participate in meetings of the Task Force as needed;
- Provide and share information related to the mandate and to assist in the development of recommendations of the Task Force;
- Participate in consultations with stakeholders and interested parties;
- Support broad stakeholder input into the process recognizing the wide range of interested parties

(c) The roles and responsibilities of the Secretariat:

Health Canada will provide a Secretariat to support the work of the Task Force including the organization of meetings and other interactions between Task Force members as required; and arranging for the preparation and distribution of documents.

Term

Members are appointed for the duration of the project (expected to be approximately twelve months).

Meetings

A large portion of the work will be conducted through written, electronic and telephone interaction between the Task Force members, however some face-to-face meetings will be needed throughout the process at the call of the Co-chairs.

Proposed Task Force Membership

Health Canada/Heart and Stroke Foundation of Canada, Co-chairs - 2

Government - 6

Industry Associations - 6

Voluntary/NGO Sector - 6 or 7

Scientific/Academic Experts - 3

Appendix 2

Task Force Membership

Chairs

Mary L'Abbé
Director
Bureau of Nutritional Sciences
Health Canada

Sally Brown
Chief Executive Officer
Heart and Stroke Foundation of Canada

Secretariat

Lydia Dumais
Project co-ordinator
Bureau of Nutritional Sciences
Health Canada

Cynthia Piazza
Admin. Assistant
Bureau of Nutritional Sciences
Health Canada

Secretary

Bruce E. McDonald
Professor Emeritus
Department of Human Nutritional Sciences
University of Manitoba

Members

Carla Barry
National Manager
Fair Labelling Practices Program
Canadian Food Inspection Agency

M. T. Clandinin
Professor of Nutrition
Director, Alberta Institute for Human Nutrition
University of Alberta

Jeanne Cruikshank
(until July 11, 2005)
Vice President Atlantic Region
Canadian Council of Grocery Distributors

Catherine Donovan
Medical Officer of Health
Eastern Region Newfoundland
Health Promotion Advisory Committee of the
Heart And Stroke Foundation of Canada

Honey Forbes
Council Member
Consumers Association of Canada
British Columbia

Dave Forster
Director
Research for Bunge Canada
Expert Committee on Oils, Fats and other Lipids

Paul Hetherington
President and CEO
Baking Association of Canada

Sheila Innis
Professor
Department of Pediatrics
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Hélène Jacques
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Department of Food Science and Nutrition
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Laval University

Bill Jeffery
National Coordinator
Centre for Science in the Public Interest

Sean McPhee
President
Vegetable Oil Industry of Canada

Lisa Mina
Director, Nutrition & Food Safety
Beef Information Centre

Howard Morrison
Senior Science Advisor
Centre for Chronic Disease Prevention and Control
Public Health Agency of Canada

Carolyn O'Brien
Director, Scientific & Regulatory Affairs
Food and Consumer Products of Canada
Starting February 27, 2006
Manager of Regulatory Affairs
Canada Bread

Francy Pillo-Blocka
President and CEO
Canadian Council of Food and Nutrition

Geneviève Reed
Head
Research and Representation Department
Option Consommateurs

Joyce Reynolds
Sr. Vice President of Government Affairs
Canadian Restaurant and Foodservices Association

Lynn Stewart
Director
Food Value Chain Bureau
Agriculture and Agri-Food Canada

Helen Stokes
Regional Program Manager
Northern Alberta Cardiac Rehabilitation Program, Capital Health
Member, Canadian Cardiovascular Society

Laurie A. Wadsworth
Associate Professor
Department of Human Nutrition
St. Francis Xavier University

Christina Zehaluk
Head, Special Purpose Foods
Bureau of Nutritional Sciences
Health Canada

Appendix 3

Fatty Acid Composition of Foods in the Canadian Market Place (Summer 2005)

Food Categories	Ingredients (food labels)	Fat	Trans	MUFA	n-6	n-3	SFA	Lauric	Myristic	Palmitic	Stearic	Trans + SFA
		g/100g of food	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat
Bakery Products												
Baked Desserts												
Brownies (n=3)	Hyd. Soy & cottonseed oils, butter oil	19 - 27	24 - 25	33.5 - 39.5	8 - 12	0.3 - 1.5	25.7 - 27	0.1	0.1	13.1 - 15	11 -12	49.7 - 52
Apple pies (n=2)	Hyd. vegetable oil	11 - 12	29 - 33	31	11 - 13	0.5	24 - 25.9	0	0.2	12.5 - 13	11 - 12	53 - 58.9
Coffeecake	Soybean oil margarine & shortening	17	0.9	31	34	6	26	0.2	0.5	20.5	4	26.9
Bread	canola oil or soybean oil											
Lard & Shortening												
Shortening	Partially hydrogenated oils		35				25					60
Shortening	Blend of sunflower, soy and cottonseed oil	100	0.6	39	33	2.7	25	0	0.1	13	11	25.6
Lard	Lard		0				43					43
Muffin mixes												
Muffin Mixes (n = 2)	Veg. oil (shortening)	9	25	31	18	0.8	23 - 25	0	0.2	14	8	48 - 50
Muffin mix	Veg oil shortening (palm oil)											
Muffin mix	None											0
Condiments & Sauces												
Peanut Butter												
Light Peanut Butter	Hydrogenated vegetable oil	40	0	61	19	0	18	0	0	9	4	18
Creamy P. Butt. (n = 4)	Hyd. veg. oil, soya oil	48 - 56	0 - 0.2	39 - 51	27 - 37	0.1 - 1.8	20 - 22	0	0	10 - 11	4 - 5	20 - 22.2
Confectionery												
Dessert												
Snack Puddings	Partially hyd. soya oil		33- 40				25 - 33					58 - 73
Snack Puddings	Hyd. coconut and palm kernel oils		0				100					100
Snack Puddings	None		0				21 - 66					21 - 66
Frozen Foods												
Dinners & Entrees												
Chicken Parmigiana	Hyd. soy oil, canola oil, sesame oil	1.6	0	51	23.5	6	23.5	0	2	16.5	4.5	23.5
Potatoes												
French Fries (n =2)	Canola oil	3	0	65	21	9	8			5	2	8
Frozen Hash Browns	Hyd. Veg. oil (may be beef tallow)	6	24	35	3	0	36		1.4	18	15	60
Hot Beverages												
Coffee Whiteners												
Regular Coffee Whitener	Partiallly hydrogenated soya oil	7.8 ± 0.1	47.8±0.1	23.7±0.1	1.6±0.1	0.1±0.0	27.1±0.1			11.0±0.0	15.1±0.1	74.9±0.2
Fat Free Coffee Whitener	Partially hydrogenated soya oil	2.6 ± 0.2	43.4±0.5	21.3±0.4	1.5±0.0	0.2±0.0	33.3±1.1			12.7±0.5	19.6±0.8	76.7±1.6
Regular Coffee Whitener	Hydrogenated coconut oil	10	0				100					100
Prepared Foods												
031- Oriental Noodles	Hyd. palm, cottonseed & soya oils	18	7	37	5	0.1	51	0.4	1	45	5	58
Oriental Noodles (n = 2)	Soya oil, cottonseed oil, chicken fat	21	39	31 - 32	5.5	0.1	23	0	0.1	14	8	62
Oriental noodles (n = 2)	Palm oil	22	0	37			50	0	1	43.5	4	50
Oriental Noodles	Beef Tallow	15	0	42			50	1	4	25	19	50
Refrigerated Foods												
Margarines												
Tub margarines (n=15)	Non-hydrogenated oils	20.2 - 71.9	0.9 ±0.3	39.8±16.9	32.1±11.7	7.3±1.3	20.0±6.0	2.2±1.3	1.0±0.4	11.0±2.4	4.5±2.5	20.9±6.3
Tub margarines (n=11)	Partially hydrogenated oils	60.8 - 72.6	19.5±4.7	32.2±10.2	26.7±10.6	4.6±1.4	17.5±2.7	0.1±0.2	0.2±0.1	9.9±0.6	6.7±2.1	37±7.4
Stick margarines (n=3)	Partially hydrogenated oils	69.5 - 71.7	39.6±3.9	33.9±1.0	7.6±1.5	0.8±0.5	18.1±2.7	0.4±0.3	0.2±0.1	9.9±0.6	6.7±2.1	57.7±6.6

Food Categories	Ingredients (food labels)	Fat	Trans	MUFA	n-6	n-3	SFA	Lauric	Myristic	Palmitic	Stearic	Trans + SFA
		g/100g of food	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat	g/100g of fat
Cookies												
Cookies (n = 3) 300 - 350 g	veg. oil shortening, coconut oil, hyd. palm kernel oil	13 - 22	17 - 19	20 - 23	4 - 6.5	0.2 - 0.3	52 - 57	18 - 24	8 - 11	12	7 - 12	69 - 76
Cookies 350 g	Coconut shortening, modified palm	20	0				80					80
Marshmallow (n = 1) 400 g	Vegetable oil shortening	14	7	34	5	0.3	53	0.1	0.3	22	29	60
Chocolate Chip 350 g	Cocoa butter, veg. oil short., butter oil	21	0	36	9	0.5	52	3.8	2	24	20.5	52
Chocolate Chip 400 g	Kernel oil, sunflower oil	20	0.5	50	15.5	6	31	2	0.8	16	11	31.5
Arrowroot Cookies 350 g	Vegetable oil shortening	12	0	37	14	0.5	48	0.2	0.8	43	4	48
Arrowroot Cookies 400 g	Mod. palm and palm oil veg. Short.	14	30	31	15	0.7	23			13	10	53
Arrowroot Cookies 500 g	Modified palm & canola oils	11	0	40	16.5	5	38		0.6	34	3	38
Arrowroot Cookies 350 g	Sunflower & canola oils	15	1	60.5	28	3	8			6	1.7	9
Crackers												
Vegetable Crackers 225 g	Palm, coconut & soya oil, hydrogenated cottonseed oil	24	0	31	9.5	0.2	59	10	4.5	37	4	59
Vegetable Crackers 250 g	Sunflower oil	24	0	84.5	7	0.4	8			4	2.4	8
Snack Foods												
Potato Chips	Vegetable oil	40	0.5	18	52.5	0.2	28		0.6	24	2.6	28.5
Potato Chips	Vegetable oil	32	2.7	65	21	8.6	6			4	1.6	8.7
Potato Chips	Sunflower oil	30	0.6	59.5	30	0.2	9			4.5	3.4	9.6
Cheese Sticks	Vegetable oil, hyd. vegetable oil	50	3.6	60	23.2	7.1	8		0.2	5	1.9	11.6
Nachos (movie theatre)	Not available	19.3	37.6	32.5	11.9	0.4	17.6	0.2	0.2	11.7	4.7	55.2
Nachos cheese sauce		11.3	38.1	32.3	1.9	0.2	27.2	0.3	1.5	13	10.9	65.3
Microwave Popcorn	Hydrogenated soybean oil	17	39	25	9	0.3	26			12	13	65
Granola bars (n = 2)	Canola oil, 1soya nuts, 2peanut butter	17.8 - 24.2	0.8 - 1.1	61.3 - 66.2	19.7 - 22	2.3 - 2.7	10.3 - 12.2	0.1	7.1 - 8.0	1.9 - 2.3	0.6 - 0.7	11.1 - 13.3
Granola Bars (n = 4) - 32S	Canola, soybean, sunflower, peanut	8.0 - 14.8	0.4 - 1.2	55.3 - 64.7	19.0 - 29.8	0.7 - 2.5	11.1 - 13.0	0 - 0.1	0.1 - 0.2	7.5 - 9.8	2.1 - 2.6	11.5 - 14.2
Granola Bars (n= 4)	Hyd. soybean oil, coconut, other fats	13.3 - 33.2	0.4 - 1.6	60.9 - 66.8	11.6 - 19.7	0.4 - 1.7	16.3 - 21.6	0.8 - 3.9	0.4 - 1.7	7.4 - 10.4	1.9 - 8.6	16.7 - 23.2
Granola Bars (n=3) S	cocoa butter, butter oil, hyd. veg oil	12.8 - 17.8	1.1 - 2.6	31.1 - 39.4	5.4 - 7.3	0.3 - 1.4	49.6 - 60.0	2.9 - 5.3	2.4 - 4.1	19.4 - 23.5	20.8 - 26.2	50.7 - 62.6
Granola Bars (n = 1)	Palm kernel, canola, peanut, soybean	9.2	0.9	32.3	15	1.4	52.2	25.4	11.2	10.7	2.9	53.1
Granola Bars (n = 2)	Coconut oil, partially hyd. veg oil	9.7 - 11.5	5.5 - 14.1	15.2 - 23.6	7.2 - 13.6	0.4 - 0.6	46.8 - 71.6	16.4 - 33.3	7.8 - 14.3	12.6 - 16.9	6.8 - 9.4	52.3 - 85.7
Granola Bars (n = 1)	Hyd. canola oil	18.1	7.5	64.6	15.1	1.8	7.5	0	0.1	7.1	1.9	15
Granola Bars (n = 1)	cocoa and peanut butters, hyd. oil	21.3	8.5	34.7	8.7	0.2	33.3	3.8	2.1	13.8	11.1	41.8
Granola Bars (n = 1)	soybean oil short., coconut	12.3	17.5	28.5	22.8	2.6	28	3.2	1.4	13.5	8.4	45.5
Granola Bars (n = 1)	hyd. Veg. oil	13.3	27.9	29.8	8.6	0.3	33.9	6	2.6	12.8	11.5	61.8

Appendix 4

Current Regulatory Context

1. Definition of Trans Fatty Acids

For nutrition labelling purposes in Canada and the US, "*Trans fatty acids*", "*trans fat*" or "*trans*" means unsaturated fatty acids that contain one or more isolated or non-conjugated double bonds in a trans-configuration.

2. Canadian Nutrition Labelling and Claims Regulations

- On January 1, 2003 Canada became the first country to require the mandatory declaration of the trans fatty in acid content of foods on the labels of most prepackaged foods.
- The new nutrition labelling regulations come into effect for most prepackaged foods on December 12, 2005.
- Trans fatty acids are included in the list of core nutrients in the Nutrition Facts table and are grouped under the same Daily Value as saturated fatty acids because both trans fatty acids and saturated fatty acids raise serum LDL cholesterol levels. This is in line with recommendations made by the IOM (DRIs – Guiding Principles for Nutrition Labeling and Fortification).
- Declaration of saturated and trans fat is optional in Nutrition Facts on labels of foods solely for children under 2 years of age.
- Conditions have been established for foods to qualify to make claims for saturated fat and cholesterol and include restrictions on content of trans fat.
- Conditions for food to qualify to make claims for trans fat include restrictions on saturated fat.

2.1 Declaration of Trans Fat in the Nutrition Facts Table

- Saturated + trans fat are declared on 2 separate lines
- Both are expressed in grams per serving and
  - Rounded to 0 if the food meets the conditions for a "free" claim
  - In all other cases < 0.5 g per serving, rounded to nearest 0.1 g
  - When ≥ 0.5 g and ≤ 5 g per serving, rounded to nearest 0.5 g
  - When > 5 g per serving, rounded to nearest 1 g
- Saturated + trans fat expressed as a % of DV (based on reference standard of 20 g)
- If saturated and trans fat are both declared as 0, declared as 0 % DV
- All other values rounded to nearest 1%
- If food qualifies for simplified format (if the food contains "0" of seven or more of energy and core nutrients) and if trans fat and saturated fat are "0", may use statement "Not a significant source of trans fat"

2.2 Nutrition Labelling of Foods for Children Under 2 Years of Age

- Children under two years of age need a high fat diet with sufficient amounts of essential fatty acids for proper growth and development.
- To avoid unduly restricting fat intake because of concerns related to types of fat Health Canada originally made it optional to list saturated fat, trans fat and cholesterol on baby and toddler food labels.

- Recent analysis of baby and toddler foods by Health Canada has shown that the trans fat content of foods other than beef and lamb products, where it occurs naturally, is minimal.
- Further monitoring by Health Canada is planned for 2006.

2.3 Nutrient Content Claims Regarding Trans Fat

- **"free"**: less than 0.2 g of trans fatty acids per reference amount and serving of stated size, and "low" in saturated fatty acids.
- **"lower" or "reduced"**: content of saturated fatty acids not higher/increased, and at least 25% less trans fatty acids per reference amount, than similar reference food.

2.4 Conditions for Nutrient Content Claims on Saturated Fat and Cholesterol

A limit on trans fat is part of the conditions for all claims for saturated fat and cholesterol.

- **"Free of saturates"**: less than 0.2 g saturated fatty acids and less than 0.2 g *trans* fatty acids per reference amount and serving of stated size.
- **"Low in saturates"**: 2 g or less of saturated fatty acids and *trans* fatty acids combined per reference amount and serving of stated size, and 15% or less energy from the sum of saturated fatty acids and *trans* fatty acids.
- **"Lower in saturates" or "Reduced in saturates"**: *trans* fatty acids not higher/increased, and at least 25% less saturated fatty acids per reference amount than similar reference food.
- For all claims for cholesterol, the food must meet criteria for "low" in saturates which includes a restriction on both saturates and *trans* fat.

2.5 Conditions for Generic Health Claims

A limit on trans fat is part of the criteria for two health claims.

- "A healthy diet low in saturated and trans fats may reduce the risk of heart disease. (Naming the food) is free of [low in] saturated and trans fats."
- For claim relating a diet containing foods high in potassium and low in sodium to reduction of risk of high blood pressure, food must meet criteria for sodium free or low sodium as well as low in saturates.

2.6 Conditions for Quantitative Statement on Trans Fat

- This statement is made outside of the Nutrition Facts table.
- Proposed amendments were published in 2005 to require that the statement "0 g trans fat" be subject to the same conditions as the "trans-free" claim.

3. U.S. Nutrition Labelling Regulations

On July 11, 2003, the US FDA published final rule requiring the declaration of trans fatty acids on food labels effective on January 1, 2006.

3.1 Declaration of Trans Fat in the Nutrition Facts Panel

- Trans fat is included in the U.S. Nutrition Facts table on a separate line immediately under the line for saturated fat.
- No DV is listed for trans fat.
- Declared as "0" if < 0.5 g per serving; if "0" may omit declaration and state "not a significant source of trans fat".

3.2 Nutrient Content Claims

- Nutrient content claims for trans fat are not defined.
- Claim "free of saturates" includes criteria for saturates and trans: < 0.5 g of saturates and < 0.5 g of trans per reference amount and per serving.
- Advance notice of proposed rulemaking in 2003 solicited information for establishing: nutrient content claims about trans fat, qualifying criteria for trans fat in claims for saturates and cholesterol and in health claims about cholesterol-raising lipids.

Appendix 5

Consumer Research Awareness of Trans Fats

Nutrition Labelling Consumer Research

This study was conducted by Canadian Facts through personal in-home interviews with a cross-section of 1105 English or French speaking Canadians, 18 years or older between January 29 and March 1, 1999.

Canadians were shown a list of nutrients that often appear on the nutrition information panel, and asked to indicate whether it is information that they understand well, have heard of but do not understand well, or have no idea about.

Only 45% of Canadians claimed that they have heard or that they understand the term "trans fat" well.

Reference: Canadian Facts, Nutrition Labelling Consumer Research (Toronto: Canadian Facts, 1999).

Canadians and Trans Fats

This study was conducted by Leger Marketing through telephone interviews among a representative sample of 1,500 English- or French-speaking Canadians, 18 years of age or older from September 6 to September 11, 2005.

To the question "Have you heard or do you know about trans fats?", 79% of Canadians say they have heard about trans fats, a proportion that does not vary according to gender. Moreover, the strongest proportion of people who know about trans fats is found in Quebec (83%).

Reference: Leger Marketing, Canadians and Trans Fats (Montreal: Leger Marketing, 2005).

Appendix 6

Principles and Criteria for Assessing Recommendation Options

Principle #1:

There will be a significant net health benefit to Canadians through food consumption.

Criteria for assessing options:

1.1 Virtual elimination of partially hydrogenated fats (industrially produced trans fats) in every product.

1.2 Increased use of healthier alternatives by the food manufacturing industry, consumers, and the restaurant and food service industry.

1.3 Increase development of healthier alternatives.

Principle #2

Recommendations from the Task Force must be feasible and sustainable.

Criteria for assessing options:

2.1 Recommendations are consistent with Government of Canada "Smart Regulations" (http://www.pco-bcp.gc.ca/smartreg-regint/en/index.html):

- Effectiveness
- Cost efficiency
- Timeliness
- Transparency
- Accountability

2.2 Recommendations will be enforceable

2.3 Timelines are reasonable for the industry and government to make the transition.

Principle #3

Recommendations are based on the best available evidence and our current state of knowledge, and build on what we've learned (e.g. labelling).

Criteria for assessing options:

3.1 Evidence is elaborated.

3.2 Recommendations are based on the preponderance and/or strength of evidence.

3.3 The knowledge on which recommendations are based will be transparent and sound, and can be clearly articulated.

Principle #4

Solutions are multi-faceted, comprehensive, integrated, and multi-sectoral.

Criteria for assessing options:

4.1 Recommendations are flexible enough to take into account the varying challenges faced by different parts of the food industry

4.2 Recommendations may include incentives, regulations and other approaches

Appendix 7

Literature Review

Part 1 Executive Summary

In spite of the mandate of the Task Force and the general agreement that *trans* fats have adverse effects on the risk factors for coronary heart disease, in particular their adverse effect on serum lipid and lipoprotein patterns, the question of the health risks of possible replacement fat sources for partially hydrogenated fats presents a conundrum to the food industry. Where *trans* fats can be replaced by monounsaturated-rich and/or polyunsaturated-rich fat sources, such as the production of margarines or in deep-fat frying operations, there is little question of a benefit in terms of effect on serum cholesterol and lipoprotein levels. Substitution of MUFA, namely oleic acid, and PUFA, namely linoleic acid, for saturated fats or *trans* fats has been shown to consistently improve serum lipid and lipoprotein patterns; namely, lower serum total and LDL cholesterol levels and, in turn, a more favourable total/HDL cholesterol ratio. In addition, there is evidence that linoleic acid may have an added benefit to its hypocholesterolemic effect; specifically, an ameliorating effect on the hypercholesterolemic character of palmitic acid. On the other hand, concerns also have been voiced with the possible adverse effect of high linoleic acid intakes on other aspects of CVD (e.g., thrombogenesis, oxidative stress, arterial endothelial integrity, etc.).[1]

There is a general consensus that *trans* fat has a more deleterious effect on risk factors for CVD than saturated fat (Ascherio et al, 1999; Stender & Dyerberg, 2003).[2] Not only do *trans* fats result in higher total and LDL cholesterol levels but they also result in a lower HDL cholesterol level.[3] These effects on total and lipoprotein levels (viz., higher total and LDL and lower HDL levels) account for the fact that the estimated regression coefficient for the percent change in total/HDL cholesterol, accompanying an isoenergetic change in energy from carbohydrate, was greater for *trans* fat than for saturated fat (Mensink et al, 2003).[4] Several studies support this conclusion. However, it is recognized that the individual long chain saturated fatty acids (i.e., C12:0 to C18:0) do not have an equal effect on the risk factors for CVD. Stearic acid, for example, is often regarded as having a neutral effect on total and LDL cholesterol levels. There also is evidence that the adverse effect of *trans* fat, relative to saturated fatty acids, occurs primarily at high dietary intakes of *trans* fat. Although a study by Lichtenstein et al (1999) found a positive linear relationship between total/HDL cholesterol ratio and level of *trans* fat in the diet, their findings suggested the minimum threshold for *trans* fat intake, from the standpoint of CVD risk as reflected by the total/HDL cholesterol ratio, is between 3.30 and 4.15% of total energy. Parameters of CVD risk (viz., total, LDL, HDL, VLDL or TG levels and total/HDL ratio) at a *trans* intake up to and including 3.30% of total energy did not differ from those on a soybean oil diet.

There is general agreement that myristic acid has the greatest effect on CVD risk factors (as reflected by high levels of total and LDL cholesterol and a high total/HDL ratio) among the long chain saturated fatty acids (Müller et al, 2001; Mensink et al, 2003). Both groups reported

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1 The effect of fatty acids on risk factors for CHD, other than lipid and lipoproteins patterns, will be dealt with in Part 2 of this literature review.

2 Report of the Danish Nutrition Council, 2003 which was previously circulated to Task Force members.

3 Although several groups have reported a decrease in HDL in response to trans fat others have reported that *trans* fat had no effect on HDL level.

4 Paper distributed to Task Force members prior to April 1, 2005 meeting.

that replacement of carbohydrate by myristic acid, on an equal energy basis, would result in greater increases in total and LDL cholesterol levels than a similar replacement of CHO by *trans* fat. These conclusions are supported by the equally hypercholesterolemic effect of *trans* fats and dairy fats (a major source of myristic acid in the Canadian diet). Likewise, there is general agreement that lauric acid does not increase the risk of CVD when it replaced carbohydrate on an equal energy basis. Although lauric acid resulted in an increase in total and LDL cholesterol levels when it replaced carbohydrate (de Roos et al, 2001a; Mensink et al, 2003), it also resulted in a marked increase in HDL cholesterol level, the net effect of which was an appreciable decrease in total/HDL ratio. By contrast, replacement of carbohydrate by *trans* fat on an isoenergetic basis resulted in an increase in total/HDL ratio (i.e., an increased risk for CVD).

Although palmitic acid also is generally regarded as hypercholesterolemic and that it results in similar increases in total and LDL cholesterol as *trans* fats, the picture is less clear than for myristic acid. Estimates suggest palmitic acid would result in a greater increase in total cholesterol level than *trans* fat when each replaces carbohydrate in the diet on an isoenergetic basis (Müller et al, 2001; Mensink et al, 2003). However, these same groups estimated replacement of carbohydrate by palmitic acid or *trans* fats results in similar increases in LDL cholesterol level. Mensink et al (2003) found replacement of carbohydrate by palmitic acid, like a similar replacement by lauric acid, resulted in an increase in HDL level. However, the increase in HDL was less than the increase for lauric acid. As a result, there was no expected change in total/HDL cholesterol ratio. By contrast, a similar replacement of carbohydrate by *trans* fat would bring about a significant increase in total/HDL ratio. Sundram et al (2003) also found that *trans* fat resulted in a higher total/HDL ratio than palmitic acid. The effect of palmitic acid on serum lipid and lipoprotein patterns is further confounded by the apparent modifying influence of dietary linoleic acid on the hypercholesterolemic effect of palmitic acid. Increasing the level of linoleic acid in the diet from 2.5 to 10 percent of energy was found to eliminate the hypercholesterolemic effect of palmitic acid (Clandinin et al, 2000; French et al, 2002).[5]

Although, as mentioned above, there is support for the belief that stearic acid, unlike the other long chain saturated fatty acid, is not hypercholesterolemic, recent studies do not support this premise. Judd et al (2002) found that *trans* fatty acids, stearic acid or a mixture of *trans* & stearic resulted in significantly higher total/HDL cholesterol ratios than a high carbohydrate (low fat) diet whereas oleic acid resulted in a significantly lower total/HDL ratio than the high CHO diet. Aro et al (1997) also found that stearic acid was not neutral with respect to its effect on serum lipid and lipoprotein patterns. They found the LDL/HDL ratio on a high stearic acid diet did not differ from the ratio on a high myristic-palmitic diet (baseline diet) even though the ratio on a high *trans* fat diet was 19 percent higher than on the baseline diet. In addition, there is epidemiological evidence (Hu et al, 1999) that stearic acid increases the incidence of CVD. By contrast a recent study by Thijssen and Mensink (2005)

[5] To the author's knowledge a similar relationship between linoleic acid and other long chain fatty acids (e.g., myristic acid) has not been investigated and as noted later (footnote 14, page 13) may be important in any substitution of long chain fatty acids for trans fatty acids in the formulation of solid fats.

found no differences in lipid and lipoprotein patterns of subjects fed diets that provided 7% of energy as stearic, oleic, or linoleic acids. Although there were no differences among the dietary groups in the levels of total, LDL and HDL cholesterol or total/HDL cholesterol ratios, the authors cautioned against concluding that these findings imply stearic, oleic, and linoleic acids can be interchanged in the diet as they may have different effects on other CVD risk factors (e.g., haemostasis, inflammation, endothelial dysfunction).

Thus, in conclusion, there may be a serious question as to whether any of the long-chain saturated fatty acids are a satisfactory substitute for *trans* fats. Even though the substitution of lauric acid for an equal caloric amount of dietary carbohydrate resulted in a significant decrease in total/HDL cholesterol ratio (Mensink et al, 2003), substitution with lauric acid resulted in marked increases in serum total and LDL cholesterol.

Part 2 Executive Summary

There has been increasing interest recently in CVD risk factors other than those associated with fasting serum lipid and lipoprotein levels. The response of plasma lipids, in particular triacylglycerides (TAG)[6], during the absorption of dietary fat has gathered appreciable interest over the past few years because humans, by eating regular meals, are usually in a postprandial state. Thrombosis (clot formation), endothelial dysfunction, and inflammation are increasingly acknowledged to be risk factors for CVD. However, these non-lipid risk factors have only been studied for a short time. As a result, the volume of data on the relationships of dietary fat to these risk factors and the confidence that can be placed on these relationships is much less well established than the relationships between dietary fat and plasma lipids and lipoproteins.

Exaggerated postprandial lipemia can give rise to chylomicron remnants which are known to be atherogenic. Thus there has been increasing interest in the relationship between postprandial lipemia and atherosclerosis. Several studies, over the past few years, have reported on postprandial lipemia in response to specific fatty acids. In general these studies show that the lipemia following a high fat meal is due primarily to TAG in triacylglyceride-rich lipoproteins (TRL), namely the chylomicrons (absorbed fat) and VLDL fraction (which are primarily of hepatic origin). Recent studies have shown most of the TAG in TRL come from the chylomicrons (i.e., absorbed fat). These studies also show the peak concentration of chylomicron TAG occurs between 3 and 4 hours following a high fat meal and then decreases to or near pre-meal levels by 6–7 hours postprandial. These studies also have found that a high oleic acid meal tends to produce the highest peak concentration and the greatest load (incremental TAG levels throughout the measurement period) while a high stearic acid meal produces the lowest peak concentration and load. Postprandial patterns for meals containing high levels of *trans* fatty acids or linoleic acid generally follow the same pattern as oleic acid whereas meals containing high levels of palmitic acid follow patterns more analogous to those of stearic acid.

[6] Triacylglycerides (TAG) are often referred to as triglycerides (TG) particularly in the popular press.

It has been hypothesized that the lower TAG levels following a high stearate meal are due to lower absorption of stearic acid but this theory does not explain the lower levels following a high palmitate meal. Overall the results of these studies do not indicate a particularly adverse effect of *trans* isomers or any of the long chain saturated or unsaturated fatty acids on lipemic response following a high fat meal. In addition, the fact that the effects of individual fatty acids on postprandial lipemia do not mimic their effects on lipid and lipoprotein CVD risk factors raises doubt about the role, if any, and thus the importance of postprandial lipemia on the development of CVD.

Positive relationships have been found between CVD and several elements in the haemostatic system, such as factor VII activity, platelet function and plasminogen factors. However, factor VII activity (FVIIc) levels did not differ for subjects fed high palmitate, high linoleic (high PUFA) or high *trans* fatty acid diets for a 17-day experimental period. Likewise, FVIIc levels did not differ from baseline values for subjects fed a high oleate diet for 16 weeks following an 8-week run-in on a high Sat diet. Thus, observations to date do not indicate a relationship between fasting FVII activity and the type or amount of dietary fat. By contrast FVIIc levels were found to increase following a high fat meal. However, the increase was only significant following palmitate, oleate and *trans* fatty acids. The postprandial increases were not statistically significant following stearate and MCT. Thus, postprandial FVIIc levels did not follow the usually accepted pattern of CVD risk associated with *trans* fat and individual fatty acids.

The role of platelet function in CVD is not well defined even though platelet activation is recognized as a factor in arterial thrombosis. One of the problems encountered in assessing the effect of fat on platelet function is the lack of a satisfactory measure of platelets function in humans. Platelet function usually is assessed by measuring the tendency for platelets to aggregate in response to an agonist (added collagen, ADP, arachidonic acid, etc.); *in vitro* platelet aggregation is assumed to reflect clot formation *in vivo.* No difference in agonist-induced platelet aggregation was found among subjects who consumed a high stearate and a high palmitate diet for 4 weeks even though rate of aggregation increased from baseline levels. On the other hand, platelet aggregation tended to decrease from baseline values, which followed a run-in period on a high saturated fat diet, when subjects were changed to moderate or high oleate diets.

The diurnal activity of tissue plasminogen activator (tPA), another factor involved in clot formation, was higher on a high palmitate diet than on a high *trans* fat diet. In fact, the levels and pattern on the high *trans* diet were similar to those on a high PUFA diet even though the activity on the PUFA diet did not differ statistically from that on the palmitate diet. It is interesting to note that one research group found tPA activity correlated with postprandial TAG levels. On the other hand, stearate was found to result in significantly higher fibrinogen levels whereas *trans* fat, oleate, or a mixture of lauric, myristic and palmitate had no effect on fibrinogen levels. These findings suggest that although stearate has minimal effect on serum LDL levels it may have an adverse effect on haemostasis.

Some of the most convincing evidence of a relationship between dietary fat and non-lipid CVD risk factors has been found for biomarkers of systemic inflammation and endothelial dysfunction. This evidence has come from both epidemiological and experimental studies. *Trans* fat has a particularly adverse effect on markers of inflammation and endothelial dysfunction. There also is evidence that stearic acid and combination of lauric-myristic-palmitic acids may increase the levels of biomarkers relative to oleic acid.

Although there is increasing interest in the relationship between dietary fat and non-lipid CVD factors, because lipid and lipoprotein risk factors do not account for the total incidence of CVD, there is insufficient data to establish a meaningful relationship between type and amount of dietary fat and non-lipid CVD risk factors. The one exception may be the effect of *trans* fatty acids on surrogate measures of systemic inflammation and endothelial function.

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Appendix 8

Trans Fat Task Force, Industry Meeting
Agenda and Presenters

Ottawa, June 13, 2005, Lord Elgin Hotel

Time		
8:30am	**Registration and Continental Breakfast**	
9:00am	Welcome and Opening Remarks	
9:15am	Review of Agenda and Approach	
Time	**Presenter**	**Organization**
9:30am	Sherry Casey	Loblaws (Canadian Council of Grocery Distributors)
9:50am	Sylvie Cloutier	Conseil de la transformation agroalimentaire et des produits de consommation
10:30am	**Break**	
11:05am	Tim Civil & Grant Morrison	PepsiCo
11:25am	Carla Abbatamarco & Jim Lows	Canadian Meat Council
11:45am	François Martel	L'Académie culinaire
12:05pm	Denny Seaman	Johnson Mattey Catalysts
12:25pm	**Lunch**	
1:15pm	Willie Loh	Cargill
1:35pm	Brent Flickinger	Archer Daniels Midland
1:55pm	Bob Ingrata	Monsanto
2:15pm	Jim Wispinski	Dow AgroSciences Canada
2:35pm	Tyler Bjornson	Canola Council of Canada
2:55pm	Gail Ewan	Dairy Farmers of Canada
3:15pm	**Break**	
3:30pm	Open Forum Task Force Member Question Period	
4:10pm	Closing Remarks	
4:30pm	**Adjourn**	

Consultation questionnaire May 20, 2005

Health Canada and the Heart and Stroke Foundation of Canada are co-chairing a task force aimed at finding ways to effectively eliminate or reduce processed (industrial) *trans* fats in the Canadian food supply to the lowest levels possible. To that end, the Task Force will be delivering, by November 2005, final recommendations to the Minister of Health regarding an appropriate regulatory framework and the introduction of healthy alternatives to processed *trans* fats.

Given the need to limit the size of the Task Force, a consultative approach will ensure that interested parties and key experts who are not on the Task Force will have the opportunity to provide input and advice on specific questions. This consultation will be held in Ottawa on **June 13, 2005**.

Comments and feedback are welcome

This questionnaire aims to obtain feedback from individuals and stakeholder groups about how Canada can effectively eliminate processed *trans* fats from foods sold in Canada. Stakeholders are asked to respond to some or all of the questions. All input will be considered by the Task Force as the final recommendations to the Minister are being developed.

Should you wish to make a presentation to the Task Force at the June 13, 2005 consultations, we would ask that you send us a 1–2 page paper addressing some or all of the questions below by **June 3, 2005**. If you wish to provide the Task Force with additional documentation, please provide a 1–2 page summary. Invitations to make a presentation to the Task Force will be issued shortly after June 3rd.

Stakeholders are also invited to attend the June 13 consultations as observers. Given that space is limited, we would ask that you reserve a spot ahead of time if you wish to attend (please see the last page of this questionnaire for instructions). We look forward to hearing from you.

Background

Parliamentary Motion

On November 23rd, 2004, a *trans* fat related motion was passed in the House of Commons. This motion called for the establishment of a Task Force that would look to "… effectively eliminate or reduce processd *trans* fats in Canadian foods to the lowest level possible… ". Among other things, the Task Force will consult with relevant stakeholders to ensure that any solution does not cause undue hardship for consumers or industry and that it leads to an overall health benefit for Canadians. The Task Force will be required to present its recommendations to the federal Minister of Health by November of 2005. A variety of stakeholders will be involved in this consultation, including the food industry, voluntary associations, academia, scientific experts and others.

Why Reduce Trans Fats?

Trans fat or *trans* fatty acids are formed during the partial hydrogenation of unsaturated fats. Vegetable oils which contain high levels of polyunsaturated and monounsaturated fatty acids are hydrogenated to increase their stability and to raise their melting point so they are solid or semi-solid at room temperature. Partially hydrogenated oils are used to make baking and frying shortenings and margarines and other spreads, all of which are solid at room temperature. Products that contain partially hydrogenated oils (e.g., crackers, cookies, pastries, snack foods, deep-fried foods) are by far the biggest source of *trans* fat in the Canadian diet.

It was only in the 1990's that it was confirmed that *trans* fatty acids raised LDL-cholesterol (also know as "bad" cholesterol) and lowered HDL-cholesterol (so-called "good" cholesterol). On the other hand, dietary saturated fatty acids, an established risk factor for coronary heart disease, raise both LDL-cholesterol and HDL-cholesterol and it has therefore been concluded that dietary *trans* fatty acids pose a significantly greater risk to health than saturated fatty acids.

It has been estimated that Canadians consume on average about 8 grams of *trans* fat per day. This is high compared to Europe and somewhat higher than in the United States. The high intake is due to the widespread use of canola and soybean oils which are partially hydrogenated for use in shortenings, commercial deep-fat frying and some margarines.

Questions

A. Questions concerning alternatives to partially hydrogenated oils

1. What alternatives are currently offered by suppliers to manufacturers who wish to replace partially hydrogenated oils and fats?
2. What are the fatty acid profiles of these alternatives, i.e. proportion of individual fatty acids in the total fat?
3. Can these alternative products be grown, processed and produced in Canada?
4. Is there a sufficient supply of these alternatives? If not, what can be done to improve the availability of these alternatives? How long do you expect it to be before a sufficient supply could be made available?
5. How does the functionality of these alternatives compare to partially hydrogenated oils with respect to the aspects below? (When providing data please indicate for which type of food product(s) the data relates to).
    - Lubricity
    - Creaming
    - Body
    - Lamination
    - Moisture barrier
    - Heat transfer (frying)
    - Oxidative stability (storage and frying stability)

B. Questions concerning the health impact of the alternatives

1. Taking into account the limitations and practical considerations of the food production process, what would be the best possible nutritional and health characteristics of alternatives to partially hydrogenated oils that could be achieved?

C. Questions concerning the transition to healthier alternatives

1. Given your understanding of the food manufacturing industry, can you identify the factors which can facilitate the transition to healthier alternatives (technological or otherwise)?
2. What can be done to support the transfer of knowledge and expertise to small and medium sized firms to facilitate the elimination or reduction of *trans* fats?
3. Based on your experience, do you have any information about the challenges associated with the elimination or reduction of processed *trans* fats? For example, costs, time and other resources required to make relevant changes within a product line.
4. Even when alternatives to partially hydrogenated oils exist for sometime, manufacturers may choose not to switch to healthier alternatives (e.g. as observed in the case of soft margarines). What are the reasons some manufacturers may not be making the change?
5. Are you familiar with any data about the consumer acceptability of food products in which partially hydrogenated oils or shortenings have been replaced with other alternatives? For example, costs, shelf-life, taste, texture, etc. If so, please provide details?

D. Questions concerning possible regulatory options

1. The Task Force is charged with providing recommendations for an appropriate regulatory framework to achieve the effective elimination of processed *trans* fat. There may be a range of options available - from regulations that would encourage the voluntary elimination of processed *trans* fat to the imposition of an upper limit that would apply to all foods without exception. In your view, what elements should be incorporated to this regulatory framework?
2. It was suggested that the Task Force should consider imposing a limit on the *trans* fat content of fats and oils, as has been done in Denmark where the limit is set at 2% of total fat. Is this a reasonable goal for Canada now or later? Please explain.

E. Other Questions

1. In the short-term, what actions are being taken or could be taken to enable consumers to reduce their *trans* fat intake?
2. Are there any other issues or perspectives regarding the elimination of processed *trans* fats that you would like to share with the Task Force?

Providing Feedback

Health Canada and the Heart and Stroke Foundation of Canada encourage all interested organizations and individuals to provide feedback and respond to the questions presented in this questionnaire. Responses and suggestions should be submitted no later than June 3, 2005, to the

contact person indicated below. If you wish to observe the consultation session, please RSVP by June 6, 2005 to:

Trans Fat Secretariat
Health Canada
A.L.2203A Tunney's Pasture
Ottawa, ON. K1A 0L2
Phone: (613) 954-5619
Fax: (613) 941-6636
E-mail: transfat-grastrans@hc-sc.gc.ca

Summary of Presentations

Lord Elgin Hotel, Ottawa
June 13th, 2005

Purpose of the Meeting

On June 13th, the Task Force held a consultation meeting to build a better understanding of the industry issues and concerns pertaining to the reduction and elimination of industrially produced *trans* fats. Stakeholder feedback was invited through a consultation questionnaire posted on Health Canada's website a few weeks prior to the meeting. The questions outlined key information gaps identified by the Task Force in the early stage of its work, mainly regarding the issues affecting the industry:

- What they are doing and have done to reduce *trans* fats
- Problems they are facing
- Potential implications
- Current and future *trans* fat alternatives
- Timelines for *trans* fat reduction/elimination in product lines

A further public consultation will be held this fall, this time on the health effects of some of the proposed alternatives to *trans* fats.

On June 13th, members had the opportunity not only to listen and learn from industry representatives but also engage in dialogue to further explore and understand the issues at hand. A synopsis of each presentation is provided below.

Canadian Council of Grocery Distributors

Sherrry Casey, Loblaws

The Canadian Council of Grocery Distributors labelling committee members are involved with various issues, one of which is *trans*. Mrs. Casey noted that consumers are looking for *trans*-free foods, not simply reduced, yet the product must deliver on taste. They are also confused by the labelling.

Mrs. Casey stated that there are many *trans* fat replacement oils (blended/modified/liquid oils and saturated fats) currently being used in a variety of products such as breads, pastries and chips, to name a few — greater use of saturated fat containing modified oils. Product impacts include a 1 to 2 yr (or more) development time, reduced shelf life, a 10–15% increase in packaging, handling and distribution costs, generally passed onto the consumer who's acceptance of products made with *trans* fat alternative is not fully understood at this time.

Since the larger manufacturers are geared to handling one or two types of oils for many different products, the impact of introducing new alternatives and nutrition re-labelling is costly and affects many products (brands). However, the small to medium sized manufacturers are faced with the most challenges — a lack of resources/knowledge, expensive healthier oils, capital costs and re-labelling issues-thus moving them away from innovation. Providing research, tax incentives, government funding and more time would most certainly help their cause. Finally, imported products present challenges due to lack of knowledge, interest, urgency and varying requirement definitions. Educating consumers about *trans* fat/healthy eating, promoting new Nutrition Facts labels and providing regulatory incentives are solutions to reduce *Trans* fat consumption. She stated that manufacturers need "real" support and suggested that the Task Force members should avoid setting "regulated" *trans* limits and consider different solutions for different food categories.

Conseil de la Transformation Agroalimentaire et des Produits de Consommation (CTAC)

Christine Jean & Sylvie Cloutier

Christine Jean stated that the Conseil de la Transformation Agroalimentaire et des Produits de Consommation recognize the need for industry to find alternative solutions for *trans* fat reduction or elimination. She cited examples of industries that have launched *trans*-free products as well as factors and considerations industry must take into account in their continued effort to find healthier alternatives.

In the short term, the mandatory labelling that will come into effect at year's end will help consumers make more informed, healthier choices but there is concern over the issue of imported "unlabelled" products. She cautioned that imposing *trans* fat reduction/elimination regulations with short or hurried timeframes may lead to undesirable alternative solutions. Industry has acted quickly to develop alternatives, yet they require more time and R&D to ensure safe and healthy solutions.

Pepsico

Tim Civil & Grant Morrison

Tim Civil presented insights on PepsiCo's effort to reduce, and in many cases eliminate, processed *trans* fats in its products, under the food brands it offers beyond their beverage portfolio. The company has had a history of looking at healthier innovations over the last couple of decades across all of their divisions which include Frito-Lay, Pepsi-Cola, Tropicana, Gatorade and Quaker. Over the last 5 years, they have focused on improving their products to responding to the emerging "wellness trend".

Consumers are concerned about *trans* fats but want great tasting products that are consistent with a healthy lifestyle. Meeting the consumer demand can be difficult since "taste is king" and consumers will not sacrifice taste. The solution means providing consumers with healthier product choices and marketing it in a way that would help them adopt healthier lifestyles. Eliminating *trans* fats has been one of the cornerstones of PepsiCo's focus and efforts. Mr. Civil stated that over the last 3 years, 50% of PepsiCo's new

products ("good for you" or "better for you" line) were healthier product choices, they have eliminated *trans* and reduced saturated fat by 66% from the Frito-Lay portfolio and have had significant *trans* fat reduction with their other products (i.e. Quaker). Tim Civil stated that PepsiCo is well aware that each product line faces unique challenges — some more onerous than others and reformulation of the remaining products in their portfolio may prove to be even more challenging.

Canadian Meat Council (CMC)

Carla Abbatemarco & Jim Laws

Founded in 1919, the Canadian Meat Council is the national trade association of federally inspected red meat packers and processors, operating under federal standards and regulations. Ms. Abbatemarco stated that the levels and type of trans fats found naturally in foods from ruminant animals should continue to be excluded from the debate. The vast majority of trans fat values in processed meat based products with pastry, breading and sauces as well as meat pies and quiches containing meat are the result of processed fat and oil ingredients. Some Canadian Meat Council members have already been proactive in searching for zero or reduced trans fat alternatives.

Healthier alternatives need to be cost effective and have sufficiently long shelf life. Suppliers need incentives to encourage them to make these healthier alternatives available so they can still remain economically competitive in the marketplace. In regards to the Regulatory Framework, the CMC recommends a mandatory imposition of an upper limit that would apply to all *processed trans* fat and that the maximum level should focus only on the *trans* fat *added* to the product, and not on the total amount of *trans* fat in the final product. She concluded by stating that to ensure adequate implementation across Canada, the transition period should be between 3 to 5 years. In addition, government should ensure a practical and effective system at the raw material processing level to monitor levels on a regular basis.

Académie Culinaire

François Martel

L'Academie Culinaire is a culinary arts school for cooking enthusiasts and professionals. It also houses an applied research and development centre for the production of new food products and techniques targeted to food industry manufacturers and distributors.

Mr. Martel presentation focussed on their studies in *trans* and saturated fats over the last few years and on their involvement in the development of alternatives. In 2003, they launched a line of low-fat vegetarian and meat spreads called PurPlaisir that won the CTAC's Innovation Award. He introduced their latest product called "zero3" that is free from *trans* fats, saturated fats and cholesterol. The product can be formulated in different ways, it is made with natural components and contains significant levels of omega-3 fatty acids. It is a healthy option with applications in the preparation of bread and pastries as well as processed meats and spreads. Mr Martel noted the challenges in finding *trans* fat alternatives, including R&D time and costs, stakeholder involvement, increasing shelf life and securing investment from various levels of government.

Johnson Matthey Catalysts

Denny Seaman

Denny Seaman provided scientific information on processes in technology hydrogenation. Johnson Matthey supplies catalysts to a wide range of industry processes. One of the applications in which their catalysts are used is partial hydrogenation of edible oils. They have a vested interest in ensuring that their products "do not unduly place consumers in any country at risk".

Today, the two main oil crops in Canada are canola and soy — both oils have high linolenic content and poor oxidative stability and need to be modified to be used in various food applications. He reviewed the fatty acid profiles and processing conditions of the alternatives currently offered by suppliers to manufacturers who wish to replace partially hydrogenated oils. In keeping with their goal to lower the production of *trans* fatty acids during hydrogenation, he explained how changing processing conditions — agitation, low temperature and high pressure can increase changes in the hydrogen concentration in the reactor thereby reducing *trans* fat content within certain limits. He also reviewed their intensive research and development project on catalyst improvement and concluded by stating although there is no "silver bullet" catalyst, by ensuring a precise control of the processing environment, significantly lower *trans* are already possible using existing catalysts. The project Johnson Matley Catalysts is working on (which we hope to commercialize by end 2006 if successful) aims to make yet further reduction possible.

Cargill

Stephanie Quah

Stephanie Quah provided information on Cargill's zero/low *trans* fat substitutes, the availability of supply and the consumer reaction to foods reformulated for *trans* fat reduction. These substitutes, based on high oleic canola, are grown, processed and manufactured in Canada. She outlined and profiled the different categories of substitutes including, heavy duty frying oils, high stability oils and solid shortenings. In anticipation of market demand, Cargill will produce over 500 million pounds of high oleic canola oil this fall. The supply can be rapidly increased if market demand continues to grow.

She provided results from a consumer survey that focused on *trans* labelling vs. non *trans* labelling on products. Based on branded corn chip and breakfast cereals, they concluded that if given a choice, an overwhelming number of consumers would select the healthier product and one third of the respondents would be ready to pay more. In summary, Cargill believes that consumers value healthier products; it's a win-win situation for the food industry and their customers.

Archer Daniels Midland (ADM)

Brent Flickenger

Brent Flickinger presented ADM's low and zero *trans* fat alternatives portfolio called Novalipid. Positioned in the middle of the food supply chain, their main efforts as an "ingredient manufacturer" is to provide the infrastructure for the processing of oil seed into functional ingredients for the makers of retail food goods. Their Novalipid's

portfolio of low *trans* solutions include naturally stable oils, interesterified products, tropical oils and blended fats/oils. He pointed out that the focus must be on soy and palm oils/fats since they currently dominate and dictate processing worldwide. ADM has been involved on a variety of levels with the United Soybean Board (USB), the United States Department of Agriculture (USDA) and Technology Providers in the development of future solutions for *trans* alternatives including low linolenic soybean oil. Oilseed supply considerations include cost, R&D, field trials, breeding expansion, etc. However having uniform, commodity oilseeds offers greater processing flexibility as well as savings generally associated with intellectual property and identity preservation costs.

Stearic- & PUFA-rich shortenings are being developed and encouraged as solutions for food manufacturers as part of ADM's Novalipid portfolio. Mr. Flickinger stated that the use of the terms "fully hydrogenated" or "hydrogentated" in the list of ingredients confuses customers regarding *trans* content, and concluded by saying that ADM has received guidance from the FDA on allowing the use of the term "interesterified vegetable oil" on food labels to address this confusion.

Monsanto

Bob Ingrata

Monsanto is an agriculture company focused on seeds, biotechnological traits, healthier foods and agricultural inputs. They have been doing research in food and nutrition for over 20 years. Consumer-driven, they recognise that without taste there is no nutrition. Mr. Ingrata stated that Monsanto's food program is focused on healthier oil for healthier living. Monsanto is striving to provide products whose composition is more healthful or can deliver healthy molecules in food.

The focus of Monsanto's food platform has been on helping to find low *trans* and saturated fat solutions. Montanto's *trans* fat alternatives include low linolenic soy oil, low lin/mid oleic soy and high stearate soy. Soybean is not optimal for most food applications therefore the oil is often hydrogenated or blended. They have launched and commercialized a soybean called Vistive I, a non biotech product with reduced linolenic acid (no *trans*). By 2012, Vistive III will offer a more stable, no *trans*, low saturated fat soybean oil. Preliminary Vistive study results with Tortilla Chips have been very encouraging. He noted that the first available low linolenic (Vistive) soybean varieties are produced in the US and he outlined the farm production cost drivers. He discussed omega-3 oils, namely vegetable and fish oil in terms of consumer diet, awareness, taste and product application. Mr. Ingrata concluded by emphasizing Monsanto's commitment to the improvement of soybean and canola oil using all available technology and the need to work together to find solutions.

Dow AgroSciences Canada

Jim Wispinski

Mr. Wispinski's presentation focussed on *trans* fat alternatives currently available. He stated that the overall goal of reducing both *trans* and saturated fats is achievable by replacing partially hydrogenated oils with alternative, naturally stable oils. Frying and food processing alternatives are now being used and baking alternatives are under development.

Natreon, a healthy branded oil grown from Nexera canola seed, was the focal point of his presentation. Dow's breeding program has been based in Saskatchewan since the mid 1990s. Natreon qualifies for "*Trans* Fat-Free" status (only very small amounts of *trans* from final processing). Mr. Wispinski reviewed comparative oil profiles and highlighted Natreon's low saturated fat, reduced linolenic and increased oleic contents. He also explained the benefits of Natreon from functionality, cost, stability and health perspectives.

Mr. Wispinski noted that Canada has great expertise in growing canola. In the future, 1.5 MM acres of Nexera canola seed could replace *all* partially hydrogenated oils. The supply of alternatives to partially hydrogenated oils could therefore respond to demand. He concluded by underlining that this solution could be produced by Canadian farmers and processors.

Canola Coucil of Canada

Tyler Bjornson

Mr Bjornson began his presentation by stressing what the goals of the Task Force should be to ensure that the decision-makers have all the relevant information to make recommendations that lead to an overall improvement in public health. He questioned the focus of the Task Force's mandate on processed *trans* fat and stated that for the benefit of public health, we must not differentiate between processed and naturally occurring *trans* fats. He also pointed to the need to understand the complexity of the oil/fat issue and how alternatives may impact on Canadians' intake of other fatty acids, in particular, saturated fat.

Canola is one of the healthiest alternatives, yet failing to duly consider and understand the "whole" issue may have a detrimental impact on the Canadian canola industry. He outlined the benefits of canola by comparing its fatty acid content with other oils, emphasizing the low level of saturated fat and high levels of monounsaturated fat and omega-3.

He noted that innovation in canola has already benefited public health and that government assistance to research and development as well as effective public education could help regulate trans reduction without having to impose regulations. He concluded by stating that the Task Force should look at assessing the efficacy of existing mechanisms in addressing the problem.

Dairy Farmers of Canada (DFC)

Gail Ewan

Gail Ewan began her presentation by stating that the DFC supports the mandate to effectively eliminate or reduce *processed trans* fats but does not support its application to foods containing *naturally occurring trans* fats found in ruminant fats. Her presentation focused on how these two types of *trans* fats differ in terms of hydrogenation process, appearance in the food supply, distribution of isomers and health impact. She presented several studies that not only differentiated ruminants from processed fats, but also associated naturally occurring *trans* fats with positive health effects compared to more detrimental health effects resulting from processed *trans* fat consumption.

Citing a ruling from Denmark that supports the differentiation between these two types of fats, she concluded by reiterating that ruminant *trans* fats should remain exempt from any new *trans* fat regulation.

Conclusion

Industry representatives thanked the members of the Task Force for the opportunity to provide input and to share their perspectives on the various challenges associated with the *trans* fat issue. At the end of the day, Task Force Members had gained valuable information and insights as well as a sense of optimism. They were pleased to hear that industry shares the same *trans* fat reduction goals.

In thanking the industry representatives, the Task Force co-chairs assured them that the feedback and issues conveyed during the day would feed into the following day's meeting deliberations where members would integrate the information they had received from industry and identify any remaining information gaps.

Appendix 9

Consultation with Scientific Experts

Agenda and Presenters

November 2, 2005

Trans Fat Task Force Consultation
The Centurion Conference & Event Centre
170 Colonnade Road South
Ottawa, Ontario
K2E 7J5
613-727-1044

8:00am	Registration & Coffee (Adriatic Room; Hall 4)
8:45am	Welcome & Setting the Context Co-chairs
9:00am	Dr Ronald P. Mensink (Maastricht University) via video conference
9:30am	Dr. Bruce Holub (University of Guelph) on site
10:15am	Dr. Penny Kris-Etherton (Penn State University) via video conference
11:00am	**Break**
11:30am	Dr. Alberto Ascherio (Harvard University) on site
	Dr. Walter Willett (Harvard University) via video conference
12:15pm	**Lunch**
1:00pm	Dr. Steen Stender (University of Copenhagen) on site
1:45pm	Dr. David Kritchevsky (The Wistar Institute) via teleconference
2:30pm	Dr. Kalyana Sundram (Malaysian Palm Oil Board) on site
3:15pm	**Break**
3:30pm	Valerie Tarasuk (University of Toronto) on site
4:15pm	Closing Remarks Co-chairs
4:30pm	**Adjourn**

Health Canada Santé Canada

HEART AND STROKE FOUNDATION OF CANADA

Finding answers. For life.

Bureau of Nutritional Sciences
Banting Research Bldg. (P.L. 2203A)
Tunney's Pasture
Ottawa, Ontario
K1A 0L2

September 12, 2005

Dear. Dr. … ,

Subject: Consultation on the health implications of alternatives to trans fatty acids

In November 2004 the Government of Canada announced the formation of a Task Force to develop recommendations and concrete strategies to effectively eliminate or reduce industrially produced *trans* fats in Canadian foods to the lowest level possible. More information on the work of the Task Force can be found at www.healthcanada.gc.ca/transfat.

In preparing its recommendations, the Task Force is examining the health implications of identified alternatives to partially hydrogenated oils through an assessment of the health benefits and risks of each alternative. A number of questions, listed below, based on a review of current scientific literature on dietary fat, have been developed to aid in the task of assessing the alternatives.

- In North America, LDL- cholesterol has been identified as the major atherogenic lipoprotein and, therefore, the primary target for cholesterol-lowering therapy. However, the impact of dietary fat and fatty acids on CVD risk has been assessed in relation to various other bio-markers of atherosclerosis, such as serum HDL cholesterol, total/HDL or LDL/HDL ratios, triglycerides and lipoprotein(a). How should the Task Force consider the relative importance of these bio-markers?
- Would the replacement of partially hydrogenated oils by oils rich in monounsaturated fatty acids have positive effects on serum cholesterol and lipoprotein levels and CVD risk?
- Although the bulk of the scientific literature relating dietary fat to CVD has dealt with the risk factors surrounding atherosclerosis (viz., blood lipid levels and patterns), there is evidence implicating it in other aspects of the disease (e.g., thrombus/clot formation; cardiac arrhythmia; and in vivo oxidative stress). In addition, dietary fat has been implicated in other chronic diseases, such as cancer, diabetes and hypertension. Since many of these additional relationships appear to be associated with dietary n-6 and n-3 polyunsaturated fatty acids, how and to what extent should these relationships be taken into consideration in recommendations to eliminate or reduce *trans* fats?

- In Canada, it is estimated that, while meeting the essential fatty acids requirement, the ratio of linoleic acid to ?-linolenic acid is relatively high? Many of the proposed alternatives to partially hydrogenated oils have low linolenic content. How should the Task Force consider a further increase of this ratio?
- There is a general consensus that *trans* fat has a more deleterious effect on risk factors for CVD than saturated fat. However, intakes of saturates are marginally high in Canada (about 11 % of total energy) and there is some evidence (Lichtenstein et al, 1999) that the adverse effect of *trans* fatty acids relative to saturated fatty acids may occur primarily at high dietary intakes of *trans* fat. Are there any conditions under which the replacement of *trans* fatty acids with saturated fatty acids could be considered? If yes, is there a threshold below which this replacement would not provide obvious benefits?
- There is growing evidence that the individual long chain saturated fatty acids do not have an equal effect on the risk factors for CVD. While it is generally recognized that myristic acid is the most hypercholesterolemic saturated fatty acid, there is still debate on the relative benefits of stearic, lauric and palmitic acids. Should recommendations regarding replacement of *trans* with saturates take into consideration that all saturates may not have the same effect on CVD risk?
- As consumers are turning away from *trans* fats and products made with partially hydrogenated oils, there is a temptation in some cases (e.g., some baked goods, cookies) to turn back towards alternatives such as butter and tropical oils which are major sources of saturated fats. Based on your analysis, would there still be an overall net health benefit to Canadians if partially hydrogenated oils were effectively eliminated from our food supply but substituted, in some instances, with butter and tropical oils?

As co-chairs of the Task Force, we would like to invite you to provide your comments on any or all of these questions, as well as any other questions regarding the health implications of alternatives to partially hydrogenated oils.

A technical consultation is planned during the next meeting of the Task Force on November 2, 2005 in Ottawa, Canada, to address the health implications of alternatives to *trans* fats. If it were possible for you to attend, this would provide an opportunity to present and discuss your perspectives with the Task Force members who are presently seeking expert advice before developing their final recommendations to the Canadian Minister of Health. We are currently finalizing a review paper regarding these questions and would also welcome your comments and/or review of the document.

If you **agree to participate in the next public consultation meeting of the Task Force in Ottawa, Canada, on November 2, 2005, we will cover your expenses: transportation, hotel accommodations and meals. Please let us know by September 20th which question(s) you intend to address** in your presentation by sending a note to:

Cynthia Piazza

If you would rather provide us your input on the review paper, please let us know as well and we will contact you to discuss and establish appropriate arrangements.

We thank you in advance for accepting to share with the Task Force your expertise on this matter and we are looking forward to discussing with you these important issues which will form the basis of our final recommendations.

Sincerely,

Dr. Mary R. L'Abbé, Co-chair
Director, Bureau of Nutritional Sciences
Health Canada

Ms. Sally Brown, Co-chair
CEO, Heart and Stroke Foundation of Canada

Summary of Responses from Experts

1. While in North America LDL-cholesterol has been identified as the major atherogenic lipoprotein and therefore, as the primary target for cholesterol-lowering therapy, the impact of dietary fat and fatty acids on CHD risk has been assessed in relation to different bio-markers of atherosclerosis. How should the Task Force consider the relative importance of these bio-markers?

The question of which bio-marker is the best for assessing coronary heart disease (CHD) risk is important and is a question for which we do not have a definitive answer. High LDL cholesterol is the risk factor with the most extensive supporting evidence. The fact that the Adult Treatment Panel (ATP) III (NCEP, Circulation 2002; 106:3124-3424) designated LDL as the primary target for cholesterol-lowering therapy reinforced the dominance of LDL cholesterol level as the primary risk factor in clinical practice. However, there also is strong evidence for a causal relationship between HDL cholesterol and atherosclerosis. Any foodstuff that results in a lower HDL cholesterol level will probably increase the risk of heart disease, stroke and peripheral vascular disease. However, the latter is not 100 percent certain. It is perhaps noteworthy that ATP III (NCEP, Circulation 2002; 106:3124-3424) identified low HDL cholesterol (< 0.9 mmol/L) as an independent risk factor for CHD.

In populations with high LDL cholesterol levels, total cholesterol/HDL (or LDL/HDL) ratio seems to have the highest correlation with risk for atherosclerosis. This position is supported by Shai et al (2004), who reported that HDL cholesterol related ratios, such as total cholesterol/HDL cholesterol (TC/HDL-C), are a "powerful predictive tool independent of other known CHD risk factors". The importance of TC/HDL-C as a predictor of CHD risk also was supported by Blake and Ridker (J of Intern Med 2002;252:283-294).

While the TC/HDL-C ratio is one of the most commonly accepted risk factors by researchers, it does not predict all of the risk associated with CHD. Hence, other risk factors such as total cholesterol, LDL cholesterol, HDL cholesterol, triacylglycerides and other lipid markers, as well as non-lipid risk factors such as markers of inflammation (e.g. C Reactive Protein or CRP), lipid oxidation, endothelial dysfunction, and platelet function/clotting factors, are also important but the appropriate application of these biomarkers is uncertain. It is perhaps worth noting that an assessment of systemic inflammation markers (Blade and Ridker, J of Intern Med 2002; 252:283-294.) found CRP to be the strongest univariate predictor of the risk of CHD events, among the 12 markers measured. By contrast, based on their own results and a recent

meta-analysis, Danesk et al (NEJM 2004; 350: 1387-97) concluded that CRP was a relatively moderate predictor of risk of CHD and that the recommended use of CRP as a risk factor be reviewed. Nonetheless, Blake and Ridker further found that after adjusting for traditional risk factors, CRP and TC/HDL-C remained the only significant predictors of future cardiovascular events. Shai et al (Circulation 2004; 110:2824-2830) also concluded that the TC/HDL-C ratio appears to be the primary lipid predictor among postmenopausal women and that the TC/HDL C ratio as a single parameter is a powerful tool for clinical practice. On the other hand, high triacylglyceride levels together with low HDL cholesterol levels are part of what's known as the "metabolic syndrome" which is associated with an increased risk of CHD.

In fact, due to the complexity of risk factors, sometimes epidemiological studies are also considered to provide evidence of CHD risk. A recent epidemiological study (Oh et al, Am J Epidem 2005; 161:672-679) showed that dietary *trans* fatty acids were associated with an increase and polyunsaturated fatty acids with a decrease in mortality from CHD. Studies such as this one, which measure death from CHD as an endpoint, presumably include all risk factors. However, it is important to note that although epidemiological research provides valuable information about disease distribution and determinants of disease, it does not establish cause and effect.

In summary, all the invited experts agreed that there is enough evidence to consider TC/HDL-C as the preferred bio-marker for CHD. CRP might be a stronger biomarker, however, at present there is lack of data on the effects of dietary fats on plasma levels of CRP.

2. Would the replacement of partially hydrogenated oils by oils rich in monounsaturated fatty acids have positive effects on serum cholesterol and lipoprotein levels and CHD risk?

There is a general consensus that the replacement of partially hydrogenated oils (including both *trans* and saturated fatty acids) with cis-MUFA would have positive effects on lipoproteins and CHD risk. The risk reduction depends on baseline saturated and *trans* fatty acid intakes.

Polyunsaturated fatty acids (PUFA) are also important components of a cholesterol-lowering and a healthy diet. Hu et al (NEJM 1997; 337: 1491-1499) concluded that replacement of the SFA and TFA by MUFA and PUFA is more effective in preventing CHD than reducing overall fat intake.

Therefore, food chosen to replace *trans* fatty acids (TFA) and saturated fatty acids (SFA) in the diet should include a balance of unsaturated fatty acids by including both MUFA and an optimal amount of PUFA .

3. Although the bulk of the scientific literature relating dietary fat to CHD has dealt with the risk factors surrounding atherosclerosis (viz., blood lipid levels and patterns), there is evidence implicating it in other aspects of the disease (e.g., thrombus/clot formation; cardiac arrhythmia; and in vivo oxidative stress). In addition, dietary fat has been implicated in other chronic diseases, such as cancer, diabetes and hypertension. How and to what extent should these relationships be taken into consideration in recommendations to eliminate or reduce trans fats?

Some of the most convincing evidence of a relationship between dietary fat and non-lipid CHD risk factors has been found for biomarkers of systemic inflammation and endothelial function. This evidence has come from both epidemiological and experimental studies. A limited number of studies suggest that TFA might exert adverse effect on markers of inflammation and endothelial function.

In a study by Baer et al (2004) stearic acid has also been found to result in higher fibrinogen levels whereas *trans* fat, oleate, and a mixture of lauric, myristic and palmitic acids had no effect on fibrinogen levels. However, this was observed at very high intakes of stearic acid (10.9% of energy), which represents a level that is unlikely to be reached by use of fats and oils high in stearic acid. In contrast, a study by Kelly et al. (Euro J Clin Nutr 2001;55, 88-96) showed that diets enriched in stearic acid did not contribute to an increase in classical risk factors for CHD and those related to thrombosis. Their results indicated that stearic acid, even at an exceptionally high intake of 19 g/day, compared to palmitic acid (22.5 g/day) had beneficial effects on thrombogenic and atherogenic risk factors. In a subsequent study, Kelly et al (Euro J Clin Nutr 2002;56:490-99) found, with the exception of a significant decrease ($P<0.05$) in LDL and ADP-induced platelet aggregation, there were no significant differences between high stearic acid and high palmitic acid diets on outcomes measured.

Although there is increasing interest in the relationship between dietary fat and non-lipid CHD factors, because lipid and lipoprotein risk factors do not account for the total prevalence of CHD, there are insufficient data to establish a meaningful relationship between type and amount of dietary fat and non-lipid CHD risk factors. The one exception may be the adverse effect of *trans* fatty acids on surrogate measures of systemic inflammation and endothelial function.

There is also growing evidence of an adverse effect of TFA intake on the risk of diabetes. The relative risk of type 2 diabetes is increased in the highest quintiles for TFA intake (Hu et al, 2001). A high intake of *trans* MUFA (20% of energy intake) adversely affected fasting concentrations of glucose and insulin in obese patients with type 2 diabetes (Christiansen et al. 1997).

Evidence for the possible relationship of TFA intake with cancer is however inconsistent.

4. In Canada, it is estimated that, while meeting the essential fatty acids requirement, the ratio of linoleic acid to alpha-linolenic acid is relatively high? Many of the proposed alternatives to partially hydrogenated oils have low alpha-linolenic content. How should the Task Force consider a further increase of this ratio?

According to the invited experts who addressed this question, it is important to ensure that any changes to the diet to include less *trans* fats would not lead to decreases in the n-3 polyunsaturated fatty acid intake. Adequate intakes of n-3 polyunsaturated fatty acids, including EPA and DHA should be maintained. At present, regular canola oil is the primary source of n-3 polyunsaturated fatty acid in the Canadian diet and therefore, it is important not to reduce the consumption of this oil. The Expert Committee on Fats and Oils (ECFOL) beleives that while changes to the diet to reduce *trans* fats will most likely not alter current intakes of n-3 polyunsaturated fatty acid, they may increase n-6 polyunsaturated fatty acids and , the linoleic acid to alpha-linolenic acid ratio. High dietary content of n-6 polyunsaturated fatty acids is not desirable because n-6 fatty acids (i.e., linoleic acid) can interefere the metabolic conversion of alpha-linolenic acid to EPA and DHA and thereby decrease the tissue amount of these two long-chain omega-3 fatty acids. High tissue content of EPA and DHA exerts cardioprotective effects in patients with preexisting coronary heart disease and in healthy individuals. Thus, the use of oils high in cis-monounsaturated fatty acids rather than n-6 polyunsaturated fatty acids should be considered.

5. There is a general consensus that trans fat has a more deleterious effect on risk factors for CHD than saturated fat. However, intakes of saturates are marginally high in Canada (about 11 % of total energy according to the Federal-Provincial surveys on nutrition collected between 1990 and 1999) and there is some evidence (Lichtenstein et al, 1999) that the adverse effect of trans fatty acids relative to saturated fatty acids may occur primarily at high dietary intakes of trans fat. Are there any conditions under which the replacement of trans fatty acids with saturated fatty acids could be considered? If yes, is there a threshold below which this replacement would not provide obvious benefits?

All of the invited experts agreed that the Task Force should promote all actions that would lower *trans* fat intake. Favourable health effects are clearly achieved when *trans* fat is replaced with cis-monounsaturated and cis-polyunsaturated fats. Some food manufacturers have already succeeded in replacing most *trans* fat with cis-monounsaturated fat in certain food categories. The switch from partially hydrogenated frying oils to frying oils high in cis-monounsaturated fat and low in saturated and *trans* fat in Europe shows that replacing *trans* fat in fast food, spreads and cooking fat is not problematic.

The primary product category that may require hard fat is baked goods (but not in all baked goods). In this category, the only viable alternative appears to be fat and oil containing a significant proportion of saturated fatty acids. However, the replacement should not lead to high intakes of

saturated fat, because there is evidence from both clinical epidemiological studies that saturated fat (at least from dairy and meat) increase the risk of heart disease.[1]

The question of whether there is a threshold below which the replacement of *trans* fatty acids with saturated fatty acids would not actually be beneficial does not appear to have been systematically investigated. However, prospective cohort studies and metabolic studies may provide some relevant insight.

In reviewing the information from such studies, it must be noted that prospective cohort studies and metabolic studies tend to have complementary strengths and weaknesses. Generally speaking, prospective cohort studies have higher levels of external validity or generalizability, while metabolic studies have higher levels of internal validity. Specific strengths of prospective cohort studies when used for examining diet-disease relationships include their large sample sizes, with subjects followed over time as they self-select food intake and CHD events occur. Balancing this strength is the fact that because nutrient intakes are estimated from self-report questionnaires and nutrient databases with varying amounts of missing data, there can be considerable measurement error associated with estimates of actual levels of nutrient intake. In contrast, metabolic studies in which all food consumed is provided to study subjects (sometimes with its nutrient content determined by analysis of aliquot portions) allow for estimation of actual nutrient intake with a high level of certainty. Weaknesses of metabolic studies include small samples sizes and short periods of follow up. Study subjects have no opportunity for self-selection of their food intake and study end points are usually biomarkers of risk for CHD development (e.g. LDL/HDL cholesterol ratio), not CHD itself.

Prospective Cohort Studies

Several large prospective cohort studies have studied relationships between dietary intakes of saturated and *trans* fat and coronary heart disease (CHD)[2]. One such study, the Nurses' Health Study, examined these relationships at 8, 14 and 20 years of follow-up, in 85,095, 80,082 and 78,778 women, respectively. Results described below are from multivariate analyses at 14 and 20 year follow-ups.

At 14 years of follow-up, Hu et al (NEJM 337; 1997:1491-1499) reported that participants in the highest quintile for *trans* fat intake were at 27% (95% CI: 3%–56%) increased risk for CHD (defined as CHD-related morbidity or mortality) when compared with individuals in the lowest intake quintile. In contrast, participants in the highest quintile for saturated fat intake were not at a significantly increased risk for CHD when compared with individuals in the lowest intake quintile (RR=1.16; 95% CI: 0.93–1.44). At 20 years of follow up, Oh et al (AMJ 161;2005:672–679) reported that women in the highest quintile for *trans* fat intake were at 33% (95% CI: 7%–66%) increased risk for CHD when compared with individuals in the lowest quintile. Participants in the highest quintile for saturated fat intake were not at a significantly higher risk for CHD than individuals in the lowest quintile (RR=0.97; 95% CI: 0.73–1.27). The findings from these two

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[1] Lichtenstein et al (N Engl J Med. 1999.340(25):1933-40) / Wood et al (J Lipid Res. 1993. 34(1):1-11) / Kris-Etherton et al (Metabolism. 1993. 42(1):121-9) / Hu et al (Am J Clin Nutr. 1999. 70(6):1001-8).

[2] (a) Oh et al (AMJ 161;2005:672-679) / Hu et al (NEJM, 337;1997:1491-1499) / Willet et al (Lancet 1993;341:581-585); (b) Ascherio et al (BMJ 1996;313:83-90); (c) Pietinen et al (AJE 1997;145:876-887); (d) Bolton-Smith et al (EHJ 1996;17 :837-845); and (e) Oomen et al (Lancet 2001;357:746-751).

follow up periods are similar and suggest that a high intake of *trans* fat is associated with a higher risk of CHD morbidity and mortality than a high intake of saturated fat.

At the 14 year follow-up Hu et al also estimated that replacement of 2% of energy from *trans* fat with 2% energy from unhydrogenated unsaturated fat would result in a 53% (95% CI: 34%–67%) reduction in risk for CHD; while replacement of 5% of energy from saturated fat with 5% energy from unhydrogenated unsaturated fat would result in a 42% reduction in CHD risk (95% CI: 23%–56%). There may be a number of reasons for the lack of a statistically significant difference between these two risk estimates. One explanation might be that nutrient intakes were estimated using self-reported questionnaire data; the sources of measurement error associated with this methodology have been well-documented.

Metabolic Studies

In 1999, Ascherio et al (NEJM 1999: 340:1994) reviewed six metabolic studies[3] that examined t he impact of substitutions of both *trans* fat and saturated fat for a "control" fat[4] on cholesterol biomarkers[5] of risk for CHD development. Across these six studies, the percent energy from saturated fat was increased by between 4.5% and 9.9% (from a baseline of 9–11%) when saturated fat was exchanged with control fat. The percentage energy from *trans* fat was increased by between 3.1% and 11% (from a baseline of 0–1.4%) when *trans* fat was exchanged with control fat. For six of the seven comparisons made[6], the effect of *trans* fat was significantly more hypercholesterolemic[7] than the effect of saturated fat. The exception was the lowest *trans* fat substitution (3.1%), where the percent energy from *trans* fat was increased from 0.7% to 3.8%.

These results suggest that at relatively high intakes of *trans* fat (5.7–11.0% energy) and saturated fat (14–20.1% energy), *trans* fat has a more deleterious effect on cholesterol biomarkers of risk for CHD than does saturated fat. While the relative health effects of *trans* fat and saturated fat at lower levels of *trans* fat intake are also of interest, extrapolation from *trans* fat levels of 5.7–11.0% energy to levels of 1–3% energy is not seen as appropriate for two reasons: (1) the large variability in LDL/HDL cholesterol ratio response to equivalent substitutions of *trans* or saturated fat for control fat; and (2) the lack of a consistent trend in LDL/HDL cholesterol ratio response across the different dose levels of saturated fat studied.

Summary

Findings from the metabolic studies reviewed by Ascherio et al (NEJM 1999: 340:1994 are consistent with the findings of the prospective cohort study with 14 and 20 years of follow-up

[3] (Zock and Katan [JLR 1992;22:399-410]; Judd et al [Lipids 2002;37:123-131]; Judd et al [Am J Clin Nutr 1994;59:861-868]; Sundram et al [J Nutr 1997;127:514S-520S]; Mensink and Katan [NEJM 1990; 323:439-445]; and Nestel et al [J Lipid Res 1992;33:1029-1036])

[4] Four studies used oleic fat as the control fat (Judd et al [Am J Clin Nutr 1994;59:861-868]; Judd et al [Lipids 2002;37:123-131]; Nestel et al [J Lipid Res 1992;33:1029-1036]; Mensink and Katan [NEJM 1990; 323:439-445]), one study used cis 18: blend as the control fat (Sundram et al [J Nutr 1997;127:514S-520S]) and one study used linoleate fat as the control fat (Zock and Katan [JLR 1992;22:399-410]).

[5] In terms of the cholesterol ratios, one study failed to calculate a cholesterol ratio (Nestel et al [J Lipid Res 1992;33:1029-1036]); in this study, both LDL and HDL levels were significantly worse for the trans versus the saturated fat diet. Of the five studies that calculated cholesterol ratios, LDL:HDL was calculated in two (Mensink and Katan [NEJM 1990; 323:439-445] and Sundram et al [J Nutr 1997;127:514S-520S]), TC:HDL was calculated in two (Judd et al [Lipids 2002;37:123-131]; Judd et al [Am J Clin Nutr 1994;59:861-868]), and HDL:LDL was calculated in one (Zock and Katan [JLR 1992;22:399-410).

[6] While six studies were reviewed, Judd et al [Am J Clin Nutr 1994;59:861-868] administered a moderate trans fat diet as well as a high trans fat diet. Thus, the total number of trans fat-saturated fat comparisons was seven.

[7] The term "hypercholesterolemic" is used to refer to a significant unfavourable change in any cholesterol parameter (LDL, HDL, LDL:HDL, TC:HDL, HDL:LDL).

(Hu et al [NEJM, 337;1997: 1491-1499] and Oh et al [AMJ 161;2005:672-679]). Research using both these study designs found that at high levels of *trans* fat (5.7–11.0% energy) and saturated fat intake, the impact of *trans* fat is more deleterious than that of saturated fat (14–20% energy), whether the outcome studied is CHD events themselves, or a cholesterol-related biomarker of such risk. Conversely, no research has been done to determine whether *trans* fat are more deleterious than saturated fat at low levels of *trans* fat intake (1-3% energy).

6 There is growing evidence that the individual long chain saturated fatty acids do not have an equal effect on the risk factors for CHD. While it is generally recognized that myristic acid is the most hypercholesterolemic saturated fatty acid, there is still debate on the relative benefits of stearic, lauric and palmitic acids. Should recommendations regarding replacement of trans with saturates take into consideration that all saturates may not have the same effect on CHD risk?

Most of the randomized metabolic studies suggest that lauric, myristic and palmitic acids are the most LDL-cholesterol raising saturated fatty acids relative to carbohydrates, and that stearic acid is either neutral or slightly hypocholesterolemic. However, the impact of these long chain saturated fatty acids on CHD is not altogether clear. These four saturated fatty acids increase HDL cholesterol to different extents and consequently result in different levels of TC/HDL-C ratios. Lauric acid would reduce the ratio to a greater extent than stearic and myristic acids, while palmitic acid would raise the ratio. All experts referred to these conclusions primarily based on the meta-analysis performed by Mensink et al in 2003 (AJCN 2003; 77:1146-1155). On the other hand, Hu et al (NEJM, 337;1997:1491-1499) , based on the data from the prospective cohort study of 80 082 women in the Nurses Health Study estimated that an increase of 1% energy from lauric + myristic acids, palmitic and stearic acids increases the relative CHD risk by 14% (significantly), 3% (non-significantly) and 9% (significantly) respectively.

Some studies have shown that linoleic acid mitigates the hypercholesterolemic effect of palmitic acid. Unfortunately, there are no data on the effects of linoleic acid on other saturated fatty acids and therefore, it is not known whether the mitigating effect of linoleic acid pertains only to palmitic acid. At this point, the possible dampening effect of n-6 and n-3 polyunsaturated fatty acids on the cholesterol raising effects of individual saturated and *trans* fatty acids cannot be taken into consideration in recommendations to eliminate or reduce *trans* fats.

One invited expert informed the Task Force that fully hydrogenated soybean oil (i.e. primarily tristearin) interesterified with soft oil would elevate LDL/HDL-cholesterol ratio and fasting blood glucose levels relative to natural saturated fat. (Unpublished data) In contrast to this assertion, a study by Snook et al. (Euro J Clin Nutr 1999: 53:597-605) demonstrated that myristic, palmitic and stearic, fed as synthetic triglycerides (i.e. trimyristin, tripalmitin and tristearin), were not particularly different from those effects of natural fats and oils on blood cholesterol levels, except myristic acid, which was not as hypercholesterolemic as expected. A study by Nestel et al. (Am J Clin Nutr 1998;68: 1196-1201) found that

effect of stearic acid-rich, structured triglyceride on plasma lipid concentrations was not different from a palmitic acid rich diet. In another study, a high-stearic acid diet that provided 5% energy as stearic acid, compared to oleic acid rich diet, did not impair glucose tolerance and insulin sensitivity in healthy women (Louheranta et al. Metabolism 1998; 47: 529-534).

In the absence of more data on the effect of fully hydrogenated oil interesterified with soft oils and also on the relative effects of individual saturated fatty acids on the various risk factors for CHD, most experts consider that it is prudent to ensure that replacements of partially hydrogenated oil not lead to large increases in saturated fats whether they are derived from natural oils and fats or fully hydrogenated fats.

7. As consumers are turning away from trans fats and products made with partially hydrogenated oils, there is a temptation in some cases (e.g., some baked goods, cookies) to turn back towards alternatives such as butter and tropical oils which are major sources of saturated fats. Based on your analysis, would there still be an overall net health benefit to Canadians if partially hydrogenated oils were effectively eliminated from our food supply but substituted, in some instances, with butter and tropical oils?

There is unanimous agreement among the invited experts that butter is not a good replacement for partially hydrogenated oils. Butter, compared to all the other solid dietary fats including palm oil, palm kernel oil, and coconut oil as well as compared to margarines and shortenings with low to moderate levels of *trans* fatty acids, has been shown to have adverse effect on the TC/HDL-C ratio (Mensink et al, AJCN 2003; 77:1146-1155 and Lichtenstein et al., NEJM 1999; 340:1933-40). Oils such as palm kernel oil, coconut oil, and palm oil might be better substitutes than butter and other animal fats.

As a general conclusion, the Task Force promotes all actions that lower TFA intake. Results of metabolic and epidemiological studies consistently show that TFA are more harmful than any other type of fat.

Favorable health effects are achieved even if TFA are replaced by saturated fat and even more so if replaced by cis-monounsaturated and cis-polyunsaturated fatty acids. It is important to maintain adequate intakes of polyunsaturated fatty acids to get the benefits of n-6 and n-3 fatty acids, and to limit the cholesterol-raising saturated fatty acids.

In this respect, high MUFA oils are considered as the first choice for an alternative to partially hydrogenated oils and could be used for frying. Coconut oil, palm kernel oil, and palm oil, and fully hydrogenated/interesterified oils can be considered as replacement but not as primary replacements. Butter is not seen as a good replacement because of its greater tendency to increase the ratio of TC/HDL-C compared to palm, palm kernel and coconut oils. (Mensink et al, AJCN 2003; 77:1146-1155)

Appendix 10

Interim Report of the Trans Fat Task Force

Background

There is strong scientific evidence that a high intake of trans fatty acids can increase the risk of developing heart disease, although it has yet to be determined if all trans fatty acids have the same detrimental effect on human health. While low levels of trans fats naturally occur in the diet, the high level in the Canadian diet is mainly related to the widespread use of partially hydrogenated oils and shortenings in food manufacturing and food preparation. Reversing this trend is highly justifiable from a public health point of view and the question asked to the Task Force is not why the trend should be reversed, but how.

In addition to providing the Minister of Health, by the end of Fall 2005, with concrete strategies to effectively eliminate or reduce processed (industrially produced) trans fats, in Canadian foods to the lowest level possible, the Task Force was also asked to prepare an interim report that focuses on public education, labelling and possible immediate opportunities for the food service and food processing industries to reduce trans fats.

Deliberations and Recommendations

The recommendations in this report are based on analysis of current research, a full-day public consultation with industry representatives, and written submissions from various stakeholders.

The Task Force members were pleased that within the agriculture and food industry there is a strong awareness of the nature and importance of the trans fat issue, acceptance of the need for change, and a commitment to change.

Furthermore, some parts of the industry have made considerable progress in addressing the issue. The Task Force was encouraged to hear of alternatives to partially hydrogenated fats and oils that are currently available, as well as alternatives that are under development and likely to be available in the near future.

One of Canada's largest food retailers indicated that its customers are requesting "no trans" foods. This push from consumers is indicative of an increasing public awareness of the health risks of trans fats and advances in food labelling.

In providing guidance to food processing and food service industries on reducing trans fat levels, the Task Force took into consideration the impact its final recommendations may have on smaller food processors and food service operators, and the need for some mitigating measures or strategies. The Task Force also noted that trans fat reduction is more of a challenge in some food product categories than in others, and that the final recommendations must be developed accordingly.

Many of the recommendations to consumers are based on the belief that while consumer awareness has increased, there is still a need for more education on the health risks associated with trans fats and the foods that contain them. It is also important to continue to educate consumers about the measures they can take to control their trans fat intake while maintaining a nutritious and balanced diet.

A number of knowledge and data gaps must be filled before the Task Force can complete its analysis

and develop its final recommendations. The Task Force recognizes the need, and plans to hold a further public consultation this fall, this time on the health effects of some of the proposed alternatives to trans fats.

In the meantime, the Task Force trusts that the following recommendations will be of value to Canadians:

Guidance Related to Food Processing and Food Service Industries

The Task Force agrees that the new nutrition labelling regulations coming into effect are key to enabling consumers to play an active role in reducing their trans fat intake, and that the Nutrition Facts disclosed pursuant to those regulations must be accurate. Therefore, the Task Force recommends that:

- the federal government:
  - underscore the importance to the food industry, including manufacturers and distributors of domestic and imported food products, of meeting the approaching deadlines for modifying their labels;
  - refer the food industry to organizations such as the American Oil Chemists' Society (AOCS) or the Standards Council of Canada (SCC), which set standards for analytical procedures and can provide names of laboratories with established competency for the analysis of trans fatty acids; and
  - work with the above-mentioned organizations to encourage laboratories to participate in their accreditation programs.
- industry associations and industry-specific journals and newsletters aid in the dissemination of this information; and
- manufacturers and distributors of domestic and imported food products respect the for regulations making claims related to trans fatty acids. For example, a "trans-free" product must contain less than 0.2 g of trans fatty acids in the reference amount (portion size) specified by regulation for that food category, and also in the portion size stated on the label's Nutrition Facts table. The food must also be low in saturated fats to carry this claim.

The Task Force notes that many of the companies that have already taken steps to reduce the content of industrially produced trans fat in their products are large manufacturers. The Task Force is aware that some small and medium-sized enterprises (SMEs) will face particular challenges in this regard. They do not have the in-house research and development capability or the financial leverage of larger manufacturers and thus rely more on their suppliers for adaptable and/or ready-to-use solutions. Therefore, the Task Force recommends that:

- the federal government work with stakeholders to develop a national list of food processing development centres that can help SMEs reformulate their products to reduce or eliminate trans fats and/or develop alternative products with little or no trans fats; and
- industry associations and industry-specific journals and newsletters aid in the dissemination of this information.

The Task Force also notes federal/provincial surveys that suggest 22 % of the average trans fat intake of Canadian adults (and as much as 31 % in the case of males 19–30 years old) is provided by foods consumed away from home. While nutrition labelling is not mandatory in food service establishments, the Canadian Restaurant and Foodservices Association has already worked with its members to develop guidelines for voluntary provision of nutrition information to consumers in chain restaurants. Therefore, the Task Force recommends that:

- the national food service industry association, in collaboration with government and other stakeholder groups as appropriate, develop and disseminate a guide on how food service operators can reduce trans fat content. Suggestions would include modifying recipes, and selecting ingredients and ready-to-serve food products containing less trans fat, based on the nutrient information that will be required to be provided by suppliers under the Nutrition Labelling regulations.

The food supply chain in North America is highly integrated. The Task Force understands that any regulation must be developed in accordance with Canada's international trade obligations, i.e. science-based, transparent and predictable. The difference in the definition of "0" trans fat[1], i.e. what can be declared as 0 g, is already seen as a trade barrier between Canada and the United States. Maintenance of stricter requirements in Canada could make product development more challenging for Canadian firms. Therefore, the Task Force recommends that:

- the federal government pursue discussions with the U.S. through existing forums such as the NAFTA Technical Working Group on Food Labelling, Packaging and Standards to raise awareness of the public health imperative underpinning the November 2004 direction from the Canadian House of Commons[2], and determine the U.S. position and share data that could inform any revision of the mandatory declaration of trans fat in the Nutrition Facts table, including what can be declared as "zero" as well as the definitions of trans-related nutrient content claims; and
- Canadian industry associations and Canadian subsidiaries of multinational firms raise awareness among their American and Mexican counterparts regarding the position of the Canadian House of Commons which calls on the government to "enact regulation… that effectively eliminates processed trans fats, by limiting the processed trans fat content of any food product sold in Canada".

Guidance Related to Consumers

The recommendations in this report are supported by strong scientific evidence showing that dietary trans fat can increase the risk of developing heart disease. Consumers can reduce this risk by adopting an overall balanced diet

[1] Threshold for declaring a serving of a food as trans fat free is 0.2 g in Canada and 0.5 g in U.S.

[2] "That, in the opinion of this House, the federal government should acknowledge processed trans fatty acids are harmful fats, which are significantly more likely to cause heart disease than saturated fats; And that this House hasten the development of replacements to processed trans fats by urging the government to enact regulation, or if necessary legislation within one year, guided by the findings of a multi-stakeholder Task Force, including the Heart and Stroke Foundation of Canada and following the consultation process with scientists and the industry currently underway; Therefore, this House calls on the government to enact regulation, or if necessary present legislation that effectively eliminates processed trans fats, by limiting the processed trans fat content of any food product sold in Canada to the lowest level possible." (Canadian Parliament House of Commons, Adopted motion, November 23, 2004)

which includes foods with little or no trans fat. Fat is an important part of a healthy diet because it provides essential fatty acids and energy (Calories). It also helps the absorption of vitamins A, D and E. However, fat is made of different types of fatty acids. Some (omega-3 and monounsaturated fatty acids, for example) are essential and/or may be beneficial to heart health, while others (such as trans and saturated fatty acids) are associated with an increased risk of heart disease.

Most trans fats in the Canadian diet come from partially hydrogenated oils used in food processing and preparation. Small amounts of trans fats also occur naturally in animal foods such as dairy products, beef and lamb. Although the trans fat content of these foods is small, it could be of concern to those who consume a diet proportionately high in higher-fat dairy and meat products. Good progress is being made by the food industry to reduce industrially produced trans fats in food categories previously recognized as significant sources of trans fats, such as margarines, french fries and cookies. However, more needs to be done to educate consumers about the health effects of trans fats as well as all other types of fats.

Consumer demand will serve as a strong incentive for industry to continue working to reduce or eliminate trans fats in foods. The new Nutrition Facts table and trans fat-related claims enable consumers to be more discerning. Many consumers already have a general awareness of the issue but are limited in their action by lack of adequate information and prevailing misconceptions.

Therefore, the Task Force recommends that:

- all parties (e.g. the Network on Healthy Eating, health professionals and the media) involved in communicating to consumers about food and nutrition:
  - reflect the following Task Force messages:
    - Any dietary change that focuses on reducing trans fat intake should be made in the context of a healthy lifestyle as outlined in *Canada's Food Guide to Healthy Eating* (www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/food_guide_rainbow_e.html) and *Canada's Guide to Healthy Eating and Physical Activity* (www.phac-aspc.gc.ca/guide).
    - Some fatty acids (e.g. omega-3 and monounsaturated) are beneficial to heart health and should be included in a healthy diet, while others (e.g. trans and saturated fatty acids) can increase the risk of heart disease and should be reduced in the diet.
    - The new Nutrition Facts table and fat-related claims can assist consumers in selecting products such as margarines, snack foods, french fries, cookies and crackers that contain less trans fat while avoiding items with significantly higher saturated fat content.

- It is not yet easy for industry to replace industrially produced trans fats in all food categories. However, low-fat versions of partially hydrogenated fat-containing products, such as microwave popcorn, coffee whiteners and croutons, are often available. Even if they contain hydrogenated oil, the amount is so small that these products can still be declared trans free which means the product contains less than 0.2 g of trans fat in the specified amount of food.
- Choosing lower-fat dairy products and leaner meats, as recommended in *Canada's Food Guide to Healthy Eating*, is a good way to reduce naturally occurring saturated and trans fat in the diet.
- Making healthy food choices means more than lowering or eliminating trans fat. Other nutrients and Calories should also be considered. For example, trans-free foods can still be high in sodium or Calories.

– direct individuals to evidence-based information sources that already exist, such as:

- Health Canada's *It's Your Health* Web page on trans fats: www.hc-sc.gc.ca/english/iyh/index.html,
- The Heart and Stroke Foundation of Canada: www.heartandstroke.ca (note: conduct a search using the term "trans fat")
- the Canadian Health Network: www.canadian-health-network.ca, and
- the Canadian Restaurant and Food-services Association Internet link to restaurant chains that provide nutrition information online: www.crfa.ca/foodandfitnessfacts;

– educate the public on how to use the Nutrition Facts table to select foods that are low in trans fats and saturated fats using such material as Health Canada's information on nutrition labelling (www.healthcanada.ca/nutritionlabelling) and the Canadian Diabetes Association and Dietitians of Canada's Nutrition Labelling Education Web site (www.healthyeatingisinstore.ca); and

– ensure that *Canada's Food Guide to Healthy Eating* (http://www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/food_guide_rainbow_e.html) and *Canada's Guide to Healthy Eating and Physical Activity* (www.phac-aspc.gc.ca/guide) are broadly disseminated.

Last updated August 12, 2005

Government Response to the Interim Recommendations of the Trans Fat Task Force

Introduction

The Government of Canada welcomes the Interim Report of the Trans Fat Task Force and commends the members of the Task Force for their hard work. We would also like to thank all those who contributed to the Task Force's consultation on alternatives for the replacement of trans fats.

The Government of Canada is pleased by the Task Force's findings that within the agriculture and food industry there is a strong awareness of the nature and importance of the trans fat issue, an acceptance of the need for change, and a commitment to change. Furthermore, some parts of the industry have already made considerable progress in addressing this issue.

This does not mean that all challenges have been overcome. The Task Force's Interim Report acknowledges the obstacles currently faced by industry in moving towards the elimination of processed (industrially produced) trans fat from Canadian foods. In developing its recommendations, the Task Force has considered, among other things, sectors that will experience more difficulty in achieving the expected outcome.

As with other recent government initiatives, openness and transparency is a cornerstone of this process. The Task Force's consultation process permits the engagement of all interested parties. We encourage all stakeholders, particularly the consumer, nutrition and health research sectors, to participate in the next consultation on the health impacts and consumer implications of the proposed alternatives to trans fats. This consultation is expected to take place in fall 2005.

There are many stakeholders who have a responsibility in implementing the recommendations of the Task Force. We also recognize the importance of providing consumers with information. The release of this Interim Report provides initial recommendations for action that can be initiated now to tackle the issue of industrially produced trans fat. The Government of Canada encourages all parties to start these actions now, instead of waiting for the Task Force's final recommendations. This report details some of the immediate steps the Government of Canada will take in response to the Task Force recommendations. All documents related to the work of the Task Force can be found at http://www.hc-sc.gc.ca/food-aliment/e_trans_fat.html.

Task Force on Trans Fats

On November 18, 2004, following a discussion on trans fat in the House of Commons, Health Canada announced that it would work, in conjunction with the Heart and Stroke Foundation of Canada, through a multi-stakeholder Task Force to develop recommendations and strategies for reducing trans fats in Canadian foods to the lowest levels possible.

The Task Force is building upon findings of a consultation process with scientists and industry initiated by the Heart and Stroke Foundation of Canada. It is exploring healthy alternatives to fats and oils high in trans fats, examining available regulatory options, and considering ways to educate the public on trans fat. The Task Force gathers people with various strengths and perspectives and includes participants from the food producing, processing and manufacturing industries, the restaurant and food service industry, governments, health and consumer interest organizations, and academia.

The Task Force was charged to provide the Minister of Health, by the end of fall 2005, with recommendations for both an appropriate regulatory framework and strategies for the introduction and widespread use of healthy alternatives to achieve the objective of reducing trans fat content in foods sold in Canada to the lowest levels possible.

In keeping with the Trans Fat Task Force Terms of Reference, the interim report focuses on providing guidance mainly for the food processing industry to take action to reduce industrially produced trans fats in Canadian foods to the lowest level possible. The report also provides guidance to consumers and the restaurant and food service industry to enable them to play a role in reducing trans fat intake.

In the coming months, the Task Force will continue to gather information in order to complete its analysis and develop its final recommendations for fall 2005.

Government Response to the Interim Report of the Trans Fat Task Force

The Government of Canada is already implementing some of the Task Force's recommendations and we will work with our partners to determine what additional actions can be taken to further support the implementation of the recommendations.

The following is a summary of the Interim Recommendations of the Task Force and an outline of the various activities underway or being planned by the Government in response to those recommendations.

Guidance Related to Food Processing and Food Service Industries

1) Regarding the declaration of the trans fat content in nutrition labelling and claims, the Task Force recommends that:

- the federal government:
  - underscore the importance to the food industry, including manufacturers and distributors of domestic and imported food products, of meeting the approaching deadlines for modifying their labels;
  - refer the food industry to organizations such as the American Oil Chemists' Society (AOCS) or the Standards Council of Canada (SCC), which set standards for analytical procedures and can provide names of laboratories with established competency for the analysis of trans fatty acids; and
  - work with the above-mentioned organizations to encourage laboratories to participate in their accreditation programs.
- industry associations and industry-specific journals and newsletters aid in the dissemination of this information; and
- manufacturers and distributors of domestic and imported food products respect the regulations for making claims related to trans fatty acids. For example, a "trans-free" product must contain less than 0.2 g of trans fatty acids in the reference amount (portion size) specified by regulation for that food category, and also in the portion size stated on the label's Nutrition Facts table. The food must also be low in saturated fats to carry this claim.

In response, the Government of Canada will

- finalize a "Trans Fatty Acids and Nutrition Labelling Fact Sheet" for posting on the website of the Canadian Food Inspection Agency (CFIA). This Fact Sheet will provide specific guidance to industry about correctly declaring trans fat in the Nutrition Facts table; making acceptable nutrient content claims and diet-related health claims on labels; and determining the amount of trans fat in a food by referencing the CFIA's Nutrition Labelling Compliance Test, which is already posted on its website;
- publish a Guide to Developing Accurate Nutrient Values (spring 2006);
- finalize a notification letter to the domestic food industry about the December 12, 2005 deadline (December 12, 2007 for small manufacturers) for nutrition labelling compliance; and
- finalize a World Trade Organization (WTO) notification about the December 12, 2005 deadline (December 12, 2007 for small manufacturers) for nutrition labelling compliance for distribution to interested parties via the WTO's Committee on Technical Barriers to Trade, targeting foreign food industries that wish to export food products to Canada.

2) Regarding support to small and medium enterprises (SMEs), the Task Force recommends that:

- the federal government work with stakeholders to develop a national list of food processing development centres that can help SMEs reformulate their products to reduce or eliminate trans fats and/or develop alternative products with little or no trans fats; and
- industry associations and industry-specific journals and newsletters aid in the dissemination of this information.

3) Regarding the food service industries, the Task Force recommends that:

- the national food service industry association, in collaboration with government and other stakeholder groups as appropriate, develop and disseminate a guide on how food service operators can reduce trans fat content. Suggestions would include modifying recipes, and selecting ingredients and ready-to-serve food products containing less trans fat, based on the nutrient information that will be required to be provided by suppliers under the Nutrition Labelling regulations.

In response, the Government of Canada will:

- develop a cross-Canada list of not-for-profit food processing development centres which can assist small- and medium-sized food companies in reformulating their products to reduce or eliminate trans fats and/or in developing alternative products with little or no trans fat;
- continue its ongoing research on the health effects of dietary fats and the measurement of their levels in the Canadian diet, the factors that influence the fatty acid content of foods, and the development of analytical methods to characterize fatty acids;
- continue to collaborate with industry on breeding development of low trans fat (low linolenic-acid, high oleic-acid) lines of canola; and

- provide support to the agriculture and food sectors for certain types of action-oriented trans fat-related initiatives (provided they meet specific eligibility criteria) under existing federal government programs, such as:
  - Advancing Canadian Agriculture and Agri-Food (ACAAF) www.agr.gc.ca/progser/acaaf_2_e.phtml
  - The Matching Investment Initiative (MII) http://res2.agr.gc.ca/indust/mii/index_e.htm
  - The Canadian Agriculture and Food International Program (CAFI) www.agr.gc.ca/int/cafi-picaa/index_e.php?page=what-quoi
  - The Agricultural Policy Framework Broker and Agri-Innovation Program contact: Lorne Heslop at heslop@agr.gc.ca or 613-759-7798

4) The Task Force recommends that:

- the federal government pursue discussions with the U.S. through existing forums such as the NAFTA Technical Working Group on Food Labelling, Packaging and Standards to raise awareness of the public health imperative underpinning the November 2004 direction from the Canadian House of Commons[1]. It should also determine the U.S. position and share data that could inform any revision of the mandatory declaration of trans fat in the Nutrition Facts table, including what can be declared as "zero" as well as the definitions of trans-related nutrient content claims; and
- Canadian industry associations and Canadian subsidiaries of multinational firms raise awareness among their American and Mexican counterparts regarding the position of the Canadian House of Commons which calls on the government to "enact regulation… that effectively eliminates processed trans fats, by limiting the processed trans fat content of any food product sold in Canada".

In response, the Government of Canada will:

- continue to support discussions with the United States with the goal to promote increased harmonization of activities and measures to address the health risk presented by trans fat. This is consistent with the September 2004 report of the External Advisory Committee on Smart Regulation that promotes a more deliberate and strategic approach to regulatory co-operation within North America; and
- identify appropriate fora to pursue these discussions. While the NAFTA Technical Working Group on Food Labelling, Packaging and Standards has been identified as a possible forum for this discussion, it may be more appropriate to consider other groups or to establish a new mechanism. This is addressed in the workplan of the Food and Agriculture Working Group of the Security and Prosperity Partnership of North America, which was publicly released on June 27, 2005[2]. In order to enhance public protection from food hazards while facilitating trade and promoting economic efficiency, the workplan outlines an initiative to establish or identify a North

[1] "That, in the opinion of this House, the federal government should acknowledge processed trans fatty acids are harmful fats, which are significantly more likely to cause heart disease than saturated fats; And that this House hasten the development of replacements to processed trans fats by urging the government to enact regulation, or if necessary legislation within one year, guided by the findings of a multi-stakeholder Task Force, including the Heart and Stroke Foundation of Canada and following the consultation process with scientists and the industry currently underway; Therefore, this House calls on the government to enact regulation, or if necessary present legislation that effectively eliminates processed trans fats, by limiting the processed trans fat content of any food product sold in Canada to the lowest level possible." (Canadian Parliament House of Commons, Adopted motion, November 23, 2004)

[2] http://www.fac-aec.gc.ca/spp/spp-menu-en.asp

American food safety co ordinating mechanism. Among other things, this mechanism would allow co-operation in the design and development of common standards and the sharing of information on food safety matters.

Guidance Related to Consumers

Regarding public education, the Task Force recommends that:

- all parties (e.g. the Network on Healthy Eating, health professionals and the media) involved in communicating to consumers about food and nutrition:
  - reflect the following Task Force messages:
    - Any dietary change that focuses on reducing trans fat intake should be made in the context of a healthy lifestyle as outlined in *Canada's Food Guide to Healthy Eating* (http://www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/food_guide_rainbow_e.html) and *Canada's Guide to Healthy Eating and Physical Activity* (www.phac-aspc.gc.ca/guide).
    - Some fatty acids (e.g. omega-3 and monounsaturated) are beneficial to heart health and should be included in a healthy diet, while others (e.g. trans and saturated fatty acids) can increase the risk of heart disease and should be reduced in the diet.
    - The new Nutrition Facts table and fat-related claims can assist consumers in selecting products such as margarines, snack foods, french fries, cookies and crackers that contain less trans fat while avoiding items with significantly higher saturated fat content.
    - It is not yet easy for industry to replace industrially produced trans fats in all food categories. However, low-fat versions of partially hydrogenated fat-containing products, such as microwave popcorn, coffee whiteners and croutons, are often available. Even if they contain hydrogenated oil, the amount is so small that these products can still be declared trans free which means the product contains less than 0.2 g of trans fat in the specified amount of food.
    - Choosing lower-fat dairy products and leaner meats, as recommended in *Canada's Food Guide to Healthy Eating*, is a good way to reduce naturally occurring saturated and trans fat in the diet.
    - Making healthy food choices means more than lowering or eliminating trans fat. Other nutrients and Calories should also be considered. For example, trans-free foods can still be high in sodium or Calories.
  - direct individuals to evidence-based information sources that already exist, such as:
    - Health Canada's It's Your Health Web page on trans fats: http://hc-sc.gc.ca/english/iyh/index.html,
    - The Heart and Stroke Foundation of Canada: www.heartandstroke.ca (note: conduct a search using the term "trans fat"),
    - The Canadian Health Network: www.canadian-health-network.ca, and

    - The Canadian Restaurant and Food-services Association Internet link to restaurant chains that provide nutrition information online: www.crfa.ca/foodandfitnessfacts;
  - educate the public on how to use the Nutrition Facts table to select foods that are low in trans fats and saturated fats using such material as Health Canada's information on nutrition labelling (www.healthcanada.ca/nutritionlabelling) and the Canadian Diabetes Association and Dietitians of Canada's Nutrition Labelling Education Web site (www.healthyeatingisinstore.ca); and
  - ensure that *Canada's Food Guide to Healthy Eating* http://www.hc-sc.gc.ca/hpfb-dgpsa/onpp-bppn/food_guide_rainbow_e.html and *Canada's Guide to Healthy Eating and Physical Activity* (www.phac-aspc.gc.ca/guide) are broadly disseminated.

In response, the Government of Canada will:

- add an interactive component to its consumer education tools on nutrition labelling. This Interactive Nutrition Label will be available on Health Canada's website in fall 2005, *www.healthcanada.ca/nutritionlabelling*; and
- continue to integrate information and education for consumers on using nutrition labelling in Health Canada and Public Health Agency activities such as the revised Food Guide (spring 2006) and the Healthy Living and Sport Participation Campaign (fall 2006).
- consider the recommendations of the Trans Fat Task Force Interim Report in future updates of national dietary guidance.
- continue public health efforts on health promotion and disease prevention such as the Integrated Strategy on Healthy Living and Chronic Disease as announced in Budget 2005. An example of activities under the Integrated Strategy include those that promote healthy eating and that can help to prevent and control chronic diseases, such as cardiovascular disease.

Last updated Aug. 12, 2005

Appendix 11

Impact of Modifying the Trans Fat Content of Foods on Dietary Intakes

1. This report documents the estimation of usual intake distributions for various Trans Fat scenarios developed for the Trans Fat Task Force. It supplements previous documents *Nutrient Sources 17 May 2005.doc, Vitamin D 1 Day Intake 30 May 2005 and Usual Intake Distributions 10 June 2005.doc* which describe trans fat nutrient sources, one-day and usual intake statistics.

2. For this modelling, data files from three Federal-Provincial adult nutrition surveys were used: Ontario (1997/98, 1187 respondents), Manitoba (1998/99, 1525 respondents) and British Columbia (1999, 1823 respondents). For children, data files from the Quebec Children Nutrition survey (1999, 1932 respondents) were used

3. Modelling levels for Trans fat were set as shown in Table 1. A list of the foods in each group can be obtained from Health Canada, Nutrition Evaluation Division. All Trans fat exceeding limits was reassigned to Saturated fat on an equivalent basis.

4. The contribution of each group to the diet is shown in Table 2. For this table, one-day Trans fat intakes are summed for each group, then expressed as a percentage of total Trans fat intakes, for the baseline and under each scenario. For example, Dairy and Meat products contribute 18.6% of the total Trans fat in diets; for the first modelling scenario above, this percentage increases to 42.0% as the Trans fat intakes from other groups are reduced. The contribution for Total Saturated fats (TSat), Total Lipids and Total Energy are also shown in Table 2.

Table 1: Modelling Limits for Trans Fat

	Trans fat limits for			
Scenario	Dairy and Meat products	Fats and Oils	Ice cream and Ice milk	All other foods
5% Trans Fat Limit	No limits	2% of total lipids	5% of total lipids	5% of total lipids
4% Trans Fat Limit	No limits	2% of total lipids	5% of total lipids	4% of total lipids
3% Trans Fat Limit	No limits	2% of total lipids	5% of total lipids	3% of total lipids

Table 2: Contribution of each group to the diet

Scenario	Dairy and Meat products	Fats and Oils	Ice cream and Ice milk	All other foods
Trans @Baseline	18.6%	36.5%	1.0%	43.9%
Trans @5%Limit	42.0%	14.2%	2.1%	41.8%
Trans @4%Limit	44.8%	15.1%	2.2%	37.8%
Trans @3%Limit	48.1%	16.3%	2.4%	33.2%

5. Modelling of the scenarios consisted of applying the above limits to the trans-fat content of foods consumed by each survey respondent, summing one-day trans fat intakes for each individual, and then adjusting for the intra-individual variability to estimate usual trans fat intake distributions resulting from each scenario. Note that adjustments for day-to-day variability were done using the SIDE software (Version 1.11 from Iowa State University Statistical Laboratory) for the estimation of usual intakes; and population weights were applied to obtain representative distributions. Note also that for the usual intake estimation, the 14 age-sex groups were pooled into 6 groups to avoid SIDE estimation failures from negative estimates of variance components.
6. Table 3 shows for each age-sex group the sample size (n=), the one-day means for the baseline Trans fats (Trans), and the Trans fat resulting from each scenario. Also, table 3 shows the Trans fat percentage of total lipids (Trans%ofLipid), and the trans fat contribution to total energy (Trans%ofEnergy), as a baseline and resulting from the scenarios above.
7. Table 4 shows the usual intake distributions estimated for Trans fat, Trans fat percentage of lipids, and Trans fat contribution to total energy, as a baseline and under the modelling scenarios.

Table 3: Average Daily Intakes

Sex=Males

	DRI Age-sex Group						
	M 6-8	M 9-13	M 14-18	M 19-30	M 31-50	M 51-70	M 71+
Trans @Baseline(g/d)	5.6	6.6	8.8	6.6	6.1	4.7	4.7
Trans @5%Limit	2.4	3.0	3.7	2.9	2.7	2.1	1.9
Trans @4%Limit	2.3	2.8	3.5	2.7	2.5	2.0	1.8
Trans @3%Limit	2.1	2.6	3.2	2.5	2.3	1.8	1.7
Trans%Oflipid @Baseline(%)	7.0	7.0	7.5	6.5	6.4	5.7	6.2
Trans%Oflipid @5%Limit	3.1	3.1	3.1	2.9	2.8	2.6	2.5
Trans%Oflipid @4%Limit	2.9	2.9	2.9	2.7	2.6	2.4	2.4
Trans%Oflipid @3%Limit	2.7	2.7	2.7	2.5	2.5	2.3	2.3
Trans%Ofenergy @Baseline(%)	2.2	2.2	2.4	2.0	2.0	1.8	2.0
Trans%Ofenergy @5%Limit	1.0	1.0	1.0	0.9	0.9	0.8	0.8
Trans%Ofenergy @4%Limit	0.9	0.9	0.9	0.8	0.8	0.7	0.7
Trans%Ofenergy @3%Limit	0.8	0.9	0.8	0.8	0.8	0.7	0.7

Sex=Females

	DRI Age-sex Group						
	F 6-8	F 9-13	F 14-18	F 19-30	F 31-50	F 51-70	F 71+
Trans @Baseline(g/d)	4.9	5.5	5.4	4.8	4.2	3.3	3.3
Trans @5%Limit	2.2	2.4	2.3	2.1	1.8	1.5	1.4
Trans @4%Limit	2.1	2.2	2.1	1.9	1.7	1.4	1.3
Trans @3%Limit	.9	2.1	2.0	1.8	1.6	1.4	1.2
Trans%Oflipid @Baseline(%)	6.9	7.1	7.1	7.0	6.3	5.6	6.3
Trans%Oflipid @5%Limit	3.1	3.1	3.0	3.0	2.8	2.6	2.7
Trans%Oflipid @4%Limit	2.9	2.9	2.8	2.8	2.6	2.5	2.5
Trans%Oflipid @3%Limit	2.7	2.6	2.6	2.5	2.5	2.3	2.4
Trans%Ofenergy Baseline (%)	2.2	2.2	2.2	2.1	2.0	1.7	1.9
Trans%Ofenergy @5%Limit	1.0	1.0	0.9	0.9	0.9	0.8	0.8
Trans%Ofenergy @4%Limit	0.9	0.9	0.9	0.8	0.8	0.8	0.7
Trans%Ofenergy @3%Limit	0.9	0.8	0.8	0.8	0.8	0.7	0.7

Table 4: Usual Intake Distribution Results

	Percentiles									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95
Male 6-18										
TRANS Baseline (g/d)	4.6	5.4	6.0	6.6	7.2	7.7	8.4	9.2	10.5	11.6
TRANS @5%Limit (g/d)	2.1	2.4	2.6	2.8	3.0	3.2	3.5	3.8	4.2	4.6
Trans @4%Limit (g/d)	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.5	3.9	4.3
Trans @3%Limit (g/d)	1.8	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.6	4.0
Trans%ofLipid Baseline(%)	5.9	6.4	6.8	7.1	7.4	7.7	8.0	8.4	9.0	9.5
Trans%ofLipid @5%Limit	2.5	2.7	2.9	3.0	3.2	3.3	3.5	3.6	3.8	4.0
Trans%ofLipid @4%Limit	2.4	2.6	2.7	2.8	2.9	3.0	3.2	3.3	3.5	3.6
Trans%ofLipid @3%Limit	2.3	2.5	2.5	2.6	2.7	2.7	2.8	2.9	3.1	3.2
Trans%ofEnergy Baseline (%)	1.9	2.1	2.2	2.3	2.4	2.4	2.5	2.7	2.8	3.0
Trans%ofEnergy @5%Limit	0.7	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.4
Trans%ofEnergy @4%Limit	0.7	0.8	0.8	0.9	0.9	1.0	1.0	1.1	1.2	1.3
Trans%ofEnergy @3%Limit	0.6	0.7	0.7	0.8	0.9	0.9	1.0	1.0	1.1	1.2

Table 4: Usual Intake Distribution Results (continued)

	Percentiles									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95
Female 6–18										
TRANS Baseline (g/d)	3.5	4.1	4.6	5.1	5.5	6.0	6.6	7.3	8.4	9.4
TRANS @5%Limit (g/d)	1.6	1.9	2.0	2.2	2.3	2.5	2.7	2.9	3.1	3.4
Trans @4%Limit (g/d)	1.5 1.	7 1.	9 2	.0	2.2	2.3	2.4 2	.6 2	.9	3.1
Trans @3%Limit (g/d)	1.4	1.6	1.7	1.9	2.0	2.1	2.2	2.4	2.6 2	.8
Trans%ofLipid Baseline (%)	6.2	6.4	6.6	6.8	7.0	7.1	7.3	7.5	7.8	8.0
Trans%ofLipid @5%Limit	2.4	2.6 2	.7	2.8 3	.0	3.1	3.2	3.4	3.6	3.7
Trans%ofLipid @4%Limit	2.2	2.4	2.6	2.7	2.8	2.9	3.0	3.1	3.3	3.5
Trans%ofLipid @3%Limit	2.1	2.2	2.4	2.5	2.5	2.6	2.7	2.8	3.0	3.2
Trans%ofEnergy Baseline (%)	1.7	1.9	2.0	2.2	2.3	2.4	2.5	2.7	2.9	3.2
Trans%ofEnergy @5%Limit	0.6	0.7	0.8	0.9	0.9	1.0	1.1	1.2	1.3	1.4
Trans%ofEnergy @4%Limit	0.6	0.7	0.8	0.8	0.9	0.9	1.0	1.1	1.2	1.3
Trans%ofEnergy @3%Limit	0.6	0.6	0.7	0.8	0.8	0.9	0.9	1.0	1.1	1.2
Male 19–50										
TRANS Baseline (g/d)	2.9	3.7	4.3	5.0	5.6	6.2	7.0	7.9	9.4	10.8
TRANS @5%Limit (g/d)	1.4	1.8	2.0	2.3	2.6	2.9	3.2	3.6	4.2	4.8
Trans @4%Limit (g/d)	1.3	1.6	1.9	2.2	2.4	2.7	3.0	3.4	4.0	4.6
Trans @3%Limit (g/d)	1.2	1.5	1.8	2.0	2.2	2.5	2.8	3.2	3.7	4.3
Trans%ofLipid Baseline (%)	4.4	4.9	5.4	5.7	6.1	6.5	6.9	7.4	8.1	8.7
Trans%ofLipid @5%Limit	1.7	2.2	2.5	2.7	2.9	3.1	3.3	3.6	3.9	4.1
Trans%ofLipid @4%Limit	1.6	2.1	2.4	2.6	2.7	2.9	3.1	3.3	3.6	3.8
Trans%ofLipid @3%Limit	1.6	1.9	2.2	2.4	2.5	2.7	2.9	3.1	3.3	3.6
Trans%ofEnergy Baseline (%)	1.3	1.5	1.6	1.7	1.9	2.0	2.2	2.3	2.6	2.9
Trans%ofEnergy @5%Limit	0.4	0.6	0.7	0.8	0.9	0.9	1.0	1.2	1.3	1.5
Trans%ofEnergy @4%Limit	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.3	1.4
Trans%ofEnergy @3%Limit	0.4	0.5	0.6	0.7	0.7	0.8	0.9	1.0	1.2	1.3
Female 19–50										
TRANS Baseline (g/d)	2.1	2.7	3.1	3.5	4.0	4.4	5.0	5.8	7.0	8.0
TRANS @5%Limit (g/d)	1.0	1.3	1.5	1.7	1.8	2.0	2.2	2.5	2.8	3.2
Trans @4%Limit (g/d)	1.0	1.2	1.4	1.5	1.7	1.9	2.1	2.3	2.6	3.0
Trans @3%Limit (g/d)	0.9	1.1	1.3	1.4	1.6	1.7	1.9	2.1	2.5	2.8
Trans%ofLipid Baseline (%)	4.6	5.2	5.6	6.0	6.4	6.8	7.3	7.8	8.7	9.4
Trans%ofLipid @5%Limit	1.9	2.2	2.5	2.7	2.9	3.0	3.3	3.5	3.9	4.1
Trans%ofLipid @4%Limit	1.8	2.1	2.3	2.5	2.7	2.9	3.0	3.2	3.5	3.8
Trans%ofLipid @3%Limit	1.7	2.0	2.2	2.3	2.5	2.6	2.8	3.0	3.3	3.5
Trans%ofEnergy Baseline (%)	1.2	1.4	1.6	1.7	1.9	2.0	2.2	2.5 2	.8	3.2
Trans%ofEnergy @5%Limit	0.4	0.6	0.7	0.8	0.8	0.9	1.0	1.1	1.3	1.4
Trans%ofEnergy @4%Limit	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3
Trans%ofEnergy @3%Limit	0.4	0.5	0.6	0.7	0.7	0.8	0.9	1.0	1.1	1.2

Table 4: Usual Intake Distribution Results (continued)

	Percentiles									
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95
Male 51+										
TRANS Baseline (g/d)	2.4	3.0	3.5	4.1	4.6	5.3	6.1	7.1	8.5	9.9
TRANS @5%Limit (g/d)	1.2	1.5	1.7	1.9	2.0	2.3	2.5	2.8	3.3	3.7
Trans @4%Limit (g/d)	1.1	1.4	1.6	1.7	1.9	2.1	2.4	2.6	3.1	3.5
Trans @3%Limit (g/d)	1.0	1.3	1.5	1.6	1.8	2.0	2.2	2.5	3.0	3.3
Trans%ofLipid Baseline (%)	3.8	4.5	5.0	5.5	6.0	6.5	7.1	7.8	8.8	9.7
Trans%ofLipid @5%Limit	1.7	2.0	2.2	2.4	2.5	2.8	3.0	3.2 3	.6	3.8
Trans%ofLipid @4%Limit	1.6	1.9	2.1	2.2	2.4	2.6 2	.8	3.0	3.3	3.5
Trans%ofLipid @3%Limit	1.5	1.8	2.0	2.1	2.3	2.4 2	.6	2.8	3.1	3.3
Trans%ofEnergy Baseline (%)	1.0	1.3	1.4	1.6	1.8	2.0	2.2	2.5	2.9 3	.2
Trans%ofEnergy @5%Limit	0.4	0.5	0.6	0.7	0.8	0.8	0.9	1.0	1.1	1.3
Trans%ofEnergy @4%Limit	0.4	0.5	0.6	0.7	0.7	0.8	0.9	1.0	1.1	1.2
Trans%ofEnergy @3%Limit	0.4	0.5	0.6	0.6	0.7	0.8	0.8	0.9 1	.0	1.1
Female 51+										
TRANS Baseline (g/d)	1.6	2.0	2.3	2.6	3.0	3.3	3.7	4.2	5.0	5.7
TRANS @5%Limit (g/d)	0.9	1.0	1.2	1.3	1.4	1.5	1.7	1.9	2.2	2.5
Trans @4%Limit (g/d)	0.8	1.0	1.1	1.2	1.3	1.4	1.6	1.8	2.1	2.3
Trans @3%Limit (g/d)	0.7	0.9	1.0	1.1	1.2	1.4	1.5	1.7	1.9	2.2
Trans%ofLipid Baseline (%)	3.8	4.3	4.8	5.1	5.5	5.9	6.3	6.8	7.6	8.3
Trans%ofLipid @5%Limit	1.7	2.0	2.2	2.4	2.6	2.8	3.0	3.3	3.6	3.9
Trans%ofLipid @4%Limit	1.6	1.9	2.1	2.3	2.5 2	.6 2	.8	3.1	3.4 3	.6
Trans%ofLipid @3%Limit	1.5	1.8	2.0	2.2	2.3	2.5	2.6	2.8	3.1	3.3
Trans%ofEnergy Baseline (%)	0.9	1.1	1.3	1.4	1.6	1.7	1.9	2.1	2.5	2.7
Trans%ofEnergy @5%Limit	0.4	0.5	0.6	0.7	0.8	0.9	0.9	1.1	1.2	1.3
Trans%ofEnergy @4%Limit	0.4	0.5	0.6	0.6	0.7	0.8	0.9	1.0 1	.1	1.3
Trans%ofEnergy @3%Limit	0.4	0.4	0.5	0.6	0.7	0.7	0.8	0.9	1.1	1.2

Table 5: Standard Errors of Usual Intake Percentile Estimates

Standard Errors of Percentiles										
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95
Male 6–18										
TRANS Baseline (g/d)	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.3	0.4	0.6
TRANS @5%Limit (g/d)	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2
Trans @4%Limit (g/d)	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2
Trans @3%Limit (g/d)	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2
Trans%ofLipid Baseline (%)	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4
Trans%ofLipid @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofLipid @4%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.00.0	0.0	0.0	
Trans%ofLipid @3%Limit	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2	0.2
Trans%ofEnergy Baseline (%)	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Trans%ofEnergy @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @4%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @3%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Female 6–18										
TRANS Baseline (g/d)	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5
TRANS @5%Limit (g/d)	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Trans @4%Limit (g/d)	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Trans @3%Limit (g/d)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Trans%ofLipid Baseline (%)	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3
Trans%ofLipid @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trans%ofLipid @4%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trans%ofLipid @3%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trans%ofEnergy Baseline (%)	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Trans%ofEnergy @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @4%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @3%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Male 19–50										
TRANS Baseline (g/d)	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.3	0.5	0.7
TRANS @5%Limit (g/d)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3
Trans @4%Limit (g/d)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2
Trans @3%Limit (g/d)	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.2
Trans%ofLipid Baseline (%)	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4
Trans%ofLipid @5%Limit	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Trans%ofLipid @4%Limit	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofLipid @3%Limit	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trans%ofEnergy Baseline (%)	0.1	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.2
Trans%ofEnergy @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @4%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @3%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 5: Standard Errors of Usual Intake Percentile Estimates (continued)

Standard Errors of Percentiles										
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	0.95
Female 19–50										
TRANS Baseline (g/d)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4
TRANS @5%Limit (g/d)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Trans @4%Limit (g/d)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Trans @3%Limit (g/d)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Trans%ofLipid Baseline (%)	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4
Trans%ofLipid @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofLipid @4%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofLipid @3%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy Baseline (%)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Trans%ofEnergy @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @4%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @3%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Male 51+										
TRANS Baseline (g/d)	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.5
TRANS @5%Limit (g/d)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2
Trans @4%Limit (g/d)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2
Trans @3%Limit (g/d)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1
Trans%ofLipid Baseline (%)	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4
Trans%ofLipid @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trans%ofLipid @4%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trans%ofLipid @3%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trans%ofEnergy Baseline (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
Trans%ofEnergy @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @4%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @3%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Female 51+										
TRANS Baseline (g/d)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3
TRANS @5%Limit (g/d)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Trans @4%Limit (g/d)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Trans @3%Limit (g/d)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Trans%ofLipid Baseline (%)	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3
Trans%ofLipid @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trans%ofLipid @4%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Trans%ofLipid @3%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy Baseline (%)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Trans%ofEnergy @5%Limit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @4%Limit	.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trans%ofEnergy @3%Limit	00.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix 12

Summaries of Studies Commissioned by Agriculture and Agri-Food Canada

Food Industry Perspective on Eliminating Trans Fats in Food Products

Executive Summary

Background

In early 2005, Agriculture and Agri-Food Canada contracted the JRG Consulting Group[1] to explore the possible impacts on the Canadian food industry of a significant reduction or elimination of industrially produced trans fatty acids (TFAs) in food products. The project also provided an opportunity to gather information on industry's readiness to declare the amount of trans fat on pre-packaged foods as part of the revised nutrition labelling requirements. This report is based on 48 of the 50 interviews conducted with food industry representatives from the areas of food retail, food service (including distribution), edible oil and margarine manufacturers, ingredient manufacturers and suppliers, snack food manufacturers, bakery and related, breaded meat products, other food manufacturers (including entrée manufacturers), suppliers to agriculture and associations.

Sources of Trans Fats

Partially hydrogenated vegetable oils and vegetable shortenings, because of their stability, functionality, low levels of saturated fat and absence of cholesterol, have been used as an alternative to animal-based saturated fats. They are the major source of TFAs in the North American diet and are now known to pose a potentially greater health risk than the saturated fats they replaced. About half of the 805,000 tonnes of vegetable oils used in Canada in 2001 were partially hydrogenated and thus a source of TFAs. The levels of TFAs in a typical North American diet have increased markedly during the past decade, largely driven by higher consumption of shortenings, mainly as an ingredient in processed foods.

Estimates of the per capita (adult) intake of total TFAs in the North American diet range from 6.0 to 15.0 grams/person/day. The average Canadian daily intake is 9.5 grams TFA/person/day with 8.5 grams being industrially produced (1.8 grams from margarine products; 4.0 grams from processed foods; 2.7 grams from restaurant meals) and 1.0 gram being naturally produced by ruminant animals.

Industry Awareness of Trans Fats and Labelling Legislation

Awareness of the Issue

There is a high awareness among Canada's food industry of the issues associated with trans fat.

- Mandatory label declaration – 98% of the food industry respondents were aware of the labelling regulations that require mandatory declaration of trans fats in the Nutrition Facts panel of pre-packaged food products by mid-December 2005.
- Parliamentary motion – 96% were aware of the parliamentary motion introduced in 2004 concerning the reduction or elimination of industrially produced TFAs in food products.

[1] The study team comprised Dr. John Groenewegen of the JRG Consulting Group, Mr. Alan Beswick of A.H. Beswick & Associates, Dr. Bruce Holub associated with the University of Guelph, and Mr. Bruce Johnson of Windrow Consulting.

- Issues raised by customers and suppliers – 82% of food manufacturers indicated that their customers (retailers, food service, other processors) or their suppliers had raised the TFA issue, with more customers than suppliers having done so.

Compliance with Labelling Legislation

Only 19% of the food companies indicated that introduction of mandatory nutrition labelling had been a major factor in the company's decision to reduce or eliminate TFAs.

- Most (76%) expected to be in compliance with mandatory trans fat labelling requirements by the end of 2005, whereas 7% did not expect to meet the deadline.
- Compliance obstacles include: labelling-related issues (cost of nutritional analysis, cost of new labelling equipment and printing); availability of non-TFA solutions; lack of information; and limited time available for compliance.
- Leading food companies were either in compliance, or expected to be by the deadline, having started on this initiative well in advance of the requirement.
- While small companies with under $1 million in sales have an additional 2 years to comply, small companies with sales over this threshold face significant challenges.

Adaptation Strategies for Reducing Trans Fat in Processed Foods

Company Goals

While trans fat reduction is seen to be an issue for a number of pastry products, the plan most food companies (68%) have to reduce TFAs in food products varies according to the product line.

In general:

- 47% were planning to reduce TFAs to a level that would allow a "trans fat free" claim;
- 29% were aiming to be in compliance with regulations on labelling, but not necessarily to reduce or eliminate TFAs;
- 23% were planning to eliminate TFAs, or to eliminate them where possible; and
- 3% were reducing TFAs but not low enough to make a "trans fat free" claim.

Sources of Information

- 71% of the food companies interviewed have a technical team working on the TFA issue. The rest either do not have a team, or have only one person such as the owner–operator working on the issue (particularly true with smaller food manufacturers).
- 60% of the manufacturers indicated that their suppliers of fats and oils have assisted with solutions to reduce the amount of trans fats.

Approaches Being Used or Considered

Many of the food companies indicated that elimination or substantial reduction of trans fats would result in a change in their products or in their product line, with 22% expecting a major change and 19% expecting a potential or possible change.

Companies were found to be using a combination of the three tactics probed: producing line extensions (continuing to produce the traditional product as well as a "trans fat free" version); reducing TFAs only in existing products; and focusing only on reducing TFAs in new products.

Several approaches are available to reduce trans fats. The respondents indicated that:

- 67% would use different fats and oils;
- 20% would use primarily different processes and/or formulations;
- 8% would use a combination of fats or blends, processes and input materials; and
- 5% would use different input materials.

Canola oil and palm or modified palm oil were by far the most likely mentioned replacements for trans fats, followed distantly by 11 other types including non-hydrogenated canola and soybean oil. Almost one quarter (24%) indicated they were planning to investigate non-fat substitutes in some of their formulations; emulsifiers, modified starch and gums were specifically mentioned.

Potential Impacts of Removal or Reduction of Trans Fat

Business-Related Impacts

- All companies interviewed see this as an important business issue, with 38% considering it to be a "top priority", 23% calling it "very important", and 38% "important".
- They view reduction of TFAs as being necessary to remain competitive, but with all companies moving in the same direction, 49% did not believe it would provide a competitive advantage, whereas 24% did.
- 44% are not planning to specifically introduce a new product with reduced TFAs. Yet, for some companies any new product launched will be a TFA-reduced product.

Production-Related Impacts

TFAs are a significant business concern for Canada's food industry. For the food companies surveyed (excluding fat and oil suppliers):

- On average, 52% of product lines (or business volumes) are affected by TFAs.
- For 29% of the companies, the TFA issue affects over 90% of their business volume.

Respondents indicated other impacts related to reduction or elimination of TFAs:

- 62% mentioned having to change product formulation; a few mentioned only having to change the fats and oils used.

- 31% have had to invest in, or expect to invest in, new equipment (such as handling equipment, processing equipment, and labelling and printing equipment).
- While 31% did not expect to make a change in food manufacturing procedures (such as longer baking time, or different temperatures) with formulations that have reduced TFAs, an additional 60% were still unsure.

The TFA issue is expected to increase costs for food manufacturers: 75% indicated that TFA-reduced products have higher input costs; only 4% indicated no cost effect. The major areas of higher costs include the fats and oils, supply chain costs, and loss of production efficiencies.

The main problems encountered by food industry can be grouped into the following areas:

- food product attributes (matching the existing products for taste, colour and texture);
- functionality (finding non-trans alternatives that work);
- availability of TFA alternatives (insufficient volumes available);
- new processes associated with TFA alternatives (reformulation, storage adjustments);
- labelling issues (labelling input costs, supporting analytical tests);
- marketing and product positioning; and
- costs incurred.

Availability of TFA Alternatives

Just under two thirds (63%) have been able to find TFA alternatives through their suppliers, while 22% indicated they have not. Comments centred on availability or functionality of alternatives, responsiveness of suppliers, and length of time spent on resolving the TFA issue.

The ease of replacing TFAs with substitutes (in terms of functionality and product attributes) was reported to differ by product.

Ease of Finding TFA Alternatives by Product

Easy	Difficult
Salty snacks	Pastries
Potato-based products	Laminates (bakery products with layers of shortening and dough)
Breads and rolls	Pies
Cookies and muffins	Doughnuts
Ready-to-eat cereals	Icings
Products with no texture issues	Corn-based snacks
Grain-based products	Biscuits
Margarines	Products with naturally occurring TFAs
Puddings	

Product-Related Impacts

By reducing TFAs, respondents expected to face product-related impacts in the areas of flavour, texture, shelf life issues and product stability.

Many of the food companies (58%) indicated encountering challenges related to labelling of trans fats. The comments centred on:

- knowledge of the standards associated with labels;
- costs associated with labelling (reanalysis, printing equipment, printing costs);
- complexity of the task;
- harmonization with the U.S.; and
- labelling and communicating with consumers (difficulty labelling products made in-store; consumer perception that trans fat content must be zero).

Trans Fat — Issues For Consideration

The survey of Canadian food industry representatives raised a number of issues.

1. TFA Alternatives and Food Product Attributes

- Increase in use of saturated fats (such as palm, fully hydrogenated)
- Difficulty of replacing TFAs in some products, such as bakery products
- Product shelf life can decrease
- TFAs present in deodorized oil in small quantities
- TFAs created in some food manufacturing processes, such as frying

2. Transition Issues to Mandatory Label Declaration

- Some TFA alternatives are not readily available
- Difficulty in having labelling and packaging ready for December 2005
- Better solutions are being developed, and time is required for testing and labelling
- Reluctant to move too quickly as cheaper solutions may become available

3. Labelling Issues

- Inclusion of naturally occurring TFAs with the declaration of industrially produced TFAs
- Potential misuse of "free of trans fats" claim in multi-serving products that exceed a total of 0.2 grams of TFAs
- Identification of labelling equipment appropriate for in-store bakery use
- Cost of printing software and equipment
- Cost of nutritional analysis per product
- Repeated nutrition analysis and label reprints as TFA-free solutions are developed

4. Harmonization with the U.S.

- Different criteria for "trans fat free" claim in U.S. (less than 0.5 grams per serving) versus Canada (less than 0.2 grams per serving)

5. Enforcement and Compliance Issues

- Enforcement of mandatory labelling requirements on imports

- Degree of precision on testing is ± 0.3 grams, whereas requirement to make a "trans fat free" claim is less than 0.2 grams per serving
- Those who delay may have an economic advantage

6. Supply Chain Issues

- Higher costs in the supply chain to handle liquid product (storage tanks, staff training)
- Higher costs due to shorter shelf life (more frequent ordering of smaller quantities)

7. Cost-Related Areas

- Higher supply chain costs
- Higher costs of alternative fats and oils
- Higher equipment costs (storage, piping, alterations to equipment)
- Labels and associated packaging and printing equipment
- Nutrient analysis to support label declarations (~ $500 to $800/product); possible need to analyze more than once as new solutions come into the market
- More staff, or contracts, to find solutions and comply with labelling requirements

8. Impact on Smaller Food Manufacturers

- Do not have in-house resources, or technical capacity
- Suppliers of fats and oils are focusing efforts on larger accounts
- Significant capital costs for small operators (cannot benefit from high volume discounts)
- Shorter shelf life means lot purchases too small to qualify for minimum order discounts
- Need to be absolutely certain before making changes

9. Impact on Domestic Oilseed Industry

- Reduction in demand for domestically grown oilseeds
- Increase in use of imported oils (such as palm oil)
- Opportunity for new varieties for specialty oils (such as high oleic sunflower oil, low linolenic/high oleic canola oil)
- Costs of identity preservation programs to deliver specialized seed varieties

Conclusion

The study of Canadian food industry on which this report is based identified a number of issues associated with a move to significantly reduce or eliminate TFAs in foods. These issues range from the functionality of the alternative fats and oils, to the attributes of the food product (including sensory evaluation), to an associated set of labelling and harmonization issues. Addressing these issues in a short period of time will be more difficult for food companies that do not have the scope and resources.

Methods and Opportunities for reducing or Eliminating Trans Fats in Foods

Executive Summary

Introduction

For some time, Canadians have been learning about the health implications of trans fatty acids produced industrially during oil refining. Trans fatty acids have been implicated as increasing levels of LDL-cholesterol and lowering the beneficial levels of HDL-cholesterol in the blood. A decrease in the consumption of trans fatty acids is being identified as important to lowering the risk of coronary heart disease. Some experts argue that, gram for gram, trans fatty acids pose a greater risk of coronary heart disease than do saturated fatty acids.

The report presented here was commissioned by Agriculture and Agri-Food Canada to Stewart J. Campbell of S.J. Campbell Investments Ltd. in early 2005 to review the methods available to reduce or eliminate trans fats in foods. The report considers alternatives to trans fats and possible innovations that might help Canada achieve the objective. The end result is an analysis, from a technological point of view, as to how ready the Canadian industry is to deal with the possibility of a reduction or elimination of industrially produced trans fatty acids from the Canadian food supply.

Main Players to Address the Issue

The objective to reduce trans fatty acids in foods involves three main players, with differing roles and responsibilities. The challenge is to align the interests and activities of these players with the public health objective.

1. Food Industry

- Requires changes in manufacturing practices.
- Requires resources to develop innovative processes and products.

2. Consumers

- Be aware of food product choices.
- Choose healthy foods and lifestyles.

3. Governments

- Be certain of the science, and the intervention strategy.
- Understand the impacts of any changes implemented.
- Guide – via regulation, by example, by inducement.
- Communicate a credible and consistent message.

Properties of Oils and Fats

Oils and fats are the primary source of energy for the body. They are also carriers of flavor and vitamin compounds and contributors to the mouthfeel of food. In manufacturing food, fats perform as a heat transfer medium, lubricant, release agent and texturizing agent. These sensory, functional and nutritional properties of fats and oils are determined by the levels of palmitic (C16:0) and stearic (C18:0) saturated fatty acids, oleic (C18:1) monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA) and trans fatty acids.

The melting characteristics of fats determine their usefulness in food products, both in terms of their behavior during processing and during consumption. Increasing the level of saturation increases the melting point of fats, and converts liquid oils into plastic semi-solids or solid fats. Saturated fats are about 10 times more stable than monounsaturated oils and fats, 100 times more stable than di-unsaturates, and 1000 times more stable than tri-unsaturates.

Occurrence of Trans Fatty Acids in Foods

Trans fatty acids originate primarily from partially hydrogenated vegetable oils. However, 3–8% of the fatty acids in butter, cheese, milk, beef and mutton can also be trans. The latter are produced naturally in animals by the enzymatic hydrogenation of unsaturated fats.

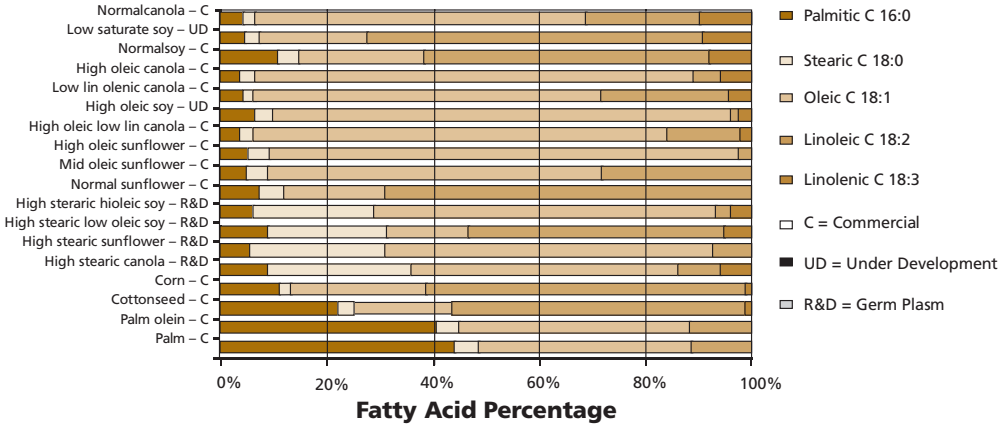
The North American edible oil industry including Canadian firms have made significant progress towards reducing the trans fat contents of foods. Many brand owners are marketing low/zero trans in established and new products. However, the inspection of food labels suggests that the trans fatty content of hard margarines and some other foods may still be problematic, with some labels declaring ~35% trans fatty acid content in the fat.

Trans Fat Reduction Methods Available to the Industry

There are three main approaches that can be used to reduce or eliminate trans fats in food:

1. Customization of Crop Varieties

- Mutation and transgenic technologies provide the possibility for plant breeders to incorporate a range of fatty acid profiles that are different to the composition of the normal (original) oil in many oilseed species (see Figure I).
- Work by Warner et al[1] has shown that salad and frying oils are more stable with moderate levels of oleic acid (< 80%) and low linolenic acid (< 3%). In addition, saturated fatty acids were recommended to be low (<7-8%) and linoleic acid at least 20–30%. Oils with this profile should have sufficient oxidative stability for use in many salad, frying and spray oil applications and not need light hydrogenation. By avoiding hydrogenation, trans and saturate fatty acid levels are not increased.
- Low linolenic high oleic canola oil genotypes with less than 3% linolenic acid are already in commercial production in Canada. The present varieties however are lower yielding than canola varieties with normal fatty acid



[1] Warner K., Neff W.E., Byrdwell W.C., Gardner H.W. Effect of oleic and linoleic acids on the production of deep-fried odor in heated triolein and triolinolein. J Agri Food Chem 49 :899 –905, 2001.

composition. This is due to the relatively lower investment that has been made over the past 15 years to breed low linolenic varieties and the fewer generations of plant improvement compared to those with normal fatty acid composition. Low linolenic genotypes in soybean are in the early stages of commercialization in the US.

- With the superior quality and expanding demand for low linolenic genotypes for food manufacturing and food service, the Canadian plant biotechnology industry might be expected to increase its investment in breeding for low linolenic genotypes adapted for Canada. The industry might also consider investing to develop high stearic genotypes targeted for the solid fat markets. Both types of oils should reduce the need for hydrogenation and resulting production of trans fatty acids. However, the high stearic genotypes are synonymous with high saturates.

2. Modification of Fatty Acid Composition by Processing

There are six main processing techniques available to the edible oil industry to reduce trans fatty acids as the chemical and physical of oils and fats are modified for food use.

Hydrogenation – mature technology, current practice of the industry.

- For products needing the melting properties of a partially hydrogenated basestock, zero trans is not likely to be possible with light hydrogenation.
- For products that must have the melting characteristics of a plastic or solid fat, complete hydrogenation of a canola or soybean oil will result in a zero trans stearine fat which is almost 100% saturated.

Blending of basestocks – mature technology, current practice.

- Zero or low trans can be produced by blending various basestocks.
- Difficult to get the desired melting properties in the plastic blended fat.

Fractionation – mature technology, with some potential for more use in Canada.

- Widely used in palm oil processing in other countries. Results in unsaturated palm olein and saturated palm fractions with useful melting properties.
- Process has been demonstrated with experimental high stearic soybean oil.

Use of Saturated Fats – mature technology, but limited alternatives for Canada.

- Domestic – fully hydrogenated canola and soybean C18:0 stearine.
- Domestic – animal fats – tallow and lard.
- Imported – tropical oils and fats – palm, coconut, babasu, etc.

Chemical Interesterification – mature but improving technology.

- Proven track record in Europe and some use in US and Canada.

- Range of consistencies and melting properties possible for zero or low trans margarine, shortening and confectionary fats.

Enzyme-assisted Interesterification – emerging technology, with great potential.

- Enzymes can be highly specific, providing for more control of the reaction and lower processing temperatures than chemical catalysis.
- Lipolase™ – produced by Novozyme A/S by fermentation of an *Apergillus orzyae* strain genetically modified with a *Thermomyces lanuginosus* lipase gene.
- Economics of interesterification improved greatly with immobilization and reuse of the Lipolase enzyme.
- Novozyme / De Smet now marketing a low trans process with lower capital and operating costs than hydrogenation and chemical interesterification.

3. Food Reformulation

One strategy for reducing trans fatty acids is to decrease the overall fat content in foods. Fat replacement will become very important if it is determined that the levels of saturated fats should not increase as trans fats are reduced. With few exceptions, fat replacement will require product reformulation in order to achieve the desired properties in the processed food.

Fat replacers are ingredients which mimic the functionality and sensory properties of fat, but contribute fewer calories. Selection of suitable fat replacers requires a solid understanding of the food system in question and careful weighing of the advantages and disadvantages of each product. In many cases, a blend of ingredients offers the best solution for fat reduction. It is worthy to note that some food ingredients that might be useful as fat replacers are not approved for use in Canada.

Initiatives to Reduce Trans Fatty Acids In Foods

1. Investment

Solutions to reduce trans fatty acids in foods will require investment for replacement technologies and development of new processes and products. These avenues call for public and private investment in R&D, technology transfer and demonstration, and capital investment. For each product, there are choices to be made whether the technical solution should be made in Canada or purchased from abroad. When considering public investment in R&D, it is suggested that public funds are best applied where the R&D provides the Canadian industry with lasting competitive advantage.

2. Public Awareness and Education – Fats & Oils

While the public is increasingly aware of trans fats, it is perhaps not sufficiently aware of the range of nutritional choices available and that many foods require the physical and chemical properties provided at present by saturated or trans fats. It appears there may be need of more public education about saturated fats – and that these might be nutritionally acceptable or at least tolerated at some level in some foods.

3. Health Benefits of Low / Zero Trans Fat Products

Many of the techniques being adopted by the industry to replace trans fats rely on the increased use of palmitic and stearic saturated fatty acids. Validation of the nutritional merits of these new palmitic and stearic saturated fat formulations as replacements for trans fatty acid formulations seems warranted.

While trans fats are a hot topic today, most trans mitigation strategies being implemented do not reduce caloric intake. It has been suggested that obesity mitigation could be a bigger issue for everyone to deal with than trans fat mitigation.

4. Change the Composition of Oils and Fats — Timeframe

Retail salad & cooking oils, salad dressings

- Native canola, soybean & sunflower oils are naturally in low trans fats.
- Very small amounts of trans fat produced during deodorization.
- Additional trans fat if, for example, soybean oil is lightly hydrogenated.
- Low linolenic canola oil is available today, but has no marketing advantage in Canada to normal canola salad oil when sold as a retail packaged salad oil.

Margarines and spreads

- Soft margarines – low trans available today. Low trans soft margarine products exhibit a wide range of polyunsaturated fatty acid content.
- Hard margarines – still high trans fat. Low trans possible if processors ignore functionality and cost. New products possible in a 1 to 3 year timeframe, but likely to contain high levels of saturated C16:0 and/or C18:0 fatty acids.

Frying oil – food service and quick service

- Heavy duty frying requires stable fats.
- Low linolenic / high oleic canola & sunflower being adopted, but at higher cost and some reduced functionality /sensory properties.
- Low linolenic soybean entering US pipeline. A Dupont high oleic soybean trait has been approved in Canada.
- 1–3 years for product development with existing oils.
- 4–8 years for low linolenic soybean oil, if pursued by the industry.

Industrial frying and food processing.

- Low linolenic / high oleic canola and sunflower available today for snack frying, with acceptable functionality and sensory properties.
- Potato chips, tortilla chips, frozen french fries, etc. converting to low trans. See USDA 2004 report confirming the progress.
- Doughnut frying and spray oils — still a challenge for functionality.
- 1–3 years for product development with existing oils.
- 4–8 years for low linolenic soybean oil, if pursued by the industry.

Baking shortenings.

- Wide range of food product specific functionalities required.
- Melting characteristics of the plastic fats critical and tied to the trans and saturate fat contents of the basestocks.
- Fractionated and interesterified fractions are possible replacements for trans.
- Formulation challenge to develop zero or low trans replacements for all purpose shortening, emulsified shortenings, and pastry roll-ins where specific functionalities required.

Innovation Opportunities

1. Fat Replacement in Foods

There are numerous opportunities in developing fat replacers for specific fat functionalities. Many approaches are available to mimic fats and achieve the lubricity, smooth texture, and mouthfeel characteristic of traditional high fat products. As trans fatty acids are often needed to achieve the required functionality in bakery products, the use of emulsifiers to reduce or eliminate fat in the formulation will result in reduced trans content.[1] Danisco has identified the use of emulsifiers as a major strategy in the reduction of trans fatty acids in its products.

Other firms are investigating the use of emulsifiers as structuring agents to eliminate the need for saturated and trans fatty acids in typical hardstocks or in edible spreads. Essentially, these are gels which mimic the texture imparted by fats, and therefore can be used in the manufacture of low-fat or low-trans and low-saturates edible spreads.

2. Nutraceutical Lipids

Structured lipids produced by interesterification are used in fat emulsions for total parenteral nutrition and enteral administration. They can be designed to contain a desirable balance of short, medium and long chain fatty acids than meets a certain nutritional requirement. Reduced calorie fats can also be produced because of differences in the absorption and physiological response of short, medium, and long chain triacylglycerides (TAGs).

3. Membrane Technologies

The recent advances in membrane technology may provide opportunities for using membrane reactors to immobilize highly specific and fast homogeneous catalysts. This would solve the problem of separating and recovering the oil-soluble catalysts from the reaction mixture. Membrane processes have not been explored commercially by edible oil processors, primarily because many of the processes require that the oil be present as a solution in a solvent (for example hexane), and earlier membranes were not resistant to hexane. (Oil is recovered from the seed as a hexane solution, which is called miscella).

4. Novel Hydrogenation

Electrochemical approaches to hydrogenation have been proposed. One method employs a solid polymer electrolyte (SPE) reactor, similar to that used in H2/O2 fuel cells[2]. Hydrogenated soybean oil products had a low percentage of total trans isomers (4–10%). A preliminary economic analysis of the SPE reactor apparatus suggested the method might be cost-competitive with traditional oil hydrogenation schemes, and commercial-grade products could be prepared by blending low trans, electrochemically hydrogenated oils.

[1] Jay Sjerven. Targeting Trans Fats.Baking & Snack, August 1, 2003. http://www.bakemark.com/TargetingTransFats.htm

[2] Hengbin Zhang, Maria Gil, Peter N. Pintauro, Kathleen Warner, William Neff, and Gary List. The Electrochemical Hydrogenation of Soybean Oil with H_2 Gas. http://www.aocs.org/archives/am2000/am2000tp.asp

Enzymatic hydrogenation might also be considered using enzymes and pathways such as used by rumen microorganisms to produce oils of varying degrees of unsaturation.[3]

5. New Types of Food Products

There are numerous alternatives for the heat treatment of food products, such as extrusion. These processes are fundamentally different from traditional cooking, frying and baking, and will result in products that are completely different from traditional food products. Combination of different unit operations might be used to develop products that reproduce some or all of the functions of traditional products, and can lead to many new unique food products. Rapid development of these technologies requires a better fundamental understanding of the kinetics of underlying processes.

Conclusions

Reducing or eliminating trans fats will be transforming for the Canadian as well as the global food industry. There are no drop-in solutions that can easily be applied at just one level of the industry in order to effect total change. The transformational change needed is systemic and requires a variety of technical solutions, many players and the support of consumers.

The industry has made considerable progress to reduce trans fats in many products, and is striving to bring forward zero or low trans fat solutions for all food products. The remaining challenges are surmountable with investment, time and learning.

It is significant that the leading technologies result from the convergence of mutation and transgenic plant breeding, innovative process engineering and the latest in food science and product formulation. Some of the basic nutrition research and plant breeding supporting the solutions that are being advanced have been under study for as long as 30 years. The investment in plant breeding has been significant, initially by public institutions, and commencing about 15 years ago, increasingly by industry in Canada and elsewhere.

Equally important, many of the core technologies beginning advanced appear to have commercial potentials for new products and new foods that might address issues far beyond the trans fats problem. The long-term benefits of these innovations are possibly greater than those identified at present for trans fat mitigation.

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[3] Loor, J. J., A. B. P. A. Bandara, and J. H. Herbein. 2002a. Characterization of 18:1 and 18:2 isomers produced during microbial biohydrogenation of unsaturated fatty acids from canola or soybean oil in the rumen of lactating cows. J. Anim. Phys. Anim. Nutr. 86:422–432.

Appendix 13

TO: Trans Fat Task Force

FROM: The Expert Committee on Fats, Oils, and Other Lipids

DATE: October 31, 2005

Revised: December 05, 2005 by D. Forster (added trans fat values and trans fat level comments)

Typical Fatty Acid Values of Alternatives to Partly Hydrogenated Fats and Oils: Frying Fats

Type of Alternative	Food Service Frying	Food Processor Frying		C12	C14	C16	C18	Total Sats	C18:1	C18:2	C18:3	Trans #	Comments
General Vegetable Oils	✓	✓	Soya	-	0.1	10.8	4	14.9	23.8	53.3	7.1	0.75 - 1.5	
	✓	✓	canola	-	0.1	4.4	1.9	7.8	57.6	21.2	9.7	0.75 - 1.5	
	✓	✓	Cottonseed	-	0.8	23.9	2.4	27.1	17.4	53.4	0.2	0.75 - 1.5	
	✓	✓	Corn	-	-	11.4	1.9	13.3	25.3	60.7	-	0.75 - 1.5	
Medium Frying Stability Vegetable Oils	✓	✓	High Oleic Canola	-	0.1	3.4	2.5	7.4	76.8	7.8	2.6	0.75 - 1.5	
	✓	✓	Low Linolenic Soya	-	-	9	5	14	30	50	3	0.75 - 1.5	
	✓	✓	Mid Oleic Sunflower	-	-	5	4	9	60	30	-	0.75 - 1.5	
	✓	✓	High Oleic Sunflower	-	-	3.7	5.4	9.1	81.3	9	-	0.75 - 1.5	
High Frying Stability Vegetable Oils	✓	✓	Palm Oil	0.2	1.1	44	4.5	49.8	39.2	10.1	-	1.0 - 2.5 ##	
	✓	✓	Palm Olein	0.2	1	39.8	4.4	45.4	42.5	11.2	-	1.0 - 2.5 ##	
	✓	✓	Coconut	47.5	18.1	8.8	2.6	91.6	6.2	1.6	-	1	
Animal fats	✓	✓	Beef Tallow	0.1	4.4	25.1	15.9	48	39.2	2.2	0.2	5.5	Natural Trans
	✓	✓	Lard	0.1	1.3	23.1	13.3	38.6	42.2	12.2	1.4	1.7	Natural Trans
Blending Oils to Reduce Trans*	✓	✓	Partially Hydrogenated + General Veg Oils										Can not estimate*
	✓	✓	Partially Hydrogenated + Hi Stability Veg Oils										
Blending Soft Oils	✓	✓	General Veg Oils + Hi Stability Veg Oils	-	0.1	3.9	2.2	7.6	67.2	14.5	6.2	0.75 - 1.5	Example: 50% ca + 50% HO Ca
Blending Oils for Solids, Performance, or to Reduce Cost	✓	✓	Palm Oil + General Vegetable Oils / High Stability Vegetable Oils	0.1	0.6	24.2	3.2	28.8	48.4	15.7	4.9	1.0 - 2.5 ##	Example: 50% ca + 50% palm oil

* This option has been applied to a limited degree in Canada and in the US during the past few years only, generally achieving trans levels in the 10% - 20% (of fat) area. This option would be expected to have limited value or no value in the future should limits be placed on the trans levels (basis fat) in foods or on foods and oils.

The Canadian edible oil industry (2005) is routinely achieving trans fat levels in the area of 1% in domestic vegetable oil products and in many or most domestic vegetable that are blended with palm / PK fractions. The incentive to have trans fat levels in the area of 1% is generally to achieve 0 g trans/serving on foods that qualify for a Zero Trans Fat Claim, or to achieve 0.0 g trans fat/serving rather than 0.1 g trans/serving (or higher) on nutritional facts panels on foods that do not qualify for a Zero Trans Fat claim. As more food manufacturers apply nutrition facts tables to their foods (2005 - 2006), more manufacturers would be expected to request trans fat levels in the area of 1%. At some point, trans oil products levels in the area of 1% will become a commonplace expectation of the edible oil industry.

Palm, palm olein, and palm stearin, are generally exported from their country of origin in a fully refined state, containing 1% trans or less. When prolongued storage of these oils is required (e.g. limited ocean vessel deliveries to Canada during winter), these oils require additional processing (in Canada), elevating their trans levels towards 2% .

TO: Trans Fat Task Force

FROM: The Expert Committee on Fats, Oils, and Other Lipids

DATE: October 31, 2005

Revised: December 05, 2005 by D. Forster (added trans fat values and trans fat level comments)

Typical Fatty Acid Values of Alternatives to Partly Hydrogenated Fats and Oils: Baking & Food Processor Shortenings

NOTE: The estimations for the values of saturates in this table is more accurate than the estimations for the values for unsaturates. There is considerable choice for the type of liquid vegetable oil that is used, where there is less choice for the types of fat to supply solids.

Type of Alternative	Bakery/Food Processor Shortening Solid	Bakery/Food Processor Shortening Spray/Liquid		C12	C14	C16	C18	Total Sats	C18:1	C18:2	C18:3	Trans #	Comments
General Vegetable Oils		✓	soya	-	0.1	10.8	4	14.9	23.8	53.3	7.1	0.75 - 1.5	
		✓	canola	-	0.1	4.4	1.9	7.8	57.6	21.2	9.7	0.75 - 1.5	
		✓	cottonseed	-	0.8	23.9	2.4	27.1	17.4	53.4	0.2	0.75 - 1.5	
		✓	corn	-	-	11.4	1.9	13.3	25.3	60.7	-	0.75 - 1.5	
Medium Stability Vegetable Oils		✓	High Oleic Canola	-	0.1	3.4	2.5	7.4	76.8	7.8	2.6	0.75 - 1.5	
		✓	Low Linolenic Soya	-	-	9	5	14	30	50	3	0.75 - 1.5	
		✓	Mid Oleic Sunflower	-	-	5	4	9	60	30	-	0.75 - 1.5	
High Stability Vegetable Oils		✓	High Oleic Sunflower	-	-	3.7	5.4	9.1	81.3	9	-	0.75 - 1.5	
	✓		Palm Oil	0.2	1.1	44	4.5	49.8	39.2	10.1	-	1.0- 2.5 ##	
		✓	Palm Olein	0.2	1	39.8	4.4	45.4	42.5	11.2	-	1.0- 2.5 ##	
		✓	Coconut Oil	47.5	18.1	8.8	2.6	91.6	6.2	1.6	-	1	
Animal fats	✓		Beef Tallow	0.1	4.4	25.1	15.9	48	39.2	2.2	0.2	5.5	
	✓		Lard	0.1	1.3	23.1	13.3	38.6	42.2	12.2	1.4	1.7	
Blending Oils and palm oil	✓ **		palm oil /palm stearin + General or Hi Stability Veg Oils LOW SATS	0	0	17	3	20	50	18	7	0.75 - 1.5	Example: Canola for Solids & Performance
	✓ **		palm oil /palm stearin + General or Hi Stability Veg Oils HIGH SATS	0	1	38	5	45	37	14	2	1.0- 2.5 ##	Example: High palm content, plus liquid canola and soya oils
Reduced Trans Hydrogenation	✓		Partially Hydrogenated General Vegetable Oils	-	-	10	20	30	22	38	5	3 - 5	
Fully Hydrogenated plus veg /	✓ *		Fully Hydrogenated plus general vegetable / hi stability vegetable oil	-	0.1	9	12	21	35	35	7	0.75 - 1.5	Example: Liquid soya / canola plus fully hydrogenated soya / canola

Continued

Type of Alternative	Bakery/Food Processor Shortening Solid	Bakery/Food Processor Shortening Spray/Liquid		C12	C14	C16	C18	Total Sats	C18:1	C18:2	C18:3	Trans #	Comments
Interesterified [Palm and PK Stearins] plus Vegetable Oil	✓ **		Interesterified [Palm or Palm and PK Stearins] with Canola Oils / High Oleic Ca LOW SATURATES	3	1	12	2	20	50	20	8	0.75 - 1.5	With canola oil
				3	1	12	2	20	65	10	2	0.75 - 1.5	With high oleic canola
	✓ **		Interesterified [Palm or Palm and PK Stearins] with General Vegetable Oils / High Stability Vegetable Oils HIGH SATURATES	4	2	33	4	45	30	20	3	.075 - 2.5 ##	With canola and soya oil
				4	2	33	4	45	45	7	1	.075- 2.5 ##	With high oleic canola
Interesterified (Fully Hydrogenated Veg Oil and Liquid Veg oil) and Liquid Veg Oil	✓		Interesterified [Fully Hydrogenated Vegetable Oil and Liquid Vegetable Oil] and Liquid Vegetable Oil MED. SATURATES	-	0.1	10	25	35	20	40	5	2-4% (practical range of ~1.5 - 4%)	Liquid soya and fully hydrogenated soya
	✓		Interesterified [Fully Hydro. Vegetable Oil and Liquid Vegetable Oil] and Liquid Vegetable Oil HIGH SATURATES	-	0.1	10	40	50	15	30	5	2-4% (practical range of ~1.5 - 4%)	Liquid soya and fully hydrogenated soya
Fully Hydrogenated veg (coconut and/or PK) oil	✓		Fully Hydrogenated veg (coconut and/or PK) oil	48 ***	17	9	14	100	1			1% - 4%	Example: Hydrogenated Coconut and/or Palm Kernel Oils
Coconut Oil Stearin*****	✓		Coconut Oil Stearin	48***	18	9	5	95	4	1		1	
Palm Kernel Oil Stearin	✓		Palm Kernel Oil Stearin	56****	22	8	2	93	6	1		1	

* Limited application in foods (other than baked goods) due to poor mouth melt qualities.

** For solid shortening requirements, the Baking and Food processing industries would expect to use a product with fatty acid values that are somewhere between the low and high saturates categories shown, using a product towards the low saturates when saturates or trans claims are being made on the manufactured food.

*** Plus 6% C8, and 5% C 10

**** Plus 2% C8, and 3% C 10

***** Although this oil showed in the list of ingredients of a food sample collected by Health Canada in 2005, there is minimal production of this type of oil. PK stearin is generally believed to be a superior product. Coconut oil stearin is more resistant to oxidation than PK stearin so specialized uses of Coconut oil stearin could occur.

The Canadian edible oil industry (2005) is routinely achieving trans fat levels in the area of 1% in domestic vegetable oil products and in many or most domestic vegetable oil products that are blended with palm / PK fractions. The incentive to have trans fat levels in the area of 1% is generally to achieve 0 g trans/serving on foods that qualify for a Zero Trans Fat Claim, or to achieve 0.0 g trans fat/serving rather than 0.1 g trans/serving (or higher) on nutritional facts panels on foods that do not qualify for a Zero Trans Fat claim. As more food manufacturers apply nutrition facts tables to their foods (2005 - 2006), more manufacturers would be expected to request trans fat levels in the area of 1%. At some point, trans levels in the area of 1% will become a commonplace expectation of the edible oil industry.

Palm, palm olein, and palm stearin, are generally exported from their country of origin in a fully refined state, containing 1% trans or less. When prolongued storage of these oils is required (e.g. limited ocean vessel deliveries to Canada during winter), these oils require additional processing (in Canada), elevating their trans levels towards 2%.

TO: Trans Fat Task Force

FROM: The Expert Committee on Fats, Oils, and Other Lipids

DATE: October 31, 2005

Revised: December 05, 2005 by D. Forster (added trans fat values and trans fat level comments)

Typical Fatty Acid Values of Alternatives to Partly Hydrogenated Fats and Oils: Margarines

NOTE: The estimations for the values of saturates in this table is more accurate than the estimations for the values for unsaturates. There is considerable choice for the type of liquid vegetable oil that is used, where there is less choice for the types of fat to supply solids.

	Consumer		Food		Baking Margarines			Percent Fatty Acid / Fat										
Type of Alternative	Soft	Hard	Soft	Hard	Soft	Hard	Laminating		C12	C14	C16	C18	Total Sats	C18:1	C18:2	C18:3	Trans #	Comments
Blending Oils for Solids & Performance					✓			Palm Oil / Palm Stearin and General Vegetable Oils / High Stability Vegetable Oils	0	0	17	3	20	50	18	7	0.75 - 1.5	
						✓	✓		-	1	38	5	45	37	14	2	1 - 2.5 ##	High palm content
Reduced Trans Hydrogenation							✓	Partially Hydrogenated General Vegetable Oils			10	40	50	15	25	5	3 - 5	
Interesterified [Palm and PK Stearins] plus Vegetable Oil and or saturates claims	✓		✓		✓ *			Interesterified [Palm and PK Stearins] with Soya Oils	4	2	20	4	30	25	40	5	0.75 - 1.5	price brand: no trans
	✓		✓		✓ *			Interesterified [Palm and PK Stearins] with Canola Oils	1.5	1	8.5	2	14.5 ##	55	21	8	0.75 - 1.5	health brand: trans and or saturates claims
		✓		✓		✓	✓	Interesterified [Palm and Palm and PK Stearins] with Soya Oils	5	3	30	5	45	25	25	2	.075- 2.5 ##	
Interesterified [Fully Hydrogenated Vegetable Oil and Liquid Vegetable Oil] and Liquid Vegetable Oil	✓		✓		✓			Interesterified [Fully Hydrogenated Vegetable Oil and Liquid Vegetable Oil] and Liquid Vegetable Oil	-	-	10	20	30	18	45	5	2 - 4	(practical range of ~1.5% - 4%)
		✓		✓		✓	✓		-	-	10	40	50	13	30	5	2 - 4	(practical range of ~1.5% - 4%)

* For soft margarine requirements, the Baking and Food processing industries would expect to use a product with fatty acid values that are somewhere between the price and health categories shown, using a product towards the health brand when saturates or trans claims are being made on the manufactured food.

The Canadian edible oil industry (2005) is routinely achieving trans fat levels in the area of 1% in domestic vegetable oil products and in many or most domestic vegetable oil products that are blended with palm / PK fractions. The incentive to have trans fat levels in the area of 1% is generally to achieve 0 g trans/serving on foods that qualify for a Zero Trans Fat Claim, or to achieve 0.0 g trans fat/serving rather than 0.1 g trans/serving (or higher) on nutritional facts panels on foods that do not qualify for a Zero Trans Fat claim. As more food manufacturers apply nutrition facts tables to their foods (2005 - 2006), more manufacturers would be expected to request trans fat levels in the area of 1%. At some point, trans levels in the area of 1% will become a commonplace expectation of the edible oil industry.

Palm, palm olein, and palm stearin, are generally exported from their country of origin in a fully refined state, containing 1% trans or less. When prolongued storage of these oils is required (e.g. limited ocean vessel deliveries to Canada during winter), these oils require additional processing (in Canada), elevating their trans levels towards 2%.

TO: Trans Fat Task Force

FROM: The Expert Committee on Fats, Oils, and Other Lipids

DATE: October 31, 2005

References for Fatty Acid Values

Oil	Reference	Oil	Volume #	page #
Soybean	Bailey's Industrial Oil and Fat Products	Soybean	2	48
Canola	Canadian Grain Commission, 2004 Composite Analysis	Canola		
Corn	Bailey's Industrial Oil and Fat Products	Corn	2	48
High Oleic Canola	Bailey's Industrial Oil and Fat Products	High Oleic Canola	2	48
Cottonseed	Bailey's Industrial Oil and Fat Products	Cottonseed	2	197
Palm Olein	Bailey's Industrial Oil and Fat Products	Palm Olein	2	341
Palm Oil	Bailey's Industrial Oil and Fat Products	Palm Oil	2	341
Coconut	Bailey's Industrial Oil and Fat Products	Coconut	2	112
Beef Tallow	Bunge Canada 2005 Data Bank Values	Beef Tallow		
Lard	Bunge Canada 2005 Data Bank Values	Lard		
Mid Oleic Sunflower	General Industry Values	Mid Oleic Sunflower		
High Oleic Sunflower	Fats and Oils (AACC, 1996), Clyde E Stauffer, Egan Press	High Oleic Sunflower		131
Low Linoleic Soybean	Values combined from PBI Bulletin 2002 Issue I (Warner) and a Vistive Low Lin Soya brochure from Monsanto	Low Linoleic Soybean		
Coconut Stearin	Estimated Values			
Palm Kernel Stearin	General Industry Values			
Palm Stearin	General Industry Values			

Appendix 14

Recommended Healthier Alternatives for Replacement of Trans Fats by Food Applications

Type of Application	Recommended Alternatives	Type of Oils	Characteristics	Comments on Health Effects
Frying fats	Medium and high stability vegetable oils	High oleic canola High oleic sunflower	High in MUFA Small amount of n-6 and n-3 PUFA Low in saturates Better oxidative stability than general vegetable oils	+ Improved fatty acid profile including ratio of n-6 to n-3 fatty acids. + May contribute to a diet which reduces CHD risk.
		Low linolenic soya Mid oleic sunflower	High in MUFA or n-6 PUFA Low in saturates Better oxidative stability than general vegetable oils	- Increased ratio of n-6 to n-3 fatty acids. + May contribute to a diet which reduces CHD risk.
Consumer and food service margarines (soft)	Interesterified oils with vegetable oil	[Palm and palm kernel (PK) stearins] with canola oils	High in MUFA Moderate in n-6 High in n-3 PUFA Low in saturates	+ Improved fatty acid profile including ratio of n-6 to n-3 fatty acids. + May contribute to a diet which reduces CHD risk.
		(Palm and PK stearins) with soya oils	Moderate in MUFA High in n-6 PUFA Moderate in n-3 PUFA Moderate in saturates	+ Better fatty acid profile than butter and hard margarines which are higher in saturated fatty acid and lower PUFA. + Expected to lower total (LDL) / HDL cholesterol ratio*
		(Fully hydrogenated vegetable oils and liquid vegetable oils) with vegetable oils	Some MUFA High in n-6 PUFA Moderate in n-3 PUFA Moderate in saturates 2–4 % trans	+ Better fatty acid profile than butter and hard margarines which are higher in saturated fatty acid and lower PUFA. + Expected to lower total (LDL) / HDL cholesterol ratio*

Shaded areas indicate alternatives that contain 2–4% trans fat.

Type of Application	Recommended Alternatives	Type of Oils	Characteristics	Comments on Health Effects
Consumer and food service margarines (hard)	Interesterified oils with vegetable oi	(Palm and PK stearins) with soya oils	Moderate MUFA and n-6 PUFA Small amount of n-3 PUFA High in saturates	+ Better fatty acid profile than butter which is high in saturated long-chain fatty acid. + Expected to lower total (LDL) / HDL cholesterol ratio*
		(Fully hydrogenated vegetable oils and liquid vegetable oils) with vegetable oils Some MUFA	Moderate in n-6 and n-3 PUFA High in saturates 2–4 % trans	+ Better fatty acid profile than butter which is high in saturated long-chain fatty acid. + Expected to lower total (LDL) / HDL cholesterol ratio*
Baking margarines (soft)	Interesterified oils with vegetable oil	(Palm and PK stearins) with canola oils	High in MUFA Moderate in n-6 PUFA High in n-3 PUFA Low in saturates	+ Improved fatty acid profile including ratio of n-6 to n-3 fatty acids. + Expected to lower cholesterol ratio*
	Blending of soft oils + highly saturated oils	Palm oil / Palm stearin and general vegetable oils	High in MUFA Moderate in n-6 and n-3 PUFA Moderate in saturates	+ Improved fatty acid profile including ratio of n-6 to n-3 fatty acids. + Expected to lower cholesterol ratio*
	Interesterified oils with vegetable oil	(Palm and PK stearins) with soya oils	Moderate in MUFA High in n-6 PUFA Moderate in n-3 PUFA Moderate in saturates	+ Better fatty acid profile than butter and hard margarines which are higher in saturated fatty acid and lower PUFA. + Expected to lower cholesterol ratio*.
		(Fully hydrogenated vegetable oils and liquid vegetable oils) with vegetable oils	Some MUFA High in n-6 PUFA Moderate in n-3 PUFA Moderate saturates 2 - 4 % trans	+ Better fatty acid profile than butter and hard margarines which are higher in saturated fatty acid and lower PUFA. + Expected to lower cholesterol ratio*

Shaded areas indicate alternatives that contain 2–4% trans fat.

* Comments on health effects are made in comparison to similar products made with partially hydrogenated oils.

Type of Application	Recommended Alternatives	Type of Oils	Characteristics	Comments on Health Effects
Baking margarines (hard and laminating)	Blending of soft oils + highly saturated oils	Palm oil / Palm stearin and high stability vegetable oils	Moderate in MUFA Small amount of both n-6 and n-3 PUFA High in saturates	+ Better fatty acid profile than butter which is high in saturated long-chain fatty acid. + Expected to lower total (LDL) / HDL cholesterol ratio*
	Interesterified oils with vegetable oil	(Palm and PK stearins) with soya oils	Moderate MUFA and n-6 PUFA Small amount of n-3 PUFA High in saturates	+ Better fatty acid profile than butter which is high in saturated long-chain fatty acid. + Expected to lower total (LDL) / HDL cholesterol ratio*
		(Fully hydrogenated vegetable oils and liquid vegetable oils) with vegetable oils	Some MUFA Moderate in n-6 and n-3 PUFA High in saturates 2–4 % trans	+ Better fatty acid profile than butter which is high in saturated long-chain fatty acid. + Expected to lower total (LDL) / HDL cholesterol ratio*
Bakery / Food Processor Shortening Solid	Blending oils for solids and performance	Palm oil / palm stearin + medium stability vegetable oils	High in MUFA Moderate in n-6 PUFA High in n-3 PUFA Low in saturates	+ Improved fatty acid profile including ratio of n-6 to n-3 fatty acids. + Expected to lower cholesterol ratio*
	Interesterified oils with vegetable oil	(Palm and PK stearins) with canola oil High in MUFA	Moderate in n-6 PUFA High in n-3 PUFA Low in saturates	+ Improved fatty acid profile including ratio of n-6 to n-3 fatty acids + Expected to lower cholesterol ratio*
		(Palm and PK stearins) with high oleic canola oil	High in MUFA Small amount of both n-6 and n-3 PUFA Low in saturates	+ Improved fatty acid profile + Expected to lower cholesterol ratio*

Shaded areas indicate alternatives that contain 2–4% trans fat.

* Comments on health effects are made in comparison to similar products made with partially hydrogenated oils.

Type of Application	Recommended Alternatives	Type of Oils	Characteristics	Comments on Health Effects
Bakery / Food Processor Shortening Solid (continued)	Blending oils for solids and performance	Palm oil / palm stearins / fully hydrogenated oil + medium stability vegetable oils	Moderate in MUFA Moderate in n-6 and n-3 PUFA Moderate to high in saturates	+ Better fatty acid profile than highly saturated oil shortening or animal fat. + Expected to lower cholesterol ratio*
	Interesterified oils with vegetable oil	(Palm and PK stearins) with high oleic canola oil	High in MUFA Small amount of both n-6 and n-3 PUFA Moderate to high in saturates	+ Better fatty acid profile than highly saturated oil shortening or animal fat. + Expected to lower cholesterol ratio
		(Fully hydrogenated vegetable oils and liquid vegetable oils) with liquid vegetable oils	High in MUFA Small amount of both n-6 and n-3 PUFA Mod. to high in saturates 2–4 % trans	+ Better fatty acid profile than highly saturated oil shortening or animal fat. + Expected to lower cholesterol ratio*
Bakery / Food Processor Shortening Spray / Liquid	General vegetable oils	Canola or soya oils	High MUFA or n-6 PUFA High in n-3 PUFA Low in saturates Poor oxidative stability	+ Improved fatty acid profile including ratio of n-6 to n-3 fatty acids. + May contribute to a diet which reduces CHD risk.
	Medium and high stability vegetable oils	High oleic canola oil High oleic sunflower	High in MUFA Small amount of n-6 and n-3 PUFA Low in saturates Better oxidative stability than general vegetable oils	+ Improved fatty acid profile profile including ratio of n-6 to n-3 fatty acids. + May contribute to a diet which reduces CHD risk.
		Low linolenic soya Mid oleic sunflower	High in MUFA or n-6 PUFA Low in saturates Better oxidative stability than general vegetable oils	- Increased ratio of n-6 to n-3 fatty acids. + May contribute to a diet which reduces CHD risk.

Shaded areas indicate alternatives that contain 2–4% trans fat.

* Comments on health effects are made in comparison to similar products made with partially hydrogenated oils.

Alternatives to Partially Hydrogenated Oils

Screen Criteria

Health implications

Alternatives to trans fat must contribute to a decreased net health risk by supporting the establishment of a diet with levels of trans fatty acids, total saturated fat; and individual saturated fatty acids (i.e. lauric, myristic, palmitic and stearic) that will minimize their negative impact on risk factors for CVD (i.e. serum lipids and lipoproteins) as well as adequate levels of linoleic acid and alpha-linolenic acids.

Availability

Alternatives to trans fat must be available for sale in Canada and supply must be sufficient to meet the demand before the final regulations are registered/promulgated.

Other Criteria

Functionality (level 5)

Alternatives to trans fat must provide sufficient functionality to develop products which are acceptable to consumers. However, they do not have to allow the development of products which are identical or have the same shelf life as those currently on the market.

Cost (level 4)

Cost of final product made with alternatives should be comparable to the cost of other similar products on the market. If alternatives are recommended despite the fact that cost could be deterrent to purchase products made with them, it will be taken into consideration in the development of the final recommendations.