

Trans-Border Reformulation: US and Canadian Experiences with *trans* Fat

Executive Summary

Food managers are engaged in altering the nutritional quality of diets. They do so directly through product innovation strategies (food manufacturers) and the selection of products available in stores (grocers and restaurants) and indirectly through distribution and promotion strategies and prices. Decisions to alter products, menus, shelf-sets and marketing strategies are drivers of supply which interact with consumer demand to impact the nutritional quality of food made available, purchased and eventually consumed.

This paper explores the decision process of managers in a holistic approach integrating several strands of the literatures of diffusion of innovation, health belief and firm strategy. A conceptual model is then applied to the case of product reformulation in response to food policy. Voluntary actions of snack food manufactures in the US and Canada to respond to the impetus to reduce the use of *trans* fat in cookies illustrates our discussion.

We present evidence of desirable reformulations in light of the standardization of label information in both nations. We also suggest differences in the response of managers responsible for product strategies in this dynamic category, with implications for food policy makers and consumers alike. Industry efforts to improve the nutritional quality of cookies offered for sale have generally been successful, however it is uncertain if there has been a concomitant change in consumption patterns.

Introduction

Unlike any other food component artificial *trans* fats serve no beneficial nutrition purpose and their consumption should be reduced as much as possible (Uauy et al., 2009). In order to maximize health gains from removing *trans fat*, the World Health Organization (WHO, 2013) recommends replacing it with unsaturated fats (WHO, 2004 & 2013). Food processing firms can therefore help improve diet quality by reducing the use of certain fats while controlling the level of other nutrients. This paper tracks firm responses to the inclusion/standardization of *trans* fat information on food labels in the US and Canada.

Product innovation is one of two key behavior changes that can improve diet quality. The other necessary condition is consumption change. On one level the reformulation and launch of novel products with improved lipid profiles serves as a simple test of managerial response to food policy. How does this labeling policy change the process of food innovation? The case considered here also explores two nuances of the role of managers in shaping food demand, diet and health - adapting to the local environment and the role of voluntary initiatives. As a comparative study of the US and Canada we describe the mostly similar policy approaches. There was heightened scrutiny provided in Canada pre- post a mid-course (2009) deadline for voluntary efforts to reduce the *trans* fat content in all foods. We explore if this led to different food innovation responses and what happened in the intervening years.

The World Health Organization has acknowledged the role that the private sector can play in limiting the levels of saturated and *trans* fat in processed food products, through product reformulation (WHO, 2004). These innovations need to be part of broader efforts to improve the quality of the food supply, inform and educate consumers in order to reduce the risk of diet-related chronic disease (WHO, 2004).

Artificial *trans* fat is produced through the process of hydrogenation resulting in a stable fat that can withstand repeated heating at high temperatures while providing an extended shelf life. Although it was previously favored by the food industry because of these properties, its consumption has been associated with an increased risk of cardiovascular disease (Teegala et al., 2009, Mozaffarian et al., 2009). In response to these public health consequences there has been a move to remove *trans* fats from the global food supply.

To impact public health through food reformulation at least four sequential managerial diffusion decisions have to be made: 1) when, and how will new ingredients be used (adoption); 2) how much will processing and product characteristics be changed (assimilation), 3) will these changes be consistent (adherence), and finally 4) what balance of marketing strategies will distribute, communicate and value these product changes (promotion)? Merging traditional industrial organization (Structure-Conduct-Performance) and population health (belief-behavior-cues to action) frameworks into the theory of diffusion of innovation (Rogers, 2003) we present a conceptual model of a path towards the impact of these managerial decisions. This model is presented within the context of a particular public health-food innovation dynamic and comparative study – *trans* fat in the US and Canada (Schleifer, 2011, 2012 and 2013).

This paper builds on a systematic review (Downs et al., 2013), empirical analysis (Van Camp et al., 2012a) and a conceptual study (Downs et al., 2012). This is a case-study of *trans* fat in cookies/sweet biscuits 2006-12 characterizing the snack food industry's response to the inclusion of *trans* fat content on Nutrition Facts panels and standards for the use of nutrient content claims on the front of pack. We consider the efficacy of monitored industry self-regulation (Canada primarily) and more autonomous firm strategy (US primarily). However, many cookies are available for sale on both sides of the border. Thus, certain managerial

decisions may impact the availability of *trans* fat in both nations.

Background

The US and Canada chose subtly different strategies to promote the reduction of artificial *trans* fat in processed foods. Both included *trans* fats on Nutrition Facts panels around the same time (December 2005/January 2006 for Canada/US respectively). The US selected a threshold of 0.5g/serving above which products couldn't claim on the front of the pack to be *trans* fat free. Canada selected a more restrictive threshold of 0.2g/serving in addition to the more binding constraint of less than 2g/serving for the sum of *trans* and saturated fat¹. In addition, Health Canada adopted the recommendations of the *Trans Fat Task Force* setting two public health goals to be met by 2009 (Health Canada, 2006):

1. Limit the *trans* fat content of vegetable oils and soft, spreadable margarines to 2% of the total fat content, and
2. Limit the *trans* fat content for all other foods to 5% of the total fat content, including ingredients sold to restaurants.

Although the Canadian Government had threatened legislation if the food industry didn't meet the recommendations by 2009, ultimately neither nation chose to ban *trans* fats in processed foods unlike other countries worldwide (Downs et al., 2013). The US and Canada opted for a collaborative, industry partnership and communication approach. Similar efforts, such as the provision of front of pack nutrition marketing messages (Van Camp et al., 2012b) have met with mixed success.

This environment provided opportunities for managerial responses at various stages of the food supply chain. This can be characterized by the speed, nature, and completeness of product and process innovation and the set of marketing strategies selected by food firms operating in each nation, retailers and food manufacturers' alike.

What do we know about Food Innovation?

Traditional studies of food innovation build from the diffusion literature (Rogers, 2003). Managers and consumers are placed along the continuum of early adopters, mainstream or laggards. Such an approach can accommodate the joint supply and demand aspects of *adoption*. As a next step, Sporleder et al. (2008) and Shanahan et al. (2008) provide a basis to consider the combined processes of adoption and *assimilation* of food innovations using the context of the US National Organic Program. In this study both are prompted by a trigger, here the policy requirements of *trans* fat labeling. Think of the adoption decision as the selection of key inputs and processes for the firm targeting *trans* fat (and saturated fat in Canada). Assimilation then considers the "spread" (or contagion) over the various products within a firms' portfolio as managers recognize and accept the benefits of the innovation.

An industrial organization Structure-Conduct-Performance model (e.g., Marion, 1976; Porter 1987) might consider this a change in basic conditions, prompting a new pattern of conduct (innovation) and performance (change in diet quality) with feedback loops perhaps altering the structure of the (sub) sector. Cooper and Zmud (1990) add a focus on the use of the innovation within firms (and by extension by consumers). The 6-step implementation process

¹ Serving size for cookies is 30g in the US and 30-40g in Canada.

(initiation, adoption, adaptation, acceptance, routinization, and infusion) is more concisely packaged by Lewin (1951) as unfreezing, changing and refreezing. This might suggest that once change has been accepted (adoption), and once the next managerial decision of how much to implement this change (assimilation) is made that **adherence** through routinization (Cooper and Zmud, 1999) or refreezing (Lewin, 1951) will suggest compliance. This may not be the case if a new trigger or impetus for innovation (consumer demand, external competition or a new internal managerial decision) or novel feedback loops (e.g., adaptation highlights food processing concerns, ingredient sourcing, etc.) arise. As discussed by Henson and Heasman (1998) more research is needed to understand this compliance (policy) or more generally adherence (voluntary) process by food firms.

Finally, from the perspective of managerial decision making, a marketing strategy is then designed to distribute, promote and value the diffusion process. Integrating an understanding of the population drivers of adoption of health behaviors (e.g., Cohen et al., 2000), prices, advertisements ad locations (convenience) all interact with product strategies to encourage the selection (purchase) and use (consumption) of innovative foods.² A schematic of this sequence of managerial decisions is presented in Figure 1.

Objective

The overall objective of this study was to determine whether the different approaches to reduce *trans* fat in cookies implemented in the US and Canada altered the degree and speed of adoption, assimilation, adherence and promotion of food reformulation managerial decisions by firms. To do this we examined: 1) the nutrition composition and type of oil used, 2) the presence of front of pack nutrition claims, and 3) price at a product-level.

Methods

The Mintel/GNPD (Global New Products Database) data were used to examine new cookie products launched between 2006 and 2012. GNPD documents a rich array of new product information and is used for competitor tracking between rival companies. The data are compiled by looking at food label information and not through food composition analysis. Key nutrient levels for each product were compared over time, and across each country.

In order to identify the main type of oil used in cookies, we examined the ingredients list of individual products. Given that ingredients are listed in the order of largest to smallest contribution to the product, we identified the first oil/fat type listed on the label as the primary oil ingredient. In many cases several types of oils are listed. However, our analyses focused on the main oil ingredient. In order to identify the proportion of oil types used, we divided the total number of products with each primary oil by the number of cookies per country and year.

All statistical analyses were performed using SPSS (version 19). T-tests and one-way ANOVAs were used to assess differences among groups using continuous variables and chi-squared tests were used to assess differences of categorical variables. Non-parametric tests (Mann-Whitney U-test and Kruskal Wallis test) were used to assess differences among groups of abnormally distributed variables. A p-value of <0.05 was considered statistically significant.

² An extension of this framework might consider lessons from the TAM – Technology Acceptance Model (Davis et al., 1989) which relies upon the perceptions and realizations of usefulness and ease of use.

Results

Our data set include a total of 2,701 new cookies launched in the US and 965 in Canada over the period 2006-12. Numbers of cookie innovations are reasonably consistent over time with the exception of a recessionary dip in 2008 and 2009 in the US.

Overall, 12.2% of products contained *trans* fat in the US as compared to 29.6% in Canada ($p < .001$). Figure 2 depicts the proportion of cookies with and without *trans* fat. Although there were differences in the proportion of products that contained *trans* fat between the two countries the actual quantity of *trans* fat did not differ ($p = .347$). There were no significant differences in key nutrients in Canadian and US cookies with the exception of 2009 where Canadian cookies had significantly more saturated fat (9.0 ± 5.6 vs 10.7 ± 6.5 ; $p = 0.015$) and energy ($p = 0.023$) than US products; however, sodium levels were significantly higher in the US (308.0 ± 142.4 vs 255.6 ± 145.5 ; $p = 0.002$).

Table 1 depicts the composition of cookies over time. In the US, saturated fat was higher in 2012 as compared to 2006 and 2007 and *trans* fat levels decreased over the same time period. In Canada, with the exception of reductions in *trans* fat over time, there were no differences in the composition of cookies from 2006 to 2012.

Products Containing trans Fat

The products that contained *trans* fat differed from those that did not contain *trans* fat in both countries. More specifically, the products without *trans* fat were significantly lower in energy, lower in fat and higher in protein and fiber in the US and Canada. Overall, 19% of US and 24% of Canadian products had front of pack product positioning claims related to *trans*, saturated or total fat. Of those products, 98.3% contained no *trans* fat. The relationship between saturated fat and *trans* fat was different between the two countries. In the US, saturated fat content was significantly higher in the products that did not contain *trans* fat but in Canada saturated fat levels were significantly lower.

Private Labels

Overall, there was no difference in the proportion of branded or private label cookies (12% vs 12.6%) containing *trans* fat in the US. However, in Canada 26% of branded products contained *trans* fat as compared to 45.6% of private label cookies ($p < 0.01$).

Price

Price was significantly related to whether or not products contained *trans* fat. Median price per 100 grams was \$US 0.75 (interquartile range: \$US 0.46, \$US 1.48) in US products containing *trans* fat as compared to \$ US 1.36 (interquartile range: \$US 0.82, \$US 2.66) in products without *trans* fat ($p < .001$). In Canada, the same relationship was found where products that did not contain *trans* fat were more expensive (Median: \$US 1.79; interquartile range: \$US 1.02, \$US 3.51) than those containing *trans* fat (Median: \$US 1.43; interquartile range: \$US 0.87, \$US 2.58; $p = .001$).

Product Launch Type

There were no significant differences in the energy or macronutrient content among the different types of product launches. However, products that were being launched with new packaging had significantly less sodium than new products and new variety/range extensions in the US ($p < .001$) and Canada ($p = .016$). Product relaunches were the least likely to contain *trans*

fat (6.3%) as compared to other launch types (new product (17%), new variety/range (19%), new packaging (14%), new formulation (10%); $p < 0.05$).

Type of Oil Used

Overall, 71% of US and 70% of Canadian products contained more than one oil ingredient. Figures 3 and 4 depict the different types of oils used as the main fat ingredient in new cookie launches between 2006 to 2012 in the US and Canada, respectively. In the US, the main fat ingredient was partially hydrogenated vegetable oils (PHVOs) in 2006 but by 2012 it was palm oil. In Canada, vegetable oils were the main fat ingredient used in both 2006 and 2012. Overall, in both countries the use of PHVOs decreased over time and by 2012 only 8.3% of products in the US and 1.3% in Canada used PHVOs as the main oil ingredient. However, many of the shortenings - most of which were made up of hydrogenated fat in combination with another type of oil - included smaller quantities of PHVOs; in the US 31% included PHVOs as compared to only 5.4% Canada. Of the products that did not contain *trans* fat quantities on the label, 11.7% in the US still contained PHVOs or shortening containing PHVOs as the main oil ingredient; in Canada, only 2.7% of products that did not contain *trans* fat on the label included PHVOs as the main oil ingredient. Cookies launched in the US provided information in the ingredients list on use of interesterification and high-oleic oils (Flickinger, 2004). In 2012, 6% of cookies used interesterification and 6.8% used high-oleic oils.

Vegetable oils were blends of a variety of oils usually including a soft oil (mono or polyunsaturated) and a hard oil (palm, palm kernel or coconut). In the US, the most frequent combination was soybean and palm and in Canada it was canola and palm. Many of the products provided a list of oils that they may use. For example, “canola or soy and palm and palm kernel” or “sunflower or safflower”, etc. In some cases, the ingredients list would provide up to six possible oils that may be used including PHVOs. Overall, 12% of US and 6% of Canadian products gave multiple possibilities for the oil used.

Implications and Limitations

Managers often call for flexibility in meeting standards or new rules and regulations. Other stakeholders question the need for public-private partnerships, championing mandatory over voluntary. Within the food environment, food manufacturers and retailers can be encouraged to change the nutritional quality of products available (whether through choice editing of the assortment or through product reformulation) and to play a role in information dissemination and education. How do managers decide strategy? This case provides a comparison of two sets of responses to self-regulation primed by mandatory food labels.

The way managers respond to different policies in terms of product reformulation has potential health implications. Given the resources required to reformulate products, it may be an opportunity not only remove *trans* fat but also address other key nutrients as well. We found that cookies that did not contain *trans* fat in both countries were also less energy dense and had less fat than those that did contain *trans* fat. Moreover, the Canadian cookies that did not contain *trans* fat also had lower saturated fat levels. This is encouraging from a public health perspective. There has been some concern that industry would simply replace *trans* fat with saturated fats, which may only have a nominal impact on health. However, this case-study demonstrates that product reformulation was done in a way that resulted in a relatively healthier product post product reformulation.

The conceptual model is part of a broader process of change that remains under studied.

We don't consider the motivation for starting the diffusion process by policy makers for example. Neither do we extend to consider the impact of these changes in supply on nutrient intake, diet quality and wellness (which may need to accommodate lifestyle changes such as exercise, smoking, etc.). A fully integrated approach would then include feedback loops encouraging subsequent policy changes, managerial decisions and consumer reactions. The empirical case provides a perspective over time in one product category focusing (mostly) on one food component – fat. However, be clear that diet and wellness isn't simply a discussion of one product, one attribute or one eating occasion!

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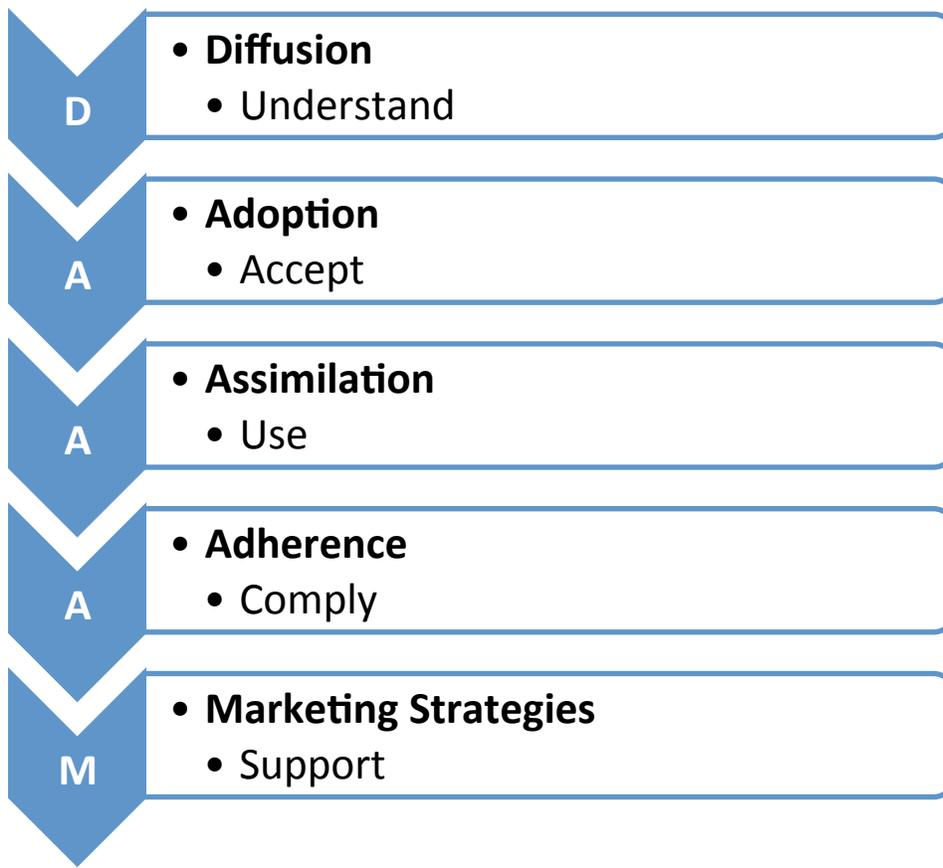


Figure 1. Conceptual Model: DAAA A Process of Change