Canadian Consumers Purchasing Behaviour of Omega-3 Products

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Abstract

The development of innovative functional food products is a major trend in today's food industry. The growth of this industry is driven by increased consumer awareness of their own health deficiencies, increased understanding of the possible health benefits of functional foods, development in formulation technologies, a positive regulatory environment and changing consumer demographics and lifestyles. While there has been proliferation of omega-3 products such as milk, eggs, yogurt, and margarine in the Canadian food market, very little is known about consumers of these products.

In our study we use ACNielsen Homescan™ data combined with survey data to develop profiles of omega-3 consumers in Canada. The focus of the study is on consumers of four products: omega-3 milk, omega-3 yogurt, omega-3 margarine and omega-3 eggs. We investigate whether there are significant differences between consumers and non-consumers of omega-3 products based on their age, income, education, and household composition. We also investigate whether a household's use of Canada's Food Guide and the Nutrition Facts table, and consideration of the health benefits of food influences the decision to purchase omega-3 products.

The results from the ordered probit model estimation show that the aging Canadian population is a major driver of omega-3 purchases. Also, the presence of children in the home increases the purchasing frequency of omega-3 yogurt and omega-3 margarine, and reading the Nutrition Facts table and considering the health benefits of food are important factors that affect omega-3 product purchases.

INTRODUCTION

Public awareness of the link between diet and lifestyle related disease has increased over the last decade (Chandler 2006; Barkema 1994; Malla et al. 2007). This increase in public awareness has led to an increased scrutiny of traditional nutritional aspects of food such as trans fat, saturated fat, cholesterol fat, fibre, salt, sodium and vitamin content and non-traditional nutritional attributes of food such as omega-3 content. These changes in consumers' attitudes have led to a demand for more healthy foods. Subsequently, food manufacturers have responded by producing food products that could be used to promote good health (Kinsey 1994).

Specifically, there has been a growth in the development and marketing of food products called functional foods. According to Health Canada (1998), a functional food is similar in appearance to, or may be, a conventional food, is consumed as part of a usual diet, and is demonstrated to have physiological benefits and/or reduce the risk of chronic disease beyond basic nutritional functions. Examples of conventional functional foods include tomatoes with lycopene and wheat bran fiber, which are thought to help prevent the incidence of certain types of cancers (International Food Information Council 2006). Some functional foods can be fortified with nutrients such as calcium enriched orange juice to help prevent specific nutritional deficiencies while others are fortified with nutrients, such as omega-3 polyunsaturated fatty acids, that could reduce the risk of chronic disease like heart disease. Omega-3 fatty acids can be found in a variety of product categories such as milk, yogurt, eggs, margarine, bread, pasta, pork and chicken.

Awareness of omega-3 fatty acids in Canada is high with 75% of Canadians stating they are aware of them (Ipsos Reid 2005a). In another poll, 10% of Canadians indicated they "always" choose omega-3 enhanced products when it was available and 14% of Canadians say they usually choose an omega-3 enhanced product (Ipsos Reid 2005b). It is not surprising that sales of select omega-3 products (milk, yogurt, margarine and eggs) in Canada grew by 35% in 2005 compared to 2004 while sales of the respective conventional products grew by 3% (Chase et al. 2007). Some factors that led to the expanded development and consumption of omega-3 enhanced products include the increased understanding of the benefits of omega-3 fatty acids, growth in consumer awareness of their own health deficiencies, developments in formulation technologies and lastly, a positive regulatory environment (Seaton 2006). Other studies suggest that consumers' preference for an omega-3 product is influenced by the level of omega-3 fatty

acid in the product (McCluskey et al. 2005), the base product (e.g. fish), labelling, information attributes and source of omega-3 fatty acid (Cox et al. 2008).

The purpose of this study is to provide insight into Canadian consumers' preferences for omega-3 yogurt, omega-3 eggs, omega-3 milk and omega-3 margarine. Specifically, the objective of this study is to assess whether household's demographics, knowledge of the Canada's Food Guide and nutrition labels, and consideration of health benefits influences the decision to purchase omega-3 products.

It is expected that a better understanding of the omega-3 consumer in Canada will be especially useful to decision makers in government and industry. Due to poor diets and lifestyles, the public incurs significant costs in the treatment of cardiovascular disease, diabetes, and high blood pressure, increasing health insurance costs and loss of productivity. Consuming omega-3 enhanced products has the potential to positively influence health outcomes, thereby reducing health care costs. It is because of this potential health benefit that policies should ensure the public gets accurate information about the health benefits of omega-3 products through an appropriate medium. At the same time, policies should encourage the growth and development of omega-3 products. Small and medium sized processors of omega-3 enhanced foods could the results of this research to market their products more effectively.

DATA SUMMARY

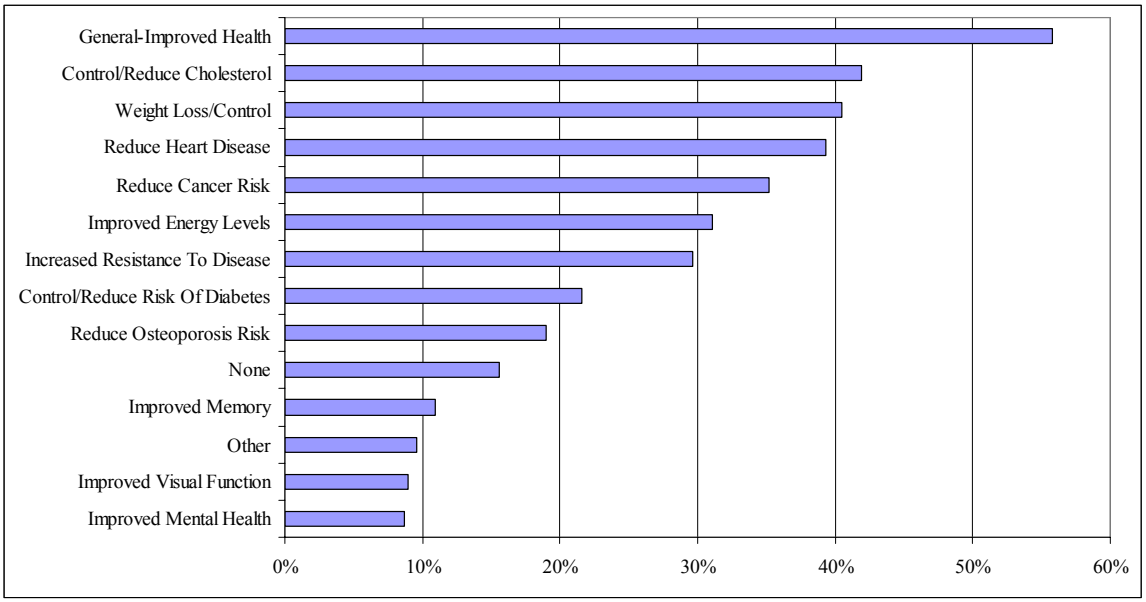
In this study, ACNielsen Homescan™ data and consumer survey data were used in the analysis. ACNielsen maintains a panel of Canadian households, representative of the Canadian population, who regularly provide ACNielsen with their purchase information. Data from that panel was used in this research. It includes the aggregate number of trips to a store that each household made between March 2005 and March 2006 to purchase a particular omega-3 product and each household's demographic information (location, income, age and level of education of household head and the presence of children) [1]. In March 2006 a survey was administered to the same households. Of the 7,947 households that completed the survey, 34% also purchased an omega-3 product[2]. The sample data of 7,947 is fairly representative of the Canadian population with a few noted exceptions (Appendix A). For instance, households in the Maritimes, households with an older head of the household, and households with no children under the age of 18 years in the home are over represented in the data.

The results of the survey provide some insight into the health benefits considered when purchasing food, awareness of the Nutrition Facts table on package labels and Canada's Food Guide. The responses to three specific questions relating to the potential purchase motivators of omega-3 products are summarized below.

Health Benefits Considered when Purchasing Food

Households were queried about which health benefits they consider when purchasing food. Respondents were asked to select as many benefits as they saw fit, out of 14 possible choices[3]. Figure 1 shows that most households buy a certain type of food if they believe it will improve their health in general, control/reduce cholesterol, aid in weight loss/control or reduce the risk of heart disease or cancer.

Figure 1. Health Benefits Considered When Purchasing Food



Awareness of the Nutritional Facts Table and Canada's Food Guide

Households were queried about their awareness of the Nutrition Facts table on packaged food products and the information they look for on it when buying a product for the first time. Of the 89% of households that stated they are aware of the Nutrition Facts table, 63% of them actually read it. Only 11% of the households were not aware of the Nutrition Facts table.

Another question queried households on whether they heard of Canada's Food Guide. Just over half of the households, 51%, have seen or heard of Canada's Food Guide and use the

information while 40% of households have seen or heard of it but do not use the information. Only 9% of the households have not seen or heard of the Canada's Food Guide.

METHODOLOGY AND RESULTS

Theoretical and Empirical Models

The model used in this study follows the random utility maximization (RUM) framework rooted in the economic theory of consumer choice (McFadden 1974). In these models it is often assumed that a household is capable of making "rational" decisions that optimize their internal utility.

For each omega-3 product, we assume that a household faces a choice between never purchasing (Nv), purchasing once (On), purchasing occasionally (Oc) and purchasing frequently (Fr). Utilities derived from the purchasing decision are given by U_{nv}, U_{On}, U_{Oc} and U_{Fr} , respectively, and these utilities are not observable. The observable variables are the purchase decisions k (where k = Nv, On, Oc, Fr) and a vector of consumer characteristics (X). The utility of a household i is postulated as follows:

$$U_{ki} = V_{ki} + \varepsilon_{ki} = \beta x + \varepsilon,\ \varepsilon \sim N(0,1) \tag{1}$$

Where U_{ki} is the latent, unobserved utility for choice alternative "k", V_{ki} is the explainable part of the latent utility that depends on the purchasing decision and a set of the household's demographic characteristics and attitudes, and ε_{ki} is the random component of the latent utility associated with the choice "k" and household "i".

Household i's choice ordering between never purchasing (Nv), purchasing once (On), purchasing occasionally (Oc) and purchasing frequently (Fr) the respective omega-3 products is modeled in the following way. Household i ranks the decision to purchase a respective omega-3 product in one of the four categories. For example, Z_i can be interpreted as additional utility derived by household i choosing to purchase an omega-3 product once (On) over never purchasing (Nv), so that

$$Z_i = (V_{Oni} + \varepsilon_{Oni}) - (V_{Nvi} + \varepsilon_{Nvi}) = (\varepsilon_{Oni} - \varepsilon_{Nvi}) - (V_{Oni} - V_{Nvi}) \tag{2}$$

A household expresses strong disapproval for a specific purchase occasion if Z_i is below some threshold value (e.g., μ_1), shows moderate disapproval if Z_i is above μ_1 but below

another threshold value μ_2 , and shows approval of a purchase decision if Z_i is above μ_2 . Formally, household i's choice ordering is denoted by U_i where U=0 implies never purchasing, U=1 implies purchasing once, U=2 implies purchasing occasionally, and U=3 implies purchasing frequently and can be expressed as follows:

$$
\begin{aligned}
&U = 0 \ \text{(Never) if } u_i^* \le \mu_1 \\
&U = 1 \ \text{(Once) if } \mu_1 < u_i^* \le \mu_2 \\
&U = 2 \ \text{(Occasionally) if } \mu_2 < u_i^* \le \mu_3 \\
&U = 3 \ \text{(Frequently) if } \mu_3 > u_i^*
\end{aligned} \tag{3}
$$

Where the unknown $\mu_i's$ are estimated along with the $\beta's$. Assuming that the $\varepsilon_i's$ are normally distributed, the ordered probit maximum likelihood estimator results and the probabilities are:

$$
\begin{aligned}
&\Pr ob(U = 0 \mid x) = F(-x'\beta) \\
&\Pr ob(U = 1 \mid x) = F(\mu_1 - x'\beta) \\
&\Pr ob(U = 2 \mid x) = F(\mu_2 - x'\beta) - F(\mu_1 - x'\beta) \\
&\Pr ob(U = 3 \mid x) = 1 - F(\mu_2 - x'\beta)
\end{aligned} \tag{4}
$$

Where F is the cumulative function of a standard normal distribution. In the above model the $\mu's$ are unknown parameters that separate the adjacent categories. The estimated β coefficients of equation (1) do not directly represent the marginal effects of the independent variables on the probabilities of choice. The marginal effects of changes in the explanatory variables are calculated as follows:

$$
\begin{aligned}
&\partial \Pr ob(U = 0 \mid x) / \partial x = F(-x'\beta)\beta \\
&\partial \Pr ob(U = 1 \mid x) / \partial x = [F(-x'\beta) - F(\mu_1 - x'\beta)]\beta \\
&\partial \Pr ob(U = 2 \mid x) / \partial x = [F(\mu_1 - x'\beta) - F(\mu_2 - x'\beta]\beta \\
&\partial \Pr ob(U = 3 \mid x) / \partial x = F(\mu_2 - x'\beta)\beta
\end{aligned} \tag{5}
$$

Where F is the probability density function of the standard normal variable. For continuous independent variables, marginal effects are calculated at the sample means; however, for binary or dummy variables, they are calculated as the difference between the probabilities at the two end points, $\Pr ob(y \mid x = 1) - \Pr ob(y \mid x = 0)$. The marginal effects for a given variable sum to zero across the different response categories.

Empirical Application

For each omega-3 product (eggs, milk, yogurt and margarine) it is assumed that the decision to purchase a respective product depends on how often a household went to the grocery store or retail store and purchased the respective product (number of trips). The more trips a household makes to the grocery store to purchase an omega-3 product the higher the expenditure on a respective omega-3 product and consequently, the higher the preference or utility for that respective omega-3 product. It is also worth noting that for each trip taken a household did purchase an omega-3 product. We also found the number of trips was positively correlated with total expenditure. Thus, using trips as a proxy for total expenditure we were able to capture a household's preferences for the respective omega-3 products. For each of the products the number of trips was divided into: 0=never (Nv), 1=once (On), 2=occasionally (Oc) and lastly, 3= frequently (Fr).

Determining the "never" and "once" categories was straightforward. Since each household in the panel had the opportunity to scan their omega-3 purchases and also do the survey, we assume that consumers who never scanned their omega-3 purchases but participated in the survey chose not to buy an omega-3 product. Thus, "never" represents those households that never took a trip to the grocery store to purchase an omega-3 product while "once" represents those households that took a single trip to the grocery store. The "occasionally" and "frequently" categories were developed based on the frequencies of the number of trips to the grocery store to ensure that each category had sufficient data to carry out the analysis (Table 1).

It should be noted that these frequencies pertain to omega-3 products only since we do not know how many trips the household took to purchase the conventional products or substitute products. Consequently, we label a household that buys omega-3 eggs five or more times a year a "frequent" purchaser of omega-3 eggs, and not a frequent purchaser of eggs in general. The same explanation can be applied to the other omega-3 categories.

Table 1 shows the number of households that purchased omega-3 products ranged from approximately 5% for omega-3 milk to 20% for omega-3 eggs.

Table 1. Distribution of the Households by Purchase Frequency and Product

	Eggs		Milk		Yogurt		Margarine	
Category	Trips	% of households	Trips	% of households	Trips	% of households	Trips	*% of households*
Never (Nv)	0	80.6	0	95.3	0	89.5	0	91.9
Once (On)	1	6.4	1	1.9	1	6.2	1	3.8
Occasionally (Oc)	2-4	5.4	2-12	1.9	2-3	3	2-3	2.1
Frequently (Fr)	5 plus	7.6	13 plus	0.9	4 plus	1.2	4 plus	2.2
Total		100		100		100		100
Mean	0.4		0.08		0.15		0.16	
Standard Deviation	0.9		0.41		0.55		0.52	

Source: Author's computation from ACNielsen Homescan™ data

The following empirical model is used to estimate the relationship between the probability that a household will purchase an omega-3 product based on number of trips and their personal characteristics and attitudes:

$$U_i = \beta_0 + \beta_1 Mart + \beta_2 MBSK + \beta_3 PQ + \beta_4 ON + \beta_5 BC + \beta_6 Inc + \beta_7 Age1 + \beta_8 Age2 + \beta_9 Age3 + \beta_{10} Age4 + \beta_{11} Poc + \beta_{12} Educ + \beta_{13} Label + \beta_{14} FG + \beta_{15} HB + \varepsilon_i \quad (6)$$

Where U_i is the purchase of omega-3 products based on the number of trips and is ranked between 0 and 3.

Table 2 provides a summary of the variables used in estimating the model. Location of residence is a dummy variable equal to one if the purchase of the omega-3 product was in a particular region and zero otherwise. A dummy variable is created for each region with the exception of Alberta which is the base case. Income is a continuous variable representing the total household income before taxes. Age is a dummy variable reflecting the age of the head of the household. A dummy variable is created for each age group with the exception of over 65 years which is the base case. Child is a dummy variable indicating the presence of children in the household. Education is a continuous variable representing the education level of the respondent. Table and Food Guide are dummy variables that indicate whether consumers read the Nutrition Facts table and use Canada's Food Guide, respectively. Health benefit is a continuous variable that refers to the heath benefits that households consider important deciding which foods to buy.

Table 2. Summary of Variables

Definitions of variables and summary statistics	Abbreviation	Mean	Standard Deviation
Location of Residence			
1=Maritimes, 0 otherwise	MART	0.12	0.33
1=Quebec, 0 otherwise	PQ	0.26	0.44
1=Ontario, 0 otherwise	ON	0.31	0.46
1=Manitoba/Saskatchewan, 0 otherwise	MBSK	0.11	0.31
1=British Columbia, 0 otherwise	BC	0.10	0.30
1=Alberta, 0 otherwise (base case)	AB	0.10	0.30
Income 1= Under $20,000, 2=$20,000-$29,999, 3=$30,000-$39,999, 4=$40,000-$49,999, 5=$50,000-$69,999, 6=$70,000 or more	Income	4.06	1.76
Age			
1= Under 35, 0 otherwise	<35	0.06	0.24
1=35-44, 0 otherwise	35-44	0.21	0.40
1=45-54, 0 otherwise	45-54	0.25	0.43
1=55-64, 0 otherwise	55-64	0.23	0.42
1=65 and over, 0 otherwise (base case)	≥65	0.26	0.44
Children 1= if children under 18 are present in a household, 0 otherwise	Child	0.23	0.42
Education 1=Not completed High School, 2=Completed High School, 3=Some Technical or College, 4=Completed Technical or College, 5=Some University, 6=Completed University	Education	3.62	1.73
Nutrition Facts table 1= household is aware of the Nutrition Facts table and has read it when buying a product for the first time 0 otherwise (i.e. household is not aware of the Nutrition Facts table, household is aware of the Nutrition Facts table but do not read it when buying a product for the first time).	Table	0.63	0.48
Canada's Food Guide 1= household has seen or heard of Canada's Food Guide, and has used the information 0 = Otherwise (i.e. household has not seen or heard of Canada's Food Guide, household has seen or heard of Canada's Food Guide but do not use the information)	Food Guide	0.51	0.50
Health Benefits Range from 0 to 13 with 0 being no health benefit and 13 being all the health benefits listed below. General-improved health, improve memory, improve mental health, improve visual function, increase resistance to disease, improve energy levels, reduce heart disease, reduce cancer risk, reduce osteoporosis risk, control/reduce risk of diabetes, control/reduce cholesterol, weight loss/control, other	Health Benefits	3.52	2.88

Model Estimation

Four ordered probit models for the different omega-3 products (eggs, milk, yogurt and margarine) were estimated to explain the household's preferences for omega-3 products. The marginal effects (M.E.) of the explanatory variables along with their t-ratios are reported in Appendix B-E. Also reported in these tables are the standard errors (S.E.), McFadden's R^2 and estimated threshold parameters for the index functions μ_1 and μ_2 . McFadden's R^2, a nonlinear transformation of the restricted and unrestricted maximum likelihood values, is a good measure of fit. The estimated threshold parameters are significant indicating the ordered probit model with four different purchasing options is highly appropriate.

The estimated coefficients and standard errors reveal which factors influence households' purchase intentions for omega-3 eggs, milk, margarine and yogurt. However, the coefficients from the ordered probit model are difficult to interpret; therefore, caution must be used when making inferences (Greene 2003). The marginal effects provide better insights into how the explanatory variables affect each household's decisions to purchase omega-3 products. The marginal effects represent changes in the dependent variable for a one percent change in the independent variable (explanatory variable) in question holding all other independent variables constant at their sample means. Therefore, only the marginal effects are reported in Appendix B-E.

Empirical Results

The following discussion is based on the summary of marginal effects presented in Table 3. Our interpretation is limited to the households that "never" purchase an omega-3 product and those respondents that "frequently" purchase an omega-3 product[4]. In Table 3, a statistically significant positive marginal effect is represented by "+" and a statistically significant negative marginal effect is represented by "-". If the marginal effect is not statistically significant, the box is left blank.

The results of the research suggest that demographic variables have a different impact on purchases of each of the omega-3 enhanced products. Region seems to be more influential in purchase of eggs than the other omega-3 products. For instance, consumers from the Maritimes, Quebec, Ontario and British Columbia appear to purchase omega-3 eggs more frequently than

consumers in Alberta (the base case) while consumers in Manitoba and Saskatchewan are more likely to never purchase omega-3 eggs than consumers in Alberta.

Consumers with higher educations and higher incomes are more likely to be frequent purchasers of omega-3 eggs and omega-3 yogurt while income and education do not appear to have any impact on the purchase of omega-3 margarine and omega-3 milk.

The results suggest that consumers over 65 (the base case) are more likely to purchase an omega-3 product than any other age category with the exception of yogurt. As people age, they are likely to have more health concerns and could be consuming some omega-3 products to address some of these health concerns. Households with children appear to be more likely than households without children to never purchase omega-3 enhanced eggs and omega-3 enhanced milk. Households with children are more likely than households without children to frequently purchase omega-3 enhanced yogurt. Given that yogurt is a convenient and nutritious food that most children like, it is not surprising that households with children are more frequent consumers of omega-3 enhanced yogurt. In terms of marketing, producers and processors of omega-3 yogurt should continue to target households with children since parents typically want to provide the best nutrition possible for their children and many health benefits (supporting the normal development of the brain, eyes and nerves) of specific omega-3 fatty acids are particularly important for children.

Consumers who use Canada's Food Guide are more likely to frequently purchase omega-3 enhanced yogurt. Because our survey that 51% of Canadians had heard of and used Canada's Food Guide, a product like Canada's Food Guide could offer an effective channel that the government can use to inform people of the benefits of consuming omega-3 products.

Consumers that read the Nutrition Facts table frequently purchased omega-3 products. This supports the notion that people who are concerned about their health tend to read food product labels. In Canada, federal government legislation requires disclosure of the nutritional contents for most prepackaged food products on a standardized label. How consumers interpret and use the information contained on the Nutrition Facts table is important to policy makers. The fact that in our survey 63 % of consumers stated they read the Nutritional Facts table presents a great opportunity for processors of omega-3 products place health claims about omega-3 products on or near the table[5].

Households who purchase food at the grocery store to attain health benefits are more likely to purchase omega-3 eggs, margarine and yogurt. This bodes well for marketers of omega-3 products since the results of our survey suggest that some of the most frequently stated health benefits consumers consider when purchasing a food such as such as reducing the risk of heart disease are consistent with health benefits provided by consuming omega-3 fatty acids[6].

Table 3. Summary of Households that Never and Frequently Purchase Omega-3 Products

	Eggs		Margarine		Milk		Yogurt	
	Never	Frequent	Never	Frequent	Never	Frequent	Never	Frequent
Region:								
MART	-	+	-	+	+		-	
PQ	-	+	-	+	-	+	+	-
ON	-	+	-	+	+			
MBSK	+		+		+		+	
BC	-	+					+	
Income	-	+					-	+
Age:								
<35			+		+		-	
35-44	+		+		+			
45-54	+		+		+		+	
55-64								
Child	+		-		+		-	+
Education	-	+					-	+
Table	-	+	-	+	-	+	-	+
Food Guide							-	+
Health Benefits	-	+	-	+	-		-	+

CONCLUSIONS

The increased awareness of the link between diet and lifestyle related diseases have resulted in consumers seeking increased health benefits from their food choices. Approving health claims is one way that governments have recognized the interconnectedness between food and health. Industry has addressed specific health concerns through product development such as omega-3 enhanced products.

The percentage growth in omega-3 product sales (eggs, milk, yogurt and margarine) exceeded the percentage growth in conventional food product sales. This growth in the omega-3 food category presents opportunities for firms looking to expand their market presence. Thus,

there is a need to better understand what is influencing consumer's decisions to purchase or not purchase omega-3 products. Knowledge of how these choices vary by household is relevant to decision-makers in government and industry who are concerned about food labeling policy, market segmentation, promotion and education.

The results from the ordered probit model show that consumers who are over 65 are more likely to purchase omega-3 products. North America's population is aging; therefore it would be a good marketing strategy to target this particular age group. To put this in perspective in 2001, one Canadian in eight was 65 or over. By 2026, one Canadian in five will have reached age 65 (Health Canada 2002).

We also found that the presence of children in the home increases the purchasing frequency of omega-3 yogurt and omega-3 margarine. Knowledge and use of the Nutrition Facts table and the health benefits associated with a food are important purchase motivators for omega-3 products.

The results of this research suggest that more consumer research on omega-3 fatty acids should be done. Future research could assess consumers' awareness and/or understanding of the different types of omega-3 fatty acids and the associated health benefits. Other research could also assess how the various omega-3 health claims influence their purchase decision and their willingness to substitute between conventional and products with additional health benefits. This type of research would be beneficial to food manufacturers and policy developers alike.

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Appendix A. Comparing Sample Data with 2001 Census Profile of Canada

	Panel Track™ Data (7947 households)	2001 Census Profile Canada
Region		
	%	**%**
Maritimes	12.2	5.9
Quebec	25.5	24.2
Ontario	30.7	39.0
Manitoba/Saskatchewan	11.0	8.0
Alberta	10.3	9.9
BC	10.3	13.0
HOUSEHOLD SIZE		
Single Member	26.6	25.7
Two Members	41.3	32.6
Three Members	12.6	16.3
Four Members	12.9	22.3 (4-5 persons)
Five or More Members	6.6	3.1 (6 or more persons)
HOUSEHOLD INCOME		
Under $20,000	11.3	19.0
$20000-$29999	13.3	11.9
$30000-$39999	13.8	11.5
$40000-$49999	11.7	10.6
$50000-$69999	19.3	17.5
$70000+	30.6	29.5
AGE[7]		
<35	6.0	22.6
35-44	20.6	17.0
45-54	24.8	14.8
55-64	22.9	9.5
≥65	25.7	13.0
CHILDREN		
Children under 18	23.1	48.0
No children under 18	76.9	52.0
LANGUAGE		
Non-French	76.3	75.9
French	23.7	24.1
EDUCATION		
Not completed High School	14.7	25.9
Completed High School	17.4	11.9
Some Technical or College	13.4	8.4
Completed Technical or College	22.2	26.0
Some University	9.8	11.2
Completed University	22.4	18.6

Source. Authors' computation from Homescan™ data, Statistics Canada, 2006

Appendix B. Omega-3 Eggs: Ordered Probit Model Results

	Estimated Marginal effects and Standard Errors							
	Never		Once		Occasionally		Frequently	
Variable	M.E	S.E.	M.E	S.E.	M.E	S.E.	M.E	S.E.
Constant	0	0	0	0	0	0	0	0
MART	-0.051*	0.0036	0.012*	0.0018	0.013	0.0111	0.026*	0.0061
PQ	-0.146*	0.0020	0.033*	0.0031	0.036**	0.0215	0.077*	0.0020
ON	-0.119*	0.0023	0.028*	0.0028	0.03	0.0186	0.061*	0.0017
MBSK	0.041*	0.0052	-0.011*	0.0005	-0.011*	0.0009	-0.019	0.0120
BC	-0.060*	0.0035	0.014*	0.0020	0.015	0.0122	0.030*	0.0056
Income	-0.020*	0.0027	0.005*	0.0007	0.005*	0.0010	0.010*	0.0029
Age								
<35	0.012	0.0046	-0.003	0.0009	-0.003	0.0040	-0.006	0.0101
35-44	0.035*	0.0051	-0.009*	0.0006	-0.009*	0.0015	-0.017	0.0118
45-54	0.042*	0.0053	-0.011*	0.0005	-0.011*	0.0008	-0.02	0.0124
55-64	0.013	0.0047	-0.003	0.0009	-0.003	0.0040	-0.006	0.0102
≥65	0.030*	0.0050	-0.008*	0.0007	-0.008*	0.0021	-0.014	0.0114
Education	-0.009*	0.0026	0.002*	0.0007	0.002*	0.0007	0.004*	0.0018
Table	-0.076*	0.0025	0.020*	0.0022	0.02	0.0135	0.036*	0.0026
Food Guide	0.002	0.0045	-0.0004	0.0011	-0.001	0.0052	-0.001	0.0095
Health Benefits	-0.008*	0.0015	0.002*	0.0004	0.002*	0.0005	0.004*	0.0013

LL Function Restricted = – 5596.3
LL Function Unrestricted = –5391.3
McFadden's R^2 = 4%
Threshold parameters for index
μ_1 = 0.278*
μ_2 = 0.599*
*Denotes significance at the 5% level; ** denotes significance at the 10% level

Appendix C. Omega-3 Margarine: Ordered Probit Model Results

Estimated Marginal effects and standard errors

	Never		Once		Occasionally		Frequently	
Variable	M.E	S.E.	M.E	S.E.	M.E	S.E.	M.E	S.E.
Constant	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MART	-0.094*	0.000	0.035*	0.003	0.024	0.017	0.035*	0.003
PQ	-0.061*	0.001	0.024*	0.002	0.016	0.012	0.021*	0.001
ON	-0.030*	0.002	0.012*	0.002	0.008	0.007	0.010*	0.002
MBSK	0.023*	0.004	-0.010*	0.001	-0.006*	0.001	-0.007	0.006
BC	0.015	0.004	-0.007	0.001	-0.004	0.002	-0.005	0.005
Income	-0.002	0.002	0.001	0.001	0.001	0.000	0.001	0.001
Age								
<35	0.026*	0.004	-0.011*	0.001	-0.007*	0.000	-0.008	0.006
35-44	0.024*	0.004	-0.010*	0.001	-0.006*	0.001	-0.007	0.006
45-54	0.015*	0.004	-0.006*	0.001	-0.004*	0.002	-0.005	0.006
55-64	0.004	0.003	-0.002	0.001	-0.001	0.003	-0.001	0.005
Child	-0.015*	0.002	0.006*	0.002	0.004	0.006	0.005	0.003
Education	0.0002	0.002	-0.0001	0.001	0.000	0.000	0.000	0.001
Table	-0.028*	0.002	0.012*	0.002	0.007	0.007	0.009*	0.001
Food Guide	-0.008	0.003	0.003	0.001	0.002	0.005	0.003	0.003
Health Benefits	-0.004*	0.001	0.002*	0.000	0.001*	0.000	0.001**	0.001

LL Function Restricted = – 2927.4
LL Function Unrestricted = –2836.4
McFadden's R^2= 3%
Threshold parameters for index
$\mu_1 = 0.331$*
$\mu_2 = 0.635$*
*Denotes significance at the 5% level; ** denotes significance at the 10% level

Appendix D. Omega-3 Milk: The Ordered Probit Model Results

Estimated Marginal effects and standard errors								
	Never		Once		Occasionally		Frequently	
Variable	M.E	S.E.	M.E	S.E.	M.E	S.E.	M.E	S.E.
Constant	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MART	0.028*	0.004	-0.012*	0.0001	-0.011*	0.001	-0.004	0.003
PQ	-0.074*	0.002	0.027*	0.003	0.031*	0.011	0.015*	0.004
ON	0.014*	0.003	-0.006*	0.000	-0.006*	0.003	-0.002	0.002
MBSK	0.012*	0.003	-0.005*	0.0004	-0.005**	0.003	-0.002	0.002
BC	0.004	0.002	-0.002*	0.001	-0.002	0.003	-0.001	0.002
Income	-0.002	0.001	0.001	0.000	0.001	0.001	0.000	0.000
Age								
<35	0.007*	0.003	-0.003*	0.001	-0.003	0.003	-0.001	0.002
35-44	0.015*	0.003	-0.006*	0.000	-0.006*	0.002	-0.002	0.002
45-54	0.005*	0.003	-0.002*	0.001	-0.002	0.003	-0.001	0.002
55-64	0.003	0.002	-0.001	0.001	-0.001	0.003	-0.001	0.002
Child	0.007*	0.003	-0.003*	0.001	-0.003	0.003	-0.001	0.002
Education	-0.0002	0.001	0.0001	0.000	0.00008	0.000	0.00003	0.000
Table	-0.012*	0.001	0.005*	0.001	0.005	0.004	0.002*	0.000
Food Guide	-0.0002	0.002	0.0001	0.001	0.0001	0.004	0.0000	0.001
Health Benefits	-0.002*	0.001	0.001*	0.000	0.001*	0.000	0.000	0.000
LL Function Restricted = – 1891.3								
LL Function Unrestricted = –1704.5								
McFadden's R^2= 11%								
Threshold parameters for index								
μ_1 = 0.265*								
μ_2 = 0.790*								
*Denotes significance at the 5% level; ** denotes significance at the 10% level								

Appendix E. Omega-3 Yogurt: Ordered Probit Model Results

Estimated Marginal effects and standard errors								
	Never		Once		Occasionally		Frequently	
Variable	M.E	S.E.	M.E	S.E.	M.E	S.E.	M.E	S.E.
Constant	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MART	-0.009*	0.003	0.005*	0.002	0.003	0.005	0.001	0.002
PQ	0.075*	0.006	-0.042*	0.001	-0.023*	0.001	-0.010*	0.005
ON	-0.003	0.003	0.002	0.002	0.001	0.005	0.000	0.002
MBSK	0.018*	0.004	-0.010*	0.002	-0.006	0.004	-0.003	0.003
BC	0.011*	0.004	-0.006*	0.002	-0.004	0.004	-0.002	0.002
Income	-0.008*	0.002	0.005*	0.001	0.003*	0.001	0.001**	0.001
Age								
<35	-0.005**	0.003	0.003	0.002	0.002	0.005	0.001	0.002
35-44	0.004	0.004	-0.002	0.002	-0.001	0.004	-0.001	0.002
45-54	0.012*	0.004	-0.006*	0.002	-0.004	0.004	-0.002	0.002
55-64	0.004	0.004	-0.002	0.002	-0.001	0.004	-0.001	0.002
Child	-0.021*	0.003	0.011*	0.002	0.007	0.006	0.003*	0.001
Education	-0.006*	0.002	0.003*	0.001	0.002*	0.001	0.001**	0.001
Table	-0.018*	0.003	0.010*	0.002	0.006	0.005	0.003*	0.001
Food Guide	-0.025*	0.002	0.014*	0.002	0.008	0.006	0.004*	0.001
Health Benefits	-0.005*	0.001	0.003*	0.001	0.002*	0.000	0.001**	0.000

LL Function Restricted = – 3426.5
LL Function Unrestricted = –3289.2
McFadden's R^2= 4%
Threshold parameters for index
μ_1 = 0.491*
μ_2 = 1.039*
*Denotes significance at the 5% level; ** denotes significance at the 10% level

Endnotes

[1] With regards to Homescan™ data, the analyst knows only if the household bought an omega-3 product but does not know how many conventional products or substitutes to the respective omega-3 the household bought. This limitation has implications on how the dependant variable was created when sub-dividing the number of trips into the 4 categories.
[2] Researchers at Alberta Agriculture and Rural Development designed the survey.
[3] This is the reason why the percentages in Figure 3 do not add up to 100.
[4] Information on the once and occasionally options are also shown in Appendix B-E.
[5] Putting health claims on products has to be done in accordance with federal regulation.
[6] A summary of health benefits provided by consuming omega-3 fatty acids can be found at http://www.ific.org/publications/factsheets/omega3fs.cfm
[7] For the census data, the age group under 18 was not considered when computing the under 35-age group. That is why this category might not add to 100.