Consumers' Willingness to Pay For Milk and Ice Cream Products Containing the 100% Canadian Milk Symbol

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Abstract

As part of the supply management system, regulations stipulate that all non-chocolate milk and cream sold in Canada must be sourced from Canadian producers, while cheese, yogurt, and ice cream can be made using milk and milk components from other countries. Recently, the Canadian Dairy Commission initiated a program enabling food processors to label products that contain only milk and milk ingredients produced in Canada with a 100% Canadian Milk label. This study uses a Canada-wide survey of dairy consumers to elicit their willingness-to-pay for milk and ice cream that carries the 100% Canadian Milk label. Our results show that Canadian consumers are willing to pay about $1.00 per litre more for milk and ice cream products that carry the 100% Canadian Milk label. However, when we account for industry knowledge, our results show that consumers wish to pay less for dairy products with the 100% Canadian Milk label. Our results further show that the 100% Canadian Milk label increases willingness-to-pay for store brands compared to national brands. Implications for the use of the 100% Canadian Milk label are given.

Introduction

Canadian consumers are becoming increasingly concerned about the origin and production methods used to process foods, including dairy products (Alberta Agriculture and Rural Development, 2011; Agriculture and Agri-Food Canada, 2009; Kuperis, Veeman, & Adamowicz, 1999). Given consumer interest in origin information, marketing strategies are now frequently geared towards highlighting information on the origin and processing methods of food products. For example, in 2009 the Dairy Farmers of Canada (DFC) launched a national branding programme focusing on the 100% Canadian milk symbol. (Dairy Farmers of Ontario, 2009). The primary aim of this initiative was to inform consumers that products displaying the symbol contained Canadian milk that is of "*high-quality, fresh, safe and containing no antibiotic residues and hormones*" (Dairy Goodness.ca). The branding initiative however implicitly serves to evoke a certain level of nationalism in consumers. The symbol suggests by that purchasing dairy products with the 100% Canadian milk symbol would be akin to buying Canadian products and would support the Canadian economy. Although not a brand in the usual sense of the word, Dairy Farmers of Canada (DFC) markets the symbol as a brand[1] used to identify dairy products made from 100% Canadian milk. The 100% Canadian milk branding initiative provides a marketing approach for Canadian produced milk and dairy products based on the explicit representation of country of origin information.

The *100% Canadian milk* symbol appears on several dairy products throughout Canada including: milk, cheese, ice cream and yogurt. Interestingly, not all products made from 100% Canadian milk display the symbol. In light of this, information on whether consumers are willing to pay more for products (particularly milk and ice cream) with the symbol would be of interest to industry stakeholders.

This paper uses a consumer survey to ascertain Canadian consumers' preferences and attitudes toward products with the *100% Canadian milk* symbol (depicted in Figure 1.1) and by extension, examines consumers' WTP for products displaying the symbol. Specifically, this paper estimates discrete choice models in order to determine if consumers are willing to pay more for milk and ice cream with the symbol, and the degree of their WTP.

Figure 1.1: The 100% Canadian Milk Symbol

Consumer Preference and Willingness to pay

The impact on product attributes on preferences has long been established. Lancaster (1966) notes that consumers derive utility from product attributes as opposed to directly from the product itself. Therefore consumers will likely decide to purchase milk, for example, because of

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[1] Dairy Farmers of Ontario, 2009

the attributes embodied in milk such as: freshness, texture, taste, price, and brand. Given the relationship between utility and product attributes, a method that economists use to measure a consumer's demand or preference is WTP.

Since Lancaster's work, several authors have evaluated the impact of various product characteristics on WTP. For example, Hobbs, Bailey, Dickinson and Haghiri (2005) evaluate WTP for credence attributes of beef and pork. In their study, an experimental auction is employed to evaluate Canadian consumers WTP for assurances related to food safety, traceability, and production methods in beef and pork markets. The results indicated that consumers were inclined to pay more for traceability and food safety combined as opposed to traceability alone, neither of which is verifiable at point of purchase in the absence of credible labelling. In addition, Peng, West and Wang (2006) also employed a stated preference experiment in the form of a survey to assess consumers' purchase intentions and attitudes towards conjugated linoleic acid (CLA) enhanced milk products.

Researchers have also examined the impact of WTP for origin information labelling. For example, Lantz and Leob (1996) employ conjoint analysis to assess the value consumers from Canada and the U.S. place on domestic products as opposed to products from another country. Unterschultz, Quaragrainie, Veeman and Kim (1998) examine the importance of the Country of Origin (COO) of beef products on buyers in the Korean hotel industry (specifically executive chefs and purchasing managers). Loureiro and Umberger (2005) assessed consumers' WTP for mandatory COO labelling of beef, chicken and pork chops displaying the label "certified U.S.", while also examining the role of socio-demographics in determining WTP for these products. Another study by Volinskiy, Adamowicz, Veeman and Srivastava (2007) utilize an incentive based compatible Becker-Degroot-Marschak auction to estimate WTP for Canola oil with either Canadian, U.S. or no origin information that was also explicitly labelled as either non-GM, GM or without GM information.

These studies represent a very small proportion of the studies that have looked at WTP in general and in particular WTP for origin information as COO information appears to be a very important attribute influencing consumers' choices. This study contributes to this growing literature by examining how the 100% Canadian milk symbol influences preferences for milk and ice cream.

Methodology

We employ a stated preference approach to gather data from a sample of Canadian consumers of dairy products. Specifically, we use a discrete choice experiment to elicit WTP values. Two internet surveys were administered to respondents in both English and French. One version assessed preferences milk with the 100% Canadian milk symbol, while the other looked at preferences for ice cream. The information obtained from the discrete choice experiment is used in estimating Multinomial Logit (MNL) and Random Parameter Logit (RPL) models.

The discrete choice experiment comprised of four attributes with attribute levels 2,2,2,4. Each choice set is comprised of three profiles accompanied by a no-choice option; therefore, each choice set is effectively comprised of four alternatives. The attributes and their levels were allowed to vary between alternatives except the alternative specific constant (ASC), which was specific to the fourth alternative and remained constant. The fourth alternative represented the

"opt out" option included in the survey as "*I would not choose any*" which gave respondents the opportunity not to select any of the available combination of attribute levels (profiles).

Table 1.1: Description of Attributes and Attribute Levels

Attributes	Explanation
	The symbol is a seal of origin that guarantees the dairy products you are buying are made entirely from 100% Canadian milk or milk ingredients.
Type: Organic, Conventional	Milk labelled organic suggests that cows used to produce this milk have not been treated with hormones and that the milk contains no antibiotics. No such claims/suggestions are made with regards to conventional milk
Brand: National, Store	A National brand such as Chapman's and Breyers can be found throughout the country in all stores while store brands are only found in the affiliated store. For example, Safeway brands (only found in Safeway and affiliated stores) and President Choice brands only found in Canadian Super Store and affiliated stores.
Price ($) **Milk:** 2.83, 3.40, 4.60 and 5.52 **Ice Cream:** 4.56, 5.50, 6.40 and 7.50	National average price range for a 2-litre carton of milk (conventional and organic) or 2-litres of ice cream.

Table 1.2: An Example of a Milk Choice Set

	Option A	Option B	Option C	
Labelled:				**I would not purchase any**
Type	ORGANIC	CONVENTIONAL	CONVENTIONAL	
Brand	STORE	NATIONAL	NATIONAL	
Price ($)	4.60	5.52	2.83	
I would choose…	☐	☑	☐	☐

With insights from So and Kuhfeld (1995) and Kuhfeld (2002), Statistical Analysis System (SAS) was used to develop the choice experiment. Thirty two choice sets were administered to respondents in blocks of four. Therefore, each respondent received 8 choice sets.

The choice questions were preceded by the behavioural choice scenario: "imagine that you are shopping for milk (ice cream) the alternatives below are the only ones available, select the one

that you would choose". Respondents were allowed to choose only one of the existing alternatives and only then they could move on to another choice context that entailed similar alternatives. Respondents were unable to view or change a choice that was previously selected. Respondents were however allowed to choose the no-choice alternative if they were dissatisfied with the available options. In order to mitigate hypothetical bias, responded were briefed with a cheap talk script.

Empirical Model and Estimation Procedure

Louviere, Hensher and Swait (2000) assert that there can be no valid measurement without theory; with that in mind it is important to explain the theoretical foundation used to measure preferences. Discrete choice modelling is based on Random Utility Theory (RUT). RUT explains the basis on which consumer choice is made and why one alternative would be chosen over another. To account for both observed and unobserved factors affecting individuals' choices, a random utility model is comprised of two components, namely a systematic component (V_n) and a random error component (ε_n), where the systematic component is observable by the analyst (comprised of product attributes and socio-demographic characteristics in choice modelling) and the random component is unobserved (preferences, perceptions and taste).

In a choice modelling context where individuals choose between different alternatives, the model representing the choice of alternative i being chosen from a set of j alternatives can, according to Hensher, Rose and Green (2005), be represented as:

$$P_{ni} = Prob\ (U_{ni} > U_{nj}) = Prob\ (V_{ni} + \varepsilon_{ni}) > Prob\ (V_{nj} + \varepsilon_{nj}) \quad \ldots\ldots\ldots\ldots\ldots\ldots(1)$$

The probability that an individual n chooses alternative i can be represented by the MNL model:

$$P_i = \frac{e^{V_i(\beta)}}{\sum_j e^{v_j(\beta)}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(2)$$

The MNL model is regarded as highly restrictive mainly because of its assumption of independence from irrelevant alternatives (IIA) and homogeneity in consumer preferences. The Random parameter logit model is seen as less restrictive and relaxes the IIA assumption.

$$U_{ni} = (\beta + \theta_n)x_{ni} + \varepsilon_{ni}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

In equation (3) β represents the mean, and θ_n represents the random term capturing the unobservable individual effects. Based on the RPL model the probability of individual n choosing alternative i can be represented as:

$$P_{ni} = \frac{e^{\beta_n x_{ni}}}{\sum_j e^{\beta_n x_{nj}}}$$

Assuming that $\beta + \theta_n = \beta_n$, if θ_n is zero, this would imply that β_n is fully known and the model would collapse into the general logit model depicted in equation (2). However, since β_n is

unknown to the analyst, the RPL (conditional choice probability) is therefore the integral of the standard logit over all possible variables of β_n (Train, 2009). This can be expressed as:

$$P_{ni} = \int L_{ni}(\beta)\, f(\beta)\, d\beta$$

Where: $L_{ni}(\beta) = \dfrac{e^{V_{ni}(\beta)}}{\sum_{j=1}^{J} e^{V_{nj}(\beta)}}$

$f(\beta)$ is a density function and called a mixing distribution- it can be either discrete or continuous.

Similarly to the standard logit $V_{ni}(\beta)$ represents the systematic component of utility. Assuming linearity in parameters $V_{ni}(\beta) = \beta' x_{ni}$ which results in the mixed logit being represented as:

$$P_{ni} = \int \left(\frac{e^{\beta' x_{ni}}}{\sum_{j=1}^{1} e^{\beta' x_{nj}}} \right) f(\beta) d\beta$$

In this paper both the MNL logit and the RPL model are estimated. Estimating both models allows for cross comparisons and evaluation of how the results obtained from employing a simple model compare with those of a more advanced model. The coefficients from the MNL and the RPL models are used to quantify preferences through WTP estimates. WTP can be represented by either:

$$WTP = \left. {-\beta_x} \middle/ {\beta_p} \right. \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots..(4) \text{ or}$$

$$WTP = \left. {-\beta_x + \beta_D * D} \middle/ {\beta_p} \right. \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(5)$$

Where β_x and β_p represent the attribute and price coefficient respectively, D represents a vector of demographic variables (for instance) being interacted with product attributes and β_D is the vector of coefficients resulting from the interactions. Equation (4) is used to estimate WTP for a variable without while equation (5) is used when the variable has interactions.

Sample Data

Prior to administering the surveys, pre-testing was done using Saskatchewan residents. The actual surveys, administered in March 2012, targeted a representative population percentage from each province (Table 1.3). A total of 510 respondents completed the milk survey while a total of 502 respondents completed the ice cream survey (Table 1.4 depicts the demographics of the sample). Both data sets were cleaned for "straight liners" (respondents who selected the same answer for all 8 choice questions) and other responses which were cognitively inconsistent. Thereafter, there were 455 useable responses for the milk survey and 453 useable responses from the ice cream survey. The survey respondents were granted the option of answering an English or French version of the surveys. In general, there was a balance in the number of male and female respondents. Respondents with at least some university education accounted for over 30 percent of the sample in both surveys.

Table 1.3: Percentage Population Represented by Province

Province	Population (%)	Ice Cream Sample (# of Completes)	Ice Cream Sample (% of Completes)	Milk Sample (# of Completes)	Milk Sample (% of Completes)
British Columbia	13.14%	71	15.67%	57	12.53%
Alberta	10.89%	49	10.82%	51	11.21%
Saskatchewan	3.09%	14	3.09%	11	2.42%
Manitoba	3.61%	17	3.75%	16	3.52%
Ontario	38.39%	180	39.74%	188	41.32%
Quebec	23.61%	88	19.43%	100	21.98%
Atlantic (NF,PEI, NS, NB)	6.95%	34	7.51%	32	7.03%
Territories/Yukon/Nun	0.32%	0	0.00%	0	0.00

Source: Created by author using 2011 census data (Statistics Canada, 2012) and total survey respondents.

Table 1.4: Comparative Demographic Characteristics

Comparative Demographic Characteristics			
	Milk Sample	Ice Cream Sample	Canadian Population
Gender			
Male	47.91%	43.93%	49.17%
Female	52.09%	56.07%	50.83%
Education			
Less than high School	25.71%	27.59%	
Completed High School			49.3%
Some Technical College	34.95%	32.89%	
Completed Technical College			28.1%
Some University	32.75%	31.35%	
Bachelors			16.6%
Graduate Degree	6.59%	8.17%	6.0%

With respect to purchasing habits, almost 25 percent of milk respondents indicate that they purchase 4-litre containers of milk more than four times per month while 19 percent of ice cream respondents purchase 1-litre containers of ice cream once and twice per three month period. In addition, most of the respondents in both survey groups claimed to be aware of the 100% Canadian milk symbol (See Figure 1.2 and 1.3). It also appears that there is a general belief among Canadian consumers that the presence of the 100% Canadian milk symbol on milk and ice cream acts as a quality cue (See Figure 1.4 and Figure 1.5).
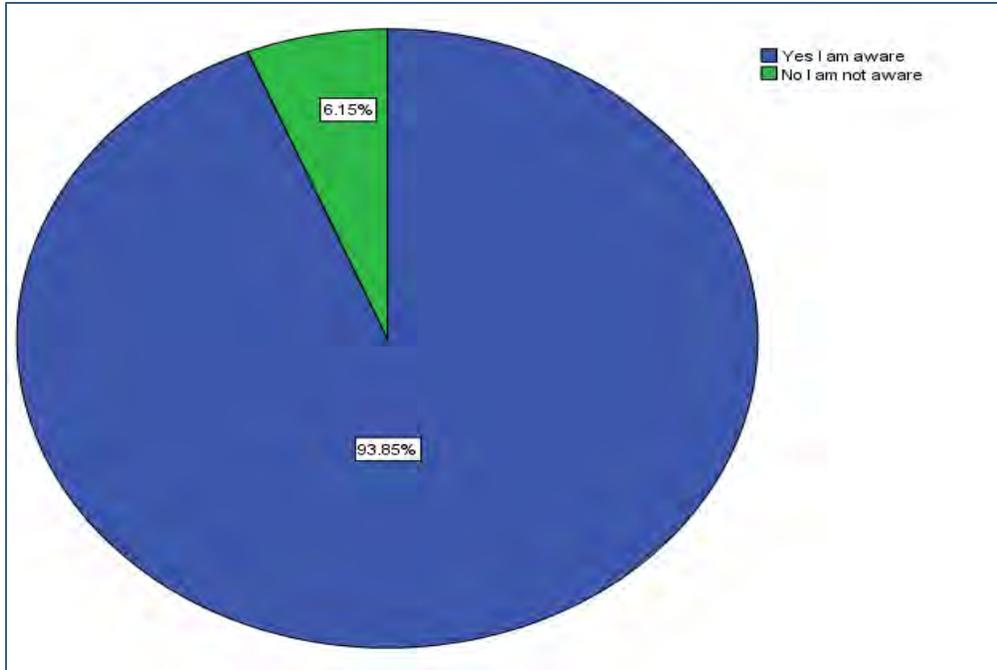
Figure 1.2: Brand Awareness- Milk Respondents
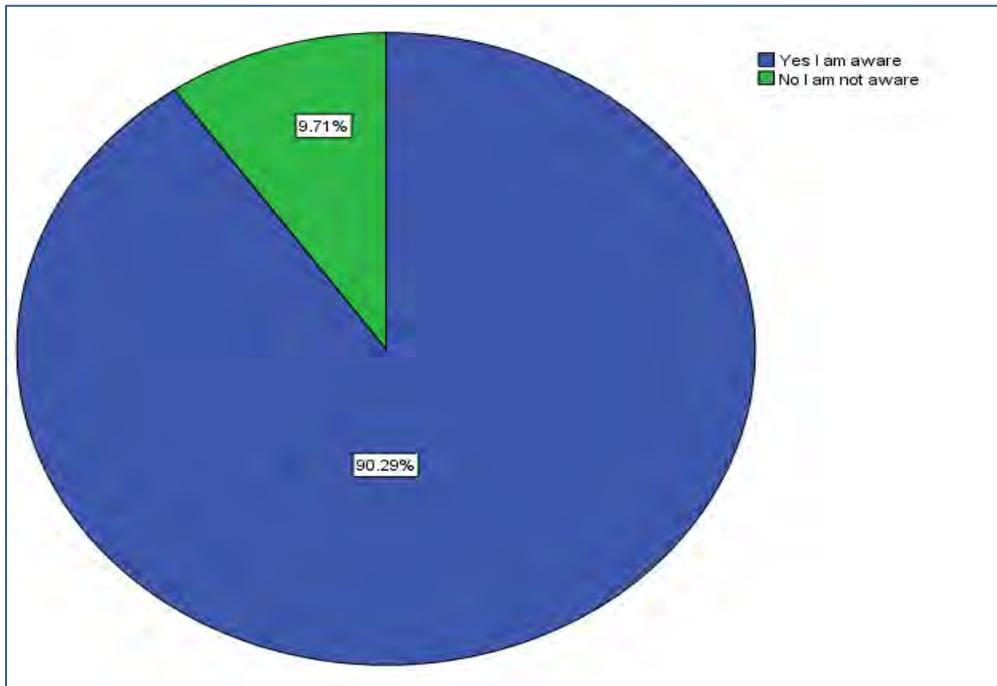Source: Created by author using survey data[2]. Number of respondents = 455

Figure 1.3: Brand Awareness- Ice Cream Respondents
Source: Created by author using survey data[3]. Number of respondents = 453

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[2] Survey Question: **"*Are you aware of the 100% Canadian milk Brand*"**
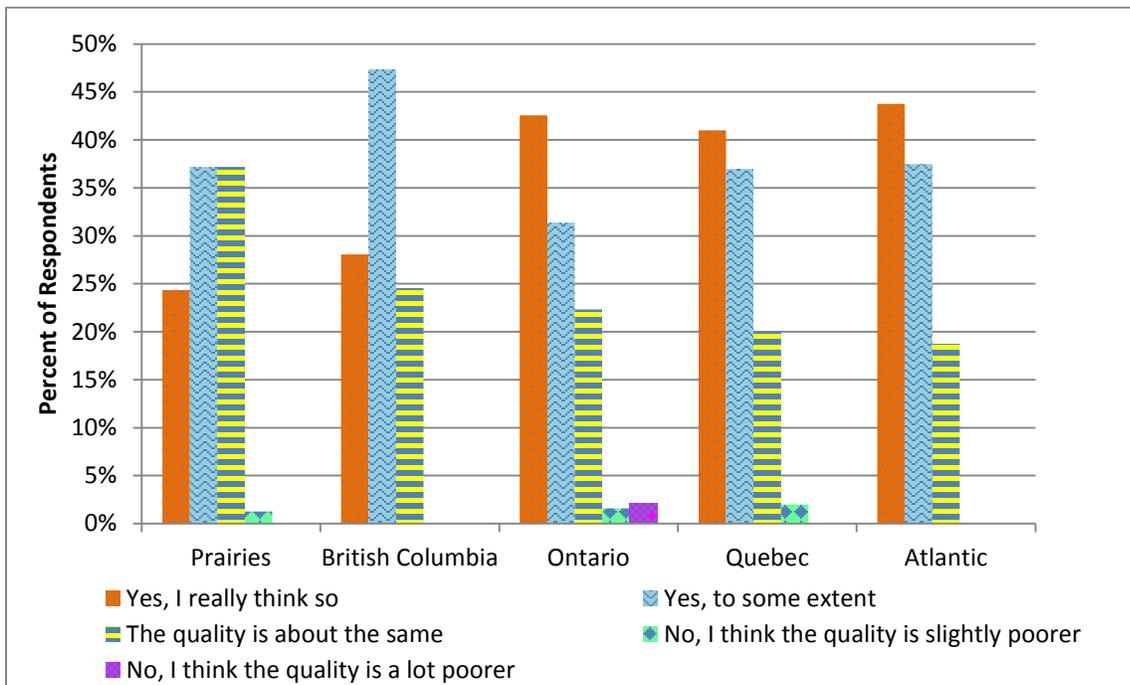[3] Survey Question: **"*Are you aware of the 100% Canadian milk Brand*"**

Figure 1.4:100% Canadian Milk Symbol as an Indication of Higher Quality- Milk Respondents by region

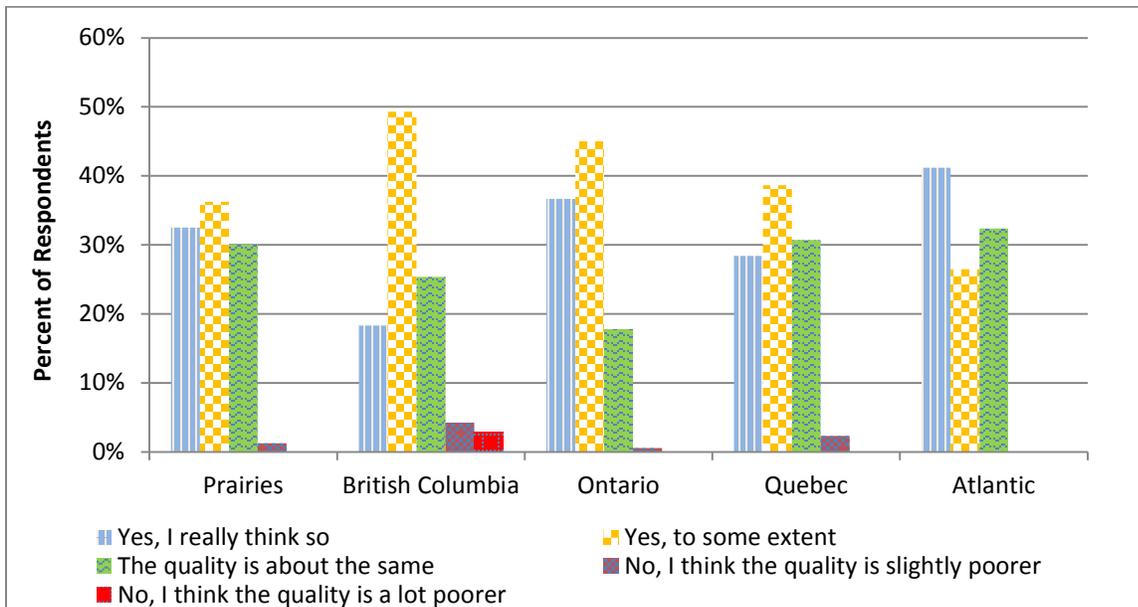Source: Created by author using survey data[4]. Number of respondents = 455.

Figure 1.5: The 100% Canadian Milk Symbol as an Indication of Higher Quality by location- Ice cream Respondents

Source: Created by author using survey data[5]. Number of respondents = 453

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[4] *On a scale of 1 to 5, please rate your agreement with the following statements "In comparison to milk products **without** the 100% Canadian milk logo, I consider **milk with the 100% Canadian milk logo to be**: Of higher quality*

When respondents were asked to select from a list of 8 factors, the most important one that influence their choice of milk, most respondents choose expiry date. The second most popular factor was price, followed by taste. Taste was the number one factor in the case of ice cream, price was the second most frequently chosen factor followed by fat content.

Respondents were also asked "industry knowledge" questions. Rationally, it would be expected that if respondents were aware that all milk is 100% Canadian, then their willingness to pay for this attribute would not be affected by issues regarding safety and risk perceptions towards imported ingredients but would be more likely driven by other extrinsic factors. On the other hand, respondents to the ice cream survey would be expected to behave differently if they are more informed about the dairy sector, since ice cream can be made from imported modified milk ingredients. Therefore, as a means of evaluating how knowledge affects respondents' choices, respondents were given industry knowledge questions *after* completing the choice experiment section; these questions were slightly different in each survey in order to capture knowledge specific to each product. The key industry knowledge question in the milk survey was a true or false question: "***With the exception of chocolate milk, all milk sold in Canada must be produced in Canada, so even if it does not display the 100% Canadian milk symbol, it is Canadian***" respondents who answered this question incorrectly (by selecting false) were automatically given the follow-up question: ***"If the previous statement ("With the exception of chocolate milk, all milk sold in Canada must be produced in Canada, so even if it does not display the 100% Canadian milk symbol, it is Canadian") were true, would this affect any of your choices.....*"**. The result for these two questions can be seen in Figure 1.6. The results from the ice cream survey industry knowledge question: ***Ice cream can contain milk ingredients or modified milk ingredients imported from other countries such as the United States, Europe, Australia or New Zealand*** can be seen in Figure 1.7

The milk survey respondents were not very knowledgeable of the Canadian dairy industry as almost 50% of respondents answered the industry knowledge question incorrectly. On the other hand, respondents to the ice cream survey appeared more knowledgeable as 71% answered the question correctly (see Figure 1.6 and 1.7). Of the number of respondents who provided an incorrect response to the industry knowledge question in the milk survey, 43% acknowledged that their choices in the discrete choice section would change if their answer to the knowledge question was incorrect. The implication of this is that slightly less than 25% of respondents to the milk survey might have responded differently had they known that milk is Canadian.

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[5] *On a scale of 1 to 5, please rate your agreement with the following statements "In comparison to milk products **without** the 100% Canadian milk logo, I consider **ice cream with the 100% Canadian milk logo to be***: Of higher quality*
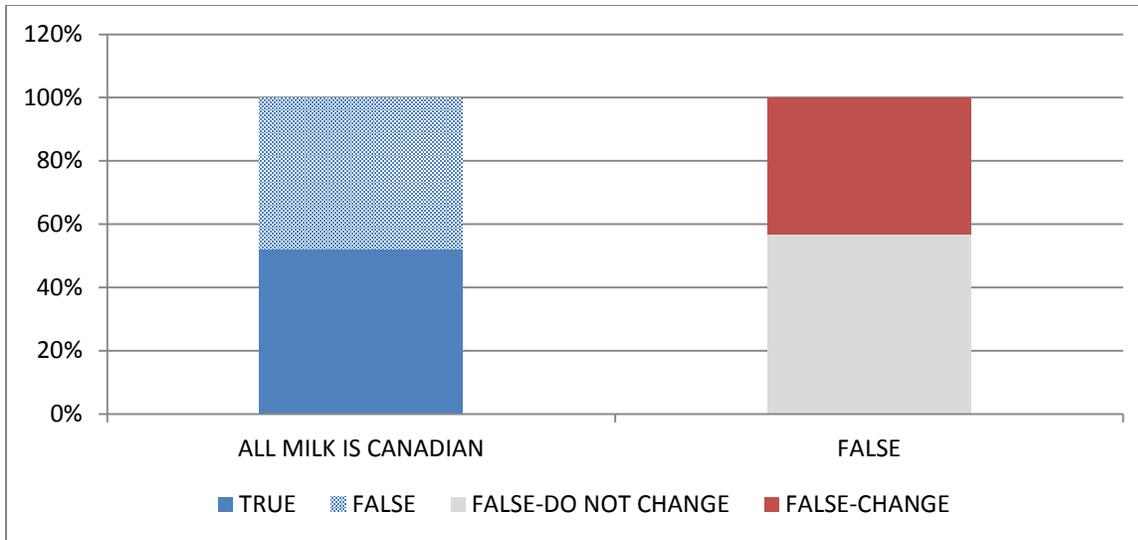
Figure 1.6: Industry Knowledge- Milk Respondents

Source: Created by author using survey data. Number of respondents = 455.
Combined responses based on the following two questions: "With the exception of chocolate milk, all milk sold in Canada must be produced in Canada, so even if it does not display the 100% Canadian milk symbol, it is Canadian" and "If the previous statement were true, would this affect any of your choices"
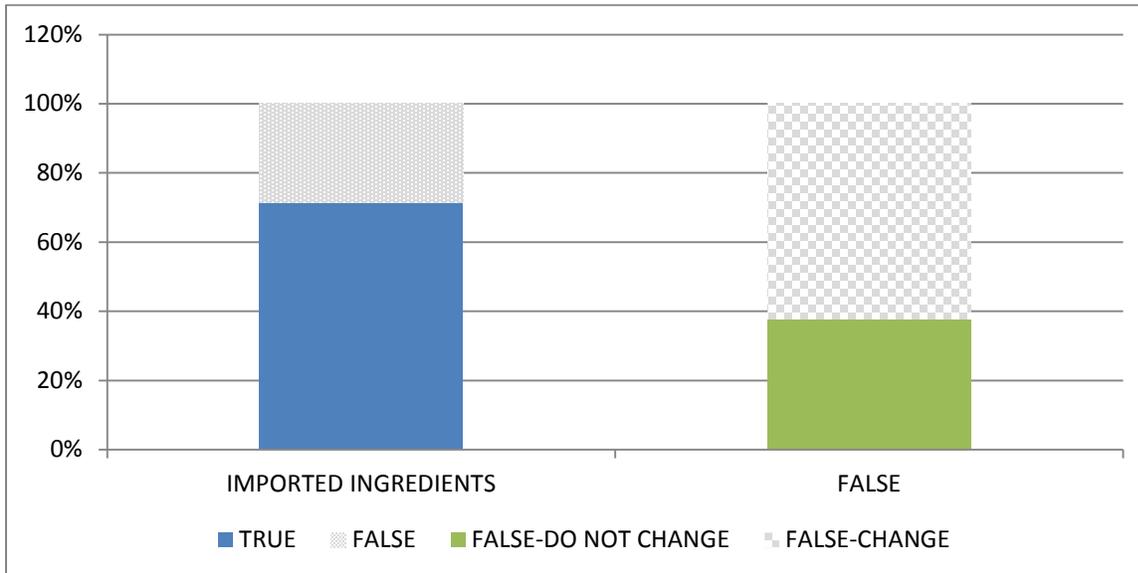

Figure 1.7: Industry Knowledge- Ice Cream Respondents

Source: Created by author using survey data. Number of respondents = 453.
Combined responses based on the following two questions: "With the exception for chocolate milk, all milk sold in Canada must be produced in Canada, so even if it does not display the 100% Canadian milk symbol, it is Canadian?" and "If the previous statement were true, would this affect any of your choices"

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The attributes used in the choice experiment (type: organic or conventional, brand: store or national and 100% Canadian: present or absent) were effects coded, price however remained continuous. Effects coding was used in contrast to dummy coding because as authors such as Hensher et al. (2005) and Bech and Gyrd-Hansen (2005) posit that there is an inherent problem with dummy coding attribute levels. Given that the effect of the base level cannot be separated from that of the regression constant, such coding potentially results in perfect confoundment with the grand mean of the regression. Covariates such as gender, income, education and language were however dummy coded. As shown below, Table 1.5 provides descriptions of the variables used in the estimation process and explains how each variable was coded for use in the estimations.

Table 1.5: Variable Name and Code

Attribute	Code Name	Description
100% Canadian	Cand	1 if product is labelled 100% Canadian milk, -1 otherwise
Organic	Org	1 if product is organic , -1 otherwise
National brand	Nat	1 if product is a national brand, -1 otherwise
Price	Price	Continuous
Alternative Specific Constant	ASC1	1 if alternative 4 (no choice alternative) is chosen, 0 otherwise

Empirical Results

In interpreting the results from the discrete choice models a positive coefficient would suggest that a respondent's utility increases when that attribute (level) is present, while a negative coefficient indicates decreased utility from selecting a choice with that attribute level. The impact an attribute has on utility influences the probability that milk or ice cream with the attribute of interest will be selected. The main effects MNL and the RPL models are estimated using both the milk and ice cream data. The following section commences with the milk results and thereafter ice cream results are discussed.

Milk Results

Table 1.6 shows that the estimates for the main effects MNL model indicate that the Canadian milk attribute (Cand) is positive and significant. The positive coefficient is an indication that, in general, respondents derive positive utility from choosing milk alternatives with the 100% Canadian milk attribute. As a result respondents are willing to pay an additional $1.05 for a 2-litre carton of milk with the 100% Canadian milk symbol.

The second attribute representing organic milk (Org) is negative and significant, indicating that respondents on average derive negative utility from choosing an organic milk alternative. In addition, it can also be observed that respondents discount milk labelled as organic by 32 cents as opposed to conventional milk. This finding is surprising since in reality a market does exist for organic milk, albeit a fairly small one. However, it should be noted that the MNL takes into consideration preferences on average and does not account for heterogeneity in preferences. Therefore the estimated willingness to pay can be more precisely interpreted as WTP on average which does not mean this attribute is not valued by some respondents. The national brand milk

coefficient is positive and significant. The sign of the coefficient indicates that respondents receive higher utility from choosing milk with the national brand attribute relative to the store brand attribute. This result is not surprising as national brand products are usually priced higher than store brand products.

The estimated regression produces a negative price coefficient, which indicates lower utility from higher milk prices. The sign of the coefficient is consistent with *a priori* expectations as we generally expect consumers to prefer lower prices. In addition, the negative sign of the alternative specific constant (ASC1) shows that respondents on average prefer one of the three milk alternatives (A, B, or C rather than the no purchase option (alternative D).

Table 1.6: Milk- MNL Main Effects

Variable	Coefficient	T-ratio	WTP	T-ratio
Cand	.643***	28.612	1.047***	21.643
Org	-.197***	-9.746	-.32***	-9.069
Nat	.09***	3.571	.146***	3.596
Price	-.615***	-24.926	-	-
ASC1	-4.1***	-33.898	-	-
Pseudo R^2		0.185		
Log likelihood Function		-3711.74		
***,** and * represent significance at the 1%, 5% and 10%				

The RPL approach to estimating consumers' choices provide an opportunity to account for heterogeneity in consumers' preferences. Specifically, differences in individuals' preferences for various attributes can be taken into consideration. Estimating RPL models is expected to provide better model fits and higher pseudo R^2 values. A RPL was first estimated with main effects only. In this model, price and the alternative specific constant were estimated as fixed parameters while the other main effects attributes (*100% Canadian milk,* organic, national brand) were estimated as random parameters.

From observing Table 1.7, it can be noted that the results from the RPL model are consistent with those from the MNL model - the signs of the parameters remain the same and are also highly significant. However, the WTP estimate for the *100% Canadian milk* attribute was marginally greater at $1.10 in comparison to the main effects MNL estimate at $1.05, while the WTP values for organic labelled and national brand milk were also approximately the same at -34 cents and 10 cents respectively.

The fixed coefficients in the model, namely price and the no-purchase option represent non-random or average utility values which suggest that respondents' preferences for these attributes are homogeneous and can be ascertained from the mean preferences for these attributes. This conclusion was drawn from observing that allowing these variables to be random resulted in insignificant standard deviations. An insignificant standard deviation suggests that there is no significant dispersion around the mean as it relates to preferences. The significance of the standard deviation of the random parameters indicate sources of heterogeneity in respondent's

choices of milk with the *100% Canadian milk* symbol, milk labelled as organic or national brand.

Table 1.7: Milk- RPL Main Effects

Variable	Coefficient	T-Ratio	WTP	T-Ratio
Random Parameters in Utility Function				
Cand	.882***	16.051	1.098***	21.266
Org	-.273***	-8.751	-.34***	-9.107
Nat	.084**	2.35	.104**	2.323
Non-random Parameters in Utility Function				
Price	-.803***	-16.724	-	-
ASC1	-4.756***	-24.262	-	-
Derived Standard Deviations of Parameter Distributions				
NsCand	.597***	4.411	-	-
NsOrg	.604***	5.078	-	-
NsNat	.832***	8.079	-	-
Pseudo R^2	0.270			
Log likelihood Function	-3683.9			
***,** and * represent significance at the 1%, 5% and 10% level respectively				

Ice Cream Results

Estimating the MNL using the ice cream data reveals that ice cream respondents also prefer ice cream with the 100% Canadian milk symbol. It can be observed from the first coefficient in Table 1.8 that respondents were willing to pay a premium of 75 cents for ice cream with the *100% Canadian milk* symbol. The second coefficient represents ice cream labelled organic, this coefficient is negative and significant which indicates that respondents derive negative utility from organic ice cream relative to conventional ice cream and discount a 2-litre carton of organic ice cream by 23 cents. Positive utility of the same magnitude was however derived from choosing ice cream of a national brand origin. The model also reflects a negative and significant coefficient for price, which indicates that respondents derive disutility from choosing ice cream with higher prices. The ASC1 coefficient is also negative and significant reflecting the disutility derived from not purchasing ice cream as opposed to purchasing ice cream.

Table 1.8: Ice Cream- MNL Main Effects

Variable	Coefficient	T-ratio	WTP	T-ratio
Cand	.728***	29.066	.752***	27.648
Org	-.221***	-10.153	-.229***	-10.039
Nat	.223***	8.555	.23***	8.725
Price	-.969***	-34.335	-	-
ASC1	-6.73***	-38.406	-	-
Psuedo R^2		0.254		
Log likelihood Function		-3544.35		
***,** and * represent significance at the 1%, 5% and 10% level respectively				

It can be observed that results obtained from estimating the main effects RPL model (ice cream) are similar to those obtained from estimating the MNL model: the signs of the coefficients remain the same and the magnitudes are also similar. There are however slight differences: the WTP values for the RPL model are slightly higher for the *100% Canadian milk* attribute. On the other hand, respondents' willingness to pay for national brand ice cream was slightly lower in the RPL model. Specifically, respondents were willing to pay 78 cents extra for a 2-litre carton of ice cream displaying the *100% Canadian milk* symbol as opposed to ice cream without the symbol. In addition, respondents discounted organic ice cream by 24 cents opposed to conventional ice cream but were willing to pay a premium of 22 cents for national brands as opposed to store brands.

In comparing the main effects MNL model and the main effects RPL model, the RPL model appears to represent a better fit for the data in light of the pseudo R^2 values. There is an improvement in the pseudo R^2 from 0.25 in the MNL main effects to 0.30 for the RPL main effects model.

Table 1.9: Ice Cream- RPL Main Effects

Variable	Coefficient	T-Ratio	WTP	T-Ratio
Random Parameters in Utility Function				
Org	-.294***	-8.387	-.241***	-8.898
Nat	.262***	7.276	.215***	7.453
Non-random Parameters in Utility Function				
Cand	.947***	19.736	.778***	27.276
PRICE	-1.218***	-22.363	-	-
ASC1	-8.076***	-25.369	-	-
Derived Standard Deviations of Parameter Distributions				
NsOrg	.944***	8.866	-	-
NsNat	.729***	6.727	-	-
Psuedo R^2		0.300		
Log likelihood Function		-3514.51		
***,** and * represent significance at the 1%, 5% and 10% level respectively				

Accounting for Industry Knowledge

Accounting for respondents' knowledge of the dairy industry is important in assessing willing to pay for the *100% Canadian milk* attribute. For example, it cannot be automatically assumed that because all milk sold in Canada is 100% Canadian that all consumers should have a willingness to pay of zero for milk with the symbol as in contrast to milk without the symbol. Reasons for this may be not all consumers may be aware of this information. Furthermore, even if there was perfect information there could be other factors affecting preferences for dairy products with the symbol. Finally, if consumers do suspect that even a very small quantity of milk is imported, the symbol could perhaps act as further verification.

In order to verify the role of knowledge in influencing WTP for the *100% Canadian milk* symbol on milk and ice cream a RPL model which includes an interaction term between respondents' "knowledge" and the *100% Canadian milk* attribute (CanKnw) and main effects were estimated. By incorporating the CanKnw variable in the analysis, the utility derived from purchasing milk and ice cream with the *100% Canadian milk* symbol can be analysed from the perspective of those who are aware that all milk must be Canadian whether or not it displays the label as opposed to respondents who are unaware. In addition, the perspective of respondents who are aware that ice cream can be made from imported milk ingredients as opposed to those who are not aware of this information is evaluated. It should be noted that the interpretation of the knowledge variables is opposite in both samples. In the milk sample the variable is analyzed from the perspective of respondents who are aware that all milk is Canadian and for ice cream,

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the CanKnw variable captures the perspective of respondents who are aware that ice cream may not be Canadian.

Specific focus is directed towards the variable representing the interaction between industry knowledge[6] and *100% Canadian milk* attribute (CanKnw). An interesting observation was made in section five; it was noted that almost 50% of respondents to the milk survey were not aware that all milk is Canadian. In addition, approximately 57% of those unaware respondents indicated that they would not change their choices if they knew otherwise. Those respondents who were aware that all milk sold in Canada must be *100% Canadian milk* discounted milk with the symbol by 28 cents as indicated by the negative and significant coefficient in Table 1.10. The significant sign of the coefficient is unexpected given that respondents who are aware should rationally be indifferent towards milk with or without the symbol. The signs of the other main effects coefficients remained as in previous estimations showing that while respondents were willing to pay a premium for milk with the *100% Canadian milk* symbol they discounted milk with the organic attribute. Respondents were also willing to pay a premium for national brand milk.

Table 1.10: Milk- RPL Accounting for Knowledge

Variable	Coefficient	T-Ratio	WTP	T-Ratio
Random Parameters in Utility Function				
Cand	1.02***	14.62	.969***	14.450
Org	-.274***	-8.59	-.335***	-8.92
Nat	.089**	2.49	.109**	2.468
CanKnw	-.227***	-3.166	-.277***	3.162
Non-random Parameters in Utility Function				
Price	-.818***	-16.853	-	-
ASC1	-4.795***	-24.232	-	-
Derived Standard Deviations of Parameter Distributions				
NsCand	.48***	4.603	-	-
NsOrg	.616***	5.11	-	-
NsNat	.802***	8.019	-	-
NsBCanKnw	.656***	3.454		
Pseudo R^2	0.273			
Log likelihood Function	-3668.924			
***,** and * represent significance at the 1%, 5% and 10% level respectively				

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[6] The knowledge variable was dummy coded.

Table 1.11 shows that respondents who are aware that ice cream can be made from imported milk ingredients still discounted ice cream with the *100% Canadian milk* symbol by 16 cents relative to respondents who are unaware of this information. This result is rather unexpected given that the *100% Canadian milk* symbol would in this case represent tangible differentiation between ice cream made from imported milk ingredients and local milk. This result however could be explained by whether or not these respondents are concerned about the origin of their foods.

Table 1.11: Ice Cream- RPL Accounting for Knowledge

Variable	Coefficient	T-Ratio	WTP	T-Ratio
Random Parameters in Utility Function				
Org	-.294***	-8.376	-.24***	-8.89
Nat	.262***	7.266	.214***	7.441
Non-random Parameters in Utility Function				
Cand	1.088***	19.736	.726***	22.297
CanKnw	-.194***	-2.846	-.159***	-2.864
Price	-1.222***	-22.329	-	-
ASC1	-8.1***	-25.318	-	-
Derived Standard Deviations of Parameter Distributions				
NsOrg	.944***	8.864	-	-
NsNat	.735***	6.776	-	-
Psuedo R^2	0.301			
Log likelihood Function	-3510.37			
***,** and * represent significance at the 1%, 5% and 10% level respectively				

Conclusions

Consumers' product perceptions and willingness to pay stem from two main causes: product attributes and individual characteristics (Hensher et al. 2005). This study examined how preferences for milk and ice cream are influenced by the 100% Canadian milk symbol.

The choice experiment used to elicit preferences included four alternatives and four attributes: national brand milk versus store brand, organic versus conventional, *100% Canadian milk* symbol versus no symbol and price. Over 90% of respondents indicated that they were aware of the *100% Canadian milk* symbol. However, there were mixed perceptions towards products with the symbol versus products without, although estimations show that consumers were in general willing to pay a premium for products with the symbol. The general results from the MNL models for both the milk and ice cream samples indicated that consumers on average derive negative utility from choosing organic milk but positive utility from national brand milk. In addition, respondents derived positive utility from choosing organic milk that also displayed the

symbol. There was disutility from choosing national brand milk with the symbol. There was however, no difference in WTP for organic or national brand ice cream with the symbol as these coefficients were found to be statistically insignificant.

As a secondary interest, this study also assessed the role of industry knowledge in accounting for differences in willingness to pay for milk and ice cream with the symbol. The results showed that respondents who were aware that all milk sold in Canada must be 100% Canadian discounted milk displaying the *100% Canadian milk* symbol. With respect to ice cream, respondents who are aware that ice cream can be made from imported milk ingredients also tended to discount ice cream with the symbol as opposed to those who are not aware.

Consumers' perceptions of the 100% Canadian milk symbol have implications for the Canadian dairy industry and the supply chain. Given that consumers on average derived positive utility from milk and ice cream with the *100% Canadian milk* symbol. In light of this, there is a potential for the milk supply chain and particularly processors to extend the "branding" initiative to other products made from milk by-products such as frozen pizzas and other "ready to eat food". Such an initiative could further promote awareness and strengthen loyalty towards domestic dairy products. This initiative is potentially important to the dairy industry as a pre-emptive measure should changes to the current supply management system occur in the future[7]. Results from the RPL models indicate that the symbol is a substitute for national brand dairy products and a compliment for store brand products. The presence of the symbol also adds value to organic milk. These results would therefore imply that companies manufacturing organic or store brand milk can benefit by forming brand alliances with Dairy Farmers of Canada (DFC) to market these products. However, an implication of forming brand alliances is that an alliance with a poorly perceived brand could potentially result in brand dilution. Therefore, while increasing awareness towards the symbol is potentially beneficial, precautions should also be taken to ensure that the image of the *100% Canadian milk* symbol is not negatively affected. One way to guard against this is by forming alliances with brands that are already strong and have in place good quality assurance measures. Such an initiative can serve as a pre-emptive measure in gaining in building a strong image and hence securing consumers' loyalty.

A key potential limitation of the study that should be noted- Given that the choice questions were based on hypothetical scenarios, respondents' choices may not truly reflect how they would actually behave in real market settings as choices were non-binding. To mitigate this hypothetical bias, a "cheap talk script" was included in the survey. The cheap talk script informed respondents of the concern about their choices in the choice scenarios not reflecting their true preferences and the importance of selecting choices as they would in real situations. Research has shown that cheap talk scripts can be an effective way of reducing hypothetical bias (Lusk, 2003). Nevertheless, the expressed preferences and WTP estimations may suffer from a degree of hypothetical bias. In addition, it is possible that the high degree of preferences exhibited towards the *100% Canadian milk* symbol may be a function of what respondents believed to be appropriate choices based on the overall objective of the survey.

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[7] The supply management system was adopted in the early 1970s. Under this system a combination of prohibitive taxes and import restrictions prevent the sale of imported fluid milk and restrict the importation of other commercial dairy products. Should this system be dismantled (partially or fully), the 100% Canadian milk symbol would have greater success and significance if consumers are aware of the symbol and have loyalty towards the symbol. This would then be beneficial to dairy farmers and processors.

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