

Perception versus Reality: Canadian Consumer Views of Local and Organic

Benjamin L. Campbell,¹ Saneliso Mhlanga² and Isabelle Lesschaeve³

¹Assistant Professor and Extension Economist, Department of Agricultural and Resource Economics, University of Connecticut, 3107 Horsebarn Hill Road, Storrs, CT 06269 (corresponding author: phone: 860-486-1925; fax: 860-486-1932; e-mail: ben.campbell@uconn.edu).

²Research Analyst-Horticulture Economics, Consumer Insights and Product Innovation, Vineland Research and Innovation Centre, 4890 Victoria Avenue North, Box 4000, Vineland Station, ON L0R 2E0 (phone: 905-562-0320 ext. 802; e-mail: saneliso.mhlanga@vinelandresearch.com).

³Research Director, Consumer Insights and Product Innovation, Vineland Research and Innovation Centre, 4890 Victoria Avenue North, Box 4000, Vineland Station, ON L0R 2E0 (phone: 905-562-0320 ext. 769; e-mail: isabelle.lesschaeve@vinelandresearch.com).

During the past decade, Canadian consumers have developed a keen interest in local and organic foods. In response, the Canadian government established standards to regulate their labeling. However, many retail and media outlets offer varying definitions that fit their needs. Consumers utilize this often conflicting information to formulate their understanding of local and organic. The aim of this study was to investigate consumer understanding and perception of local and organic food, especially in regard to production characteristics. The results indicate that local is predominantly defined as decreased miles to transport, whereas organic is defined as food produced without the use of synthetic pesticides. However, a fairly large percentage of consumers perceive inaccurate definitions as being characteristics of local and organic. Furthermore, consumers with accurate definitions of local and organic share a similar consumer profile, while consumers with misguided perceptions do not. We also see that characteristics such as ethnic heritage, personal characteristics, geographic region, and length of stay in Canada not only influence consumer understanding and perception, but also the geographic boundaries associated with local.

Au cours de la dernière décennie, les consommateurs canadiens ont montré un intérêt marqué pour les aliments biologiques et locaux. En réaction à cet intérêt, le gouvernement du Canada a élaboré des normes pour en réglementer l'étiquetage. Toutefois, de nombreux détaillants et médias offrent des définitions qui satisfont leurs besoins respectifs. Les consommateurs se fondent sur cette information souvent conflictuelle pour se faire une idée des appellations «biologique et local». La présente étude visait à examiner la compréhension et la perception des consommateurs concernant les aliments biologiques et locaux, en particulier les caractéristiques de production. Les résultats de notre étude ont indiqué que le qualificatif «local» est principalement associé à une diminution de la distance parcourue par les aliments, tandis que le qualificatif «biologique» fait référence à des aliments qui ont été produits sans l'utilisation de pesticides synthétiques. Cependant, un assez fort pourcentage de consommateurs a des définitions inexactes des qualificatifs «biologique et local». De plus, les consommateurs qui ont des définitions exactes de ces qualificatifs présentent un profil similaire, contrairement aux consommateurs qui ont des perceptions erronées. Nous avons aussi observé que certaines caractéristiques, comme l'origine ethnique, les caractéristiques personnelles, la région géographique et la durée du séjour au Canada, influencent non seulement la compréhension et la perception, mais aussi les frontières géographiques associées au qualificatif «local».

INTRODUCTION

A decade or so ago the environmental friendliness of products had only made its way into the fringe of the consumer psyche with only hard-core environmentalists taking note. Today, however, environmentalism in some form or fashion is mainstream with a large number of consumers being self-conscious about the environment. This can be seen by the rise in “locally” sourced product and entire sections of supermarkets devoted to “organic.” For instance, 24% of Loblaw Companies Limited, Canada’s largest food distributor, produce was sourced locally, with 40% being local during the Summer of 2008 (Britnell 2010). Retailers have not been the only entities pushing the “buy local” movement, as numerous regional and provincial organizations are actively purchasing and touting local product. For instance, many provincial governments have established local labeling, such as “Product of Nova Scotia,” “Foodland Ontario,” “Buy BC,” or “Quebec Vrai.” Furthermore, many regional organizations are promoting local, such as the Greenbelt Fund (Ontario focused) and Local Food Plus (Canada focused). Other entities, for example, universities, public schools, and hospitals, are pursuing local food when available with some, such as the University of Guelph, developing food sustainability plans. In this vein, organic products have also experienced a similar explosion with 2006 sales topping \$1 billion, 41% of which moved through mainstream supermarkets (Organic Agriculture Centre of Canada 2007). Like local, organic initiatives are widespread but new initiatives, such as the Foodland Ontario Organic label, are being undertaken by governments and other organizations to raise awareness and sales of organic products.

As local and organic foods have increased, advertising and promotion initiatives have increased as well. Many agricultural promotional campaigns (e.g., “Beef, It’s what’s for dinner,” “Got Milk”) provide consistent messages throughout the value chain, but local and organic campaigns have tended to not offer consistent messages across value chain members. In these cases, the message(s) can arrive to the consumer in a jumbled manner, leaving the consumer to decipher the intended meaning. For instance, Wal-Mart U.S. defines local as food produced within a state’s borders, while other shops define local in terms of time it takes (hours) to transport the food (Martinez 2010). Furthermore, there have been instances where retailers, whether intentionally or unintentionally, have been found to be selling imports as local product (Thomlinson 2011).

Based on the varying messages associated with local and organic (Yiridoe et al 2005; Canadian Produce Marketing Association 2011), our objective was to better understand consumer perceptions of local and organic relating to production practices. Specifically, we identify where perception meets reality for Canadian consumers regarding views on local and organic definitions. We identify key demographic, geographic characteristics, and food attitudes that might facilitate an understanding of why consumers believe what they believe. We also examine the role of demographics, geographic characteristics, and food interest on a consumer’s geographic boundary of local using both governmental, media defined, and provincial boundaries. Results shed interesting light on the perception of organic and local and show that value chain messages are not always communicated effectively to consumers.

LITERATURE REVIEW

Given increased demand, a large amount of effort has been directed at understanding the local and organic movements. Results have indicated positive willingness to pay (WTP) for local food (Darby et al 2008; Yue and Tong 2009; Campbell et al 2010; Onozaka and McFadden 2011) and organic food (Batte et al 2007; Campbell et al 2010). However, attempts to identify those consumers most likely to purchase local and/or organic food have produced conflicting results. A common shopper characteristic for local is higher income, but gender and higher education have been found to have positive, negative, and no impacts (Jekanowski et al 2000; Brown 2003; Campbell et al 2010). Similarly, conflicting results have been found for income level and ethnicity for organic purchasers (Thompson 1998; Hartman Group 2002; Zhang et al 2008; Smith et al 2009)

In response to local and organic food becoming more popular, regulations and certification labels have been put in place to standardize their meanings. For instance, the Guide to Labelling and Advertising put forth by the Canadian Food Inspection Agency (CFIA) defines “local” as:

Locally grown and any substantially similar term shall mean that the domestic goods being advertised originated within 50 km of the place where they are sold, measured directly, point to point, or meets the requirements of section B.01.012 of the food and drug regulations, whichever condition is least restrictive. B.01.012 Local food means a food that is manufactured, processed, produced or packaged in a local government unit and sold only in the same local government unit or to one or more local government units that are immediately adjacent to it.

The explanation goes on to add that other terms such as “Product of Nova Scotia,” “Foodland Ontario,” “Buy BC,” or “Quebec Vrai,” etc., may be used to describe fresh produce, which is produced and grown within a province but which does not meet the CFIA (notably 50 km or less) criteria for “Local” (CFIA 2010).

The limited nature of the above definitions has given rise to other geographic definitions. As noted by Carter-Whitney (2008), the 50 km limit is not an appropriate definition of local given the reality of distances between farms and urban consumers. For retail, provincial boundaries may not suffice, which has given rise to “Product of Canada” labeling. The “Product of Canada” label may not be regulated as local, but it is often displayed prominently against nonprovincial products. The other local geographic boundary that has moved into the consumer psyche is the 100 mile boundary made famous by the media. Of note, the CFIA regulations and other geographic boundaries do not regulate or mandate anything about production practices used, environmental impact, or nutrition/taste advantages. Given the varying meanings of local and that they are often used interchangeably, resulting in confusion among consumers (Canadian Produce Marketing Association 2011).

In regards to the “buy organic” message, what does “organic” mean? Unlike local, organic labeling is highly regulated. Governmental agencies have established detailed criteria such as strict production practices and chemical lists,¹ which must be satisfied before a product can be certified as organic. For instance, some of the practices covered within the Canadian Organic Standards include application practices of fertilizer (e.g., manure)

¹ See Canadian Organic Standards (Canadian General Standards Board 2011a, 2011b).

and approved pesticides, means to transition to organic production, and preparation and handling of organic products (Canadian General Standards Board 2011a, 2011b). The Organic Standards do attempt to encourage perceived environmental friendly practices, such as recycling and reuse, but the exact friendliness of these practices varies by producer/product, and therefore may/may not be accurate for all organic products.

Even with specific certification standards and certifiers (CFIA 2012), the wide ranges of media coverage and certification labels have the potential to misguide consumers. Gil and Soler (2006) note that there is some confusion that has been created due to the large amount of “branded” products on the market. For instance, how many Canadian consumers know the difference between a “Canada Organic” certification label (Canada Organic Growers 2011) and a “Verified Organic” certification label (Pro-Cert Organic 2011)? In both cases, each implies that a product has met the criteria laid out in the Canadian Organic Standards. To this end, how many consumers know what the Canada Organic Standards are? As noted by Yiridoe et al (2005), consumers understand broad issues about organic food, but consumer interpretation of organic is inconsistent with consumers devoting little energy to understanding the complexities of the farming practices and quality attributes associated with organic. However, we do see that organic labels are working with respect to WTP such that the “Canada Organic” and “Verified Organic” labels generate a \$0.16/lb and \$0.19/lb premium across all consumers, respectively (Campbell et al 2010).

METHODS

During the Fall of 2010, an online survey was implemented to assess Canadian consumer perception of local and organic. Global Market Insite, Inc. (GMI) contacted consumers via e-mail and invited them to participate in a survey. Those agreeing to participate were directed to the online survey via a web link. A total of 1,470 consumers were invited to participate in the study with 891 completed responses, representing a 61% response rate. In order to gather more responses from the major horticultural regions of Ontario and British Columbia, we oversampled as compared to their percentage of the Canadian population, while undersampling in other provinces. Response rates were consistent across provinces. During analysis, we grouped nonmajor horticultural provinces into regions based on their proximity to a major horticultural production region.

Respondents were asked to answer a variety of questions, including demographic, socio-economic, purchase behavior, food attitudes, as well as their knowledge and perceptions of local and organic. Demographic questions included income, education, marital status, age, province, length of residence in Canada, gender, household characteristics, and ethnic heritage and postal code. For the demographic questions, respondents were asked to mark which ethnic heritage they best identified with. The categories were based on 2006 Statistics Canada census categories, but we transformed the question to relate to which ethnic heritage they best identified with instead of which ethnic origin. This change was based on consultation with GMI and our desire to directly understand how a respondent perceives them self. Postal codes were linked with 2006 Statistics Canada census estimates for various postal code characteristics (e.g., population density, percent minority, employment rate, etc.).

Purchase behavior questions consisted of whether they were the primary shopper in the household, the types of stores generally shopped in, and whether they purchased fruit

Table 1. Overall percentage of consumers believing a characteristic represents local and organic

| Definition | All | |
|---|-------|---------|
| | Local | Organic |
| Number of consumers | 891 | 891 |
| Definition ^a | | |
| No synthetic pesticide use | 11.0% | 82.9% |
| No natural pesticide use | 5.3% | 29.0% |
| Produced locally (organically) ^b | 12.0% | 16.7% |
| Less pesticide residue on products | 11.1% | 35.2% |
| Better for the environment | 27.7% | 52.1% |
| Products have a longer shelf life | 21.1% | 7.5% |
| Better taste | 38.2% | 33.2% |
| More nutritious | 22.2% | 33.7% |
| Artificial fertiliser used | 4.8% | 3.3% |
| Natural fertiliser used | 13.5% | 55.2% |
| Non genetically modified | 12.9% | 54.8% |
| Lower carbon footprint | 27.6% | 26.8% |
| Lower greenhouse gas emissions | 21.5% | 24.0% |
| Decreased miles to transport product | 72.5% | 15.4% |
| Some other characteristic not listed | 9.9% | 6.1% |
| I do not know what local is | 4.3% | 4.3% |

Notes: ^aWhen asked about organic characteristics, “produced locally” was a choice. When consumers were asked about local characteristics, “produced organically” was a choice.

^bRespondents were allowed to mark any characteristics that were indicative of their perception of local and organic, thereby the columns do not sum to 100%. For example, 11% of respondents perceived “no synthetic pesticide use” as a characteristic of local, implying that 89% did not view it as a characteristic of local.

during the last year. Food attitude questions were measured on a 1–5 Likert scale related to whether the respondent had an interest in food and whether food matters to them. Several questions were also asked regarding the respondents self-perceived knowledge of local and then organic. These questions were measured based on their choice of “not at all knowledgeable,” “somewhat knowledgeable,” or “very knowledgeable.”

During the survey, respondents were also asked to mark any and all attributes, from the predefined list, they associated with local and then organic (Table 1). For instance, 11% of consumers associate “no synthetic pesticide use” with local, implying that 89% do not perceive “no synthetic pesticide use” with local. Finally, respondents were asked to identify the geographic area they considered to encompass local with categories being 10 km increments up to 250 km, then moving to “greater than 250 km but within province,” “anywhere within province respondent resides,” “within Canada,” “within the U.S. or Canada,” “within North America,” or “worldwide.”

Empirical Model

In order to gain a better understanding of whether perceptions can be explained by demographics, geographic characteristics, and food attitudes, we used a set of binary

logit models. For example, a respondent answering the question, “which of the listed characteristics do you associate with local?” could mark any or all of the characteristics from the predefined list (Table 1). A consumer marking a characteristic as characterizing local was coded as 1, with 0 coding if the characteristic was not indicated. We followed the same coding procedure for the “which of the listed characteristics do you associate with organic?” question. After coding for each attribute, we ran a binary logit model whereby one of the local (and then organic) characteristics was used as the dependent variable with demographics, geographic characteristics, and food attitudes as explanatory variables. After estimating the log-likelihoods and marginal effects for an attribute, we proceeded to the next characteristic until all characteristics had been modeled. Thereby, each individual characteristic was modeled individually against a set of explanatory variables such that

$$P_i = \frac{1}{1 + e^{-x_i}} \beta \quad (1)$$

where P_i is the probability of the i th respondent choosing the particular characteristic and x_i is a set of demographic, attitudinal, purchasing behavior, and geographic characteristics associated with the i th respondent.

After evaluating perceptions via the binary logit models, we utilized a multinomial logit model (MNL) to better understand how consumer and geographical characteristics affect perception of a local geographic boundary. While taking the survey, consumers were asked to indicate the maximum distance that encompasses the term “local” with categories being 10 km increments up to 250 km, “greater than 250 km but within province,” “anywhere within province respondent resides,” “within Canada,” “within the United States or Canada,” “within North America,” or “worldwide.” Instead of utilizing all the geographic boundary delineations noted above, we chose to combine categories so that we could replicate the boundaries typically advertised on the market and repeatedly emphasized by media outlets. Thereby, the categories used within the MNL were the CFIA definition of 30 miles (50 km) or less, 31–100 miles (representative of the 100 mile diet, but outside the CFIA area), and 101 miles or more within province, within province, and within Canada. There was also a very small group (0.9%) that indicated outside of Canada could be local, but this group was too small to include within the analysis. Responses were coded with either a 0, 1, 2, 3, or 4 dependent on which category was marked. Given the multiple nonordered categories, an MNL model was used where the dependent variable was the geographic boundary category and the explanatory variables were the respondent characteristics (e.g., demographics and food attitudes) and geographical characteristics of the postal code to explain consumer perception.

RESULTS AND DISCUSSION

Overall Comparisons

Examining Table 1, we see that a large percentage of consumers tend to directly relate their perception of local and organic with what is most heavily promoted as being the definition of local and organic. For local, 73% of all consumers perceive “decreased miles to transport product” as a characteristic of local, which is consistent with findings by

Roininen et al (2006). Of interest, is that 27% of consumers do not consider “decreased miles to transport product” as a characteristic of local, even though this is a central component of the definition of local. In regard to organic, 83% of consumers perceive organic as “no synthetic pesticides being used.” Following suit, consumers tended to associate environmental characteristics with organic at a higher rate than local, which is to be expected given the media attention that associates organic with environmental issues. For instance, 52% of consumers relate organic as “better for the environment,” while only 28% indicated that “better for the environment” was a characteristic of local. Alternatively, 48% do not relate organic as “better for the environment” with 72% not relating local with “better for the environment.” However, both organic and local are touted by many organizations as being better tasting and more nutritious, but only 38% and 34% of consumers believed that local and organic provide a better tasting product, respectively; whereas, only 22% and 34% believed that local and organic provides a more nutritious product, respectively.

The findings above can be logically explained and come as little shock. However, looking at the other characteristics consumers associate with local and organic is quite intriguing. As noted by Yue and Tong (2009), local does not equal organic and vice versa. Twelve percent of consumers believed that local is organic, while 17% believed that organic is local. This finding corresponds with statements from the Canadian Organic Growers (2011) that “Sadly, ‘local’ and ‘organic’ have had the misfortune of entering our vocabulary as separate concepts and then getting jumbled into one, unclear concept.” Furthermore, other characteristics are also “jumbled” and “unclear” to consumers. For instance, nearly one out of three consumers believes that no natural pesticides are used in organic production, which for most all organic producers is completely false considering organic producers routinely utilize “natural” pesticides such as copper and sulphur. So, why are some consumers “confused” about the characteristics that make up local and organic? A logical answer would be that some personal or geographic factor might allow those consumers to be exposed to varying messages. Therefore, we examine several of these characteristics below.

Local and Organic Perceptions

Understanding how different personal and geographic characteristics influence perceptions provides a better framework for identifying why consumers have the perceptions they have. Through the logit models (logit parameter estimates available in the Appendix),² and corresponding marginal effects (discussed in text and tables), we see that a variety of consumer characteristics are driving these perceptions. When examining the beliefs that are “accurate” for local (e.g., decreased distance) and organic (e.g., no synthetic pesticides), we see some of the same variables significant for each (Tables 2 and 3). Consumers that are more likely to have a correct definition for local and organic production are higher educated Western European (as compared to “Canadian”) females with fewer adults in the household that have lived a longer period in Canada. Furthermore, these consumers tend to primarily shop at chain stores (compared to those who do not shop at chain

² Due to space limitations, the Appendix can be found at <http://www.cag.uconn.edu/are/are/perceptionappendix.php> or by contacting the corresponding author at ben.campbell@uconn.edu.

Table 2. Marginal effects associated with consumers believing that a definition fits with local: do not know, accurate, and inaccurate definitions^a

| | Accurate definitions | | | | Inaccurate definitions | | | |
|---|----------------------|------------------------------|----------------------------|-------------------------|-----------------------------|---------------------------|----------------------|-------------------------|
| | I do not know | Decreased miles to transport | Artificial fertilizer used | Natural fertilizer used | No synthetic pesticide used | No natural pesticide used | Produced organically | Nongenetically modified |
| Knowledge^b | | | | | | | | |
| Local: somewhat knowledgeable | -0.0111 | 0.0059 | 0.0073 | 0.0292 | -0.0073 | -0.0174 | -0.0105 | -0.0041 |
| Local: very knowledgeable | -0.0130** | -0.0365 | 0.0386 | 0.1031 | 0.0364 | -0.0124 | 0.0448 | 0.0324 |
| Organic: somewhat knowledgeable | -0.0124 | 0.0336 | 0.0116 | -0.0214 | -0.0228 | 0.0098 | 0.0051 | 0.0264 |
| Organic: very knowledgeable | -0.0086 | 0.0680 | 0.0230 | -0.0355 | -0.0019 | 0.0503 | 0.0010 | -0.0070 |
| Individual/household characteristics | | | | | | | | |
| Income ^c | 0.0000 | 0.0010* | -0.0003** | -0.0001 | -0.0009*** | -0.0004** | -0.0005* | -0.0006* |
| Education | | | | | | | | |
| Some college education | -0.0186*** | 0.1131*** | -0.0077 | 0.0238 | -0.0043 | -0.0228** | -0.0262 | -0.0007 |
| Bachelor's degree | -0.0159*** | 0.1189*** | -0.0078 | -0.0477** | -0.0189 | -0.0337*** | -0.0386** | 0.0121 |
| Above bachelor's degree | -0.0190*** | 0.1769*** | 0.0049 | -0.0243 | -0.0136 | -0.0105 | 0.0354* | 0.0143 |
| Live in a major fruit production region | -0.0023 | -0.0341 | -0.0053 | -0.0287 | 0.0148 | -0.0025 | 0.0037 | -0.0058 |
| Married/partner | 0.0135* | -0.1020*** | 0.0073 | -0.0079 | 0.0287 | 0.0247** | 0.0266 | -0.0031 |
| Age (years) | -0.0001 | -0.0020 | -0.0005 | 0.0036*** | 0.0030*** | -0.0004 | 0.0015** | 0.0026*** |
| Province of residence ^d | | | | | | | | |
| British Columbia | 0.0095 | -0.0396 | -0.0119 | -0.0075 | 0.0018 | -0.0064 | 0.0784** | -0.0168 |
| Quebec | 0.0129 | -0.1235 | -0.0201** | 0.0201 | -0.0034 | -0.0151 | 0.0356 | 0.0015 |

(Continued)

Table 2. Continued

| | Accurate definitions | | | | Inaccurate definitions | | | |
|---|----------------------|------------------------------|----------------------------|-------------------------|-----------------------------|---------------------------|----------------------|-------------------------|
| | I do not know | Decreased miles to transport | Artificial fertilizer used | Natural fertilizer used | No synthetic pesticide used | No natural pesticide used | Produced organically | Nongenetically modified |
| West | -0.0034 | -0.0180 | 0.0285 | -0.0134 | -0.0084 | -0.0256** | -0.0156 | -0.0664*** |
| Central | 0.0050 | 0.0129 | 0.0007 | -0.0316 | -0.0326 | -0.0296*** | 0.0028 | -0.0704*** |
| Atlantic | 0.0074 | -0.0804 | -0.0131 | -0.0717*** | -0.0672*** | -0.0221 | 0.0125 | -0.0084 |
| Ethnic heritage | | | | | | | | |
| Eastern European | 0.0148 | -0.0072 | 0.0057 | -0.0103 | 0.0322 | 0.0023 | 0.0225 | 0.1713** |
| Other Asian | 0.0023 | -0.0871 | 0.0166 | -0.0197 | 0.0228 | 0.0272 | 0.1099* | 0.0375 |
| Western European | -0.0006 | 0.0781** | 0.0035 | -0.0406** | -0.0192 | -0.0030 | -0.0710*** | -0.0069 |
| African/Caribbean | - | -0.0594 | 0.0593 | 0.0070 | 0.1189 | 0.0670 | 0.0140 | 0.0762 |
| Chinese/Japanese | 0.0092 | -0.0898 | -0.0151 | -0.0971*** | 0.0426 | 0.0352 | 0.0659 | -0.0152 |
| Other ethnicity | -0.0036 | -0.0326 | -0.0161 | -0.0686*** | 0.0219 | -0.0250* | 0.0276 | -0.0137 |
| Gender (1 = male) | 0.0025 | -0.1317*** | 0.0381*** | -0.0280 | -0.0067 | 0.0221* | -0.0088 | -0.0107 |
| Persons in household < 18 years | -0.0031 | -0.0150 | 0.0026 | 0.0206** | 0.0240*** | 0.0032 | 0.0225*** | 0.0132* |
| Persons in household ≥ 18 years | -0.0039 | -0.0293* | 0.0067** | 0.0162* | -0.0040 | 0.0002 | -0.0067 | 0.0104 |
| Primary household shopper (1 = yes, 0 = no) | -0.0022 | -0.0021 | 0.0088 | -0.0105 | -0.0202 | 0.0046 | -0.0162 | -0.0154 |
| Primarily shop at chain store (1 = yes, 0 = does not) | -0.0009 | 0.0821** | 0.0020 | 0.0088 | 0.0284 | -0.0100 | -0.0016 | -0.0402 |

(Continued)

Table 2. Continued

| | Accurate definitions | | | | Inaccurate definitions | | | |
|---|----------------------|------------------------------|----------------------------|-------------------------|-----------------------------|---------------------------|----------------------|-------------------------|
| | I do not know | Decreased miles to transport | Artificial fertilizer used | Natural fertilizer used | No synthetic pesticide used | No natural pesticide used | Produced organically | Nongenetically modified |
| Primarily shop at farmers' market (1 = yes, 0 = does not) | -0.0051 | 0.0002 | 0.0183* | 0.0136 | 0.0176 | 0.0051 | 0.0209 | -0.0067 |
| Purchased fruit within last year (1 = yes, 0 = no) | -0.0866 | 0.0580 | 0.0110 | 0.0541* | 0.0427 | -0.0033 | 0.0525*** | -0.0234 |
| Length of residence in Canada | -0.0019** | 0.0138*** | 0.0024* | -0.0082*** | -0.0019 | 0.0008 | -0.0025 | -0.0043 |
| Food matters | -0.0032 | 0.0719*** | 0.0036 | 0.0226 | -0.0103 | 0.0075 | 0.0174 | 0.0476*** |
| Food interest | -0.0043 | 0.0093 | -0.0105** | -0.0237* | -0.0005 | -0.0027 | 0.0058 | -0.0066 |
| Percentage of whole fruit purchases local | -0.0000 | 0.0001 | -0.0002 | 0.0000 | -0.0002 | -0.0001 | -0.0005 | -0.0005 |
| Percentage of whole fruit purchases organic | -0.0003 | 0.0003 | -0.0001 | 0.0009* | 0.0013*** | 0.0001 | 0.0020*** | 0.0012*** |
| Postal code characteristics | | | | | | | | |
| Population change from 2001 to 2006 | 0.0004 | -0.0041 | 0.0008 | -0.0024 | 0.0011 | 0.0005 | -0.0003 | -0.0022 |
| Population density per square kilometer ^e | -0.0016 | -0.0090 | -0.0003 | -0.0018 | -0.0016 | -0.0045 | -0.0105 | 0.0181 |
| Median age | -0.0001 | -0.0018 | 0.0012 | 0.0014 | 0.0008 | 0.0012 | -0.0041 | -0.0018 |
| Median after tax income ^c | 0.0008** | -0.0036 | 0.0009* | -0.0002 | -0.0014 | -0.0005 | 0.0000 | -0.0005 |
| Average household size | 0.0021 | -0.0810 | -0.0150 | 0.0118 | 0.0450 | -0.0084 | -0.0419 | 0.0216 |

(Continued)

Table 2. Continued

| | Accurate definitions | | | | Inaccurate definitions | | | |
|---|----------------------|------------------------------|----------------------------|-------------------------|-----------------------------|---------------------------|----------------------|-------------------------|
| | I do not know | Decreased miles to transport | Artificial fertilizer used | Natural fertilizer used | No synthetic pesticide used | No natural pesticide used | Produced organically | Nongenetically modified |
| Employment rate | -0.0006 | 0.0024 | -0.0010 | -0.0001 | 0.0001 | 0.0007 | -0.0010 | 0.0018 |
| Percentage employed in agriculture ^c | 0.0014* | -0.0103** | 0.0005 | -0.0006 | 0.0006 | 0.0015 | 0.0027 | 0.0018 |
| Percentage nonvisible minority | 0.0037 | 0.0275 | 0.0047 | 0.0001 | -0.0199** | -0.0087* | -0.0057 | 0.0101 |
| Percentage visible minority | 0.0036 | 0.0279 | 0.0047 | -0.0003 | -0.0205** | -0.0087* | -0.0057 | 0.0059 |
| Log pseudolikelihood | -113.7 | -453.2 | -307.8 | -142.4 | -274.8 | -162.6 | -265.3 | -298.4 |
| Wald Chi ² | 119.62 | 123.21 | 80.03 | 96.35 | 66.54 | 90.52 | 136.30 | 94.97 |
| Prob > Chi ² | 0.000 | 0.001 | 0.001 | 0.000 | 0.012 | 0.000 | 0.000 | 0.000 |
| Pseudo R ² | 0.271 | 0.135 | 0.126 | 0.173 | 0.110 | 0.116 | 0.189 | 0.129 |
| Sensitivity | 0.816 | 0.687 | 0.744 | 0.708 | 0.694 | 0.681 | 0.776 | 0.730 |
| Specificity | 0.767 | 0.645 | 0.717 | 0.639 | 0.668 | 0.674 | 0.723 | 0.668 |
| Percentage correctly predicted | 0.769 | 0.676 | 0.718 | 0.649 | 0.671 | 0.675 | 0.735 | 0.676 |

Notes: ^aBase categories include: not knowledgeable about local, not knowledgeable about organic, high school education or less, do not live in fruit production region, not married/with partner, Ontario, Canadian, female, not the primary household shopper, does not shop at chain store, does not shop at farmers' market, and did not purchase fruit last year. Food matters and food interest scales are 1-5 with 1 = disagree and 5 = agree.

^bKnowledge does not account for any temporal or spatial differences in knowledge, it is only a one-time view of how knowledgeable consumers perceive themselves to be.

^cRepresents the probability change given a \$1,000 increase in the mean.

^dWest—Alberta, Northwest Territory, and Yukon Territory; Atlantic—Nova Scotia, Newfoundland and Labrador, Prince Edward Island, and New Brunswick; Central—Saskatchewan and Manitoba. Defined based on their proximity to major horticultural production areas.

^eRepresents the probability change given a 1,000 person increase in the mean.

*, **, *** indicate significance at the 0.1, 0.5, and 0.01 alpha levels, respectively.

Table 3. Marginal effects associated with consumers believing that a definition fits with organic: do not know, accurate, and inaccurate definitions^a

| | Accurate definitions | | | | Inaccurate definitions | | | |
|---|----------------------|-----------------------------|-------------------------|--------------------------|---------------------------|----------------------------|------------------|------------------------------|
| | I do not know | No synthetic pesticide used | Natural fertilizer used | Non-genetically modified | No natural pesticide used | Artificial fertilizer used | Produced locally | Decreased miles to transport |
| Knowledge^b | | | | | | | | |
| Local: somewhat knowledgeable | -0.0036 | -0.0028 | 0.0426 | -0.0222 | -0.1015* | 0.0089* | 0.0127 | 0.0253 |
| Local: very knowledgeable | 0.0020 | -0.0191 | -0.0409 | -0.0325 | -0.0421 | 0.0391 | 0.0017 | 0.0080 |
| Organic: somewhat knowledgeable | -0.0619*** | 0.0977*** | 0.1990*** | 0.1600*** | -0.0445 | -0.0235** | 0.0154 | 0.0077 |
| Organic: very knowledgeable | -0.0077* | 0.0944*** | 0.2076*** | 0.1019 | -0.0417 | -0.0067* | -0.0300 | -0.0114 |
| Individual/household characteristics | | | | | | | | |
| Income ^c | -0.0001 | 0.0006 | 0.0004 | 0.0000 | 0.0000 | -0.0001 | -0.0011*** | -0.0004 |
| Education | | | | | | | | |
| Some college education | -0.0030 | 0.0314 | 0.0851* | 0.0368 | -0.0468 | -0.0037 | -0.0161 | 0.0309 |
| Bachelor's degree | -0.0012 | 0.0380 | 0.1038* | 0.1475*** | -0.0691 | -0.0023 | -0.0176 | 0.0586 |
| Above bachelor's degree | 0.0033 | 0.0680*** | 0.1569*** | 0.1304** | -0.0792 | -0.0013 | -0.0649* | -0.0342 |
| Live in a major fruit production region | 0.0048 | -0.0194 | -0.0397 | -0.0122 | -0.0216 | 0.0029 | 0.0668** | -0.0002 |
| Married/partner | 0.0003 | -0.0232 | -0.0257 | -0.0322 | 0.0406 | 0.0066 | 0.0177 | -0.0215 |
| Age | 0.0001 | 0.0007 | 0.0013 | -0.0038** | 0.0006 | 0.0000 | 0.0015 | 0.0029*** |
| Province of residence ^d | | | | | | | | |
| British Columbia | 0.0003 | -0.0480 | -0.0510 | -0.0266 | -0.0358 | -0.0034 | 0.0170 | -0.0516* |
| Quebec | 0.0161 | -0.0571 | -0.0274 | -0.0073 | -0.0860 | -0.0066 | -0.0262 | 0.0185 |
| West | 0.0104 | -0.0356 | 0.0213 | -0.0939 | -0.1259** | -0.0060 | 0.0504 | -0.0688** |
| Central | - | -0.0105 | -0.0185 | 0.0072 | -0.0821 | 0.0057 | -0.0321 | -0.0367 |
| Atlantic | 0.0296 | -0.0371 | -0.1349 | -0.0019 | -0.1021 | - | -0.0744 | -0.0709* |

(Continued)

Table 3. Continued

| | Accurate definitions | | | | Inaccurate definitions | | | |
|---|----------------------|-----------------------------|-------------------------|--------------------------|---------------------------|----------------------------|------------------|------------------------------|
| | I do not know | No synthetic pesticide used | Natural fertilizer used | Non-genetically modified | No natural pesticide used | Artificial fertilizer used | Produced locally | Decreased miles to transport |
| Ethnic heritage | | | | | | | | |
| Eastern European | 0.0336 | -0.0721 | 0.0207 | 0.0347 | -0.1015* | 0.0033 | 0.1009 | 0.0674 |
| Other Asian | -0.0061 | 0.0217 | 0.0786 | 0.0368 | 0.0573 | 0.0201 | 0.0360 | 0.0143 |
| Western European | -0.0015 | 0.0658*** | 0.0765 | 0.1725*** | -0.0382 | -0.0097* | -0.0118 | 0.0156 |
| African/Caribbean | -0.0029 | 0.0187 | 0.0335 | 0.2216** | -0.0132 | 0.0181 | 0.0774 | 0.1978 |
| Chinese/Japanese | -0.0006 | 0.0123 | -0.0372 | -0.1465* | 0.1098 | 0.0058 | -0.0046 | -0.0035 |
| Other ethnicity | -0.0045 | 0.0296 | 0.0388 | 0.0927 | 0.0416 | 0.0113 | 0.0389 | 0.0519 |
| Gender (1 = male) | 0.0003 | -0.0623** | -0.0215 | -0.1309*** | -0.0012 | 0.0034 | -0.0732*** | 0.0012 |
| Persons in household < 18 years | -0.0010 | -0.0068 | 0.0125 | -0.0180 | 0.0006 | 0.0036* | 0.0104 | 0.0180 |
| Persons in household ≥ 18 years | 0.0033* | -0.0376*** | -0.0435** | -0.0541*** | 0.0269 | 0.0026* | 0.0188 | -0.0019 |
| Primary household shopper (1 = yes, 0 = no) | -0.0076 | 0.0475* | 0.0021 | -0.0718* | 0.0238 | 0.0068 | -0.0137 | -0.0277 |
| Primarily shop at chain store (1 = yes, 0 = does not) | -0.0002 | 0.0558* | 0.0856* | 0.0813* | 0.0221 | -0.0017 | 0.0430* | 0.0024 |
| Primarily shop at farmers' market (1 = yes, 0 = does not) | 0.0011 | -0.0229 | 0.0562 | 0.0453 | 0.0513 | 0.0095* | 0.0185 | 0.0153 |
| Purchased fruit within last year (1 = yes, 0 = no) | -0.0436 | 0.1307 | 0.2307** | 0.0668 | 0.0546 | -0.0103 | 0.0127 | - |
| Length of residence in Canada | -0.0008* | 0.0087*** | 0.0105* | 0.0144** | 0.0015 | 0.0007 | 0.0009 | 0.0098** |
| Food matters | -0.0013 | 0.0304** | -0.0044 | 0.0593*** | 0.0748*** | 0.0016 | -0.0250 | 0.0250 |
| Food interest | 0.0012 | 0.0240* | 0.0343 | -0.0029 | -0.0214 | -0.0052* | 0.0004 | -0.0118 |
| Percentage of whole fruit purchases local | -0.0000 | -0.0001 | 0.0001 | 0.0001 | 0.0006 | 0.0001 | 0.0003 | 0.0009** |
| Percentage of whole fruit purchases organic | -0.0001 | -0.0008 | -0.0006 | 0.0024** | -0.0012 | -0.0001 | 0.0023*** | 0.0016** |

(Continued)

Table 3. Continued

| | Accurate definitions | | | | Inaccurate definitions | | | |
|--|----------------------|-----------------------------|-------------------------|--------------------------|---------------------------|----------------------------|------------------|------------------------------|
| | I do not know | No synthetic pesticide used | Natural fertilizer used | Non-genetically modified | No natural pesticide used | Artificial fertilizer used | Produced locally | Decreased miles to transport |
| Postal code characteristics | | | | | | | | |
| Population change from 2001 to 2006 | -0.0002 | 0.0016 | -0.0027 | -0.0020 | 0.0004 | -0.0001 | -0.0005 | -0.0007 |
| Population density per square kilometer ^a | 0.0003 | -0.0013 | 0.0007 | -0.0150 | 0.0329* | 0.0040 | 0.0149 | -0.0122 |
| Median age | 0.0007 | 0.0107 | 0.0043 | 0.0197* | 0.0004 | 0.0001 | 0.0070 | -0.0086 |
| Median after tax income ^c | -0.0000 | 0.0014 | -0.0039 | 0.0033 | 0.0033 | 0.0005** | 0.0004 | -0.0013 |
| Average household size | 0.0166* | -0.0405 | 0.0581 | -0.0898 | -0.0909 | -0.0131 | 0.1067 | -0.0222 |
| Employment rate | 0.0001 | 0.0001 | 0.0051 | 0.0120* | -0.0026 | 0.0005 | -0.0001 | 0.0009 |
| Percentage employed in agriculture ^d | 0.0004 | -0.0068* | -0.0056 | -0.0033 | -0.0028 | 0.0014* | -0.0014 | -0.0036 |
| Percentage nonvisible minority | -0.0007 | 0.0063 | -0.0130 | -0.0254 | -0.0174 | 0.0057 | -0.0121 | -0.0158 |
| Percentage visible minority | -0.0008 | 0.0080 | -0.0139 | -0.0226 | -0.0176 | 0.0052 | -0.0126 | -0.0161 |
| Log pseudolikelihood | -90.59 | -331.86 | -94.11 | -550.74 | -505.01 | -566.28 | -364.14 | -339.79 |
| Wald Chi ² | 104.10 | 116.74 | 116.74 | 107.82 | 61.24 | 81.95 | 75.63 | 61.68 |
| Prob > Chi ² | 0.000 | 0.000 | 0.000 | 0.000 | 0.04 | 0.000 | 0.002 | 0.026 |
| Pseudo R ² | 0.413 | 0.185 | 0.258 | 0.102 | 0.058 | 0.076 | 0.095 | 0.099 |
| Sensitivity | 0.921 | 0.728 | 0.665 | 0.641 | 0.597 | 0.793 | 0.664 | 0.737 |
| Specificity | 0.816 | 0.711 | 0.576 | 0.633 | 0.605 | 0.774 | 0.654 | 0.620 |
| Percentage correctly predicted | 0.821 | 0.725 | 0.625 | 0.638 | 0.603 | 0.774 | 0.655 | 0.634 |

Notes: ^aBase categories include: not knowledgeable about local, not knowledgeable about organic, high school education or less, do not live in fruit production region, not married/with partner, Ontario, Canadian, female, not the primary household shopper, does not shop at chain store, does not shop at farmers' market, and did not purchase fruit last year. Food matters and food interest scales are 1-5 with 1 = disagree and 5 = agree.

^bKnowledge does not account for any temporal or spatial differences in knowledge, it is only a one-time view of how knowledgeable consumers perceive themselves to be.

^cRepresents the probability change given a \$1,000 increase in the mean.

^dWest—Alberta, Northwest Territory, and Yukon Territory; Atlantic—Nova Scotia, Newfoundland and Labrador, Prince Edward Island, and New Brunswick; Central—Saskatchewan and Manitoba. Defined based on their proximity to major horticultural production areas.

^eRepresents the probability change given a 1,000 person increase in the mean.

*, **, *** indicate significance at the 0.1, 0.5, and 0.01 alpha levels, respectively.

stores) while also having an increasing view that food matters. For instance, consumers that primarily shop at chain stores are 8% more likely to believe local implies “decreased miles to transport product,” while being 6% more likely to believe organic implies “no synthetic pesticide use.”

As for consumers that tend to have incorrect definitions of local and organic, we do not see a set pattern of characteristics across incorrect definitions (Tables 2 and 3). For instance, consumers that equate local as organic are more likely to be married/partner, from British Columbia compared to Ontario, be other Asian with increasing numbers of minors in the household. In contrast, older Eastern European consumers that increasingly feel food matters are more likely to believe that local consists of nongenetically modified food, which may or may not be the case. When looking at use of fertilizers, which are not regulated as part of “local,” we again see that consumer and geographic characteristics can help explain perceptions. Higher income and female consumers are less likely to believe that artificial fertilizers are used on local products, while many ethnic groups are less likely to believe that natural fertilizers are used. Also of interest is the belief that many consumers equate local to organic. We see that older British Columbia consumers are more likely to have this belief. Also, we see that as consumers increasingly believe that food matters to them, they are 8% more likely to believe that organic production implies “no natural pesticide use,” which is incorrect for many producers (Table 3).

When examining the characteristics that are generally thought of as representing local and organic, such as less pesticide residue, better taste, etc., we see an eclectic mix of characteristics that help explain beliefs (Tables 4 and 5). For instance, higher perceived knowledge increases the likelihood that a consumer will associate local and organic as better tasting, as does shopping primarily at a farmers’ market (compared to not shopping at a farmers’ market). However, younger more educated consumers believe that local is represented by “lower carbon footprint,” while higher education, increased length of Canadian residence, and certain ethnicities believe that organic implies “lower carbon footprint.”

All in all from this analysis, we see that consumers that are more likely to believe in the “accurate” local and organic messages share certain similar characteristics. In regards to the “incorrect” characteristics, and the much hyped but not scientifically proven or regulated characteristics, there are no consumer characteristics that are consistently shared across the board. Typically, consumers that have incorrect or believe in the scientifically conclusive meanings seem to be driven by their convictions regarding food (e.g., it matters or interests them) and also, in many cases, by their perceived knowledge levels. This seems to indicate that as consumers invest themselves, whether through perceived knowledge or interest in foods, they gravitate to a more positive view of local and organic at the expense of conclusive scientific evidence.

Geographical Comparisons

From our earlier analysis, we see which consumer characteristics drive perception, but what is local from a geographic perspective? For the small proximity definition put forth by CFIA, it is apparent that higher income Eastern Europeans are the least likely to trust in the 50 km or less definition, but as consumers perceive themselves to have more knowledge about local, they are 10% more likely to believe the CFIA definition (Table 6). Notably

Table 4. Marginal effects associated with consumers believing that a definition fits with local: may or may not be accurate definition^a

| | May or may not be accurate definition | | | | | | | |
|---|---------------------------------------|----------------------------|-----------------------------------|--------------|-----------------|------------------------|--------------------------------|---------------------------|
| | Less pesticide residue on products | Better for the environment | Products have a longer shelf-life | Better taste | More nutritious | Lower carbon footprint | Lower greenhouse gas emissions | Some other characteristic |
| Knowledge^b | | | | | | | | |
| Local: somewhat knowledgeable | 0.0361 | 0.1439*** | 0.0382 | 0.1437** | -0.0047 | 0.0210 | 0.0446 | 0.0108 |
| Local: very knowledgeable | 0.1365 | 0.2076** | 0.0834 | 0.3771*** | 0.2036** | 0.0089 | 0.0687 | 0.0236 |
| Organic: somewhat knowledgeable | -0.0034 | -0.0060 | -0.0018 | -0.0490 | -0.0266 | 0.0346 | -0.0131 | -0.0408 |
| Organic: very knowledgeable | -0.0174 | -0.0749 | -0.0227 | -0.1929*** | -0.0979** | 0.1716** | 0.0767 | -0.0260 |
| Individual/household characteristics | | | | | | | | |
| Income ^c | 0.0000 | -0.0006 | 0.0002 | -0.0005 | -0.0000 | 0.0003 | -0.0002 | 0.0001 |
| Education | | | | | | | | |
| Some college education | 0.0209 | 0.0494 | 0.0075 | 0.0666 | 0.0327 | 0.0880* | 0.0165 | 0.0103 |
| Bachelor's degree | -0.0224 | 0.0874 | -0.0232 | -0.0422 | 0.0720 | 0.1272** | 0.0709 | 0.0868* |
| Above bachelor's degree | -0.0242 | 0.1585** | 0.0020 | 0.0019 | 0.0108 | 0.1741*** | 0.0917 | 0.1137** |
| Live in a major fruit production region | -0.0078 | 0.0238 | 0.0732** | 0.0068 | -0.0322 | 0.0240 | -0.0105 | 0.0265 |
| Married/partner | 0.0152 | -0.0014 | 0.0030 | 0.0537 | 0.0589** | -0.0155 | -0.0006 | -0.0258 |
| Age | 0.0024** | 0.0007 | 0.0020 | 0.0069*** | 0.0057*** | -0.0038*** | -0.0038*** | -0.0000 |
| Province of residence ^d | | | | | | | | |
| British Columbia | -0.0194 | 0.0002 | -0.0628* | -0.0890* | -0.0749** | 0.0157 | -0.0548 | -0.0110 |
| Quebec | 0.1252** | 0.0771 | -0.0326 | -0.0933 | -0.0405 | 0.0110 | -0.0263 | -0.0238 |

(Continued)

Table 4. Continued

| | May or may not be accurate definition | | | | | | | |
|---|---------------------------------------|----------------------------|-----------------------------------|--------------|-----------------|------------------------|--------------------------------|---------------------------|
| | Less pesticide residue on products | Better for the environment | Products have a longer shelf-life | Better taste | More nutritious | Lower carbon footprint | Lower greenhouse gas emissions | Some other characteristic |
| West | 0.0116 | -0.1157** | 0.0612 | -0.1285** | -0.0710* | -0.0764 | -0.0314 | 0.0005 |
| Central | -0.0255 | -0.0480 | -0.0435 | -0.0879 | -0.1009*** | -0.0965* | -0.0370 | 0.0315 |
| Atlantic | - | -0.0319 | -0.0084 | -0.0049 | -0.0753 | 0.0979 | -0.0020 | - |
| Ethnic heritage | | | | | | | | |
| Eastern European | 0.0595 | 0.0292 | 0.0416 | 0.0919 | 0.0492 | 0.0122 | 0.0351 | -0.0382 |
| Other Asian | 0.0273 | 0.0921 | 0.0409 | 0.0231 | 0.0691 | 0.0456 | 0.0351 | 0.0020 |
| Western European | -0.0264 | 0.0588 | 0.0162 | -0.0377 | -0.0182 | 0.1357*** | 0.0723* | -0.0146 |
| African/ Caribbean | 0.1932* | 0.0018 | 0.0535 | -0.0077 | 0.0563 | 0.1083 | 0.0449 | 0.0489 |
| Chinese/ Japanese | -0.0234 | 0.0358 | -0.0415 | -0.0539 | 0.0279 | 0.0592 | 0.0578 | 0.0234 |
| Other ethnicity | -0.0105 | -0.0032 | -0.0004 | -0.0780 | 0.0003 | -0.0560 | 0.0125 | 0.0029 |
| Gender (1 = male) | 0.0015 | -0.0845** | 0.0150 | -0.0709* | -0.0669** | -0.0427 | -0.0049 | 0.0046 |
| Persons in household < 18 years | 0.0107 | 0.0024 | 0.0441*** | 0.0299 | 0.0351** | -0.0200 | -0.0243* | -0.0098 |
| Persons in household ≥ 18 years | 0.0036 | 0.0144 | -0.0176 | 0.0090 | -0.0047 | -0.0076 | -0.0120 | 0.0140* |
| Primary household shopper (1 = yes, 0 = no) | 0.0269 | -0.0364 | 0.0309 | -0.0097 | -0.0191 | -0.0371 | -0.0202 | 0.0136 |
| Primarily shop at chain store (1 = yes, 0 = does not) | -0.0361 | -0.0342 | 0.0331 | -0.0212 | 0.0172 | -0.0070 | 0.0093 | 0.0292 |

(Continued)

Table 4. Continued

| | May or may not be accurate definition | | | | | | | |
|---|---------------------------------------|----------------------------|-----------------------------------|--------------|-----------------|------------------------|--------------------------------|---------------------------|
| | Less pesticide residue on products | Better for the environment | Products have a longer shelf-life | Better taste | More nutritious | Lower carbon footprint | Lower greenhouse gas emissions | Some other characteristic |
| Primarily shop at farmers' market (1 = yes, 0 = does not) | 0.0219 | 0.0286 | 0.0041 | 0.1189*** | 0.0887*** | 0.0244 | 0.0685** | 0.0534*** |
| Purchased fruit within last year (1 = yes, 0 = no) | 0.0201 | 0.0960 | -0.0369 | 0.0692 | 0.0157 | 0.0371 | -0.0167 | 0.0540* |
| Length of residence in Canada | -0.0026 | 0.0022 | 0.0011 | -0.0004 | -0.0043 | 0.0115** | 0.0123*** | 0.0015 |
| Food matters | -0.0078 | 0.0190 | 0.0545** | 0.0401 | 0.0459** | 0.0482* | 0.0104 | 0.0066 |
| Food interest | -0.0055 | 0.0233 | -0.0043 | -0.0012 | 0.0165 | 0.0298 | 0.0237 | -0.0115 |
| Percentage of whole fruit purchases local | -0.0003 | 0.0002 | 0.0001 | -0.0001 | -0.0006 | 0.0000 | 0.0004 | 0.0003 |
| Percentage of whole fruit purchases organic | 0.0007 | 0.0017** | 0.0001 | 0.0006 | 0.0018*** | 0.0008 | 0.0012* | -0.0001 |
| Postal code characteristics | | | | | | | | |
| Population change from 2001 to 2006 | -0.0004 | 0.0015 | -0.0011 | -0.0017 | -0.0027 | 0.0005 | 0.0010 | 0.0021 |
| Population density per square kilometer ^c | -0.0098 | -0.0087 | -0.0082 | 0.0292 | 0.0035 | 0.0045 | -0.0163 | 0.0013 |
| Median age | -0.0030 | 0.0137* | -0.0009 | -0.0053 | 0.0042 | -0.0001 | 0.0063 | -0.0045 |
| Median after tax income ^c | 0.0005 | -0.0014 | 0.0010 | 0.0003 | -0.0011 | -0.0019 | 0.0015 | -0.0020 |

(Continued)

Table 4. Continued

| | May or may not be accurate definition | | | | | | | |
|---|---------------------------------------|----------------------------|-----------------------------------|--------------|-----------------|------------------------|--------------------------------|---------------------------|
| | Less pesticide residue on products | Better for the environment | Products have a longer shelf-life | Better taste | More nutritious | Lower carbon footprint | Lower greenhouse gas emissions | Some other characteristic |
| Average household size | -0.1124* | -0.1806* | 0.0590 | -0.0467 | -0.0933 | -0.0874 | -0.1795** | -0.0520 |
| Employment rate | -0.0010 | 0.0074 | -0.0060 | 0.0011 | 0.0037 | 0.0030 | 0.0021 | 0.0014 |
| Percentage employed in agriculture ^e | -0.0066** | -0.0038 | -0.0069 | -0.0067 | -0.0069 | -0.0088* | -0.0100** | 0.0003 |
| Percentage nonvisible minority | -0.0064 | 0.0205 | -0.0031 | -0.0053 | 0.0020 | -0.0177 | 0.0045 | -0.0053 |
| Percentage visible minority | -0.0039 | 0.0225 | -0.0017 | -0.0070 | 0.0015 | -0.0186 | 0.0066 | -0.0049 |
| Log pseudolikelihood | -283.31 | -484.98 | -427.73 | -524.49 | -404.40 | -477.54 | -428.75 | -259.64 |
| Wald Chi ² | 45.40 | 81.27 | 64.42 | 104.74 | 113.67 | 76.49 | 60.31 | 45.91 |
| Prob > Chi ² | 0.332 | 0.000 | 0.019 | 0.000 | 0.000 | 0.001 | 0.042 | 0.313 |
| Pseudo R ² | 0.077 | 0.078 | 0.068 | 0.115 | 0.143 | 0.090 | 0.077 | 0.085 |
| Sensitivity | 0.606 | 0.656 | 0.644 | 0.712 | 0.692 | 0.671 | 0.662 | 0.682 |
| Specificity | 0.629 | 0.613 | 0.625 | 0.664 | 0.694 | 0.651 | 0.648 | 0.625 |
| Percentage correctly predicted | 0.626 | 0.625 | 0.629 | 0.682 | 0.694 | 0.651 | 0.651 | 0.631 |

Notes: ^aBase categories include: not knowledgeable about local, not knowledgeable about organic, high school education or less, do not live in fruit production region, not married/with partner, Ontario, Canadian, female, not the primary household shopper, does not shop at chain store, does not shop at farmers' market, and did not purchase fruit last year. Food matters and food interest scales are 1-5 with 1 = disagree and 5 = agree.

^bKnowledge does not account for any temporal or spatial differences in knowledge, and it is only a one-time view of how knowledgeable consumers perceive themselves to be.

^cRepresents the probability change given a \$1,000 increase in the mean.

^dWest—Alberta, Northwest Territory, and Yukon Territory; Atlantic—Nova Scotia, Newfoundland and Labrador, Prince Edward Island, and New Brunswick; Central—Saskatchewan and Manitoba. Defined based on their proximity to major horticultural production areas.

^eRepresents the probability change given a 1,000 person increase in the mean.

*, **, *** indicate significance at the 0.1, 0.5, and 0.01 alpha levels, respectively.

Table 5. Marginal effects associated with consumers believing that a definition fits with organic: may or may not be accurate definition^a

| | May or may not be accurate definition | | | | | | | |
|---|---------------------------------------|----------------------------|-----------------------------------|--------------|-----------------|------------------------|--------------------------------|---------------------------|
| | Less pesticide residue on products | Better for the environment | Products have a longer shelf-life | Better taste | More nutritious | Lower carbon footprint | Lower greenhouse gas emissions | Some other characteristic |
| Knowledge^b | | | | | | | | |
| Local: somewhat knowledgeable | 0.1142** | 0.0243 | -0.0052 | 0.0148 | 0.0078 | 0.0553 | 0.0662 | 0.0165 |
| Local: very knowledgeable | 0.1141 | -0.0695 | 0.0049 | -0.0546 | -0.0891 | -0.0451 | 0.0520 | 0.0344 |
| Organic: somewhat knowledgeable | 0.0190 | 0.0542 | -0.0288 | 0.1173*** | 0.0470 | 0.0620 | 0.0028 | 0.0094 |
| Organic: very knowledgeable | 0.0930 | 0.0972 | 0.0067 | 0.2800*** | 0.0862 | 0.0910 | -0.0302 | 0.0369 |
| Individual/household characteristics | | | | | | | | |
| Income ^c | -0.0005 | 0.0001 | -0.0001 | -0.0005 | -0.0008 | 0.0005 | -0.0001 | -0.0004** |
| Education | | | | | | | | |
| Some college education | -0.0261 | 0.0178 | -0.0188 | 0.0483 | 0.0402 | 0.0561 | -0.0060 | 0.0422 |
| Bachelor's degree | -0.0222 | 0.0578 | -0.0022 | 0.0399 | 0.0391 | 0.0490 | -0.0354 | 0.0801* |
| Above bachelor's degree | 0.0504 | 0.0568 | -0.0319** | -0.0549 | -0.0303 | 0.1507** | 0.0103 | 0.1711** |
| Live in a major fruit production region | -0.0329 | -0.0217 | 0.0100 | 0.0481 | -0.0507 | -0.0112 | -0.0346 | -0.0061 |
| Married/partner | -0.0062 | 0.0067 | 0.0294** | 0.0573 | -0.0549 | -0.0145 | 0.0109 | -0.0076 |
| Age | -0.0012 | -0.0013 | 0.0002 | -0.0006 | -0.0020 | -0.0009 | -0.0008 | 0.0000 |
| Province of residence ^d | | | | | | | | |
| British Columbia | -0.0870* | 0.0627 | -0.0203 | 0.0463 | 0.0547 | -0.0836** | -0.0744* | -0.0223* |
| Quebec | -0.0168 | -0.0960 | 0.0400 | 0.0422 | 0.0239 | -0.0088 | -0.0224 | -0.0017 |

(Continued)

Table 5. Continued

| | May or may not be accurate definition | | | | | | | |
|---|---------------------------------------|----------------------------|-----------------------------------|--------------|-----------------|------------------------|--------------------------------|---------------------------|
| | Less pesticide residue on products | Better for the environment | Products have a longer shelf-life | Better taste | More nutritious | Lower carbon footprint | Lower greenhouse gas emissions | Some other characteristic |
| West | -0.1377** | -0.0037 | -0.0024 | -0.0309 | -0.0657 | -0.1017** | -0.0577 | 0.0458 |
| Central | -0.0754 | -0.0468 | 0.0015 | 0.1440* | -0.0095 | -0.0358 | -0.1036** | 0.0032 |
| Atlantic | -0.1568** | -0.1053 | -0.0303 | 0.0467 | 0.0838 | 0.0037 | 0.0095 | -0.0200 |
| Ethnic heritage | | | | | | | | |
| Eastern European | -0.0104 | -0.0671 | 0.0511 | 0.1253 | 0.1126 | 0.0472 | -0.0159 | -0.0075 |
| Other Asian | 0.0842 | 0.2467*** | 0.1308** | 0.0880 | 0.1957** | 0.1792** | 0.1334* | -0.0098 |
| Western European | 0.0215 | 0.1114** | -0.0059 | 0.0961** | 0.1090** | 0.0859** | 0.0152 | -0.0015 |
| African/Caribbean | -0.1060 | 0.0147 | 0.0794 | 0.0583 | 0.1440 | 0.0023 | 0.0784 | 0.0186 |
| Chinese/Japanese | -0.0341 | -0.0290 | 0.0168 | -0.0902 | 0.0535 | -0.0101 | 0.0136 | -0.0038 |
| Other ethnicity | -0.0111 | -0.0024 | 0.0279 | 0.0654 | 0.0890 | -0.0611 | -0.0229 | 0.0169 |
| Gender (1 = male) | -0.0427 | -0.0997** | -0.0216* | -0.0388 | -0.1024*** | -0.1070*** | -0.0962*** | 0.0000 |
| Persons in household <18 years | 0.0134 | -0.0079 | 0.0040 | -0.0034 | 0.0227 | 0.0015 | -0.0062 | 0.0048 |
| Persons in household ≥ 18 years | -0.0272 | -0.0402** | 0.0082 | 0.0133 | -0.0109 | -0.0185 | -0.0286 | 0.0016 |
| Primary household shopper (1 = yes, 0 = no) | -0.0684* | -0.0495 | -0.0093 | -0.0253 | -0.0531 | -0.0192 | -0.0051 | 0.0063 |
| Primarily shop at chain store (1 = yes, 0 = does not) | -0.0190 | 0.0423 | 0.0027 | 0.0647 | 0.0582 | -0.0177 | 0.0189 | 0.0068 |
| Primarily shop at farmers' market (1 = yes, 0 = does not) | -0.0421 | 0.0430 | 0.0175 | 0.0554 | 0.0855** | 0.0416 | 0.0228 | 0.0180 |

(Continued)

Table 5. Continued

| | May or may not be accurate definition | | | | | | | |
|--|---------------------------------------|----------------------------|-----------------------------------|--------------|-----------------|------------------------|--------------------------------|---------------------------|
| | Less pesticide residue on products | Better for the environment | Products have a longer shelf-life | Better taste | More nutritious | Lower carbon footprint | Lower greenhouse gas emissions | Some other characteristic |
| Purchased fruit within last year (1 = yes, 0 = no) | 0.0303 | 0.0583 | 0.0275 | 0.0855 | 0.1619* | 0.1168 | 0.0791 | 0.0079 |
| Length of residence in Canada | 0.0068 | 0.0086 | -0.0013 | 0.0005 | -0.0019 | 0.0103** | 0.0045 | 0.0046*** |
| Food matters | 0.0864*** | 0.0612** | -0.0060 | 0.0188 | 0.0501* | 0.0658*** | 0.0828*** | -0.0003 |
| Food interest | -0.0048 | 0.0514** | 0.0111 | 0.0509** | 0.0473* | -0.0059 | -0.0125 | 0.0060 |
| Percentage of whole fruit purchases local | -0.0002 | 0.0012 | -0.0004 | -0.0001 | -0.0005 | 0.0005 | 0.0006 | -0.0002 |
| Percentage of whole fruit purchases organic | 0.0007 | 0.0021** | 0.0008*** | 0.0045*** | 0.0044*** | 0.0011 | 0.0014* | 0.0005** |
| Postal code characteristics | | | | | | | | |
| Population changes from 2001 to 2006 | -0.0041 | 0.0027 | -0.0012 | 0.0023 | 0.0040 | -0.0028 | -0.0042 | -0.0021* |
| Population density per square kilometer ^e | -0.0150 | 0.0190 | -0.0133 | -0.0034 | 0.0084 | 0.0161 | -0.0076 | 0.0036 |
| Median age | 0.0016 | 0.0037 | -0.0019 | -0.0062 | 0.0137 | 0.0067 | -0.0098 | -0.0030 |
| Median after tax income | 0.0003 | 0.0012 | 0.0006 | 0.0008 | -0.0032 | -0.0022 | 0.0005 | -0.0003 |
| Average household size | -0.0497 | 0.0936 | 0.0061 | -0.0446 | 0.0236 | 0.0305 | -0.0312 | 0.0051 |
| Employment rate | 0.0072 | -0.0064 | -0.0011 | -0.0059 | 0.0070 | 0.0123*** | -0.0027 | -0.0010 |

(Continued)

Table 5. Continued

| | May or may not be accurate definition | | | | | | | |
|---|---------------------------------------|----------------------------|-----------------------------------|--------------|-----------------|------------------------|--------------------------------|---------------------------|
| | Less pesticide residue on products | Better for the environment | Products have a longer shelf-life | Better taste | More nutritious | Lower carbon footprint | Lower greenhouse gas emissions | Some other characteristic |
| Percentage employed in agriculture ^e | -0.0163*** | -0.0009 | -0.0006 | 0.0063 | 0.0082 | -0.0102* | -0.0017 | -0.0024 |
| Percentage nonvisible minority | 0.0090 | 0.0280 | -0.0035 | 0.0271 | 0.0428* | -0.0269 | -0.0318* | 0.0009 |
| Percentage visible minority | 0.0103 | 0.0232 | -0.0027 | 0.0263 | 0.0406* | -0.0273 | -0.0323* | 0.0009 |
| Log pseudolikelihood | -545.21 | -563.16 | -201.13 | -501.13 | -498.67 | -468.44 | -451.62 | -168.31 |
| Wald Chi ² | 64.00 | 89.64 | 82.77 | 107.65 | 119.29 | 80.94 | 70.98 | 89.86 |
| Prob > Chi ² | 0.021 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | 0.000 |
| Pseudo R ² | 0.057 | 0.087 | 0.154 | 0.115 | 0.124 | 0.096 | 0.081 | 0.174 |
| Sensitivity | 0.640 | 0.651 | 0.716 | 0.679 | 0.677 | 0.700 | 0.659 | 0.704 |
| Specificity | 0.593 | 0.639 | 0.749 | 0.687 | 0.690 | 0.628 | 0.628 | 0.710 |
| Percentage correctly predicted | 0.609 | 0.645 | 0.746 | 0.685 | 0.686 | 0.635 | 0.635 | 0.709 |

Notes: ^aBase categories include: not knowledgeable about local, not knowledgeable about organic, high school education or less, do not live in fruit production region, not married/with partner, Ontario, Canadian, female, not the primary household shopper, does not shop at chain store, does not shop at farmers' market, and did not purchase fruit last year. Food matters and food interest scales are 1-5 with 1 = disagree and 5 = agree.

^bKnowledge does not account for any temporal or spatial differences in knowledge, it is only a one-time view of how knowledgeable consumers perceive themselves to be.

^cRepresents the probability change given a \$1,000 increase in the mean.

^dWest—Alberta, Northwest Territory, and Yukon Territory; Atlantic—Nova Scotia, Newfoundland and Labrador, Prince Edward Island, and New Brunswick; Central—Saskatchewan and Manitoba. Defined based on their proximity to major horticultural production areas.

^eRepresents the probability change given a 1,000 person increase in the mean. *, **, *** indicate significance at the 0.1, 0.5, and 0.01 alpha levels, respectively.

Table 6. Marginal effects associated with the MNL for consumer and geographical influences on geographical boundaries of local^a

| | 30 Miles or less | 30–100 Miles | 100 Miles more, within province | Within province | Within Canada |
|--|---------------------|-----------------|---------------------------------------|--------------------|------------------|
| Knowledge^b | | | | | |
| Local: somewhat knowledgeable | 0.0973* | 0.0261 | -0.0015 | -0.1125* | -0.0094 |
| Local: very knowledgeable | 0.0623 | 0.0162 | 0.0034 | -0.0584 | -0.0235** |
| Organic: somewhat knowledgeable | -0.0725 | 0.0639 | -0.0014 | -0.0025 | 0.0126 |
| Organic: very knowledgeable | -0.1094 | 0.0161 | 0.0175 | 0.0221 | 0.0537 |
| Individual/household characteristics | | | | | |
| Income ^c | -0.0018*** | 0.0009 | 0.0002 | 0.0008 | -0.0001 |
| Education | | | | | |
| Some college education | 0.0047 | 0.0607 | -0.0106 | -0.0560 | 0.0013 |
| Bachelor's degree | -0.0457 | 0.1493** | 0.0023 | -0.0946* | -0.0113 |
| Above bachelor's degree | -0.0267 | 0.1452** | 0.0188 | -0.1225** | -0.0148 |
| Live in a major fruit production region | 0.0458 | -0.0338 | 0.0072 | -0.0316 | 0.0123 |
| Married/partner | 0.0470 | -0.0337 | -0.0245* | -0.0011 | 0.0124 |
| Age | 0.0014 | 0.0007 | -0.0005 | -0.0014 | -0.0003 |
| Province of residence ^d | | | | | |
| British Columbia | -0.0629 | -0.0357 | -0.0021 | 0.1311** | -0.0304*** |
| Quebec | -0.0174 | -0.1550*** | -0.0189* | 0.1467* | 0.0447 |
| West | -0.0654 | -0.0782 | 0.0262 | 0.0337 | 0.0837 |
| Central | -0.1359** | -0.0752 | 0.0455 | 0.0506 | 0.1151 |
| Atlantic | -0.2446*** | -0.0675 | -0.0043 | 0.2971*** | 0.0192 |
| Ethnic heritage | | | | | |
| Eastern European | -0.1509** | -0.0309 | 0.0509 | 0.1335* | -0.0026 |
| Other Asian | 0.0129 | -0.1274** | -0.0175*** | 0.1403* | -0.0084 |
| Western European | -0.0708 | 0.0247 | 0.0238 | 0.0356 | -0.0133 |
| African/Caribbean | -0.1486 | -0.2502*** | 0.0607 | 0.2606** | 0.0775 |
| Chinese/Japanese | 0.0245 | -0.1254** | -0.0140 | 0.1141 | 0.0008 |
| Other ethnicity | -0.0245 | -0.0530 | -0.0117 | 0.0813 | 0.0080 |
| Gender (1 = male) | 0.0219 | 0.0697* | -0.0046 | -0.0780** | -0.0089 |
| Persons in household < 18 years | 0.0078 | -0.0175 | -0.0022 | 0.0129 | -0.0009 |
| Persons in household ≥ 18 years | 0.0434** | -0.0011 | 0.0068 | -0.0459** | -0.0031 |
| Primary household shopper (1 = yes, 0 = no) | -0.0034 | 0.0108 | -0.0084 | 0.0065 | -0.0055 |
| Primarily shop at chain store (1 = yes, 0 = does not) | -0.0379 | -0.0440 | -0.0253* | 0.0900** | 0.0172* |
| Primarily shop at farmers' market (1 = yes, 0 = does not) | 0.0120 | 0.0482 | -0.0007 | -0.0670* | 0.0076 |
| Purchased fruit within last year (1 = yes, 0 = no) | -0.1519 | 0.0630 | -0.0096 | 0.1130 | -0.0145 |
| Length of residence in Canada | -0.0046 | 0.0045 | 0.0062*** | -0.0030 | -0.0032** |

(Continued)

Table 6. Continued

| | 30 Miles or less | 30–100 Miles | 100 Miles more, within province | Within province | Within Canada |
|---|---------------------|-----------------|---------------------------------------|--------------------|------------------|
| Food matters | -0.0189 | -0.0168 | -0.0080 | 0.0510** | -0.0073 |
| Food interest | -0.0313 | 0.0278 | 0.0042 | -0.0093 | 0.0086 |
| Percentage of whole fruit purchases local | -0.0011 | -0.0002 | -0.0001 | 0.0013* | -0.0000 |
| Percentage of whole fruit purchases organic | 0.0012 | -0.0005 | 0.0002 | -0.0008 | -0.0001 |
| Postal code characteristics | | | | | |
| Population change from 2001 to 2006 | -0.0004 | 0.0050* | 0.0001 | -0.0038 | -0.0010 |
| Population density per square kilometer ^c | 0.0201 | -0.0385 | -0.0009 | 0.0185 | 0.0007 |
| Median age | 0.0053 | 0.0055 | 0.0036* | -0.0198* | 0.0055** |
| Median after tax income ^c | -0.0032 | -0.0042 | -0.0002 | 0.0073** | 0.0003 |
| Average household size | 0.2187* | -0.1460 | -0.0008 | -0.0939 | 0.0220 |
| Employment rate | -0.0013 | 0.0039 | 0.0022 | -0.0080 | 0.0031* |
| Percentage employed in agriculture ^c | 0.0074 | -0.0003 | -0.0002 | -0.0075 | 0.0005 |
| Percentage nonvisible minority | 0.0049 | -0.0305 | 0.0009 | 0.0263 | -0.0015 |
| Percentage visible minority | -0.0005 | -0.0282 | 0.0009 | 0.0287 | -0.0009 |
| Percentage correctly predicted | 0.530 | 0.400 | 0.049 | 0.500 | 0.240 |
| Log pseudolikelihood | | | -1,076.40 | | |
| Wald Chi ² | | | 404.80 | | |
| Prob > Chi ² | | | 0.000 | | |
| Pseudo R ² | | | 0.125 | | |

Notes: ^aBase categories include: not knowledgeable about local, not knowledgeable about organic, high school education or less, do not live in fruit production region, not married/with partner, Ontario, Canadian, female, not the primary household shopper, does not shop at chain store, does not shop at farmers' market, and did not purchase fruit last year. Food matters and food interest scales are 1–5 with 1 = disagree and 5 = agree.

^bKnowledge does not account for any temporal or spatial differences in knowledge, and it is only a one-time view of how knowledgeable consumers perceive themselves to be.

^cRepresents the probability change given a \$1,000 increase in the mean.

^dWest—Alberta, Northwest Territory, and Yukon Territory; Atlantic—Nova Scotia, Newfoundland and Labrador, Prince Edward Island, and New Brunswick; Central—Saskatchewan and Manitoba. Defined based on their proximity to major horticultural production areas.

^eRepresents the probability change given a 1,000 person increase in the mean.

*, **, *** indicate significance at the 0.1, 0.5, and 0.01 alpha levels, respectively.

insignificant is the very knowledgeable consumer and those consumers that purchase a large percentage of their whole fruit as local. This seems fit with Carter-Whitney (2008) in that as consumers become more knowledgeable or actually have to purchase local, the 50 km boundary is too small.

However, when we move to the 30–100 mile range as a boundary, we see that higher educated “Canadians” tend to be more likely to believe in this distance. We also see that

postal codes that could be classified as “growing population” are 1%, for every 1% increase in population growth from the mean, more likely to believe in this message. Interesting, we do not see knowledge or percent local whole fruit consumption as significant. In regards to the third category represented by a boundary greater than 100 mile but less than provincial, we see that consumers that shop at a chain store are less likely to buy into this definition, but consumers that have lived in Canada for increasing periods are more likely.

As expected, the provincial geographic delineation encompassed the largest number of consumers. This mindset tended to be associated with less educated females that shop at chain stores, while also living in communities made up of younger high-income consumers. The emergence of several geographic characteristics (younger and higher median income) is interesting. This could indicate that different messaging or product placement is occurring in stores in these areas as compared to older, lower income areas. Of further interest is that African/Caribbean consumers are 26% more likely to believe the provincial boundary compared with Canadians. This provides a key insight as to how to market local product to a large ethnic community within Canada.

With respect to the Canada wide definition, we see that consumers shopping in chain stores are 2% more likely to believe in a national definition of local, while consumers that perceive themselves as very knowledgeable about local are also less likely. From these findings, we are not able to truly define this group, other than to make the generalization that the “Product of Canada” definition is adopted by chain store consumers with limited knowledge of local.

CONCLUSIONS

Given the amount of resources being spent throughout the entire value chain to promote “local” and “organic” products, it is imperative that we understand what consumers believe. Through this study, we identified that demographics, knowledge, and geographic characteristics do play a role in both consumer beliefs about local and organic food, as well as which geographical boundary consumers associate with local. General findings are that for the most part, consumers know the key concepts of local and organic production. However, many are confused about less publicized practices. To this end, we see that as consumers increasingly want to understand their food, they begin to associate more and more positive attributes to local and organic, especially organic.

With respect to actionable findings for the value chain, it is apparent that the market is heterogeneous with respect to perceptions. For instance, ethnic consumers not only have distinct views about what local and organic mean, but also what boundary should be applied to still be considered as local. Furthermore, newer residents seem to have distinct belief differences compared to Canadians. These findings offer key insights as to how the value chain can market to new demographics by addressing the incorrect associations and reaffirming the accurate associations.

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