Consumer Preferences for Peach Attributes: Market Segmentation Analysis and Implications for New Marketing Strategies

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Consumers in today's marketplace have seemingly endless choices with regards to produce. Peach growers and retailers in Ontario, Canada, have begun taking steps to increase demand for their products. This study investigates the impact of those strategies on the market. Using conjoint analysis and market simulations, we evaluate the peach market to identify key drivers of peach purchasing. The results indicate that the market is heterogeneous and that price, origin, and quality indicators are the most important drivers of purchases. Our simulations indicate that adoption of new plastic packaging by the industry is a viable strategy for increasing demand for local peaches.

***Key Words*:** conjoint analysis, market simulation, tender fruit

A quick look at the tender fruit industry in Ontario, Canada, reveals an industry that has tremendous potential. For instance, few industries can capitalize on "eat healthy" and "buy local" movements as well as producers of tender fruit. In the Ontario market, Ontario-grown fresh peaches held an average market share of 79 percent in-season and 51 percent year round from 2003 through 2007 (Deloitte and Touche LLP 2010) with a slight uptick in market share between 2007 and 2011, making up 84 percent of the market during the prime month of August and 51 percent in July and September (Marshall 2012). These market shares suggest a strong and vibrant industry.

However, a closer look reveals an industry that is threatened on several fronts. A report by Deloitte and Touche LLP (2010) described several types of barriers that are impeding Ontario peach producers. For example, many large retail outlets have traditionally used Ontario peaches as a loss leader at various times during the peach season, which can offset premiums associated with the fruit's high-quality "local" image. Furthermore, suppliers of tender fruit have little bargaining power within the value chain and have to compete with numerous

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potential substitutes (Deloitte and Touche LLP 2010). While many exporting countries have become more consumer-driven (e.g., by offering fruit with a consistent internal and external quality), the lack of bargaining power on the part of Ontario suppliers has prevented them from developing their produce to better meet consumer demand. Additional weaknesses identified in the report by Deloitte and Touche LLP (2010) are inconsistent quality at the consumer level and a lack of market-oriented approaches by Ontario producers, packers, and shippers.

The threat of potential substitutes is particularly ominous (Deloitte and Touche LLP 2010), especially the threat of consumers substituting imported peaches. Imports of peaches consist not only of new varieties but also of new types of packaging that are competing with traditional products and packaging for space once occupied primarily by domestic products. As imports claim retail space, they have the potential to erode demand for domestic product. For instance, U.S. peaches have maintained a visible presence in the Canadian market even with the increasing emergence of Chinese and Chilean products (Integrity Intellectual Property, Inc. 2009).

As a result of these market forces, simply sending peaches to market (domestic or international) is not a viable long-term strategy for Ontario producers endeavoring to increase demand for their produce. Thus, we seek to identify strategies that can successfully expand the Ontario peach industry. We first identify key factors that drive consumers to purchase fresh market peaches, focusing particularly on consumer segments and the consumer profiles associated with those segments. Of key interest is consumers' reaction to new plastic packaging that was introduced by some large Ontario retailers in 2010. We then use market simulations to examine (i) the impacts of changes in quality, packaging, and production practices on the Ontario market and (ii) the effect of introduction of Ontario-grown and competing peaches in various regional markets in Canada. Our results will provide Ontario peach producers with valuable insights into the most effective strategies for maintaining and expanding their markets.

Methods

Data

To achieve our research objectives, we implemented a nationwide internet-based survey of Canadian consumers during the 2010 peach season (July through September). We timed the survey to coincide with peach season so that survey participants would be faced with similar decisions when making household purchases of fruit. Survey participants were recruited by Global Market Insite, Inc. (GMI) and were directed to the survey site to first answer two qualification questions: (1) Do you purchase fruit? (2) Do you purchase peaches? Respondents who had not purchased fruit were directed to a survey that collected information about their reasons for not buying. Respondents who had not purchased peaches were directed to a survey focused on their reasons for not buying peaches. Respondents who had purchased both fruit and peaches completed a survey that examined their peach buying habits plus a conjoint section. This survey collected detailed demographic, socio-economic, and purchasing behavior information. The recruited sample consisted of 1,469 consumers; 2 percent had purchased no fruit, 9 percent had purchased no

peaches, and 50 percent had purchased both fruit and peaches. The remaining 39 percent did not complete a survey so the overall response rate was 61 percent.

Methodology

As noted, we divided survey respondents into three groups based on their answers to two qualifying questions and consumers who had purchased peaches proceeded to the conjoint section of the survey. Conjoint analysis has been used extensively to better understand consumer preferences for attributes for a wide variety of produce, including apples (Manalo 1990, Baker and Crosbie 1994, Baker 1998, 1999, Onozaka and McFadden 2011), bell peppers (Frank et al. 2001), citrus fruit (Campbell et al. 2004, Campbell et al. 2006), strawberries (Darby et al. 2008), and tomatoes (Lin, Payson, and Wertz 1996, Onozaka and McFadden 2011), and of produce in general (Campbell et al. 2010).

Product characteristics that affect consumers' purchase decisions can be thought of as search (verified prior to purchase), experience (known after purchase), and credence (difficult to verify before or after use) attributes (Ford, Smith, and Swasy 1990, Darby and Karni 1973, Nelson 1970, 1974). For peaches, internal characteristics such as taste and texture can be treated as experience attributes since they are known only after consumption while external characteristics such as color, size, firmness, and shape can be treated as search attributes because consumers can verify those characteristics prior to purchase. Credence attributes of peaches tend to be related to marketing, such as labels that identify the fruit as local or organic (Wirth, Stanton, and Wiley 2011).

The attributes and levels used in the study were selected after consultation with industry experts and a review of pertinent literatures. Because experience attributes are not known to consumers until after purchases are made, we did not use those attributes in the conjoint design. We used numerous search and credence attributes. A prior study (Bruhn 1995) identified firmness and external color of peaches as the most important attributes used by consumers to judge the internal quality of the fruit. We thus included "external feel" (firm, soft, or extremely soft) and external color (green, yellow, red/yellow, or red) in our study design. Bruhn (1995) also found that fruit size plays a role in perceptions of quality so we added external size (2 inches, 2.75 inches, and 3.5 inches) as a characteristic. Finally, we included internal color (yellow, white, or white/red) as an attribute since newer varieties of peaches have unique internal fruit colors.

As noted throughout the literature on consumer preferences for produce (Darby et al. 2008, Yue and Tong 2009, Campbell et al. 2010, Nganje, Hughner, and Lee 2011, Onozaka and McFadden 2011), consumers are willing to pay a premium for locally grown produce. Campbell et al. (2010) examined the Ontario produce market specifically and found that provincial labeling in general and the "Foodland Ontario" logo in particular increased not only willingness to pay but also the likelihood of purchasing produce for some consumers. Given the importance to consumers of "buy local" messaging (e.g., "Product of Nova Scotia," "Foodland Ontario," "Buy BC," and "Quebec Vrai"), we expect that "locally" produced peaches will be preferred by some segments of the market. We therefore included the production region (i.e., labeled as coming from British Columbia, Ontario, or the United States and no label) as

an attribute. Peaches labeled as organic were also considered important since they could establish whether there are viable markets in Ontario for organic peaches.

The final three attributes were price ($0.59, $1.29, $1.99, and $2.49 per pound), shape (normal and oblong), and package type (loose, three-liter plastic container, three-liter cardboard basket, and seven-pound tray). We selected the price levels after consulting with industry experts and determining retail prices for peaches throughout Canada for both large nationwide sellers and local markets such as farmers' markets in regions where peaches are produced. Shape was included because new oblong or "doughnut" shaped peaches are entering the market.

We also categorized respondents according to their view of their heritage—as Canadian heritage or as non-Canadian heritage. Based on our discussions with industry experts, we hypothesize that those consumers who see themselves as non-Canadian heritage will have increased preference for oblong peaches compared to normal (round) peaches as they are more readily accessible in non-Canadian markets. We are also interested in consumers' responses to various types of packaging and particularly in their responses to the three-liter plastic container that was introduced in the Ontario market in 2010.

Once we chose our set of attributes and levels, we used a fractional factorial design to generate 32 product profiles. Much of the literature on agricultural products has restricted such profiles to 25 or less to limit respondent fatigue; however, studies in marketing and business have used larger numbers of profiles to evaluate products (see Moskowitz, Gofman, and Beckley 2006). Given the potential for order effects, we randomized the profiles. Each survey respondent was asked to rate all 32 profiles based on a combination of written descriptions (price, external feel, region label, and organic label) and pictorial presentations (package type, external color, internal color, size, and shape).

Our rating system was a continuous line that allowed respondents to click anywhere on the scale. There were no numerical endpoints, only phrases—"Definitely would not purchase" and "Definitely would purchase"—since numerical marker values could generate bias (Lawless and Heyman 1999). Though the respondents did not see numerical values, the software recorded the position of each click on the line on a scale of 0 to 100 measured at the single decimal increment. Thus, a consumer marking the exact halfway point of the line registered a 50 rating on the scale. A large number of respondents selecting one of the endpoints (0 or 100) would potentially generate an econometric problem. However, in our survey, no respondent chose the minimum endpoint and only 0.4 percent chose the maximum endpoint. As noted by Fields and Gillespie (2008), this rating scale allowed respondents to communicate preference order, indifference, and intensity across the products evaluated. Furthermore, as described in Harrison and Sambidi (2004), it was easy for respondents to rate each product profile since unique ordering was not required and cardinal properties could be expressed without a loss of information. Once respondents finished the conjoint section of the survey, they were asked to answer questions about their purchase behavior and demographics.

Applications of conjoint analysis are based on a random utility framework. As noted by Wirth, Stanton, and Wiley (2011), a buyer's overall product utility is the sum of the buyer's individual utilities for all of the attributes that make

up the product. Furthermore, a willingness-to-purchase rating represents the buyer's overall utility such that choice *j* is characterized by

$$U_{ij} = V_{ij} + \varepsilon_{ij} \tag{1}$$

where U_{ij} is total utility for the *i*th respondent to the *j*th product, ε_{ij} is the stochastic error, and V_{ij} is "the systematic portion of the utility function" (Lusk and Schroeder 2004) associated with peach attributes. Given the continuous nature of the scale, we estimated the parameters via ordinary least square regression:

$$Y_{ij} = \beta_0 + \beta_i \mathbf{X}_{ij} + \varepsilon_{ij} \tag{2}$$

where ε_{ij} is the error term (assumed to be independent and identically distributed), $\mathbf{X}_{ij}$ is the vector of product-related attributes (see Table 1), Y_{ij} is the dependent variable (ratings), β_0 is the intercept, and β_i is a vector of part-worth utilities. We further treat all of the independent variables as dummy variables but code them for effects, thus transforming them into deviations from the mean (Hair et al. 1998). Instead of traditional dummy variable coding of 0 and 1, effect coding uses a [–1, 0, 1] scheme. For example, if the model uses three prices (low, medium, and high) with the low price denoted as the base price, each price would be coded as –1 when the base price was shown to the consumer. When the medium price was shown to the consumer, the low price would be coded –1, the medium price as 1, and the high price as 0. When the high price was shown to the consumer, the low price would be coded as –1, the medium price as 0, and the high price as 1. The effect-coded variables are no longer compared to a base category; instead, they are compared directly to the rating scale and added or subtracted from the mean (i.e., intercept) rating. Through this transformation, we can calculate coefficients for each attribute level and relative importance values (Wirth,

Table 1. Attributes and Levels Used in the Conjoint Analysis

Attribute	Levels			
Price per pound	$0.59	$1.29	$1.99	$2.49
Size	2 inches	2.75 inches	3.5 inches	
External feel	Firm	Soft	Extremely soft	
Internal color	Yellow	White	White/red	
External color	Green	Yellow	Red/yellow	Red
Shape	Normal	Oblong		
Package type	Three-liter basket	Three-liter plastic	Seven-pound tray	One pound loose
Origin	Ontario	British Columbia	United States	No label
Organic	Yes	No		

Stanton, and Wiley 2011) while conducting a wide array of simulations by changing product designs.

After the individual regressions were run, we assigned respondents to groups (clusters) by similarity of preferences (part-worth utilities) (Green and Helsen 1989). The most common method for identifying the number of clusters is a predefined algorithm (e.g., Ward's linkage) to cluster like consumers and then use a statistical test (e.g., pseudo *J*, pseudo *T*-square) to determine the optimum number of segments. As discussed by Kotler and Armstrong (2001), market segments should be measurable, accessible, substantial, differentiable, and actionable. Purely objective (i.e., statistical) approaches to finding the optimum number of segments offer little control over the selection. Therefore, we used two algorithms (Ward's linkage and weighted-average linkage) to cluster the respondents (results presented are based on Ward's linkage, but few differences were present across clustering algorithms) and then used a pseudo *J* and a pseudo *F* statistical test to guide our subjective evaluation of the segments to determine whether the identified segments met Kotler and Armstrong's (2001) criteria.

After determining the optimal number of segments, we applied a multinomial logit model (MNL) and corresponding marginal effects to establish profiles for each consumer segment. Before estimating the MNL model, we conducted a correlation analysis to identify any multicollinearity in the proposed model. The results of the variance inflation factor and condition index diagnostics indicated that the final model had a low degree of multicollinearity between explanatory variables.

The MNL model (Greene 2003) was specified as

$$\text{Prob}(S_i = j) = \frac{e^{\beta'_j x_i}}{\sum_{k=1}^{6} e^{\beta'_k x_i}} \quad \text{where j} = 1, \ldots, 6 \tag{3}$$

where Prob(S_i = *j*) represents the probability that respondent *i* belongs to segment *j;* k_i is a set of demographics, food attitudes, purchasing behavior characteristics, and postal code characteristics; and β is a vector of parameters.

Table 2 presents a detailed description of the explanatory variables and definitions. The demographic variables represent traditional demographic characteristics. We used ethnic heritage instead of the typical ethnicity question to better understand how survey participants see themselves culturally. Thus, respondents could classify themselves as of Canadian heritage regardless of their families' ethnic origins (and related cultural food preferences) or vice versa. The questions about purchase behavior revolved around purchases of local and organic fruits and the ratio of fruit expenditures devoted to peaches. We established characteristics related to population density, median income, and median age by linking participants' postal codes to characteristics of the population of those postal codes from the 2006 Census of Canada.

The MNL β coefficients represent log-odds and are somewhat cumbersome to interpret, so we examined marginal effects to obtain more useful results. Marginal effects give the increased or decreased probability that an explanatory variable has on the probability of being in a specific dependent variable category, segment membership in our case. Accurate interpretation depends on whether the explanatory variable is continuous or discrete. For a continuous explanatory variable such as age, the marginal effect indicates the probability

Table 2. Explanatory Variables Used in the Multinomial Logit Model

Variable	Categories Baseline Category in Italics	Definition
Ethnic heritage	*Canadian*, Eastern European, Western European, African/ Caribbean, Japanese/Chinese, Other Asian, Other	Ethnic heritage with which the consumer primarily identifies
Region	*Ontario*, British Columbia, Quebec, Western (Yukon Territory, Northwest Territory, Alberta), Central (Saskatchewan, Manitoba), Atlantic (Newfoundland and Labrador, New Brunswick, Prince Edward Island, Nova Scotia)	Region where the household is located
Gender	Male, *Female*	Sex of the respondent
Knowledge about local food	*No Knowledge*, Somewhat knowledgeable, Very knowledgeable	Consumer's perceived knowledge about local food
Knowledge about organic	*No Knowledge*, Somewhat knowledgeable, Very knowledgeable	Consumer's perceived knowledge about organic food
Time between peach purchase and consumption	Days	Number of days from peach purchase to consumption
Sweet	Sweet, *Not sweet*	Respondent's view about whether peach should be sweet or not
Extremely juicy	Extremely juicy, *Not extremely juicy*	Respondent's view about whether peach should be extremely juicy or not
Primary household shopper	Yes, Equally shared, *No*	Whether the respondent was the primary shopper
Retail outlet primarily shop	Large chain store, Independent chain store, Discount store, Mass merchandiser, Warehouse/club, Farmers' market, Other	Location where the respondent primarily shops; could check all outlets that applied
Education	*High school diploma or less*, Some college, Associate degree, Bachelor's degree, Greater than bachelor's degree	Education attained by respondent
Household size ≥ 18 years	Number	Number of people living in the household who are 18 years of age or older
Household size < 18 years	Number	Number of people living in the household who are younger than 18 years of age
Married/partner	Yes, *No*	Whether respondent is married or has a partner

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Table 2. (continued)

Variable	Categories Baseline Category in Italics	Definition
Spending dollar ratio: percent peach/fruit	Percentage	Amount of fruit budget spent on peaches
Length of time lived in Canada	Years	Number of years respondent has lived in Canada
Food matters	Rating scale where 1 = disagree and 5 = agree	Respondent's agreement with "the food I eat matters"
Food interest	Rating scale where 1 = disagree and 5 = agree	Respondent's agreement with being interested in the food purchased
Production region	Live in, *Do not live in*	Whether the respondent lives in a peach production region
Income	Dollars	Amount of household income
Quantity of peaches purchased per trip	Kilograms	Amount of peaches purchased per trip to a retail outlet
Age	Years	Respondent's age in years
Percent of food purchases locally produced	Percentage	Amount of respondent's purchased food that is locally produced
Percent of food purchases organically produced	Percentage	Amount of respondent's purchased food that is organically produced
Population change from 2001 to 2006	Percentage	Percentage increase/decrease in population within the respondent's postal code
Median age	Years	Median age within the respondent's postal code
Median after-tax income	Dollars	Median after-tax income within the respondent's postal code
Average household size	Number	Average household size within the respondent's postal code
Employment rate	Percentage	Percentage of people within the respondent's postal code who are employed
Number employed in agriculture	Number	Number of persons within the respondent's postal code employed in agriculture
Percent visible minority	Percentage	Nonaboriginal people of non-Caucasian in race
Percent nonvisible minority	Percentage	Aboriginal people who are non-Caucasian

of a change in a consumer being in a segment given a one-unit increase in the mean, while for a discrete variable such as gender, the marginal effect indicates the probability of a consumer being in a segment given a move from the base dummy variable to the dummy variable of interest.

Traditionally, many conjoint studies have stopped at identification of consumer segments and corresponding profiles. However, a central objective of our research was to determine how various marketing strategies impact the current market using market simulations. By varying the provision of various attributes (package types, prices, and fruit qualities), we developed an assortment of peach products and simulated the effects of marketing strategies to see how introduction of the new and changed products would affect the market. For the simulations, we based our assumptions about prices and levels of quality on discussions with experts in the industry and trends for the current and preceding year.

To conduct the simulations, we employed a first-choice model, which is the same procedure used by Bretton-Clark's (1992) conjoint analysis software. This model has been used in agricultural conjoint analyses of mandarins (Campbell et al. 2006) and peanuts (Nelson et al. 2005). The first-choice model is built on a cornerstone of economic theory—that consumers choose products that maximize their individual total utility. We established a base scenario made up of products currently on the market. We then used the part-worth utilities obtained from the conjoint analysis and calculated total utility for each product within the base case by summing the part-worth utilities for the level of each attribute making up the product. In making a purchase decision, consumers choose the product that generates the highest product utility. By systematically changing the base case, we can observe how these changes will affect our simulated market.

Since the Ontario peach industry may not be able to directly market to the segments we defined, we used the simulation to examine the impacts of new competitors in traditional Ontario peach markets (e.g., peaches produced in British Columbia being introduced in Ontario) and expansion of Ontario peaches to new regions (e.g., Ontario peaches entering the British Columbia market). We also analyzed how geography in a particular production region impacts the market (e.g., Ontario peaches moving into Western Canada, currently supplied by British Columbia producers; British Columbia peaches moving into Quebec, currently supplied by Ontario producers). Furthermore, we took an in-depth look at the Ontario market to determine the impact of varying quality and packaging. We focused solely on the Ontario market for product changes since it is by far the largest consumer market for Ontario peaches in Canada. We used market share, a gross revenue index (GRI) (a unitless measure calculated by multiplying price by market share), demand, and revenue as measures of changing market conditions in our scenarios. Market share (the number of respondents who chose a product divided by the total number of respondents) and GRI values were calculated as in Bretton-Clark (1992). For demand, we used responses to the survey questions about peach purchases to identify aggregate demand and then multiplied the aggregate demand by each product's market share to obtain demand for each product. Revenue was calculated by multiplying a product's demand by the product price. The simulations are static in that a single change is made to the scenario by a single firm in the market. For example, Ontario producers change the packaging they use and the other firms make no changes to their products.

Results

Overall Preferences for Purchasing Peaches

The results for all survey respondents are presented under Total Sample in Table 3. The most influential driver is price, which makes up 18.2 percent of the respondents' purchase decision. The next most important drivers are package type, external feel of the fruit, and regional labeling, which are nearly equally weighted at 15.2 percent, 14.9 percent, and 14.8 percent of the purchase decision, respectively. The drivers that have the smallest impact on the purchase decision are the fruits' size (7.3 percent), external color (9.5 percent), shape (7.1 percent), internal color (7.7 percent), and organic labeling (5.2 percent).

Due to space limitations, we limit our discussion of results of part-worth utilities to the price, external feel, package type, and regional origin labeling attributes (Table 3).[1] We see that respondents' preferences for levels of each attribute are as expected. As theory dictates, consumers prefer lower prices. In line with Bruhn (1995), we find that consumers prefer larger fruit that has more advanced color (ripeness). They also prefer peaches that are the traditional round shape and peaches sold loose. There is little in the way of a premium or discount in preference associated with organic labeling or internal color. Our results are consistent with Campbell et al. (2010) in that regional labeling has added value as evidenced by increased utility for peaches from British Columbia and Ontario and negative utility associated with U.S. peaches.

Market Segments

Critical information can be obtained by identifying segments of the Canadian peach market and the profile of consumers in each segment. By clustering the survey respondents according to similarity of preferences (i.e. part-worth utilities), we identified six market segments that were differentiated and labeled by how respondents valued the various drivers of peach purchasing: price sensitive, location matters, non-discriminating, Ontario / external feel, external feel, and "find their own." We present the results of the conjoint analysis by market segment (Table 3) and the marginal effects from the MLN model for each segment (Table 4).

The price-sensitive segment makes up 15 percent of the sample and places a high value on the lowest price, $0.59 per pound, while heavily discounting the highest price presented, $2.49 per pound (see Table 3). The marginal effects for the price-sensitive segment (Table 4) indicate that Western Europeans and consumers who typically shop in large chain stores are less likely to be price sensitive than consumers perceiving themselves as of Canadian heritage (Table 4). Men are 6.9 percent more likely to be price sensitive than women, which is consistent with Campbell et al. (2010), which found that men valued production and origin labeling less than women. Consumers with higher incomes are less likely to be price sensitive while consumers with more education are more likely to be sensitive to price. As expected, consumers who shop at discount stores, which typically offer lower prices, are 13 percent more likely to be price sensitive while consumers who perceive themselves as very

[1] Full results for the part-worth utility analysis are available from the corresponding author.

Table 3. Results of the Regression and Cluster Analysis and a Summary of the Six Clusters

	Price Sensitive		Location Matters		Non-Discriminating		Ontario / External Feel		External Feel		Find Their Own		Total
	Part-Worth	p-value	Part-Worth	p-value	Part-Worth	p-value	Part-Worth	p-value	Part-Worth	p-value	Part-Worth	p-value	Part-Worth
Relative Importance (percent)													
Price	42.4	*0.000*	12.9	*0.006*	13.5	*0.000*	13.4	*0.000*	13.5	*0.002*	14.9	*0.004*	18.2
Size	6.3	*0.010*	5.6	*0.005*	9.2	*0.000*	6.6	*0.055*	6.2	*0.022*	7.6	*0.504*	7.3
External color	7.4	*0.000*	7.3	*0.011*	10.9	*0.004*	11.4	*0.001*	8.6	*0.182*	8.5	*0.069*	9.5
Shape	4.5	*0.000*	4.4	*0.009*	7.6	*0.401*	12.3	*0.000*	4.8	*0.007*	5.2	*0.003*	7.1
Region label	10.2	*0.000*	39.5	*0.000*	16.3	*0.074*	15.2	*0.682*	10.1	*0.000*	10.3	*0.000*	14.8
External feel	8.3	*0.000*	9.9	*0.003*	11.3	*0.000*	15.5	*0.579*	36.2	*0.000*	14.3	*0.546*	14.9
Package type	10.7	*0.000*	8.8	*0.000*	15.4	*0.840*	11.2	*0.000*	9.2	*0.000*	28.2	*0.000*	15.2
Internal color	6.2	*0.002*	6.4	*0.076*	9.9	*0.000*	7.4	*0.610*	7.6	*0.971*	6.5	*0.005*	7.7
Organic label	4.1	*0.040*	5.3	*0.953*	5.7	*0.264*	6.9	*0.002*	3.8	*0.027*	4.4	*0.085*	5.2
Part-Worth Utilities													
Constant	48.5	*0.060*	45.9	*0.828*	56.8	*0.000*	41.0	*0.002*	**35.7**	*0.000*	37.4	*0.000*	45.4
Price per pound													
$0.59	24.3	*0.000*	5.2	*0.606*	0.2	*0.000*	–1.4	*0.000*	6.6	*0.653*	7.5	*0.131*	6.0
$1.29	3.9	*0.032*	2.0	*0.433*	0.8	*0.000*	4.4	*0.000*	2.7	*0.825*	2.2	*0.439*	2.6
$1.99	–7.6	*0.000*	–0.5	*0.407*	0.1	*0.003*	2.4	*0.000*	–0.9	*0.590*	–2.7	*0.016*	–1.3
$2.49	–20.6	*0.000*	–6.6	*0.609*	–1.1	*0.000*	–5.4	*0.016*	–8.5	*0.309*	–7.1	*0.763*	–7.3

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Table 3. (continued)

	Price Sensitive		Location Matters		Non-Discriminating		Ontario / External Feel		External Feel		Find Their Own		Total
	Part-Worth	p-value	Part-Worth	p-value	Part-Worth	p-value	Part-Worth	p-value	Part-Worth	p-value	Part-Worth	p-value	Part-Worth
Region Label													
Ontario	1.6	*0.025*	9.4	*0.000*	1.5	*0.002*	5.0	*0.008*	3.8	*0.469*	2.3	*0.183*	3.2
British Columbia	1.3	*0.404*	18.7	*0.000*	1.1	*0.140*	0.3	*0.010*	0.1	*0.027*	0.6	*0.035*	1.9
United States	–3.5	*0.014*	–27.4	*0.000*	–2.8	*0.000*	–6.0	*0.521*	–4.6	*0.356*	–3.3	*0.003*	–5.5
No Label	0.6	*0.722*	–0.8	*0.186*	0.2	*0.611*	0.7	*0.574*	0.8	*0.565*	0.4	*0.923*	0.4
External Feel													
Firm	0.6	*0.000*	4.7	*0.564*	–1.3	*0.000*	7.3	*0.060*	24.8	*0.000*	6.8	*0.201*	5.6
Soft	0.6	*0.376*	0.4	*0.666*	1.0	*0.047*	–0.7	*0.118*	–3.1	*0.000*	0.9	*0.113*	0.1
Extremely Soft	–1.2	*0.000*	–5.2	*0.700*	0.3	*0.000*	–6.5	*0.250*	–21.6	*0.000*	–7.7	*0.011*	–5.7
Package Type													
Plastic	0.4	*0.315*	0.4	*0.532*	–1.1	*0.093*	0.6	*0.145*	–1.6	*0.085*	0.1	*0.624*	–0.2
Basket	1.2	*0.561*	–0.2	*0.218*	0.7	*0.736*	0.6	*0.647*	0.4	*0.570*	1.6	*0.192*	0.8
Tray	–3.0	*0.052*	–1.4	*0.016*	–0.8	*0.000*	–2.6	*0.006*	–0.7	*0.000*	–17.1	*0.000*	–4.8
Loose	1.4	*0.001*	1.3	*0.025*	1.3	*0.000*	1.4	*0.000*	1.8	*0.022*	15.4	*0.000*	4.2
Observations	113		49		195		154		79		147		737
Market share	15%		7%		26%		21%		11%		20%		
R-square	0.88		0.88		0.75		0.84		0.88		0.85		0.83
Adjusted R-square	0.67		0.66		0.29		0.56		0.66		0.58		0.53

Note: P-values are associated with a t-test comparing each segment to the total sample.

knowledgeable about local foods are 16.6 percent less likely to be sensitive to price.

For the location-matters segment, 39.5 percent of the decision to purchase peaches is based on region labels (Table 3). The British Columbia label is ranked highest, followed by the Ontario label. This is likely because of the significantly greater number of British Columbia consumers in this segment; Ontario consumers are scattered more or less equally across all of the segments. According to the marginal effects reported in Table 4, increased knowledge of local produce is a key indicator for the location-matters segment. For instance, as knowledge of local produce rises from "no knowledge" to "some knowledge" and "very knowledgeable," we see a 28.3 percent and 99.9 percent increase, respectively, in the likelihood of being in this segment. Consumers who shop at discount stores and mass merchandisers are less likely to be in this segment.

The non-discriminating segment is so labeled because there are no clear peach purchase drivers. Regional labeling (16.3 percent) and package type (15.4 percent) are slightly more important to consumers in this segment (Table 3). Our results are in line with results from studies of several horticultural products that identified a non-discriminating segment (Campbell et al. 2006, Hall et al. 2010); the R-square and adjusted R-square are the lowest for this segment. Consumers in this segment include younger and less educated men who are apt to perceive themselves as knowledgeable about local produce (Table 4).

The Ontario / external feel segment represented 21 percent of the market (Table 3). Consumers in this segment prefer Ontario peaches, red and red/yellow skin coloring, and large firm fruit, and they slightly discount peaches labeled as organic. The marginal effects shown in Table 4 indicate that those who shop at large chain stores are 7.9 percent more likely to be in this segment while both consumers who are married and consumers who devote a large portion of their fruit expenditures to peaches are 9.9 percent more likely to be in this segment. In contrast, consumers from British Columbia and Atlantic and Western provinces are less likely than consumers from Ontario to be in this segment, as are consumers who are very knowledgeable about local and organic food.

As expected, the appearance of peaches available in the market is the primary driver for some consumers (the external-feel group). The external-feel group represented 11 percent of the market (Table 3). Consumers in this segment prefer firm peaches and are likely to shop at discount and large chain stores (Table 4). They are unlikely to be male, live in a peach-producing region, or be knowledgeable about local and organic food. Since they shop at discount and large chain stores, their preference for firm peaches may be based on a predominance of less ripe peaches in those outlets as a way to reduce shrinkage. This theory gains support from the fact that consumers in this segment are less likely to live in a peach-production region, which implies that the peaches they buy most likely have been shipped longer distances.

For the find-their-own segment, which has a 20 percent market share (Table 3), package type is the most important factor with a strong preference for unpackaged loose fruit. As indicated by the marginal effects shown in Table 4, consumers in this segment are knowledgeable about local and organic food, shop at warehouse/club and mass merchandiser stores, and purchase large quantities of peaches. They are unlikely to be Western European or male. As expected, consumers in this segment are more likely to earn higher incomes.

Table 4. Marginal Effects Associated with the Multinomial Logit Model

	Price Sensitive		Location Matters		Non-Discriminating		Ontario / External Feel		External Feel		Find Their Own	
ME: Marginal Effects	**ME**	**p-value**	**ME**	**p-value**	**ME**	**p-value**	**ME**	**p-value**	**ME**	**p-value**	**ME**	**p-value**
Heritage												
Eastern European	0.072	*0.305*	0.008	*0.334*	–0.149	*0.030*	0.024	*0.743*	0.077	*0.319*	–0.032	*0.574*
Other Asian	–0.031	*0.553*	–0.002	*0.722*	–0.035	*0.650*	0.020	*0.810*	0.144	*0.122*	–0.096	*0.048*
Western European	–0.078	*0.040*	0.005	*0.294*	–0.035	*0.519*	0.007	*0.885*	0.013	*0.724*	0.088	*0.055*
African/Caribbean	0.000	*0.999*	0.003	*0.797*	–0.103	*0.290*	–0.001	*0.993*	0.181	*0.192*	–0.080	*0.246*
Japanese/Chinese	0.083	*0.293*	0.001	*0.868*	–0.088	*0.254*	–0.032	*0.735*	0.083	*0.379*	–0.048	*0.420*
Other	–0.061	*0.196*	0.011	*0.400*	0.105	*0.251*	–0.086	*0.173*	0.100	*0.237*	–0.067	*0.181*
Province												
Western – Yukon, Northwest Territories, Alberta	0.040	*0.596*	0.022	*0.224*	0.017	*0.852*	–0.147	*0.006*	0.041	*0.510*	0.027	*0.722*
British Columbia	0.052	*0.471*	–0.000	*0.997*	0.081	*0.340*	–0.113	*0.036*	0.027	*0.560*	–0.047	*0.317*
Central – Saskatchewan, Manitoba	0.082	*0.440*	0.000	*0.969*	0.005	*0.967*	–0.023	*0.777*	–0.069	*0.008*	0.004	*0.959*
Atlantic – Newfoundland / Labrador, New Brunswick, Prince Edward Island, Nova Scotia	0.244	*0.116*	–0.003	*0.518*	0.065	*0.650*	–0.166	*0.005*	–0.085	*0.000*	–0.055	*0.434*
Quebec	–0.052	*0.364*	–0.008	*0.002*	0.074	*0.414*	0.080	*0.325*	–0.034	*0.442*	–0.060	*0.285*
Gender (1 = Male)	0.069	*0.046*	0.003	*0.366*	0.098	*0.035*	–0.013	*0.750*	–0.043	*0.085*	–0.113	*0.001*
Knowledge about Local Food												
Somewhat knowledgeable	–0.065	*0.206*	0.283	*0.000*	–0.099	*0.150*	–0.047	*0.448*	–0.012	*0.711*	–0.059	*0.276*
Very knowledgeable	–0.166	*0.000*	0.999	*0.000*	–0.300	*0.000*	–0.233	*0.000*	–0.100	*0.000*	–0.200	*0.000*

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Table 4. (continued)

	Price Sensitive		Location Matters		Non-Discriminating		Ontario / External Feel		External Feel		Find Their Own	
	ME	**p-value**	**ME**	**p-value**	**ME**	**p-value**	**ME**	**p-value**	**ME**	**p-value**	**ME**	**p-value**
Knowledge about Organic Food												
Somewhat knowledgeable	0.047	*0.209*	–0.009	*0.054*	–0.063	*0.302*	–0.037	*0.515*	–0.066	*0.070*	0.127	*0.001*
Very knowledgeable	0.020	*0.798*	–0.005	*0.051*	–0.165	*0.016*	–0.162	*0.006*	–0.045	*0.167*	0.357	*0.006*
Internal Characteristic Expectation												
Extremely juicy	–0.014	*0.661*	0.003	*0.275*	0.043	*0.339*	–0.018	*0.643*	–0.040	*0.108*	0.027	*0.431*
Sweet	0.009	*0.835*	0.001	*0.832*	–0.047	*0.400*	0.061	*0.192*	–0.052	*0.192*	0.029	*0.511*
Length from purchase to consumption (days)	0.015	*0.102*	–0.001	*0.283*	–0.019	*0.174*	0.005	*0.647*	0.005	*0.511*	–0.005	*0.614*
Primary Household Shopper												
Yes	0.002	*0.982*	–0.001	*0.938*	0.039	*0.697*	–0.106	*0.321*	–0.084	*0.167*	0.149	*0.152*
Equally shared	–0.049	*0.488*	–0.002	*0.819*	0.009	*0.942*	–0.131	*0.158*	–0.077	*0.051*	0.250	*0.158*
Retail Outlet Primarily Shop												
Large chain store	–0.094	*0.044*	–0.002	*0.590*	–0.082	*0.160*	0.079	*0.097*	0.063	*0.010*	0.036	*0.371*
Independent store	–0.033	*0.278*	–0.001	*0.637*	0.051	*0.264*	–0.043	*0.293*	0.013	*0.624*	0.013	*0.706*
Discount store	0.130	*0.008*	–0.006	*0.019*	–0.083	*0.080*	–0.048	*0.297*	0.050	*0.162*	–0.042	*0.302*
Mass merchandiser	0.108	*0.123*	–0.007	*0.014*	–0.049	*0.429*	0.075	*0.328*	–0.024	*0.550*	–0.103	*0.029*
Warehouse/Club	–0.026	*0.531*	–0.001	*0.771*	0.127	*0.053*	–0.049	*0.338*	0.019	*0.610*	–0.070	*0.084*
Farmers' market	–0.021	*0.501*	0.001	*0.717*	0.054	*0.250*	0.023	*0.570*	0.013	*0.646*	–0.070	*0.058*
Other	0.037	*0.551*	0.013	*0.287*	–0.044	*0.590*	–0.048	*0.505*	0.051	*0.432*	–0.008	*0.899*
Education												
Some college	0.082	*0.178*	–0.005	*0.190*	–0.111	*0.059*	0.101	*0.113*	–0.019	*0.565*	–0.048	*0.239*
Associate degree	0.050	*0.567*	–0.000	*0.976*	–0.038	*0.648*	0.038	*0.651*	0.005	*0.929*	–0.054	*0.311*
Bachelor's degree	0.162	*0.040*	0.002	*0.657*	–0.133	*0.026*	0.017	*0.820*	–0.016	*0.665*	–0.032	*0.511*
Greater than bachelors	0.161	*0.055*	–0.002	*0.716*	–0.137	*0.034*	0.072	*0.398*	–0.023	*0.558*	–0.071	*0.134*

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Table 4. (continued)

	Price Sensitive		Location Matters		Non-Discriminating		Ontario / External Feel		External Feel		Find Their Own	
	ME	p-value	ME	p-value	ME	p-value	ME	p-value	ME	p-value	ME	p-value
Household size ≥ 18 years (number of persons)	0.018	*0.311*	–0.000	*0.877*	0.012	*0.597*	–0.014	*0.474*	–0.004	*0.798*	–0.012	*0.573*
Household size < 18 years (number of persons)	–0.049	*0.012*	–0.001	*0.759*	0.063	*0.008*	0.011	*0.624*	–0.005	*0.745*	–0.020	*0.464*
Married/Partner (1 = yes)	–0.043	*0.311*	–0.003	*0.492*	–0.054	*0.333*	0.099	*0.036*	0.024	*0.416*	–0.023	*0.611*
Spending dollar ratio (percent peach/fruit)	0.004	*0.907*	–0.002	*0.550*	0.077	*0.131*	0.099	*0.032*	–0.022	*0.536*	–0.157	*0.003*
Length of time lived in Canada (years)	0.002	*0.696*	0.000	*0.398*	–0.015	*0.011*	0.011	*0.104*	0.006	*0.178*	–0.004	*0.470*
Food matters[a]	–0.033	*0.149*	0.001	*0.758*	–0.044	*0.118*	0.024	*0.437*	0.031	*0.102*	0.022	*0.400*
Food interest[a]	0.060	*0.008*	–0.003	*0.198*	–0.031	*0.312*	–0.017	*0.518*	0.021	*0.236*	–0.030	*0.194*
Production region (1 = live in)	–0.008	*0.825*	0.004	*0.224*	0.069	*0.158*	–0.034	*0.415*	–0.031	*0.207*	0.000	*0.999*
Income[b]	–0.013	*0.014*	0.000	*0.955*	–0.004	*0.628*	0.001	*0.874*	0.003	*0.547*	0.014	*0.025*
Quantity of peaches purchased per trip (kilograms)	0.002	*0.361*	0.000	*0.490*	0.005	*0.174*	0.004	*0.165*	0.001	*0.486*	–0.012	*0.000*
Age	0.001	*0.634*	0.000	*0.801*	–0.003	*0.087*	0.001	*0.638*	–0.000	*0.860*	0.002	*0.230*
Percent food purchases locally produced	0.002	*0.020*	0.001	*0.010*	–0.003	*0.001*	0.001	*0.092*	–0.000	*0.696*	0.000	*0.744*
Percent food purchases organically produced	–0.002	*0.060*	0.000	*0.409*	0.004	*0.000*	–0.003	*0.030*	–0.001	*0.174*	0.001	*0.199*
Postal Code Characteristics												
Population change from 2001 to 2006	0.007	*0.011*	–0.001	*0.059*	0.001	*0.815*	–0.003	*0.404*	–0.004	*0.037*	0.000	*0.933*

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Table 4. (continued)

	Price Sensitive		Location Matters		Non-Discriminating		Ontario / External Feel		External Feel		Find Their Own	
	ME	**p-value**	**ME**	**p-value**	**ME**	**p-value**	**ME**	**p-value**	**ME**	**p-value**	**ME**	**p-value**
Population density per square kilometer[b]	0.010	*0.960*	–0.002	*0.166*	–0.398	*0.128*	0.116	*0.673*	0.081	*0.626*	0.214	*0.273*
Median age	0.020	*0.009*	0.001	*0.399*	–0.010	*0.462*	–0.001	*0.953*	–0.005	*0.347*	–0.004	*0.619*
Median after-tax income[b]	0.010	*0.720*	0.002	*0.489*	0.099	*0.008*	–0.051	*0.177*	–0.063	*0.003*	0.004	*0.887*
Average household size	–0.070	*0.547*	0.006	*0.542*	–0.025	*0.871*	–0.057	*0.681*	0.096	*0.248*	0.050	*0.658*
Employment rate	0.007	*0.196*	–0.000	*0.448*	–0.012	*0.144*	0.013	*0.067*	–0.002	*0.528*	–0.005	*0.443*
Number employed in agriculture[b]	0.100	*0.077*	0.003	*0.511*	0.141	*0.056*	–0.031	*0.642*	–0.087	*0.123*	–0.127	*0.033*
Percent nonvisible minority	0.018	*0.535*	–0.001	*0.758*	–0.041	*0.312*	–0.004	*0.897*	0.028	*0.247*	–0.000	*0.998*
Percent visible minority	0.018	*0.525*	–0.001	*0.756*	–0.039	*0.335*	–0.006	*0.862*	0.026	*0.268*	0.000	*0.998*
Observations	734											
MNL log pseudo-likelihood	–1,009.7											
Wald Chi-square	4,921.9											
Pseudo R-square	0.1950											
Prediction accuracy	0.43		0.42		0.51		0.45		0.41		0.46	

[a] Represents a scale on which 1 = disagree and 5 = agree.

[b] Marginal effects represent the addition of 1,000 units, either dollars or people depending on the variable.

Notes: Results can be interpreted as the change in probability of being in a segment. Base values to which each subcategory is compared are as follows: Canadian ethnic heritage, Ontario, female, no knowledge of local, no knowledge of organic, not juicy, not sweet, not primary shopper, high school diploma or less, not married or with partner, do not live in a production region.

Market Simulations

As Ontario peach producers strive to be competitive, they must adapt to the evolving market by proactively identifying new strategies. Potential strategies include improving the quality of their fruit to target new consumers, pricing that generates greater revenue, and new and improved production practices such as redesigned packaging. However, proceeding with a new strategy without a sound understanding of its potential consequences is potentially rewarding but also risky. If the strategy fails, Ontario peach producers could lose vital ground to imports while a successful strategy could expand the market for their products. To test some of the strategies under consideration, we use the part-worth utilities from the conjoint analysis to construct several scenarios to see how market share, the GRI, demand, and revenue are likely to react to changing stimuli.

To make our comparison, we set the base case as a market comprised of peaches supplied by Ontario and the United States. Industry representatives we consulted indicated that the internal color and external feel of those two types of peaches are comparable and that U.S. peaches tend to be slightly larger than Ontario peaches. We chose the season's mid-point price for each type of peach. Therefore, the U.S. base product was a 2.75-inch red normal-shaped firm peach that was yellow inside, was sold loose for $0.99 per pound, and was not organic. The Ontario base product was a 2.63-inch red normal-shaped firm peach that was yellow inside, was sold in a three-liter traditional cardboard basket for $0.99 per pound, and was not organic. Using the part-worth utilities from Table 3, we can calculate total product utilities for the base scenarios: 13.1 for U.S. peaches and 18.2 for Ontario peaches. The total product utility is determined by summing the part-worth utilities of the attribute levels included in Table 3 (U.S. –5.5, firm 5.6, loose 4.2) and the attribute levels omitted from the table (medium size 0.1, red 0.9, normal shape 2.7, yellow interior 0.7, nonorganic 0.3). The price attribute is the only part-worth that must be calculated. It corresponds to the part-worth utility at the $0.99 price point along the line between the $0.59 and $1.29 part-worth utilities: 4.1. For Ontario peaches, total product utility is 18.3—the sum of the utilities of Ontario (3.2), firm (5.6), three-liter basket (0.8), red exterior color (0.9), normal shape (2.7), yellow interior color (0.7), and nonorganic (0.3) attributes. The price attribute for Ontario and U.S. peaches is the same and thus the price part-worth utility for Ontario peaches is also 4.1. The size part-worth is calculated as the part-worth at the 2.63-size point along the line between the 2.00-inch and 2.75-inch part-worth utilities or –0.1.

Given that producers often market to specific regions, we focus not on the aggregate simulation results but on how changes impact the market within particular regions. We first examined the Ontario market since it has the largest population and volume of peach production in Canada. Ontario is also the largest market for peaches grown there. When we simulated the base scenario for Ontario consumers only, U.S. peaches accounted for 36 percent of the market and Ontario peaches represented 64 percent (Table 5). These market shares are in line with average five-year market shares for Ontario peaches in Ontario of 65 percent between 2003 and 2007 (Deloitte and Touche LLP 2010) and 68 percent between 2007 and 2011 (Marshall 2012).

Our first simulation compared the base case to a change in quality by Ontario peach producers that was represented by some producers supplying softer

fruit (Table 5). From a production standpoint, this change involves a tradeoff in that a softer peach is most likely a riper peach, which could increase shrinkage. Our results indicate that this quality change would decrease demand for U.S. peaches by 15.7 percent while increasing demand for Ontario peaches by 8.7 percent. Revenue would also increase because of greater demand, but the increased revenue could potentially be offset by higher shrinkage rates.

Peach producers are searching for ways to reduce shrinkage rates while offering consumers a more visually appealing product. Recently, several larger Ontario retailers required suppliers of containerized peaches to move

Table 5. Comparison of Various Marketing Strategies to the Current Base Situation in Ontario

	Market Share (percent)	Gross Revenue Index (unitless)	Demand (pounds)	Revenue (dollars)	Change in Demand (percent)
Base					
United States	36%	46.1	1,102	1,421	—
Ontario	64%	63.6	1,981	1,961	—
Quality Change					
United States	30%	38.9	929	1,198	–15.7%
Ontario	30%	29.3	912	903	–53.9%
Ontario – soft	40%	39.9	1,241	1,229	
Total Ontario	70%	69.2	2,154	2,132	8.7%
New Package					
United States	29%	37.8	904	1,167	–17.9%
Ontario	38%	37.8	1,176	1,164	—
Ontario – plastic	33%	32.2	1,003	993	—
Total Ontario	71%	70.0	2,178	2,157	10.0%
New Variety					
United States	34%	43.3	1,036	1,336	–6.0%
Ontario	46%	59.2	1,414	1,400	–28.6%
Ontario – oblong	21%	26.5	633	627	—
Total Ontario	66%	85.7	2,047	2,026	3.3%
Organic Introduction					
United States	30%	38.5	921	1,188	–16.4%
Ontario	42%	42.0	1,307	1,294	–34.0%
Ontario – organic $1.99/lb	28%	55.2	855	1,701	—
Total Ontario	70%	97.2	2,162	2,995	9.1%
Price Change					
United States	57%	56.2	1,751	1,733	59%
Ontario – $2.49/lb	43%	107.6	1,332	3,316	–33%

Notes: Ontario product unless otherwise stated: 2.63-inch red normal-shaped firm peach, yellow internal color, not organic, sold in a three-liter cardboard basket for $0.99 per pound. U.S. product: 2.75-inch red skinned normal-shaped firm peach, not organic, sold loose for $0.99 per pound. Market share is calculated by dividing the number of consumers choosing a product by total number of consumers; gross revenue index is found by multiplying market share by price; demand is found by multiplying aggregate of self-reported purchasing per consumer by market share; revenue is found by multiplying demand by price.

away from the traditional three-liter cardboard basket to a new three-liter plastic container. The traditional cardboard basket costs about $0.30 each and the new plastic container costs about $0.35. This is a very small increase in cost considering the savings associated with the plastic container in terms of reductions in shrinkage both in the packing and transportation and from handling by consumers in-store. This new container was just entering the Ontario market at the time of our survey (2010 peach season). Thus our interest in examining the potential impact of this new packaging on the Ontario peach market. In our simulation, we introduced the new plastic container to our base scenario. Since many producers who do not market to large retailers still use the traditional cardboard basket, we included the cardboard packaging in the simulation as well. The results of the simulation show that Ontario demand for Ontario-grown peaches would increase by 10 percent while Ontario demand for U.S. peaches would drop by 17.9 percent in response to a move to the plastic container by some Ontario producers. Revenue would also increase and would eclipse revenue from the quality change described in the first scenario.

There are other changes that Ontario producers could try, such as introducing an organic peach, new varieties (with different shapes or other characteristics), and price changes. Introduction of an organic peach at a higher price could increase demand and revenue, but the time required to establish an organic product and the cost to produce it could make such a transition economically infeasible. In terms of new varieties with an oblong shape, there is a market for such peaches and Ontario producers could capture a market share of roughly 21 percent of the Ontario market. This small market share is consistent with the opinions of industry experts and the results of our segmentation analysis, which suggest that oblong-shaped peaches would be a niche market for a select group of growers.

The final potential strategy considered is purely economic in nature—pricing. Since Ontario consumers have shown a tendency to prefer provincial peaches, raising the price of those peaches could decrease demand but increase revenue. Our study confirms that outcome. In our model, the price that generates the largest impact on GRI and revenue in our tested range was $2.49 per pound, which cut demand 33 percent but raised revenue and the GRI to the highest level of any strategy examined. As expected, some consumers substituted other peaches for Ontario peaches as the price increased; however, for many consumers, the price was not high enough to induce them to switch, most likely because they valued local production. Implementation of this strategy would require a conscientious effort by all members of the Ontario peach industry and value chain with penalties against suppliers and retailers who sell the fruit for a lower price. As a result, this strategy likely is not a viable option.

Given the dynamic nature of the peach industry in Ontario, we also examined the effect of adoption of these potential new strategies by other producers on the Ontario market and how introduction of Ontario peaches in other markets would affect those markets (see Table 6). In general, the introduction of peaches produced in other areas (e.g., U.S. organic or British Columbia peaches) in the Ontario market would significantly damage the Ontario industry. U.S.-produced organic peaches would capture a large share of Ontario producers' market share and demand (rather than nonorganic peaches produced in the United States). Introduction of peaches from British Columbia would do the same. Consumers who purchase U.S. peaches most likely prefer them because of their size and appearance, and that preference would not change in response to new

Table 6. Comparison of Various Competitive Situations

	Market Share (percent)	Gross Revenue Index (unitless)	Demand (pounds)	Revenue (dollars)	Change in Demand (percent)
New Competition					
Base					
United States	36%	46.1	1,102	1,421	—
Ontario	64%	63.6	1,981	1,961	—
Organic Introduction					
United States	23%	30.3	723	933	–34.3%
Ontario	57%	56.5	1,759	1,742	–11.2%
United States–organic $1.99/lb	19%	38.7	600	1,194	—
Total United States	43%	69.0	1,324	2,127	20.1%
British Columbia Introduction					
United States	31%	39.6	945	1,220	–14.2%
Ontario	50%	49.6	1,545	1,530	–22.0%
British Columbia	19%	19.0	592	586	
Price Change					
United States – $2.09/lb	28%	58.5	863	1,804	–21.6%
Ontario	72%	71.3	2,220	4,639	12.0%
New Markets					
Move into British Columbia					
United States	29%	28.4	186	184	—
Ontario	16%	15.9	104	103	—
British Columbia	55%	54.7	358	354	—
Move into Western Region					
United States	34%	33.8	1,051	1,040	—
Ontario	33%	32.6	1,016	1,006	—
British Columbia	33%	32.6	1,016	1,006	—
Move into Central Region					
United States	36%	35.8	1,115	1,104	—
Ontario	21%	21.1	656	649	—
British Columbia	43%	42.1	1,312	1,299	—
Move into Quebec					
United States	26%	25.6	797	789	—
Ontario	50%	49.5	1,541	1,526	—
British Columbia	24%	23.9	744	737	—
Move into Atlantic Region					
United States	27%	26.7	830	822	—
Ontario	46%	45.7	1,423	1,409	—
British Columbia	27%	26.7	830	822	—

Notes: Ontario product unless otherwise stated: 2.63-inch red normal-shaped firm peach, yellow internal color, not organic, sold in a three-liter cardboard basket for $0.99 per pound. U.S. product: 2.75-inch red skinned normal-shaped firm peach, not organic, sold loose for $0.99 per pound. Market share is calculated by dividing the number of consumers choosing a product by total number of consumers; gross revenue index is found by multiplying market share by price; demand is found by multiplying aggregate of self-reported purchasing per consumer by market share; revenue is found by multiplying demand by price.

introductions. But new options provided by supplies of U.S. organic or British Columbia peaches would peel off local purchasers who want an organic option or who do not limit local produce to provincial boundaries.

Currently, Ontario-grown peaches are sold primarily in Ontario and Quebec with only minimal supplies available in the Atlantic, Central, and Western regions (Marshall 2012). Changing supply destinations would require a shift of some of the supply out of Ontario or Quebec so that strategy would have to present a gain over the current supply structure. We simulated the effect of introduction of Ontario peaches in other regions (see Table 6). Our results indicate that Ontario peaches competing in the British Columbia market would garner only 16 percent of that market but would gain larger portions of the Central (21 percent) and Western (33 percent) markets. Ontario peaches would earn a large market share in the Atlantic region and Quebec. Introduction in the Atlantic region does not supply the GRI or revenue gains that adjusting product characteristics to better meet the desires of Ontario consumers would bring, but it does offer a viable market outlet if additional supplies from new tree plantings became available.

Conclusions

Maintaining market share in an ultra-competitive environment like the one in Canada's tender fruit marketplace forces producers and the value chain to take a proactive approach in making decisions while understanding the likely outcomes of strategies chosen. Our study identifies specific areas in which the Ontario peach industry can most effectively maintain and expand its markets.

The conjoint analysis identifies price, regional labeling, packaging types, and the external feel of peach products as the main drivers of consumer purchases. However, there is heterogeneity within the Canadian peach market with respect to the suite of attributes and levels of those attributes preferred by consumers. We identified six consumer segments based on key purchase drivers. Given the peach industry's traditional one-size-fits-all marketing approach, producers most likely are turning off a subset of consumers and consequently encouraging those consumers to find alternative peach supplies. Consequently, producers and value chain members can better position their products by direct-marketing with messages designed to appeal to specific consumer segments.

As with any industry, Ontario producers should be looking now at ways to improve their product positioning to offer consumers the products they want. In many cases, direct marketing may not be a viable option, so our simulations focused on geographic areas within Canada. Our results indicate that the industry has so far chosen the best option from a revenue and production standpoint among the scenarios examined in this study. Increased prices offer the greatest revenue reward, but enforcing such a strategy across the industry would be almost impossible. However, a shift to plastic packaging offers the second greatest increase in revenue plus the advantage of decreased shrinkage. Consequently, the value chain has an incentive to move to plastic packaging and implementing that strategy would be less difficult than increasing prices. An alternative approach, "do nothing," which has traditionally been the mainstay of agricultural producers, will most likely lead to a reduction in demand and lost revenue if competitors introduce their products in Ontario (e.g., organic U.S. peaches or peaches from British

Columbia). Other provincial and international peach producers are looking to expand their markets, and Ontario peach producers should do the same. Careful consideration must be given to how and where Ontario peaches are introduced in new markets; alternative markets do exist, but some are better for Ontario producers than others.

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