Toward a Marketing Strategy For Fresh

Wild Blueberries in the Northeast*

by

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Introduction

Maine wild blueberries traditionally have been marketed almost entirely in processed form. In recent years there has been increasing interest and participation in marketing them as fresh produce. Fresh wild blueberries are considered by most to differ in appearance and taste relative to cultivated varieties. This paper is concerned with the prospects for profitable expansion of Maine fresh wild blueberries into northeastern markets outside of Maine. The specific question addressed here is: how will the expansion of Maine fresh wild blueberry sales in existing and new markets affect the market price? An important ancillary question is: which large, northeastern markets are most appropriate for expansion? The answers to these questions require consideration of both the demand relationship between Maine wild blueberries and cultivated blueberries from other producing regions (which currently dominate the markets most likely to be targeted for expansion) as well

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as the own price effect of increased wild blueberry supply into these regions.

Both quantitative and qualitative evidence is utilized to address these issues. Regression analysis provides evidence as to the relevant price flexibilities. Evidence from interviews with retail market participants is presented in support of the statistical results.

Marketing fresh wild blueberries, while not a new concept, has been limited to a very small percentage of the crop. Most Maine wild blueberries have been sold frozen or canned. Real producer-level prices received from the processors in Maine averaged approximately $0.52/pound in 1982 (1982 dollars). This price declined sharply over the next four years to $0.20/pound in 1986 in response to steady increases in total wild blueberry production in a series of excellent growing seasons, then rose in 1987 and 1988 to approximately $0.40 per pound. The low field prices paid by processors from 1982 to 1986, however, caused independent producers to initiate fresh packing of wild blueberries. The volume of wild blueberries packed fresh in Maine, less than one-half million pounds, has remained relatively small compared to the total state production (35.3 million pounds in 1987), but has been increasing steadily since 1986 (Hoelper, Marra, and Woods 1988).

A fresh packing cooperative was formed in Maine in 1986 after several fresh packing enterprises entered and exited the market between 1983 and 1986. The principal objectives of this cooperative have been to provide centralized fresh packing facilities and to coordinate a joint marketing effort for its member producers. A Canadian producer group joined the cooperative marketing effort in 1988 by marketing jointly with the Maine cooperative through a common broker.

Boston is the closest large metropolitan market for fresh wild blueberries and a significant receiver of fresh cultivated blueberries from North Carolina, New Jersey, and Michigan. The Boston terminal market is the wholesale supplier for most fresh produce retailers for the Boston metropolitan area and most of northern New England. Large chain stores purchase most of their fresh produce independently, but use the terminal market to supplement their purchases.

A Model of Retail Price Determination

A marketing strategy cannot be successful unless it is based on knowledge of the important components of the demand for the product. This demand, regardless of at what point in the marketing chain it is observed, is derived from the behavior of consumers toward the product and related products. This section describes a basic model of consumer behavior from which the important facets of consumer demand can be identified for study.

Assume that marketers of fresh wild blueberries must decide how much of the annual harvest destined for fresh packing to allocate between two markets: the fresh market in Maine and the fresh market in Boston. This decision is based upon the total profit expected from the final allocation scheme. The total profit is based upon the relative prices, \( P_m \) and \( P_b \), the quantities sold in each market, and the relative costs of marketing in the two regions. These prices are, in turn, based upon consumer demand and, possibly, some aspects of the attitudes of wholesalers and retailers as in the following price dependent demand functions:

\[
P_m = d_m(Q_w^m, Q_c^m, X_m, Z_m)
\]

\[
P_b = d_b(Q_w^b, Q_c^b, X_b, Z_b)
\]

where:

\( P = \) the price per unit received by the blueberry marketers;

\( Q_w = \) the quantity of fresh wild blueberries available for sale;

\( Q_c = \) the quantity of fresh cultivated blueberries available for sale;
\( X = \) a vector of demographic factors affecting consumer demand, such as income or population;

\( Z = \) a vector of product attributes which affect consumer and/or wholesaler willingness to purchase wild blueberries; and

\( m \) and \( b \) refer to the Maine and Boston markets, respectively.

We expect that:

1. As the quantity of fresh wild blueberries available for sale in any market increases, the price per unit will fall, so that

\[ \frac{\partial P_{wi}}{\partial Q_{wi}} < 0; \ i = m, b \]

This relationship is measured by the own-price flexibility, where the price of a good changes in response to a percentage change in the quantity supplied of that good.

2. If fresh wild blueberries and fresh cultivated blueberries are substitutes in demand, then as the quantity of fresh cultivated blueberries available for sale in the market increases and the price of fresh cultivated blueberries falls, consumers will purchase more cultivated blueberries and fewer wild blueberries, which causes the price of wild blueberries to fall, so that

\[ \frac{\partial P_{wi}}{\partial Q_{ci}} < 0; \ i = m, b \]

This relationship is measured by the cross-price flexibility.

3. As the demographic variables, such as income and population, increase, the price of wild blueberries is expected to increase, so that

\[ \frac{\partial P_{wi}}{\partial X_i} > 0; \ i = m, b \]

The characteristics of the retail outlet, e.g. size, location, etc., are assumed to be related to these demographic variables.

4. As the product attributes, such as product quality, product appearance, or product awareness, become more favorable, the price of wild blueberries is expected to increase, so that

\[ \frac{\partial P_{wi}}{\partial Z_i} > 0 \]

These hypotheses are investigated in this paper. Some do not lend themselves to quantitative analysis as well as others. Therefore, the methods employed in the investigation include both quantitative and qualitative techniques. These are described in the next section.

The Data

Telephone interviews were conducted with a random sample of retail produce managers throughout Maine, and in the Boston and New York City metropolitan areas. These interviews were conducted weekly during the 1988 fresh blueberry marketing season. Random sampling with replacement was performed each week resulting in a data set characteristic of a cross-sectional sample within the 1988 marketing season. Each produce manager was asked about the blueberry varieties sold (wild or cultivated), the price received by variety, the package size, the region of origin, and the sales volume of fresh blueberries expected during the week. Beginning the first week of the wild blueberry marketing season, they were also asked whether they would sell more fresh wild blueberries if more were available.

Information obtained from the telephone surveys was combined with secondary data to estimate price-dependent demand functions for wild blueberries in these markets. Since the study found no wild blueberries for sale in New York
City, these data were not included in the regression analysis.

There were 181 stores in the three market regions of Maine, Boston, and New York City surveyed during the wild blueberry marketing season, July 27 to September 9. Table 1 presents the regional comparison of fresh blueberry sales by variety in the sample. Fifty-seven percent of the stores in Maine and Boston selling fresh blueberries during the week reported sales of fresh wild blueberries. Stores not reporting wild blueberry sales may have carried the commodity at some time during the season, but did not report any sales during the week that they were interviewed. No wild blueberry sales were observed in New York City.

In Boston wild blueberries were more likely to be sold simultaneously with cultivated varieties. In Maine the tendency was toward selling either wild or cultivated varieties with the wild variety being sold exclusively at 53 percent of the stores.

Differences in the weekly sales volume per store are presented by region and variety in Table 2. While the overall average total volume of fresh blueberries sold per store per week was not significantly different among the three regions, there were proportional differences in sales by variety. In stores selling both varieties, wild blueberry sales averaged 66 percent of total sales in Maine and 33 percent in Boston. Each store's expected fresh blueberry sales volume was used as the best available proxy for overall store size in the empirical estimates of the model of retail price determination.

The data from weekly inspections of fresh wild blueberries sold through the marketing order were made available by the Quality Assurance Division of the Maine State Department of Agriculture, Food and Rural Resources. There were 273,048 pints of wild blueberries inspected between the week ending July 30, 1988 and the week ending September 10, 1988. Weekly unloads of cultivated blueberries at the Boston terminal market were made available by the Market News Service branch of the USDA. These data are presented in Table 3.

**Results**

**Sales Potential for Wild Blueberries**

The produce manager's willingness to initiate or increase sales of wild blueberries was assessed in all three market regions. Their responses are summarized in Tables 4 and 5. Table 4 presents a regional comparison of produce managers' willingness to initiate sales of wild blueberries in stores where they were not sold. Table 5 presents a regional comparison of their willingness to increase wild blueberry sales in stores where they were currently sold.

A total of 98 observations were made in stores currently selling only cultivated blueberries, 16 in Maine, 33 in Boston, and 49 in New York. The willingness to initiate sales of wild blueberries decreased as distance increased from the traditional in-state market. The coinciding increase in the uncertain or non-committal response, "DON'T KNOW", suggests that perhaps differences in regional product awareness is a contributing factor to regional differences in willingness to initiate sales. The responses seem quite favorable to market expansion in Maine, Boston, and New York City, even considering differences in product awareness, as 75 percent of the produce managers in Maine, 49 percent in Boston, and 37 percent in New York indicated that they would like to sell wild blueberries in their store if they were available.

A total of 81 observations were made in stores selling wild blueberries during the weeks surveyed, 50 in Maine and 31 in Boston. The willingness, or perceived opportunity, to expand wild blueberry sales also decreased with increased distance from the Maine market. Fifty percent of the surveyed stores currently carrying wild blueberries in Maine and 29 percent in Boston would expand their sales of wild blueberries if they were available. Overall, there was a greater willingness to initiate sales where no wild blueberries were being sold compared to a willingness to expand current volumes. Unwillingness to expand current volume could indicate that the current product availability is satisfactory or that there is some difficulty in selling the store's current volume at the current prices.
### Table 1

**Regional Comparison of Stores Selling Fresh Blueberries by Variety**

<table>
<thead>
<tr>
<th>Market Region</th>
<th>Wild Only</th>
<th>Cultivated Only</th>
<th>Both Wild and Cultivated</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of stores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boston</td>
<td>12 (17.1)</td>
<td>37 (52.9)</td>
<td>21 (30.0)</td>
</tr>
<tr>
<td>Maine</td>
<td>41 (52.6)</td>
<td>26 (33.3)</td>
<td>11 (14.1)</td>
</tr>
<tr>
<td>New York City</td>
<td>0 (0.0)</td>
<td>49 (100.0)</td>
<td>0 (0.0)</td>
</tr>
</tbody>
</table>

* Stores reporting varietal sales during the 1988 wild blueberry season, July 27 - September 7.

### Table 2

**Average Weekly Store Volume of Fresh Blueberries for Maine, Boston, and New York City**

<table>
<thead>
<tr>
<th>Region</th>
<th>Exclusive Sales</th>
<th>Joint Sales</th>
<th>12 Pint Flat Equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wild</td>
<td>Cultivated</td>
<td>Wild</td>
</tr>
<tr>
<td>Maine</td>
<td>28.42</td>
<td>22.05</td>
<td>29.97</td>
</tr>
<tr>
<td>Boston</td>
<td>14.62</td>
<td>31.87</td>
<td>8.42</td>
</tr>
<tr>
<td>New York</td>
<td>--</td>
<td>28.22</td>
<td>--</td>
</tr>
</tbody>
</table>
Table 3
Weekly Quantities of Inspected Wild Blueberries in Maine and Cultivated Unloads at the Boston Terminal Market, 1988

<table>
<thead>
<tr>
<th>DATE (Week Ending)</th>
<th>Wild Blueberries</th>
<th>Cultivated Blueberries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PINTS*</td>
<td>UNLOAD EQUIVALENTS* b</td>
</tr>
<tr>
<td>7/30/88</td>
<td>5,400</td>
<td>0.54</td>
</tr>
<tr>
<td>8/6/88</td>
<td>36,612</td>
<td>3.66</td>
</tr>
<tr>
<td>8/13/88</td>
<td>64,656</td>
<td>6.47</td>
</tr>
<tr>
<td>8/20/88</td>
<td>59,400</td>
<td>5.94</td>
</tr>
<tr>
<td>8/27/88</td>
<td>57,288</td>
<td>5.73</td>
</tr>
<tr>
<td>9/3/88</td>
<td>31,380</td>
<td>3.14</td>
</tr>
<tr>
<td>9/10/88</td>
<td>18,312</td>
<td>1.83</td>
</tr>
<tr>
<td>Mean Values</td>
<td>39,007</td>
<td>3.90</td>
</tr>
</tbody>
</table>

* Reported by Quality Assurance Division of the Maine Department of Agriculture, Food and Rural Resources.
* Measured in 10,000 pint units.
* Reported by the Market News Service of the U.S. Department of Agriculture for the Boston Terminal Market (1 unload = 10,000 pints).

Table 4
Responses of Produce Managers to the Question, "Would You Sell Wild Blueberries if They Were Available?": Stores Selling Only Cultivated Blueberries

<table>
<thead>
<tr>
<th>Market Region</th>
<th>Manager's Response (Regional Percentages)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YES</td>
</tr>
<tr>
<td>MAINE</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>(75.0)</td>
</tr>
<tr>
<td>BOSTON</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>(48.5)</td>
</tr>
<tr>
<td>NEW YORK CITY</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>(36.7)</td>
</tr>
</tbody>
</table>
Table 5

Responses of Produce Managers to the Question, "Would You Sell More Wild Blueberries if They Were Available?: Stores Selling Wild Blueberries

<table>
<thead>
<tr>
<th>Market Region</th>
<th>YES</th>
<th>NO</th>
<th>DON'T KNOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAINE</td>
<td>25</td>
<td>23</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>(50.0)</td>
<td>(46.0)</td>
<td>(4.0)</td>
</tr>
<tr>
<td>BOSTON</td>
<td>9</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(29.0)</td>
<td>(61.3)</td>
<td>(9.7)</td>
</tr>
</tbody>
</table>

Regression Analysis of Retail Demand

Parameters of several specifications of the price-dependent demand functions for wild blueberries were estimated using ordinary least-squares regression techniques. The linear regression model is equation 1 below. The linear form of the demand equation, while not as theoretically plausible as the log linear forms, allows a clearer interpretation of regional differences in price. It also serves as a basis of comparison for the own- and cross-price flexibilities estimated from the log linear function (equation 2) below. Cultivated blueberry unloads are recorded on the Friday of each week and the prices were recorded on Wednesday of each week. Since the unloads represent arrivals at the terminal market and it takes some time for the berries to reach the retail shelves, it was not known whether a one or two week lag would be appropriate, so both were tried. The parameters of these four specifications are presented in Table 6.

\[
(1) \quad WPXUNIT_t = \alpha_0 + \alpha_1 BOSTON + \alpha_2 WQ_{t-1} + \alpha_3 CQ_{t-j} + \alpha_4 TVOLM_t + \alpha_5 QUART + \alpha_6 CHAIN + \epsilon
\]

\[
(2) \quad \log(WPXUNIT_t) = \gamma_0 + \gamma_1 \log(WQ_{t-1}) + \gamma_2 \log(CQ_{t-j}) + \gamma_3 \log(TVOLM_t) + \gamma_4 BOSTON + \gamma_5 QUART + \gamma_6 CHAIN + \epsilon
\]

Where

\[
WPXUNIT_t = \text{Retail price for fresh wild blueberries per unit pint (cents) during week } t;
\]

\[
BOSTON = \text{Indicator variable for prices observed in the Boston market. Maine is the reference variable;}
\]

\[
WQ_t = \text{Unloads (10,000 pint equivalents) of wild blueberries inspected during the week } t-1;
\]

\[
CQ_{t-j} = \text{Unloads of cultivated blueberries registered at the Boston terminal market during week } t-j;
\]

\[
TVOLM_t = \text{Projected number of flats of fresh blueberries sold during the week of the observed price;}
\]

\[
QUART = \text{Indicator variable for observed price reported in } \$/\text{quart;}
\]

\[
CHAIN = \text{Indicator variable for store affiliation with a larger chain (more than three stores observable;}
\]

\[
\epsilon = \text{random error.}
\]
Table 6
Fresh Wild Blueberry Demand Functions in Boston and Maine, 1988

<table>
<thead>
<tr>
<th>MODEL</th>
<th>linear&lt;sup&gt;a&lt;/sup&gt;</th>
<th>log linear&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parameter Estimates (Standard errors are in parentheses)</td>
<td></td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>252.50*** (20.27)</td>
<td>248.59*** (21.90)</td>
</tr>
<tr>
<td>BOSTON (0/1)</td>
<td>43.00*** (8.99)</td>
<td>40.53*** (9.19)</td>
</tr>
<tr>
<td>WQL1</td>
<td>-6.81** (2.57)</td>
<td>-6.53** (2.68)</td>
</tr>
<tr>
<td>CQL1</td>
<td>-0.26** (0.09)</td>
<td></td>
</tr>
<tr>
<td>CQL2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TVOLM</td>
<td>-0.35** (0.13)</td>
<td>-0.41** (0.13)</td>
</tr>
<tr>
<td>QUART (0/1)</td>
<td>-63.69*** (12.65)</td>
<td>-64.82*** (13.02)</td>
</tr>
<tr>
<td>CHAIN (0/1)</td>
<td>2.12 (12.34)</td>
<td>-0.07 (12.83)</td>
</tr>
<tr>
<td>LWQL1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCQL1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LCQL2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTVOLM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>68</td>
<td>68</td>
</tr>
<tr>
<td>F</td>
<td>14.96</td>
<td>13.56</td>
</tr>
<tr>
<td>R² ADJ</td>
<td>.56</td>
<td>.53</td>
</tr>
<tr>
<td>Own price flexibility (95% C.L.)</td>
<td>-.16&lt;sup&gt;c&lt;/sup&gt; (-.24 to -.11)</td>
<td>-.15&lt;sup&gt;c&lt;/sup&gt; (-.24 to -.11)</td>
</tr>
<tr>
<td>Cross price flexibility (95% C.L.)</td>
<td>-.11&lt;sup&gt;c&lt;/sup&gt; (-.17 to -.08)</td>
<td>-.07&lt;sup&gt;c&lt;/sup&gt; (-.11 to -.05)</td>
</tr>
</tbody>
</table>

***, **, * Significant at the 99%, 95%, and 90% levels, respectively.
<sup>a</sup> Dependent variable is the retail price for fresh wild blueberries per unit pint (cents).
<sup>b</sup> Dependent variable is the logarithm of the fresh wild blueberry retail price per unit pint (cents).
<sup>c</sup> Flexibility estimated at the mean, following Miller, Capps, and Wells.
Confidence intervals were constructed around each estimated own- and cross-price flexibility implied by each model. The method of calculating confidence intervals around price flexibilities derived from linear models proposed by Miller, Capps and Wells (1984) was employed for the linear price flexibilities estimated at the data means. Standard confidence intervals around the parameter estimates were used for the log linear models.

Retail-level wild blueberry prices were found to be quite inflexible to changes in their own quantity across all specifications. This inflexibility may be due in part to the shortness of the fresh wild blueberry season. The price flexibilities implied by the regressions indicate that for each percentage increase in the quantity of wild blueberries there is a small, but statistically significant, negative price response. The 95 percent confidence intervals around these price flexibilities add further evidence to the inflexible response of price to a change in its own quantity. The flexibility is within the range of -0.15 to -0.02 for the log linear functions and -0.24 to -0.11 for the linear. This implies that quantities of fresh product supplied could be expanded significantly within the Boston and Maine markets with only a small decrease in the retail price which, assuming constant marketing margins, implies also little change in the price received by producers.

The effect of changes in the quantity of cultivated blueberries on the price of wild blueberries is also statistically significant and negative, but smaller in absolute value than the own-price flexibilities (Table 6). This implies that wild and cultivated blueberries are not good substitutes in these markets. The degree of substitutability is weak, indeed, almost zero. This result is supported by the claim made by wholesale buyers in the Boston market that there is a separate market for wild and cultivated blueberries in Boston (Woods, Marra, and Leiby, 1989). This has important implications for a marketing strategy. These implications will be discussed in more detail in the conclusions section.

Another interesting feature of these results is the implied price premium for wild blueberries marketed in Boston relative to the price in Maine. The average price premium calculated from the survey data means was about $0.51 per pint. The 1988 price premium paid by consumers in Boston, as estimated by the demand functions, ranged between 41 and 43 cents per pint. This premium probably reflects both income and population differences in the two regions.

Summary and Conclusions

This study has examined several facets of the markets for fresh wild blueberries in Maine, Boston, and New York City. Telephone surveys and secondary data sources were used to assess the factors affecting the demand for fresh blueberries at the retail level. The results are both qualitative and quantitative in nature. They should be viewed with some caution because they are based on information for only one marketing season, but since significant fresh wild blueberry marketings have such a short history in Boston, this information is among the most detailed available at the present time. Marketing decisions should be based not only on the relative returns, but also the relative marketing costs. These costs are not investigated in this report, although transport costs from Machias, Maine to Boston have been estimated to be approximately $0.06 per pint in 1988 (Hoelper and Marra, 1989).

Several interesting results are apparent from the investigation. First, there appear to be differences among markets in the demand for fresh blueberries. To develop a wild blueberry marketing strategy for the New York City market would require a longer time frame and promotion targeted initially at educating the consumer about wild blueberries. Boston, on the other hand, is a market that seems to be ripe for the expansion of wild blueberry sales. Consumers are more aware of the product's unique features and are willing to pay a significant premium over the price paid in the traditional Maine market. It appears that, given the estimated own and cross-price flexibilities, wild blueberries are perceived as a separate good from cultivated blueberries in both Boston and Maine. Product promotion, then, might best be targeted toward the uniqueness of wild blueberries and away from promotional activities comparing wild and cultivated blueberries.
Expanded wild blueberry marketings in Boston should result in higher profits. These results point to a clear gain in revenues after transport costs from marketing fresh wild blueberries in Boston relative to marketing them in Maine. This conclusion assumes, of course, similar wholesale to retail marketing margins two regions. This assumption should hold since it was revealed during the course of this study that most of Maine’s fresh produce is channeled through distribution centers in and around Boston. There appears to be room in this market and in Maine for expansion before a significant price decrease would result.

The supply of wild blueberries is relatively fixed in the short run, and blueberry processors are currently experiencing an increased demand for their product as well. A degree of caution is indicated, then, in plans for expansion. A slow, orderly expansion with all supply commitments met should result in significant increases in profits for the fresh wild blueberry industry.

References


