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TOWARD A COOPERATIVE MARKETING STRATEGY FOR FRESH WILD BLUEBERRIES

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TOWARD A COOPERATIVE MARKETING STRATEGY FOR FRESH WILD BLUEBERRIES

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ACKNOWLEDGMENTS

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INTRODUCTION

Marketing wild blueberries as a fresh product has become an increasingly viable alternative for Maine wild blueberry producers. Given the recent inception and expansionary trend of this alternative, many important factors pertinent to the development of the best marketing strategy for this dimension of the industry must be considered. The purpose of this study is to begin to investigate some of these factors, specifically, identifying which marketing regions have the greatest profit potential for fresh wild blueberries and determining whether there are packaging or promotional strategies that are likely to be more successful than others within these marketing regions. This paper presents an analysis of retail demand for fresh wild blueberries in Maine, Boston, and New York City, as well as the results of a survey of wholesale buyers of fresh blueberries in Boston. The conclusions based on the analysis of demand at these two levels of the marketing chain provide some interesting evidence with which to begin to develop a fresh wild blueberry marketing strategy.

BACKGROUND

The Maine Wild Blueberry Industry

The expanding supply of wild blueberries in Maine during recent years is seen in the annual production figures in Table 1. The Maine Department of Agriculture, Food and Rural Resources reported a record wild blueberry crop of 52.3 million pounds for the state in 1988, representing approximately one-half of the total North American wild blueberry output (Packer 1989). Producers and processors have thus sought new markets to capture additional farm-gate revenues with a view toward these steadily increasing supplies.

A number of producers recently have endeavored to capture a value-adding market niche by cooperatively packing and marketing their product as a fresh pack. 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. The Maine Department of Agriculture, Food and Rural Resources, as recently as 1985, reported only the total volume of wild blueberries processed since freezing and canning operations utilized almost the entire crop. Relatively high field prices for the raw product made consignment contracts with these processors almost the exclusive economic alternative for the independent wild blueberry producer. Real producer-level prices received from the processors in Maine averaged approximately $0.52/lb in 1982 (1982 dollars). This price declined sharply over the next four years to $0.20/lb in 1986, then rose in 1987 and again in 1988 to approximately $0.40 per lb (Hoelper, Marra, and Woods 1988). The falling field prices from 1982 to 1986, however,

Table 1. Maine Wild Blueberry Production and Field-Level Prices, 1980–1988.

Year	Nominal Field-Level Price	Real Field-Level Price	Production for Processing	Three Year Production Average
	------Dollars per Lb------		------Million Lbs-------	
1980	.38[a]	.48[b]	21.2[c]	18.9
1981	.43	.42	20.6	19.8
1982	.52	.52	35.9	25.9
1983	.37	.37	44.7	33.7
1984	.25	.22	24.7	35.1
1985	.23	.19	43.7	37.7
1986	.30	.20	40.0	36.1
1987	.45	.40	35.3	39.7
1988	.50	.38	52.3	42.5

[a] Prices from 1980 to 1987 are those reported for Maine in the 1988 North American Blueberry Council Annual Report. The price for 1988 was reported by the National Agricultural Statistics Service.

[b] Prices are deflated by the producer's price index for frozen fruits, juices and ades, 1980=100.

[c] Production figures were reported by the Maine Department of Agriculture, Food and Rural Resources.

caused independent producers to expand the production and packing of wild blueberries to be sold fresh. The volume of wild blueberries packed fresh in Maine has remained relatively small, less than one-half million pounds, compared to the total state production, but has increased steadily since 1986.

Several developments have occurred as result of these new fresh market initiatives. After several fresh packing enterprises entered and exited the market between 1983 and 1986, a fresh pack cooperative was formed in Maine in 1986. The principal objective of this cooperative has been to provide fresh packing facilities for members and to coordinate a joint marketing effort. A Canadian producer group joined the cooperative marketing effort in 1988 by marketing jointly with the Maine cooperative through a shared broker. Packing facilities for the cooperative have expanded since its inception, both by the number of member packing lines and the size of the central packing operation.

Another development has been the establishment of a fresh pack marketing order. Adopted in Maine in 1987, it imposed strict quality standards and inspections on all Maine fresh wild blueberry marketing exceeding 5000 pounds and shipped beyond a 75-mile radius of the packing site (Maine Dept. of Ag., Food and Rural Resources 1987). This marketing order was designed to establish a standardized, high-quality product marketed from Maine, enabling competition

with the established, fresh cultivated blueberries marketed within Maine and the greater Boston area.

The Boston Terminal Market

The Boston market is the largest, single metropolitan market for fresh wild blueberries and a significant market for fresh cultivated blueberries from North Carolina, New Jersey, and Michigan. The Boston terminal market is the wholesale outlet for most fresh produce retailers for the Boston metropolitan area and most of northern New England. Large chain stores, such as Star Market, Shaw's Supermarkets, and Hannaford Brothers, purchase most of their fresh produce independently and utilize the terminal market to supplement their purchases.

A MODEL OF CONSUMER BEHAVIOR

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 directly 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 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, and the quantities sold in each market, as well as upon 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:

$P_m = d_m(Q_{wm}, Q_{cm}, X_m, Z_m);$
$P_b = d_b(Q_{wb}, Q_{cb}, X_b, Z_b);$

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 $\partial P_{wi} / \partial Q_{wi} < 0$, $i = m,b$. This relationship is measured by the economic concept of own-price flexibility, where the price of a good changes in response to a percentage change in the quantity demanded for that good. An own-price flexibility greater than 1.0 (in absolute terms) is considered to be flexible; that is, a 1% change in the quantity demanded results in a greater than 1% change in the corresponding price. An inflexible measure, less than 1.0 in absolute terms, suggests a less than 1% change in price corresponding to a 1% change in quantity.

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 $\partial P_{wi} / \partial Q_{ci} < 0$, $i = m,b$. This relationship is measured by the economic concept of cross-price flexibility, where price flexibility and inflexibility are determined by the percentage change in price corresponding to a 1% change in the quantity demanded of another good.

3. As the demographic variables, such as income and population, increase, the price of wild blueberries is expected to increase, so that $\partial P_{wi} / \partial X_i > 0$, $i = m,b$.

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 $\partial P_{wi} / Z_i > 0$.

These factors, all assumed to determine the retail price of wild blueberries, are investigated in this report. Some of the factors 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.

METHODOLOGY

Produce Manager and Wholesale Buyer Surveys

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 on a weekly basis during the 1988 fresh blueberry marketing season. Each produce manager was asked a series of questions 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. Summaries of the survey data are presented in the data section of this report.

Information obtained from the telephone surveys was combined with secondary data to estimate price-dependent demand functions for wild and cultivated blueberries in these markets. Because of the nature of the secondary data, the Boston and Maine information was combined in the regression models. Linear and log linear functional forms were estimated. Since the study found no wild blueberries for sale in New York City, its regional data were not included in the regression analysis.

Personal interviews were conducted with all of the wholesale buyers and handlers of fresh blueberries at the Boston terminal market in the early spring of 1989. In addition, one produce buyer for a large supermarket chain in the Boston area was interviewed. There are six companies dealing in fresh blueberries at the terminal market. Half of the companies do not take ownership, but act as commissioned agents, and half buy and resell the product. Some act as purchasing agents for retailers and buy berries from other brokers in the terminal market. Not all of the companies interviewed currently deal in wild blueberries, however, due to the small number handling blueberries at the wholesale level in Boston, all are quite knowledgeable about the markets for both wild and cultivated blueberries. The results from these interviews are presented later in the report.

DESCRIPTION OF THE DATA

Regional Sales by Variety

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 2 presents the regional comparison of fresh blueberry sales volumes 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 most 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% of the stores.

Table 2. Regional Comparison of Stores Selling Fresh Blueberries by Variety.

| Market Region | Fresh Blueberry Sales: No. Stores[a] (Percentage of Region) | | |
	Wild Only	Cultivated Only	Both Wild and Cultivated
	------------------Number of stores-------------------		
Boston	12 (17.1)	37 (52.9)	21 (30.0)
Maine	41 (52.6)	26 (33.3)	11 (14.1)
New York City	0 (0.0)	49 (100.0)	0 (0.0)

[a] Stores reporting varietal sales during the 1988 wild blueberry season, July 27 – September 7.

Regional Store Volume

Differences in the weekly sales volume per store are presented by region and variety in Table 3. While the overall average total volume of fresh blueberries sold per store per week did not vary significantly between the three regions, definite regional differences were apparent when considering volume by variety. In stores selling both varieties, wild blueberry sales averaged 66% of total sales in Maine and 33% in Boston.

Secondary Data Sources

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 (equivalent to 22,754 flats) of wild blueberries inspected between

Table 3. Average Weekly Store Volume of Fresh Blueberries for Maine, Boston, and New York City.

| Region | Average Weekly Volume per Store ------------------------12 Pint Flat Equivalents---------------------- | | | | | |
| | Exclusive Sales | | Joint Sales | | | Avg. Total |
	Wild	Cultivated	Wild	Cultivated	Total	Volume
Maine	28.42	22.05	29.97	15.61	45.58	28.43
Boston	14.62	31.87	8.42	17.00	25.41	29.27
New York	---	28.22	---	---	---	28.22

the week ending July 30, 1988 and the week ending September 10, 1988. The weekly data were transformed into 10,000 pint unload equivalents to facilitate comparison to cultivated blueberry unload data at the Boston terminal market. 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 4. Because the weekly prices and unloads were recorded at different times during the week and because of the lag between arrival of a shipment at the terminal market and its retail sale, one and two week lag structures were considered for the quantity variables in the regressions. Wild blueberry prices were thus recorded in the early weeks for which the corresponding lagged quantities were zero. Consequently, to save degrees of freedom, 1.0×10^{-8} was added to each quantity observation to enable the estimation of the log linear form. We judged the bias this imposed to be outweighed by the increase in the number of usable observations.

Table 4. Weekly Quantities of Inspected Wild Blueberries in Maine and Cultivated Unloads at the Boston Terminal Market, 1988.

DATE (Week Ending)	------------Wild Blueberries----------		--Cultivated Blueberries--
	PINTS[a]	UNLOAD EQUIVALENTS[b]	UNLOADS[c]
7/30/88	5,400	0.54	109
8/6/88	36,612	3.66	175
8/13/88	64,656	6.47	112
8/20/88	59,400	5.94	63
8/27/88	57,288	5.73	37
9/3/88	31,380	3.14	52
9/10/88	18,312	1.83	54
Mean Values	39,007	3.90	86

[a] Reported by Quality Assurance Division of the Maine Department of Agriculture, Food and Rural Resources.
[b] Measured in 10,000 pint units.
[c] Reported by the Market News Service of the U.S. Department of Agriculture for the Boston Terminal Market.

Regional population data were gathered from the U.S. Department of Commerce, Bureau of the Census. These data are presented in Table 5. The census data for the regions surveyed reflect the relative magnitude of the markets involved. The results of the analyses suggested by this study should be considered with these population figures in mind. The Maine population, as reported in 1986, is primarily non-metropolitan and spread over a wide geographical area. About 36% of the state's population is concentrated in metropolitan areas. The census figures in the primary metropolitan statistical areas (pmsa) not far be-

yond Maine's southern border indicate that there are large and concentrated populations nearby where marketing efforts can be focused. The population in the Boston pmsa is approximately 2.4 times that of the state of Maine. The Boston--Lawrence-Salem pmsa population is more than 3.4 times larger, and New York City, 7.2 times larger, than that of Maine.

Table 5. Population Comparisons Between Regions Surveyed, 1986.

Market Region	------------------Population----------------
Maine	
Metropolitan	424,000
Non-Metropolitan	750,000
Total	1,174,000
Boston[a]	2,832,000
Boston-Lawrence-Salem[b]	4,052,000
New York City[c]	8,473,000

[a] Boston primary metropolitan statistical area (pmsa) within which "Boston" observations were collected.
[b] The larger pmsa containing the Boston pmsa.
[c] New York, New York pmsa.
U.S. Department of Commerce, Bureau of the Census. *Statistical Abstract of the United States, 1988.*

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 6 and 7. Table 6 presents a regional comparison of produce managers' willingness to initiate sales of wild blueberries in stores where they were not sold. Table 7 presents a regional comparison of their willingness to increase wild blueberry sales in stores where they were currently sold.

Stores Currently Selling Only Cultivated Blueberries. 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 both in Maine and out of state, even considering differences in product awareness, as 75% of the produce

Table 6. Responses of Produce Managers to the Question "Would You Sell Wild Blueberries if They Were Available?": Stores Selling Only Cultivated Blueberries

Market Region	------------------------Manager's Response----------------------		
	(Regional Percentages)		
	YES	NO	DON'T KNOW
MAINE	12	3	1
	(75.0)	*(18.8)*	*(6.2)*
BOSTON	16	13	4
	(48.5)	*(39.4)*	*(12.1)*
NEW YORK CITY	18	10	21
	(36.7)	*(20.4)*	*(42.9)*

Table 7. Responses of Produce Managers to the Question "Would You Sell More Wild Blueberries if They Were Available?": Stores Selling Wild Blueberries

Market Region	------------------------Manager's Response----------------------		
	(Regional Percentages)		
	YES	NO	DON'T KNOW
MAINE	25	23	2
	(50.0)	*(46.0)*	*(4.0)*
BOSTON	9	19	3
	(29.0)	*(61.3)*	*(9.7)*

managers in Maine, 49% in Boston, and 37% in New York indicated that they would like to sell wild blueberries in their store if they were available.

Stores Currently Selling Wild Blueberries. A total of 81 observations were made in stores selling wild blueberries during the weeks surveyed, 50 in Maine and 31 in Boston. As with stores not selling wild blueberries, the willingness, or perceived opportunity, to expand current sale levels decreased with increased distance from the Maine market. Fifty percent of the surveyed stores currently carrying wild blueberries in Maine and 29% 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.

Boston Wholesaler's Perceptions of the Fresh Blueberry Market

The purpose of this section is to summarize what was learned from the personal interview process with the wholesale buyers at the Boston terminal

market. Although some descriptive statistics are reported, the results are primarily qualitative because of the small number of wholesalers involved. Some respondents were reluctant to answer a few of the questions posed, so response numbers varied by question.

The format for the interviews was designed primarily to elicit the respondents' expert opinions on the relative strengths and weaknesses of fresh wild blueberries in the Boston market. Maine wild blueberries have been marketed in Boston in significant quantities only recently. Wild blueberries from neighboring New England states and Canada have a somewhat longer market history in Boston, but have been marketed in relatively small volumes.

Respondents were asked to choose from a list of the factors that had an important negative influence on their decision to purchase or handle wild blueberries. Table 8 presents the mean response for each of the factors listed. Although all of the factors seemed to be important, with mean responses greater than 2.5, the most important factors were the variable quality of wild blueberries throughout the marketing season and the uncertain expected shelf life of fresh wild blueberries, partly as a result of the variable quality. More attention could be paid, even with a marketing order in place, to assure that berries of a consistent quality arrive in Boston. One factor not directly addressed by the inspection process at the packing plant is the length of time berries remain in the sun before they are brought to the packing plant. This exposure time can significantly reduce the ultimate shelf life of the berries. If retailers find that wild blueberries have a shorter shelf life than cultivated berries, they may favor stocking the cultivated variety.

Table 8. Respondents' Ranking of Factors Negatively Affecting Their Decision To Purchase or Handle Wild Blueberries.

Factor	Mean Response[a]
Variable quality during the season	4.4
Uncertain expected shelf life	4.4
High unit cost relative to cultivated blueberries	3.8
Inconsistent supplies	3.8
Relative packaging appearance	3.8
Inadequate supplies	3.6
Changes in consumer attitudes or preferences	3.6

[a] Relative importance ranking was 0=insignificant to 5=very important.

Another question asked of all respondents was "which factors were important in deciding when to begin or discontinue purchasing berries from a particular region during the marketing season?" Table 9 shows the results of the re-

spondents' average scoring of the importance of the three factors hypothesized to be important. Again, quality was listed consistently as the most important factor of the three. It is important to note that the quality of the berries was considered to be more than twice as important as the wholesale price. There does not seem to be an important amount of allegiance among these buyers and handlers to berries from a particular region. This indicates that a marketing region cannot rely heavily on quantities purchased historically, independent of quality. These buyers indicated that their actions are quite sensitive to increases or decreases in relative regional quality. The market region must monitor quality continuously in order to maintain their share of the market.

Table 9. Respondents' Ranking of Factors Affecting the Decision to Begin or Discontinue Purchases from a Particular Region During the Season.

Factor	Mean Response[a]
Changing seasonal quality	4.8
Wholesale price	2.2
Past market allegiances	2.2

[a] Relative importance ranking was 0=insignificant to 5=very important.

New technologies have been developed recently for packaging fresh berries. One development is a new top wrapping device that heat seals the clear wrapping around the box, eliminating the time consuming job of covering the package with a cellophane square and securing it with a rubber band. Another innovation is the "shallow pint". This holds the same amount as the traditional square pint container, but displays more of the fruit in a container that is wider and flatter. The shallow pint also lessens the weight on the berries on the bottom of the box. The quart boxes are another traditional way to pack fresh blueberries. The respondents were asked their opinions on these various packaging alternatives. All of the respondents said that quart packaging was a thing of the past and that there was no room for quarts in the Boston market. A significant majority (83%) of the respondents thought that the shallow pints had more appeal and preferred high-quality berries packed in these shallow pints. Interestingly, most (67%) of the respondents preferred the traditional cellophane and band closure over the newer, heat wrap technology. Their reasons were that the heat wrapped boxes could not be opened and repacked if there were any boxes that had been damaged in shipment and that the heat might damage the berries.

Finally, the respondents were asked if they had any advice to give to the Maine wild blueberry industry as to how it could better serve the Boston market in the future. The responses were surprisingly consistent as only three areas were mentioned. One third mentioned that the Maine industry should pay closer attention

to the handling of the berries from the field to market. Two thirds mentioned the problem of consistent supplies, and two thirds of the respondents said that the industry should try to capitalize on the distinction between wild and cultivated blueberries, since the uses and characteristics of the products are different. They urged the wild blueberry industry to differentiate their product more through advertising and promotion.

Some important points are apparent from these personal interviews. First, if the Maine cooperative and the fresh wild blueberry industry in general want to expand their sales in the Boston market, they must be willing to offer consistent supplies to this market throughout their marketing season. If marketings are sporadic, then the wholesale buyers will likely look elsewhere for fresh blueberries. Second, the quality of the berries is a much more important factor than is the price. The additional cost of assuring a quality product is likely to be captured in the price the buyers are willing to pay for the berries. Last, there is some evidence from the interviews that wild blueberries are facing a different market than cultivated blueberries in Boston. If this is true, then it has important implications for the promotion and marketing strategy for the producers of wild blueberries. More evidence on this last point is presented below.

Regression Analysis of Retail Demand

Parameters of several specifications of the price-dependent demand functions for wild and cultivated blueberries were estimated using ordinary least-squares regression techniques. Linear and log linear forms, each with two lag specifications for the effect of cultivated quantity, were estimated.

The linear regression models are equations 1 and 2 below.

(1) $\text{WPXUNIT}_t = \alpha_0 + \alpha_1 \cdot \text{BOSTON} + \alpha_2 \cdot \text{WQ}_{t-i} + \alpha_3 \cdot \text{CQ}_{t-j} + \alpha_4 \cdot \text{TVOLM}_t + \alpha_5 \cdot \text{QUART} + \alpha_6 \cdot \text{CHAIN} + \varepsilon$

(2) $\text{CPXUNIT}_t = \beta_0 + \beta_1 \cdot \text{BOSTON} + \beta \cdot \text{WQ}_{t-i} + \beta_3 \cdot \text{CQ}_{t-j} + \beta_4 \cdot \text{TVOLM}_t + \beta_5 \cdot \text{QUART} + \beta_6 \cdot \text{CHAIN} + \mu$

Where

WPXUNIT_t = Retail price for fresh wild blueberries per unit pint (cents) during week t;

CPXUNIT_t = Retail price for fresh cultivated blueberries per unit pint (cents) during week t;

BOSTON = Indicator variable for prices observed in the Boston market. Maine is the reference variable;

WQ_{t-i} = Unloads (10,000 pint equivalents) of wild blueberries inspected during the week t-i;

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

TVOLM$_t$ =   Projected number of flats of fresh blueberries sold during the
                   week of the observed price;

QUART =   Indicator variable for observed price in quart volumes;

CHAIN =   Indicator variable for store affiliation with a larger chain
                   (more than three stores observable);

ε and μ =   random errors.

The linear forms of the demand equations, while not as theoretically plausible as the log linear forms, allow a clearer interpretation of the difference in price in each region. They also serve as a basis of comparison for the own- and cross-price flexibilities estimated from the log linear functions (equations 3 and 4) below.

$$(3)\ \log(WPXUNIT_t) = \gamma_0 + \gamma_1 \cdot \log(WQ_{t\text{-}i}) + \gamma_2 \cdot \log(CQ_{t\text{-}j}) + \gamma_3 \cdot \log(TVOLM_t)$$
$$+ \gamma_4 \cdot BOSTON + \gamma_5 \cdot QUART + \gamma_6 \cdot CHAIN + \varepsilon$$

$$(4)\ \log(CPXUNIT_t) = \theta_0 + \theta_1 \cdot \log(WQ_{t\text{-}i}) + \theta_2 \cdot \log(CQ_{t\text{-}j}) + \theta_3 \cdot (TVOLM_t)$$
$$+ \theta_4 \cdot BOSTON + \theta_5 \cdot QUART + \theta_6 \cdot CHAIN + \mu$$

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.

Tables 10 and 11 present the regression results for wild and cultivated blueberries. In each of these tables, Model 1 is a linear model with own quantity lagged one week, Model 2 is a linear model with own quantity lagged two weeks, Model 3 is the log linear form with a one week lag, and Model 4 is the log linear form with a two week lag.[1]

Wild Blueberry Demand. Retail-level, wild blueberry prices were found to be quite inflexible to changes in their own quantity across all specifications. The price flexibilities implied by the regressions indicate that for each percentage increase in the quantity of wild blueberries there is a significantly negative, but small price response. The 95% confidence intervals around these price flexibilities add further evidence to the inflexible response of price to changes in its own quantity, as 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 means that sales could be ex-

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[1]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, we did not know whether a one or two week lag would be appropriate, so we tried both.

Table 10. Fresh Wild Blueberry Demand Functions in Boston and Maine, 1988.

	---------------------MODEL-------------------			
	----------linear[a]-------------		------------log linear[b]-----------	
	Parameter Estimates			
	(Standard errors are in parentheses)			
INTERCEPT	252.50***	248.59***	5.901***	6.001***
	(20.27)	(21.90)	(0.179)	(0.190)
BOSTON (0/1)	43.00***	40.53***	0.217***	0.203***
	(8.99)	(9.19)	(0.040)	(0.039)
WQL1	−6.81**	−6.53**		
	(2.57)	(2.68)		
CQL1	−0.26***			
	(0.09)			
CQL2		−0.13*		
		(0.07)		
TVOLM	−0.35**	−0.41**		
	(0.13)	(0.13)		
QUART (0/1)	−63.69***	−64.82***	−0.353***	−0.364***
	(12.65)	(13.02)	(0.057)	(0.056)
CHAIN (0/1)	2.12	−0.07	0.029	0.010
	(12.34)	(12.83)	(0.057)	(0.056)
LWQL1			−0.082***	−0.093***
			(0.030)	(0.031)
LCQL1			−0.102***	
			(0.037)	
LCQL2				−0.107***
				(0.035)
LTVOLM			−0.057***	−0.065***
			(0.018)	(0.017)
N	68	68	68	68
F	14.96	13.56	19.43	20.28
R[2] ADJ	.56	.53	.62	.63
OWN PRICE FLEXIBILITY	−.16[c]	−.15[c]	−.08	−.09
(95% C.I.)	(−.24 to −.11)	(−.24 to −.11)	(−.14 to −.02)	(−.15 to −.03)
CROSS PRICE FLEXIBILITY	−.11[c]	−.07[c]	−.10	−.10
(95% C.I.)	(−.17 to −.08)	(−.11 to −.05)	(−.17 to −.03)	(−.18 to −.04)

***,**,* Significant at the 1%, 5%, and 10% levels, respectively.

[a] Dependent variable is the retail price for fresh wild blueberries per unit pint (cents).

[b] Dependent variable is the logarithm of the fresh wild blueberry retail price per unit pint (cents).

[c] Flexibility estimated at the mean, following Miller, Capps, and Wells

panded significantly within the Boston and Maine market with only a small reduction in the price.

The effect of changes in the quantity of cultivated blueberries on the price of wild blueberries is also significantly negative, but quite small; a cross price flexibility ranging from −.03 to −.18. This indicates that wild and cultivated blueberries are to a small degree substitute goods in these markets, but that the wild blueberry price is quite inflexible to changes in the quantity of cultivated blueberries appearing in these markets. The degree of substitutability is weak, indeed, almost zero. This result supports the claim made by the wholesale buyers that there is a distinct demand for each wild and cultivated blueberries in Boston, and it 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. On average, the 1988 price premium paid by consumers in Boston was between 41 and 43 cents per pint. This premium reflects both income and population effects. These results point to a clear gain from marketing fresh wild blueberries in Boston relative to marketing them in Maine.

The weekly store volume of blueberries had a negative impact on the wild blueberry price, but whether or not the store belonged to a chain had no effect on price. If wild blueberries were packed in quarts consumers were willing to pay about $0.64 less per unit pint.

Cultivated Blueberry Demand. The summary of the regression results for the demand for cultivated blueberries (equations 2 and 4) is presented in Table 11. The own-price flexibilities estimated from these models imply a slightly greater flexibility for the cultivated blueberries compared to that of the wild blueberries. The estimated cross-price flexibilities imply that changes in the quantity of wild blueberries in these markets have no effect on the price of cultivated blueberries. This result is not too surprising given that average weekly inspected wild blueberry volumes were slightly under 5% of the Boston cultivated unloads (see Table 4). This also supports the hypothesis that wild and cultivated blueberries have separate markets in Boston and Maine.

Cultivated blueberries also command a price premium in Boston relative to Maine, although the price difference for the cultivated variety is not not nearly as great as it is for the wild blueberries. Store volume had no effect on the price of cultivated blueberries, nor did chain affiliation. If cultivated blueberries were packed in quarts, the price consumers were willing to pay per pint decreased significantly more than it did for the wild blueberries, though only a small number of quarts were observed.

Table 11. Fresh Cultivated Blueberry Demand Functions in Boston and Maine, 1988.

	----------linear[a]----------		----------log linear[b]----------	
	— MODEL			
	Parameter Estimates			
	(Standard errors are in parentheses)			
INTERCEPT	220.73*** (23.88)	227.82*** (26.30)	6.053*** (0.263)	6.028*** (0.227)
BOSTON (0/1)	16.35 (11.59)	17.50 (11.54)	0.078 (0.058)	0.082 (0.057)
WQL1	4.63 (2.93)	3.54 (3.20)		
CQL1	−0.20** (0.08)			
CQL2		−0.21** (0.09)		
TVOLM	−0.02 (0.19)	−0.04 (0.19)		
QUART (0/1)	−103.16*** (21.12)	−105.33*** (20.33)	−0.683*** (0.102)	−0.691*** (0.101)
CHAIN (0/1)	−1.61 (13.35)	2.79 (13.32)	0.030 (0.068)	0.041 (0.067)
LWQL1			0.00161 (0.00507)	0.00584 (0.00389)
LCQL1			−0.158*** (0.058)	
LCQL2				−0.141*** (0.046)
LTVOLM			−0.014 (0.024)	−0.024 (0.023)
N	80	80	80	80
F	10.72	10.71	14.68	15.38
R^2ADJ	.42	.42	.51	.52
OWN PRICE FLEXIBILITY (95% C.I.)	−.13[c] (−.23 to −.09)	−.17[c] (−.35 to .11)	−.16 (−.27 to −.04)	−.14 (−.23 to −.05)
CROSS PRICE FLEXIBILITY (95% C.I.)	+.07[c] (+.03 to +.14)	+.06[c] (+.02 to +.13)	.00 (−.01 to +.01)	+.01 (0 to +.01)

***,** Significant at the 1% and 5% levels, respectively.

[a] Dependent variable is retail price for fresh cultivated blueberries per unit pint (cents).

[b] Dependent variable is the logarithm of the fresh cultivated blueberry retail price per unit pint (cents).

[c] Flexibility estimated at the mean, following Miller, Capps, and Wells.

SUMMARY AND CONCLUSIONS

This study has examined several facets of the markets for fresh wild and cultivated blueberries in Maine, Boston, and New York City. Telephone surveys, personal interviews, and secondary data sources were utilized to assess the factors affecting the demand for fresh blueberries at the wholesale and retail levels. The results are both qualitative and quantitative in nature. They should be viewed with some caution because they are based on information for one marketing season, but since substantial fresh wild blueberry marketings have such a short history in Boston, this information should be among the most detailed available at the present time. Marketing decisions should not only be based on the relative returns, but also the relative marketing costs. These costs are not investigated in this report.

Several interesting results are apparent from the investigation. First, there appear to be regional differences 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 initial promotion targeted at educating the consumer about wild blueberries. This would require significant resources and would have uncertain results. 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 also that 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. There is a great deal of room in this market for expansion before a significant price decrease would result. This is true also, but to a lesser extent, in the Maine market.

Product packaging is important for the fresh wild blueberry industry. Shallow pints seem to be preferred to the traditional square pints, and quart containers should be phased out in these markets, particularly in Boston.

If the fresh wild blueberry industry decides to expand sales in the Boston and Maine markets, maintenance of a high-quality product is of the utmost importance. This factor is far more important than the price per pint. Any additional costs of quality assurance are likely to be recouped in the higher price the consumers are willing to pay.

A final important result from this study is the aspect of consistent supplies to the Boston market. If market expansion is undertaken, the supply of blueberries must remain consistent throughout the season. This may be troublesome for the

industry at this time. The supply of wild blueberries is relatively fixed in the short run, and blueberry processors are experiencing an increasing 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, however, should result in significant increases in profits for the fresh wild blueberry industry.

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