A CASE STUDY COMPARING THE PRICE OF FRESH PRODUCE SOLD AT FARMERS' MARKETS AND CHAIN SUPERMARKETS

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ABSTRACT

This exploratory research found that produce purchased at San Luis Obispo County, California farmers' markets to be an apparent better value than supermarket produce. Prices for most commodities were either the same or lower and the product quality was better at times than the same product offered at the paired supermarket. Fourteen commodities were examined at six farmers' markets locations, over half of those in the county, conducted across all four seasons in 1999.

BACKGROUND

Approximately 98% of U.S. consumers purchase produce from supermarkets [1]. While most consumers purchase produce at supermarkets (SM), the number of farmers' markets (FM) in the U.S. increased from 1,200 in 1980 to 2,000 in 1990 [2]. Further increases are shown in USDA's 1996 National Farmers' Market Directory which lists 2,411 farmers markets [3]. In 1993 California had 175 certified FM and Southern California FM generated sales of $10 million [4]. A case study in San Luis Obispo, California showed that approximately one-third of consumers purchase produce at FM and 95% of FM shoppers also purchase produce at the supermarket[5].

The California case study found that consumers considered "good value," "reasonably priced," and "high quality product" to be very to extremely desirable attributes for fresh produce. In addition, the research indicated that consumers perceived fresh produce at FM to be a better value for the money and higher quality product compared to produce sold in local supermarkets. Existing studies have generated conflicting results concerning the price of fresh produce sold at FM relative to supermarkets [6].

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The purpose of this research was to determine if 1997 consumers' perceptions in San Luis Obispo matched reality and to examine the empirical price of fresh produce sold in SM compared to that sold in FM on the same day.

Overtly, one would expect that FM products being sold directly to consumers might allow substantial or significant price advantages over conventional SM as layers of resale or wholesale activities are eliminated. It is our hypothesis based on Wolf [6] and other industry observation that part of this savings is passed on to the consumer in the form of lower prices. In California state law requires FM sellers all be farmers, their family members, or employees of the products presented for FM sale, thus coercing farmer-consumer direct sales. The system avoids products from the now more traditional wholesale entities. This prohibition of products procured from others in the traditional grower-packer-shipper-wholesaler-retailer system is not required for other forms of direct marketing, such as roadside stands or green grocers. FM sellers are also exempt from inspection, grading, and packaging requirements of the more conventional producers for the produce sold in FM[7].

The theoretical implications for FM product quality are positive also. As farmers become direct retail marketers without the infrastructure for large volumes of product storage or systems of distribution the marketing opportunity would appear to require an as needed inventory designed or planned by the farmers' knowledge of the particular FM venues. To our knowledge most farmers so marketing adjust daily for individual FM location demands and harvest much closer to shipping time for these individual markets. As a result the product can mature in the field closer to full maturity or ripeness and still be fresher at the retail than conventional SM produce. Sommer [8] suggests that modern grower-packer-shippers "horticultural" products are marketed over increasingly greater distances to receive the benefits of market opportunities, but at a cost of "stretching the postharvest life of the commodity to its limit." The latter is packed, shipped, warehoused, and reshipped to destination, all of which cut into the shelf life of mostly perishable products. Senescence and decay is potentially less of a problem then at farmers markets and could result in apparent higher quality.

METHODS

This research was exploratory and conducted to begin an assessment of the willingness–to-pay by consumers, their effective demand, for products at venues where previously only consumer perceptions were reported. This case study examined the price of fresh produce sold in supermarkets compared to that sold in FM on the same day. The specific pieces of data gathered were price per unit (equated to per pound prices where necessary), produce quality or condition, date, location and type of market. The table below presents the commodities represented by season. The first phase of research was conducted for six consecutive weeks in January and February 1999. Eight commodities were examined at four paired market sites.

In a second phase, similar prices were collected from four total sites, two alternate sites relative to phase 1-winter data, for four items during a 13 week

period commencing in late spring and continuing into summer of 1999.[1] When the prices were collected, the condition of the produce was rated on a scale of 1 to 5, where 1 indicated unsatisfactory and 5 indicated excellent. The prices and condition of the same commodities were collected from a nearby SM on the same day. The third phase was conducted during fall 1999 again at four markets with four commodities for six weeks. This research is being continued over time with additional phases to examine additional commodities based on seasonal differences.

TABLE I. CALIFORNIA CENTRAL COAST FARMERS' MARKET DATA COLLECTION LOCATIONS BY SEASON, 1999.

	Market Locations by Season		
Commodity	**Winter—Spring**	**Spring—Summer**	**Fall**
Navel Oranges	SLO-Hig, ArGr-OP SLO-CCM, ArGr-Vil		
Granny Smith Apples	SLO-Hig, ArGr-OP SLO-CCM, ArGr-Vil		
Tomatoes	SLO-Hig, ArGr-OP SLO-CCM, ArGr-Vil		
Cauliflower	SLO-Hig, ArGr-OP SLO-CCM, ArGr-Vil		
Broccoli	SLO-Hig, ArGr-OP SLO-CCM, ArGr-Vil	Ar Gr-OP, SLO – Hig, SLO-CCM, Los Osos	
Celery	SLO-Hig, ArGr-OP SLO-CCM, ArGr-Vil		
Fuji Apples	SLO-Hig, ArGr-OP SLO-CCM, ArGr-Vil		
Romaine Lettuce	SLO-Hig, ArGr-OP SLO-CCM, ArGr-Vil		
Iceberg Lettuce		Ar Gr-OP, SLO – Hig, SLO-CCM, Los Osos,	SLO-Hig, SLO-CCM, ArGr-OP, ArGr-Vil
Strawberries		Ar Gr-OP, SLO – Hig, SLO-CCM, Los Osos,	
Oranges		Ar Gr-OP, SLO – Hig, SLO-CCM, Los Osos	
Haas Avocados			SLO-Hig, SLO-CCM, ArGr-OP, ArGr-Vil
Squash			SLO-Hig, SLO-CCM, ArGr-OP, ArGr-Vil
Vine Ripe Tomatoes			SLO-Hig, SLO-CCM, ArGr-OP, ArGr-Vil

Symbols: SLO-Hig = San Obispo-Hig St; SLO-CCM = San Luis Obispo-Central Coast Mall; ArGr-OP = Arroyo Grande-Oak Park; ArGr-Vil = Arroyo Grande-Village Area.

[1] Originally another set of four commodities and markets data for Spring-Summer was planned and collected, but condition or quality was not recorded. Consequently, that data was not utilized in the analysis.

The commodities examined were: broccoli, cauliflower, celery, Granny Smith apples, Fuji apples, Haas avocados, Navel and Valencia oranges, Romaine lettuce, squash, strawberries, large tomatoes, and vine ripe tomatoes. The data was analyzed for price differences between FM and SM across all markets and commodities using ANOVA on SPSS®10.0. Chi-square tests, t-tests, and one-way analysis of variance are used to examine statistical differences.

RESULTS

Overall, the mean price of the produce observed at FM during this phase of the research was significantly lower than the price of the commodities examined at local supermarkets. The mean prices of most price comparisons were lower at FM, exceptions were mean prices of both Fuji and Granny Smith apples and squash, which exhibited no significant statistical difference at FM and SM; however, broccoli showed a statically significant price advantage for SM.

A comparison of the interval rating of the condition of the produce sold at FM with that sold at the supermarket indicated the farmers' market product had significantly better condition by non-parametric chi-square test of frequency distribution. Later ANOVA tests also support this finding. Therefore, shopping for the commodities examined in this research at a San Luis Obispo County FM appears to be a better consumer value than shopping for them at local supermarkets since the prices were generally lower and the condition better at FM.

Price Differences

Significant price differences were found in all but two of the market price pairing's by commodity, Granny Smith apples and squash having the insignificant price differentials, see Table II. Twelve of fourteen commodities revealed apparently lower prices by test of means adjusted for unequal variance. The price differentials varied from 115% greater SM price for Navel oranges to 11% lower SM price for broccoli. One commodity's price, Fuji apples, was significant only at the $\alpha = 0.10$ level, while the others had differences significant at the 0.05 level.

While FM were apparently lower, the price variation levels had no specific observable pattern. If one can temporarily permit the mixing of apples and oranges, when the commodities' identities were dropped the prices were generally greater in SM. FM prices per pound were cumulatively (unweighted average) 35% lower than the prices found the same day in the paired supermarket. However, calculated price variances per pound were mixed with three commodities showing similar distributions, four with greater variance in FM, and seven commodities exhibiting greater variance at SM (see Table II).

TABLE II. COMMODITY PRICES(IN DOLLARS), PRICE DIFFERENTIALS, AND TESTS OF MEANS FOR PAIRED SLO COUNTY FARMERS' MARKETS–SUPERMARKETS

	FM/SM	Means(SDev)		Mean	Levene's	
Commodity	N	FM	SM	Difference	F test	t-test
GrSmApples	36/16	0.947(.102)	0.981(.272)	-0.035	44.25**	-0.49
NavelOranges	65/24	0.569(.109)	1.225(.217)	-0.656	44.13**	-14.18**
Val.Oranges	52/52	0.776(.099)	1.389(.262)	-0.613	4.43**	-15.78**
Tomatoes	48/23	2.480(.236)	2.925(.507)	-0.445	10.01**	-4.00**
Cauliflower	80/30	1.091(.222)	2.222(.550)	-1.132	38.40**	-10.95**
Broccoli	130/74	0.980(.422)	0.870(.184)	0.110	51.50**	2.59**
Celery	30/23	0.825(.163)	1.064(.129)	-0.239	1.84	-5.97**
Fuji Apples	37/23	0.986(.067)	1.107(.293)	-0.121	40.41**	-1.95*
RomLettuce	69/30	0.732(.224)	1.033(.090)	-0.301	50.80**	-9.55**
Head Lettuce	52/52	0.782(.169)	0.960(.160)	-0.178	3.37	-5.52**
Strawberries	52/52	1.285(.202)	1.859(4.73)	-0.574	32.90**	-8.05**
Avocados	43/15	1.233(.252)	1.990(.000)	-0.757	2960.9**	-19.68**
Squash	21/15	0.883(.135)	0.870(.101)	0.013	4.55**	0.34
VRTomatoes	43/15	1.395(.530)	2.823(.244)	-1.428	19.96	-13.94**
All Commod.#	782/458	1.035(.506)	1.401(.677)	-0.366	64.32**	-10.04**

Notes: ** - indicates significance at at $\alpha = 0.05$, * - indicates significance at $\alpha = 0.10$,
- of unweighted average prices

TABLE III. SLO FM-SM CONDITION RATINGS BY OUTLET (n= 1240)

Condition	Farmers' Market (n = 458)	Supermarket (n = 782)	Chi-Square[a]
Excellent	1.3 %	0.4 %	
Good	91.7%	87.1%	12.15**
Acceptable[b]	7.0%	12.4%	

a-Tests for independence between FM and SM
b-Some SM produce items received some less than "acceptable" condition scores, while FM goods did not, those SM items with a condition score of 2 were recoded to a 3 in order to avoid an empty cells problem.
**Significant at the 0.05 level.

Quality or Condition Differences

A contingency table of produce quality versus market origin, the dichotomous response of FM or SM, resulted in a distribution different from a random assignment. An inspection of Table III reveals a pattern of incrementally higher quality at FM. Again the occasion of lower quality observed at SMs is likely due to earlier harvest and the greater time of initial transport, warehousing, and re-shipment for SM items. This would appear to be a FM advantage that SM would have a limited ability to overcome. The SM has the advantage of daily greater produce item selection and the convenience of one-stop shopping, neither of which would not be reflected in this data.

Organics

Although the data set had limited observations on organic produce, the data reflect higher prices for organics than conventionally grown produce items. The paired SM did not include any of the organic food stores in the area. There was only one such store in SLO County that could be labeled a SM. FM sellers are not required to grow organically and of course no such requirement exists for conventional SM, all of which were major chain stores in this study. For all four organic items recorded and tracked organic item prices were significantly higher (see Table IV).

TABLE IV. CONVENTIONAL LY GROWN MEAN PRICES VERSUS ORGANICALLY GROWN MEAN PRICES ALL OUTLETS

Item	Conventional	n	Organic	n	t –statistic
All Items	$1.16	784	$1.70	40	5.10**
Broccoli	0.73	87	1.37	13	10.20**
Cauliflower	1.32	103	2.45	7	3.12**
Romaine Lettuce	0.80	93	1.21	6	14.29**
Vine RipeTomatoes	1.69	49	2.17	9	3.28**

**Significant at the 0.05 level using an independent sample t-test.

Analysis of Variance

Table V shows the results of an analysis of variance examining the differences in price for all products based on the outlet where the product was sold, the growing method, and the condition of the produce. Only 20% of the sum of squares are explained by these variables. There is a difference in price based on whether the product was conventionally or organically grown when controlling for outlet and condition. There was a significant difference in price based on condition when controlling for outlet and growing method. There is not a difference based on outlet when controlling for type of growing method and condition. However, there is an interaction between the outlet and type of growing method on price and there is an interaction between outlet and condition on price. The interaction effects explain more of the variation in the sum of squares than the main effects. This aggregation of commodities implies much of the variation is between commodities, which is not surprising.

TABLE V. PRICE DIFFERENCES BASED ON OUTLET, GROWING METHOD, AND CONDITION

Source of Variation	Sums of Squares	Contribution to Sum of Squares	F Statistic
Main Effects	3.944	1%	2.7 **
Organic/Conventional	2.065	2%	5.7 **
Condition	2.592	1%	3.6 **
FM/SM	0.003	0%	0.01
2-Way Interactions	12.484	3%	6.9 **
FM/SM & Organic/Conven.	3.261	1%	9.0 **
FM/SM & Condition	7.872	2%	10.9 **
Condition&Organic/Conven.	0.207	0%	0.3
Explained	72.285	20%	22.2 **
Residual	294.250	80%	
Total df = 822	366.534	100%	

Note: ** - indicates significance at $\alpha = 0.05$

Since Table V explained only 20% of the sum of squares, the type of produce was included in the analysis shown in Table VI. Table VI shows the results of an analysis of variance examining the differences in price for all types of produce (or commodities observed) examined based on the outlet where the product was sold, the growing method, the condition of the produce, and the type of produce. In

TABLE VI. DIFFERENCES IN PRICE BASED ON OUTLET, GROWING METHOD, TYPE OF PRODUCE, AND CONDITION

Source of Variation	Sum of Squares	Contribution to Sum of Squares	F Statistic
Main Effects	289.9	79%	203.6 **
FM/SM	37.1	10%	390.3 **
Organic/Conventional	8.3	2%	87.3 **
Condition	0.2	0%	1.0
Produce Type	230.1	63%	220.3 **
Explained	289.9	79%	203.6 **
Residual	76.6	21%	
Total df = 822	366.5	100%	

Note: **Significant at the 0.05 level.

this case 79% of the sum of squares is explained by these variables. Product type explains 63% of the sum of squares. There is a difference in price based on the type of product when controlling for outlet, whether the product is conventionally or organically grown, and condition. There is a difference in price based on whether the product was conventionally or organically grown when controlling for outlet, type of product, and condition. There is a difference in price based on outlet when controlling for type of product, condition, and growing method. Therefore, when

the interaction effects are suppressed, whether the product was sold at a farmers' market or supermarket becomes an important factor in explaining the variation in price contributing 10% to the sum of squares. However, there is not a difference based on condition when controlling for type of growing method, outlet, and condition. Interaction effects could not be examined due to empty cells.

TABLE VII. DIFFERENCES IN PRICE OF CAULIFLOWER BASED ON OUTLET, GROWING METHOD, TYPE OF PRODUCE, AND CONDITION

Source of Variation	Sum of Squares	Contribution to Sum of Squares	F statistic
Main Effects	29.263	72%	91.2**
FM/SM	20.842	51%	194.8**
Organic/Conventional	1.264	3%	11.8**
Condition	0.045	0%	0.4
Explained	29.263	72%	91.2**
Residual	11.343	28%	
Total df = 109	40.607	100%	

Notes: ** - indicates significance at $\alpha = 0.05$

Since the type of produce or item is very important in explaining the price of produce, individual analysis of variance was examined by produce type. Table VII examines the factors that impact the price of cauliflower. The location of sale, farmers' market or supermarket explains approximately half of the sum of squares. The type of growing method impacts the price of cauliflower, when controlling for outlet and condition. However, the condition does not impact the price of cauliflower when controlling for outlet and growing method.

TABLE VIII. DIFFERENCES IN BROCCOLI PRICE BASED ON OUTLET, GROWING METHOD, AND CONDITION

Source of Variation	Sum of Squares	Contribution to Sum of Squares	F statistic
Main Effects	5.147	57%	31.7 **
FM/SM	0.338	4%	8.3 **
Organic/Conventional	4.335	48%	106.8 **
Condition	0.098	1%	1.2
Explained	5.147	57%	31.7 **
Residual	3.858	43%	
Total	9.004	100%	
Total df = 99			

Notes: ** - indicates significance at $\alpha = 0.05$

Table VIII examines the factors that impact the price of broccoli, which is the only product that generated a significantly higher price in SM. The location of sale, FM or SM, explains only 4% of the sum of squares. The type of growing method impacts the price of broccoli, when controlling for outlet and condition. Whether organic growing practices are used explains almost half of the sum of squares. However, the condition does not impact the price of broccoli when controlling for outlet and growing method.

Table IX examines the factors that impact the price of vine ripe tomatoes. The location of sale explains approximately three-quarters of the sum of squares. The type of growing method impacts the price of vine ripe tomatoes, when controlling for outlet and condition. However, the condition does not impact the price of vine ripe tomatoes when controlling for outlet and growing method.

TABLE IX. DIFFERENCES IN VINE RIPE TOMATO PRICE BASED ON OUTLET, GROWING METHOD, AND CONDITION

Source of Variation	Sum of Squares	Contribution to Sum of Squares	F statistic
Main Effects	30.110	85%	77.0 **
FM/SM	26.922	76%	275.5 **
Organic/Conventional	6.449	18%	66.0 **
Condition	0.661	2%	3.4
Explained	30.110	85%	77.0 **
Residual	5.179	15%	
Total df = 57	35.289	100%	
Total			

Notes: ** - indicates significance at $\alpha = 0.05$

Table X examines the factors that impact the price of Romaine lettuce. The condition of romaine lettuce did not vary enough to be included in the analysis of variance. The location of sale (*i.e.* FM or SM) explains only 21% of the sum of squares. The type of growing method impacts the price of Romaine, when controlling for outlet and condition. However, the variables examined only account for 38% of the sum of squares.

TABLE X. DIFFERENCES IN ROMAINE LETTUCE PRICE BASED GROWING ON OUTLET, METHOD, AND CONDITION

Source of Variation	Sum of Squares	Contribution to Sum of Squares	F statistic
Main Effects	2.125	38%	29.8 **
FM/SM	1.186	21%	33.3 **
Organic/Conventional	0.225	4%	6.3 **
Explained	2.125	38%	29.8 **
Residual	3.423	62%	
Total df = 98	5.549	100%	

Notes: ** - indicates significance at $\alpha = 0.05$

CONCLUSIONS

Fourteen commodities were examined across six farmers' markets-supermarket pairings conducted during the winter and late spring-early summer, and fall 1999. This research shows that produce items purchased at San Luis Obispo County (California) farmers' markets were a better value than supermarkets as prices are

either the same or lower in all but one commodity and fruit and vegetable product quality was apparently better as well. Supermarket prices could be as much as one-third higher for produce items. Such information can be used by farmers' market managers for the development of their positioning statement, thus reaffirming farmers' markets usefulness to consumers, while providing an important venue for small scale farm operations.

These results may not be appropriate for other regions of the country as few locations have the year round production capability of California, except perhaps Florida, south Texas, island locations, and parts of Arizona.

References

1. *The Packer Fresh Trends. 1997*. "A Profile of the Fresh Produce Consumer," Vance Publications: Lincolnshire, IL. P. 18.
2. Associated Press. 1990. "Farmer's Market: Good for Growers, Shoppers in Cities." *The New York Times*, 3 October 1990: p. C9.
3. Trivers, L. and C. Crunkleton. 1996. "Glickman Lauds FM for Consumers and Farmers Washington". *United States Department of Agriculture News Release.* August 23, 1996.
4. Gottlieb, Catherine. 1993. "Making a Difference; One Market's Approach: Farm-Fresh Food, Low Prices and Fellowship." *Los Angeles Times*. October 4, 1993: p. B4.
5. Wolf, M. M. 1997. "A Target Consumer Profile and Positioning for Promotion of the Direct Marketing of Fresh Produce: A Case Study," *Journal of Food Distribution Research*, 28 (3): 12.
6. Wolf, M. M. 1997. "A Target Consumer Profile and Positioning for Promotion of the Direct Marketing of Fresh Produce: A Case Study," *Journal of Food Distribution Research*, 28 (3): 15-17.
7. Kader, A. A., 1985. "Standardization and Inspection of Fresh Fruits and Vegetables," Ch. 21 in A.A. Kader, et al. *Postharvest Technology of Horticultural Crops*, Cooperative Extension, University of California, Special Publication 3311, 123.
8. Sommer, Noel F. 1985. "Principles of Disease Suppression by Handling Practices," Ch. 14 in A. A. Kader, et al., *Postharvest Technology of Horticultural Crops*, Cooperative Extension, University of California, Special Publication 3311, 75.