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Theme Overview: Fresh Produce Marketing: Critical Trends and Issues

by Ramu Govindasamy and Suzanne Thornsbury, Guest Editors

Recent Trends

The fresh produce market has experienced significant change, driven in large part by increased consumer demand and sophistication and corresponding adaptations by streamlined supply chains. These changes are accompanied by consolidation of retailers, an expansion of product offerings and movement towards year-round supply, increases in imports, and shifts in marketing efforts.

Increasing Consumer Demand

The national per capita consumption of fresh fruits and vegetables has risen at an increasing rate, up a total of 15% between 1987 and 2000 (283 lbs. in 1987 to 326 lbs. in 2000). Since 1987, the variety of fresh produce items offered by retailers has doubled (173 items in 1987 to 345 items in 1997) and branded items share of produce sales has more than doubled (7% in 1987 to 19% in 1997). Fresh-cut and packaged salad sales have risen even more substantially (1% in 1987 to 15% in 1997). These growth trends reflect increasing consumer demand for variety, quality, and convenience. There has also been an approximate three-fold increase in the share of sales by produce wholesalers to the foodservice channel over the same time period (8% in 1987 to 21% in 1997), reflecting the rise in food dollars spent in the foodservice/restaurant sector (approaching half of U.S. consumers' total food dollars). This rising proportion of foodservice/restaurant sales is another reflection of consumer desire for convenience and value-added products.

Improved Cost Efficiencies and Streamlined Supply Chain

In 1997, $71 billion worth of fresh fruit and vegetables were sold to U.S. consumers. The dollars moving through specialized produce wholesalers have increased significantly, but there has been a decline in the share of produce wholesaler sales to food retailers (and an increase in the share of foodservice) over the same time period. This is in response to the growing demand for specialized and value-added products in a market where traditional outlets, requiring large volumes and year-round supplies, are beginning to bypass traditional wholesalers altogether and increase volume of direct purchases.

Large supermarket retailers continue to strive for lower labor and capital costs, product differentiation, and improved consumer services in order to remain profitable in an increasingly competitive environment. Mass merchandise and warehouse club stores are rapidly expanding and capturing a significant percentage of retail food sales. As a result, there has been a trend toward consolidation of large retailers and distributors to reduce costs and stream-

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line and improve supply-chain management practices. Innovations in procurement and distribution of produce, such as inventory mechanization, direct delivery by suppliers, use of specialty wholesalers, and fixed contracts with suppliers, help to reduce costs and increase efficiencies.

Future Needs

Although there are certainly some large players that exist in produce markets (i.e., Dole, Del Monte, etc.), many small firms remain active, particularly in the fresh produce arena. Many small farmers exist in this arena, struggling to profitably coexist with their large-volume competitors. Profitability and, in turn, farm viability has been particularly challenging to many growers competing in this era of supercenters and warehouse retailers, firms striving to cut costs starting at the farm gate.

In the 21st century, success in commercial production and sales by small farmers and retail firms will likely depend on their ability to focus on high-value, specialty crops targeted at specific niche markets. Small farmers and retailers of fresh produce will need to become adept at identifying such market niche opportunities and successfully differentiating their products. This will enable them to achieve market penetration and increase share (without the substantial costs typically required to dominate the market), uniquely position their products in the eyes of the consumer, optimize product mix, and establish early brand loyalty (either by private labeling or early-to-market efforts) to ensure their economic survival.

The focus of this theme in *Choices* is on changes in fresh produce marketing and small farm/firm response strategies in order to remain competitive, profitable, and economically viable in this changing market. The literature that follows includes six manuscripts which address relevant marketing issues (i.e., demand, regulatory/health, and distribution concerns) and provide appropriate response strategies.

Consumer Demand

Bond et al. analyze results from a 2006 national consumer survey that collected data on fresh produce purchasing habits, with a particular emphasis on those consumers who purchase directly from producers. Direct marketing is integral to the prosperity of most small fruit and vegetable farms. In order to enhance the profitability of these enterprises, it is important to understand the targeted consumers, the role of extrinsic and intrinsic attributes in purchase decisions, and how willingness-to-pay may be affected. The focus of this paper is on consumer response to fresh produce marketing claims. Highlighted are consumers' buying habits such as expenditures, shopping locales, frequency of purchases, priorities with respect to the product attributes, and response to various marketing claims about fresh produce. Differences in consumer response and willingness to pay a premium are analyzed with respect to questions on product and process attributes including the importance of color, taste, production location, production process (organic vs. conventional), and varying nutritional properties.

Govindasamy et al. examine the demographics and marketing of ethnic produce in the Mid-Atlantic States. Continued land development, rising production costs, and increased competition from low-cost suppliers from outside of the region are creating new challenges for traditional agriculture in the Northeast United States. Farmers in the area operate on a relatively small land base with high production costs, making it particularly difficult for viable production of crops, which require substantial acreage in order to break even. This study was initiated to help farmers in this area to identify, size, and seize market niche opportunities for agricultural crops that can be locally grown and was based on data collection and results analysis from an ethnic consumer survey. This survey included ethnic consumers of three different Asian ethnicities (Chinese, Indian, and Korean) in the Mid-Atlantic States to understand their socio-demographic characteristics, shopping patterns, preferences and related practices, and ethnic produce purchases. Findings indicate increased market profitability will be attained by helping retailers and growers exploit the comparative advantages associated with proximity to large, dense, high income population concentrations. The study documents the available opportunities for Mid-Atlantic farmers to grow ethnic crops from a market demand perspective by: (1) assessing ethnic consumer shopping patterns, 2) analyzing consumer willingness-to-pay for ethnic produce, and 3) suggesting products for potential local production.

Regulation and Health Concerns

Fonsah examines economically efficient strategies of formulating and implementing traceability regulations in the fruit and vegetable industry utilizing empirical techniques adopted worldwide by some Multinational Fresh Fruit and Vegetable Corporations. Traceability and Country of Origin Labeling (COOL)

have been at the forefront of those regulations affecting the U.S. fresh produce supply chain and are two areas where the wholesale sector is providing increased services. Concerns about adoption of traceability regulations have centered on the cost of implementation, which may increase the financial burden to growers. Other studies have shown that the cost of implementation is based on the breath, depth, precision, objective of the system, and subsequent advantage perceived by the implementing firm. The specific objectives of this paper are: (1) to provide producers or horticultural farm firms with a practical standard operation procedure (SOP) on how to set up traceability systems, and (2) to provide producers with an alternative on how to economically and efficiently collect accurate traceability record-keeping data.

Carman documents the efforts of some firms to capture benefits from targeting sales to growing demands for the health benefits of specific fresh produce products. For example, there is a significant market segment in the Unites States that is concerned with following a diet that will reduce the incidence of two important sources of mortality, cancer and heart disease. Another segment focuses on the relationship between diet and weight. Fruit, vegetable, and nut producers are attempting to "capture" these market segments by funding research on the health attributes of their particular products and then disseminating the results of this focused research through commodity promotional programs. This paper illustrates such a strategy by documenting health research programs conducted by four California commodity organizations and describing the utilization of research results in demand expansion programs.

Wholesale and Distribution

Thornsbury et al. examine the role of fresh produce intermediaries in away-from-home food markets. This sector of the supply chain is comprised of business operations which in general do not transform a specific fresh product, but rather provide services related to the sale of this product. In contrast to the food retail/grocery sector, many establishments in the foodservice industry remain small- and medium-sized businesses, where purchasing is handled by local buyers or chefs. Still, chain restaurants have high volume requirements and need consistency in products across time and outlets. The dichotomy in size among away-from-home food outlets provides opportunities for a greater number of intermediaries to be active in the supply chain when compared with retail food sales. Results illustrate that changes in fresh produce distribution and management have created new forms of commercial relationships between suppliers and wholesalers. In some cases, these changes represent valuable opportunities for business, beyond the demand for additional marketing services from suppliers.

Hall et al. compare produce market development activities in Georgia, Kentucky, North Carolina, and Tennessee, where the prevalence of small farms and growing seasons are comparable across all four states. Part of the difficulty confronting smaller operations relates to market access. Increasingly, fruit and vegetable growers with good entrepreneurial skills have established on-farm outlets or created niche markets with local independent wholesalers or retailers. Small-volume growers tend to have limited marketing personnel and post-harvest handling equipment, rely more on direct outlets, and sell to final retail consumers, whereas large-scale growers utilize volume-oriented outlets that encompass more involved and specialized marketing activities. Different states have pursued different types of market development to assist small growers and have achieved different degrees of success. This article summarizes the results from a systematic analysis of market development strategies in four states. Kentucky and Tennessee have tended to rely on local initiatives, more independent site selection, and smaller volume outlet activities, such as retail-only farmers' markets or only assembly/packing operations at specific sites. Georgia and North Carolina have tended to develop highly coordinated marketing channels that include regional facilities with activities that range from farmers' markets to wholesaling and brokering at the same site.

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Direct Marketing of Fresh Produce: Understanding Consumer Purchasing Decisions

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JEL Classification: Q13

Direct marketing via farmers' markets, roadside stands, community supported agriculture (CSA) programs, and other outlets, is integral to the prosperity of many small fruit and vegetable farms.[1] Through direct marketing, producers are able to establish a closer relationship with consumers, avoid expenses associated with using a broker or wholesaler, and increase their profits (USDA-AMS, 2002a). Moreover, direct marketing may be one of the most effective marketing system strategies to address emerging demand for more local food systems (Pirog, 2004).

Evidence of direct marketing's popularity among producers can be found in the growth of the number of farmers' markets countrywide. The United States Department of Agriculture reported that between 1994 and 2006, the number of U.S. farmers' markets more than doubled to over 3,700, and the value of U.S. agricultural products directly sold increased thirty-seven percent from $592 million to $812 million (USDA-AMS, 2002b). Furthermore, the 2002 USDA Ag Census found that the number of farmers using direct marketing channels grew from 110,639 in 1997 to 116,733 in 2002, while the average value of direct marketing per farm rose from $5,349 to $6,958 over the same time period.

American consumption trends may be contributing to growth in produce-related direct marketing channels. According to the 2004 USDA Vegetables and Melons Situation and Outlook, U.S. per capita consumption of fresh vegetables and melons increased by 52.6% between 1979 and 2004. Increased demand may have consumers seeking out new sources, including direct marketing channels, to satisfy their desire for fresh produce. Furthermore, a significant number of consumers have expressed a willingness to pay a premium for environmentally friendly (e.g., organic) and locally produced products, both of which are common offerings at many farmers markets and CSA programs (Wimberley et al., 2003).

In addition to farmers' markets, producers may choose to develop their own marketing enterprises, including "pick-your-own" farms and on-farm produce stands, as a way to capture consumers who may drive by or be seeking an on-farm experience. Other programs, like the aforementioned CSAs, allow producers to spread production risk over a number of shareholders by selling shares of the farm production prior to the growing season. As such, direct marketing strategies may play a role in supporting the financial prosperity of small- and medium-sized farms.

This article contributes to the understanding of direct produce marketing by reporting some key results from a national survey that collected data on consumers' fresh produce purchasing habits, with a particular emphasis on those consumers who purchase directly from producers. In particular, we discuss the differences in motivations when selecting fresh produce purchase locations, and compare attribute preferences between direct purchasers and consumers who do not use these channels. With this analysis, we compare how consumers who buy directly from pro-

1. *CSAs are subscription agriculture programs that allow consumers to purchase shares of a farm's production in exchange for a weekly allotment of fresh produce during the harvest season.*

ducers differ from other consumers in terms of fresh produce purchasing habits and which attributes are most valued by different consumer groups.

The Consumer Survey

Consumer data concerning purchasing habits, production practice, and product attributes were collected from a national online survey conducted in May 2006. A total of 3,170 members of the National Family Opinion Organization's online survey database were solicited to take the survey, with 1,549 returned (a response rate of 48.86%). The sample is representative of the United States population in terms of income, household size, and the percent of households with children living at home (USDC Bureau of the Census, 2000); however, Hispanics are underrepresented as is the case in many consumer surveys. The fact that our respondents are predominantly female is similar to findings in several contemporary food and grocery-oriented surveys which determined that females are most likely to be the primary grocery shoppers in a household.[2] Primary grocery shoppers were asked about their general food and fresh produce purchase location preferences, including primary, secondary, and seasonal sources, in addition to those not frequented over the last twelve months. Respondents were also asked to rate how important various motivations were to them when selecting where they purchased produce and an additional question asked how important numerous production practices and product attributes were to consumers when making purchase decisions.

2. *The primary grocery shopper was asked to respond to this survey.*

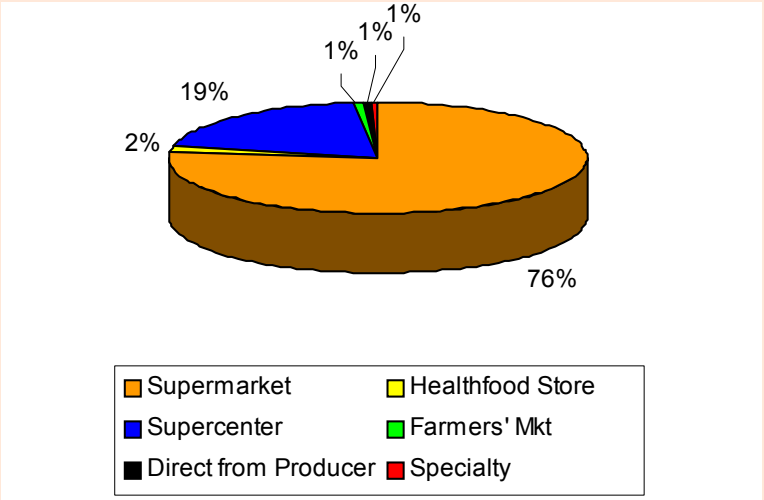

Figure 1. General food primary purchase location preference, n=1549.

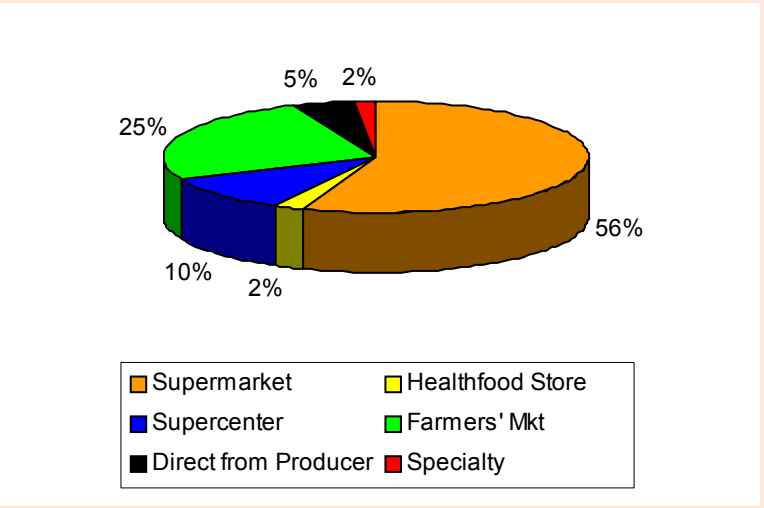

Figure 2. Fresh produce primary purchase location preference, n=1549.

Consumer Grocery and Fresh Produce Shopping Behavior

Survey respondents were asked to identify where they preferred to purchase food in general and fresh produce in particular. Figures 1 and 2 indicate the breakdown of consumers' preferred primary food and fresh produce purchase locations, respectively. Unsurprisingly, for food in general, the majority of respondents (76%) prefer to make primary purchases at the supermarket and another 19% prefer supercenters (e.g., Costco, Sam's Club). Healthfood stores are preferred by just 2% of the group, while direct from producer venues and specialty stores are the preferred primary food purchase locations for only 3% of the survey population. The findings are consistent with expectations that supermarkets are the preferred food purchase location for the majority of shoppers, while other outlets comprise a minority.

Restricting attention to sources of fresh produce (Figure 2), the percentage of consumers who prefer supermarkets as their primary source

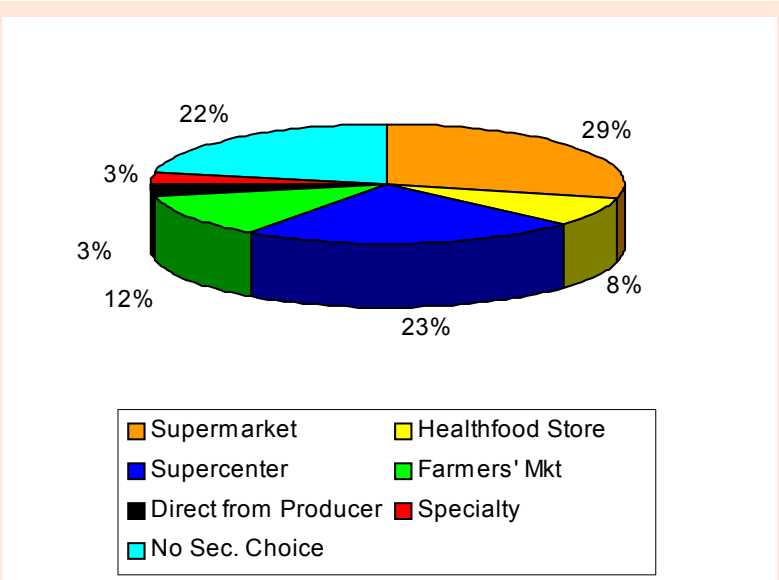

Figure 3. Fresh produce secondary purchase location preference, n=1549.

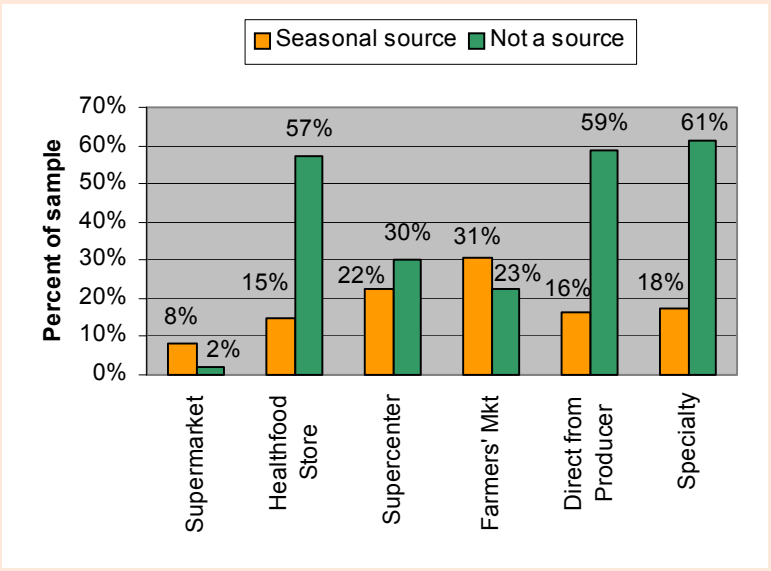

Figure 4. Fresh produce: Seasonal source or not source percentage.

declines to 56%. Thus, it appears that, through product offerings or locational attributes, alternative outlets provide features that make them a relatively more appealing venue for produce purchases over general food purchases. The share associated with farmers' markets and direct from producer channels constitutes a collective 30% of respondents, while just 10% prefer to purchase fresh produce primarily from supercenters and 2% prefer to purchase fresh produce primarily from specialty and healthfood stores.

Consumers were also asked to indicate their preferences for secondary sources of fresh produce (Figure 3).[3] While 22% of the sample had no preferred secondary source of fresh produce, 52% indicated supermarkets or supercenters as a complement to their primary source, and 15% selected farmers' markets or direct-from-producer channels. Relative to primary produce sources, this sample expresses greater diversity in consumers' secondary purchase location preferences. This may be a function of consumers' willingness to "shop around" or make a special trip for specific items, such as ethnic vegetables like kohlrabi or organic herbs that may not be available at their primary produce or general food purchase location.

Just as supplies of local produce in most areas of the country are likely to be seasonal in nature, many farmers' markets and some direct from producer channels are accessible only during certain times of the year (USDA-AMS, 2002a). To capture seasonal preferences, we asked consumers to indicate which locations they preferred to use as a source of seasonal fresh produce, as well as those sources that were not used in the past twelve months (Figure 4).[4] About 30% of respondents indicated a preference for farmers' markets as a seasonal source of produce, followed by about 22% who preferred supercenters. Specialty stores (17.6%), direct from producer channels (16.1%), healthfood stores (15%), and supermarkets (8.3%) follow in order of preference. Just 22.7% and 2%, respectively, indicated they did not purchase fresh produce at farm-

3. *Primary and secondary source categories were both mutually exclusive; in other words, only one primary and one secondary source was identified per respondent.*
4. *Seasonal sources and those not used in the past twelve months were not mutually exclusive; in other words, respondents chose all categories that applied.*

Table 1. Motivations.

Group	Variety Avail	Superior Product	Safety	Support Local	Convenience	Aesthetics	Recommendation	Prices	Social Interaction
Group 1	3.86	4.35	4.17	3.55	3.45	2.76	2.54	3.72	1.88
Direct Primary	(0.89)	(0.79)	(0.94)	(1.16)	(1.05)	(1.16)	(1.09)	(1.02)	(1.08)
	bc	**bc**	**bc**	**bc**	**bc**		**c**		**bc**
Group 2:	3.74	4.05	4.00	3.10	3.61	2.83	2.47	3.77	1.72
Direct Occasionally	(0.90)	(0.91)	(0.98)	(1.10)	(1.00)	(1.12)	(1.08)	(0.97)	(1.01)
	a	**ac**	**a**	**ac**	**ac**		**c**		**a**
Group 3:	3.68	3.88	3.92	2.67	3.75	2.90	2.32	3.85	1.68
Direct Never	(0.93)	(0.96)	(1.05)	(1.19)	(0.99)	(1.12)	(1.10)	(1.04)	(0.98)
	a	**ab**	**a**	**ab**	**ab**		**ab**		**a**

Statistical tests on mean: a=statistically different from group 1; b=statistically different from group 2; c=statistically different from group 3 @ 5%.
Standard errors are in parentheses.

ers' markets and supermarkets over the past year. These results are consistent with the observation that supermarkets are popular primary and secondary sources of produce on a year-round basis, while many farmers' markets are subject to seasonal demand and supply. For example, a 2002 USDA-AMS study of farmers' markets found that just 13% were open year-round, while markets that were not open all year operated for an average of 18 weeks. Nevertheless, the fact that 3 out of 4 respondents evidently shopped at a farmers' market in the past year suggests at least some valuable differentiation on the part of this market channel, and provides some evidence that exploitation of direct channels may help small- and medium-sized producers reach specialized niche markets. It should be emphasized that consumers expressed preferences as opposed to actual purchase locations; hence, it is not certain how correlated these stated preferences are with revealed behavior. However, the contrast in the survey results suggests that consumers value different attributes when selecting a primary general food source as opposed to a primary produce source, and that there is heterogeneity between primary, secondary, and seasonal fresh produce purchase locations as well.

The heterogeneity of sources led us to organize consumers into three groups in order to analyze motivations and produce attributes. The first group, Direct Primary, preferred to make primary fresh produce purchases via consumer direct channels (either at farmers' markets or direct from producers), and represents about 30% of the sample. The second group, Direct Occasionally, preferred to use direct channels as a source of secondary or seasonal fresh produce, but not as a primary source, and includes approximately 50% of the sample. The final group, Direct Never, did not utilize direct sources over the prior twelve months, and accounts for approximately 20% of survey respondents. These market segments are used in the subsequent analysis.

Consumer Fresh Produce Attribute Preferences and Purchase Location Motivations

To better understand consumers' motivations for selecting fresh produce purchase locations and preferences for product-specific features, respondents were asked to evaluate the relative importance of a series of location-specific attributes and three categories of product-specific attributes, including production practice, intrinsic properties, and value/package/convenience. Tables 1 through 4 summarize the mean motivation and attribute rankings and tests for statistical differences in means across the three groups of consumers using a scale of 1 (Not Important) to 5 (Extremely Important). Information from this analysis may be used to inform production practice and varietal selection decisions, as well as produce-specific marketing efforts of direct marketers.

Purchase Location Motivations

Table 1 summarizes the importance of various motivations for choosing where to shop for fresh produce, which may aid producers and location managers in better marketing their venues as a whole to specific consumer groups. Overall, rankings are quite similar, with all groups indicating that superior products, safety, and prices were top concerns. Relative to other groups, however, Direct Primary consumers tended to rank variety available and support for local producers higher than other attributes, while Direct Never con-

Table 2. Production practice attribute importance.

Group	Organic	Pest Free	Traceability	Country of Origin	Locally Grown	Relationship w/ Producer
Group 1	2.58	3.53	2.80	3.18	3.36	2.18
Direct Primary	(1.21)	(1.20)	(1.24)	(1.22)	(1.15)	(1.10)
	bc	**bc**	**bc**	**bc**	**bc**	**bc**
Group 2:	2.25	3.20	2.35	2.85	2.77	1.88
Direct Occasionally	(1.14)	(1.17)	(1.10)	(1.22)	(1.05)	(0.96)
	a	**ac**	**ac**	**ac**	**ac**	**ac**
Group 3:	2.14	2.96	2.17	2.52	2.34	1.74
Direct Never	(1.19)	(1.24)	(1.16)	(1.24)	(1.10)	(0.96)
	a	**ab**	**ab**	**ab**	**ab**	**ab**

Statistical tests on mean: a=statistically different from group 1; b=statistically different from group 2; c=statistically different from group 3 @ 5%.
Standard errors are in parentheses.

sumers tended to discount this latter factor in favor of convenience. Recommendations of friends and family and social interaction were ranked as the least important motivational factors for each group.

Although the rank attributes were similar across groups, there are some subtle differences. For example, Direct Primaries tended to value a connection to local production and their fellow consumers to a greater degree than the other groups, while those that did not frequent direct channels tended to value convenience, aesthetics, and price (attributes more associated with supermarkets) more than the other groups. Furthermore, the Direct Occasional group seemed more closely aligned with Direct Nevers, with five of nine attribute ratings not significantly different from each other. As such, it appears that a marketing strategy that highlights product quality and safety, in conjunction with lowering transactions costs to enhance convenience, may help to grow the market share of direct marketing channels.

Production Practice Attributes

Table 2 reports the mean production practice attribute ratings by consumer group. Pesticide-free production was the most important attribute across all three buyer groups, though Direct Primary purchasers valued the attribute statistically more than Direct Occasionals and Direct Nevers. Locally grown is the next most important attribute to Direct Primary purchasers, while country of origin labeling is ranked second for the other buyer groups (perhaps as a proxy for safety concerns). Although Direct Occasionals use direct marketing channels that are likely to supply much locally grown produce, it is interesting to note that this feature is less important than country of origin.

Given recent growth in availability of organic produce, it is somewhat surprising to find that this production practice attribute ranked sixth out of seven across all groups (Kremen, Greene, & Hanson, 2004). No statistical difference was found between Direct Occasional and Nevers' mean value on the organic attribute, which is somewhat unexpected given that Direct Occasionals are likely to encounter relatively more organic vendors. It thus appears that this group patronizes direct marketing channels for reasons other than access to organic produce, and is consistent with a 2004 finding by Pirog that found "locally grown by family farmers" was a more compelling claim than the bundled "locally grown and organic" claim.

Intrinsic Attributes

Table 3 reports the mean importance placed on produce-specific intrinsic attributes. All buyer groups ranked firmness and texture most highly; however, there is heterogeneity in the importance rankings assigned to the remaining product attributes, particularly between Direct Primaries and the two other buyer categories. Notably, Direct Primary consumers ranked freshness second, followed by color and visual appeal. The freshness attribute is a point of differentiation associated with produce available at farmers' markets (Brown, 2002). Freshness was less important to Direct Occasionals and Nevers who value color and visual appeal relatively more. In general, these two groups ranked attributes that can be assessed visually relatively more than Direct Primaries who tended to value

Table 3. Intrinsic attribute importance.

Group	Vitamins	Other Nutrients	Firm & Text	Color	Visual Appeal	Taste	Carbs	Freshness
Group 1	3.58	3.42	4.11	3.80	3.71	3.26	2.67	3.95
Direct Primary	(1.04)	(1.09)	(0.83)	(0.90)	(0.91)	(1.18)	(1.25)	(0.98)
	bc	**bc**	**bc**	**bc**	**b**	**bc**	**bc**	**bc**
Group 2:	3.27	3.12	3.89	3.62	3.60	3.08	2.46	3.46
Direct Occasionally	(1.01)	(1.04)	(0.90)	(0.94)	(0.95)	(1.17)	(1.15)	(1.04)
	ac	**ac**	**ac**	**a**	**a**	**ac**	**a**	**ac**
Group 3:	3.03	2.93	3.75	3.54	3.61	2.88	2.35	3.20
Direct Never	(1.12)	(1.14)	(0.92)	(0.97)	(0.99)	(1.23)	(1.17)	(1.16)
	ab	**ab**	**ab**	**a**		**ab**	**a**	**ab**

Statistical tests on mean: a=statistically different from group 1; b=statistically different from group 2; c=statistically different from group 3 @ 5%.
Standard errors in parentheses.

health-related attributes such as freshness, vitamin, nutrient and carbohydrate content more highly. These findings indicate that producers may be able to further appeal to consumers in the Direct Primary category by offering nutritionally superior cultivars and marketing the health aspects of their produce. To reach out to consumers in other buyer categories, direct marketers may do well to prominently display attractive and colorful produce of high quality.

Value/Package/Convenience Attributes

Table 4 reports the importance of value, packaging, and convenience attributes to alternative consumer groups. These attributes exhibited the greatest homogeneity across groups, with few of the means statistically different from each other. Only the mean for convenient preparation was statistically different between Direct Primary and Direct Nevers, with the latter placing more importance on convenient preparation of fresh produce (such as prewashed and pre-cut products). As produce offerings at farmers' markets and other direct channels are less likely than those at supermarkets to be processed, it is not surprising that Direct Primary purchasers would place less importance on convenience. Overall, the greatest importance is placed on value, followed by convenience of preparation, and type of package. Despite the Kaufman et al. (2000) finding that shares of branded produce have been on the rise in recent years, brand name of fresh produce ranks as the least important attribute among our respondents.

Table 4. Value/Package/Convenience attribute importance.

Group	Brand	Convenient Prep	Package	Value
Group 1	2.27	2.53	2.49	3.99
Direct Primary	(1.09)	(1.11)	(1.14)	(0.88)
		c		
Group 2:	2.22	2.65	2.51	3.91
Direct Occasionally	(0.99)	(1.08)	(1.10)	(0.90)
Group 3:	2.24	2.70	2.43	3.94
Direct Never	(1.07)	(1.08)	(1.06)	(0.94)
		a		

Statistical tests on mean: a=statistically different from group 1; b=statistically different from group 2; c=statistically different from group 3 @ 5%.
Standard errors are in parentheses.

Advice for Fresh Produce Direct Marketers

In general, we find that consumers who purchase direct from producers are similar to other consumers in that they tend to place a high value on firmness and texture, freshness and taste, safety, and value for the produce dollar. This is interesting in that it tells us that supporters of local food systems still have high expectations for product quality, even if other attributes also enter into their purchase decisions. In terms of choosing where to shop, these direct purchasers feel that having a wide variety of superior and safe produce as well as supporting local producers is important, but tend to rank convenience, aesthetics, and competitive prices relatively lower than consumers who do not express a preference for producer

direct purchases. This information may assist small- to medium-sized farmers determine the dimensions that may be important when promoting their products.

If producers wish to increase patronization by consumers with a strong preference for purchasing through direct market channels, produce could be differentiated with marketing materials that highlight vitamin content, nutritional properties, traceability, pesticide-free, and locally grown claims. To better target this market segment, an opportunity also exists for direct sellers to differentiate their produce through choice of production practice and cultivar to better satisfy the preferences of their consumers for superior, nutritionally enhanced produce that is pest free and locally grown. On the other hand, if producers wish to grow their market share by appealing to consumers who only occasionally prefer to patronize direct market channels, promotion should emphasize safety, country of origin, variety, and visual appeal of produce offerings. In combination with attractive displays that showcase colorful varieties of high quality produce, direct marketers may also consider capitalizing on this segment's stronger demand for convenience by offering semi-processed produce, such as cleaned and roasted chilies and pre-washed salad mixes.

Acknowledgements

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For More Information

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Ethnic Produce Marketing in the Mid-Atlantic States: Consumer Shopping Patterns and Willingness-to-Pay Analysis

by Ramu Govindasamy, Aparna Nemana, Venkata Puduri, and Kim Pappas

JEL Classification: C41, Q13

Access and proximity to large nearby population concentrations, high population density in general, and high per capita income have traditionally been competitive advantages for commercial farmers in the Mid-Atlantic states and larger Northeast region. However, as population in this already densely populated area has increased, so has land development, causing the commercial growers in the area to operate on a relatively small land base with high production costs. Encroachment on farmland, coupled with the challenge to maintain profitability, make it particularly difficult for viable production of larger-scale agronomic crops that require substantial acreage in order to breakeven. In addition, modern produce distribution practices are allowing commodity products from distant areas, with lower production costs, to be shipped into the Northeast region's population centers. In response to these new challenges and to remain profitable, many farmers in the region have been shifting production and adopting methods to grow higher value horticultural and specialty crops. Such crops are usually targeted toward a specific, small consumer base or market niche that is particularly interested in and highly values the inherent uniqueness of the crop. Therefore, this study seeks to identify the local demand for ethnic produce, assess ethnic consumer shopping patterns, analyze consumer willingness to pay for the ethnic produce, and suggest products for potential local production. The research area is fresh Asian ethnic fruits and vegetables, and in particular those preferred by Chinese, Indians, and Koreans. The perishable nature of such crops, combined with the local growth trends in these Asian segments, will well position farmers in the region who grow such crops to exploit the comparative advantages associated with marketplace proximity.

Identify Ethnic Market Niches (Who?)

The study targets Asian consumers as an ethnic market niche opportunity, chosen for their prevalence and significant growth in the United States, and even more notable growth in the Northeast. The significant Asian population proportions and recent growth trends in the Northeast are consistent with Asian representation and trends at a national level (U.S. Census, 2000; 4.0% and 3.6% Asian population in the Northeast and United States, respectively, with growth over U.S. Census 1990 at 60% and 48%, respectively, for the Northeast and United States). Correspondingly, the Northeast's absolute population growth of Asians exceeds that of any other race category, contributing significantly to the overall population growth for this region. Another consideration for selection, and for which the Asian group stands out at a national level, is the purchasing power for each ethnic population segment. With median household income as the selection criteria, Asians far exceed the national totals for all races combined, as well as Whites, Blacks, and Hispanics, and have consistently done so since before 1990 (Current Population Survey, 2000, 2004).

Assess and Address Ethnic Market Demand (Research Approach)

The research approach entailed the use of a mail-administered written survey that was sent to and completed by the

(self-identified) principal grocery shopper for each household. Prior to survey administration, a panel of experts was formed to provide input, offer suggestions, and ultimately review the three ethnic group selections and varieties of fruits and vegetables included in the questionnaire for each Asian group. Upon completion of the crop selection and survey design process, the questionnaires were mailed to samples of Chinese, Asian Indian, and Korean residences (presumed households per address, as identified by leads purchased via InfoUSA.com) throughout New Jersey, New York, and Pennsylvania. Specifically, sample targets were identified based on 2000 Census populations for Chinese, Asian Indians, and Koreans in the three Mid-Atlantic states (NJ, NY, PA). A sample size of 1,800 surveys was statistically determined, with 600 surveys for each of the three groups. Further sample size requirements were established, based upon ethnic group by state, in accordance with a stratified random sampling method. A total of 447 useable surveys were returned. A roughly 25% response rate was realized and was fairly consistent across groups. The usable surveys by group were 152 from Chinese, 135 from Indians, and 160 from Koreans, with overall response rates of 25%, 23%, and 27%, respectively. The corresponding results for each ethnic group (irrespective of state) yields a margin of error of approximately 8% in order to achieve the desired 95% confidence interval.

Respondents were separated into two groups; consumers and nonconsumers (more than 90% and less than 10%, respectively, in each of the three ethnicities), based on a surveyed criteria of having purchased ethnic (Chinese, Indian, or Korean) produce in the past year. Both groups were questioned for sociodemographic information. Only the consumer group was questioned as to their specific produce expenditures and shopping patterns and preferences. Despite the variation in survey usability by question (not every question applied to each respondent; not all questions were completed for each survey), a margin of error of less than 9% is maintained throughout the study.

1. Prioritize Potential Production Crops for Local Entry (What?)

The respondents' average weekly expenditures for total fresh fruits and vegetables, whether traditional U.S. or ethnic produce, is $45.48 (all respondents, consumers and non-ethnic produce consumers; ranging from $38.60 for Koreans to $54.06 for Chinese respondents, with $43.53 for Indians being relatively close to the average for all three groups). Specific produce expenditures for respondents that purchased ethnic produce within the past year (ethnic produce "consumers") were also documented. Expenditure data was collected for thirteen ethnic produce items for each respective ethnic group. The crops of interest were selected based upon their potential for production in the Mid-Atlantic states and larger Northeast region, with specific consideration for the growing cycle of specialty crops and their conduciveness to the climatic patterns in the area. The top five ethnic produce items purchased in each group, ranked in descending order on the basis of average weekly respondent expenditure are as follows (with the corresponding expenditures in parentheses); for Chinese, Flower Chinese Cabbage ($3.18), Edible Snow Peas ($2.68), Chinese Kale ($2.66), Bitter Gourd ($2.65), and Oriental Eggplant ($2.36); for Indians, Bitter Gourd ($3.14), Okra ($2.95), Yam ($2.95), Mustard Leaves ($2.73), and Black Eyed Beans ($2.69); and for Koreans, White Nectarine ($3.76), Fuji Apple ($3.39), Korean Cabbage ($2.58), Korean Cucumber ($2.39), and Green Onions ($2.32). The individual respondent expenditures for each item were calculated based on the corresponding quantity purchased and price paid for each, in an attempt to prioritize and target individual ethnic crops with the highest market potential in the Mid-Atlantic area.

2. Understand Shopping Patterns of Respondents (When? Where?)

i) Shopping Frequency . The shopping patterns of respondents included the responses of ethnic consumers who identified themselves as having purchased ethnic (Chinese, Indian, or Korean) produce in the past year (Figure 1). Just under half of these ethnic produce consumers shop once a week (ranging from 41% to 48% by ethnicity). Another roughly 40% shop either more than once a week or once every two weeks. Fewer than 20% in each group shop once a month or less. However, there is variation across the groups, as the Chinese typically shop slightly more frequently than their Indian and Korean counterparts; 36% of Chinese shop more than once a week compared to 15% of each of the Indian and Korean groups in this category.

ii) Multi-Store Shopping and Establishments Frequented. Consumer responses indicated that approximately three-quarters of those purchasing ethnic produce shop at more than one food store for their ethnic produce (Figure 2). Not surprisingly, as seemingly correlated with more frequent store visits, slightly more

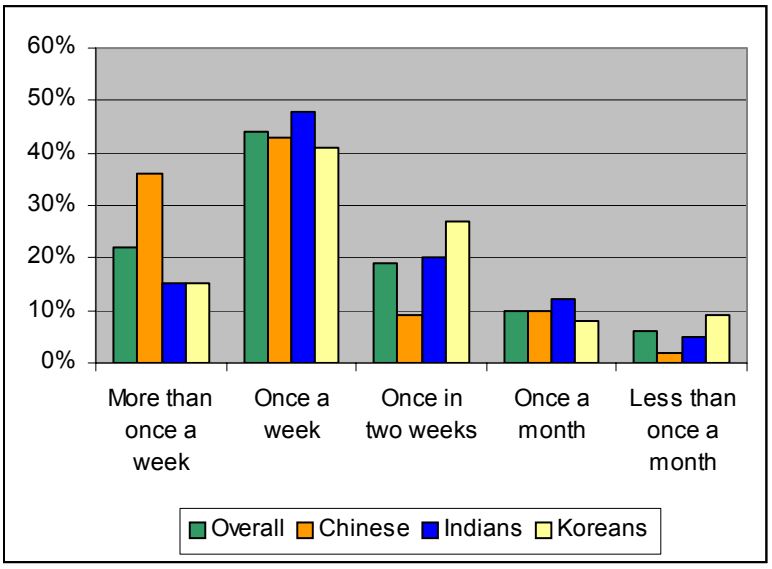

Figure 1. 2005 ethnic consumer survey: Shopping frequency of ethnic respondents.

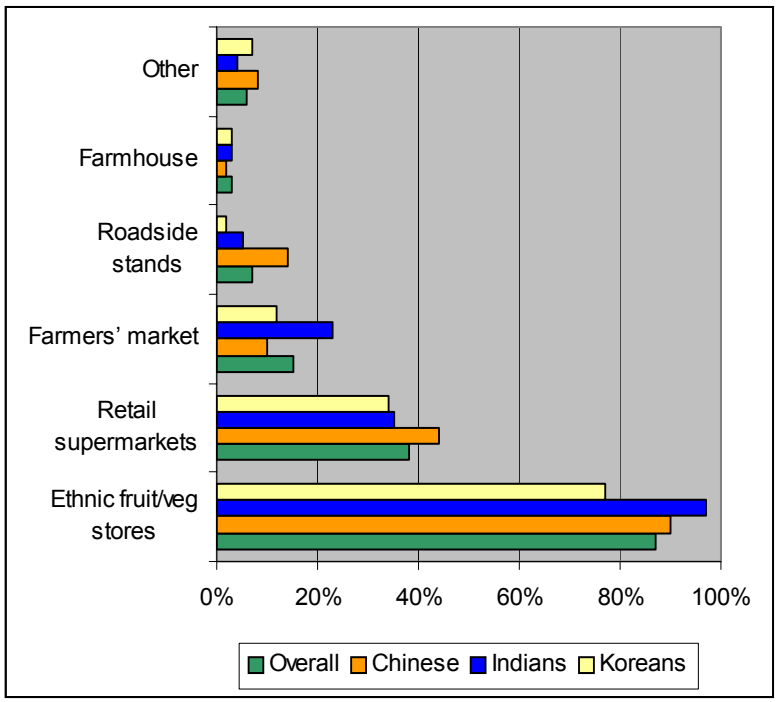

Figure 2. 2005 ethnic consumer survey: Establishments frequented for ethnic produce.

Chinese consumers shop multiple stores than Indians or Koreans. To ascertain which establishments consumers shop at for ethnic produce, respondents were asked to indicate all types of establishments from which they purchase ethnic produce during the peak season or "summer" months (as not all types are available at non-peak times of year). Each respondent was provided a list of five types of establishments, as well as an "other" category. They were then asked to indicate all that apply. More than three-quarters of the consumers in each group indicated that they purchase from ethnic stores. Although all three ethnic groups display high "brand loyalty," there is notable variation across the sample groups as the ethnic store shoppers range from 77% of Korean consumers, compared to 90% of Chinese, and a staggering 97% of Indian consumers. Approximately 40% of the consumers surveyed indicate that they purchase ethnic produce at retail supermarkets (with relatively little variation across groups, ranging from 35% to 44%). Between 10% and 23% of consumers surveyed indicate that they make purchases at farmers' markets, with Indians at the high extreme and Chinese and Koreans at or close to the bottom of that range.

iii) Proximity to Market. One factor that may affect consumer shopping patterns is each consumer's ability to shop, based upon store availability (or lack thereof). To assess store availability, the consumers purchasing ethnic produce were asked to indicate how close the nearest ethnic store is to them (Figure 3). The results reveal that more than half (53%-68%) of the consumers in each sample group has access to an ethnic market within 10 miles. Another 20% or so have a market within 10-20 miles, while fewer than 25% do not have an ethnic store within 20 miles. The Korean consumers sampled appear to have fewer stores within a 10-mile radius, relative to the Chinese and Indians sampled. A higher percentage of Koreans, relative to Chinese and Indian consumers, indicated that the nearest store is greater than 20 miles away.

3. Determine Willingness-to-Pay Ethnic Produce Premiums (How?)

The modeling section of the study examined the consumer profiles of respondents who purchase ethnic produce to ascertain whether relationships exist between their perceptions, practices, and socio-demographics and their willingness to pay (WTP) a premium over traditional American produce for ethnic produce (Figure 4). Roughly half of the respondents from each ethnic group indicated they would be willing to pay a premium for ethnic produce. The respondents were questioned as to their willingness to pay premiums in increments of 5%, up to 20% (1-5%, 6-10%, 11-15%, 16-20%), or more. Roughly 25% indicated a willingness to pay a premium of up to 5%, and an additional 14% indicated a willingness to pay premiums of up to 10%. The results in subsequent categories were significantly lower and varied slightly by ethnicity (12% or less, with most categories within ethnic groups having 5% or less). As such, the categories that captured respondents' willing to pay premiums of more than 10% are determined to be more discriminating for the purpose of identifying and targeting ethnic consumer groups, and a criterion for WTP modeling is established accordingly.

A WTP variable is modeled against relevant consumer 'belief' and related practice variables, demographic variables (age, gender, number of adults in the household, education, income, number of years in the United States), and fixed effects for the states and ethnicities (dummy variables). The 'belief' variables reflect consumers' opinions and perceptions (for example; 'availability' is an important/very important factor in shopping for ethnic produce, and 'prices' of products from ethnic markets are better than American produce). Related practice variables include consumers' approximate spending on all produce (traditional and ethnic), whether or not they regularly read advertisement brochures, and whether they have a garden at home.

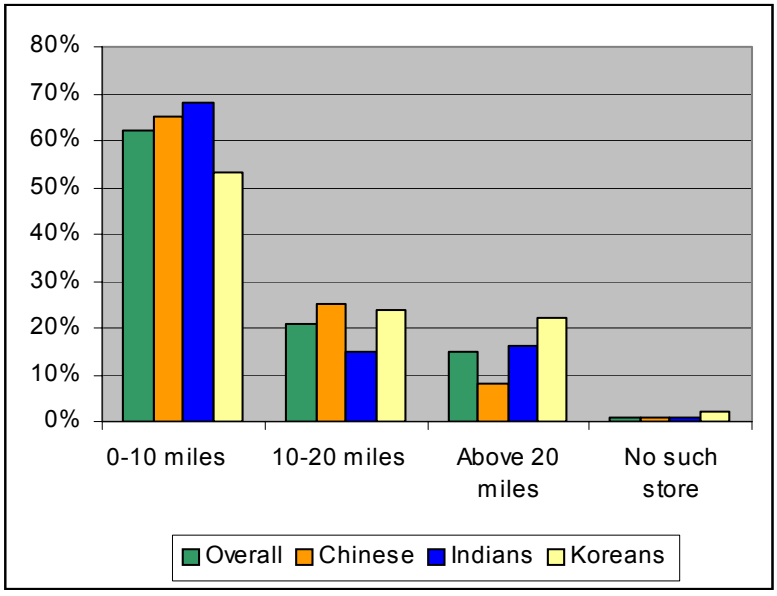

Figure 3. 2005 ethnic consumer survey: Proximity of ethnic market to respondents.

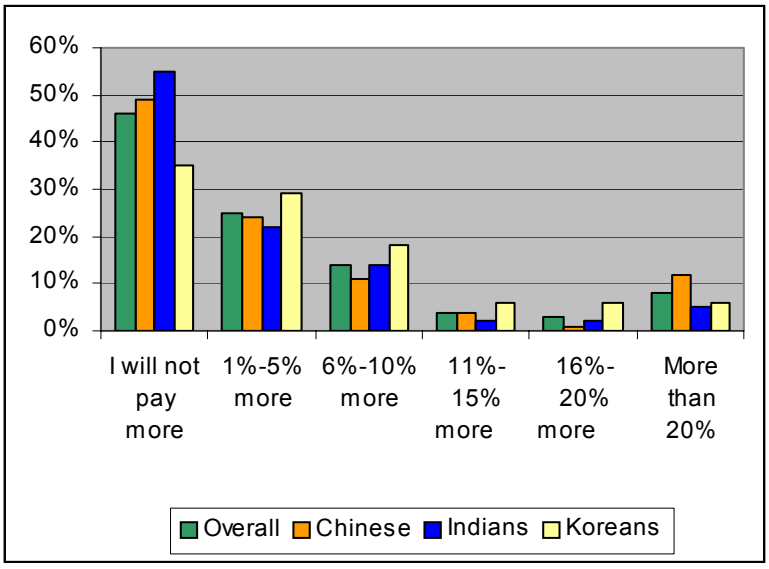

Figure 4. 2005 ethnic consumer survey: Willingness to pay a premium for ethnic produce.

Results derived from the model indicate that consumers in households earning greater than $60K seem 9% less willing to pay a premium of more than 10% compared to consumers in lower income groups, despite the counter-intuitive nature of this response, given that produce purchases represent a rela-

tively small portion of total expenditures for high income consumers. However, it is plausible that, due to their higher income, they have more luxury-type food alternatives available to them (such as eating out) than their lower-earning counterparts who view ethnic produce as more of a staple in their diet. Females are 13% more likely to pay a premium of more than 10% for ethnic produce than male shoppers.

In addition, ethnicity and state of residency appear to play a significant role in consumers' willingness to pay a premium. For example, Koreans and Chinese are 16% and 13%, respectively, less likely to be willing to pay a premium than Indians. Further, consumers in New York and New Jersey are 9% and 7%, respectively, more likely to be willing to pay a premium than those in Pennsylvania. As a result of these predictions, it would be most beneficial to growers and retailers to place premiums of greater than 10% on ethnic produce purchased by consumers earning less than $60,000 annual income, females, Indians, and New York/New Jersey residents.

4. Combine Consumer Profiles and Predictive Modeling to Exploit Local Ethnic Market Opportunities (Why?)

This study assessed the survey results of 447 respondents of three different Asian ethnicities (Chinese, Indian, and Korean) in the three Mid-Atlantic states to identify the local demand for ethnic produce, suggest crops for potential local production, assess ethnic consumer shopping patterns, and analyze consumer willingness to pay for ethnic produce. The survey results reveal that a vast majority (more than 90%) of respondents in each of the three ethnic groups purchased ethnic produce within the past year. Further, more than half of the consumers in each group shop once a week or more frequently for ethnic produce. Three-quarters shop at more than one food store for these purchases. More than three-quarters of those purchasing ethnic produce have access to an ethnic market (store) within 20 miles. The results of the study's "Willingness-to-Pay" model suggest that premiums for ethnic produce in excess of 10% over traditional American produce should be limited to consumers earning less than $60,000 annual income, females, Indians, and New Jersey/New York residents. These results can be used by public policy makers, retailers, and commercial growers in each state to identify and address niche market opportunities in the ethnic produce sector.

For More Information

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Traceability: Formulation and Implementation of an Economic Efficient System in the Fruit and Vegetable Industry

by Esendugue Greg Fonsah

JEL Classification: Q18

Traceability is a "record keeping system designed to track the flow of product or product attributes through the production process or supply chain" (Golan et al., 2004; Fonsah, 2005a). The globalization of world trade, the North American Free Trade Agreement (NAFTA), food safety in the fresh produce industry, and political and commercial realities have put the traceability regulation on the radar screen. Canada, which is now the number one trading partner of fruit and vegetables from the United States, has become an advocate of traceability, which means that the United States fruit and vegetable industry has no choice but to comply if they must export fresh produce to Canada (PMA, 2005; GS1, 2006; Fonsah, 2003a,b; Huang, 2004).

This study is aimed at developing economic efficient strategies of formulating and implementing traceability regulations in the fruit and vegetable industry. It utilizes techniques adopted by some multinational fresh fruit and vegetable corporations the world over. The specific objectives are (1) to provide fruit and vegetable producers with a practical standard operation procedure (SOP) on how to set up traceability systems, and (2) to provide producers with an alternative on how to economically and efficiently collect and handle traceability records.

How Can Traceability be Formulated in a Farm Firm?

The formulation phase of an integrated traceability process in a farm firm is a function of the following factors: (a) the food safety and quality management system, (b) identification of risk and opportunities involved in the operation, (c) identifying strengths and weaknesses of the organization, (d) aspiration and values of the stakeholders/owner of the organization, and (e) recognition of the non-economic factors to society. Management plays a vital role in both the formulation and implementation phases of traceability regulations adoption in a farm firm. A well-formulated strategy can still fail if not well managed. On the other hand, good governance can transform an inferior formulated strategy to success (Fonsah, 2003b).

Is the Implementation of Traceability Possible in a Horticultural Farm Firm?

Anecdotal experience shows that an effective implementation of an inferior strategic formulation can provide successful result. On the other hand, the ineffective implementation of even a superior or well-orchestrated strategic formulation can lead to failure (Fonsah, 2003b). That simply means that, although the formulation of a traceability program is important, the implementation is of utmost importance. The best place to start is with the organizational structure and relationship (see Figure 1).

Although the participation of each department on the organizational chart in Figure 1 is crucial, the most important person to implement and follow up the traceability adoption in a farm firm is the operation manager (OM), since he/she is expected to be adept with all the operations in the project. Figure 1 can be adjusted to reflect the structure of any small-, medium- or large-sized horticultural farm producing fruit and/or vegetables. A large farm in this study is defined as greater than 5,000 acres, while a medium-sized farm is from 1,001–5,000 acres. A small farm in this study is defined as less than 1,000 acres.

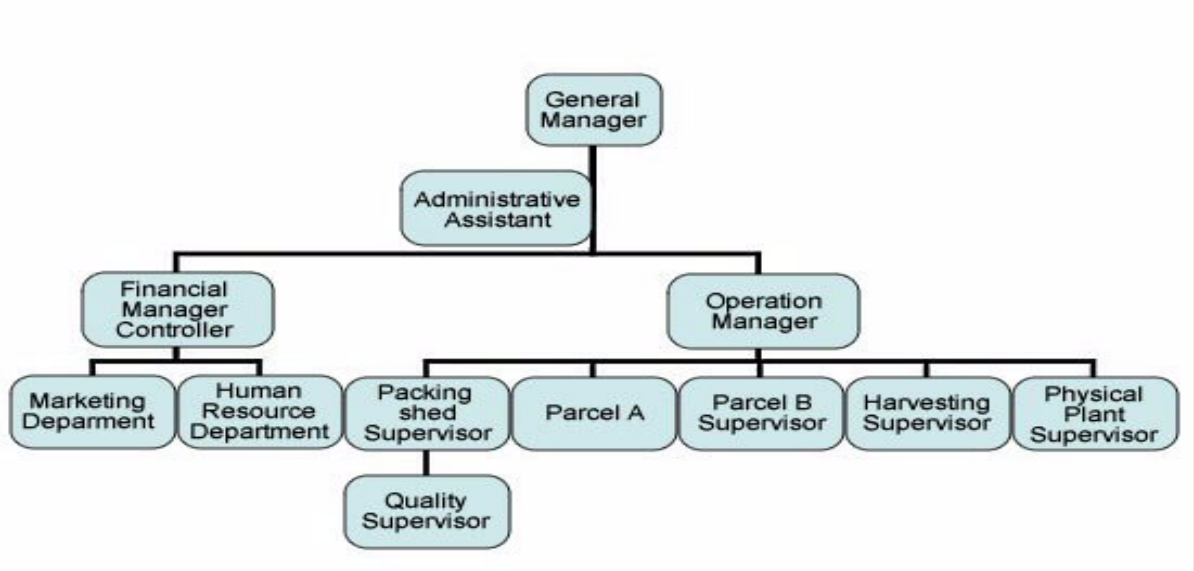

Figure 1. Organizational chart for implementing traceability in a large- and/or medium-sized farm operation.

What are the Functions of the Operation Manager in Implementing Traceability?

First, records of the day-to-day operations of the farm firm from planting to packaging must be kept in writing. This record keeping process only requires the operation manager to reallocate his/her work schedule to accommodate time for compiling records. A ledger or a notebook is required in the case of a small-sized farm firm or a computer in the case of a large- or medium-sized farm. Some corporate and multinational fresh fruit and vegetable companies around the world have adopted the ledger system because of its cost effectiveness (Fonsah & Chidebelu, 1995). The advantages of the ledger are as follows: (1) All supervisors must read and sign the ledger prior to going to the field; (2) Any unclear or well-defined instruction must be clarified prior to carrying out the operation. The clarification can be done either by radio, telephone, or the fastest means of communication available; (3) When the ledger is full, the beginning and ending date is labeled on it and filed for future reference; (4) If any field operation is wrongly implemented, it is easy to trace where the communication breakdown occurred; and (5) It is cheaper to use a ledger than a computer, especially in the case of small farmers who in most cases lack computer proficiency and do not even want to be bothered with it. It is recommended that the records be kept for at least five years.

What Techniques Can We Use for Traceability Data Collection/ Record keeping?

The rule of thumb is to have a surveyor demarcate the farm into parcels or plots and draw it into a map. A good map should have the following information: (1) parcel numbers; (2) acreage per parcel; (3) all primary and secondary roads; (4) all ponds or rivers; (5) irrigation system main and secondary lines, if applicable; (6) drainage system, if applicable; (7) bridges, if applicable; (8) offices, packing house, physical plant, or any building infrastructure; (9) cableways network, if applicable; and (10) nursery, if applicable. Mapping is a common practice.

How Do We Obtain Traceability Information from Field Operations Using a Map?

A staff person can be designated to enter these instructions in the ledger for the supervisors to read and implement. These instructions must be written at least one day prior to execution to give the supervisors enough time to read, collect, and arrange for all the logistical needs to successfully carry out the recommended operations. In the case of a large- or medium-sized farm, the physical plant or field operation supervisor or a combination of technical people will be the ones to implement these instructions. For example, the following is some pertinent information to be entered in the ledger during the planting of bell pepper: (1) date; (2) state manual or mechanical planting, plot, or parcel number, (3) planting pattern (for example double or single rolls); (4) crew number and names of

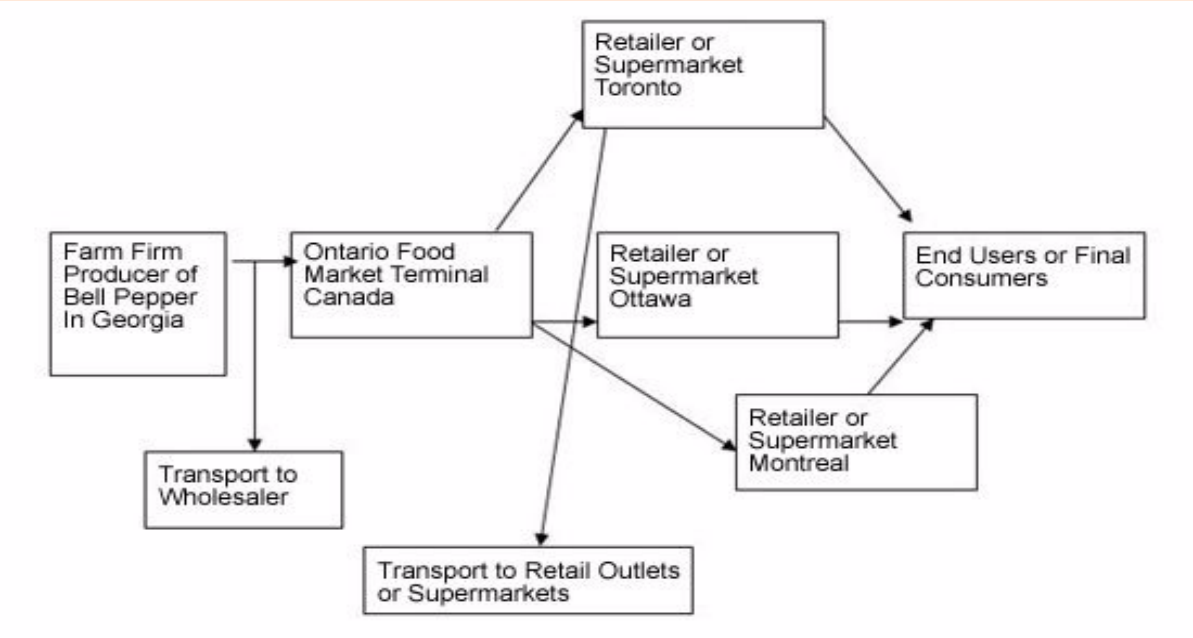

Figure 2. Traceability in a two-level distribution channel for horticultural crops.

crew members; (5) seed number and company from which it is bought; (6) origin of seed and date purchased; and (7) color plot or parcel where the planting operation took place. Enter the same information for all the plots or parcels planted and use different colors for different planting dates. It is suggested here that the same information must be entered for all plots or parcels planted such as weed control, fertilization application, irrigation, insect, pest and disease control, harvesting, handling, and sanitation, respectively.

How Can Packing House Information be Collected for Traceability?

Each packed box must be legibly coded prior to leaving the packing station with a simple stamp code. The coded number should contain the following information: (1) date the box was packed; (2) packer's number – optional; (3) packing station number if the company has many; (3) packing line number – optional; (4) harvested date; (5) harvested plot number; and (6) harvested crew number and names. If the crop is field packed, the packer will stamp each box immediately after the operation. The stamps are small and self-inked.

Tracking Traceability Back to the Farm with All the Information Gathered

Assuming there is an outbreak of disease on bell pepper shipped to a supermarket in Montreal, how do we trace it back to the farm? In Figure 2, simple steps to follow are presented, assuming the produce goes through a two-level distribution channel: (1) The customers report to the retail chain manager of company ABC supermarket in Montreal, Canada; (2) The manager complains to the wholesaler at the Ontario Food Market Terminal; (3) The wholesaler requests the box number and consignment date from company ABC manager in Montreal; and (4) The Ontario Food Market Terminal manager sends the number to the horticultural farm firm manager where the pepper was cultivated; (5) On receiving the box packing code, the manager or his associate immediately determines the date on which the box was packed and by which packer; and (6) The manager opens the ledger on the packing date and retrieves the following on packaging, harvesting, fertility application, irrigation, weed, pest and disease control, land preparation, cultivar, and source of the seed that was planted. All of these operations can take less than 30 minutes. Strategic management decisions can then be made in a timely manner to minimize further costs incurred because of the disease outbreak.

Cost of Implementing Traceability

The economic efficient initial cost of formulating and implementing trace-

Table 1. Economic efficient cost of implementing traceability per acre in a farm firm producing bell pepper in Georgia, 2006.

Operations	Medium/Large Firm No Traceability ($)	Medium/Large Firm With Traceability ($)	Small Firm No Traceability ($)	Small Firm With Traceability ($)
1. Field Operations	$2,725.00	$2,725.00	$2,725.00	$2,725.00
- Includes all pre-harvest variable cost components such as plants, fertility, insecticides, fungicides, nematicides, herbicides, plastic, drip tapes.				
2. Harvesting Operations				
- Picking & hauling	$1,275.00	$1,275.00	$1,275.00	$1,275.00
3. Packing Shed Operations				
- Container/boxes/crates	$1,125.00	$1,125.00	$1,125.00	$1,125.00
- Grading and packing	$1,650.00	$1,650.00	$1,650.00	$1,650.00
- Marketing	$1,275.00	$1,275.00	$1,275.00	$1,275.00
- Stamps with code number		$25.98		$25.98
4. Transportation				
- Temperature recorder (2)	$128.00	$128.00	$128.00	$128.00
- Mixed cargo	$27.52	$27.52	$27.52	$27.52
5. Fixed Costs				
- Machinery	$56.27	$56.27	$56.27	$56.27
- Irrigation	$220.65	$220.65	$220.65	$220.65
- Land	$129.53	$129.53	$129.53	$129.53
- Overhead and management	$408.75	$408.75	$408.75	$408.75
Total Budgeted Cost	$9,020.72	$9,046.70	$9,020.72	$9,046.70
Total Cost of Traceability	**0.00**	**25.98**	**0.00**	**25.98**

ability in a small, medium, or large-farm firm producing bell pepper in Georgia is estimated at $25.98 per acre, respectively (Table 1). This is the cost which the grower will incur for purchasing a personalized rubber stamp with the packer's code number. Although one stamp is capable of producing thousands of impressions, this study assumed that at least two packers will be needed to pack 1,500 boxes of bell pepper per acre to be economically efficient, irrespective of whether the fresh produce was packed at the packing shed or in the field. The initial cost will eventually reduce as only a self-inking replacement pad which cost from $4-$7 will be needed after the ink runs out.

The field operation or pre-harvesting variable cost, harvesting, packing, and fixed costs were derived from an enterprise bell pepper budget (Fonsah, Escalante, & Byrd, 2005c). It was assumed that two temperature recorders was needed per container worth $64, and since 1,500 boxes of pepper can fill 1.64 containers, a total of four recorders worth $128.00 would be required. However, this is a common practice whether traceability is adopted or not. Further, the cost of polyethylene pallet covers needed for tracing co-mingled produce in the same container was $27.52. This is also a common shipping and/or refrigerated container transportation SOP. Different color polyethylene pallet covers can be used for each consignment. One roll that can cover 88 pallets costs $77.50. The cost of a ledger was not included because any notebook will suffice and it is part of the office stationery.

Is Traceability Possible During Transportation?

During transportation, any kind of recording device that would provide accurate documentation in different time and temperature ranges could be used to track any fluctuation in temperature that would affect the quality of the fresh produce. There are so many inexpensive ones, such as the cox recorder or a disposable strip temperature chart recorder. The price ranges from $10 to $450 per unit and it is recommended to have at least two in a container, one at the back and one at the front. This is a standard procedure in the fresh fruit and vegetable business irrespective of whether traceability is implemented

or not. A grower, small, medium, or large, who is yet to adopt this technology, is taking a great risk. There are more sophisticated data logging software that can be installed in the computer to monitor all containers carrying fresh produce to various destinations around the world right in the office. Although these are more expensive, they are better for well-established larger growers and the price becomes cheaper in the long run. In this study, 4 disposable strip temperature chart recorders were utilized for the price of $32 each, which is equivalent to a 1.64 container of fresh pepper and to 1,500 boxes per acre.

Is Traceability Possible if There are Mixed Produce in the Same Container?

In the case of co-mingling of produce, one of the most economic efficient ways to trace them is by using a different colored pallet strap for each category of produce. Another technique is to use different color covers. Some of the commonly used ones are the polyethylene and insulated pallet covers, respectively.

How Can One Use Rubber Stamp for Traceability?

A rubber stamp is an efficient method to trace who and when the produce was packed, and possibly where, in the case of multiple packing stations. Although any shape of rubber stamp will do, for quality and cosmetic appearance purposes, a round self-inking stamp will suffice. One of these is capable of producing thousands of repetitive impressions without re-inking and better still, the stamp can be re-inked. The stamp is small, light, portable, and convenient to carry. Furthermore, you can customize it and the prices range from $12.99 to $23.99 each. Assuming 1,500 boxes of bell pepper per acre, 2 stamps at $12.99 each should suffice.

Discussion Notes

In the first section, information on how traceability can be formulated was provided. Secondly, information on the implementation strategy was discussed. Thirdly, the functions of the operation manager in implementing traceability were elaborated. Then the techniques on how to collect traceability data and/or record-keeping were provided. Next, the methods of obtaining traceability information from field operations using a map were vividly discussed. In section six, the strategies utilized to collect packing house traceability information were provided. Section seven provided information on tracking traceability back to the farm in the case of a disease outbreak. The cost of formulating and implementing traceability using our economic efficient model was discussed in section eight. Section nine provided information on how traceability could be adopted during transportation of fresh produce. Section ten discussed the implementation of traceability when fresh produce are co-mingled. Finally, the use of rubber stamps in the adoption of traceability was elaborated.

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Preventive Health Maintenance Information Brought to You by Your Local Fruit and Nut Producers

by Hoy F. Carman

JEL Classification: I12, Q13

When we were children, our mothers told us that "eating an apple a day keeps the doctor away," that "carrots contribute to good eyesight," and we saw "Popeye" gain amazing strength from consuming cans of spinach. This was reinforced by please "eat your vegetables; they are good for you," but we also remember that food and vitamins that were good for us often did not taste very good! Regardless, these appeals were effective. Spinach growers credited Popeye with a 33% increase in U.S. spinach consumption–and saving the spinach industry in the 1930s (King Features, 2006).

Fast forward to the 21st century. Now many consumers have moved past accepting generalities and want to know the dietary and health contributions of specific food products. There is a significant and growing market segment that is concerned with consuming a diet that will reduce the incidence of important sources of mortality, including obesity, cancer, heart disease, and diabetes. These same health issues are a public policy priority, and government provides general diet recommendations to improve public health. Many commodity groups, looking for a "New Popeye" to spur their product demand, believe in the "special beneficial attributes" of their products, but are faced with U.S. Food and Drug Administration (FDA) requirements that product and health claims be factually correct. Several have moved to fund diet and health research designed to discover and document relevant special product attributes. This article describes the diet and health research efforts of the Almond Board of California, the California Avocado Commission, the California Strawberry Commission, and the California Walnut Commission.

Developing Health-Oriented Research and Promotion Programs

Producer-funded research by California's marketing orders and commissions has traditionally focused on production problems and, to a much lesser extent, marketing issues. At the same time, generic promotion programs were based on messages about the origin, taste, and appearance of the fruit, vegetable, and nut products. Public relations activities included news releases about product availability, new recipes, articles on choosing, storing and preparing the products, and other newsworthy events. References to health attributes of commodities were based on U.S. Government diet recommendations such as the "Food Pyramid" or references to vitamin or nutrient content. The California Walnut Commission (CWC) was one of the first mandated marketing programs to fund health and nutrition research in 1992, when it decided to counter diet recommendations urging consumers to reduce or constrain consumption of nuts because of their high oil content. The Almond Board of California (ABC), the California Avocado Commission (CAC), and the California Strawberry Commission (CSC) initiated funding for health and nutrition research in 1995, 1997, and 2003, respectively. A review of budgets for the five-year period 2000/01 to 2004/05 indicates that these four organizations spent a total of over $8.1 million on health and nutrition research.

Health and Nutrition Research Expenditures and Topics

Annual health and nutrition research expenditures for the four commodity groups recently totaled over $2.77 mil-

lion, ranging from 2.5 to 7.0% of total annual budgets (Table 1). Note that health and nutrition research has tended to be an addition to traditional production and marketing research rather than a substitute. The same four groups spent about $3.8 million on production research during the 2004/05 crop year.

Health and nutrition research topics pursued by the four commodity groups have similarities as well as differences (Table 1). Each commodity group has or is seeking evidence on the value of consuming their product on reducing the risk of heart disease. Each of the four commodity groups has evidence that product components may lower the risk of certain cancers and each of the commodities contains antioxidants that are known to slow the aging process and protect against heart disease and various forms of cancer. Almonds, avocados, and walnuts can be a component of a diet to control weight gain, and each can be part of a diet for managing and controlling diabetes. Following is a short summary of research interests for each commodity.

Table 1. Health and nutrition research expenditures and areas of interest mentioned by four California commodity groups.

	Commodity			
Expenditures, 2004/05	**Almonds**	**Avocados**	**Strawberries**	**Walnuts**
Amount	$1,200,000	$444,754	$605,000	$525,260
Percent of Total Budget	5.0	2.5	7.0	6.8
Research Area				
Cardiovascular Disease	X	X	X	X
Weight & Obesity	X	X		X
Cancer Prevention	X	X	X	X
Diabetes	X	X		X
Antioxidants	X	X	X	X
Aging	X	X	X	X
Prostate Health				X
Bone Health				X

Walnuts

Initial studies funded by the CWC concentrated on the relationships between walnut consumption and the risk of coronary heart disease and walnut consumption and cholesterol levels. Focusing on relationships between walnut consumption and heart health, the CWC funded a combination of epidemiological and clinical studies conducted by leading universities in the United States, France, New Zealand, Spain, Norway, and Japan and published in medical, nutrition, and scientific journals. These studies indicate that walnuts reduce LDL cholesterol and heart disease risk, the fatty acids in walnuts improve the function of arteries, walnuts reduce cell adhesion molecules and enhance the circulatory system, and that omega-3 fatty acids in walnuts reduce inflammation in arteries. More recent studies indicate that melatonin in walnuts protects against cancer and heart disease, omega-3s reduce blood pressure, arterial inflammation, the stickiness of platelets and have antidepressant-like effects, walnuts can help in weight management, that consumption of walnuts are protective for people with type 2 diabetes, and that the form of vitamin E found in walnuts might halt the growth of prostate and lung cancer cells. Walnuts have high concentrations of antioxidants, which help the body ward off cancer, heart disease, and diabetes, as well as arthritis, osteoporosis, and Alzheimer's disease. The Scientific Research Update for Health Professionals, posted on the CWC website, includes results for 23 professional studies published between 1992 and 2005.

The CWC used their research results to secure an FDA qualified health claim for walnuts on July 15, 2003 that was separate from the health claim for other nuts. The final wording for the claim, issued in March 2004, states: "Supportive but not conclusive research shows that eating 1.5 ounces per day of walnuts as part of a diet low in saturated fat and cholesterol may reduce the risk of heart disease. See nutrition information for fat content."

Almonds

The ABC initiated nutrition research in 1995 with studies on cardiovascular disease, decreased cancer risk, glucose metabolism, and analysis of the nutrient content of almonds. The number of research projects expanded to 12 in 1997-1998, and gained an international flavor with ABC-funded studies at the University of Toronto Medical School and at Beijing Medical University. The most important outcome of the nutrition research program for almond industry promotion was securing the FDA qualified health claim for almonds on July 15, 2003 that states: "Scientific evidence suggests but does not prove that eating 1.5 ounces per day of almonds as part of a diet low in saturated fat and cholesterol may reduce the risk of heart

disease." Shortly after approval of the FDA health claim, an article published in the *Journal of the American Medical Association* on a study known as the Portfolio Eating Plan, found that eating a diet high in heart-healthy foods, including almonds, is as effective in managing cholesterol as taking a starting dose of lovastatin, a cholesterol-lowering statin drug (Jenkins et al., 2003).

The ABC has ongoing research relationships with more than 20 scientific organizations and universities around the world. Cardiovascular research has the largest research budget (24%), followed by research on the composition of almonds (20%), research on antioxidants (19%), cancer research (14%), and research on weight (3%) (www.almondsarein.com). Research projects on topics in the above areas include food allergies, Vitamin E, the chemical composition of almond skins, colon cancer, cholesterol levels and reduction, the effect of almonds on glycemic control and insulin response, and the effects of almond consumption on appetite, energy and weight. The ABC website lists references for 46 publications reporting nutritional characteristics and research results on potential health benefits of consuming almonds.

Avocados

In 1997, the CAC made a strategic decision to proactively communicate the health and nutritional benefits of avocados through their public relations and outreach programs and to fund nutritional research. Research focused initially on a detailed analysis of the composition and nutrient content of avocados, including fatty acids, vitamins, and minerals. Recent emphasis has shifted to quantifying and qualifying various phytochemicals (i.e. pytosterols, carotenoids, glutathione), as well as their health benefits and effects on disease processes. The CAC communicates the results of ongoing research to health and nutrition professionals in publications and on their website. For example, three of the seven short articles in the Summer/Fall 2006 issue of *California Avocado Healthy Times* are based on recent research publications (See CAC website: www.avacado.org/healthy_living/healthcare_professionals.php).

Strawberries

The California Strawberry Commission's health and nutrition research and promotion programs are a change in strategy stemming from changing industry structure. Prior to 2003, the CSC jointly promoted California strawberries with major retailers. This strategy began to conflict with large shippers who were establishing their own brands and also sponsoring joint promotions with retailers. In a major strategic change in 2003, the CSC established a health and nutrition research program and shifted its marketing emphasis to consumer-oriented promotion based on the health benefits of consuming fresh strawberries. The CSC introduced a new promotion campaign, the "Red Edge" campaign, that targets health and nutrition professionals, the consumer, and trade media through trade events, and media materials that communicate findings from CSC-sponsored research on the health benefits of consuming fresh strawberries. In their recent request for proposals, the CSC states: "The primary goal of the California Strawberry Commission nutrition research program is to develop the scientific basis for a qualified health claim in chronic disease prevention. Improved understanding of the bioactive components of strawberries, bioavailability, and mechanism of action are considerations. Priority areas are cardiovascular health, cancer prevention, cognitive function, and obesity." The CSC accepts proposals for up to three years of research funding. The CSC website has references and links to nine research papers related to their research program.

Health and Nutrition Promotion

The promotion strategy used for health and nutrition varies by commodity. Public relations programs have proven to be very effective for dissemination of health and nutrition research results and are used by each of the four commodity groups. Based on laboratory testing of advertising themes, the California Walnut Commission (CWC) concluded that the message on the health benefits of walnuts is best communicated through a third party such as a magazine, newspaper, doctor, nutritionist, or other credible source. The advertising emphasis has been on quality, taste, and uses for walnuts in meal preparation, with public relations used for the health and nutrition message. The CAC also focuses on the use of public relations to disseminate the health and nutritional message for avocados rather than using paid advertising and promotion. The CAC's public relations program, emphasizing health and nutritional benefits associated with avocado consumption, has garnered the attention of news organizations and has been widely disseminated with a modest expenditure of funds. In addition, most consumers place much more credibility on a news story about health and nutrition benefits of consuming a product than they do on advertising with the same message.

The Almond Board of California (ABC) began disseminating results from their nutrition studies through their public relations program during 1997-1998. The 1998 Almond Almanac noted that expenditures of $761,000 on public relations gained exposure that would have cost over $1.72 million using traditional advertising and promotion. During 1998-1999, public relations expenditures increased to $1 million, but the advertising value equivalency of exposures related to health benefits of consuming almonds increased to $7 million (Almond Almanac, 1999). The health message was extended to ABC advertising in Japan during 1998-1999 and to Europe in 2000-2001.

With FDA approval of a qualified health claim for almonds on July 15, 2003 and a "partnering" agreement with the American Heart Association (AHA) that permits use of the AHA logo in almond advertising, the ABC focused on a health message in most of its advertising and promotion. The copy for one 2004 magazine advertisement, for example, reads "California Almonds; Admired by Great Chefs & Prominent Cardiologists Alike" (Almond Almanac, 2004). Note that 2003-2004 advertising and public relations expenditures based on the health and nutrition message accounted for about two-thirds of the ABC budget ($16 million).

Success Encourages Imitation

Marketing program innovations improve the competitive position of commodity groups. Health and nutrition research for almonds, avocados, strawberries, and walnuts, funded by the respective marketing programs, has reported results that document the value of consuming each product. These results are of interest to health conscience consumers and are widely circulated through unpaid newspaper and magazine articles, diet recommendations by health professionals, and recommendations by health organizations such as the American Heart Association and the American Diabetes Association. The value of media space devoted to health and nutrition aspects of these four products is a large multiple of the public relations budgets. In addition, news stories for these commodities are more believable than advertising to many consumers.

There is anecdotal evidence on the value of health and nutrition research, but empirical studies of the impact of research results on product demand are not available. For example, the CWC firmly believes that McDonald's May 2005 decision to add a fruit and walnut salad to its menu in its 13,700 U.S. restaurants was due to the availability of research on the health and nutritional benefits of walnuts. The positive impact of commodity group advertising and promotion on demand has been documented for many products, but the effects of a health and nutrition message versus alternatives have not (Kaiser, Alston, Crespi, & Sexton, 2005). Never-the-less, the perceived success of health and nutrition research programs for increasing product demand is encouraging other commodity groups to undertake similar health and nutrition research.

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Fresh Produce Intermediaries: Impacts of Change in Away-from-Home Food Markets and Trade Practices

by Suzanne Thornsbury, Roger Hinson, Lourdes Martinez, and Dixie Watts Reaves

JEL Classification: L14, L20, L81

The markets and channels that supply fresh produce are among the most dynamic in the food system. Fresh fruits and vegetables, as a group, benefit from trends in consumer preferences. A stream of evidence from the scientific community confirms the health benefits of fresh produce in a world of concerns about health issues. Convenience is essential to many time-starved consumers, encouraging product development and advances in packaging. Most, if not all, fresh produce items are available year-round, and the variety of products has continued to grow. Consumption is dramatically affected by safety issues, as illustrated by the recent illnesses from *E. Coli* on spinach. Continuing consolidation at retail affects supply chain relationships, as efficiencies in that area are thought to be a sustainable competitive advantage. Another dynamic is the emergence of large distributors serving the retail grocery and foodservice segments, placing additional pressure on small- and mid-size companies in the areas of market access and supply chain efficiencies.

Food away from home, or the foodservice sector, represents an increasing share of food purchases in the United States. Expenditures on meals eaten outside the home increased dramatically over the last six decades (Figure 1). Rising incomes, changing demographics (smaller households, busier lives), and other factors have encouraged consumers to expect conveniences from food providers. In this article, we address the food away-from-home segment of the produce industry and the impacts of changes on wholesalers and other intermediary businesses that serve the segment, with implications for firms across the size spectrum. The implications of changing trade practices are also highlighted.

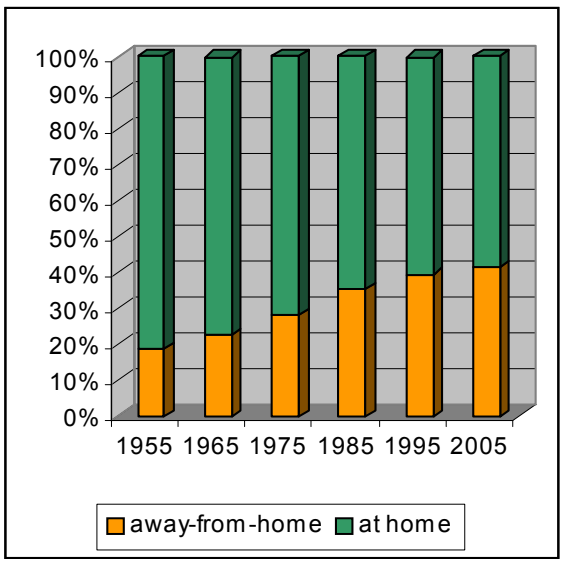

Figure 1. Food away-from-home share increases in the United States.
Source: USDA 2006.

Wholesale and distribution businesses are intermediate stage operations that provide services related to product sale. Historically, a 'wholesaler' operated from a warehouse often in central markets, and usually received and sold goods. A much greater variety of services and functions now characterize this sector.[1] We use the inclusive term "intermediary" to describe agents who (i) take title to product, such as wholesale merchants, distributors,

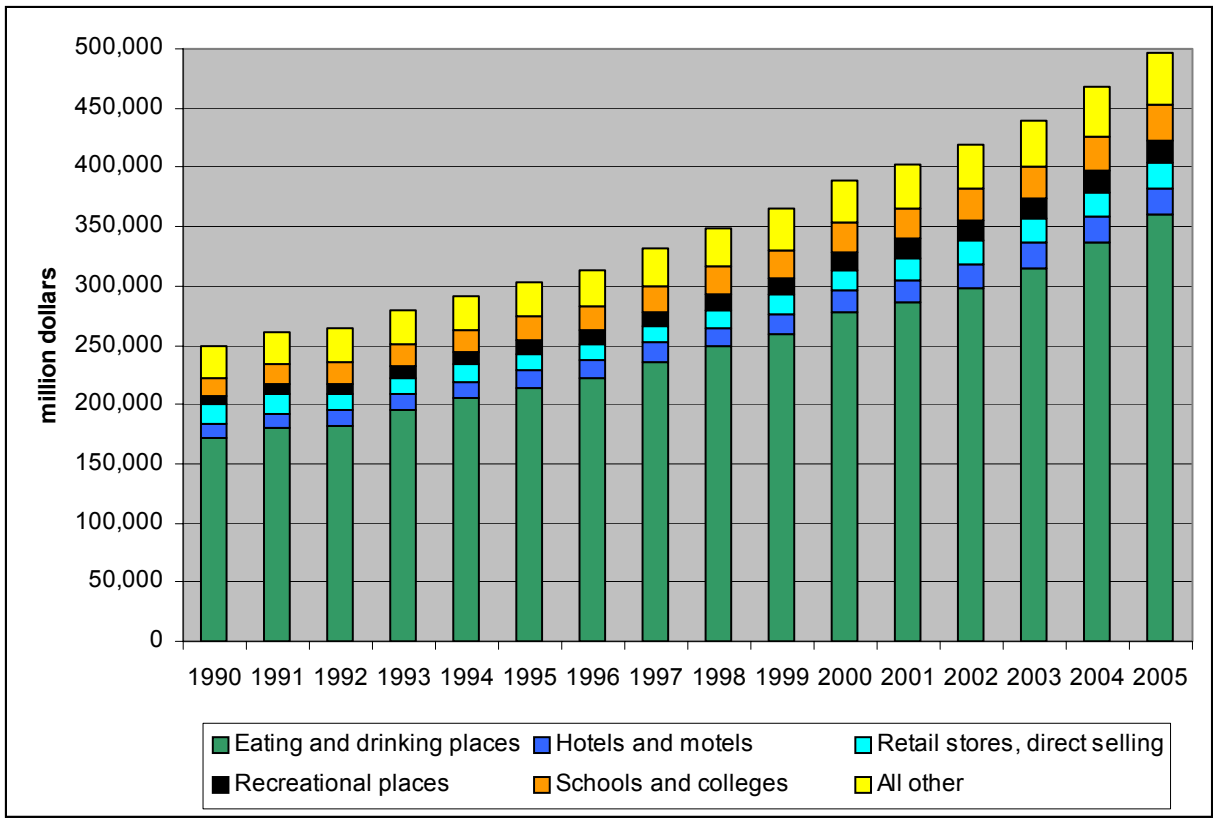

Figure 2. Total expenditures on food away-from-home by type of outlet, 1990-2005.
Source USDA, 2006

import/export merchants, and sales branches; (ii) charge a fee but do not take title, such as brokers and commission merchants; and (iii) provide services such as sorting, packaging, and labeling. Also, there is a common distinction between *broadline wholesalers,* who sell a wide variety of products, and *specialty wholesalers,* who deal with a limited product line, such as fresh produce or dairy products. In terms of distribution of sales in 2002, the four-firm concentration ratio for general line grocery merchant wholesalers was 40%, compared to just under 10% for fresh fruit and vegetable merchant wholesalers (U.S. Department of Commerce, 2005). Since large retail grocers are self-distributors, they are not included in this analysis.

Intermediaries in Food Service

Not only has the proportion of away-from-home food sales grown in the United States, but there have been important shifts among outlets within this broad category (Figure 2). Away-from-home foods normally include restaurant sales (eating and drinking places; hotels and motels), take-away (or ready-to-eat) foods such as prepared food from counters at grocery stores, and institutional foodservice, including schools, military, and retirement institutions. The remaining away-from-home food sales are provided by recreation places, bars, and vending machines. Historically, food away-from-home sales of produce were lower when compared with sales of other food products. This is no longer true. Perosio et al. (2003) estimated that approximately 45% of fresh produce is sold through foodservice channels.

The largest sector of away-from-home food sales remains eating and drinking places, which can be further analyzed by type of outlet. In 2002, sales through full-service and fast food restaurants were almost 80% of the total dollars spent on away-from-home foods (Stewart et al., 2004). Share of sales in fast-food restaurants grew steadily from 29% in the 1980s to 38% in the mid-1990s. The share for full service restaurants declined

1. *Due to the diversity and number of services provided by intermediaries, consistent definition and categorization of firms is difficult. See U.S. Department of Commerce (2005); Harris et al. (2002); and McLaughlin, Park, and Perosio (1997).*

over the same period, from 42% to 38%. Consumer spending in both of these outlets is projected to increase between 2000 and 2020, by 18% at full-service restaurants and by six percent at fast-food restaurants. Even within these two categories there are important distinctions such as the "fast-casual" segment, an important area of fast-food growth (Perosio, McLaughlin, & Cuellar, 2003). Unlike full-service restaurants, fast-casual outlets offer an atmosphere targeted primarily to adults and often feature fresh, high-quality ingredients, including produce.

Chain restaurants (fast-food or upscale establishments) have multiple outlets and often have wide geographic reach. These firms demand high volumes and require consistency, portion control, and other product characteristics across time and outlets. This is the dominant market for broadliners, who reported that about 95% of their sales were made to these buyers (Perosio, McLaughlin, & Cuellar, 2003). In addition to food, broadliners may supply equipment, packaging, uniforms, and other items to foodservice customers.

In contrast to large chain restaurants and the documented concentration of the food retail/grocery segment, most establishments in the foodservice industry remain small-or medium-sized. These businesses include local fast-food, fast-casual, up-scale fine dining, and hotel foodservice, where purchasing is handled by local buyers or chefs. A cross-section of these outlets is prevalent in all geographic regions, a pattern expected to continue in the foreseeable future. Small foodservice establishments often demand smaller volumes of a range of fresh produce, with a product mix that may vary across seasons. They are important and active customers for produce intermediaries. In a study that included both small- and mid-sized broadliners and produce wholesalers, differentiation strategies emphasized high levels of service and product quality, strong specialty product availability, freshness, and daily (or very frequent) service (Hinson, Sinoha, & Reaves, 2006)

The dichotomy in size among foodservice outlets provides opportunities for a greater number of intermediaries to be active in the supply chain when compared with retail food sales. While growth and additional volume in the overall market are one opportunity, changes in the venue, where the food dollar is spent, represent valuable opportunities for produce suppliers.

Trade Practices and Enabling Technologies

Trade practices are the services provided and the overall structure of transactions between intermediaries, their customers, and their suppliers. Evolving trade practices include increased emphasis on product characteristics, chain management, and commitment-based relationships such as strategic alliances. Successful intermediaries (both small and large firms) have been able to adapt and adopt new trade practices to serve different fresh produce customers, including those in away-from-home food markets. Understanding evolving trade practices and their enabling technologies is fundamental for intermediaries who want to gain or maintain market share, or to re-position themselves, within the away-from-home market.

Trade practices based on consumer concerns. Fresh produce intermediaries are aware of the growing concern about health and safety. These concerns include farm-based and handler-based issues such as the use of 'good agricultural practices' to reduce microbial contamination and pesticide residue risks, validation of claims such as organic, and other credence attributes. Preferences regarding origin can be important. Some consumers feel that locally produced fruits and vegetables are fresher and that statements such as 'organic' are more credible from local farmers. The possibility of regulation to require ability to trace a product to its origin has already established traceability as a channel requirement in many cases. Intermediaries often supply these assurances through third-party certification that all parties in the chain, including themselves, are following the rules. Compared with 2000, increased buyer demand for third-party certification and traceability were reported in 2005, with further increases expected by 2010 (Martinez & Thornsbury, 2006). Intermediaries may meet special requests applicable to packaging and organic/environmentally friendly products in multiple ways, including coordination with their suppliers to make product or service adjustments (Hinson, Sinoha, & Reaves, 2006).

Trade practices based on service requirements. For the large number of small- and mid-size foodservice outlets, produce intermediaries provide extensive services to customers. Examples include the willingness to break cases to assemble the mix of products and sizes ordered, delivery of less-than-truck-load quantities, and the ability to adjust orders on short notice. Although some large intermediaries that supply large foodservice establishments (for example, Sysco and Gordon Food Service) also service these small firms, many small foodservice establishments remain

highly reliant on local intermediaries.

Trade practices – the personal relationship. Although the use of contracts has increased particularly among the larger firms, personal relationships with both suppliers and customers remain a cornerstone of exchange in foodservice. Many smaller suppliers maintain a very traditional personal contact approach. Results from a 2005 survey indicated that 31% of fresh produce intermediaries had maintained commercial relationships with their primary suppliers for six to ten years, while 12% had worked with their primary supplier more than 20 years. Long-term relationships are also predominant in intermediary relationships with customers. Over one-third of survey respondents indicated having worked with the same customers for more than six years (Martinez & Thornsbury, 2006).

Enabling technologies and innovations. Enabling technologies have the potential to increase efficiency across the supply chain and include the internet as a platform, hardware for data sources, and intellectual property software. For example, sharing of bar-code and radio frequency identification (RFID) scanner data provides information within firms and across firm boundaries to provide better customer service levels. They can facilitate efficient replenishment and category management. Studies report that produce wholesalers believe inventory management will be increasingly important. Produce distributors used electronic data interchange (EDI) and cross-docking technologies more than their broadline competitors, but lagged in continuous replenishment and automated purchase orders (Perosio, McLaughlin, & Cuellar, 2003). Ratings by small- and mid-size businesses indicated that partnerships and e-commerce would increase in importance, while lower-ranked issues were pallet bar-coding, RFID, returnable containers, and flow through/cross docking (Hinson, Sinoha, & Reaves, 2006).

In addition to electronic technology, long-term partnerships, alliances, and software-based property are knowledge-based innovations that enhance coordination. As an example, Collaborative Planning Forecasting and Replenishment (CPFR) allows firms to coordinate supply chains through sharing of retail-level demand forecasts, which are developed iteratively using a web-based procedure. When forecasts converge to pre-agreed limits, they become the order and the basis for production and replenishment plans (Fleidner, 2003).

While this level of technology and application may be less common among smaller intermediaries, customer and consumer demands are little different from those expected of their larger competitors. Gaining the benefits of these technologies requires both the acquisition cost of the technology and the learning curve associated with implementation. Benefits arise from widespread adoption. While large intermediaries can more easily absorb these costs, small- and mid-size companies are at a disadvantage. Outsourcing to third-party logistics providers is an increasingly important model that helps smaller firms acquire the benefits of technology. Development costs are spread across many customers by the third-party provider, and each intermediary is then able to provide services that in many ways mimic those offered by large firms.

Outlook for Fresh Produce Intermediaries

Demands from consumers are driving subtle and overt changes in fresh produce supply chain requirements and the firms that serve these markets. The dichotomy between large chain restaurants and the many smaller consumer outlets active in the away-from-home food market has provided opportunities for multiple success strategies among fresh produce intermediaries. All intermediaries continue to adapt their offerings to meet the needs of a marketplace increasingly driven by dollars spent on away-from-home foods and evolving trade practices. Large broadline companies generally target chain restaurants and more frequently use partnerships and alliances. They pursue growth goals through existing accounts, increasing market share through acquisitions, and entering smaller markets. More typical fresh produce intermediaries are small- and mid-size businesses with many small accounts. They compete by providing high service levels on items important to their customers, such as small order sizes, special deliveries, procurement of products appropriate to the customer base, and promotion, technology, and other customer support. As a part of chain management, electronic and software-enabling technologies including EDI, barcodes, RFID, and internet platforms have become the standard. Many smaller suppliers, however, maintain a very traditional personal contact approach.

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A Marketing Systems Approach to Removing Distribution Barriers Confronting Small-Volume Fruit and Vegetable Growers

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JEL Classification: L11, L25

Fruit and vegetable growers have always faced dynamic, rapidly changing markets because of underlying factors such as consumer tastes and preferences, weather patterns, regulatory legislation, insect/disease infestations, production costs, and marketing logistics. In addition, evidence suggests that significant changes in market structure are occurring in the fresh fruit and vegetable industry in that the flow of produce from farm to consumer follows a different path than it once did. Rather than making heavy use of the wholesale terminal markets, retailers (large ones in particular) are purchasing a larger portion of fruits and vegetables directly from shippers. Farms and supermarkets alike are expanding, while it appears that the wholesaler sector is decreasing in size. Alternative forms of pricing, such as rebates, slotting fees, and other kinds of allowances, are becoming more common. Some industry sources suggest that mergers at the retail level are driving many of these changes.

In light of these structural changes occurring in the produce industry, fruit and vegetable growers find themselves in a continual cost-price squeeze as the downward pressures on price (resulting from the increased purchasing power associated with fewer produce buyers) forces growers to increase their volumes in an attempt to minimize per-unit production and marketing costs. Today's produce transactions are very different from the traditional emphasis/focus on f.o.b. commodity-oriented pricing, with growers competing for shelf space through "ad" pricing. Instead, growers must offer value-added services and product traits demanded by produce buyers, such as: (1) growing varieties that have been specifically designed/developed for taste and nutritional qualities; (2) using cooling technologies in the field, packing shed, and during transport to reduce product temperatures, enhance quality, and increase shelf life; (3) offering on-time and just-in-time delivery schedules, sometimes involving multiple deliveries per week; (4) customizing palletizing, packaging, and product labeling requirements; (5) tracking and traceability from the field to the site of sale; (6) producing in a manner that is "safe," that is, free from microbial and pesticide contamination; (7) developing fresh produce contracts, sometimes on a multiple-year basis; and (8) offering a year-round supply of diverse produce items.

Although these services do tend to act as a means for growers to differentiate themselves from the competition, they also increase costs dramatically, further eroding profits, especially for small and mid-sized fruit and vegetable growers. Volume and per-unit costs are inversely correlated, so unless sufficient volumes can be produced and/or marketed by the grower (or grower organizations) in some vertically coordinated fashion to reduce per-unit costs, the chances of long-term survival are much lower for independent smaller-volume growers.

In the midst of these structural changes, facilitating the roles of key produce industry participants is more involved and crucial than with other crops or livestock, particularly because of the seasonality of fruit and vegetable production, the perishable nature of these products, and the con-

stantly shifting supply from produce regions. Historically, Extension Services, Experiment Stations, and state Departments of Agriculture have been actively involved in the marketing of fruits and vegetables. Production-related research has been conducted over several decades regarding best management practices associated with fruits and vegetables. Research in agricultural economics has focused on the costs and returns of growing, packing, and processing operations; market windows; and competitive position studies. The Cooperative Extension Service has provided educational programs and assistance in facilitating market development. Several types of marketing support have also been provided by state Departments of Agriculture. Notably, several Southern states have provided coordinated development of public marketing facilities and marketing activities. The extent of their involvement seems to be positively correlated with the growth of fruit and vegetable production in their respective states. But none of the extant research viewed produce market development from a small versus larger grower perspective and the ways these operations contributed to the development of market infrastructure and channels from the farm gate to the consumer.

Georgia and North Carolina rank among the top ten U.S. states in income obtained from fruit and vegetable production. The USDA ranks Georgia as third in the United States in harvested fresh vegetable acreage and fifth in value. North Carolina ranks first in the United States in production of sweetpotatoes, flue-cured tobacco, and turkeys raised, while the state's growers are ranked among the leading five states in cucumbers for pickle production, bell peppers, strawberries, blueberries, and snap beans. In Georgia and North Carolina, harvested fruit and vegetable acreage usually exceeds 300,000 acres annually, with sweetpotatoes, watermelons, sweet corn, tomatoes, and sweet onions identified as important sources of horticultural income. In Kentucky and Tennessee, fruit and vegetable sales are relatively small sources of total farm income for most growers, and therefore only limited information is available about horticultural growers. Surveys indicated that, on average, about 10,000 acres of fruits and vegetables were grown in Kentucky annually. The Tennessee fruit and vegetable industry is somewhat larger than Kentucky's, but it is probable that Tennessee growers collectively farm fewer than 60,000 acres of fruits and vegetables each year.

This paper reports on a recent assessment of the comparative produce market development activities in the states of Georgia, Kentucky, North Carolina, and Tennessee because of commonalities such as the prevalence of small farms, the reliance on tobacco as a cash crop, and the comparable growing seasons in all four states. Each state has historically had a large number of small-volume growers, but production in Kentucky and Tennessee has not kept pace with the other two states. To examine the reasons for this discrepant performance, separate surveys were conducted of Extension Services, Departments of Agriculture, growers, and produce marketing agents and market managers.

Extension

County agents with horticultural responsibilities were personally interviewed in each state about produce-related programs, professional training and development activities, and the need for additional support [respondents n = 19 KY; 20 NC; 14 GA; 12 TN]. Extension agents were asked to indicate the relative importance of produce-related information and services being demanded by growers. Overall, there was a fair amount of agreement among the states with respect to the relative positions of the service areas. Pest control was most frequently requested in all three states. Soil tests, market development, and variety recommendations comprised a group of information requests that had comparable overall scores after pest control. The county agents in all four states indicated they had offered programs in establishing or managing farmers' markets; pesticide certification; market pricing; and meetings, short courses, or conferences. North Carolina and Georgia had provided assistance in all the areas listed. Neither Kentucky nor Tennessee had developed programs in agritourism, direct sales to schools and restaurants, or marketing weather-damaged produce. Unlike their North Carolina and Georgia counterparts, Kentucky respondents had not provided information on packaging or vegetable field days and Tennessee respondents had not conducted educational tours of other production regions.

All four states have implemented comparable staffing strategies. However, the divergence in the number and size of produce operations has resulted in quite different numbers of Extension agents with produce responsibilities. In those counties in which there is sufficient activity, there are horticultural Extension agents. Staffing levels in Kentucky and Tennessee were several times lower than those for Georgia and North Carolina. The latter pair of states also had industry-oriented

training programs for new hires that reflected demand in counties where produce production was high. North Carolina had horticultural agents in every county. The simultaneity encountered here was that fewer and smaller produce operations led to lower demand for Extension programs with respect to not only staffing, but also in terms of production, post-harvest handling, and marketing support.

Growers

Produce growers in each of the states were also surveyed [respondents n = 385 KY; 87 NC; 198 TN]. Kentucky and Tennessee farmers tended to have smaller operations in terms of acreage, produce sales, and farm income than the typical Georgia and North Carolina counterparts. Growers were asked to estimate the percentages of their sales that went through each of the possible market outlets. The weighted averages by state for each type of outlet were calculated, and both Tennessee and Kentucky had significantly higher concentrations of direct market sales than Georgia and North Carolina. Tennessee's largest outlet share was "wholesalers," while North Carolina was almost evenly split between "direct to retailers" and "wholesalers" and had the highest average for "direct to retail store." The share for Tennessee's "wholesalers" was larger than the other two states, and Kentucky had the largest share of weighted sales going to "co-ops." Notable among the percentages is the "shipper-packer" share for North Carolina, which was 17.4% versus less than 1% for Kentucky and Tennessee.

The extent of North Carolina and Georgia's produce activity vis-à-vis Kentucky and Tennessee, was consistent with the produce-related behaviors of the typical growers in the states' samples. The percentages of each state's grower respondents indicating interest in expanding their operations were 58% for Kentucky, 69% for North Carolina, and 53% for Tennessee. Respondents were given a list of 14 factors that could limit expansion and were asked to indicate the extent to which they were limiting. The rankings of the average scores were similar across states, with "labor availability, market outlets, and prices received" being the three highest factors stated, and "equipment, transportation, and credit availability" the lowest. North Carolina growers tended to indicate that "prices received, market outlets, and cooling" were limiting, which is consistent with these growers having greater interaction with the commercial distribution system. Tennessee growers were more likely to have indicated "disease control" was a problem.

In general, the level of grower activity in North Carolina and Georgia greatly exceeds that found in Kentucky and Tennessee. North Carolina and Georgia growers have created "critical mass" in terms of volumes and interest in marketing, compared to Kentucky and Tennessee. For example, when asked to indicate the organizations or people they would consult with about marketing a new crop, the states had similar proportions of growers who stated they would first ask "other growers," closely followed by "Extension." The only exception was "the co-op," for which Kentucky and North Carolina were more likely than Tennessee growers to use as a market information source.

Produce Marketing Agents

We interviewed representatives from "marketing agent" firms, defined as that subset of wholesalers who conducted the bulk of their transactions in the four-state area and were in business primarily to buy and resell fruits, vegetables, and melons [respondents n = 10 KY; 19 NC; 9 GA; 35 TN]. The number of these intermediaries that operate in the respective states is one important indicator/measure of the extent of market development in each state. Secondary references (e.g., the Red Book and Blue Book) indicate that Georgia and North Carolina have considerably more marketing agents than Kentucky or Tennessee, which is reflective of the greater orientation toward the commercial produce-marketing systems in those states. Important functions that these intermediaries provide include buying in bulk quantities from growers, grading and repacking, fresh/canned/frozen processing, refrigerated storage, and sales and transport to independent grocers, institutions (e.g., hospitals, schools, etc.), restaurants, supermarket warehouses or retail sites, and other distributors. The ability of small independent growers to forge relationships with these agents is more limited in Kentucky and Tennessee. That is, the lower frequency of larger growers in these two states lowers the likelihood that smaller growers have had the opportunity to work with marketing agents. And, as noted in the next section, the scope of the activities at public markets in Kentucky and Tennessee exacerbates the problem.

Public Market Managers

To be included in the survey, these markets had to have a manager, be open for the entire harvest season,

have permanent buildings, and have received public financial support. Kentucky had no such market. Georgia had six, and North Carolina and Tennessee both had five of these markets. Managers of each of these markets were interviewed. All three states with public farmers' markets received some level of public financial support to cover operating costs, utilities, and/or capital expenditures, so none were completely self-supporting. Georgia was the only state in which utilities were subsidized. North Carolina markets received their support from the state. Georgia and Tennessee also obtained financial assistance from cities, counties, and development districts. Only one market (in Georgia) had received federal funds. Funding is a critical issue, however, and the success of the markets with respect to fostering the development of the produce industry from the farm through the retail levels varied by state. The results of these interviews revealed the importance of the inherent simultaneity associated with market development, and the synergy associated with having a *variety* of marketing activities occur at centralized locations.

Kentucky and Tennessee are similar in that there are no public outlets for produce marketing other than retail. Hence, there is little incentive for growers to provide adequate supply to attract stakeholders who are involved in other market channel activities, such as brokering, wholesaling, and repacking. On the other hand, Georgia and North Carolina have created facilities that encompass a range of produce-marketing activities, including retail. In addition, these markets have successfully encouraged complementary enterprises, such as food distribution and institutional suppliers (e.g., for school systems), to locate in close proximity to these state markets. The variety of marketing activities encourages production because growers have alternative outlets available at centralized locations. Similarly, wholesalers, brokers, and repackers operating independently have the retail markets as backups to fill unexpected orders. Furthermore, retail vendors often look to the wholesale side of the market to fill in product shortages. This tends to offset the seasonal aspects of the retail activity, increase the range (diversity) of products offered at the market, and accentuate the appearance and perception of being a professionally run market. The breadth and scale of operations tend to be self-sustaining. The wholesale side of these public markets is successful in generating sales dollars and volume, while the retail side is successful in generating awareness and public support for the markets.

State Departments of Agriculture

Within each state Department of Agriculture, people responsible for fruit and vegetable marketing were interviewed. Georgia and North Carolina indicated the greatest numbers of their respective department's staff are assigned to fruit and vegetable marketing with 20 and 15 marketing specialists, respectively (not including market managers or assistant managers). Interestingly, several of North Carolina's Department of Agriculture staff are former Extension agents. Kentucky and Tennessee had considerably fewer personnel assigned to produce marketing with six and one staff persons, respectively.

In Georgia and North Carolina, a number of publicly funded farmers' market facilities were built. The state of North Carolina built five public farmers' markets, while Georgia constructed 16 publicly funded community markets. Conversely, the states of Tennessee and Kentucky did not build a single farmers' market facility using state appropriations, although several city and county governments in Tennessee did construct community markets that serviced local produce and specialty crop growers.

Marketing services from Departments of Agriculture typically included fruit and vegetable directories of growers, packers, wholesalers, or brokers (several were also on-line Internet-based directories); state-focused generic promotional programs; trade show hosting and promotions; export promotions and reverse trade missions; farm-to-school programs where produce is sold and distributed to local school systems; and sponsorship of state farmers' markets and/or marketing centers.

The types of financial support offered to fruit and vegetable growers by the respective departments differed between North Carolina/Georgia and their Kentucky/Tennessee counterparts. Georgia and North Carolina provided funding for advertising, promotion, and market development grants; salaries of market managers (North Carolina even provided salary funds for market workers); subsidies to pay for the utilities of state farmers' market facilities; and organic third-party certification. Kentucky and Tennessee only provided grants for advertising and organic certification. Both North Carolina and Georgia reported an increase in funding over the last five years.

Publicly sponsored (through Departments of Agriculture) produce markets also play a key role in market development. Managers of all the

public produce markets (for which there were permanent buildings and utilities on the sites) were surveyed during 2001 to obtain a snapshot of the types of market channel activities present in each of the four states. Kentucky had no such markets in 2001, although there were seasonal tailgate community markets in the state. There were six, five, and five farmers' markets in Georgia, North Carolina, and Tennessee, respectively, that were included in the public market manager survey. Wide disparities in the scale of operations were present within the Georgia and North Carolina markets. With the exception of one market in Tennessee that only focused on assembly/packing/shipping, all of the markets had retailing activity.

This suggested that Tennessee and Kentucky producers had fewer marketing options and assistance available to them than did either North Carolina or Georgia growers. Marketing assistance was critical for many Kentucky and Tennessee farmers, because most farms (about 91% in Tennessee and 88% in Kentucky) reported total annual sales of less than $50,000 in 2000. In Georgia and North Carolina, a majority of farms also reported total annual sales less than $50,000, but a large percentage (25%) of firms reported sales greater than $50,000. Thus, the average sales figures in Georgia and North Carolina were much higher. In addition, the steady-to-declining demand reported by many Tennessee and Kentucky growers was in direct contrast to the positive sales growth reported by other growers, especially Georgia and North Carolina growers.

Simultaneity and Produce Market Development

The disparity in the development of the produce industries among the states studied is only partially related to grower behaviors. Results of the surveys of the four other stakeholder groups indicate they have important roles in overcoming the simultaneity barriers in market development. In general, the level of activity in North Carolina and Georgia has exceeded that found in Kentucky and Tennessee.

Differences have been identified for the breadth and variety of programs and in the number of people involved with produce marketing activities. With respect to public farmers' markets, the states differ widely in terms of the financial support and the types of facilities in operation. For example, Tennessee does not provide any operating assistance for them, whereas North Carolina does. The types of facilities also vary. The Tennessee and Kentucky markets generally provide limited services. North Carolina and Georgia accommodate brokers and wholesalers at several of its locations, which also have cooling and repacking capabilities. The number of brokers and wholesalers operating in each state varies. Both Kentucky and Tennessee have fewer of these stakeholders versus North Carolina and Georgia. Extension programs with produce marketing emphasis are quite different. The latter has many more programs to assist growers in marketing their crops, including activities to bring buyers and growers together. The Tennessee Department of Agriculture has one full-time produce marketing position, while North Carolina has nearly thirty.

Taken together, the surveys point to the need for critical masses to be present in order for development to proceed. A sufficient number of large growers, who may also be shippers, is needed to attract buyers at the first-handler level. Just building facilities is insufficient as critical masses of buyers and sellers need to come together with products that are in sufficient volumes, over sufficient time periods, and with the properties that buyers want. Then, smaller operations have outlets for their production beyond direct outlets, such as roadside stands and farmers' markets. Extension and state Departments of Agriculture need to have the personnel and programs in place to assist in produce marketing decision making and in bringing buyers and growers together. Public markets with facilities to attract brokers, wholesalers, and repackers could help facilitate development.

For More Information

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