Consumer Preferences for Locally Produced Strawberries

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Consumers were surveyed to understand preference in an effort to stabilize acreage and market share in a minor strawberry production area. Preferred attributes were identified using conjoint analysis. Local product was highest in overall relative importance, followed by price, pesticide strategy, and container. Cluster analysis identified groups with similar demographics. For two groups, local product was 77 percent and 67 percent of relative importance; for another group, price was about 75 percent of importance; while the final group was balanced across three attributes. Alignment with consumer preferences and with strategies of local retailers and wholesalers lead to suggested tactics to support local product.

Among fresh fruits and vegetables, strawberries are second only to apples in value of sales, and have been one of the leading fruits in terms of growth in per-capita consumption over the last two decades (Cook 2002). In 2004, about 51,600 acres of strawberries were harvested in the United States, led by California with 33,200 acres (with a yield of about 52,500 pounds per acre) and Florida with 7,100 acres (about 26,000 pounds per acre). Among the minor producer states, Louisiana harvested about 400 acres (about 21,000 pounds/acre) and has had a downward trend in harvested acreage over time (USDA/ERS 2008; LSU Agricultural Extension Service 2005). The Louisiana production season begins in January, reaches full production by late February, and continues to May, roughly coinciding with the Florida season. California's production typically begins in mid-March and reaches full production within a month. The arrival of California strawberries into wholesale distribution brings an end to seasonally higher winter prices.

The major market channels for strawberries, as for most fresh produce, are the regional and national wholesale markets and the direct/local channel. Direct markets, including roadside stands, peddlers, farmers' markets, and pick-your-own, are the dominant outlets for most minor production areas. Other local markets include direct deliveries to individual and small chain grocers and sales through local distributors. For Louisiana, direct/local marketing traditionally has accounted for about 60 percent of sales, with the balance going through the wholesale channel (Boudreaux 2003).

While there are advantages to the direct/local channel, most consumers shop at chain grocery stores. A factor affecting access to large retail markets is consolidation among multi-state, regional, and national retail grocers, which has benefited production areas that have the capability to serve large retailers. These retailers, in turn, tend to use a few large suppliers (Thornsbury et al. 2006). Other significant barriers to the wholesale channel exist, including a product volume requirement that may exceed the area's total production, and conditions of sale such as certifications, take-back policies, and/or participation in promotions. These conditions may be difficult and expensive to meet (Hinson, Sinoha, and Reaves 2006).

Cost of production also plays a role in market opportunity for local growers. While costs of bringing the crop to harvest probably are reasonably similar across production areas, California's long harvest season enables much higher total yields, pre-harvest costs are spread across more than twice as many units of output, and this product can be sold at lower prices than the local specialty product. Preference for Louisiana's product in the local area does facilitate continuing sales at lower levels until summer temperatures end the Louisiana crop in May or June.

The problem, then, is that most growers in minor production areas are absent from large chain stores and that is not expected to change. These growers do find opportunities in direct sales and development of local grocer customers, but information based on research about preferences in local markets is not available. This article summarizes a study designed to assist the industry and individual growers in identifying attributes and preferences valued by alternative segments in the relevant marketplace. Promotion and advertising programs then may

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be designed for positioning to specific consumers. Specifically, strawberry attributes preferred by consumers in the local market were identified and related to key demographic factors thought to influence the decision about source and preferences. These results were combined with results from other research to suggest key steps that producers might take to support and perhaps enhance their share of the local market.

Review of Literature

General trade-oriented literature on preferences for strawberries is in the public domain. However, there has been relatively little focus on local markets which may be affected by factors that mimic or diverge from trends that affect regional and national markets. Customers' purchasing patterns have changed significantly over time. Moving to the forefront are increased health and safety concerns and a demand for convenience in the shopping and the consumption experiences.

Health and safety issues have become a part of popular consciousness as science has moved toward identification of the positive and negative impacts of our food supply (Carman 2006). Concerns about "bad" food choices include health issues regarding long-term impacts of pesticide residues. "Better" choices may lead to an increase in wellbeing through reduction of chronic diseases or specific advantages from functional foods. Examples include the debate about food choices in public school vending machines and changes to fast-food restaurant menus that acknowledge health and nutrition concerns.

U.S. lifestyles increasingly are driven by, and consumers are willing to pay for, convenience as a food product characteristic (Stewart et al. 2004). Women are fully integrated into the workforce and families are smaller, bringing changes in preferred food characteristics. Adults and children have busy schedules. At the same time, a generally strong economy has increased household incomes.

Increasingly, consumers perceive benefits from local production of food (Patterson 2006). In a larger sense, product origin is an increasingly important component of preference. Brands and logos can validate origin, and logos may serve as proxy for brand. In a very competitive grocery market, origin/brand may provide a point of differentiation for local producers.

This study focuses on health/safety preferences, origin/brand and price, so a brief overview of literature on the fresh produce category with respect to these factors is provided. Traditionally, quality characteristics (size, color, and the absence of physical damage) were thought to be most important when consumers made choices about fresh produce. While these characteristics are still important, other issues have moved upward in a relative sense.

There are numerous examples of studies on attitudes and preferences regarding aversion to pesticide and other contamination in fresh produce. These examples range from attitudes toward pesticide usage to use of crop rotations on potato farms, viral and bacterial contamination, and the influence of food safety on the retail food-supply chain.

Regarding attitudes toward pesticide use, Baker (1999) included the safety issue in a model that estimated the value placed on hypothetical apple products by different consumer segments. Specific product attributes of apples included (i) pesticide-use levels and their corresponding cancer risk (the total health risk to consumers resulting from three hypothetical pesticide-usage regulations), (ii) government inspection (represented by a specific food-safety-compliance program), (iii) price, and (iv) quality as represented by three levels of physical damage. Overall, conjoint analysis results indicated that pesticide policy was highest in relative factor importance, at about 61 percent; price and damage were next, at about 15 percent; and the compliance program was about 10 percent. Cluster analysis suggested four groups. Using conjoint analysis by group, Baker gave a descriptive name to each based on what appeared to be the most important factors. The groups were (i) Safety Seekers, primarily concerned with pesticide policy and associated cancer risk; (ii) Balanced Buyers, concerned with price, quality, and food-safety attributes; (iii) Price Pickers; and (iv) Perfect Produce, concerned about damage level. These were the basis analysis of segments.

In another study on perceptions of food safety, consumer response to genetically modified foods (GMF) was examined (Baker and Burnham 2001). Groups were formed based on whether GMFs were acceptable. Explanatory variables were socioeconomic characteristics, risk preferences, and knowledge and opinions of GMO foods. Results indicated that the segment to which a consumer

belonged was based not on socioeconomic characteristics but on level of risk aversion and opinions regarding GMO foods.

Consumer perceptions and buying behaviors for foods containing a range of pesticide residues and hormonal treatments provided information about willingness to pay for these attributes (Veeman and Adamowicz 2001). Respondents were more concerned about pesticide use than hormones in food production, and women were more concerned about pesticide residues than were men. As knowledge of these issues increased, so did respondents' concerns. Even as the cost of food increased, consumers still chose to restrict pesticide or hormone use. Another goal of the study was to understand welfare changes from knowledge of whether rBST milk was labeled or non-labeled, using a simulated market. Absence of labeling resulted in a slightly larger welfare loss for females than for males, and for respondents with higher levels of education and income. When purchasers were offered a full range of "rBST" and "non-rBST" milk, there was a small welfare gain. However, welfare increased when consumers also were given the opportunity to purchase a labeled product indicating "rBST-free," presumably because preferred choices were available.

Origin, particularly a preference for domestic local product, has been demonstrated to be an important factor in consumer preferences. This result is documented in studies of preferences for locally produced fruits and vegetables (Govindasamy, Italia, and Thatch 1998; Brooker et al. 1988), beef products (Grannis, Hooker, and Thilmany 2000), and wines (Terry and Callahan 1992). Country of origin was identified as an important attribute in beef (Schupp and Gillespie 2001) and mutton (Clemens and Babcock 2004) preference.

Materials and Methodology

In the first step, cluster analysis was used to gather observations into similar groups or segments based on predetermined selection criteria following Baker and Burnham (2001). Conjoint analysis (CA), a multi-attribute procedure, was used to evaluate importance of the attributes. Products are specified in terms of attributes with distinct levels. Respondents rate those products, and a measure of relative importance of each attribute is calculated (Hair et al. 1998).

A mail survey, conducted in March, April, and May, 2004, followed conventional procedures (Dillman 2002). It was mailed to 2,000 households randomly selected from a list purchased from a local commercial source with access to national databases. The list was conditioned to exclude households with heads less than 21 years old. The survey was to be completed by the member of the household who made most of the purchasing decisions regarding fruits and vegetables for home use. The instrument was designed to be useable across the range of educational, geographic, and cultural segments expected in the population. The target population was households located in Louisiana, the southern half of Mississippi including Jackson, and the SMSA of Mobile, AL. These areas were within reasonable driving distance of Louisiana's strawberry producing area and where the "Louisiana-produced" logo was expected to be meaningful. Respondents were asked to base answers on typical strawberry purchase behavior during the months of February, March, and April (Louisiana's production season).

An appropriate survey instrument for conjoint analysis was created and revised based on review by extension specialists and by a marketing/graphic-design consultant. The attributes and levels included in the study were:

- Product container: levels were (i) the traditional plastic basket and (ii) the clear plastic clamshell. The clamshell design provides better product protection and a cleaner appearance.
- Grower's pesticide strategy: levels were (i) conventional insect/disease control where scheduled applications are expected to control most problems, and (ii) integrated pest management, where pesticides are applied when problems are observed.
- Price per pound: levels were $ 1.99, $2.49, and $2.99. A typical retail price during the season is about $2.00. Upward adjustments were made from that base.
- Origin/brand: levels were California private label, Florida private label, and a package featuring a "Louisiana produced" logo.

Color, size, and price have been the typical consumer choice criteria for strawberries. Respondents

were asked to assume that strawberries were large in size and fully red in color. Attributes and levels were presented as brief written descriptions, without pictures. The pesticide strategy would not be observable in photos, and the other three attributes were explained in text. Pretests suggested the descriptions were acceptable.

Cluster analysis (SAS Institute 2004) identified groups of similar respondents based on criteria that maximized the internal (within-cluster) homogeneity while minimizing the external (between-cluster) heterogeneity (Hair et al. 1998). Observations were joined sequentially, using the agglomerative procedure, until all observations had been put into one cluster. The pseudo F-statistic peaked at two clusters (52.3) and the pseudo t^2 statistic peaked at one cluster (52.3), indicating that either two clusters or one was the best choice. However, the between-groups sum of squares, as measured on the y-axis of the screen plot, decreased sharply until the number of respondent clusters reached four, then flattened. A preferred model would account for more of the variance among the clusters. Four clusters accounted for 77 percent of the total variance, and fewer clusters accounted for little additional improvement. This "elbow" point suggested four as an appropriate number of clusters (Bruchhaus 2004).

Conjoint analysis, a multi-attribute procedure, was used to measure preferences for strawberry products. In conjoint analysis, products or services are specified in terms of attributes with distinct levels. Respondents' rating or rank of products and a measure of relative importance of each attribute is calculated (Hair et al. 1998). The full-profile method, where all respondents rate all attribute/level combinations, is preferred for presentation but is flawed except for small problems because respondents cannot consistently rate large numbers of profiles. The fractional factorial design used was an alternative that reduces the ratings burden via a sample of profiles that represents the alternatives and maintains orthogonality (Hair et al. 1998). The design rated by the respondents included 11 of 36 possible combinations.

SPSS software was used to estimate preferences for the strawberry attributes (SPSS 1997). The CA model was estimated with Ordinary Least Squares (OLS), where y_i is the dependent variable and x_i are the independent variables. The linear form of the model is given as

$$(1)\quad y_i = \beta_0 + \beta_1 x_{1i} + \ldots + \beta_m x_{mi} + u_i ,$$

where the β_i are coefficients to be estimated and u_i is an additive random "error" term representing variation in y_i that was not explained by the independent variables x_i (Hair et al. 1998). The respondent's rating is the dependent variable and is expected to vary by levels of attributes (independent variables). The parameter coefficients are called part-worths. The relative importance for an attribute is calculated from the part-worth utility values by dividing the range of its level by the sum of the ranges across all attributes:

$$(2)\quad RI_i = [\text{Utility Range}_i / \Sigma \text{ Utility Ranges for all attributes}] \times 100 ,$$

where RI_i is the relative importance measure for the i^{th} attribute.

Results

Sample Statistic

There were 309 useable responses, a 15.5-percent response rate. Respondents to the survey were mostly Caucasian and female, had an average age of about 50, and were better educated and had higher incomes compared to state populations. "Couple with no children at home" was the most frequently reported kind of household (Table 1). In general, respondents were a reasonable representation of the general population except that minorities were underrepresented. Although the non-white shares of state populations were 29 percent in Alabama, 39 percent in Mississippi, and 36 percent in Louisiana (U.S. Census Bureau 2000), the response rate for non-white respondents to the survey was at 11 percent. This outcome should be considered when interpreting results.

Overall CA Model Results

From the estimates of part-worths and relative importance using all responses (Table 2), the most important attribute was origin/brand, with a contribution of about 54 percent to the preference rating, followed by price, at about 26 percent. Least important were container and pesticide strategy at about ten percent each.

Table 1. Demographic Characteristics of Survey Respondents, Louisiana, Mississippi, and Alabama.

	Question	Frequencies	Percent
Gender of respondent	Male	111	36
	Female	198	64
Educational level	Less than high school	6	2
	High school graduate or GED	68	22
	Some college	105	34
	Bachelor's degree	49	16
	Some graduate study	19	6
	Advanced degree	59	19
Employment status	Still in school	3	1
	Employed part-time	22	7
	Employed full-time	164	53
	Unemployed	15	5
	Retired	74	24
	Other	31	10
Household characteristics	Single	65	21
	Single with children	19	6
	Couple (no children)	49	16
	Couple (children aged 13 to 20)	43	14
	Couple (children aged 0 to 12)	46	15
	Couple (no children at home)	71	23
	Other	15	5
Household income	Less than $20,000	43	14
	$20,000–$39,999	71	23
	$40,000–$59,999	80	26
	$60,000–$79,999	34	11
	$80,000–$99,999	37	12
	$100,000 or more	43	14
Racial/ethnic background	Caucasian	221	89
	African-American	22	9
	Other	6	2

Conjoint Analysis of Cluster-Formed Segments

Descriptive statistics were calculated for each of the four clusters. They were given descriptive names, and relative importance of attributes and demographics are discussed below for each segment (Table 3).

There were 85 *Local Product Loyalists*. Demographically, the group consisted mostly of "couples with no children at home," had the highest average age among the groups, was mostly female, had the highest proportion of Caucasians, and had the highest proportion of respondents with household income greater than $60,000. In terms of rela-

Table 2. Part-Worth Values for Attributes and Levels, Conjoint Analysis Results.

Attribute/level	Part-worths	Relative importance (percent)
Container		10.10
Clamshell	0.1459	
Plastic basket	−0.1459	
Origin/brand		54.38
California private company	−0.5721	
Florida private company	−0.4275	
Louisiana produced	0.9996	
Pesticide strategy		9.77
Conventional strategy	−0.1412	
Reduced pesticide strategy	0.1412	
Price per unit		25.75
$1.99	0.4159	
$2.49	−0.0875	
$2.99	−0.3284	

Measures of Fit: $R^2 = 0.996$; Pearson's R = 0.998; Kendall's tau = 1.000 (Significance = .0001); Kendall's tau for 2 holdouts = 1.000

tive importance, "Louisiana produced" was most important by far and had a positive utility value. Price and package followed in importance, and little importance was placed on pesticide strategy (about three percent).

There were 70 *Loyal and Safes*. The group was described by the predominance of "single households," was second in average age, was mostly female and Caucasian, had the highest proportion of "some college/technical school," and had the highest proportion of household incomes between $60,000 and $79,999. For this group, origin/brand still was most important (68 percent), followed by price. For this group, price preference was inverted; high price was preferred by a small margin to the middle price. This is inconsistent with theory. The idea of conspicuous consumption has been used to explain choices like this. However, other explanations that may be more applicable include brand power (logos in this case). Brands may provide guidance about quality, especially when credence attributes are involved (pesticide strategies, in this survey). In one brand example, a beef product carried "the well communicated guarantee of origin and traceability which accounts for the special quality image of the company in the *poultry* (emphasis added) market" (Lueth, Spiller, and Schramm 2006). A local production logo might carry some of that influence. The local logo was very important to this group and might have particular influence in combination with the increased importance of safety compared to the Local Loyalist group. In addition, this group predominantly comprised single households, so per-capita income may have been relatively high. However, even given these considerations, the reader should consider implications for structure of the instrument and/or understanding of instructions by the respondent.

There were 35 *Price Explorers*. The group's characteristics were predominantly "couples with no children" or "couples with teenage children," had the lowest average age, had a similar proportion of female and male respondents, were mostly Caucasian, had the highest proportion of "full-time employed," and had the highest proportion of household incomes between $40,000 and $59,999. The name was appropriate because price concerns dominated, with a relative importance of about 75

Table 3. Relative Importance and Part-Worth Values for Attribute Levels of Clusters, Conjoint Analysis.

	Local Product Loyalists		Loyal and Safe		Price Explorers		Safety Seekers	
Factor	Relative importance	Part-worth	Relative importance	Part-worth	Relative importance	Part-worth	Relative importance	Part-worth
Container	4.90		1.56		2.83		35.46	
Clamshell		.1010		.0190		.0524		.4167
Plastic basket		-.1010		-.0190		-.0524		-.4167
Origin/brand	77.66		67.90		19.05		25.96	
CA label		-1.2484		-.6492		-.2889		.3258
FL label		-.7072		-.3587		-.1270		-.2844
LA produced		1.9556		1.0079		.4159		-.0414
Pesticide strategy	2.52		14.54		3.22		29.45	
Scheduled		-.0520		-.1774		.0595		-.3460
As needed		.0520		.1774		-.0595		.3460
Price	14.92		16.00		74.90		9.13	
Low		.3242		.2413		1.4921		.1168
Medium		-.0327		-.1492		-.2127		-.0188
High		-.2915		-.0921		-1.2794		-.0979
	Constant = 3.3732		Constant = 4.8163		Constant = 4.1468		Constant = 3.3908	
			Measures of fit					
Pearson's R	.999		.998		.997		.983	
Kendall's tau	.889	Sig. level = .0004	.873	Sig. level = .0006	.944	Sig. level = .0002	.833	Sig. level = .0009
Kendall's tau for 2 holdouts	1.000		1.000		1.000		1.000	

percent. Origin/brand was next in importance, at about 19 percent, and pesticide strategy and container were not important factors.

There were 59 *Safety Seekers*. The group was predominantly "singles" and "couples with young children" or "no children at home," had the highest proportion of female respondents, had the lowest Caucasian-to-African-American ratio, had the highest proportion with education in the high school graduate/GED category, the highest proportion of part-time employed and retired, and the most respondents with household incomes less than $60,000. Container and pesticide strategy (both part of the safety issue) led in relative importance, at about 35 percent and about 29 percent, respectively, followed by origin/brand, and price was least important. In addition, the part-worth signs for Safety Seekers differed from the other groups. The origin/brand category "California private label" was preferred, as indicated by its positive part-worth, in contrast to the overall analysis and the other groups where "Louisiana produced" was preferred. The total distances between the high and low part-worth values for origin/brand and price in this group were smaller relative to these attributes in the other clusters. Their preferences as indicated by relative importance calculations for the two most direct indicators of safety—pesticide strategy and package—were highest among the groups. The preference for California berries could be construed as a safety issue also—shippers there have more to lose by missteps regarding safety, since health/safety events receive extensive media attention and can result in dramatic short-term declines in product sales.

Connecting Results from the Study with Previous Research

In marketing, strategies that can support sales include product, price, and distribution. After the interrelationship between these factors is established, promotion choices are made. This approach has been used by the California strawberry industry through efforts that use appropriate packages, emphasize nutrition and safety, include consumer public relations programs, and incorporate allied areas such as the culinary industry and fitness campaigns (Phillips and Jolley 2004). Due to expense, media initiatives may not be feasible for growers in minor production areas.

From our study and others, local producers clearly have strengths in their alignment with important consumer trends. Local producers have credence—consumers believe that attributes that cannot be seen or directly verified do in fact exist. As an example, if local product is labeled organic, the consumer trusts that the grower is following the rules of certification. Other attributes include freshness, reduced food miles, and sustainability. In addition, many consumers want to support local growers by purchasing local product, and enjoy interacting with farmers at direct markets (Patterson 2006). These perceptions and factors work in different ways in different components of the local/direct channel, but, as a whole, are positive for local/direct outlets.

Other research results and perceptions indicate support for local strawberries. Respondents indicated strong willingness to pay more for local berries (Hinson and Bruchhaus 2005). Local grocery store managers' actions indicated that they view local products as one of their competitive advantages (Hounshell 2008). Casual observation of local grocers' advertising inserts has featured local strawberries in-season. The leading organic/natural foods retailer has encouraged local production by providing producer loans. Furthermore, even mass merchandisers sometimes source and sell local products.

We recognize the importance of the pesticide-residue component of food safety from empirical evidence and popular press. Few studies pose a trade-off between local product and a safety attribute to consumers, as is included in this study. Baker's work indicated that pesticide policy was highest in relative factor importance, at about 61 percent, followed distantly by price and damage levels. Our results differ in that local product as measured by brand/logo is most important, with price and pesticide policy much lower in importance in the overall analysis and in three of the four respondent clusters. Differences such as region of the country, period analyzed, and construction of the variable can influence these outcomes, but these results suggest the importance of understanding preferences for attributes by different population segments. This is further reinforced by preferences of the group we call Safety Seekers, who had a very balanced preference set in terms of relative impor-

tance that included container, pesticide strategy, and brand/logo, while price was not as important. In that case, appropriate product messages might address that group's preferences. Given these results and comments, it seems reasonable to conclude that growers in minor production areas should emphasize the "locally produced" attribute and the credibility of farmers to their actual and potential customers.

Strategies for Promotion

This section devlops tactics for industry and grower strategy based primarily on local/direct markets. Early and late season strategies result from the seasonal decline in price as California production reaches the market.

Early-Season Strategy

An early-season strategy or value proposition should reinforce preference for the local product. Local growers should implement their strategy by

1. Using an effective state logo consistently in individual and cooperative efforts. Farmers' markets and other direct/local outlets would be encouraged to support the logo;
2. Funding positioning materials for the Local Product Loyalists, the Loyal and Safe, and the Safety Seekers groups on the themes of
   a. support for local product, based on results from this study, and
   b. taste, convenience (multiple package size options), freshness, and trust, based on the review of literature;
3. Building on and leveraging existing grower partnerships with local grocers, based on Extension Specialist reports of successful relationships. One of the strategic assets of these grocers is their knowledge of local preferences and effective promotions; and
4. Building stronger relationships (partnering or other forms) with local produce specialty and broadline distributors, based on observed strengths and efficiencies of the distribution system. This could enhance product availability at reasonable distribution costs.

Late-Season Strategy

The competitive landscape changes drastically after the California strawberry season arrives. Plentiful supplies of strawberries, excellent in appearance, are available in grocery stores. Unit retail price declines roughly by half. For the Louisiana product, there is a reduction in difference between revenue per unit and harvest cost. Warmer weather tends to decrease the shelf-life of the local product, but the local product advantages remain—local customers want to support local producers and prefer the taste of the fresher, more mature local product.

When the point of purchase shifts toward grocery stores of all sizes, a late-season strategy should stress a different value proposition. The groups that formed the early-season customer base for local growers would be expected to continue to purchase. The more price-sensitive groups—the Price Explorers, for example—would be expected to come into the market. The value proposition would emphasize that consumers get more for their money in the late season, because the preferred local product attributes are available at a lower price. Since industry promotional efforts will be in place, Louisiana's promotion efforts should be flexible and adapt to industry-wide themes of nutrition, healthy life-style, and special events. These themes should be supported locally, with continuing emphasis from the early-season strategy on credence, freshness, and taste, and connection to the grower.

Although outside the research questions of this study, several additional suggestions seem warranted. More emphasis on "pick-your-own" would attract price-sensitive customers. Community involvement activities such as school field days could garner community support. Free publicity might be captured by appearing on radio and television talk shows. Community-supported agriculture ventures could provide a closer connection to the consumer. These activities might seem to have little impact, but connection to the customer and community build loyalty and customer base.

In summary, producers of fresh horticultural products in minor production areas such as Louisiana can build stronger market positions by making consumers aware that the attributes they want are provided by locally produced products. This knowledge can help optimize the benefits from public and private resources invested in promotion.

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