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An Examination of Consumer Willingness to Pay for Local Products

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Recent years have seen a resurgence in marketing and consumption of locally produced food products (National Agricultural Statistics Service (NASS) 2009, Agricultural Marketing Service (AMS) 2009, Brown and Miller 2008). However, the definition and concept of local remains nebulous, and consumers have been left to project attributes, often positive, onto local products. In a recent publication, the U.S. Department of Agriculture (USDA) suggested that consumers are choosing local food products because of perceptions of its freshness and health benefits, familiarity with its sources, environmental sustainability, and as a way of supporting small farms and local economies (Martinez et al. 2010).

These findings suggest that the "local" moniker is vulnerable to misinterpretation by consumers and misuse by producers so long as there is no formal definition or certification process. As with establishment of standards for the Organic label in the United States, certification of products labeled as local can assure consumers that such food products meet specific geographic requirements, protect price premiums for producers, and increase market efficiency (Lohr 1998). Given an increasing focus nationwide on local food economies through campaigns such as USDA's "Know Your Farmer, Know

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Your Food" and farm-to-school programs and the apparent popularity of state-funded marketing programs (e.g., Jersey Fresh, Maryland's Best, Pride of New York, and California Grown), we undertook this study to quantify premiums for locally produced food products, determine which groups of consumers are willing to pay a premium for these products, and investigate whether consumers confound a distance-based local attribute with other desirable process attributes that are commonly associated with a local label but do not necessarily depend on geographic proximity.

To examine consumer preferences for the local attribute, we chose to analyze fresh, never-frozen ground beef since it, unlike fruits and vegetables, has no obvious notion of freshness associated with the distance it is transported.[1] The distance attribute thus conveys more signal and less noise in measurements of preferences for locally produced food (Dentoni et al. 2009). This concern is akin to the classic issue of omitted variables; unobserved freshness is likely to be strongly correlated with distance transported.

A second advantage of using ground beef is the limited spectrum of product attributes that can vary—primarily, they are leanness and production method. We limited our analysis to "lean" ground beef (10 percent fat content) and used grass-fed production as the production variable. By definition, grass-fed production involves unconfined cattle, a relatively large amount of land per head, and generally positive resource use because fewer inputs are needed for growing grass than for growing grain. Since consumers often project positive notions onto local products,[2] we used the grass-fed attribute to capture those positive associations, directly isolating the distance component of the local attribute.

Because of the multifaceted nature of local labeling, we narrowed our definition of local to the distance between the producer and consumers.[3] Therefore, once we isolated the production method and held leanness and freshness constant, consumers who still valued geographic proximity in the production of ground beef could be expressing preferences to support the local economy and its farmers and/or to know the source of their food.

To estimate willingness to pay (WTP) for ground beef, we collected preference data from a choice-based conjoint-analysis survey of multiple populations, including shoppers with relatively greater market experience[4] and a random sample of the general population. To our knowledge, this study is the first to examine the extent to which market information and/or food shoppers' market experience affect WTP for products labeled as local based on distance transported. We also examine preferences for local products among the general population using both hypothetical and nonhypothetical scenarios. We find that the experienced shoppers place a much smaller value than the general public on the distance-based local attribute, though the

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[1] Frozen ground beef would not necessarily meet this condition since it can be frozen for months prior to delivery and consumption.

[2] Martinez et al. (2010) suggested that consumers may also attribute sustainable production, fair farm labor practices, animal welfare, and a certain provenance to local foods.

[3] In the surveys, we never referred to a product as local; instead, we provided participants with information about the number of miles the product had been transported. All subsequent references to local in this context refer exclusively to distance.

[4] On average, club members had almost three years of experience shopping in grass-fed and local beef markets. Throughout the discussion, therefore, we refer to consumers who self-selected to be part of the consumer buying club as market-experienced shoppers.

premiums for both groups are significantly different from zero. The general public is willing to pay a premium for local products in both the hypothetical and nonhypothetical settings. And perhaps contrary to common perceptions, we find that there is a premium for local products for all income levels and age groups.

Lastly, we address possible substitution and complementarity between the production-method and distance attributes (Onozaka and Thilmany McFadden 2011). That is, consumers may have overlapping values for short transport distances and grass-fed production, especially if they project personal positive notions onto local products that are also explicitly embodied in grass-fed production. For example, because consumers may associate local production with more "friendly" farming methods, grass-fed production may contribute little additional value to a locally produced beef product. In such a case, grass-fed and local production would be substitutes. On the other hand, local production may independently provide value or enhance the value of the grass-fed attribute for consumers with different beliefs. In either case, any evidence that consumers confound the local attribute with other production attributes would suggest that the market could benefit from some form of standardization.

Methods for Eliciting Willingness to Pay

In the last decade, a large literature has developed from efforts to estimate consumers' WTP for various quality attributes. Most studies have used one of three basic methods to elicit WTP: conjoint analysis, experimental auctions, or hedonic models. Conjoint analysis is widely used in consumer marketing (Green and Srinivasan 1990) and by environmental economists to evaluate nonmarket goods. It typically involves use of a survey instrument, and the WTP measure is elicited from a hypothetical market scenario. However, values elicited using stated preference data do not reflect actual market transactions and have thus been met with some skepticism among other economists (e.g., Cummings, Brookshire, and Schulze 1986, Mitchell and Carson 1989, Adamowicz, Louviere, and Williams 1994). To address this concern, researchers have devised incentive-compatible field experiments in which decisions involve real money (e.g., List and Gallet 2001, Harrison and List 2004). In such studies, the method for eliciting WTP can involve a nonhypothetical conjoint analysis or some type of experimental auction. Hedonic models used with revealed-preference data such as consumer scanner data offer an alternative to experiments but provide much less control and limit the analysis to existing products for which such data are available.

Studies of Willingness to Pay for Food Attributes

Food products are increasingly differentiated by quality and production attributes, including the environmental impacts of production, production methods, seed genetics, the distance from farm to market, and health-related factors. In particular, numerous studies have attempted to estimate consumers' WTP for foods that contain genetically modified organisms (GMO). Lusk et al. (2005) identified 25 separate studies that together provided 57 estimates. Another group of studies has examined consumers' preferences and estimated consumers' WTP for geographic indicators such as country-of-origin labeling

(COOL) (Loureiro and Umberger 2003, 2005). These studies have generally found small, statistically significant positive WTP for certified products of U.S. origin.

In terms of beef, grass-fed production is a process trait that can encompass several quality attributes. For example, grass-fed production can be valued both for the way the cattle are raised (pasturing) and because grass-fed cattle are commonly associated with leaner beef (taste and health attributes). Lusk and Parker (2009) employed a conjoint analysis design and found positive WTP for beef with a lower fat content and improved composition of fats, results that are consistent with prior hedonic analyses of demand for ground beef (Brester et al. 1993, Parcell and Schroeder 2007, Ward, Lusk, and Dutton 2008). Positive WTP for grass-fed production that is independent of WTP for a particular fat content has been measured using hypothetical conjoint analysis (Abidoye et al. 2011), incentivized conjoint analysis (Lusk, Fields, and Prevatt 2008), and experimental auctions (Umberger et al. 2002, Umberger, Boxall, and Lacy 2009). We recognize the importance of leanness in the market for ground beef and thus control for this confounding effect by holding leanness constant in all choice sets.[5]

Much of the literature on WTP for local production is based on hypothetical surveys, but we observe the same trend—consumers have positive WTP for local food (Loureiro and Hine 2002, Brown 2003). As with grass-fed beef production, local food production can represent multiple quality attributes, including product freshness, farm size, and geographic distance between production and the market. Darby et al. (2008) estimated WTP for strawberries differentiated by the production location, the farm size, and a guarantee of freshness and found that consumers had positive WTP for local production that did not depend on other attributes. An important consideration in such product choices is freshness attached to fruits and vegetables that, having been harvested nearby, were likely to have been harvested relatively recently. Our use of ground beef avoids this problem.

Sampling and Data Collection

Our data derive from three primary sources: (i) a survey of participants in a food buying club based in Maryland in fall 2011 that generated hypothetical conjoint responses; (ii) a survey of a randomly selected sample of Maryland's general population in fall 2011 that generated hypothetical conjoint responses; and (iii) a field experiment conducted in a suburban Maryland grocery store in fall 2012 that generated nonhypothetical conjoint responses.

The food buying club in the study represents a set of shoppers who have experience purchasing local and grass-fed food products, primarily meat, eggs, and dairy. The club was established in 2004, delivers to locations across Maryland, and gains new members by word of mouth. Products are ordered via the internet and the orders are fulfilled weekly by one of a handful of farmers in Maryland and southeastern Pennsylvania. Club members were approached for participation in the survey via email solicitation using the group's listserv, which contained approximately 1,200 email addresses. The club members are an important choice-based sample because they self-selected as interested

[5] Given the consumer backlash that occurred during the study period to lean finely textured beef (LFTB), also known as "pink slime," our choice of 90 percent lean (90/10) beef was fortuitous because both grass-fed and conventional beef can attain that level of leanness without using LFTB. All of the beef in our study was LFTB-free.

in local and grass-fed production and have, on average, nearly three years of experience in this market.

The random sample of Maryland residents 25 years of age or older was recruited by a web survey company and was used as a baseline population in our study to compare to the buying-club sample. The two groups received the same survey instrument and conjoint analysis questions during the same period.

The shoppers who participated in the field experiment were recruited at a store of a mid-sized, regional nonspecialty grocery chain in a Baltimore suburb over a weekend in fall 2012. They were given a shortened version of the survey instrument presented to the other two groups and a nonhypothetical version of the conjoint choice questions in which they would receive actual ground beef and a coupon discount off their grocery bills based on their choices.

Hypothetical Survey

In the hypothetical survey of club members and the general public, the questionnaires were administered online. After consenting to participate, respondents completed a brief survey of their food-purchasing behaviors, completed four hypothetical conjoint choice questions regarding purchases of ground beef, and answered a set of questions about their demographic and socioeconomic characteristics. The survey was completed by 358 club members and 327 randomly selected Maryland residents. Table 1 reports descriptive statistics for those samples. The instructions for the conjoint choice questions asked respondents to choose between two hypothetical

Table 1. Demographic Characteristics of Buying-club and Random Samples

	Maryland	Buying Club	Random Sample
Number of respondents	—	358	327
Median household income (2011 inflation-adjusted dollars)	$70,004	—	—
Household income (percent)			
Less than $50,000	—	24.8	17.3**
Between $50,000 and $100,000	—	36.4	40.9
Between $100,000 and $150,000	—	26.5	23.3
Greater than $150,000	—	13.3	18.5*
Age	38 (Median)	42.7	47.3***
Female (percent)	51.6	85.1	58.5***
Mean household size	2.7	3.4	3.2
Households with children (percent)	33.2	58.1	57.7
Bachelor's degree or higher (percent)	36.9	89.5	82.8***
White (percent)	58.6	83.3	78.1*

Notes: The state demographic characteristics come from the U.S. Census Bureau's (2011a) American Community Survey one-year estimates. Single asterisks, double asterisks, and triple asterisks denote that the *t*-test of a difference in the means for the consumer buying-club and random sample groups was significant at the 0.10, 0.05, and 0.01 level, respectively.

one-pound packages of ground beef that were identical in every way except for the attributes described. The two product profiles were presented side by side (see Figure 1), and information was provided on five attributes: producer (farmer you know, farmer you do not know); distance traveled (100 miles, 400 miles, 1,000 or more miles); use of antibiotics and hormones (USDA certified organic, not organic but no use of antibiotics or hormones, not organic and use of antibiotics and/or hormones); livestock production (pastured for zero to three months of the year, pastured for three to six months of the year, pastured for six or more months); and price per pound ($4.00, $6.00, $8.00).[6] The attribute levels are fully described in Table 2. Respondents were asked to choose one of the products (beefs A and B) or neither product (beef C).

In designing the experiment, we created sets of product profiles using a variation of a standard full-factorial design (Kuhfeld 2009). Under the standard full-factorial design, respondents evaluate all possible combinations of attribute levels. Our experiment involved 162 unique product profiles (two producer levels × three distances traveled × three antibiotic/hormone states × three livestock production methods × three prices). To maximize voluntary participation and minimize effects of learning and fatigue (Savage and Waldman 2008), we asked each respondent to evaluate four choice sets that each

[6] We chose the price points to reflect the distribution of prices for ground beef observed at six major supermarkets in the region. We visited the stores and collected prices for a large variety of ground beef products that varied in fat content, production method, production location, organic status, use of antibiotics and hormones, and branding.

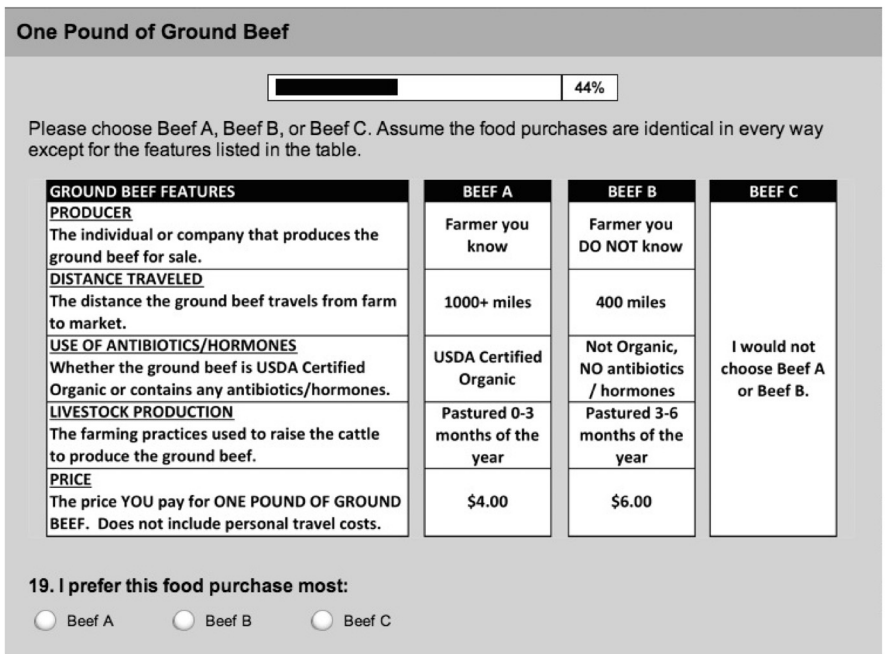

Figure 1. Example of Hypothetical Conjoint Choice Question Regarding Ground Beef

Note: All attributes and attribute levels are listed in Table 2.

Table 2. Attributes of Ground Beef in Hypothetical Conjoint Choice Questions

Product Attribute	Levels
Producer	1. Farmer you know 2. Farmer you do not know
Distance traveled	1. 100 miles 2. 400 miles 3. 1000+ miles
Use of antibiotics/hormones	1. USDA Certified Organic 2. Not organic, no antibiotics/hormones 3. Not organic, use of antibiotics/hormones
Livestock production	1. Pastured 0–3 months of the year 2. Pastured 3–6 months of the year 3. Pastured 6+ months
Price	1. $4.00 2. $6.00 3. $8.00

consisted of profiles of two products. The choice sets were randomly selected from the full factorial design.[7] Because a common utility function is assumed for all respondents, both the main effects and the interaction effects can be estimated without bias (Darby et al. 2008, Lusk and Norwood 2005). Each choice set was reviewed and dominant profiles were removed. For example, if the choice set involved a producer that was not known (i.e., store bought), the price of organic ground beef was set to exceed the price of ground beef produced using antibiotics and/or hormones. This restriction was imposed to mimic price relationships normally observed in retail outlets.

Econometric Model

We used a random utility model to determine WTP for grass-fed and local attributes in one pound of ground beef. When individual i chooses between J choices, let the utility of choice j be

$$U_{ij} = \mathbf{x}'_{ij}\boldsymbol{\beta} + \varepsilon_{ij} \tag{1}$$

where $\mathbf{x}_{ij}$ is a vector of choice-specific attributes and ε_{ij} is a stochastic component of utility. The vector of coefficients, $\boldsymbol{\beta}$, represents the change in utility associated with a unit change in a given attribute. When individual i chooses alternative j, we assume that U_{ij} is greater than or equal to U_{ik} for all $k \neq j$, $k \in J$.

Let Y_i be a random variable indicating the alternative j chosen by individual i. If the J error terms for each individual are independent and identically distributed with a type 1 extreme value distribution, we can express the probability that choice j is made as

[7] Additional supporting materials regarding the design of the hypothetical choice experiment and *ex post* measures of design efficiency are available upon request.

$$(2) \qquad \text{Prob}(Y_i = j) = \text{Prob}(U_{ij} \geq U_{ik}) = \exp(\mathbf{x}'_{ij}\boldsymbol{\beta}) / \sum_{j=1}^{J} \exp(\mathbf{x}'_{ij}\boldsymbol{\beta}),$$

which provides the basis for the conditional logit model (McFadden 1974, Louviere, Hensher, and Swait 2000).

For the hypothetical choice analyses, the baseline empirical specification that corresponds to equation 1 for the deterministic component of utility for individual *i* and alternative *j* is

$$(3) \qquad V_{ij} = \beta_1 KnowFarmer_j + \beta_2 Dist100_j + \beta_3 Dist400_j + \beta_4 Organic_j + \beta_5 NoHormone_j + \beta_6 Pasture3_j + \beta_7 Pasture6_j + \beta_{cost} Price_j.$$

In this model, the variables are binary except for price. *KnowFarmer* equals 1 when the ground beef is produced by a farmer known to the consumer, *Dist100* equals 1 when the distance the ground beef travels from farm to market is 100 miles, *Dist400* equals 1 when the distance the ground beef travels is greater than 100 miles but less than 400 miles, *Organic* equals 1 when the ground beef is USDA-certified as organic, *NoHormone* equals 1 when the ground beef is not USDA-certified as organic but also contains no antibiotics or hormones, *Pasture3* equals 1 when the cattle from which the ground beef was produced were pastured for three to six months of the year, and *Pasture6* equals 1 when the cattle were pastured for six or more months of the year; the value for each variable is otherwise 0. *Price* is the cost of one pound of the ground beef. To address potential interactions between the grass-fed attribute and local attributes, we also estimated a model that included an interaction term for those components:

$$(4) \qquad V_{ij} = \beta_1 KnowFarmer_j + \beta_2 Dist100_j + \beta_4 Organic_j + \beta_5 NoHormone_j + \beta_7 Pasture6_j + \beta_{cost} Price_j + \beta_8 (Dist100_j \times Pasture6_j).$$

We used a simplified choice experiment for the nonhypothetical choice analysis, and the baseline empirical specification corresponding to equation 1 is

$$(5) \qquad V_{ij} = \beta_1 Local_j + \beta_2 Grassfed_j + \beta_{cost} Coupon_j$$

in which the binary variable *Local* equals 1 when the cattle from which the ground beef was produced were raised within 100 miles of the market (and 0 otherwise), the binary variable *Grassfed* equals 1 when the cattle were fed a diet consisting entirely of grass (and 0 otherwise), and *Coupon* is the amount of the discount on the grocery bill associated with a specific alternative. To address potential interactions between the grass-fed attributes and local attributes, we also estimated a companion model with an interaction term:

$$(6) \qquad V_{ij} = \beta_1 Local_j + \beta_2 Grassfed_j + \beta_{cost} Coupon_j + \beta_3 (Local_j \times Grassfed_j).$$

Each empirical specification included a cost attribute and the coefficient of that attribute, β_{cost}, is interpreted as the marginal utility of income. We calculated the marginal WTP (MWTP), also referred to hereafter as the price premium, for a particular attribute as the compensating variation for a change in that attribute, which is simply the ratio $\beta_{att} / \beta_{cost}$ where β_{att} is the attribute coefficient.

Results from the Hypothetical Survey

The club and general-population groups in the hypothetical choice analyses differed on several demographic margins as shown in Table 1. The club sample was overwhelmingly female, relatively young and less wealthy, and slightly more educated. There were no differences between the groups for the mid-range income brackets, household size, and households with children. The survey collected some background information about the groups' knowledge of and participation in a local food market represented by a farmers' market. We find that 84.7 percent of the club members visit farmers' markets an average of 21 times per year while 67.3 percent of the sample of the general population visit farmers' markets an average of 13 times per year.[8]

The survey also presented an open-ended question: "Within how many miles of where you live would meat, poultry, and dairy products need to be raised to be considered local?" For the experienced club shoppers, the median response was 100 miles and the mean response was 113 miles; for the general population, the median response was 40 miles and the mean was 47 miles. See Figure 2 for the distribution of these responses. It is clear that the club responses are more realistic for major metropolitan areas such as Washington, D.C., where

[8] A *t*-test of the difference of the means confirmed that these differences are statistically significant.

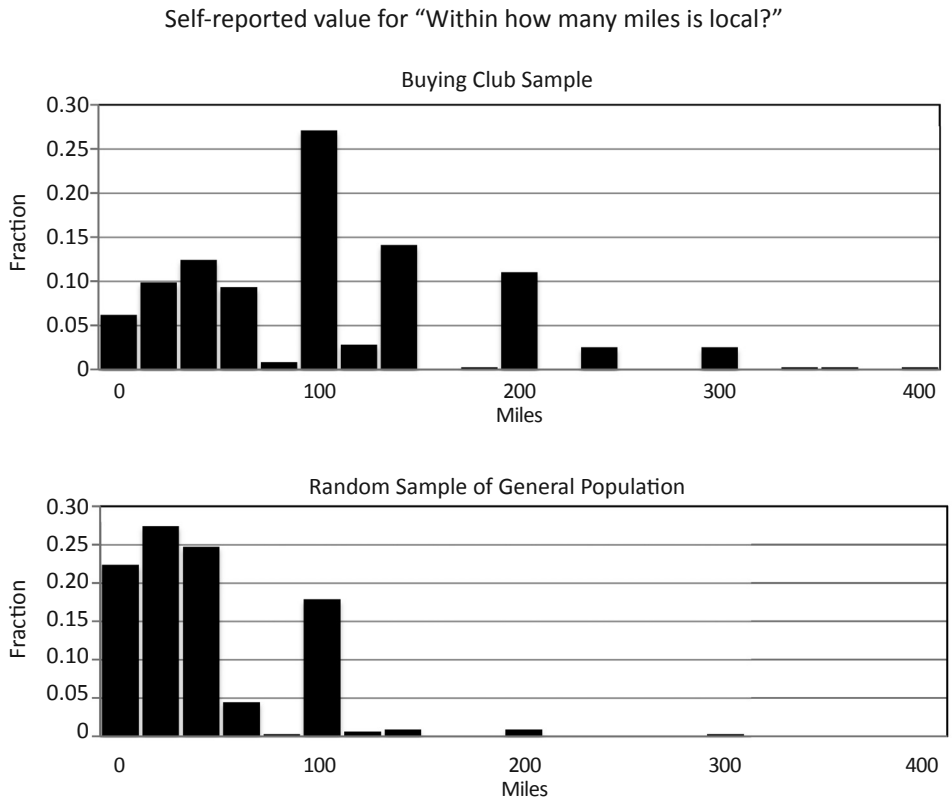

Figure 2. Distribution of Responses for Self-reported "Local" Miles

sourcing food from within 40 miles would be difficult. Participants in the buying club group had been members of the club for an average of 2.83 years. Given that tenure as members and their generally accurate understanding of local agriculture in the Washington, D.C., metropolitan area, it is evident that the club members had considerably more experience and a greater exposure to local attributes of food than the general population. Thus, we expect that the hypothetical WTP of club buying-group members fairly accurately reflects their true valuations, and we are interested in how those individuals trade off higher prices for distance and production attributes. List (2003) showed that the market experience of survey and experiment participants is an important predictor in eliminating anomalous market actions, particularly with regard to valuation.

We use the standard conditional logit model[9] specified in equation 3 to analyze the hypothetical survey data and calculate estimates of MWTP for the buying club sample and random sample of Maryland residents. The model estimates and corresponding MWTP estimates for each attribute are presented in Table 3. The baseline product for comparison is one pound of ground beef that was produced by an unknown farmer 1,000 miles away and from cattle that were given antibiotics and hormones and were pastured for zero to three months.[10] We find that buying club shoppers had an estimated MWTP[11] for beef raised only 100 miles away of $1.21, which is less than half of the $2.72 estimated for the general population. Interestingly, we find that buying club shoppers were not willing to pay a significant premium for beef raised 400 miles away but estimate a large MWTP of $2.39 among the general population group for this attribute. We view this result as further confirmation that the buying club shoppers have well-formed views of the meaning of local and the value of distance as an attribute. On the other hand, buying club members were willing to pay a $2.65 premium for ground beef produced from cattle that were pastured six or more months, which was about 63 percent greater than the $1.63 premium for the general population sample.

These results are revealing in terms of direct effects, but we wish to disentangle the relationship between the attributes. Do the attributes act as substitutes or complements? Substitution would suggest that individual consumers vary in defining the local attribute. If, on the other hand, they are complements, consumers would likely value the local attribute separately from other commonly associated premium process attributes. To address this question, we estimate the model specified in equation 4 with an interaction term for pasturing for six or more months and production within 100 miles.[12] The estimates from that model and corresponding estimates of MWTP for each attribute are presented in Table 3. For the general population sample, we find

[9] In our preliminary analysis, we pooled the samples and analyzed the data using a latent-class logit model. The results suggest that a two-class model is appropriate, and the classes largely separate into the buying club and the general population samples. Given these results, we simplified the exposition and present the models from each sample separately using conditional logit estimators. Results from the latent class model are available upon request.

[10] The MWTP estimates we present in this section should be interpreted relative to the base case for each attribute.

[11] All of the MWTP estimates are dollars per pound of ground beef.

[12] Given the different compositions of the samples, we also explored interactions between attributes and other key demographic variables: gender, income, college education, age, household size, and white race. Those results produced no obvious departures from the direct results; they are available upon request.

Table 3. Results from the Hypothetical Survey

	Buying Club		Random Sample	
Attribute	**Baseline**	**Interaction**	**Baseline**	**Interaction**
Conditional Logit Models				
Farmer you know	0.301***	0.316***	0.268***	0.281***
	(0.080)	(0.080)	(0.078)	(0.078)
Distance traveled = 100 miles	0.429***	0.296*	0.610***	0.499***
	(0.104)	(0.118)	(0.098)	(0.110)
Distance traveled = 400 miles	–0.055	—	0.537***	—
	(0.099)	—	(0.098)	—
Certified organic	1.441***	1.495***	1.526***	1.534***
	(0.107)	(0.108)	(0.121)	(0.120)
Not organic, no antibiotics	1.174***	1.222***	0.868***	0.897***
	(0.103)	(0.106)	(0.119)	(0.117)
Pastured 3–6 months	0.289**	—	0.316***	—
	(0.102)	—	(0.095)	—
Pastured 6+ months	0.938***	0.634***	0.366***	0.398***
	(0.108)	(0.116)	(0.106)	(0.115)
Distance = 100 miles ×	—	0.429*	—	–0.425
pastured 6 months	—	(0.206)	—	(0.222)
Cost	–0.354***	–0.334***	–0.225***	–0.173***
	(0.021)	(0.020)	(0.023)	(0.020)
Number of observations	4,218	4,218	3,843	3,843
Number of clusters	358	358	328	328
Pseudo R-squared	0.151	0.150	0.136	0.122
Willingness-to-pay Estimates in Dollars per Pound of Beef				
Farmer you know	0.85	0.95	1.19	1.62
	[0.39, 1.29]	[0.46, 1.40]	[0.49, 1.85]	[0.73, 2.49]
Distance traveled = 100 miles	1.21	0.89	2.72	2.88
	[0.68, 1.73]	[0.22, 1.50]	[1.88, 3.58]	[1.63, 4.17]
Distance traveled = 400 miles	–0.15	—	2.39	—
	[–0.72, 0.39]	—	[1.53, 3.29]	—
Certified organic	4.07	4.47	6.79	8.84
	[3.53, 4.68]	[3.92, 5.06]	[5.58, 8.42]	[7.35, 10.93]
Not organic, no antibiotics	3.32	3.66	3.86	5.17
	[2.77, 3.89]	[3.10, 4.31]	[2.94, 4.87]	[4.09, 6.65]
Pastured 3–6 months	0.82	—	1.41	—
	[0.27, 1.38]	—	[0.59, 2.29]	—
Pastured 6+ months	2.65	1.90	1.63	2.29
	[2.13, 3.21]	[1.23, 2.54]	[0.76, 2.54]	[0.99, 3.67]
Distance = 100 miles ×	—	1.28	—	–2.45
pastured 6 months	—	[0.12, 2.64]	—	[–5.03, 0.02]

Note: In the conditional logit models, the single asterisks, double asterisks, and triple asterisks denote significance at the 0.10, 0.05, or 0.01 levels, respectively, and the numbers in parentheses are robust standard errors. In the willingness-to-pay estimates, the figures are estimates of compensating variation for each of the attributes and the numbers in brackets are 95 percent confidence intervals calculated using the Krinsky-Robb bootstrapping method.

Table 4. Self-reported Importance of Attribute in Choices Made

	Percent		
What influenced your choice?	**Production Method**	**Distance**	**Price**
Buying Club Sample			
Very important	**86**	22	11
Important	13	**66**	**58**
Not important	1	13	31
Random Sample			
Very important	32	14	**50**
Important	**47**	44	37
Not important	21	42	12
Grocery Store Sample			
Very important	37	22	36
Important	**42**	**45**	39
Not important	11	33	25

a MWTP for the interaction of –$2.45, which effectively mitigates the price premium for either of the attributes individually and suggests that consumers see those attributes as substitutes. Intuitively, then, consumers view local production and grass-fed production methods as having overlapping benefits (e.g., perhaps some notion of sustainability) and therefore do not view the attributes as independent of one another. The buying club members' behavior is markedly different; we find a positive MWTP for the interaction of $1.28. For these consumers, then, the attributes are complementary, a result that reinforces the notion that the experienced shoppers value the actual distance to the farm without assuming any additional production properties.

To better understand differences in MWTP across samples, we compared the MWTP estimates with the consumers' self-reports of the importance of each attribute from a follow-up question on the survey that asked them to rank how important each attribute was (very important, important, not important) in their decisions, and we present the results in Table 4. The buying club members focused primarily on the grass-fed attribute—86 percent defined it as very important. A significant majority of the members, 66 percent, considered the distance to the producer to be important as well. The respondents in the general population sample were less consistent in which attributes most influenced their choices. Only price garnered a 50 percent share in the important category. These results beg the question of whether the hypothetical choice results for the general Maryland sample reflect true valuations and motivate our subsequent nonhypothetical in-store experiment.

Nonhypothetical In-store Experiment

While we have no reason *a priori* to suspect bias from our survey data, we are interested in validating the hypothetical choice results with a comparable set of nonhypothetical data. This research design is rooted in criticisms of stated-preference elicitation mechanisms (Cummings, Brookshire, and Schulze

1986, Mitchell and Carson 1989, Adamowicz, Louviere, and Williams 1994) and comparisons of stated-preference and revealed-preference mechanisms (Carson et al. 1996). However, the criticisms have primarily addressed contingent-valuation methods, and there so far is no consensus among economists regarding hypothetical versus nonhypothetical choice experiments as the superior mechanism for eliciting WTP. Research by Carlsson and Martinsson (2001), Cameron et al. (2002), and List, Sinha, and Taylor (2006) has suggested that there are no significant differences in WTP estimates. However, List, Sinha, and Taylor (2006) simultaneously found that hypothetical choice experiments may induce internal inconsistencies in subjects' preferences and thus drew mixed conclusions. With regard to retail shopping, Chang, Lusk, and Norwood (2009)[13] found that nonhypothetical choices better approximated preferences but that both elicitation methods had a reasonably high level of external validity. In studies of food attributes that employed both hypothetical and nonhypothetical choice experiments to estimate WTP, Lusk and Schroeder (2004) analyzed WTP for quality-differentiated beef steaks and found that the estimates of MWTP for steak attributes were similar in both settings while Aoki, Shen, and Saijo (2010) examined the effects of provision of information on WTP for a food additive in ham and found that hypothetical and nonhypothetical settings produced significantly different WTP and information effects.

It is reasonable to assume that the buying club shoppers have considerable experience making decisions regarding WTP for local production and for specific production attributes through their routine market purchases. Consequently, the hypothetical choice results for that group are more likely to reflect true valuations, but we do not know if the sample from the general population has experience with a similar context to inform their decisions in the hypothetical setting. In short, the in-store experiment allows us to check our hypothetical WTP values for the general population against an incentivized treatment in an actual shopping context. This setting also addresses the issue of potential hypothetical bias, although distinguishing bias from a lack of market context is not possible in our design. In light of the distinct benefits and drawbacks of each setting, we do not favor one approach over the other and therefore use them in tandem to construct a more comprehensive analysis.

We collect nonhypothetical data using an in-store experiment, and our study resembles the work of Loureiro, McCluskey, and Mittelhammer (2003) and Lusk, Norwood, and Pruitt (2006). While the literature comparing field experiments to lab experiments is comprehensive, far less attention has been given to comparing conjoint analysis to a field counterpart.[14] We have a unique opportunity—access to the population and the product (locally produced, grass-fed beef) of interest—and a simple decision structure that allows us to implement a field experiment. Using terminology popularized by Harrison and List (2004), one can view our experiment as a framed field experiment with the field context implemented in the commodity, the information set, and the task. Our experiment differs from a purely natural field experiment only in that our subjects are aware of their participation. Furthermore, the experiment mechanism can be classified simply as a nonhypothetical conjoint analysis. Even though we control the product attributes, we must value them in randomly

[13] Chang, Lusk, and Norwood (2009) examined three product categories: ground beef, wheat flour, and dishwashing liquid.

[14] This is most likely due to the types of issues studied by conjoint analysis, some involving exogenous nonmarket attributes that must, by nature, be hypothetical.

generated combinations because they are too numerous for individual isolation treatments.

Design and Implementation of the Experiment

We adapted the hypothetical choice experiment design to use in the in-store experiment in which subjects make tradeoffs between money and quality attributes of ground beef products. To simplify the choice experiment, we vary two attributes: distance the product traveled from farm to market and production method used. Based on the levels of significance found in the hypothetical WTP analysis, we limited each attribute to two levels. For distance, we compared production within 100 miles to domestic production (anywhere in the United States); for production method, we compared grass-fed to no claim made about production. In addition, we introduced a three-level coupon attribute.

In the experiment, we approached shoppers in the nonspecialty supermarket and presented them with a simple choice involving a familiar product (a pound of ground beef) and money. Shoppers were approached in the meat section of the store to limit the sample to individuals who were likely to be interested in buying meat. Unlike Lusk, Norwood, and Pruitt (2006), we did not alter consumers' information set using any form of cheap talk;[15] the participants had to rely on their existing views regarding grass-fed and locally produced ground beef products.

Though the survey results suggested little correlation between the grass-fed and local attributes for beef and the socioeconomic characteristics of the participants, we chose to conduct the in-store experiment in a conventional grocery store rather than in a specialty or natural food store. If the conventional wisdom was true, our store selection would bias the WTP measures *a priori* toward zero. For example, the store we selected had little penetration into markets for organic or local products and carried no grass-fed or local beef products in the meat department. Based on our discussion with the store's managers about their customer demographics, we conducted the experiment over ten hours on a mid-month non-holiday weekend day to avoid any bias resulting from atypical holiday-only shopping and any potential impact from a concentration of once-monthly fixed-income shoppers.

The day before the experiment, we had more than 300 pounds of grass-fed, locally produced ground beef delivered to the store in (approximate) one-pound packages. The morning of the experiment, the store's meat department produced one-pound packages of conventionally raised ground beef. In both cases, the ground beef was 90 percent lean to minimize selection based on leanness. We then labeled the delivered packages of ground beef as grass-fed, raised within 100 miles, or both, and each consumer received a package labeled according to the choice made. The participants did not see the packages prior to completing the choice experiment to eliminate any visual bias. The choice presented to the participants is illustrated in Figure 3 using an example of grass-fed local versus simply grass-fed.

[15] In this context, cheap talk refers to any nonbinding communication or information disclosure between the researcher and the participant prior to the experiment that is intended to alter the participant's information set and thus influence the participant's behavior in a measureable way. In contingent-valuation studies, cheap talk is commonly employed to reduce or eliminate hypothetical bias (Cummings and Taylor 1999, Lusk 2003).

Table 5 describes the attributes and levels presented in the experiment. As in the hypothetical conjoint analysis, we used a variation of the full-factorial design to generate the nonhypothetical product-profile pairs from twelve unique product profiles (two distance-traveled levels × two livestock-production levels × three coupon levels). Each participant was asked to evaluate only two choice sets (each consisting of two product profiles) that were randomly selected from the full-factorial design.[16] The coupon value offered in the no-beef option was always \$0.25 higher than the largest coupon value offered in the beef choices to ensure that participants would choose ground beef only because they desired it. Any participant who was primarily interested in receiving the greatest discount on groceries would migrate to the no-beef option. The with-beef coupon amounts were \$0.50, \$2.50, and \$4.50 with a price restriction imposed to mimic the price differential for grass-fed and local beef normally observed in retail outlets, where such products are always more expensive than conventional, domestic ground beef options. To ensure incentive compatibility, participants were informed prior to completing the

Table 5. Attributes of Ground Beef in Nonhypothetical Conjoint Choice Questions

Attribute	Levels
Livestock production	1. Grass-fed 2. —
Distance traveled	1. Raised within 100 miles 2. Domestic (United States)
Price (coupon value)	1. \$0.50 2. \$2.50 3. \$4.50

[16] Additional material regarding the design of the in-store choice experiment and *ex post* measures of the design's efficiency are available upon request.

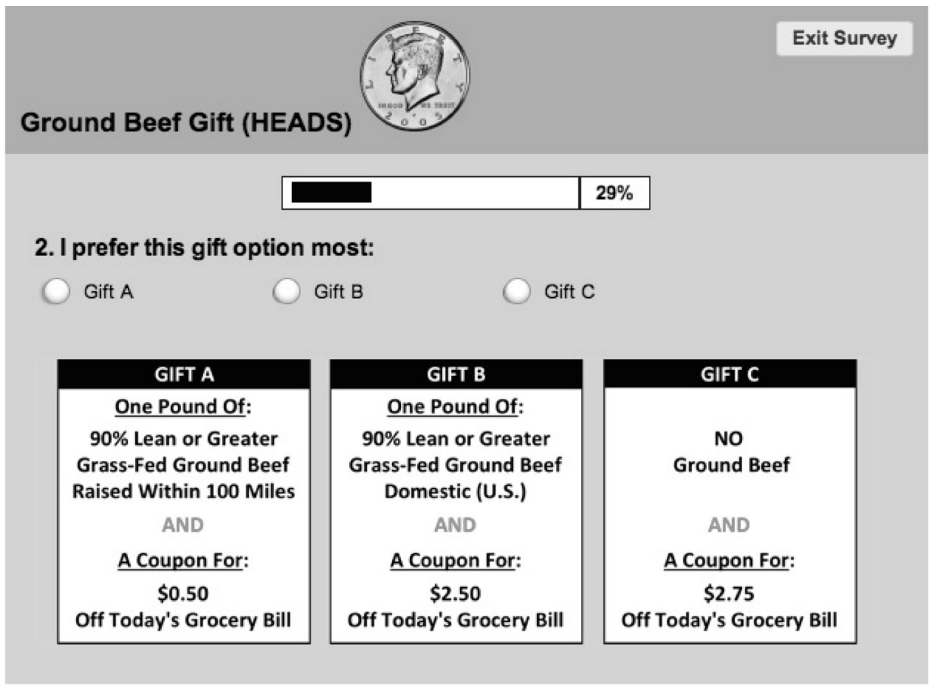

Figure 3. Example of Nonhypothetical In-store Conjoint Choice Question Regarding Ground Beef

conjoint choice questions that one of the two questions presented would be randomly selected after completing the survey and they would receive their respective choice as a free gift.

Participants completed the experiment using a tablet computer as follows, and the entire interaction took five to ten minutes.

1. Shoppers pass near the supermarket's meat department.
2. An enumerator asks the shoppers if they would like to participate in a brief survey and a short experiment to receive a coupon and/or a pound of ground beef. The enumerator explains that the coupon is good for the day of the experiment and that the amount of the coupon will be subtracted from their total grocery bills.
3. The enumerator provides shoppers who agree to participate with a tablet computer and simply asks them to follow the on-screen instructions.[17]
4. The shoppers are first presented with a few questions that collect information on their demographic characteristics and then with two choice questions in the format shown in Figure 3. One of the questions presents an image of a coin in the "heads" position in the top margin; the other question shows the coin in the "tails" position.
5. When shoppers have completed the experiment, the enumerator offers them a coin, which they flip to select the choice that will be fulfilled.

In all, 279 shoppers agreed to participate, generating 558 observations. Table 6 compares the distribution of each attribute presented versus the percentage of each attribute chosen by participants, and the sample statistics for the socioeconomic and demographic data for the participants are presented in Table 7. It is important to remember that the in-store sample is slightly older, is less educated, and comes from smaller households than the survey samples.

Results from the Nonhypothetical In-store Experiment

We estimate the same conditional logit model for the nonhypothetical choice sample using the specification in equation 5 to produce estimates of MWTP for attributes of ground beef.[18] Table 8 reports the results from the conditional logit and corresponding MWTP estimates for each attribute. The baseline product for comparison is one pound of ground beef produced from cattle raised in the United States with no claim of production method, and the MWTP estimates are interpreted relative to the base case for each attribute. We find an estimated MWTP of $0.82 for the grass-fed attribute and $1.47 for the local attribute. These nonhypothetical values are about half as much as the ones from the hypothetical survey of the general public but are similar in that the local attribute is valued almost twice as much as the grass-fed attribute. Interestingly, the estimated price premium for the local attribute is very close to the estimated hypothetical value expressed by the experienced club shoppers, which reinforces the idea that the club buyers are more accurate than other shoppers in reporting true valuations. However, the nonhypothetical estimate

[17] In a few cases in which shoppers were uncomfortable with the tablet interface, the enumerator administered the survey and experiment after informed consent was granted.

[18] In this case, MWTP is not quite correct since participants did not pay any money. However, for presentation consistency, we use MWTP since there should be no distinction between MWTP and marginal willingness to accept since the endowment point is neutral.

Table 6. Distribution of Attributes in the In-store Experiment for the Overall Choices

Attribute	Percent of Presented Choices	Percent of Choices Made
Grass-fed	37.87	38.71
Local	37.34	41.39
Grass-fed and local	18.34	20.97
Not grass-fed and not local	18.99	20.43
No beef included	33.33	25.09

Note: By design, 33.33 percent of the choices offered no beef (gift C).

Table 7. Demographic Characteristics of the In-store Sample

	Maryland	In-store Sample	Random Sample
Number of respondents	—	279	327
Median household income (2011 inflation-adjusted dollars)	$70,004		
Household income (percent)			
Less than $50,000	—	21.9	17.3
Between $50,000 and $100,000	—	40.1	40.9
Between $100,000 and $150,000	—	18.2	23.3
Greater than $150,000	—	19.8	18.5
Age	38 (median)	56.0[a]	47.3***
Female (percent)	51.6	58.8	58.5
Mean household size	2.7	2.7	3.2***
Bachelor's degree or higher (percent)	36.9	74.5	82.8***
White (percent)	58.6	74.8	78.1

[a] Approximations using the mid-point of the interval from the in-store sample.

Notes: The state demographic characteristics come from the U.S. Census Bureau's 2007–2011 American Community Survey (2011b) five-year estimates. Single asterisks, double asterisks, and triple asterisks denote that the *t*-test of a difference in the means for the in-store sample and hypothetical random sample groups was significant at the 0.10, 0.05, or 0.01 level, respectively.

of MWTP for the grass-fed attribute is less than a third of the estimate for the club sample so the groups may value those two attributes in fundamentally different ways.

We again estimate the model specified in equation 6 using the nonhypothetical choice data to examine the interaction between the grass-fed attribute and the local attribute and how consumers perceive them.[19] Table 8 reports those results. We find a statistically significant negative MWTP of –$1.09 for the

[19] We also analyzed the interactions between the product attributes and key demographic variables for the nonhypothetical sample and found no clear pattern of statistical significance. The only result of note was that the older the participant, the less favorable the view of the local attribute. The results are available upon request.

Table 8. Results from the Nonhypothetical In-store Experiment

	Econometric Specification	
Variable	**Baseline**	**Interaction**
Conditional Logit Model		
Grass-fed	0.377***	0.614***
	(0.124)	(0.163)
Local	0.675***	0.911***
	(0.121)	(0.170)
Coupon Value	0.459***	0.486***
	(0.053)	(0.055)
Grass-fed × *Local*	—	–0.531**
	—	(0.237)
Number of observations	1,674	1,674
Number of clusters	279	279
Pseudo R-squared	0.0846	0.0901
Willingness-to-pay Estimates in Dollars per Pound of Beef		
Grass-fed	0.82	1.26
	[1.34, 0.26]	[1.86, 0.60]
Local	1.47	1.87
	[2.05, 1.00]	[2.49, 1.25]
Grass-fed × *Local*	—	–1.09
	—	[–0.12, –1.95]

Notes: For the conditional logit model, single asterisks, double asterisks, and triple asterisks denote significance at the 0.10, 0.05, or 0.01 level, respectively, and the numbers in parentheses are robust standard errors. For the willingness-to-pay estimates, the figures are estimates of compensating variation for each of the attributes and the numbers in brackets are 95 percent confidence intervals calculated using the Krinsky-Robb bootstrapping method.

interaction of *Grass-fed* and *Raised within 100 Miles*, a result that is similar to the hypothetical choice result for the general population sample. Once again, the interaction of the attributes effectively cancels out the price premiums for the attributes separately, providing further evidence that the attributes are interdependent and at least partially substitutable for consumers in the samples. As previously noted, the results for the buying-club sample are quite different.

Conclusion

Food products labeled as "local" are an increasingly popular option for shoppers and a focus of food policy at federal and state levels. The local attribute of food products has not been formally defined and is, perhaps, even more poorly understood by most consumers. We focused in this study on isolating the attribute most often associated with localness—the distance between the producer and the consumer of the product. Using a unique choice-based sub-sample of local food shoppers, we compared estimates of WTP and of the relationship between the local attribute and a production attribute (grass-fed) for ground beef from two hypothetical and one nonhypothetical choice samples of Maryland residents. We find that experienced food shoppers place a lower value than other shoppers on the local attribute and that the local attribute

is not being conflated with other premium attributes. For the experienced consumers in our sample, the local attribute and grass-fed attribute actually enhanced each other's value when presented simultaneously. On the other hand, Maryland residents in general in both the hypothetical and nonhypothetical choice analyses were willing to pay a premium for the local attribute but viewed the local and grass-fed attributes as substitutes. They appeared to attribute the premium qualities of a grass-fed operation to the local attribute and therefore were unwilling to pay an additional separate premium for grass-fed production.

Our results point to several ways to define the local label that could benefit both producers and consumers. Although many states have launched marketing programs to promote local products, state-level labeling may not effectively capture all of the products that could benefit from local labeling that is based on geographic proximity, especially in smaller states. From the perspective of a local producer, clearer labeling could help protect the brand and maintain a premium.[20] From the perspective of consumers, clearer labeling could allow them to pay a premium solely for the attributes desired. Our results from the consumer buying club shoppers suggest that relatively informed and experienced consumers are willing to pay even more for quality attributes that are bundled. Therefore, for local beef producers and associations and for groups promoting consumption of local food, a marketing campaign to educate consumers about the difference between local and other premium production attributes such as grass-fed could allow producers to obtain a higher price for ground beef that offers such bundled attributes.

Our results suggest several possibilities for future work. First, our study focused primarily on two groups: members of a buying club who had experience with local and grass-fed beef products and shoppers at a nonspecialty suburban grocery store. As specialty grocers and farmers' markets continue to expand and attract new shoppers, further insight could be gained by examining the same shoppers in other venues. We also focused on decomposition of "local" into distance and production attributes. However, some research has suggested that consumers associate other attributes with "local," including farm size, environmental sustainability, and potential benefits to human health from consumption of local products (Darby et al. 2008, Martinez et al. 2010). Further decomposing "local" using those attributes would provide a more complete picture of how local labels affect consumer behavior. It is also possible that consumer behavior varies with the type of product analyzed. We used a non-premium cut of beef (ground), and consumers might value local and grass-fed attributes of a premium cut such as steak differently. Similarly, valuations could vary for fresh and processed versions of a food (e.g., fresh fruit versus shelf-stable jam). In short, the benefit of a product being labeled as local could vary by product. The local attribute carries value in all of these contexts, but it is exceedingly difficult to determine exactly how the local nature of the product is valued even when the meaning of local is well-defined. This study successfully narrowed the spectrum of attributes and identified a rather dramatic interaction effect in which consumers who had relatively little market experience incorrectly valued local and premium production attributes as substitutes. If we assume that such behavior is not isolated to the market for

[20] In the case of organic food, price premiums became more stable after standards were put in place, suggesting that consumers are in greater agreement about what organic means (Oberholtzer, Dimitri, and Greene 2005).

ground beef, consumers may significantly overspend on products labeled as local when trying to purchase food with other attributes.

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