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Point-of-Sale Specific Willingness to Pay for Quality-Differentiated Beef

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Abstract: Despite the growing interest of producers and consumers toward grass-fed, local, and organic beef, the supply chain for these products to reach consumers is not always clear-cut. Among the available options are direct-to-consumers and the conventional food supply chain. Although consumers may pay a premium for beef differentiated by quality attributes, the willingness to pay (WTP) difference across point-of-sales is unclear. In this study, we contrast the WTPs for conventional, grass-fed, local, and organic beef by brick-and-mortar supermarkets (B&Ms), farmers' markets, and via online stores. We conduct a choice experiment with a nationwide online sample of American consumers. The findings indicate that compared to B&Ms, more consumers are reluctant to purchase beef from farmers' markets and online outlets. Moreover, the WTP for quality-differentiated attributes varies significantly by the point-of-sales. For most consumers, the downside of online or farmers' markets outweighs the upside of the quality-differentiated attributes sold in those venues.

Keywords: farmers' market; online grocery; local; organic; grass-fed; beefsteak; willingness to pay

JEL Classification: Q13; L81

1. Introduction

Beef is no longer a simple commodity differentiated by just marbling and cut. While large and grain-finished (conventional) feedlots still supply the bulk of U.S. beef, alternatives have gained ground: retail sales of grass-fed beef reached $272 million in 2017 [1], while 5.2% of the total value of beef sold in the fourth quarter of 2017 was labeled organic or natural [2].

The growth of these differentiated products is often attributed to consumers' preferences. The quality attributes convey positive environmental and health quality images [3,4]. In theory, the positive images spark a higher willingness to pay (WTP) from consumers. The premium then feeds back to reward the producers of beef with quality-differentiated attributes [5]. However, in practice, the producers face challenges to reach the consumers. Often alternative supply chains must be utilized, as these usually-smaller beef farms struggle to meet the conventional supply chain's volume and price expectations [6,7]. Even when feasible, specialty stores or supermarkets typically have higher margins, so the producers may receive a smaller net price [7]. Direct-to-consumer operations are only optimal when consumers' WTP in these channels exceeds the additional marketing cost.

Little is known about point-of-sale effects on the WTP for differentiated beef products, which adds uncertainty to the producers' profitability and their selection of the optimal marketing channel. While consumers' WTP for quality-differentiated beef is common in the literature, assuming the

same WTP for all point-of-sales may be too simplistic. This may mislead producers in their marketing decisions.

From a wider food-system context, the marketing difficulty may prevent a higher adoption of these alternative beef production systems, which may have sustainability and environmental consequences. The grass-fed and organic production process may generate less greenhouse gas than conventional beef, and the grass-ruminant ecosystem imposes lower environmental impact [8–14]. Antibiotic-free organic beef may reduce the risk of antibiotic-resistant bacteria and groundwater contamination [15,16]. While the true impact is still being debated, the future blueprint of sustainable beef production may include grass-fed and organic beef.

If more grass-fed and organic beef are desirable from an environmental and market standpoint, the marketing bottleneck for these products must be resolved for production to scale up [7]. This study adds clarity to consumers' WTP for the quality-differentiated beef, distinguished by point-of-sales; namely their WTP in brick-and-mortar (B&M) supermarkets, farmers' markets, and online markets.

2. Background

The literature describes consumer preference for quality-differentiated beef that spans across multiple attributes and geographical boundaries. For instance, Americans' WTP for grass-fed beef is observed by various studies [17,18]. Similarly, consumers from Maryland are willing to pay a premium for organic, grass-fed, and local beef [19]. Canadians prefer local and grass-fed beef, however, on average, they are unwilling to pay a premium for organic beef, although, there is a niche market for it [20]. Nevertheless, most of the existing analyses—with few exceptions—do not account for the potential taste difference that may exist with different point-of-sales.

The diverse marketing operations of livestock farms highlight the value of this research question. Livestock farms account for over half of the direct-marketing farms in the U.S. [21]. Most grass-fed beef producers engage in some form of direct-to-consumer sales; one-third participate in farmers' markets and online sales; less than one-fifth market through grocery stores or wholesalers; and most engage in at least two marketing outlets [6].

Online meat sales are another expanding marketing channel. Amazon.com alone accounted for $50 million in U.S. meat sales in 2017 [22]. The sales volume is expected to increase with the predicted higher utilization of online grocery shopping. American households will spend $100 billion a year on online groceries by 2022, or $850 per household, up from $12-to-$27 billion in 2018 [23]. Eatwild.com can be seen as an example; the online directory lists more than 1400 livestock farms and provides extensive state-by-state information to facilitate purchases of local and pasture fed livestock.

This momentum stands in contrast to consumers' earlier reluctance toward online grocery purchases. Factors historically fueling the reluctance for online purchases are the risk of receiving inferior quality products, the loss of enjoyment from shopping instore, and shipping costs [24,25]. In addition, improper shipping and handling—leading to a higher prevalence of pathogens—may fuel food safety concerns for meats purchased online [26,27]. It remains unknown if consumer confidence in online meat purchases has altered following the uptake of online grocery shopping, or will online meat purchases lag other grocery categories?

On the other hand, farmers' markets appeal to a smaller segment of consumers than B&M supermarkets in general. Farmers' markets are found to be more attractive to local farm supporters and quality seekers, but convenience seekers resist farmers' markets [28–30]. Nevertheless, food expenditures do not vary significantly among farmers-market users and non-users; the higher emphasis on quality and the unchanged expenditure suggest a very competitive environment at farmers' markets [31]. Further, operational costs and logistic challenges may make this option infeasible to some producers [32,33].

The Transactional Utility theory suggests that WTP for the same product may diverge at different point-of-sales [34]. Consumers hold disparate perceptions of taste and nutrition—factors of WTP—by point-of-sale [35]. Further, WTP for local beef differs between consumers at supermarkets versus a

Community-Supported-Agriculture-like buying club [19]. Despite the rather pervasive hints from previous research and trends in consumer behavior, there are few studies that contrast the difference in WTP for quality-differentiated beef in B&Ms, farmers' markets, and online stores.

Do farmers' markets add value to grass-fed, local, and organic beef? Which sets of attributes most attract online meat shoppers? Which outlets offer better marketing opportunities, supermarkets or direct-to-consumers sales, and are direct-to-consumer marketing channels attractive to a large-enough segment of consumers to begin with? A host of questions is left unanswered. This study offers some insights from the consumer's perspective.

3. Method

3.1. Design of the Choice Experiment

This study quantified consumers' trade-off between money and quality-differentiated attributes at various retail outlets. The inherent multiple attributes setting is well suited for choice experiments [36–38], which was utilized in this study. The experiment featured the relatively homogenous and common steak cut of strip-loin steak as the representative product. This specific cut has been used in previous studies [39,40].The choice experiment examined three common quality-differentiated attributes of beef—local, organic, and grass-fed [20,41,42]. Four levels of prices were included, ranging from \$8.99/lb to \$16.49/lb, reflecting steak prices in the average-to-higher-end markets at the time of the study [43]. Table 1 lists the levels of the attributes.

Table 1. Choice experiment attributes and levels.

Attributes	Levels			
	1	2	3	4
Organic	No label [1]	Organic		
Grass-fed	No label [1]	Grass-fed		
Origin-Label	Product of USA [1]	Locally raised		
Marketing Channel (alternative-specific constant)	B&M [1]	Farmers' market	Online store	
Price	\$8.99/lb	\$11.49/lb	\$13.99/lb	\$16.49/lb

[1] Baseline Category. B&M = brick-and-mortar supermarket

The analysis aimed to contrast point-of-sale effects on consumption utility of quality attributes, as opposed to quantifying the consumption utility while holding constant a point-of-sale. Therefore, the point-of-sales appear as alternative-specific constants (aka "labeled" or "branded" approach), allowing the contrast to be made econometrically from each choice set. The alternative-specific constant approach, in this case, is more direct than the "unlabeled" choice set approach [44,45]. Figure 1 depicts a choice set.

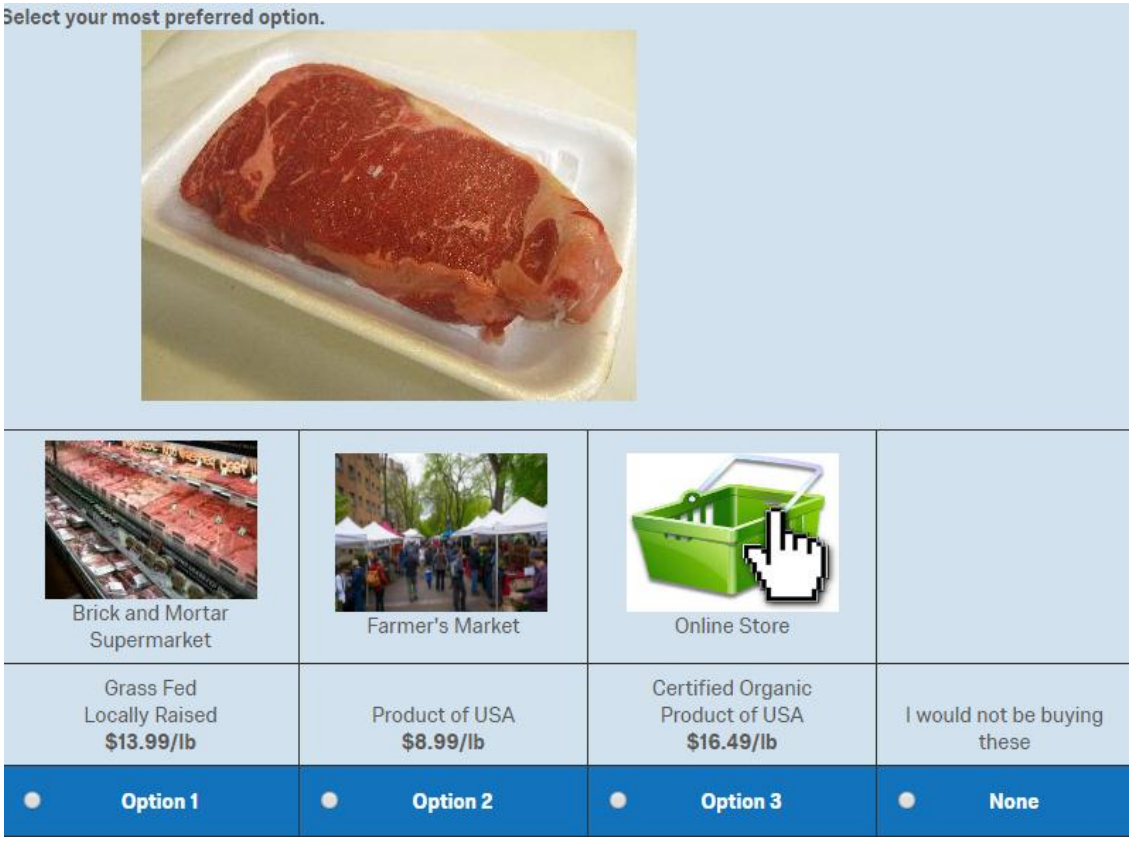

Figure 1. A choice set sample.

The point-of-sales examined were brick-and-mortar supermarkets, farmers' markets, and online stores. Many other options exist that are a mixture of conventional B&Ms and direct marketing, such as the intermediate supply chain discussed in Reference [46]. As there is an inherent limit to the number of factors a choice experiment can realistically examine, these other options were not within this study's scope, but our results are nevertheless useful references for these excluded options.

Considering the small number of attributes examined, we used a full factorial design to generate thirty-two unique choice sets ($2 \times 2 \times 2 \times 4$, with the alternative-specific point-of-sales excluded). JMP 13 was used for the choice set design. The D-efficiency score is 100%, thus, all the primary and interaction attributes can be estimated [47]. To reduce respondents' fatigue, the choice sets were distributed into four blocks, each respondent completed eight choice tasks—well within the limit of a reasonable choice experiment [48]. We undertook measurements to safeguard the data quality and respondents' rights. The survey instrument was tested with focus groups to aid clarity. Specifically, fourteen beef consumers were recruited from the public to pretest the survey and comments about the clarity of the questionnaire were elicited. In addition, a preliminary analysis was conducted with a sample of two hundred online respondents. The pilot study and preliminary analysis were conducted about four months before the collection of the full sample.

Validation questions were used to exclude inattentive respondents [49]. These were, for example, "Please select "Somewhat agree" to help us safeguard the data quality" in one of the questions. The survey was approved by the Institutional Review Board and appropriate informed consent was obtained from the respondents. The sample was stratified to the U.S. populations' income and education level, mirroring the U.S. population characteristics overall (Table 2).

Table 2. Summary statistics of consumers' socio-demographic characteristics.

Variable	Sample	United States
Gender		
Female	74.71%	50.8% (2015 Census)
Male	25.29%	49.2%
Age (years)	45.24	37.3 (median, 2013)
Educational Attainment		
<High school	10.81%	11.7%
High school graduate	29.92%	28.95%
Some college	19.40%	19.06%
Associates degree	9.46%	4.04%
Bachelor's degree	19.50%	19.49%
Graduate degree	9.27%	9.88%
Professional degree	1.64%	5.35%
Household Income ($)		
<20,000	18.63%	16.77%
20,000–29,999	16.41%	10.32%
30,000–39,999	14.19%	9.61%
40,000–49,999	10.81%	8.11%
50,000–59,999	9.75%	7.32%
60,000–69,999	6.95%	6.43%
70,000–79,999	3.86%	5.82%
80,000–89,999	12.93%	4.96%
>90,000	6.47%	30.6%

N = 1036.

The sample consisted of 1036 respondents. Three-quarters of the sample were females, which reflects women's higher rate as primary grocery shoppers; indeed, 91% of the sample had self-identified as the primary shopper of the household. All respondents identified themselves as consumers of beef through a screening question "which of the following statements describes your beef consumption?" with answers that range from "I eat beef regularly" to "I don't buy or eat beef at all"; respondents who claimed to neither purchase nor consume beef were screened out of the survey. Further, almost 90% of the sample claimed that they had not purchased meat online and almost 90% of the sample claimed that they do not frequent farmers' markets (or only visit infrequently).

Qualtrics—a company specializing in online surveys—was contracted for administrating the sample collection in September 2016. The respondents were given points that could be exchanged for some token gifts upon completion of the survey.

3.2. Econometric Model

We used mixed logit (ML) for the econometric model, as with studies of similar scope [38,40,50]. ML possesses two advantages: first, it accounts for potential heterogeneity in consumers' preferences; second, it relaxes the restrictive independence of irrelevant alternative assumption [51].

Following the random utility theory, the consumer's i utility from selecting steak j from the choice set t is:

$$U_{ijt} = \alpha p_{ijt} + \boldsymbol{\beta}\mathbf{x}_{ijt} + \boldsymbol{\gamma}\mathbf{z}_{ijt} + \epsilon_{ijt} \quad (1)$$

where p represents the price variable, and α is assumed a fixed coefficient to avoid unrealistic willingness to pay from the price coefficient's spread around zero [36]. The vector $\mathbf{x}$ represents the main level attributes as dummy variables, namely $\mathbf{x}$ = [opt out, farmers' market, online], the B&M is the omitted category to avoid perfect collinearity. The vector z, with nine elements (from the three point-of-sales and the three quality attributes), represents the interaction terms. Thus, the baseline is a pound of conventional steak sold at a B&M.

As no a-priori knowledge exists to guide the distribution of the coefficients, the estimated coefficients ($\boldsymbol{\beta}$ and $\boldsymbol{\gamma}$) were assumed to follow an IID normal distribution [52]. The maximum simulated likelihood estimation was proceeded with 2000 iterations of Halton draws, which yielded stable estimates that are indicative of coefficients' identification [53]. The estimation was carried out with the Mixlogit module of Stata 15 [54].

4. Results

The price coefficient α is negative, indicating an inverse price-demand relationship (Table 3). The negative $\beta_{opt\ out}$ suggests a positive preference for beefsteak, which indicates the success of sample screening. Further, nine of the twelve standard deviation coefficients are statistically significant. The model explains a substantially higher observed variance than a conditional logit model, which justifies ML as the estimator. The model fit is a decent McFadden R-square of 0.196 [36].

We scrutinized the point-of-sale effect with two joint tests. The first examines if consumer utility for conventional products sold in B&Ms, farmers' markets, and online are statistically equivalent; the hypothesis is rejected ($H_0 : \boldsymbol{\beta} = \mathbf{0}$; $\chi^2(2) = 420.44$; $p < 0.001$), suggesting the presence of a significant point-of-sale effect. The second examines if the quality-differentiated attributes produce equivalent utility across the point-of-sales; the hypothesis is also rejected ($\chi^2(6) = 147.95$; $p < 0.001$), which suggests significant interaction effects between the point-of-sales and the products' attributes.

The WTPs are calculated as:

$$WTP_{point\ ,attribute} = -\frac{\beta_{point} + \gamma_{point\ *attributes}}{\beta_{price}} \quad (2)$$

Table 3. Mixed logit parameter estimates.

Coefficients	Mean Estimate		Std. Dev. Estimate	
	Coefficient	Standard Error	Coefficient	Standard Error
Price (α)	−0.350 ***	0.010		
Random Coefficient (β)				
Opt-out	−6.382 ***	0.209	3.442 ***	0.157
Farmers' market (FM)	−1.333 ***	0.103	1.245 ***	0.087
Online Grocery Store (Online)	−2.920 ***	0.159	1.825 ***	0.124
Interaction Terms (γ)				
B&M * Organic	−0.085	0.065	0.689 ***	0.127
B&M *Grass-fed	−0.261 ***	0.064	0.445 **	0.199
B&M * Local	0.775 ***	0.063	0.004	0.284
Online * Organic	0.038	0.137	0.598 *	0.321
Online * Grass-Fed	0.043	0.114	−0.375	0.398
Online * Local	0.331 **	0.142	0.902 ***	0.239
FM * Organic	0.625 ***	0.084	1.069 ***	0.118
FM * Grass-Fed	0.361 ***	0.071	0.017	0.194
FM * Local	−0.296 **	0.099	1.500 ***	0.127
Log-likelihood	−7666.16			
McFadden R^2	0.1959			
Joint Hypotheses				
$H_o : \beta_{FM} = \beta_{Online} = 0$			$\chi^2(2) = 420.44$ ***	
$H_o : \begin{bmatrix} \gamma_{BM*Organic} = \gamma_{FM*Organic} \\ \gamma_{BM*Organic} = \gamma_{Online*Organic} \\ \gamma_{BM*Grassfed} = \gamma_{FM*Grassfed} \\ \gamma_{BM*Grassfed} = \gamma_{Online*Grassfed} \\ \gamma_{BM*Local} = \gamma_{FM*Local} \\ \gamma_{BM*Local} = \gamma_{FM*Local} \end{bmatrix}$			$\chi^2(6) = 147.95 * **$	

*, **, *** denotes significant at the 90%, 95%, and 99% significance levels, respectively.

The estimates represent the amount consumers are willing to pay to acquire a quality-differentiated attribute from a specific point-of-sale. The delta method produces the WTP's standard error (Hensher et al., 2005).

The standard deviation of the WTPs is calculated as [55]:

$$SD\left(WTP_{point,attribute}\right) = -\frac{\sqrt{\sigma^2_{point} + \sigma^2_{point*attributes}}}{\beta_{price}} \quad (3)$$

The standard deviations denote the WTPs' dispersion, which is useful for inference of niche consumers' preference. Pairing the mean and standard deviation estimates, the percentage of consumers preferring an attribute can be derived as the right-hand tail above zero of a normal distribution. The willingness to pay of the *n*th percentile consumer can be derived by inversion of the appropriate normal distribution [56].

Compared to the baseline (B&M sales), the negative β_{FM} and β_{online} suggest that online and farmers' markets are less preferred by consumers. This is consistent with B&Ms being the most utilized shopping channel. For an average consumer, purchasing conventional beef at a farmers' market results in a negative compensation equivalence (a loss) of \$3.80/lb; and \$8.33/lb for online (Table 4). The significant compensation equivalence suggests most consumers are reluctant to purchase beef at a farmers' market or online.

Table 4. Willingness to pay (WTP) estimates against conventional steak at B&M.

Inferred WTP Distribution	Mean (\$/lb)	Standard Deviation	% > 0 [a]	Upper 5th Percentile (\$/lb) [b]
FM	−3.80 ***	3.55	14.22%	2.04
Online	−8.33 ***	5.20	5.46%	0.22
B&M * Grass	−0.74 ***	1.27	28.01%	1.35
B&M * Local	2.21 ***	0.01	100.00%	2.23
B&M * Organic	−0.25	1.97	44.94%	2.98
FM * Grass	−2.77 ***	3.55	21.76%	3.07
FM * Local	−4.65 ***	5.56	20.15%	4.49
FM * Organic	−2.02 ***	4.68	33.30%	5.68
Online * Grass	−8.21 ***	5.31	6.11%	0.53
Online * Local	−7.38 ***	5.80	10.18%	2.17
Online * Organic	−8.22 ***	5.48	6.67%	0.79

*, **, *** denotes significant at the 90%, 95%, and 99% significance levels, respectively. [a] Left-hand tail denoted by 1-F(0, μ, σ), where F is a normal distribution CDF. [b] $F^{-1}(0.95,\ \mu,\ \sigma)$.

The standard deviations, σ_{FM} and σ_{online}, are statistically significant; indicating that segments of consumers prefer the non-B&M venues. The top fifth percentile of consumers is willing to pay a premium of \$2.04/lb for conventional beef sold at a farmers' market. Further, the top fifth percentile of the niche consumers is largely indifferent between buying beef online and in-store. These suggest that the opportunity to direct market, while narrow, is not shutoff completely. There are still consumers who are willing to pay higher prices online and at farmers' markets.

At the mean level, preferences toward quality attributes differ by shopping venues. Organic is preferred more at farmers' markets than at B&Ms or online. Grass-fed beef is preferred at farmers' markets, but not at B&Ms. Local appeals at B&Ms and online. The coefficient $\gamma_{FM*Local}$ is unexpectedly negative, which may signal a growing consumers' skepticism of "local" at farmers' markets at the mean level, potentially fueled by fraudulent misrepresentations of non-local products as local in farmers' markets [57]. The negative coefficient is also consistent with the observation of Reference [19], that consumers purchasing through buying clubs are unwilling to pay for the local attribute.

Beyond the mean level, the standard deviations suggest niche potential for some attributes. The organic attribute is not valued at the mean level at B&Ms, but some consumers still prefer organic beef at B&Ms; grass-fed, which is not preferred at the mean level, is preferred by niche consumers at B&Ms. For online stores, organic and local attributes appeal to a subgroup. Lastly, some farmers'

market consumers have higher-than-average WTP for the organic attribute, and some prefer the local attribute despite the negative mean-level observation reported earlier. The presence of significant taste heterogeneity suggests that producers must consider the niche potential of the quality attributes at different point-of-sales.

5. Discussion

On the central question: does it benefit quality-differentiated beef producers to market online or at farmers' markets? The answer is a qualified yes. We refer to the implied WTPs' mean and standard deviation of Table 4 for discussions.

5.1. Are Quality Attributes at Non-B&Ms a Solution?

On average, conventional steak at B&Ms appeals more than organic, local, or grass-fed steak sold at farmers' markets and online. Yet, a segment of consumers prefers farmers' markets and online more than B&Ms. These niche markets have a low-saturation point that is unlikely to accommodate many sellers. Quality attributes may help—to a limited extent—to win over some consumers of conventional beef who frequent B&Ms.

For farmers' market vendors, the quality attributes appear to be effective quality differentiation attributes. For the conventional product, 14% of consumers prefer to purchase from farmers' markets, rather than B&Ms, but this percentage increases to 20% when the beefsteak at farmers' markets is either grass-fed or local. Similarly, one-third of the sample prefers organic beefsteak at farmers' markets over conventional beefsteak at B&Ms. Overall, the quality attributes add value to beefsteak sold in farmers' markets for some shoppers. These attributes may help to win over some B&M consumers, especially if the farmers market vendors hold a price advantage over products at B&Ms.

These advantages do not translate fully to online marketing. Consumers who prefer grass-fed and organic beef sold online to conventional B&M beef increase marginally from 5% to 6%. The local attribute might be more advantageous, with 10% of the sample preferring local beef sold online to conventional beef sold at B&Ms. The online sales of local beef can conceivably be done by direct-to-consumer shopping websites that emphasize the localness of the product, such as the examples in the eatwild.com's directory and tenneeseegrassfed.com. Alternatively, a livestock farm can utilize food hubs with existing online stores and a delivery network. Nevertheless, the online sales of beef are likely to remain a small segment of the market. Many consumers may still harbor some underlying concern about online meat purchases, due to food safety and freshness issues.

5.2. The Demographic Characteristics of Beef Shoppers at Farmers' Markets and Online Markets

To provide more context, we explore the influence of demographic factors on the use of the non-B&M point-of-sales for the purchase. This is accomplished by a conditional logit regression that includes interaction terms between the point-of-sale and demographic variables of Table 2. The more parsimonious estimator is chosen, instead of mixed logit, as the unobserved taste heterogeneity is not a focus in this instance [51]. The utility model is

$$U_{ijt} = \alpha p_{ijt} + \boldsymbol{\beta}\mathbf{x}_{ijt} + \boldsymbol{\delta}\mathbf{q}_{ijt} + \epsilon_{ijt} \quad (4)$$

The vector $\mathbf{q}$ denotes the interaction terms between farmers' markets and online with the demographic terms. Table 5 reports the results.

Table 5. Conditional logit model with demographic interaction terms.

	Coefficient	SE		Coefficient	SE
Main Coefficients					
Price	−0.238 ***	0.006			
Opt Out	−3.397 ***	0.088			
Organic	0.152 ***	0.033			
Grass Fed	0.040	0.032			
Local	0.293 ***	0.033			
FM	−1.195 ***	0.089			
Online	−2.044 ***	0.127			
Demographic Interaction Terms					
FM * AG1	0.624 ***	0.097	Online * AG1	0.206	0.149
FM * AG2	0.699 ***	0.095	Online * AG2	0.463 ***	0.140
FM * AG3	0.236 **	0.098	Online * AG3	0.035	0.146
FM * AG5	−0.227**	0.103	Online * AG5	0.022	0.145
FM * AG6	−0.337 ***	0.103	Online * AG6	0.159	0.141
FM * Income	0.001	0.001	Online * Income	−0.002	0.002
FM * Male	0.278 ***	0.066	Online * Male	0.209 **	0.094
FM * College	0.296 ***	0.062	Online * College	0.134	0.090
FM * Child	0.013	0.029	Online * Child	0.093 **	0.041
Log-likelihood		−9468.55			
Pseudo R^2		0.176			

*, **, *** denotes significant at the 90%, 95%, and 99% significance levels, respectively. AG = age group.

Age is represented as a categorical variable to allow potential non-linear age effects. The five age groups (AGs) included in the analysis are 18–24, 25–34, 35–44, 45–54, 55–64, and above 64. These are denoted AG1 through AG6 in Table 5. The omitted reference age group is 45–54.

From the δ_{FM*AGs} estimates, the pattern suggests the preference for purchasing beef at farmers' markets is negatively correlated with age. Consumers in the three younger age groups are observed to prefer beef purchases at farmers' markets more than consumers in the 45–54 age group; and consumers in the two older age groups prefer purchasing beef at farmers' markets even less than the reference age group. For online beef purchases, only consumers in the 25–34 age group ($\delta_{Online*AG2}$) are statistically different than the reference age group. One potential explanation is that people in this age group are more likely to be new parents with tighter time constraints; the positive interaction term between the number of children and online beef purchases ($\delta_{Online*Child}$) provides further support for this explanation ($p < 0.05$).

Lastly, male consumers are observed to prefer purchasing beef at farmers' markets and online stores more than female consumers. Consumers with college degrees are also found to prefer farmers' markets more than consumers without a college degree.

5.3. Limitations and Future Research Suggestions

While useful information is produced, as with all stated preference studies, the survey participants responded to hypothetical, rather than real purchases. Thus, hypothetical bias is a concern. Readers are urged to bear in mind that such bias is often found to inflate the WTP in stated preference studies [58]. A revealed preference study, which tracks consumers' beef purchases with details on the point-of-sales and the quality-differentiated attributes of beef, can be conducted to verify this study's findings.

In addition, this study does not exhaust all factors relevant to the various shopping outlets due to practical limits of the experiments. For example, the travel time to the grocery store versus the farmers' market, and delivery cost and time from online groceries; these might be non-trivial to the WTP. Further research that is dedicated to each of these questions can provide more clarity to the picture. As more retailers join this space, future research may also explore how the reputation of

retailers may influence the WTP. In addition, this study focuses only on beef products, future research may also investigate how the results differ by product category.

Other research could focus on the underlying psychological and social factors for the behavior observed in this study, in addition to the demographic factors examined here. This knowledge could be used to inform the marketing strategy and consumer targeting.

6. Conclusions

Grass-fed, organic, and local beef producers must decide between multiple marketing outlets. While each outlet has pros and cons in their operational aspects, crucial information—how consumers' WTP for the quality attributes differ in these point-of-sales—is lacking. The missing knowledge may result in lost potential revenue by choosing the conventional supply chain over outlets with better prospects. Alternatively, a producer might leap into a costly direct marketing option without a full understanding of consumer preferences. This study addresses this void. Specifically, we conduct a choice experiment to investigate how the point-of-sales influence WTP for the quality attributes of beefsteak.

This study demonstrates that, in general, B&Ms are still the most preferred channel for beefsteak purchases. Online beefsteak shopping is less preferred than B&M shopping, potentially because most consumers still cannot move past the negatives of online grocery shopping, such as shipping costs, food safety, and difficulties in returning the goods. Our findings resonate with those concerns, showing a considerable negative WTP for beef shopping online. The potential for online marketing is slim. Only 5% of the sample is willing to pay a premium for grass-fed and organic beef sold online over conventional beef from B&Ms. For online to accommodate more quality-differentiated beef producers, consumer preference for online groceries must grow substantially. Among the quality attributes examined, local seems most promising for increasing online sales.

In contrast, farmers' markets—although less preferred to B&Ms—are more preferred than online grocery channels for beefsteak products. In particular, more than one-fifth of the sample prefers and is willing to pay more for local and organic beef at a farmers' market than conventional beef at B&Ms.

In summary, for most consumers, B&Ms are preferred over farmers' markets or online marketing. Thus, if quality-differentiated beef producers want to expand their market share greatly, they need to find ways to enter this high volume, low margin outlet. Quality attributes may help to increase the appeal of online and farmers' markets to some extent, but these markets are not large enough to lure the majority of consumers to the non-B&M channels. Thus, producer decisions must account for the smaller market potential of these direct-to-consumer operations.

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