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## **Uncommon Alternative: Consumers' Willingness to Pay for Niche Pork Tenderloin in New England**

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### **Abstract**

Opportunities for retail niche meat are emerging as consumer awareness of and demand for regional food are on the rise. This study investigated consumer valuation of meat raised in New England, focusing on pork tenderloin. Specialty market retail customers were surveyed to estimate their willingness to pay (WTP), prioritize production characteristics, and evaluate meat eco-labeling understanding. Significant predictors of WTP centered on pork purchase and preference, organic production, and eco-label recognition. Participants were concerned with added hormones, subtherapeutic antibiotics, and living conditions. Participants recognized federal eco-labels but did not understand production differences among federal and private labeling programs.

**Keywords:** animal welfare, consumer preferences, eco-labeling, livestock production practices, local meat, pastured pork

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## **Introduction**

### *Overview*

Consumers are becoming more interested in the practices used to raise livestock for meat products (Innes and Cranfield, 2009; Umberger, Thilmany McFadden, and Smith, 2009; Gracia, de Magistris, and Nayga, 2012; Muringai, 2017). Consumer awareness of conventional and alternative agricultural production is contributing to heightened concerns for animal welfare, food safety, economic viability of farm and community, and environmental sustainability. These broader categories of concerns are associated with socio-environmental credence attributes of meat production that include local, organic, natural, humanely raised, pastured, grass-finished, no routine use of antibiotics, no added hormones, and raised on small- to medium-scale farms with known origin (Honeyman et al., 2006; National Pork Board, 2017). Consequently, there is growing demand for meat produced with those process attributes (O'Donovan and McCarthy 2002; Wheatley, 2003; Honeyman et al., 2006; Greene, 2013; Torres, Barry, and Pirog, 2015). For example, between 2008 and 2010, natural and organic red meat sales in the United States increased 15%, while overall red meat sales increased only 1.7% (Curtis, McKissick, and Spann, 2011). The most current values of sales, as measured by the U.S. Department of Agriculture (USDA) in 2014, were \$4,914,970 for organic hogs and pigs and \$12,579,879 for organic beef cows (USDA, 2016). Comparing 2014 and 2008 sales, these values represent growth of 13% in organic hogs and pigs and 98% in organic beef cows and (USDA, 2010, 2016; authors' calculations). Looking at the overall food system, sales of organic food account for more than 4% of total U.S. food sales (estimated value of \$34.8 billion in 2014) (Greene, 2015).

Without direct interaction with a producer or value-chain partner, retail shoppers can reference the meat label in order to make purchase decisions based on these credence attributes. For meat, poultry, or egg products sold in the United States, the USDA Food Safety and Inspection Service (FSIS) requires up to eight specific identifiers on each label; these include the product name, inspection legend and establishment number, handling statement, net weight statement, ingredients statement, address line, nutrition facts, and safe handling instructions (USDA, 2007). In addition, a meat product label may voluntarily include other process characteristics, such as improved animal welfare and environment-friendly practices used to raise the animal. Eco-labels are a typical market instrument used by food companies to reduce information asymmetry externality between the consumer and the producer (van Amstel et al., 2007). As a policy instrument, eco-labels can also increase market transparency by verifying the product claims of socio-environmental qualities (credence attributes) that cannot easily be determined or experienced directly by the consumer. When comparing labeled and nonlabeled food products, consumers associate environmental quality with the eco-label (Brécard, 2013). Thus, eco-labels may increase consumer confidence that their food purchase aligns with more environment-friendly practices (Gutierrez and Thorton, 2014). At the time of this publication, there were 59 eco-labels associated with food, representing a subset of 463 eco-labels in 199 countries and 25 industry sectors (Ecolabel Index, 2019).

Given the trends within differentiated meat demand and process attribute labeling, the specific purpose of this study was to estimate consumers' willingness to pay (WTP) for regionally raised New England pork tenderloin. Our secondary objectives were to identify meat cuts and production characteristics most important to retail consumers and to evaluate consumer recognition of meat eco-labeling. These secondary objectives met the needs identified within the regional meat industry while helping us build a robust model to explain WTP.

### *Literature Review*

Previous research has examined consumers' WTP for differentiated meat products with specific credence attributes related to farm management styles. Conducted in the United States and Europe, these case studies examined consumer preferences toward animal welfare; meat traceability and transparency; and small-scale, natural, or organic production methods (Dickinson and Bailey, 2002; Grannis and Thilmany, 2002; Lagerkvist, Carlsson, and Viske, 2006; McMullen, 2006; Lusk, Nilsson, and Foster, 2007; Gwin and Hardesty, 2008; Innes and Cranfield, 2009; Umberger, Thilmany McFadden, and Smith, 2009; Liljenstolpe, 2011; Gracia, de Magistris, and Nayga, 2012; McKendree et al., 2013; Wheatley, 2003). These studies were typically based in stated preference methods using either contingent valuation or choice experiments; data were collected using mail or Internet surveys with sample sizes ranging from 35 to 1,400 participants. Overall, these studies found that consumers were willing to pay price premiums for process characteristics associated with differentiated meat production. For some analyses, consumer WTP was associated with class membership relating to purchase history of local and nonconventional meat products, shopping location, agricultural awareness, and demographics (Umberger, Thilmany McFadden, and Smith, 2009) or segmented by price consciousness, naturalness, and animal health (Innes and Cranfield, 2009). Many of these studies were localized, answering research questions specific to areas such as the western United States (Dickinson and Bailey, 2002; Grannis and Thilmany, 2002; Gwin and Hardesty, 2008; Umberger, Thilmany McFadden, and Smith, 2009) and the Midwest (McMullen, 2006) as well as the counties of Canada (Innes and Cranfield, 2009), Spain (Gracia, de Magistris, and Nayga, 2012), and Sweden (Lagerkvist, Carlsson, and Viske, 2006; Liljenstolpe 2011) for explicit cuts of meat.

Given that consumer demographics as well as agricultural knowledge and preference for meat or production characteristics vary, the estimation results may not be applicable to other regions. Literature summarized by Dobbs et al. (2016) and Carpio and Isengildina-Massa (2009) supports the contention that WTP premiums for locally grown foods vary by state and by product. Regional price variation within local and regional direct sales outlets was also found by Low et al. (2015). For these reasons, we decided to build upon these previous case studies to analyze consumer preferences and WTP for niche pork raised in New England that would be sold in retail specialty markets. The U.S. region of New England is of particular interest for this study because of the recent growth in regional aggregation for primal cuts and value-added charcuterie (Lewis, 2014). Further, New England continues to serve as an innovation center for the local and regional agricultural movement of food hubs (aggregation for wholesale and retail) and direct marketing through farmers' markets, community supported agriculture, and farm to institution (Donahue et al., 2014).

With the increasing demand in regionally produced meat (USDA, 2012), this study presents a unique opportunity to examine potential consumer interest to the development of a retail value chain with New England producers, processors, and aggregators. New England was appropriate for this study because meat processors and aggregators in the region had expressed strong interest in selling local meat within the retail sector; however, the ability of consumer demand to sustain a profitable supply chain for such a product was not known. Further, localized animal production poses special challenges because of existing limited capacity in slaughter and processing (Lewis and Peters, 2011; Reinvestment Fund, 2017). For these reasons, this study provided a unique opportunity to integrate the interests and needs of these stakeholders into the design and execution of the project in order to provide critical information for establishing a meat value chain partnership within the region. For farmers and processors, third-party certification programs using eco-labels are added cost and labor. Our informants shared with us their concerns about balancing these costs against whether future customers of niche meat would recognize and understand existing labeling programs and whether such recognition would be beneficial to their marketing of local-differentiated meat.

Following from Grannis and Thilmany (2002) and others, we used a contingent valuation framework for estimating consumers' WTP for a product—regionally produced pork tenderloin—that does not currently exist in the retail marketplace in the Boston metropolitan area. Although previous literature focused on ham, pork chops, or deli lunch meat, we chose pork tenderloin after consulting with experts who work in New England's meat value chain. As aggregators, processors, and distributors, these experts have access to various markets for selling lower-cost ham and chops. Of particular interest is the potential retail marketplace for the highest-valued pork cut, the tenderloin. Thus, this study extends the meat WTP literature by estimating premiums for a high-value cut in an emerging regional specialty meat market under alternative conditions.

## **Study Methodology**

### *Research Question and Hypotheses*

Our central research question centered on consumers' WTP for New England regionally raised niche pork tenderloin. For the purpose of this study, niche pork referred to pigs raised in a known location, on vegetarian feed, without subtherapeutic antibiotics or added growth hormones. The New England location attribute was of primary concern, thereby distinguishing this product from other differentiated pork products raised elsewhere, such as the midwestern United States.

To answer our primary research question and build the final estimation model explaining variation in WTP, we first explored several hypotheses concerning consumers' WTP for New England pork tenderloin as an individual function of the following: (i) demographics for households without children eating at home; (ii) previous purchase of local or organic pork; (iii) concerns with specific production practices for raising swine; and (iv) meat eco-label recognition. These potential predictors for differences in WTP were based on the literature cited above as well as observations in the field and feedback from value chain representatives.

First, we hypothesized that households with higher disposable income or smaller families would have a higher WTP for local pork (Gwin and Hardesty, 2008; Umberger, Thilmany McFadden and Smith, 2009). This hypothesis was supported in the beef literature, which showed that households without children were more likely to consume grass-fed beef (Lin, 2013) or higher-cost cuts like steak and roasts more often (Reicks et al., 2010). Second, we postulated that those who previously bought local pork or organic meat through direct marketing channels like farmers' markets would have a higher WTP for pork purchased through a specialty retail market (Grannis and Thilmany, 2002). Third, we proposed that those concerned with tight living conditions, like gestation crates, would have a higher WTP for these products (Innes and Cranfield, 2009; Liljenstolpe, 2011; McKendree et al., 2013). Finally, we hypothesized that consumers who correctly recognize meat eco-labels would have a higher WTP for niche pork. This assumption was based on the perceived superiority of eco-labeled alternatives to conventional food products (Grankvist and Biel, 2001) and positive preferences toward sustainability labeling for chicken (Van Loo et al., 2014).

For the secondary objectives, we anticipated that the avoidance of growth hormones and antibiotics would be very important production issues for the consumers. This hypothesis was based on similar findings from Dickinson and Bailey (2002), Grannis and Thilmany (2002), Gwin and Hardesty (2008), Liljenstolpe (2011), and McKendree et al. (2013). Conversely, we expected that organic production would not be highly regarded, based on previous work by McMullen (2006), Gwin and Hardesty (2008), Umberger, Thilmany McFadden, and Smith (2009), and Liljenstolpe (2011). With regard to meat cut preferences, we assumed the participant responses would follow the current retail market offerings of boneless chicken breast (either sold as organic or natural) and ground beef (either marketed as grass-fed or organic). Last, we hypothesized that participants would recognize the USDA's national eco-labeling program but would not understand program production specifications. We based this assumption on van Amstel et al. (2007), USDA (2012), and Brécard (2013).

### *Contingent Valuation and Econometric Framework*

Consumer preference data for New England pork tenderloin were analyzed using stated preference methodology, for two main reasons. First, niche pork production has associated public good characteristics. Survey methods using stated preference are particularly well-suited for eliciting WTP for changes in the availability of credence attributes associated with public goods (Khaw et al., 2015). Second, regionally produced niche pork is not currently available in the metro-Boston marketplace through commercial retail outlets (and only in a very limited amount through direct sales on-farm or at farmers' markets). As noted by Brown (2003), survey instruments used with stated preference methodology can describe new goods, such as retail specialty foods, thus offering valuation possibilities beyond those estimated with revealed preferences methods.

Of the various stated preference methods, contingent valuation (CVM) is the most established in the economic literature (Carlsson, 2011) and the most widely used approach to estimate benefits associated with public goods (Khaw et al., 2015). CVM has been used in thousands of valuation studies in more than 130 countries, across a wide range of cultural, environmental, and health issues (Carson, 2012). While discrete choice experiments (DCEs) have increased in popularity

when analyzing stated choice of food products in recent years (Carlsson, 2011), the analytical properties of the two methods are roughly equivalent when the variation of interest is in only one attribute other than price (Carson and Louviere, 2011; Carson and Czajowski, 2014), as is the case here, and CVM questions can generally be administered with a lower time burden for respondents.

A primary motivation for this work is to determine whether regional pork can be economically produced and distributed in the region. Therefore, we are focused on the total premium for regional production—an application for which CVM is particularly well-suited. We recognize, however, that drawbacks to CVM exist (Carson, 2000; Grannis and Thilmany, 2002). For example, since CVM estimates represent total WTP, comparisons among attributes may not be meaningful (Liljenstolpe, 2008). Further, the validity of contingent valuation is potentially limited by biases induced by the stated preference nature of the exercise. Incentives to misrepresent responses can occur when participants deliberately respond to questions to shape the outcome of the study and serve their own interest (strategic bias) or to please the interviewer by providing a WTP value that differs from their true WTP amount (interviewer bias) (Mitchell and Carson, 1989). In addition, starting-point or range biases may happen with a predefined range of WTP options acting as implied value cues (Mitchell and Carson, 1989; Teitenberg and Lewis, 2012).

To avoid WTP misrepresentation, we stressed with the participants the importance of truthful responses since people often overstate their amount if they are not actually buying the product. This explicit discussion of potential hypothetical bias with the participants, known as “cheap talk” methodology, was based on the approach suggested by Cummings and Taylor (1999). To mitigate implied values, we framed the WTP range on current pricing of similar products. Such conservative limits on WTP options was based on elicitation guidelines set by Arrow et al. (1993). We designed and implemented our CVM survey following the guidelines recommended by Arrow et al. as well as those developed by Carson (2000). For instance, we carefully pretested the questionnaire to evaluate comprehension of new and technical information and to validate the range of prices used in the study. It was our goal to provide enough information within the survey for participant to make an informed decision without being overwhelmed or confused by technical details (Carson, 2000). We also administered the survey face-to-face with trained researchers, rather than through mail or telephone interviews, as recommended by Carson and Arrow et al.

The WTP estimation for New England pork tenderloin was elicited through a payment card style, which was bounded by premiums ranging from \$0 to \$6 per pound (Figure 1). We based this payment card design on previous methodology developed by Grannis and Thilmany (2002) and subsequently used by Umberger, Thilmany McFadden, and Smith (2009). In addition to using an established payment card style, another advantage was the ease of use by the participants in the survey instrument. However, disadvantages of the payment card included less freedom to identify the exact WTP amount and cognitive demand of the surveyed participants (Guerriero 2019).

As design elements, premiums for the New England region were conditioned on the willingness to buy a product not currently available. Since New England does not have a comparative advantage in production, we did not examine premiums below the actual market price. The lower value was therefore set at a \$0/lb premium to correspond to the current benchmark price (\$12/lb)

Pork tenderloin raised in the Midwest costs \$12.00/pound										
Additional cost premium per pound of LOCAL pork tenderloin ->	\$0	\$0.50	\$1	\$1.50	\$2	\$3	\$4	\$5	\$6	Would NOT purchase
Reasonable to pay this amount	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Figure 1.** WTP Payment Card

of niche Midwestern tenderloin that was sold at a nearby national greengrocer chain not participating in the study. The upper value was determined by two factors: first, our pretesting concluded that a \$6/lb premium over the benchmark price was considered too expensive for nonorganic pork products in our focus groups; and second, certified organic pork tenderloin from outside New England (raised in Canada) was priced at \$18/lb at a nearby regional supermarket chain. Moreover, the conservative approach to this upper value increased the reliability of the WTP estimate by not offering more extreme values that enlarge estimates (Arrow et al., 1993). In addition to these payment choices, we also offered a “would not purchase” option, based on the Arrow et al. guidelines.

The dependent variable used in subsequent regressions, WTP for New England tenderloin, is considered in a two-step process estimated using a Cragg truncated normal hurdle model (Cragg, 1971; Wooldridge, 2010). Such models are appropriate when the decision to participate in a (simulated) market can be decoupled from decisions regarding how to much spend (Garcia, 2013; Okoffo et al., 2016). In the first stage, we model whether respondents are willing to purchase the New England product as a function of their interest in purchasing the (actually available) analogous Midwestern product as well as whether they eat pork and their liking of the specific cut under consideration (i.e., tenderloin). This first stage also allows for explicit consideration of truncation at the upper-bound of our observable range (i.e., \$18, or a premium of \$6/lb over the cost of Midwestern product).

In the second stage, we estimate WTP within our effective censored range of \$12 to \$18 as a function of the following categories of variables:

$$(1) \quad WTP = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + u,$$

where WTP is willingness to pay per pound of niche New England pork tenderloin;  $\beta_i$  are the coefficients associated with vector of variables  $x_i$ , where  $i = 1, \dots, 4$ ;  $x_1$  are the variables associated with consumer demographics (first hypothesis);  $x_2$  are the variables describing meat purchase history (second hypothesis);  $x_3$  are the variables describing process attribute preferences (third hypothesis); and  $x_4$  are the variables describing meat eco-labeling recognition (fourth hypothesis).

Specific variables are detailed in the next section and follow the order asked in the survey instrument. Standard errors in the second stage of estimation were clustered on the location where consumers were interviewed to account for unobserved heterogeneity at the store level. All



analysis was conducted in Stata 15, with the Cragg hurdle model estimated using the “churdle” routines (StataCorp, 2017).

### *Survey and Independent Variables*

The customer questionnaire was pretested with focus groups and store owners prior to data collection. It consisted of six sections and was usually completed within 10 minutes. The first section (survey questions 1–4 in the Appendix) focused on purchase history for in-home consumption of pork and beef. These questions connected with our second hypothesis that those who had previously bought local or organic meat through direct marketing would have greater interest in retail niche pork. We then turned our focus to the pork tenderloin cut of meat (*Tenderloin*) and customer reasoning for not purchasing tenderloin (*Vegetarian*, *NoEatPork*, *NoCookMeat*, *NoLikeTenderloin*).

The second section (questions 5–7) asked about WTP for Midwestern and New England pork tenderloin as well as preferences for various cuts of regionally raised beef, chicken, and pork. We began with a hypothetical single-shot purchase question (*MidwestNiche*) that inquired about willingness to buy Midwestern niche pork tenderloin for \$12/lb. We asked first about Midwestern pork since a similarly produced product from New England was not offered in the retail setting. In the survey, we defined this product as boneless pork tenderloin that is raised in the Midwest on vegetarian feed with no subtherapeutic antibiotics or growth hormones. Transitioning from the Midwest to New England, we posed a payment-card WTP question for local tenderloin, with similar process attributes except the location of production. The payment card included a “would not purchase” option, which was used to define the participation hurdle in our estimation procedure. The final question of this section explored general interest in 11 other cuts of locally raised pork, chicken, and beef. The question was informed by gray literature from the New England region that recognized the lack of data on consumer demand for specific cuts and species of meat products (State of Vermont, 2001; Dickenson, Joseph and Ward, 2013).

The third section (questions 9–11) focused on customers’ personal characterizations of “local” and “natural.” We solicited their personal definition for local meat as being raised within the state of Massachusetts (*LocalMA*), the region of New England *LocalNE*), or within 100 miles of their location (*Local100*).

The fourth section (question 12) asked participants to categorize meat production characteristics in terms of most and least important. These process attributes connected with our third hypothesis that those concerned with livestock rearing practices would have greater interest in niche pork. In total, 12 characteristics reflected general categories of animal welfare, environmental sustainability, and geographic production. Although the 12 process attributes were the same, we provided two separate opportunities for participants to identify the three characteristics that were most important and three characteristics that were least important to them. These variables were incorporated in the WTP estimation and represented by “More” if a top three production characteristic and “Less” if a bottom three characteristic. The 12 production characteristics included (i) knowing the name of the farm that raised the pork (*MoreFarmName*, *LessFarmName*)

(ii) whether it was regionally produced in New England (*MoreNEProd*, *LessNEProd*), (iii) locally produced in Massachusetts (*MoreMAProd*, *LessMAProd*), (iv) no use of growth hormones (*MoreNoHormones*, *LessNoHormones*), (v) no use of subtherapeutic antibiotics (*MoreNoAntibiotics*, *LessNoAntibiotics*), (vi) no genetically modified (GMO) feed (*MoreNoGMO*, *LessNoGMO*), (vii) certified organic pig farm (*MoreOrganic*, *LessOrganic*), (viii) proper management of manure (*MoreManureMang*, *LessManureMang*), (ix) no tight confinement (e.g., no crates) (*MoreNoConfine*, *LessNoConfine*), (x) raised with access to the outdoors (*MoreOutdoors*, *LessOutdoors*), (xi) Small herd size (small to mid-size farm) (*MoreSmallHerd*, *LessSmallHerd*), and (xii) heritage breed of pig (*MoreHeritage*, *LessHeritage*).

The fifth section (questions 13–16) concentrated on recognition of meat eco-labels associated with some of the production characteristics from the previous section in the questionnaire. These eco-labels included USDA Process Verified, USDA Organic, Animal Welfare Approved, Certified Humane, Global Animal Partnership, as well as a fabricated label (Figure 2). We asked participants whether they knew the differences between the labels (*KnowDiffLabel*). If they found the eco-labels confusing, we followed up with possible reasons for such uncertainty, including (i) not knowing what the labels represents with regard to animal agriculture (*DontKnowProd*); (ii) not trusting the label as it could be misleading or dishonest (*DontTrust*), and (iii) not understanding the relationship between the label and the meat company or farmer (*DontKnowRelationship*). From these measures we constructed a dichotomous measure of “correct” familiarity with existing labels (*CorrectRecognition*) in which respondents who recognized at least one of the existing labels were coded separately from those who either failed to recognize any label or falsely recognized the fabricated label. This section was associated with our fourth hypothesis that eco-labeled products have positive premiums.



**Figure 2.** Meat Eco-labels

Labels (clockwise from top left):

1. USDA Process Verified, <http://www.ams.usda.gov/AMSV1.0/processverified> [Accessed February 16, 2014].
2. Animal Welfare Approved, <http://animalwelfareapproved.org> [Accessed August 18, 2015].
3. Certified Humane, <http://certifiedhumane.org> [Accessed August 18, 2015].
4. Cage-Free Meat Certified, created by the authors for the purpose of this study.
5. Global Animal Partnership, [www.globalanimalpartnership.org](http://www.globalanimalpartnership.org) [Accessed August 18, 2015].
6. USDA Organic, [www.usda.gov/wps/portal/usda/usdahome?navid=organic-agriculture](http://www.usda.gov/wps/portal/usda/usdahome?navid=organic-agriculture) [Accessed August 18, 2015].

The sixth and final part (questions 17–21) contained socioeconomic questions regarding household size and makeup (*EatHomeAdults*, *EatHomeKids*), gender (*Female*), education level (*YrsEd*), race (*White*), and income (*Income*). The demographics related to our first hypothesis that households with greater disposable income or smaller family size would have increased WTP for this high-priced specialty cut. Regarding total household income, we based the mean of the five categories on the U.S. Census average of household income for the area. Although the participants selected from a range of categories, we calculated the average value for the range indicated by their categorical response.

### *Data Collection*

The customer-intercept questionnaire was administered at three specialty retail grocery stores in metro-Boston, Massachusetts (USA), in early summer 2014. Of the three stores, one was located in Boston and the other two were in suburbs near Boston. The stores were chosen based on their current availability of regionally produced food products, such as fresh fruits and vegetables, bakery items, dairy, and nonpork livestock products. These stores already had value chain partnerships established with other local and regional purveyors, thus were receptive to alternative supply chain structures should New England pork products be marketed in the future. We collected data for 1 week in each of the three stores. We strived to reach diverse populations by administering the survey during all major periods of business hours (early morning, lunch hour, late afternoon, evening rush hour, and late night). By being physically present in the stores, we were available to answer questions from the participants, thus potentially reducing information bias for unknown attributes. We used a computer tablet-assisted survey administered with Qualtrics Research Suite software, which was both an appealing format for approaching potential respondents and also simplified data entry. Study participants were compensated with a small thank-you gift (a beeswax-based lip balm with an estimated value of \$1 US). Approximately half of shoppers who we approached to participate in our study chose to take the survey, resulting in 388 participants, with 100, 141, and 147 surveys at the three stores.

Survey participants were encouraged to answer all questions, especially the WTP questions for Midwestern and New England pork, even if objection to pork consumption was identified earlier in the survey. This was deliberately allowed so that participants could indicate interest in purchasing niche pork for others within the household, or for themselves even if they do not currently eat pork resulting from objections that may be due to perceptions of conventional pork production rather than disinterest in eating pork under any circumstance. During pretesting of the survey, we found that nonpork consumers, such as some vegetarians, buy pork for family members and guests. Others who do eat meat shared that they would buy New England niche pork if it were available but currently do not eat pork because of their concerns with how commodity pork is raised. Thus, we asked nonpork consumers to complete the survey to capture this potential market should niche New England pork be offered in the future.

The vast majority of surveys were complete. Only 15 surveys had several unanswered questions and were removed from the data. The question set regarding past purchases of local and organic beef and pork (question 2) resulted in several blanks. For this question, we assumed that they did

not previously purchase if they did not respond, leaving any question blank within this set. This assumption resulted in a “no previous purchase” for 35 organic pork, 40 local pork, 32 organic beef, and 48 local beef responses. Our final sample size was 373 completed surveys, which came very close to our target of 385. We chose this number of observations because Mitchell and Carson (1989) found this number of observations helped approximate true WTP.

## Results

The findings of this study were organized around our main objectives to estimate the WTP for New England pork tenderloin. In order to consider pork WTP, we began with the descriptive results of independent variables, such as demographics, purchase history, process attributes preferences, meat eco-labeling knowledge, and WTP for Midwestern and New England niche meat products. Details associated with our secondary objectives for learning preferences of meat cuts, production characteristics, and eco-label recognition were described to better contextualize knowledge and preference of our participants. Selected variables were incorporated into the final WTP model for New England pork tenderloin and described in the final portion of this section.

### *Descriptive Statistics of Independent Variables*

#### Demographics

As shown in Table 1, our study’s participants formed a relatively homogeneous group, as we anticipated based on the type and location of retail stores where data were gathered. On average, participants were from small households with 2.1 adults and 0.6 children eating dinner at home. They were college-educated, having earned at least an undergraduate college degree, with a relatively high household income. The majority of respondents self-identified as being female (66%) and white. Some demographics of our sample aligned well with the general metro-Boston population, which included the counties of Suffolk, Norfolk, and Middlesex weighted by population for each of the three counties. For instance, mean 2018 household income of the metro-Boston area was \$89,204 (U.S. Census Bureau, 2019), whereas for our study it was \$95,783. Likewise, the 2018 racial makeup of this tri-county area was 74% white, compared with our sample of 82% white. On the other hand, educational attainment census estimates for bachelor’s degree or higher for the tri-county population was 52%, contrasted with our sample’s 88%. Although not generalizable to the average Bostonian, this sample represented the population that shops at specialty retail markets in the greater Boston area where differentiated meat products are available and therefore was assumed to represent a substantial portion of the demand for niche pork products.

#### Purchase History

Regarding previous meat purchases for home consumption, 39% of our participants had previously purchased organic pork and 58% had purchased organic beef. Fewer reported having bought locally raised pork and beef (33% and 40%, respectively). For the organic meats, most customers purchased the products at a retail grocery store (72% for pork and 74% for beef). The second most popular method for buying organic meat was through direct marketing (DM), such as a farmers’

**Table 1.** Descriptive Statistics

Variable	Description	Mean	Std. Dev.	Min.	Max.
<b>Demographics</b>					
<i>EatHomeAdults</i>	Number of adults eating dinner at home	2.11	0.80	1	6
<i>EatHomeKids</i>	Number of children eating dinner at home	0.60	1.08	0	5
<i>Female</i>	= 1 if female, 0 otherwise	0.66	0.47		
<i>Yrs_Ed</i>	Total number of years of education	16.69	1.62	10	18
<i>White</i>	= 1 if white, 0 otherwise	0.82	0.38		
<i>Income</i>	Total household income	\$95,783	\$42,863	\$12,500	\$150,000
<b>Purchase History</b>					
<i>HomePorkConsump</i>	Number of weeks per year consume pork at home	20.44	21.78	0	52
<i>OrgPork</i>	= 1 if purchased organic pork in the past, 0 otherwise	0.39	0.49		
<i>LocalPork</i>	= 1 if purchased local pork in the past, 0 otherwise	0.33	0.47		
<i>OrgBeef</i>	= 1 if purchased organic beef in the past, 0 otherwise	0.58	0.49		
<i>LocalBeef</i>	= 1 if purchased local beef in the past, 0 otherwise	0.40	0.49		
<i>AgreeLocalAvail</i>	= 1 if strongly agree or agree with statement, 0 otherwise <sup>a</sup>	0.26	0.44		
<i>Tenderloin</i>	= 1 if purchased tenderloin for home consumption, 0 otherwise	0.49	0.50		
<i>Vegetarian</i>	= 1 if vegetarian, 0 otherwise	0.11	0.31		
<i>NoEatPork</i>	= 1 if does not eat pork, 0 otherwise	0.11	0.31		
<i>NoCookMeat</i>	= 1 if does not cook meat or know how to cook meat at home, 0 otherwise	0.04	0.20		
<i>NoLikeTenderloin</i>	= 1 if does not like pork tenderloin, 0 otherwise	0.03	0.18		
<b>WTP Midwestern and New England Niche Meats</b>					
<i>MidwestNiche</i>	= 1 if WTP \$12/lb for Midwestern tenderloin, 0 otherwise	0.40	0.49		
<i>WTPvalue</i>	WTP New England tenderloin	9.46	6.73	0	18
<i>WTPnobuy</i>	= 1 if would not purchase New England tenderloin at any price, 0 otherwise	0.33	0.47		
<i>CertaintyWTP</i>	= 1 if very certain or somewhat certain in WTP decision, 0 otherwise	0.79	0.41		

*continued on following page*

**Table 1.** (continued)

Variable	Description	Mean	Std. Dev.	Min.	Max.
<b>Local Meat Definition</b>					
<i>AgreeRaiseSlaughter</i>	= 1 if strongly agree or agree with statement, 0 otherwise <sup>b</sup>	0.75	0.43		
<i>LocalMA</i>	= 1 if local was defined by state boundaries, 0 otherwise	0.17	0.38		
<i>LocalNE</i>	= 1 if local was defined by regional boundaries, 0 otherwise	0.60	0.49		
<i>Local100</i>	= 1 if local was defined within 100 miles of farm, 0 otherwise	0.23	0.42		
<b>Meat Eco-Labeling Knowledge</b>					
<i>USDAProcesLabel</i>	= 1 if specific label was recognized, 0 otherwise	0.72	0.45		
<i>AWALabel</i>	= 1 if specific label was recognized, 0 otherwise	0.16	0.37		
<i>USDAOrgLabel</i>	= 1 if specific label was recognized, 0 otherwise	0.89	0.31		
<i>CertHumLabel</i>	= 1 if specific label was recognized, 0 otherwise	0.26	0.44		
<i>GAPLabel</i>	= 1 if specific label was recognized, 0 otherwise	0.10	0.30		
<i>WrongLabel</i>	= 1 if specific label was recognized, 0 otherwise	0.15	0.36		
<i>SameGuidelines</i>	= 1 if labels represent same guidelines for raising animals, 0 otherwise	0.03	0.18		
<i>UnsureGuidelines</i>	= 1 if unsure whether the guidelines are the same for raising animals, 0 otherwise	0.50	0.50		
<i>KnowDiffLabel</i>	= 1 if guidelines were known, 0 otherwise	0.12	0.32		
<i>DontKnowProd</i>	= 1 if production practices of label were not known, 0 otherwise	0.55	0.50		
<i>DontTrust</i>	= 1 if label was not trusted, 0 otherwise	0.26	0.44		
<i>DontKnowRelationship</i>	= 1 if relationship between certification and farmer was not known, 0 otherwise	0.32	0.47		

Notes: <sup>a</sup> Locally raised meat is readily available for purchase at the grocery store where you most regularly shop.

<sup>b</sup> Locally raised meat means that the animals were raised from birth through slaughter in the local area.

markets or community supported agricultural enterprises (25% for pork, 20% for beef). However, for local meats, the opportunity with direct marketing increased. Local beef purchases were similar between the grocery store (47%) and DM (44%). As anticipated, the majority sourced local pork through direct marketing (49% DM vs. 43% for grocery store). We expected locally sourced pork to be purchased through DM, as retail fresh pork was not available at any of the three stores when the survey was conducted, nor at any similar venues in the region to the best of our knowledge. This observation was affirmed by the participants, 74% of whom believed local meat was not readily available at the grocery store where they typically shopped. Focusing on the pork tenderloin cut, nearly half had purchased tenderloin in the past for home consumption. Others described reasons for not buying tenderloin. For this sample, 11% did not eat pork, 11% were vegetarian, 4% did not cook meat at home or know how to prepare meat, and 3% did not like tenderloin.

### Process Attribute Preferences

The most important production characteristics for animal agriculture centered on the use of technology such as “no added hormones” (68% of participants indicated this attribute in their top three), “no subtherapeutic antibiotics” (57%), followed by “no genetically engineered feed” (39%), as shown in Table 2. Secondary concerns emerged with the themes of housing and space allocation as attributes of “no tight confinement” and “access to the outdoors” were chosen by 40% of the population. On the other hand, raising the animals in Massachusetts (8%), “knowing the name of the farm” (8%), and “using heritage breeds” (4%) scored the lowest. Learning these results met our study’s secondary objectives and provided visual context for understanding the WTP model.

**Table 2.** Production Characteristic Preferences

Most Important Attribute	Preference for Attribute (% of sample)
No added hormones	68
No subtherapeutic antibiotics	57
No tight confinement	40
Outdoor access	40
No GMO in feed	39
Raised in New England	25
Organic certification	15
Proper manure management	14
Small herd size	12
Raised in Massachusetts	8
Knowing farm name	8
Heritage breed	4

Notes: In the survey, participants could choose three attributes of greatest importance. Values in this table represent those who indicated a given production characteristic as most important. Thus, values do not sum to 100%.

The location process attribute was asked in two areas of the survey: production characteristics described above and personal definitions of local agriculture. The findings were similar. For instance, that animals were raised in the region of New England was more important than that they were raised within the state boundaries of Massachusetts. This result paralleled how participants

defined “local.” Our sample viewed the attribute “local” as raised in New England (60%) as opposed to Massachusetts (17%) or within 100 miles (23%). Culturally, strong regional identity and place attachment exist in New England as demonstrated in this study and others (Conforti, 2001; Walker and Ryan, 2008).

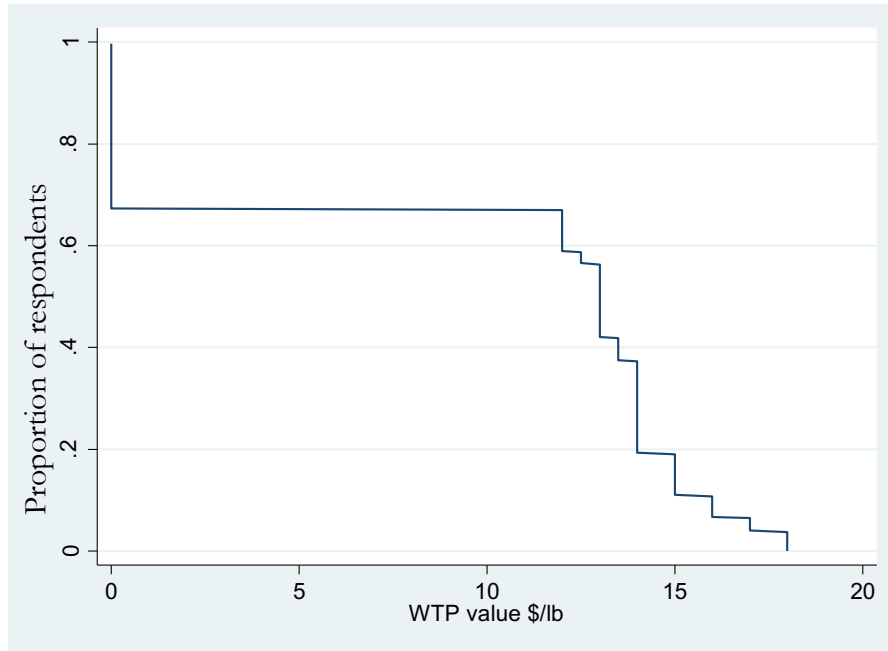
### Meat Eco-Labeling Knowledge

When presented with visual labels, the majority of participants recognized the two labels from the USDA (Organic, 89%, and Process Verified, 72%). However, the third-party certification programs were not as popular, even though they are used on numerous livestock products ranging from bacon to eggs. Of these three icons, Certified Humane was the most familiar (26%), followed by Animal Welfare Approved (16%). Interestingly, more respondents acknowledged the fictitious Cage-Free Meat Certified label (15%) than the extant Global Animal Partnership icon (10%). Aggregating label knowledge, 79% of participants identified at least one of the five existing labels and correctly detected the false meat label. When examining the meat eco-labels as a whole, 88% of participants did not know the production differences among the labels. We asked about possible sources of confusion; they could list more than one reason. More than half (55%) did not know what the label represented with regard to animal agriculture, 32% did not understand the relationship between the label (certification) and the meat company or farmer, and 26% did not trust the label because they see it as misleading or dishonest.

### WTP for Midwestern and New England Niche Meat Products

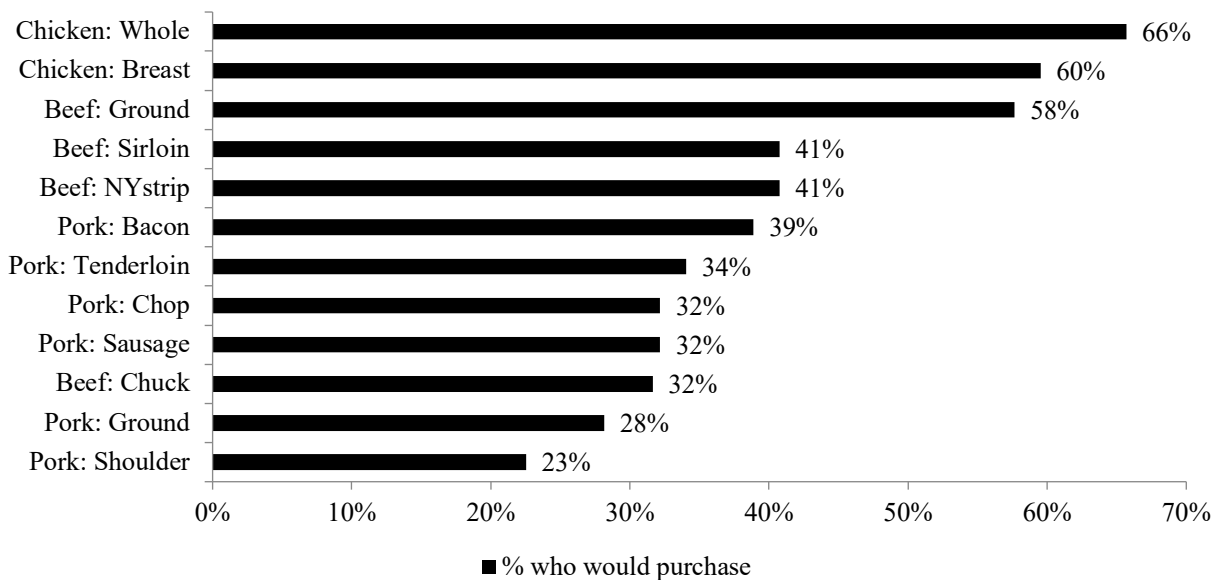
Within the survey, niche process attributes were explicitly bundled as animals that were raised in a certain region, on vegetarian feed, without subtherapeutic antibiotics or added growth hormones. Nearly 40% stated they would purchase Midwestern niche tenderloin at \$12/lb. This price was approximately double the retail cost of commodity pork tenderloin at the time the survey was administered. Shifting to New England production while keeping constant the other process attributes, 33% indicated that they would not purchase the New England product at the comparison price of \$12/lb. Among those who would purchase the New England product, the average WTP was \$14/lb. This value does not represent those participants who indicated that they would not purchase the New England pork tenderloin; these respondents may or may not be willing to purchase this specific pork product at a discounted price. Whether they would buy the local pork, the majority (79%) reported certainty in their New England WTP decision. The implied demand curve of specialty market customers for New England tenderloin is shown in Figure 3; this implied demand curve was derived from the inverse cumulative distribution function for responses to the WTP question in our survey. The *y*-axis represents the proportion of respondents willing to pay at least the indicated amount on the *x*-axis. Finally, for these related questions, we expanded the list of locally raised cuts of meat beyond pork to include beef and chicken. Although specific premiums were not investigated, participants responded for each cut of meat knowing it would be sourced locally with an additional cost. Chicken dominated the list, following by beef and then pork, which are shown in order of selection in Figure 4. These results were important to our regional meat producers, aggregators, and distributors since consumer demand for specific cuts and species of meat products was not available.





**Figure 3.** Implied Demand Curve for New England Pork Tenderloin

Notes: x-axis represents respondents' WTP value (\$/lb). y-axis represents the proportion of respondents that would be willing to pay that amount or less per pound of niche pork tenderloin.



**Figure 4.** Preference for Locally Raised Meat Cuts

### *Cragg Hurdle Regression Model*

These descriptive findings for consumers' purchase history, preferences, and eco-label knowledge were integrated into our regression model (Tables 3 and 4). The variables used for selection into the market for New England tenderloin in the first stage of the model were willingness to purchase the Midwest tenderloin (*MidwestNiche*), aversion to tenderloin (*NoLikeTenderloin*), and pork (*NoEatPork*). As expected, this first-stage selection, as shown in the lower portions of Table 3, found that those who would buy the comparable and actually available Midwest product were likely to participate in the market for the hypothetical New England product, whereas those who do not eat pork or do not like tenderloin were less likely (i.e., have a WTP less than that of the \$12 price of the comparable Midwestern product). The upper limit estimation allows for simultaneous consideration of the upper-bound truncation of our survey instrument in the estimation; as expected, respondents who indicated they do not eat pork or do not like tenderloin were also less likely to be at this upper bound available on the payment card.

Following equation (1), the specific independent variables for the second-stage WTP model (*WTPValue*, representing the total willingness-to-pay for the New England product, i.e., the indicated premium plus \$12) included measures of pork purchasing frequency (*HomeYear*, *HomeWeek*, *HomeMonth*), belief in available local meat (*AgreeLocalAvail*), tenderloin preferences (*Tenderloin*), local meat preferences (*PorkTenderloin*, *PorkChop*), demographics (*Income*, *Yrs\_Ed*, *Female*, *White*), process attributes (*MoreNoHormones*, *MoreNoAntibiotics*, *MoreNoConfine*, *MoreNoGMO*, *LessOrganic*, *MoreOrganic*), and correct recognition of meat eco-labels (*CorrectRecognition*). Appropriate tests (not shown) did not indicate any concerns with multicollinearity with this set of explanatory variables. The three retail store locations (*Store*) were used to cluster the standard errors to account for unobservable differences by location. These regression variables corresponded to our original hypotheses that focused on pork purchase history, preference for process attributes, and household characteristics.

The most significant findings were generally focused on pork purchase and preference as well as organic production and eco-label knowledge (Table 3). In particular, participants who typically ate pork weekly at home had higher WTP for New England pork (\$0.22/lb) compared to those who purchase pork less often (\$0.12/lb for monthly and \$0.15/lb for yearly at-home consumption of pork; WTP results for these less frequent purchases were not significantly different from 0). Likewise, customers who shopped at stores with readily available local meat and those who valued locally raised pork chops and organic production methods had positive WTP for New England pork tenderloin (\$0.17/lb, \$0.36/lb, and \$0.37/lb, respectively). Those who correctly recognized the meat eco-labeling also had positive WTP for New England pork tenderloin (\$0.27/lb). Conversely, participants who regularly ate conventional pork tenderloin had negative WTP (−\$0.22/lb) for the premium New England product. It is worth noting that in investigating alternative specifications, demographic variables—such as number of adults and children eating at home, household income, and years of formal education—that were found to be important predictors of WTP in other studies (e.g., Grannis and Thilmany (2002); Umberger, Thilmany McFadden and Smith (2009); Dickinson and Bailey (2002) were not significant here (not shown).

**Table 3.** Cragg Hurdle Regression Model of WTP for New England Pork Tenderloin ( $N = 373$ )

Variable	Coefficient	Robust SE	p-value	95% Confidence Interval	
<i>HomeWeek</i>	0.677	0.078	0.000***	0.524	1.254
<i>HomeMonth</i>	0.371	0.351	0.291	-0.317	0.830
<i>AgreeLocalAvail</i>	0.509	0.053	0.000***	0.404	1.058
<i>Tenderloin</i>	-0.650	0.231	0.005***	-1.102	0.613
<i>PorkTenderloin</i>	0.284	0.394	0.471	-0.488	-0.197
<i>PorkChop</i>	1.089	0.476	0.022**	0.156	1.055
<i>Income</i>	0.000	0.000	0.184	0.000	0.000
<i>Yrs_Ed</i>	0.012	0.064	0.850	-0.114	0.138
<i>Female</i>	0.082	0.154	0.595	-0.219	0.383
<i>White</i>	0.237	0.580	0.683	-0.900	1.375
<i>MoreNoHormones</i>	-0.342	0.600	0.569	-1.517	0.834
<i>MoreNoAntibiotics</i>	0.025	0.527	0.962	-1.007	1.058
<i>MoreNoConfine</i>	-0.570	0.655	0.384	-1.855	0.714
<i>MoreNoGMO</i>	0.493	0.295	0.096	-0.087	1.072
<i>LessOrganic</i>	-1.052	0.223	0.000***	-1.489	-0.615
<i>MoreOrganic</i>	1.104	0.479	0.021**	0.165	2.044
<i>CorrectRecognition</i>	0.806	0.134	0.000***	0.543	1.069
_cons	12.024	0.609	0.000	10.830	13.218
selection_II					
<i>NoEatPork</i>	-1.234	0.256	0.000***	-1.737	-0.731
<i>NoLikeTenderloin</i>	-1.164	0.113	0.000***	-1.386	-0.943
<i>MidwestNiche</i>	1.659	0.091	0.000***	1.481	1.837
_cons	12.169	0.071	0.000	12.030	12.308
selection_ul					
<i>NoEatPork</i>	-3.594	0.219	0.000***	-4.024	-3.164
<i>NoLikeTenderloin</i>	-3.622	0.171	0.000***	-3.957	-3.287
<i>MidwestNiche</i>	-0.343	0.254	0.178	-0.842	0.156
_cons	16.449	0.093	0.000	16.266	16.631

Notes: Double and triple asterisks (\*\*, \*\*\*) denote significantly different than 0 at the 5% and 1% levels, respectively. Pseudo- $R^2 = 0.150$ .

## Implications and Conclusions

We designed this study not only to examine the potential retail market interest in regionally produced meat products but also to develop a better understanding of consumer preference of meat cuts and process attributes and recognition of meat eco-labels. Regarding our original WTP hypotheses, we had mixed findings. For the first hypothesis, our sample's demographics, particularly those households without children, did not lend much to our understanding of drivers of WTP. This was certainly due at least in part to our sample being fairly homogeneous, and focusing on those consumers who had already self-selected their presence in the specialty stores

**Table 4.** Cragg Regression Model Marginal Effects

Variable	dy/dx	Delta-method SE	p-value	95% Confidence Interval	
<i>HomeYear</i>	0.148	0.121	0.223	-0.090	0.386
<i>HomeWeek</i>	0.224	0.039	0.000***	0.148	0.299
<i>HomeMonth</i>	0.122	0.109	0.262	-0.091	0.336
<i>AgreeLocalAvail</i>	0.168	0.004	0.000***	0.160	0.176
<i>Tenderloin</i>	-0.215	0.101	0.034**	-0.413	-0.017
<i>PorkTenderloin</i>	0.094	0.129	0.467	-0.159	0.347
<i>PorkChop</i>	0.360	0.125	0.004***	0.115	0.604
<i>Income</i>	0.000	0.000	0.147	0.000	0.000
<i>Yrs_Ed</i>	0.004	0.022	0.852	-0.038	0.046
<i>Female</i>	0.027	0.051	0.598	-0.073	0.127
<i>White</i>	0.078	0.184	0.670	-0.282	0.438
<i>MoreNoHormones</i>	-0.113	0.188	0.548	-0.481	0.256
<i>MoreNoAntibiotics</i>	0.008	0.174	0.962	-0.334	0.350
<i>MoreNoConfine</i>	-0.188	0.210	0.369	-0.600	0.223
<i>MoreNoGMO</i>	0.163	0.100	0.103	-0.033	0.358
<i>LessOrganic</i>	-0.348	0.059	0.000***	-0.463	-0.232
<i>MoreOrganic</i>	0.365	0.190	0.054	-0.007	0.736
<i>CorrectRecognition</i>	0.266	0.071	0.000***	0.127	0.405

Notes: Double and triple asterisks (\*\*, \*\*\*) denote significantly different than 0 at the 5% and 1% levels, respectively.

in which this study was conducted. With our second hypothesis, we anticipated and found meat purchase history and tenderloin preferences to be strong predictors for differences in WTP for New England tenderloin. Regarding our third hypothesis, most process attributes were not significant predictors of WTP. However, organic certification, which was significant, would require many of the other production characteristics of niche meat. Given that participants identified with existing eco-labels (fourth hypothesis), perhaps these customers recognized organic as a general umbrella qualification that included other process attributes, such as restrictions on antibiotics and GMO feed. Those consumers who could correctly recognize at least some currently used labels did indicate higher WTP for the New England specialty product than those who were not knowledgeable about labels.

Organic preferences are related to preferences regarding the use of hormones, antibiotics, and GMO feed within livestock production. Since some of our participants did not consume pork, we asked them to respond to the production characteristic questions for any livestock product that they purchase. “Raised without added hormones” was a top concern for our sample and a significant predictor of WTP. Although USDA federal regulations prohibit the use of added hormones in pork or chicken, these findings may be important for regional beef producers and aggregators who market to specialty retail grocers.

Immediately following “added hormones,” the second most important production attribute was “raised without subtherapeutic antibiotics.” Although antibiotic use was an important factor in other studies (e.g., Grannis and Thilmany, 2002), it was not a strong predictor of differences in WTP here. Because this attribute was a top concern for most participants, we believe that the null outcome here reflected the lack of variation in our sample of specialty food market customers.

Finally, we expected concern with use of GMO feed, such as transgenic corn and soybean meal, to contribute significantly to WTP estimation. Informed by the regional supply chain, GMO-free feed has been a critical factor for New England producers and aggregators who market directly to consumers (such as farmers’ markets or on-farm sales). Our results imply that different customer bases have different priorities. New England producers can utilize this information to prioritize management options to meet customer preferences for specific markets. Process attributes may cost additional time or money. For instance, within New England, GMO-free feed is typically more expensive and can be difficult to source. Hence, we believe that such preference information is valuable to supply chain players for allocating limited resources.

Reflecting upon our WTP methodology and results, we can evaluate the design and survey implementation to improve future studies as well as draw market implications. We were concerned *a priori* that some respondents might have been confused by asking about premium amounts rather than total price. To remedy potential confusion, enumerators were available and trained to clarify survey questions and participant interpretation. We used a two-stage conditional model specifically to examine the feasibility of introducing this niche meat product at a price premium into specialty grocery stores. More than 67% of our respondents responded positively to New England pork tenderloin priced at or above the \$12 minimum estimated by an industry informant to successfully retail this product (personal communication with Sean Buchanan, president of Black River Meats of North Springfield, Vermont, July 23, 2013). For those willing to purchase the local product, the average premium was \$2 above this minimum feasibility price of \$12/lb.

Should industry costs reduce through scale of production or increased efficiency or consumer awareness increase through marketing outreach, it is plausible for retail local tenderloin to be economically viable in the future. Differentiated pork production has room for improvements, as demonstrated in our companion study with pork farmers (Picardy et al., 2017). We found the niche system produced 15% fewer weaned piglets and finished 12% fewer hogs per bred sow per year than the conventional system due to fewer breeding cycles, smaller litters, higher piglet mortality, and a need for 18 additional days for finishing to standard slaughter weight in alternative production. At this time, regional suppliers may instead focus retail efforts on other cuts of pork (such as lower priced chops or sausages) or different species (e.g., chicken or beef) to close the price gaps. Further exploration is needed to estimate the WTP for these other meat products, but our preliminary results from Figure 2 provide insight into priorities for product introduction.

Concerning eco-labeling, our findings support recent literature. The meat eco-labels that we presented to our sample apparently did not make the market more transparent for these participants; 88% of our respondents self-reported that they did not understand the differences in production methods across these labels (also found in van Amstel et al., 2007). Thus, meat eco-labeling within

our sample does not provide additional information to understand attributes associated with the certification programs. Our participants did not understand the complexities of agricultural practices and process attributes (also reported by USDA, 2012; Brécard, 2013). For these reasons, information asymmetry within this analysis was not reduced because consumers did not know what the eco-labels represented.

Our results suggest that consumers who reference meat eco-labels may benefit from additional packaging information that clearly describes the practices associated with process attributes and the relationships between the certification agency and meat company or farmer. Such results point toward the direction of production descriptions (such as “raised with outdoor access” and “without subtherapeutic antibiotics”) incorporated on the meat package as opposed to costly certification programs using established eco-labels. Additional outreach effort is needed to gain consumer trust of the labeling claims or certification agencies. Such trust though, may be challenged by a range of terms and claims that are not regulated by a governmental agency, possibly leading to company misuse (Animal Welfare Approved, 2011). Confusion compounds when animal raising claims are similar to commonly approved claims. Within the United States, animal raising claims include *naturally raised*, *naturally grown*, *antibiotic free*, *humane*, and *hormone free* (USDA FSIS 2016). As recommended by Umberger, Thilmany, and Smith (2009), all value chain partners have a responsibility to provide credible, transparent evidence of their labeling claims to avoid deceit. Without trustworthy communication, consumer confusion may override confidence in process attributes, impacting food purchase decisions (Abrams, Meyers, and Irani, 2010; Hobbs and Goddard, 2015; Rihn and Yue, 2016).

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## Appendix: Meat Consumer Survey

**Directions:**

**PLEASE ANSWER ALL QUESTIONS TO THE BEST OF YOUR KNOWLEDGE.** Feel free to ask us any questions that you may have. Thank you for your time.

1. How often does your family consume pork (*such as pork tenderloin, chops, bacon, roast or ground pork*) at home?

*Please circle your answer*

Never                      Once a year                      Once a month                      Once a week                      Other: \_\_\_\_\_

2. In the past, have you ever purchased any of the following? If yes, where did you *last purchase* the meat?



Organic pork:                      YES    NO.....                      Location: \_\_\_\_\_

Local pork:                      YES    NO.....                      Location: \_\_\_\_\_

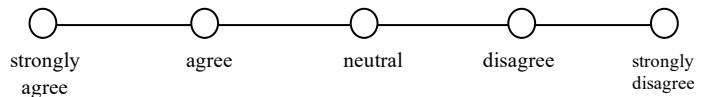


Organic beef:                      YES    NO.....                      Location: \_\_\_\_\_

Local beef:                      YES    NO.....                      Location: \_\_\_\_\_

3. Do you agree with this statement?  
***Locally-raised meat is readily available for purchase at the grocery store where you most regularly shop.***

*Mark the circle that best represents your opinion.*



4. Do you ever buy pork tenderloin for home consumption?                      YES    NO    *Circle your answer*

*If yes, please go to the next question. If no, why not?* \_\_\_\_\_

5. Now, suppose you are considering purchasing boneless pork tenderloin that is **raised in the Midwest** on vegetarian feed with no sub-therapeutic antibiotics or growth hormones. The cost for this pork in the Metro-Boston area is \$12/lb.

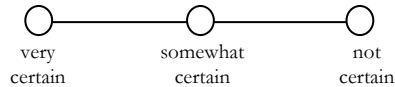
Would you be willing to pay \$12/lb for this meat?                      YES    NO    *Circle your answer*

6. Compared to the average price (\$12/lb), how much of a premium would you pay for a similar pork tenderloin product that was **raised in New England** on vegetarian feed with no sub-therapeutic antibiotics or growth hormones. The **ONLY** difference between the two products is the location **WHERE** the animals were raised.

Keep in mind that people often overstate their amount willing to pay because they are not actually buying the product. For this reason, please respond truthfully, as if you are buying the pork tenderloin.

Pork tenderloin raised in the Midwest costs \$12.00/pound										
Additional cost premium per pound of LOCAL pork tenderloin -->	\$0	\$0.50	\$1	\$1.50	\$2	\$3	\$4	\$5	\$6	Would NOT purchase
Reasonable to pay this amount	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

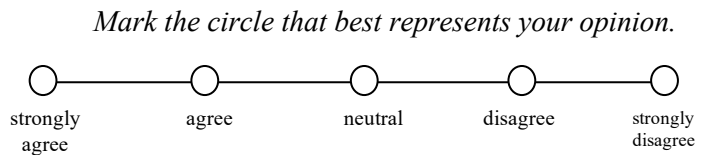
How certain are you of your answer above?  
Please mark the circle



7. What cuts of meat would you prefer come from a more **LOCAL source**, knowing it may cost more?  
Please circle all that apply

- |                  |              |                     |                         |
|------------------|--------------|---------------------|-------------------------|
| beef NY strip    | ground beef  | pork tenderloin     | pork bacon              |
| beef top sirloin | ground pork  | pork chop           | whole chicken           |
| beef chuck roast | pork sausage | pork shoulder roast | boneless chicken breast |

8. Do you agree with this statement?  
**Locally-raised meat means that the animals were raised from birth through slaughter in the local area.**



9. How would you define "local" meat?
- Raised within Massachusetts
  - Raised within New England region
  - Raised within 100 miles
  - Other: \_\_\_\_\_

10. If you were to buy FRESH (not frozen) local meat, what is its shelf life? *In other words, how long will it safely last in your home's refrigerator?*

- |                                   |                                       |
|-----------------------------------|---------------------------------------|
| <input type="radio"/> 1 to 3 days | <input type="radio"/> 7 to 9 days     |
| <input type="radio"/> 4 to 6 days | <input type="radio"/> 10 days or more |

11. What does "natural meat" mean to you? or how would you define "natural meat"?

\_\_\_\_\_

12. For this question, think about a pig farm that produces the meat you consume. In order to align with YOUR priorities and values, which production practices should they focus on? **Please circle the 3 characteristics as MOST IMPORTANT to you.**

*Ask us if you want explanations or need clarification for any of these items! Please identify your priorities even if you don't eat pork!*

- |   |   |
|---|---|
| <i>Knowing the farm's name that raised the pork</i> | <i>Certified organic pig farm</i>               |
| <i>Regionally-produced in New England</i>           | <i>Proper management of manure</i>              |
| <i>Locally-produced in Massachusetts</i>            | <i>No tight confinement (no crates)</i>         |
| <i>No use of growth hormones</i>                    | <i>Raised with access to the outdoors</i>       |
| <i>No use of sub-therapeutic antibiotics</i>        | <i>Small herd size (small to mid-size farm)</i> |
| <i>No genetically-modified (GMO) feed</i>           | <i>Heritage breed of pig</i>                    |

Now, please circle the 3 characteristics as **LEAST IMPORTANT** to you:

*Ask us if you want explanations or need clarification for any of these items! Please identify your priorities even if you don't eat pork!*

- |   |   |
|---|---|
| <i>Knowing the farm's name that raised the pork</i> | <i>Certified organic pig farm</i>               |
| <i>Regionally-produced in New England</i>           | <i>Proper management of manure</i>              |
| <i>Locally-produced in Massachusetts</i>            | <i>No tight confinement (no crates)</i>         |
| <i>No use of growth hormones</i>                    | <i>Raised with access to the outdoors</i>       |
| <i>No use of sub-therapeutic antibiotics</i>        | <i>Small herd size (small to mid-size farm)</i> |
| <i>No genetically-modified (GMO) feed</i>           | <i>Heritage breed of pig</i>                    |

13. Please look at the following labels and indicate whether you recognize the label on a meat product.



Yes, I have seen this label

No

Yes, I have seen this label

No

Yes, I have seen this label

No



Yes, I have seen this label  
 No

Yes, I have seen this label  
 No

Yes, I have seen this label  
 No

14. Do these labels represent the same guidelines for raising animals? **YES NO UNSURE** *Circle your answer*

15. Do you know what each of these labels (below) means? *In other words, do you know the differences between these labels?*

**YES NO** *Circle your answer*



16. If no, what about the above labels is confusing? *Check all that apply*

- I don't know what the labels represent with regard to animal agriculture
- I don't trust the label (could be misleading/dishonest)
- I don't understand the relationship between the label (certification) and the meat company/farmer
- Other: \_\_\_\_\_

17. Typically, how many people eat dinner together in your home?  
 \_\_\_\_\_ # of adults    \_\_\_\_\_ # of children

18. What is your gender? *please circle*    FEMALE    MALE    OTHER

19. What is the highest level of education that you have completed? *please check appropriate circle*

- primary school
- high school degree/GED
- undergraduate degree
- some high school
- some undergraduate college
- graduate degree

20. What is your total household income? *please check appropriate circle*

- Less than \$25,000
- \$50,001 to 75,000
- \$100,001 to \$150,000
- \$25,000 to \$50,000
- \$75,001 to \$100,000
- More than \$150,000

21. What is your race? *please check the most-appropriate circle for which you self-identify*

- Asian
- Black or African American
- Hispanic, Latino or Spanish origin
- Native American (American Indian)
- Pacific Islander or Hawaiian
- White or European American
- Some other race: \_\_\_\_\_

.....

You have reached the end of this survey.  
**THANK YOU for your PARTICIPATION, KNOWLEDGE, and TIME!**

*Please return completed survey to Jamie Picardy or Emily Nixon before you leave the grocery store.*

*If you would like to receive project results and register for the raffle, please clearly PRINT your email address here: \_\_\_\_\_*

*If you have any other feedback for Jamie, please add here: \_\_\_\_\_*