Modeling Impacts of Location- and Product-Targeted Demand Enhancement on Pork Producer Profitability

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Executive Summary

Prior research has documented wide variation in consumer sensitivity to changes in pork prices across different pork products and locations. This heterogeneity in demand elasticities implies there are potential benefits in location- and product-specific promotion strategies. To explore this issue, an economic model of the pork sector was created linking retail demand for six pork products in 50 retail markets with the farm-level supply of hogs in the U.S. The model is used to determine the impacts of targeted demand enhancement strategies by identifying which products, and in which locations, promotion would produce the greatest return for pork producers. Key results include the following:

- When consumer willingness-to-pay for all pork products increases by 10% in a location, the largest positive impacts on pork producer profitability are observed when the increases occur in the largest consumer markets, which include New York, Los Angeles, Chicago, Phoenix/Tucson, and Philadelphia markets.
    - On average, when pork willingness-to-pay increases by 10% in a location, producer profitability increases by $53.6 million/year and ranges from $8.3 million/year when the increase occurs in Spokane to $184.2 million/year when the increase occurs in New York.
- Applying a 10% increase in willingness-to-pay across allocations to a specific product results in the largest increases in producer profitability when applied to bacon followed by loin. Increasing consumer willingness-to-pay for pork shoulder (while leaving demand for all other pork products unchanged) results in a decline in pork producer profitability as consumers shift from higher priced products toward lower priced shoulder.
- Recognizing that it might be more costly to increase all consumers' willingness-to-pay in larger markets than in smaller markets, scenarios are modeled in which demand in each location is increased by a fixed dollar amount. When there is a $100,000 increase in consumers' willingness spend on all six pork products (a total increase of $600,000 in willingness-to-spend), the largest gains in producer profitability are observed when the demand increases occur in Phoenix/Tucson, Portland, Boise, Sacramento, and Chicago.
    - Across all 50 locations, the average increase in producer profitability from a $100,000 increase in consumers' willingness spend for all six pork products is $1.1 million/year and ranges from $536,672 when the demand increase occurs in Raleigh/Greensboro to $1.7 million/year when the demand increase occurs in Phoenix/Tucson.
    - Differential impacts across locations results, in part, from differences in consumer price sensitivity. In general, producer profitability increases are greater when the demand shock occurs in locations where consumers are more price sensitive.
- Returns to producers are highest when consumers' willingness-to-spend an extra $100,000 in all 50 markets occurs in loin, followed by bacon, and then dinner sausage.
- Results of this analysis suggest that demand promotion aimed at loin and bacon in locations such as Chicago and Phoenix/Tucson are likely to generate the greatest returns for pork producers.
- Future updates could consider expected impacts of demographic shifts in regional population or efficacy of promotional investment that could further refine this assessment.

1. Introduction and Motivation

Most economic analyses of the protein sector are undertaken using market-level aggregates. Such analysis is useful when analyzing policies or supply shocks, for examples, that have national impacts that have similar effects across the United States and that affect all pork products. However, there are many situations where one region enacts a policy governing pork that differs from the rest of the United States, or where one pork product (e.g., bacon) experiences a demand shock different from that of another (e.g., loin). Of particular interest is promotion and advertising resulting from pork check-off programs. Previous research has shown that there are significant and positive returns to producers from pork-checkoff promotion (Beach et al., 2007)[1] and there is evidence that targeted advertising in specific locations can dramatically increase the return on investment in checkoff spending (Capps, 2020).[2] As such, there is notable value developing an economic model of the pork sector that accounts for location- and product-specific heterogeneity in demand.

2. Economic Model of the Pork Sector

2.1. Overview

Here we describe the construction and implementation of an economic model of the pork sector designed to estimate the effects of location- and product-specific demand shocks on U.S. hog prices and retail pork prices. The model is a system of supply and demand equations specified as changes from an initial equilibrium. Equilibrium displacement models are widely used in the economic literature to calculate *ex ante* effects of cost and demand shocks and are described in resources such as Alston (1991), Lusk and Anderson (2004), Okrent and Alston (2012), and Wohlgenant (2011).[3] The model is constructed to make use of the data and analysis in Tonsor and Lusk (2024), who used retail grocery scanner data to estimate demand for 6 pork products in 50 U.S. markets.[4]

[1] Beach, R.H., Zhen, C., Piggott, N.E., Wohlgenant, M.K., Viator, C.L. and Cates, S.C., 2007. An Economic Analysis of the Effectiveness of the Pork Checkoff Program. Final Report, National Pork Board, Des Moines, IA.
[2] Capps, O. 2020. Targeted Advertising and Promotion Campaigns: A Case Study of the National Pork Board. Journal of Agribusiness 38, 1.
[3]Alston, J.M., 1991. Research benefits in a multimarket setting: a review. Review of Marketing and Agricultural Economics, 59(430-2016-31351), pp.23-52.
Lusk, J.L. and Anderson, J.D., 2004. Effects of country-of-origin labeling on meat producers and consumers. Journal of Agricultural and Resource Economics, pp.185-205.
Okrent, A.M. and Alston, J.M., 2012. The effects of farm commodity and retail food policies on obesity and economic welfare in the United States. American Journal of Agricultural Economics, 94(3), pp.611-646.
Wohlgenant, M.K. 2011. "Consumer demand and welfare in equilibrium displacement models." In The Oxford Handbook of the Economics of Food Consumption and Policy (J.L. Lusk, J. Roosen, and J. Shogren, eds). Oxford: Oxford UK.
[4] Tonsor, G.T. and J.L. Lusk. 2024. Consumer Sensitivity to Pork Prices: A 2018-2023 Comparison of 50 U.S. Retail Markets and 6 Pork Products.

2.2 Economic Model of the Pork Sector

The foregoing describes an economic model of the pork sector linking retail demand for 6 pork products in 50 markets with the farm-level supply of hogs in the U.S. The description of the model starts at the retail level and works upstream in the pork supply chain back to the farm.

End-User Demand

There are 50 primary locations or markets (k = 1 to 50) and six pork products (j = Loin, Ribs, Shoulder, Breakfast Sausage, Dinner Sausage, and Bacon) sold in grocery/supermarkets explicitly considered in this model. Thus, there are 50*6 = 300 demand equations, which can be expressed in differential form as:

(1)-(300) $\quad \hat{Q}_k^j = \eta_k^j(\hat{P}_k^j + \delta_k^j)$

where $\hat{Q}_k^j$ is the proportionate change in retail quantity of pork product j in location k (i.e., $\hat{Q} = \Delta Q/Q \approx dlnQ/Q$), $\hat{P}_k^j$ is the proportionate change in retail price of pork product j in location k, η_k^j is the own-price elasticity of demand for product j in location k. $-\delta_k^j$ measures the magnitude of the demand shift for product j in location k; it is the increase in willingness to pay expressed relative to the initial equilibrium price.

While data in Tonsor and Lusk (2024) enable estimation of location- and product-specific demands for pork products in food-at-home markets (i.e., demand through retail grocery/supermarkets), such disaggregate data do not exist for food-away-from-home (i.e., restaurants) or for foreign buyers of U.S. pork. Nonetheless, significant volumes of pork products flow through these additional markets, and ignoring them might over-state the effects of demand shifts. To address these additional pork demands, we model national demands for six pork products in food-away-from-home markets:

(301)-(306) $\quad \hat{Q}_k^j = \eta_k^j(\hat{P}_k^j + \delta_k^j)$

where, in this case, k corresponds to a 51st market representing national aggregate food-away-from-home for each of the six pork products. Likewise, we consider six additional demands for each pork products in foreign markets:

(307)-(312) $\quad \hat{Q}_k^j = \eta_k^j(\hat{P}_k^j + \delta_k^j).$

where, in this case, k corresponds to a 52nd market representing foreign buyers of each pork product.

Inverse Supply of Retail Products from Packers

Assuming constant returns to scale in production of retail pork products, there are six pork products in 52 markets resulting in 312 supply equations of the form:

(313) – (624) $\quad \hat{P}_k^j = SR_k^j \hat{w}_{hogs} + (1 - SR_k^j)\hat{w}_{other}$

where $\hat{w}_{hogs}$ is an endogenous variable indicating the proportionate change in price of hogs, SR_k^j is the share of the total cost of producing retail pork product j attributable to hogs in location k, $(1 - SR_k^j)$ is the share of total cost of producing retail pork product j attributable to other marketing inputs, and $\hat{w}_{other}$ is the proportionate change in the price of other marketing inputs to the pork sector.

Aggregation across Locations

While the model allows geographic- and product-specific heterogeneity in demand, we adopt the conventional approach of modeling the packing and farm sectors quantities as industry-level aggregates. The proportionate change in total quantity (across all locations) of product *j* is defined as.

(625)-(630) $\hat{Q}^j = \sum_{k=1}^{K} \left(\frac{Q_k^j}{Q^j}\right) \hat{Q}_k^j$,

where $\left(\frac{Q_k^j}{Q^j}\right)$ is the share of total quantity of product *j* sold in location *k*.

It is possible to calculate the aggregate retail price effects for each of the six pork products across the U.S. and foreign markets. In levels, the quantity weighted-average price of product *j* is: $P^j = \sum_{k=1}^{K} P_k^j \left(\frac{Q_k^j}{Q^j}\right)$, where the latter term is the share of total quantity sold in location *k*. Expressed in differential form, the expression for proportionate change in the weighted-average price for the six pork products is:

$$\hat{P}^j = \sum_{k=1}^{K} R_k^j \left(\hat{P}_k^j + \hat{Q}_k^j - \hat{Q}^j\right),$$

where for product *j*, $R_k^j = \left(\frac{P_k^j Q_k^j}{P^j Q^j}\right)$ is the share of aggregate revenue generated by location *k* across all *K* locations, $\sum_{k=1}^{K} R_k^j = 1$. These aggregate price equations can be calculated after solving the model as they are solely a function of model solutions.

Demand for Commodities Used in Pork Packing and Processing

Assuming constant returns to scale and fixed proportions technology, two Hicksian demands for the commodities used in pork production take the form:

(631) $\hat{x}_{hogs} = \sum_{j=1}^{6} SC_{hogs}^j \hat{Q}^j$

(632) $\hat{x}_{other} = \sum_{j=1}^{6} SC_{other}^j \hat{Q}^j$

where $\hat{x}_{hogs}$ is the proportionate change in quantity of hogs, SC_{hogs}^j is the share of the total cost of hogs used by retail pork product *j*, $\hat{x}_{other}$ is the proportionate change in quantity of other marketing inputs to the pork processing, and SC_{other}^j is the share of the total cost of other marketing inputs used by retail pork product *j*.

Supply of Farm Products and Marketing Inputs

There are primary supply curves for hogs and for other inputs to meat packing and processing. These supply equations take the form:

(633) $\hat{x}_{hogs} = \varepsilon_{hogs} \widehat{w}_{hogs}$

(634) $\hat{x}_{other} = \varepsilon_{other} \widehat{w}_{other}$

where ε's are the own-price elasticities of supplies of hogs and other inputs, respectively.

Equilibrium and Welfare Calculations

The model consists of a total of 634 endogenous variables: proportionate changes in 312 end-user quantities for 6 pork products in 52 locations, $\hat{Q}_k^j$, 312 end-user prices for 6 pork products in 52 locations, $\hat{P}_k^j$, aggregate end-user quantities for six pork products, $\hat{Q}^j$, two farm-commodity quantities, $\hat{x}_k$, and two farm-commodity prices, $\widehat{w}_k$. Exogenous shocks consist of ad valorem tax

equivalents. The model can be solved with matrix algebra. Let the 634x1 vector of endogenous variables be represented by **Y**, the 634x1 vector of exogenous shocks be given by **Z**, and **B** be an 634x634 matrix of model parameters, such that the aforementioned equations can be written as **YB**=**Z**. The values for the endogenous variables (changes in prices and quantities) are given by: $\mathbf{Y}=\mathbf{B}^{-1}\mathbf{Z}$.

Once the model is solved, changes in the economic well-being of producers and consumers can be calculated. For producers, the change in so-called producer surplus is calculated. Producer surplus is equal to economic profits ignoring fixed costs that do not vary with the volume of production. Producer surplus includes the losses/gains to all producers and upstream suppliers to the producers in question.

2.3 Data and Model Calibration

To implement the model, values need to be assigned for all elasticity and share values. All demand elasticities specified in equations (1)-(300) come from Tonsor and Lusk (2024) (see Appendix table A1). To determine demand elasticities for equations (301)-(312), assumptions must be made. Absent good estimates of elasticities of demand for pork products in food-away from home markets, we set these values at the median values estimated in the 50 food-at-home market. There are also no previous existing estimates of export demand elasticities for the six different pork products considered in this analysis. Nonetheless, these values are expected to be more elastic given that foreign buyers have many substitutes for U.S. pork. As such, we set these values at 1.5 times the median values estimated in the 50 food-at-home domestic markets.

Equations (313) – (624) require estimates of the share of the total cost of producing retail pork product *j* attributable to hogs. To determine these values, the average live market price of lean hogs (51-52%) as reported by the U.S. Department of Agriculture during 2023 ($0.59/lb) is divided by the retail price of pork product *k* in location *j*.[5] The shares (i.e., farmer share of the retail dollar) range from 0.075 for bacon in San Francisco to 0.404 for shoulder in Houston. Food-away-from-home prices for pork products are unknown; however, following Richard's (2020) estimate of relative prices of food-at-home vs. away from home, prices of the six pork products away from home are set to double the median value across all locations, and cost shares are calculated as with other prices.[6] Likewise, prices of the six pork products in foreign markets is unknown, but reflecting the fact that foreign prices must be higher than domestic prices to induce exports, these values are set 25% higher than the median domestic price in food-at-home markets, and cost shares are calculated as previously described.

To implement equations (625)-(630), the share of each type of pork sold in each market must be calculated. The quantities sold in each of the 50 retail (food-at-home) domestic markets come from Tonsor and Lusk (2024). Estimates suggest about 70% of pork is consumed at home through grocery, whereas about 30% is consumed away from home in restaurants (Lin et al.,

[5] https://www.ers.usda.gov/data-products/livestock-and-meat-domestic-data/livestock-and-meat-domestic-data/
[6] Richards, T. 2020. "Food Service versus Retail: COVID-19 Impacts" in Economic Impacts of COVID-19 on Food and Agricultural Markets (J. Lusk and J. McCluskey eds). Council for Agricultural Science and Technology. https://www.cast-science.org/wp-content/uploads/2020/06/QTA2020-3-COVID-Impacts.pdf

2016).[7] Thus, for each of the six pork products, the volume of food-away from home consumption (in lbs) is set to a value that is 30% of total domestic consumption (the sum of the quantities in the 50 domestic food-at-home markets plus the portion in food-away-from-home).[8] The US Meat Export Federation estimates the share of each primal that is exported. In 2022, they estimated 53% of the picnic, 43% of hams, 22% of butts, 15% of loins, 12% of ribs, and 5% of bellies are exported.[9] Based on these data, the inferred quantities of product exported for each of our six retail pork products are extrapolated by setting the export shares at 15% for loin, 12% for ribs, 22% for shoulder, 37.5% for both breakfast and dinner sausage (this is the average exports across picnic and butts), and 5% for bacon. Once the total quantities for exports and food-away-from home are known, then the share of a pork product sold in each of the 52 locations is calculated.

Equation (631) requires estimates of the share of the total cost of hogs used by retail pork product *j*. To estimate this value, 2023 data in Tonsor and Lusk (2024) are used to calculate total consumer expenditures on all six pork products across all 50 food-at-home markets. The share of total expenditure going toward each of the six pork products is 0.21 for loin, 0.12 for ribs, 0.06 for shoulder, 0.11 for breakfast sausage, 0.14 for dinner sausage, and 0.36 for bacon. Note, however, that there are pork products, such as ham, not considered in this analysis (i.e., given the lack of data, changes in the ham market are assumed exogenous in this model). The ham is typically considered to represent about 25% of the carcass by weight (but less by value).[10] Thus, the share of the total cost of the hog represented by the six pork products considered in this study are determined by taking each aforementioned expenditure share and scaling back by 0.75 so that the sum is equal to 0.75 (this ensures we do not over-estimate the impacts of retail price changes on farm-level hog prices): 0.16 for loin, 0.09 for ribs, 0.05 for shoulder, 0.08 for breakfast sausage, 0.11 for dinner sausage, and 0.27 for bacon. The share of total costs of other inputs in equation (632) was assumed evenly spread across all pork products, with a value of 1/6 for each product.

Finally, equations (633) and (634) require estimates of own-price supply elasticities. Following Lusk et al. (2022), the elasticity supply of marketing inputs is set at 1.[11] The elasticity of supply of hogs is set at the value of 0.15 based on the estimates in Suh and Moss (2017).[12]

2.4. Specification of Model Shocks and Outcomes

To implement the model, values for demand shift, δ_k^j, must be specified. A variety of scenarios are considered. One approach is to determine the impact on producer profitability from a location-targeted demand increase. An initial way to explore this is to explore, sequentially, the

[7] Lin, B.H., Anekwe, T.D., Buzby, J.C. and Bentley, J., 2016. US Food Commodity Availability by Food Source, 1994-2008 (No. 1477-2017-3954). https://www.ers.usda.gov/webdocs/publications/81818/err-221.pdf?v=9606.7
[8] Algebraically, this means the quantity of food-away-from-home is sum of the quantity in all 50 food-at-home markets times (1/0.7-1) = 0.4286.
[9] https://www.usmef.org/news/guide-to-major-destinations-for-u-s-pork-and-beef-cuts-variety-meat/
[10] https://www.ams.usda.gov/sites/default/files/media/LMRPorkCutoutHandout.pdf
[11] Lusk, J.L., Blaustein-Rejto, D., Shah, S. and Tonsor, G.T., 2022. Impact of plant-based meat alternatives on cattle inventories and greenhouse gas emissions. Environmental Research Letters. 17(2):024035.
[12] Suh, D.H. and Moss, C.B., 2017. Decompositions of corn price effects: implications for feed grain demand and livestock supply. Agricultural Economics, 48(4), pp.491-500.

effect of a 10% increase in willingness-to-pay for all six pork products in a given location and compare outcomes to the impacts that occurs when the same 10% increase in willingness-to-pay increase occurs in another location.

This approach will tend to show greater increases in profitability when the demand shift is applied in locations that are larger vs. smaller, because, for example, aa 10% increase in willingness-to-pay in New York City is applied to many more consumers than is a 10% in willingness-to-pay in Peoria. Because it might be more challenging and costly to increase demand among all consumers in a larger vs. smaller location, there is also a need to make a more apples-to-apples comparison.

To accomplish this, note that a demand increase of $-\delta$ implies an upward shift in the demand curve in the price direction equivalent to a proportionate price increase of $(P_1 - P_0)/P_1$, where P_1 and P_0 are the post- and pre-shock prices associated with the new and old demand curves such that: $-\delta = (P_1 - P_0)/P_1$. Solving this expression for the new price yields: $P_1 = P_0/(1+\delta)$. Holding the initial equilibrium quantity constant at Q_0 implies a new level of expenditure equal to: $Q_0P_0/(1+\delta)$. Thus, the change in spending resulting from the demand shock (in dollar terms) is: $\frac{Q_0P_0}{1+\delta} - Q_0P_0$. What is the demand shock that would increase the amount consumers are willing to spend by \$100,000? It is $100{,}000 = \frac{Q_0P_0}{1+\delta} - Q_0P_0$. Solving this expression for the demand shock yields $\delta = \frac{1}{\frac{100{,}000}{Q_0P_0}+1} - 1$. Using this equation along with the initial expenditure on each product in each location, Q_0P_0, we can calculate the economic effects of a demand shock associated with an increased willingness-to-spend \$100,000 in each location.[13]

In addition to comparing the effects of shocks in different locations, we can similarly compare product-specific shocks to determine if, say, an increase in willingness-to-pay for loin creates greater producer profitability than, say, an increase in willingness-to-pay for bacon.

Once demand shocks are specified for a given scenario, the model can be solved to determine changes in prices and quantities in each location. Aggregate changes in pork producer surplus are: $\Delta PS_k = w_{k,0}x_{k,0}(\widehat{w}_k)(1 + 0.5\hat{x}_k)$, where $w_{k,0}x_{k,0}$ are the value of production of commodity *k* prior to the demand shock, and $\widehat{w}_k$ and $\hat{x}_k$ are determined by the solution to the model. For pork, the U.S. Department of Agriculture estimates 27.3 billion lbs of pork were produced in the United States in the year 2023 at an average live-weight price of \$0.59/lb (equivalent to \$0.59/0.74 = \$0.80/lb carcass weight).[14] Together, these data imply farmers produced 27.3*\$0.80 = \$21.8 billion worth of pork in 2023 at the farm level. Thus, $w_{pork,0}x_{pork,0} = \$21.8$ billion.

[13] To be clear, this shock is associated with an increased willingness to spend \$100,000 but it does not imply that consumer spending actually increases by \$100,000 in a location or for a product in equilibrium because of the upward sloping supply curves that interact with the demands.
[14] https://www.usda.gov/oce/commodity/wasde/wasde0224.pdf

3. Results

3.1. 10% Increases in Consumer Willingness-to-Pay for Pork

We first consider a scenario in which consumer willingness-to-pay for all pork products increases in a location (and demand remains unchanged in all other 49 food-at-home, food-away-from-home, and foreign markets). This could reflect a region-specific, focused promotional effort conservatively presumed to not spillover onto other regions. Table 1 and figure 1 show the estimated impacts of these demand increases on producer profitability as well as hog prices and quantities. These demand increases tend to have the largest positive impacts on pork producer profitability when they occur in the largest consumer markets, which include New York, Los Angeles, Chicago, Phoenix/Tucson, and Philadelphia markets. The smallest profit increases are observed when a 10% increase in willingness-to-pay for pork occurs in locations such as Spokane, Boise, Providence, and Wichita.

Table 1. Effects of a 10% Increase in Consumer Willingness-to-Pay for all Six Pork Products by Location

Location	Change in Producer Profits	Change in Hog Price	Change in Hog Quantity
Albany, NY	$21,227,568	0.10%	0.01%
Atlanta, GA	$65,709,925	0.30%	0.05%
Baltimore, MD/Washington D.C.	$59,321,317	0.27%	0.04%
Birmingham/Montgomery, AL	$69,422,297	0.32%	0.05%
Boise, ID	$11,440,051	0.05%	0.01%
Boston, MA	$45,576,567	0.21%	0.03%
Buffalo/Rochester, NY	$46,319,927	0.21%	0.03%
Charlotte, NC	$37,839,772	0.17%	0.03%
Chicago, IL	$124,714,515	0.57%	0.09%
Cincinnati/Dayton, OH	$55,649,189	0.26%	0.04%
Columbus, OH	$32,821,025	0.15%	0.02%
Dallas/Ft. Worth, TX	$82,251,567	0.38%	0.06%
Denver, CO	$58,170,363	0.27%	0.04%
Detroit, MI	$58,057,552	0.27%	0.04%
Grand Rapids, MI	$20,714,498	0.10%	0.01%
Harrisburg/Scranton, PA	$75,354,000	0.35%	0.05%
Hartford, CT/Springfield, MA	$57,654,956	0.26%	0.04%
Houston, TX	$67,261,493	0.31%	0.05%
Indianapolis, IN	$42,157,628	0.19%	0.03%
Jacksonville, FL	$37,573,238	0.17%	0.03%
Knoxville, TN	$19,071,553	0.09%	0.01%
Las Vegas, NV	$32,878,275	0.15%	0.02%
Los Angeles, CA	$144,998,317	0.66%	0.10%
Louisville, KY	$25,228,877	0.12%	0.02%

Miami/Ft. Lauderdale, FL	$61,771,961	0.28%	0.04%
Nashville, TN	$34,505,016	0.16%	0.02%
New Orleans, LA/Mobile, AL	$46,881,097	0.22%	0.03%
New York, NY	$184,235,255	0.84%	0.13%
Orlando, FL	$65,917,734	0.30%	0.05%
Peoria/Springfield, IL	$29,269,184	0.13%	0.02%
Philadelphia, PA	$104,661,799	0.48%	0.07%
Phoenix/Tucson, AZ	$111,518,849	0.51%	0.08%
Pittsburgh, PA	$32,631,313	0.15%	0.02%
Portland, OR	$74,139,638	0.34%	0.05%
Providence, RI	$11,481,657	0.05%	0.01%
Raleigh/Greensboro, NC	$36,779,237	0.17%	0.03%
Richmond/Norfolk, VA	$38,876,621	0.18%	0.03%
Roanoke, VA	$42,070,678	0.19%	0.03%
Sacramento, CA	$43,659,760	0.20%	0.03%
San Diego, CA	$30,380,295	0.14%	0.02%
San Francisco/Oakland, CA	$66,678,833	0.31%	0.05%
Seattle/Tacoma, WA	$37,956,038	0.17%	0.03%
South Carolina	$89,523,960	0.41%	0.06%
Spokane, WA	$8,387,521	0.04%	0.01%
St. Louis, MO	$38,209,886	0.18%	0.03%
Syracuse, NY	$22,642,265	0.10%	0.02%
Tampa/St. Petersburg, FL	$66,567,499	0.31%	0.05%
Toledo, OH	$37,082,172	0.17%	0.03%
West Texas/New Mexico	$59,745,272	0.27%	0.04%
Wichita, KS	$17,114,894	0.08%	0.01%

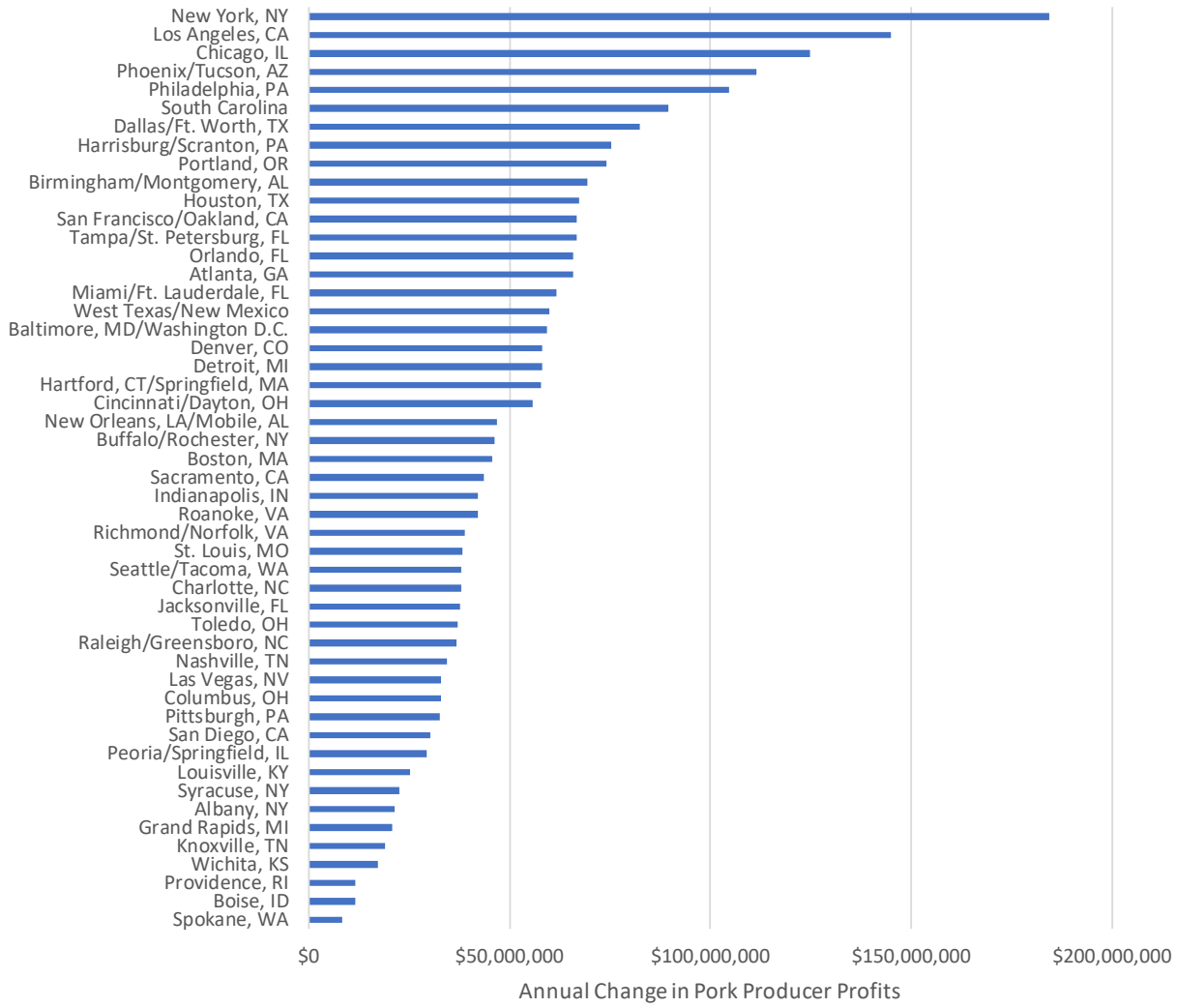

Figure 2. Ranking of Changes in Producer Profitability Resulting from a 10% Increase in Consumer Willingness-to-Pay for all Six Pork Products by Location

Instead of focusing on differences across location, it is also possible to explore the differential impacts of demand increases applied to different pork products. These results are shown in table 2. The largest effects are observed for those pork products with the highest expenditures such as bacon and loin. Somewhat surprisingly, the results indicate that a 10% increase in consumer willingness-to-pay for Shoulder results in a decline in pork producer profitability. This result is observed because when demand for one pork product increases, purchases of other pork products tends to fall due to substitution effects. Shoulder is the least expensive of the pork products modeled (the average price of shoulder across all 50 locations was $2.16//lb in 2023 as compared with $3.71/lb for loin, $3.23/lb for ribs, $4.69/lb for breakfast sausage, $4.48/lb for dinner sausage, and $6.31/lb for bacon). When consumers substitute away from higher priced products toward lower priced products, the model suggests the net effect is a reduction in overall producer profitability.

Table 2. Effects of a 10% Increase in Willingness-to-Pay for Each Pork Product in All 50 Domestic Food-at-home Markets by Product

Product	**Change in Producer Profits**	**Change in Hog Price**	**Change in Hog Quantity**
Loin	$856,794,095	3.92%	0.59%
Ribs	$292,742,741	1.34%	0.20%
Shoulder	-$181,292,161	-0.83%	-0.12%
Breakfast Sausage	$130,559,719	0.60%	0.09%
Dinner Sausage	$429,380,851	1.97%	0.30%
Bacon	$1,163,452,831	5.32%	0.80%

3.2. $100,000 Increases in Consumer Willingness-to-Spend on Pork

The results in the previous section consider scenarios where all consumers in a location increase willingness-to-pay by 10%. However, there are many more consumers in some locations than others, and it might be more difficult and expensive to reach more consumers. To address this issue, we also model the effect of a fixed dollar increase in demand in each location. Table 3 and figure 2 show the effects resulting from a $100,000 increase in consumers' willingness spend for all six pork products (a total increase of $600,000 in willingness-to-spend) in each location.

In this scenario, the largest gains in producer profitability are observed when the demand increases occur in Phoenix/Tucson, Portland, Boise, Sacramento, and Chicago. The smallest gains in producer profitability occur when these demand increases occur in Raleigh/Greensboro, Baltimore /Washington DC, New Orleans/Mobile, Richmond/Norfolk, and Charlotte. Across all 50 locations, the average increase in producer profitability from a $100,000 increase in consumers' willingness spend for all six pork products (a total increase of $600,000 in willingness-to-spend) is $1.1 million/year and ranges from $536,672 when the demand increase occurs in Raleigh/Greensboro to $1.7 million/year when the demand increase occurs in Phoenix/Tucson.

Table 3. Effects of a $100,000 Increase in Consumer Willingness-to-Spend on Each of the Six Pork Products (a $600,000 increase) by Location

Location	Change in Producer Profits	Change in Hog Price	Change in Hog Quantity
Albany, NY	$1,169,264	0.005%	0.001%
Atlanta, GA	$769,077	0.004%	0.001%
Baltimore, MD/Washington D.C.	$597,497	0.003%	0.000%
Birmingham/Montgomery, AL	$925,417	0.004%	0.001%
Boise, ID	$1,579,021	0.007%	0.001%
Boston, MA	$781,845	0.004%	0.001%
Buffalo/Rochester, NY	$1,380,507	0.006%	0.001%
Charlotte, NC	$707,305	0.003%	0.000%
Chicago, IL	$1,532,220	0.007%	0.001%
Cincinnati/Dayton, OH	$1,194,782	0.005%	0.001%
Columbus, OH	$1,014,616	0.005%	0.001%
Dallas/Ft. Worth, TX	$953,128	0.004%	0.001%
Denver, CO	$1,044,218	0.005%	0.001%
Detroit, MI	$977,575	0.004%	0.001%
Grand Rapids, MI	$960,884	0.004%	0.001%
Harrisburg/Scranton, PA	$1,263,712	0.006%	0.001%
Hartford, CT/Springfield, MA	$1,405,854	0.006%	0.001%
Houston, TX	$1,016,997	0.005%	0.001%
Indianapolis, IN	$1,233,904	0.006%	0.001%
Jacksonville, FL	$1,120,125	0.005%	0.001%
Knoxville, TN	$817,090	0.004%	0.001%
Las Vegas, NV	$1,426,591	0.007%	0.001%
Los Angeles, CA	$1,045,236	0.005%	0.001%
Louisville, KY	$1,011,472	0.005%	0.001%
Miami/Ft. Lauderdale, FL	$910,998	0.004%	0.001%
Nashville, TN	$844,412	0.004%	0.001%
New Orleans, LA/Mobile, AL	$659,633	0.003%	0.000%
New York, NY	$1,205,811	0.006%	0.001%
Orlando, FL	$1,057,729	0.005%	0.001%
Peoria/Springfield, IL	$1,189,933	0.005%	0.001%
Philadelphia, PA	$1,328,750	0.006%	0.001%
Phoenix/Tucson, AZ	$1,726,579	0.008%	0.001%
Pittsburgh, PA	$1,163,727	0.005%	0.001%
Portland, OR	$1,695,296	0.008%	0.001%
Providence, RI	$1,055,025	0.005%	0.001%
Raleigh/Greensboro, NC	$536,672	0.002%	0.000%
Richmond/Norfolk, VA	$681,679	0.003%	0.000%
Roanoke, VA	$925,634	0.004%	0.001%

Sacramento, CA	$1,570,380	0.007%	0.001%
San Diego, CA	$1,112,980	0.005%	0.001%
San Francisco/Oakland, CA	$1,415,616	0.006%	0.001%
Seattle/Tacoma, WA	$1,068,333	0.005%	0.001%
South Carolina	$813,509	0.004%	0.001%
Spokane, WA	$1,084,951	0.005%	0.001%
St. Louis, MO	$983,964	0.005%	0.001%
Syracuse, NY	$1,338,246	0.006%	0.001%
Tampa/St. Petersburg, FL	$992,943	0.005%	0.001%
Toledo, OH	$1,332,874	0.006%	0.001%
West Texas/New Mexico	$1,105,995	0.005%	0.001%

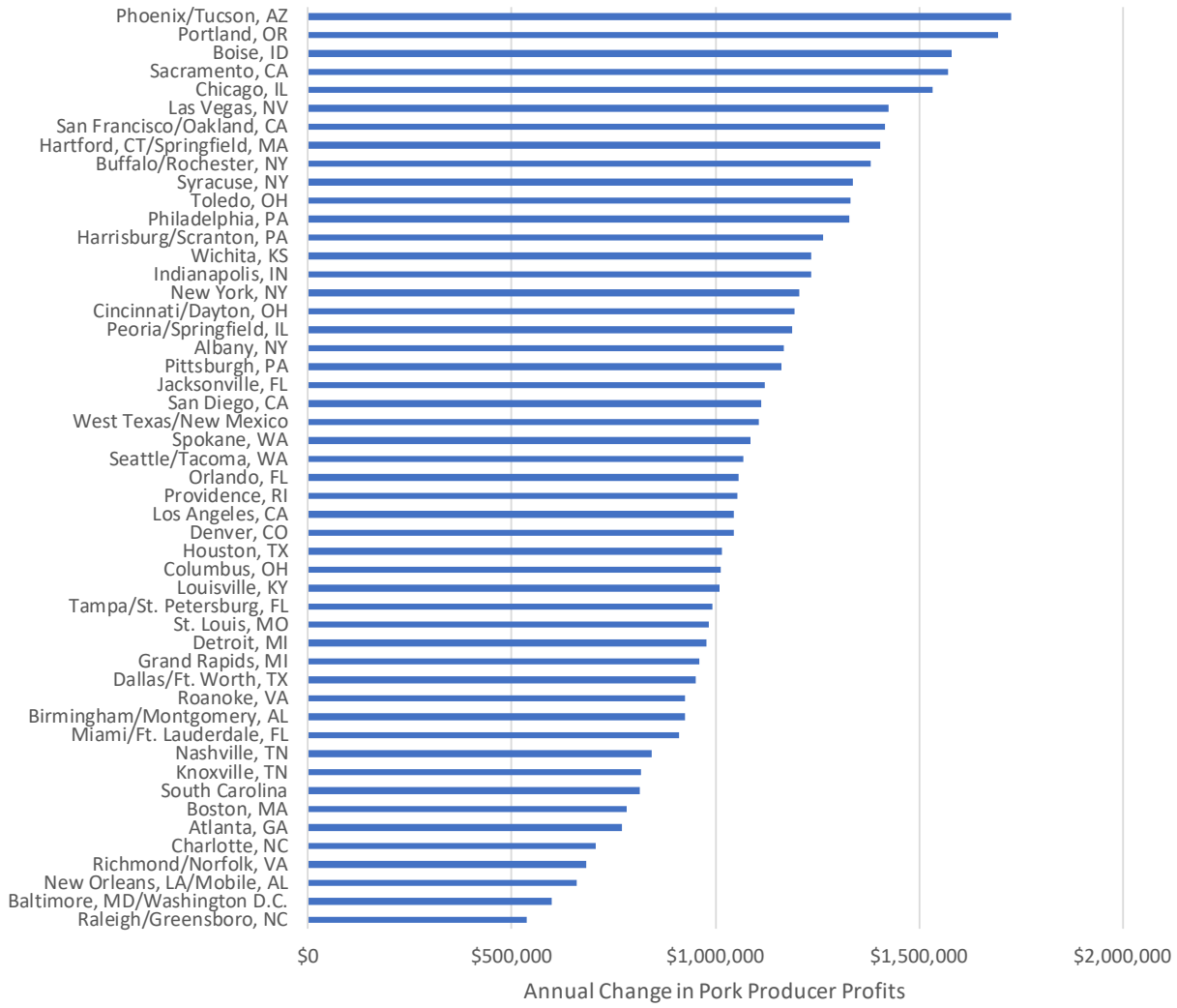

Figure 2. Ranking of Locations in Terms of the Change in Producer Profits Resulting from a $100,000 increase in Consumer Willingness-to-Spend on Each Pork Product

What explains the differences in producer returns when demand increases occur in different locations? Figure 3 provides a partial explanation. Producer returns from the demand increase are plotted against the own-price elasticity of demand for bacon. In general, producer profitability increases tend to be greater when the demand shock occurs in locations where consumers are more price sensitive. For example, the own-price elasticity of demand for bacon is highly elastic (-1.7) in Portland where the returns to demand increases are high ($1.7 million/year). By contrast, the own-price elasticity of demand for bacon is highly inelastic (-0.15) in Raleigh/Greensboro where the returns to demand increases are low ($536,671/year).

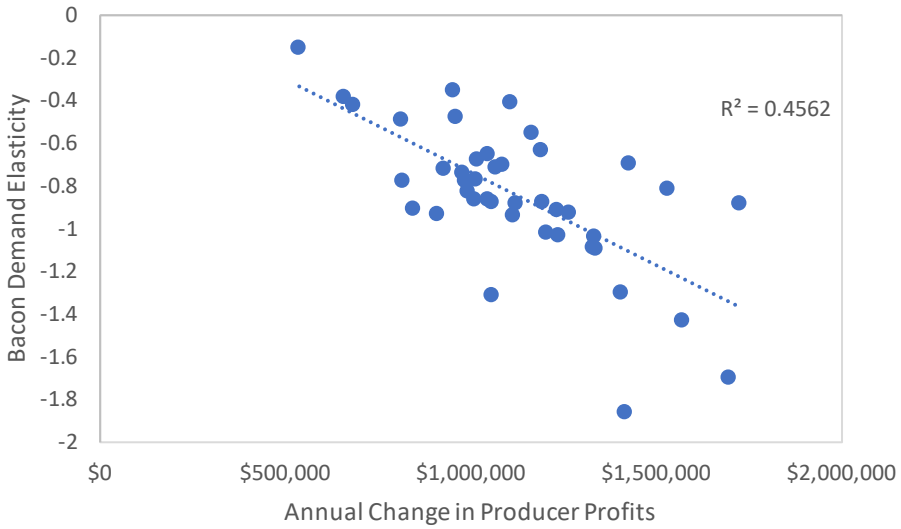

Figure 3. Relationship Between Producer Returns from a $100,000 Increase in Consumer Willingness-to-Spend on Each Pork Product and the Own-Price Elasticity of Demand for Bacon

Table 4. Effects of a $100,000 Increase in Willingness-to-Spend for Each Pork Product in All 50 Domestic Food-at-home Markets by Product

Product	Change in Producer Profits	Change in Hog Price	Change in Hog Quantity
Loin	$21,343,204	0.10%	0.01%
Ribs	$12,278,234	0.06%	0.01%
Shoulder	-$16,613,323	-0.08%	-0.01%
Breakfast Sausage	$5,897,597	0.03%	0.00%
Dinner Sausage	$14,883,888	0.07%	0.01%
Bacon	$17,180,531	0.08%	0.01%

Table 4 shows the projected impacts of a $100,000 increase in consumers' willingness-to-spend on each pork product in all 50 markets. In this scenario, returns to producers are highest when the demand increase is applied to loin, followed by bacon, and then dinner sausage. Again, it is observed that when demand for shoulder rises (while holding demand for all other products unchanged), producer profitability falls.

4. Conclusion

Given the variation in results across the two demand enhancement scenarios considered, there is some ambiguity about which targeted strategies might produce the highest returns. Future extended research that considered expected demographic regional shifts or efficacy of producer investment in generating consumer demand response would help narrow insights and mitigate this ambiguity. Nonetheless, as shown in figure 4, there are some locations that perform highly in both modeled scenarios. Demand promotion focused on Chicago and Phoenix/Tucson are likely to yield the highest returns for producers. Moreover, focusing promotion on loins and bacon are likely to generate the highest producer returns. Focusing promotion on relatively low-valued pork products may be counter-productive.

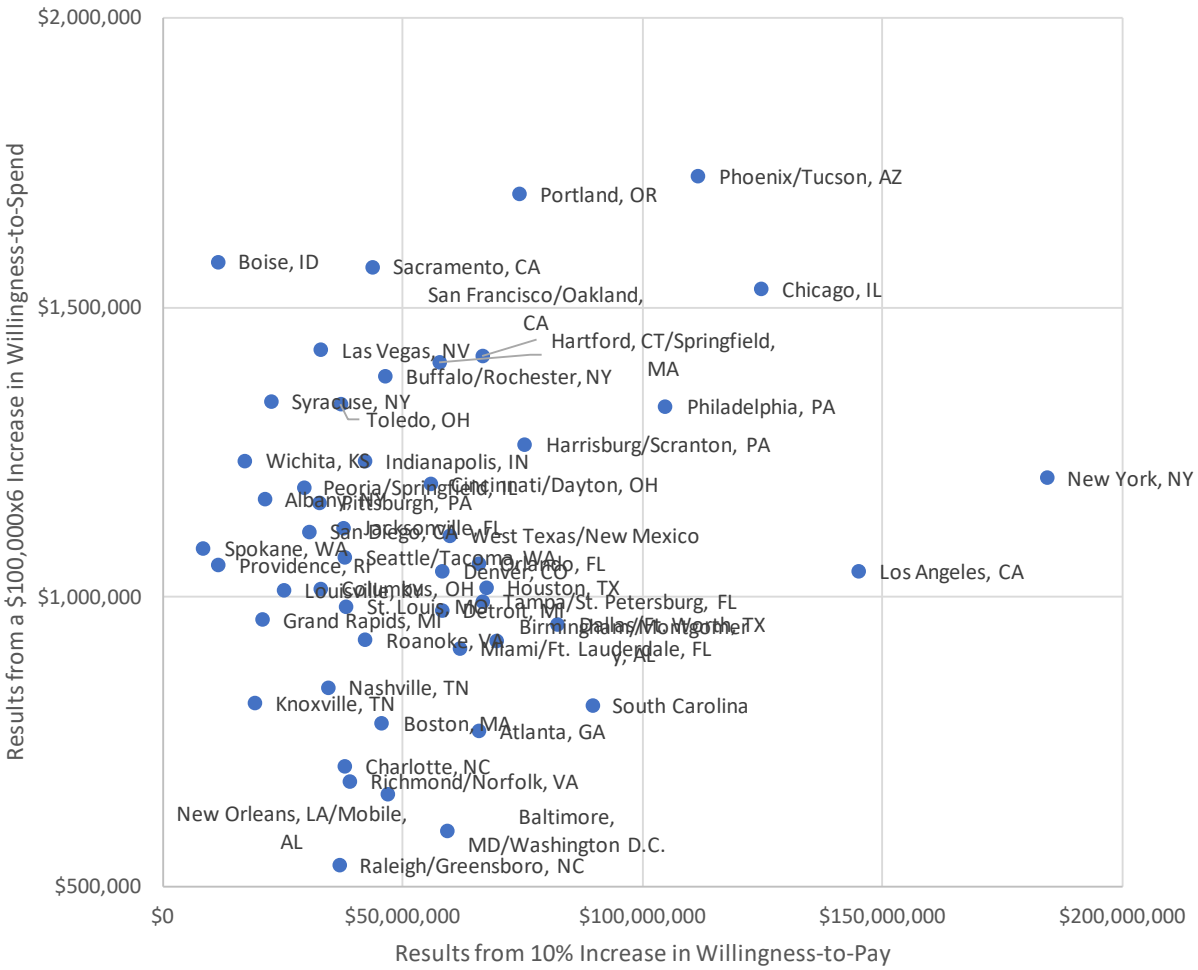

Figure 4. Relationship between Two Demand Enhancement Scenarios Considered

Appendix

Table A1. Own-Price, Demand Elasticities by Location and Product

Location/Market	Loin	Ribs	Shoulder	Breakfast Sausage	Dinner Sausage	Bacon
Albany, NY	-1.06	-1.69	-1.82	-2.61	-3.31	-0.83
Atlanta, GA	-1.59	-1.68	-2.52	-1.97	-1.48	-0.60
Baltimore /Washington DC	-1.22	-1.45	-2.07	-1.78	-1.93	-0.32
Birmingham/Montgomery, AL	-1.52	-2.57	-2.63	-1.22	-2.20	-0.65
Boise, ID	-2.38	-2.91	-1.82	-2.30	-2.09	-0.93
Boston, MA	-1.15	-0.85	-1.64	-2.04	-0.98	-1.21
Buffalo/Rochester, NY	-1.12	-1.21	-1.14	-2.26	-2.78	-1.42
Charlotte, NC	-1.96	-1.79	-2.70	-2.37	-1.50	-0.27
Chicago, IL	-1.53	-2.07	-0.91	-2.19	-3.29	-0.81
Cincinnati/Dayton, OH	-1.50	-1.62	-2.03	-2.58	-2.05	-0.87
Columbus, OH	-1.73	-1.45	-2.77	-2.24	-2.25	-0.76
Dallas/Ft. Worth, TX	-1.61	-1.82	-1.62	-2.63	-1.67	-0.35
Denver, CO	-1.02	-1.84	-1.18	-1.91	-2.22	-0.65
Detroit, MI	-1.22	-1.35	-2.03	-2.44	-2.19	-0.74
Grand Rapids, MI	-1.42	-0.65	-1.60	-2.21	-2.32	-0.47
Harrisburg/Scranton, PA	-1.37	-1.29	-1.67	-2.11	-2.66	-0.92
Hartford, CT/Springfield, MA	-1.48	-1.58	-1.36	-2.52	-2.55	-1.30
Houston, TX	-1.39	-2.13	-1.64	-2.43	-1.43	-0.67
Indianapolis, IN	-1.28	-1.57	-1.60	-2.19	-2.35	-0.91
Jacksonville, FL	-1.91	-2.59	-2.41	-1.83	-1.50	-0.88
Knoxville, TN	-1.11	-2.45	-2.58	-1.34	-1.88	-0.77
Las Vegas, NV	-1.61	-1.88	-1.07	-2.06	-2.28	-0.69
Los Angeles, CA	-0.79	-2.31	-0.81	-1.82	-1.64	-0.86
Louisville, KY	-1.57	-1.42	-2.73	-2.57	-1.83	-0.86
Miami/Ft. Lauderdale, FL	-0.76	-1.84	-0.75	-1.59	-1.46	-0.93
Nashville, TN	-0.91	-1.92	-2.56	-2.39	-2.00	-0.90
New Orleans, LA/Mobile, AL	-1.78	-1.38	-2.43	-1.77	-0.97	-0.38
New York, NY	-1.01	-1.10	-0.70	-1.81	-2.64	-1.02
Orlando, FL	-1.28	-2.58	-1.85	-1.89	-1.56	-0.87
Peoria/Springfield, IL	-1.18	-1.92	-1.53	-2.01	-2.85	-0.63
Philadelphia, PA	-1.24	-1.64	-1.40	-2.03	-2.78	-1.08
Phoenix/Tucson, AZ	-1.95	-2.36	-1.73	-2.43	-2.72	-0.88
Pittsburgh, PA	-1.87	-1.06	-1.80	-1.84	-2.94	-0.54
Portland, OR	-1.78	-2.38	-1.96	-1.98	-1.70	-1.69
Providence, RI	-1.36	-1.10	-1.38	-2.31	-1.08	-1.31
Raleigh/Greensboro, NC	-1.61	-1.69	-2.56	-2.82	-1.11	-0.15
Richmond/Norfolk, VA	-1.33	-2.02	-2.44	-2.20	-1.63	-0.42
Roanoke, VA	-1.63	-2.07	-2.55	-1.95	-1.91	-0.71
Sacramento, CA	-1.59	-2.90	-1.05	-1.86	-2.46	-1.43
San Diego, CA	-1.21	-2.52	-1.13	-1.68	-1.66	-0.93

San Francisco/Oakland, CA	-1.50	-2.54	-1.10	-1.67	-1.67	-1.85
Seattle/Tacoma, WA	-1.51	-2.54	-1.89	-1.86	-1.88	-0.71
South Carolina	-1.85	-1.82	-2.44	-2.10	-1.39	-0.48
Spokane, WA	-1.69	-2.23	-2.18	-1.63	-1.98	-0.70
St. Louis, MO	-1.66	-1.18	-2.47	-2.35	-1.55	-0.77
Syracuse, NY	-0.92	-1.73	-1.23	-2.21	-3.48	-1.09
Tampa/St. Petersburg, FL	-1.35	-2.39	-1.86	-1.98	-1.37	-0.82
Toledo, OH	-1.65	-1.92	-2.44	-2.66	-2.56	-1.03
West Texas/New Mexico	-1.39	-2.07	-1.09	-1.58	-1.67	-0.40
Wichita, KS	-1.28	-1.67	-2.22	-2.08	-2.48	-1.03
Food-away-from-home	-1.45	-1.83	-1.82	-2.07	-1.95	-0.83
Foreign	-2.17	-2.74	-2.73	-3.10	-2.93	-1.24

Table A2. Price, Expenditures, Cost Shares, and Quantity Shares by Product and Location for 2023

Market	Cut	Price ($/lb)	Expenditure	Cost Share (SR)	Quantity Share
Albany, NY	Loin	$3.21	$16,373,249	0.184	0.0054
---	Ribs	$3.06	$6,116,315	0.193	0.0034
---	Shoulder	$1.62	$2,877,772	0.365	0.0036
---	B Sausage	$4.84	$3,821,058	0.122	0.0015
---	D Sausage	$4.16	$13,114,507	0.142	0.0043
---	Bacon	$6.25	$22,198,717	0.094	0.0041
Atlanta, GA	Loin	$4.10	$58,002,688	0.144	0.0150
---	Ribs	$3.44	$31,331,266	0.172	0.0155
---	Shoulder	$2.23	$13,644,714	0.264	0.0125
---	B Sausage	$4.48	$35,209,029	0.132	0.0145
---	D Sausage	$4.75	$33,821,705	0.124	0.0097
---	Bacon	$6.19	$115,451,000	0.095	0.0217
Baltimore, MD/Washing DC	Loin	$3.90	$68,634,955	0.151	0.0187
---	Ribs	$3.46	$34,078,664	0.170	0.0167
---	Shoulder	$1.95	$14,641,301	0.303	0.0153
---	B Sausage	$5.18	$47,674,620	0.114	0.0170
---	D Sausage	$4.65	$47,653,968	0.127	0.0140
---	Bacon	$6.62	$146,068,558	0.089	0.0257
Birmingham/Montgome, AL	Loin	$4.25	$53,965,484	0.139	0.0135
---	Ribs	$3.46	$25,045,565	0.171	0.0123
---	Shoulder	$2.44	$12,977,898	0.242	0.0109
---	B Sausage	$4.37	$39,261,755	0.135	0.0166
---	D Sausage	$5.13	$44,216,273	0.115	0.0117
---	Bacon	$6.13	$108,493,148	0.096	0.0206
Boise, ID	Loin	$3.85	$5,331,502	0.153	0.0015
---	Ribs	$3.59	$2,750,890	0.164	0.0013
---	Shoulder	$2.45	$1,628,523	0.240	0.0014
---	B Sausage	$4.38	$4,824,370	0.135	0.0020
---	D Sausage	$4.48	$5,039,548	0.132	0.0015
---	Bacon	$5.84	$12,252,849	0.101	0.0024
Boston, MA	Loin	$3.77	$44,804,786	0.157	0.0126
---	Ribs	$3.32	$22,856,691	0.178	0.0117
---	Shoulder	$2.11	$9,327,098	0.279	0.0090
---	B Sausage	$5.33	$8,590,373	0.111	0.0030
---	D Sausage	$4.75	$31,668,132	0.124	0.0091
---	Bacon	$7.84	$63,494,213	0.075	0.0094
Buffalo/Rochester, NY	Loin	$3.75	$30,073,167	0.157	0.0085
---	Ribs	$3.32	$11,845,524	0.178	0.0061
---	Shoulder	$2.26	$6,618,214	0.261	0.0060

---	B Sausage	$4.81	$8,991,359	0.123	0.0035
---	D Sausage	$4.78	$24,798,809	0.124	0.0071
---	Bacon	$6.28	$42,650,375	0.094	0.0079
Charlotte, NC	Loin	$3.78	$42,575,934	0.156	0.0120
---	Ribs	$3.28	$18,799,796	0.180	0.0097
---	Shoulder	$1.84	$11,624,879	0.320	0.0129
---	B Sausage	$4.57	$26,670,532	0.129	0.0108
---	D Sausage	$4.31	$18,584,099	0.137	0.0059
---	Bacon	$6.39	$71,340,633	0.092	0.0130
Chicago, IL	Loin	$3.54	$66,958,954	0.166	0.0201
---	Ribs	$3.33	$44,216,192	0.177	0.0226
---	Shoulder	$1.83	$15,010,072	0.323	0.0168
---	B Sausage	$4.52	$41,497,457	0.131	0.0170
---	D Sausage	$4.18	$64,262,325	0.141	0.0209
---	Bacon	$6.13	$131,721,863	0.096	0.0250
Cincinnati/Dayton, OH	Loin	$3.53	$38,011,212	0.167	0.0114
---	Ribs	$3.11	$16,740,840	0.190	0.0092
---	Shoulder	$2.26	$9,293,211	0.261	0.0084
---	B Sausage	$4.17	$31,085,013	0.142	0.0138
---	D Sausage	$4.39	$23,488,792	0.134	0.0073
---	Bacon	$5.88	$64,801,575	0.100	0.0128
Columbus, OH	Loin	$3.62	$23,561,731	0.163	0.0069
---	Ribs	$3.15	$11,385,783	0.188	0.0061
---	Shoulder	$2.03	$5,506,030	0.290	0.0055
---	B Sausage	$4.03	$15,523,691	0.146	0.0071
---	D Sausage	$4.27	$15,814,930	0.138	0.0050
---	Bacon	$5.99	$40,122,934	0.099	0.0078
Dallas/Ft. Worth, TX	Loin	$3.68	$73,971,767	0.160	0.0214
---	Ribs	$2.86	$51,714,905	0.206	0.0307
---	Shoulder	$1.75	$23,415,597	0.336	0.0272
---	B Sausage	$4.23	$47,053,136	0.139	0.0206
---	D Sausage	$4.40	$43,386,770	0.134	0.0134
---	Bacon	$6.08	$150,270,399	0.097	0.0288
Denver, CO	Loin	$3.89	$45,573,751	0.152	0.0125
---	Ribs	$3.21	$25,864,874	0.184	0.0137
---	Shoulder	$2.34	$15,206,812	0.252	0.0132
---	B Sausage	$4.73	$29,842,895	0.125	0.0117
---	D Sausage	$4.38	$43,325,516	0.135	0.0135
---	Bacon	$6.26	$88,687,687	0.094	0.0165
Detroit, MI	Loin	$3.60	$37,936,923	0.164	0.0112
---	Ribs	$3.03	$24,023,296	0.195	0.0135
---	Shoulder	$1.94	$9,840,766	0.304	0.0103
---	B Sausage	$4.24	$31,401,991	0.139	0.0137
---	D Sausage	$4.06	$34,166,675	0.145	0.0114

---	Bacon	$6.08	$83,284,282	0.097	0.0159
Grand Rapids, MI	Loin	$3.42	$16,558,234	0.173	0.0052
---	Ribs	$2.97	$11,421,777	0.198	0.0065
---	Shoulder	$2.17	$7,525,034	0.272	0.0071
---	B Sausage	$4.35	$13,242,661	0.136	0.0056
---	D Sausage	$4.15	$15,332,771	0.142	0.0050
---	Bacon	$6.07	$33,619,568	0.097	0.0064
Harrisburg/Scranton, PA	Loin	$3.39	$59,115,775	0.174	0.0185
---	Ribs	$3.23	$23,344,377	0.183	0.0123
---	Shoulder	$2.30	$12,838,970	0.256	0.0114
---	B Sausage	$5.14	$19,514,502	0.115	0.0070
---	D Sausage	$4.05	$39,519,375	0.146	0.0133
---	Bacon	$6.07	$74,490,704	0.097	0.0143
Hartford, CT/Springfiel, MA	Loin	$3.54	$39,886,339	0.167	0.0120
---	Ribs	$3.26	$16,112,345	0.181	0.0084
---	Shoulder	$2.18	$6,660,535	0.270	0.0062
---	B Sausage	$5.09	$6,752,603	0.116	0.0025
---	D Sausage	$4.62	$28,137,322	0.128	0.0083
---	Bacon	$6.89	$53,671,335	0.086	0.0091
Houston, TX	Loin	$3.45	$49,283,131	0.171	0.0152
---	Ribs	$2.65	$37,684,227	0.223	0.0242
---	Shoulder	$1.46	$18,594,571	0.405	0.0260
---	B Sausage	$4.36	$32,207,141	0.135	0.0137
---	D Sausage	$4.22	$36,171,778	0.140	0.0117
---	Bacon	$5.89	$92,369,498	0.100	0.0183
Indianapolis, IN	Loin	$3.56	$30,446,778	0.166	0.0091
---	Ribs	$3.08	$15,572,191	0.192	0.0086
---	Shoulder	$2.23	$8,064,524	0.264	0.0074
---	B Sausage	$4.12	$21,442,473	0.143	0.0096
---	D Sausage	$4.18	$16,278,756	0.141	0.0053
---	Bacon	$6.00	$50,384,488	0.098	0.0098
Jacksonville, FL	Loin	$4.04	$29,226,407	0.146	0.0077
---	Ribs	$3.47	$16,282,332	0.170	0.0080
---	Shoulder	$2.44	$8,323,849	0.241	0.0069
---	B Sausage	$4.81	$13,780,593	0.123	0.0053
---	D Sausage	$4.74	$15,081,070	0.125	0.0043
---	Bacon	$6.41	$44,067,331	0.092	0.0080
Knoxville, TN	Loin	$3.62	$16,761,578	0.163	0.0049
---	Ribs	$3.38	$7,172,829	0.175	0.0036
---	Shoulder	$2.04	$4,113,719	0.289	0.0041
---	B Sausage	$4.10	$14,585,656	0.144	0.0066
---	D Sausage	$4.65	$7,084,397	0.127	0.0021
---	Bacon	$6.47	$32,276,001	0.091	0.0058
Las Vegas, NV	Loin	$3.38	$19,512,293	0.175	0.0061

---	Ribs	$3.07	$15,059,879	0.192	0.0083
---	Shoulder	$2.35	$4,997,589	0.251	0.0043
---	B Sausage	$4.41	$10,345,164	0.134	0.0043
---	D Sausage	$3.82	$15,134,431	0.154	0.0054
---	Bacon	$5.82	$39,817,458	0.101	0.0080
Los Angeles, CA	Loin	$4.25	$91,999,717	0.139	0.0230
---	Ribs	$3.18	$91,528,251	0.185	0.0488
---	Shoulder	$2.30	$36,123,613	0.256	0.0320
---	B Sausage	$4.84	$39,160,398	0.122	0.0150
---	D Sausage	$4.42	$98,742,874	0.133	0.0304
---	Bacon	$6.90	$229,086,069	0.085	0.0386
Louisville, KY	Loin	$3.57	$18,539,848	0.165	0.0055
---	Ribs	$3.17	$8,146,687	0.186	0.0044
---	Shoulder	$2.13	$4,541,429	0.277	0.0043
---	B Sausage	$4.05	$10,633,782	0.146	0.0049
---	D Sausage	$4.30	$9,083,944	0.137	0.0029
---	Bacon	$5.77	$32,344,670	0.102	0.0065
Miami/Ft. Lauderdale, FL	Loin	$4.11	$81,081,337	0.144	0.0210
---	Ribs	$3.54	$52,502,457	0.167	0.0252
---	Shoulder	$2.28	$19,711,725	0.259	0.0176
---	B Sausage	$5.39	$13,176,220	0.109	0.0045
---	D Sausage	$5.09	$31,179,978	0.116	0.0083
---	Bacon	$6.97	$83,197,742	0.085	0.0139
Nashville, TN	Loin	$3.96	$27,902,854	0.149	0.0075
---	Ribs	$3.41	$13,990,059	0.173	0.0070
---	Shoulder	$2.14	$7,701,477	0.275	0.0073
---	B Sausage	$4.31	$18,637,708	0.137	0.0080
---	D Sausage	$4.59	$14,328,168	0.128	0.0042
---	Bacon	$6.15	$53,946,457	0.096	0.0102
New Orleans, LA/Mobil, AL	Loin	$3.88	$50,697,931	0.152	0.0139
---	Ribs	$3.30	$27,509,728	0.179	0.0142
---	Shoulder	$2.30	$11,660,066	0.257	0.0103
---	B Sausage	$4.60	$21,912,465	0.128	0.0088
---	D Sausage	$5.10	$63,996,341	0.116	0.0171
---	Bacon	$6.16	$68,001,352	0.096	0.0128
New York, NY	Loin	$3.27	$145,587,468	0.181	0.0474
---	Ribs	$3.29	$78,263,177	0.179	0.0404
---	Shoulder	$2.10	$29,014,991	0.281	0.0282
---	B Sausage	$6.31	$29,269,364	0.093	0.0086
---	D Sausage	$4.43	$102,163,216	0.133	0.0314
---	Bacon	$6.84	$218,216,613	0.086	0.0371
Orlando, FL	Loin	$4.05	$61,832,654	0.146	0.0162
---	Ribs	$3.46	$31,046,988	0.171	0.0153
---	Shoulder	$2.51	$14,052,716	0.236	0.0114

---	B Sausage	$4.90	$22,122,212	0.120	0.0083
---	D Sausage	$4.56	$27,033,422	0.130	0.0081
---	Bacon	$6.49	$85,260,440	0.091	0.0153
Peoria/Springfield, IL	Loin	$3.54	$23,998,825	0.167	0.0072
---	Ribs	$3.08	$11,095,239	0.192	0.0061
---	Shoulder	$2.18	$8,600,114	0.270	0.0080
---	B Sausage	$4.41	$16,400,414	0.134	0.0069
---	D Sausage	$4.20	$16,346,236	0.140	0.0053
---	Bacon	$6.09	$39,311,618	0.097	0.0075
Philadelphia, PA	Loin	$3.55	$69,409,265	0.166	0.0208
---	Ribs	$3.32	$31,704,641	0.178	0.0162
---	Shoulder	$2.23	$13,249,899	0.265	0.0121
---	B Sausage	$5.30	$39,326,956	0.111	0.0137
---	D Sausage	$4.19	$46,584,612	0.141	0.0151
---	Bacon	$6.34	$112,593,195	0.093	0.0207
Phoenix/Tucson, AZ	Loin	$3.23	$55,113,013	0.183	0.0182
---	Ribs	$2.70	$35,047,460	0.218	0.0220
---	Shoulder	$2.20	$15,202,670	0.268	0.0141
---	B Sausage	$4.41	$25,310,594	0.134	0.0106
---	D Sausage	$3.87	$48,798,186	0.153	0.0172
---	Bacon	$5.87	$102,745,932	0.100	0.0204
Pittsburgh, PA	Loin	$3.68	$27,290,789	0.160	0.0079
---	Ribs	$3.35	$10,870,988	0.176	0.0055
---	Shoulder	$2.62	$5,347,151	0.225	0.0042
---	B Sausage	$5.02	$15,944,750	0.117	0.0059
---	D Sausage	$4.71	$14,638,232	0.125	0.0042
---	Bacon	$6.02	$41,426,077	0.098	0.0080
Portland, OR	Loin	$3.37	$28,079,639	0.175	0.0089
---	Ribs	$3.35	$14,703,866	0.176	0.0075
---	Shoulder	$2.22	$8,186,946	0.266	0.0075
---	B Sausage	$4.56	$17,796,512	0.129	0.0072
---	D Sausage	$4.50	$23,132,209	0.131	0.0070
---	Bacon	$5.59	$60,661,810	0.106	0.0126
Providence, RI	Loin	$3.70	$8,346,322	0.159	0.0024
---	Ribs	$3.11	$3,979,608	0.190	0.0022
---	Shoulder	$2.25	$1,453,042	0.263	0.0013
---	B Sausage	$5.38	$1,845,806	0.110	0.0006
---	D Sausage	$4.71	$7,253,949	0.125	0.0021
---	Bacon	$7.13	$13,602,046	0.083	0.0022
Raleigh/Greensboro, NC	Loin	$3.71	$50,432,222	0.159	0.0145
---	Ribs	$3.25	$22,337,656	0.181	0.0117
---	Shoulder	$1.81	$12,909,167	0.326	0.0145
---	B Sausage	$4.66	$35,707,657	0.127	0.0142
---	D Sausage	$4.34	$23,603,299	0.136	0.0074

---	Bacon	$6.32	$84,010,901	0.093	0.0155
Richmond/Norfolk, VA	Loin	$3.64	$42,094,156	0.162	0.0123
---	Ribs	$3.28	$18,632,102	0.180	0.0097
---	Shoulder	$1.75	$11,314,920	0.337	0.0132
---	B Sausage	$4.41	$28,295,318	0.134	0.0119
---	D Sausage	$4.30	$22,959,840	0.137	0.0073
---	Bacon	$6.05	$76,378,319	0.097	0.0147
Roanoke, VA	Loin	$3.57	$34,261,091	0.165	0.0102
---	Ribs	$3.26	$11,780,624	0.181	0.0061
---	Shoulder	$1.76	$8,325,678	0.334	0.0096
---	B Sausage	$4.18	$26,788,210	0.141	0.0119
---	D Sausage	$4.31	$11,999,172	0.137	0.0038
---	Bacon	$6.15	$64,329,125	0.096	0.0122
Sacramento, CA	Loin	$4.02	$17,954,367	0.147	0.0048
---	Ribs	$3.37	$17,118,936	0.175	0.0086
---	Shoulder	$2.48	$8,776,405	0.238	0.0072
---	B Sausage	$5.47	$12,845,357	0.108	0.0043
---	D Sausage	$5.15	$17,176,227	0.115	0.0045
---	Bacon	$7.00	$45,612,811	0.084	0.0076
San Diego, CA	Loin	$4.37	$16,943,192	0.135	0.0041
---	Ribs	$3.24	$15,374,493	0.182	0.0081
---	Shoulder	$2.37	$6,390,651	0.249	0.0055
---	B Sausage	$5.02	$9,847,698	0.118	0.0036
---	D Sausage	$4.54	$19,206,571	0.130	0.0058
---	Bacon	$7.24	$46,617,587	0.082	0.0075
San Francisco/Oakland, CA	Loin	$4.06	$32,836,259	0.145	0.0086
---	Ribs	$3.47	$28,814,909	0.170	0.0141
---	Shoulder	$2.43	$13,282,947	0.242	0.0111
---	B Sausage	$5.95	$14,857,025	0.099	0.0046
---	D Sausage	$5.88	$27,351,381	0.100	0.0063
---	Bacon	$7.91	$65,632,166	0.075	0.0097
Seattle/Tacoma, WA	Loin	$3.87	$26,948,479	0.152	0.0074
---	Ribs	$3.53	$17,651,767	0.167	0.0085
---	Shoulder	$2.38	$9,609,524	0.247	0.0082
---	B Sausage	$4.90	$19,854,792	0.121	0.0075
---	D Sausage	$4.82	$22,537,944	0.123	0.0064
---	Bacon	$6.53	$56,439,690	0.090	0.0101
South Carolina	Loin	$3.88	$89,225,616	0.152	0.0244
---	Ribs	$3.35	$44,751,082	0.176	0.0227
---	Shoulder	$2.00	$24,181,760	0.295	0.0247
---	B Sausage	$4.46	$55,372,887	0.132	0.0229
---	D Sausage	$4.45	$40,497,104	0.133	0.0124
---	Bacon	$6.18	$139,796,209	0.095	0.0263
Spokane, WA	Loin	$3.90	$5,313,412	0.151	0.0014

---	Ribs	$3.49	$3,201,775	0.169	0.0016
---	Shoulder	$2.52	$1,831,836	0.234	0.0015
---	B Sausage	$4.65	$5,558,523	0.127	0.0022
---	D Sausage	$4.56	$4,776,450	0.129	0.0014
---	Bacon	$6.03	$12,203,581	0.098	0.0024
St. Louis, MO	Loin	$3.37	$29,445,086	0.175	0.0093
---	Ribs	$2.82	$14,222,026	0.209	0.0086
---	Shoulder	$2.11	$19,630,891	0.280	0.0190
---	B Sausage	$4.74	$25,447,612	0.125	0.0099
---	D Sausage	$3.94	$22,908,016	0.150	0.0079
---	Bacon	$6.00	$57,713,618	0.098	0.0112
Syracuse, NY	Loin	$3.45	$15,290,039	0.171	0.0047
---	Ribs	$3.19	$5,620,422	0.185	0.0030
---	Shoulder	$1.98	$3,869,906	0.298	0.0040
---	B Sausage	$4.77	$4,354,338	0.124	0.0017
---	D Sausage	$4.66	$15,757,935	0.127	0.0046
---	Bacon	$6.25	$21,044,079	0.094	0.0039
Tampa/St. Petersburg, FL	Loin	$4.08	$64,975,087	0.144	0.0169
---	Ribs	$3.50	$34,239,568	0.169	0.0166
---	Shoulder	$2.51	$17,329,539	0.235	0.0141
---	B Sausage	$5.02	$24,518,193	0.117	0.0090
---	D Sausage	$4.56	$31,856,212	0.129	0.0095
---	Bacon	$6.60	$88,825,595	0.089	0.0157
Toledo, OH	Loin	$3.58	$21,278,898	0.165	0.0063
---	Ribs	$3.06	$10,708,109	0.193	0.0060
---	Shoulder	$2.04	$6,103,267	0.289	0.0061
---	B Sausage	$4.04	$16,363,338	0.146	0.0075
---	D Sausage	$4.29	$16,681,436	0.138	0.0053
---	Bacon	$5.84	$36,546,641	0.101	0.0073
West Texas/New Mexico	Loin	$3.35	$54,442,180	0.176	0.0173
---	Ribs	$2.89	$34,622,459	0.204	0.0203
---	Shoulder	$2.13	$19,538,490	0.278	0.0187
---	B Sausage	$4.39	$29,980,943	0.134	0.0126
---	D Sausage	$4.04	$27,755,719	0.146	0.0094
---	Bacon	$5.82	$98,369,748	0.101	0.0197
Wichita, KS	Loin	$3.61	$10,953,874	0.163	0.0032
---	Ribs	$2.92	$5,794,412	0.202	0.0034
---	Shoulder	$2.25	$4,315,896	0.262	0.0039
---	B Sausage	$4.08	$7,866,648	0.144	0.0036
---	D Sausage	$4.15	$6,970,072	0.142	0.0023
---	Bacon	$5.72	$19,754,485	0.103	0.0040
Food-away-from-home	Loin	$7.32	$1,753,684,926	0.081	0.2550
---	Ribs	$6.54	$1,016,380,073	0.090	0.2640
---	Shoulder	$4.42	$507,380,786	0.133	0.2340

---	B Sausage	$9.17	$930,580,921	0.064	0.1875
---	D Sausage	$8.85	$1,220,197,215	0.067	0.1875
---	Bacon	$12.32	$3,015,610,149	0.048	0.2850
Foreign	Loin	$4.57	$644,737,105	0.129	0.1500
---	Ribs	$4.09	$288,744,339	0.144	0.1200
---	Shoulder	$2.76	$298,140,419	0.214	0.2200
---	B Sausage	$5.73	$1,163,226,151	0.103	0.3750
---	D Sausage	$5.53	$1,525,246,518	0.107	0.3750
---	Bacon	$7.70	$330,659,008	0.077	0.0500