Food Distribution Research Society

Journal of Food Distribution Research
Volume 54, Issue 1, pp. 33–44

Research Report: Are State Branded Products Local? A Case in Missouri

Lan Tran[a] and Ye Su[b✉]

[a]*Researcher, Lincoln University of Missouri,*
E4 Building, 144 Xuan Thuy Str., Cau Giay Dist, VNU-University of Economics and Business,
Hanoi, Vietnam

[b]*Assistant Professor, Department of Agribusiness,*
311 Foster Hall, 820 Chestnut Street, Lincoln University of Missouri,
Jefferson City, MO 65101, USA

Abstract

This study aims to analyze consumer perceptions and preferences for local and state-sponsored labels and how consumers' familiarity with the state brand affects their willingness to pay for the labeled products using the case of Missouri. We found that the local label and state brand differ from the consumer perspective. Consumers familiar with the Missouri Grown brand and who support farms in Missouri were willing to pay a higher premium for the state brand than the local label.

Keywords: state brand, local food, consumer preferences, choice experiment

✉Corresponding author: Tel: (573) 681-5370
Email: suy@lincolnu.edu

Introduction

Local food has received significant interest from consumers, producers, and communities. Under this trend, all U.S. states have launched state-sponsored marketing programs to promote local food to benefit agribusinesses, consumers, and state economies (Witzling, 2021). Many states also established state-sponsored brands and treated them as local food (e.g., Jersey Fresh, Go Texan, and Colorado Grown), differentiating products from other origins (Patterson, 2006). The effectiveness of state-sponsored food promotion programs depends on consumers' definition of local food, awareness of the state labels, and willingness to pay for the labeled products. Compared to typical local products, those certified by the state promotion programs are well defined. However, few studies have compared consumer preferences among state-branded products and local food. This study fills the research gap and answers the following questions using the case of Missouri: (i) how do consumers define local food; (ii) do consumers treat local and state-branded products the same; and (iii) do consumers' familiarity with the state brand and attitudes toward the state affect their willingness to pay (WTP) for local and state-branded products?

Background: Missouri Grown Program

The Missouri Department of Agriculture launched the Ag Missouri program in 1985 and rebranded it to Missouri Grown (Brown, 2003). The program's website (missourigrownusa.com) provides a searchable list of members who offer products in five categories: baked goods, fruits and vegetables, meat, dairy and eggs, snacks and beverages, and everything else. Producers can be listed on the website for free and use the Missouri Grown logo with a minimum $50 annual membership fee. There are more than 1,000 members in the Missouri Grown program, including producers, food manufacturers, retailers, etc. This program also offers events to help members market their products.

Data and Empirical Model

Data

An online Missouri consumer survey was conducted through Amazon Mechanical Turk (MTurk) from December 2021 to January 2022.[1] Consumer preferences for local and Missouri Grown food were examined in a nine-scenario choice experiment for fresh tomatoes. Four attributes, price, origin, producer type, and production method, were selected (see Table 1). Each choice set has three alternatives and an opt-out option. An example of choice questions is shown in Table 2. Fresh tomatoes were used because they are one of the most common produce items purchased by consumers as well as their popularity in multiple marketing channels in Missouri (Piñero and Keay, 2018). Demographics and consumer definitions for local were also elicited. The valid respondents were at least 18 years old, residents of Missouri, primary grocery shoppers, and fresh tomato consumers in the past 12 months. The sample consisted of 343 valid respondents, including 151

[1] The survey was approved by the Lincoln University IRB board.

males and 192 females, with an average age of 41 and an average income of $58,000 (see Table 3). A majority of them were Caucasian (79%).

Table 1. Attributes and Levels of Choice Experiment

Attributes	Level 1	Level 2	Level 3
Production method	Organic	50% reduced pesticide*	Conventional
Origin	Local	Missouri Grown	
Farm type	Small and medium family	Large family	Large corporation
Price of tomatoes	$1.99/lb.	$2.99/lb.	$3.99/lb.

Notes: *The 50% reduced pesticide technique can be defined as the methods farmers use to reduce by half the pesticide amounts usually used in tomato cultivation.

Table 2. A Sample Scenario for the Choice Experiment

Option A	Option B	Option C
Organic	Conventional	50% reduced pesticide
Not local or Missouri Grown	Local	Missouri Grown
Large family	Large corporation	Large family
$2.99/lb	$3.99/lb	$1.99/lb

Note: Options for answer to the question, "Which choice for buying tomatoes would you prefer: Option A, Option B, Option C, None of them?"

Table 3. Characteristics of Local and Missouri Grown Consumers

Demographic Characteristics	Sample	Local Consumers	Missouri Grown Consumers
No. of observations	343	294	133
Gender			
Male	43.2%	44.2%	50.4%
Female	56.0%	54.8%	49.6%
Age			
18–24	5.2%	4.8%	7.5%
25–34	31.5%	31.3%	33.1%
35–44	28.6%	29.3%	27.8%
45–54	16.9%	16.3%	12.8%
55–64	14.0%	14.3%	15.0%
65 or older	3.8%	4.1%	3.8%
Education			
High school and less	21.0%	20.8%	15.8%
2-year/associate's degree	13.1%	12.9%	6.8%
4-year /bachelor's degree	41.7%	41.8%	52.6%
Graduate or professional degree	24.2%	24.5%	24.8%

Table 3. (cont)

Demographic Characteristics	Sample	Local Consumers	Missouri Grown Consumers
Race			
Caucasian	78.7%	80.5%	72.7%
Others	21.3%	19.5%	27.3%
Income			
Less than $25,000	12.0%	10.9%	9.1%
$25,000–$50,000	32.7%	32.4%	30.3%
$50,000–$75,000	21.9%	22.5%	25.0%
$75,000–$100,000	16.1%	16.4%	19.7%
$100,000 and above	17.3%	17.7%	15.9%
House location			
Rural	25.1%	25.2%	21.1%
Suburban	41.7%	41.5%	35.3%
Urban	33.2%	32.3%	42.9%
Children			
No children	51.5%	49.0%	43.1%
At least 1 child	48.5%	51.0%	56.9%

Empirical Model

Following McFadden (1974), Cameron and James (1987), Train and Weeks (2005), and Train (2016), we developed an empirical model to measure WTP for tomato attributes:

$$Utility\,(choice) = b_0 OptOut + b_1 Price + b_2 Local + b_3 MissouriGrown + b_4 Organic + b_5 50\%ReducedPesticide + b_6 SmallFamily + b_7 LargeFamily \quad (1)$$[2]

Where the consumer utility is represented by part-worth utilities for conjoint attributes of the selected option, all variables (except price) enter the model as dummy variables, b_0 captures the utility of the opt-out alternative, b_1 represents the marginal utility of price, and b_k $(k = 2, \ldots, 7)$ indicates the estimated WTPs for non-price attributes, which are implied by the ratio of marginal utility of non-price attributes to marginal utility of price. The WTP measures are expressed in $/lb.[3]

[2] Details of the formula are provided in Figure 1.
[3] Details of the calculation are provided in Figure 1.

Willingness-to-pay (WTP) for attributes in a discrete choice experiment is analyzed on the basis of Random Utility Models (McFadden 1974). Typically, the random utility of a choice or alternative "j" in choice scenario "t" is often specified as a linear function of price "p" and non-price attributes "x" of the alternative "j" and their corresponding weights: "α" and "β" respectively, plus stochastic component "ε" of the utility:

$$Utility_j(choice = \mathrm{j}) = -\alpha * \mathrm{p_{jt}} + \beta' x_{jt} + \varepsilon_{jt} \qquad \text{(i)}$$

In the standard practice for application of choice models, WTP for non-price attributes are implied by the ratio of estimated utility coefficients to the estimated price coefficient from the model (i) (known as estimating WTP in "preference space"). However, this approach is limited considering impacts of correlated attributes on their WTP and unreasonably large standard deviations (SDs) of the implied WTPs (Train and Weeks, 2005).

Seminal works of Cameron and James (1987), Train and Weeks (2005) indicate practitioners can overcome these limitations by estimating WTP from a parameterized model where the distributional assumptions and restrictions are placed on the WTP instead of the coefficients (referred as estimating WTP in "willingness-to-pay space"):

$$Utility_j(choice = \mathrm{j}) = -\gamma(\mathrm{p_{jt}} + wtp' * x_{jt}) + \varepsilon_{jt} \quad \text{(ii)}$$

where γ is a scalar parameter and wtp represents vector of WTP for non-price attributes. Model (ii) is equivalent to (i) but allows random scalar that would be helpful to address different correlation patterns in utility coefficients, leads to small variance of WTP estimates, and offers directly interpretable measurments in terms of currency (a detailed explanation for this parameterization can be found in Train and Weeks (2005), Helveston et al. (2018)).

To account for potential correlations between pairs of attributes like "local" and "organic," "local" and "small&medium family farms" and pay attention to accuracy of WTP estimates, we adopt the approach "WTP space" in this paper. This is also particularly convenient when the goal of the study is to compare the value of attributes like "local" and "Missouri Grown". In this regard, we assume normal distributions for price and WTP of non-price attributes. Further, we incorporate a fixed effect of alternative specific constant (ASC) into (ii) to resolve endogeneity issues when repeating choice experiment over nine scenarios (Helveston et al. 2018). Following Train (2016), a logit form of the probability that individual "i" chooses alternative "j" in scenario "t" conditional on β_i in the WTP space becomes:

$$P_{ijt}(\beta_\mathrm{i}) = \frac{e^{-\gamma_i(\mathrm{ASC} + \mathrm{p}_{ijt} + wtp_i' * x_{ijt})}}{\sum_{k \epsilon T} e^{-\gamma_i(\mathrm{ASC} + \mathrm{p}_{ikt} + wtp_i' * x_{ikt})}} \qquad \text{(iii)}$$

Noting that $\beta_\mathrm{i} = \gamma_i wtp_i'$ and the random parameters in the logit model (iii) can be estimated by maximizing a simulated log-likelihood function (Train 2016).

Given attributes and attribute levels of alternatives, and ASC represents the opt-out option in the experiment, the baseline model is specified as model (1). Also, to explore heterogeneity in WTP for origin labels in terms of Missouri Grown's awareness and state supporting attitude, an extended model (iv) is developed by adding interaction terms between local, Missouri Grown labels and these factors to model (1) (e.g., Bazzani et al., 2017).

$$\begin{aligned} Utility\,(choice) = {} & b_0 OptOut + b_1 Price + b_2 Local + b_3 MissouriGrown + b_4 Organic \\ & + b_5 50\%ReducedPesticide + b_6 SmallFamily + b_7 LargeFamily \\ & + b_8 Local * MG\_awareness + b_9 MissouriGrown * MG\_awareness \\ & + \beta_{10} Local * SupportMissouri + \beta_{11} MissouriGrown * SupportMissouri \end{aligned} \qquad \text{(iv)}$$

where b_0 captures the portion of the utility associated with the opt-out option, b_1 represents estimate of price coefficient, b_k $(k = 2, \dots, 7)$ indicate the estimated WTPs for non-price attributes, b_k $(k = 8, \dots, 11)$ indicate marginal effects of Missouri Grown awareness and "supporting farms in Missouri" attitude on the WTP for local and Missouri Grown label, respectively. All the variables (except price) enter the model as dummy variables, for example Local, MissouriGrown as opposed to neither local nor Missouri Grown label, Organic, 50%ReducedPesticide as opposed to conventional method, and SmallFamily, LargeFamily as opposed to large corporation producer.

Figure 1. Willingness-to-pay Estimation in the Willingness-to-pay Space

Results

Definitions of Local Food

Local food was defined by two dimensions, geographic distance and producer type. About 56% of respondents defined local using geographic distance, 9% by producer type, and 34% defined by a combination of the two. Geographically, 33% of consumers considered food grown in Missouri as local, and the remainder proposed distance matters (see Figure 2). The most common distance was 100 miles from their home. Regarding producers, as long as family farmers produced the food, most respondents did not care about their size. Among the respondents, 87% have purchased local food in the past 12 months based on their definition of local. Grocery stores/supermarkets and farmers' markets were the most popular shopping channels for local food, representing 70% of the choices. The most important reason to purchase local food was to support local small farmers, followed by support local community, local food is healthier, local food is more environmentally friendly, the origin of local food is clear, and others (see Figure 3). The number one reason for not purchasing local food was not being aware of local food, and the second was that it is too expensive.

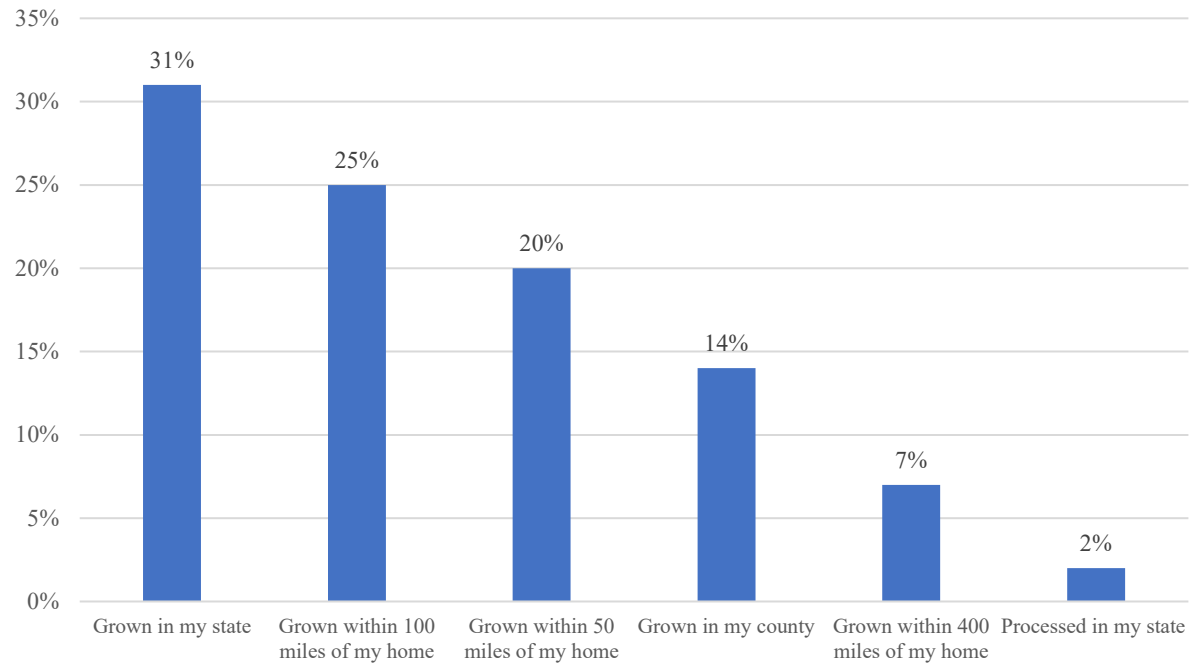

Figure 2. How Local Is Defined by Geographic Perspective

Figure 3. Reasons for Buying Local Food (Percentage of Responses)

Awareness of Missouri Grown Label

The survey showed that less than half of the sample (47%) had seen the Missouri Grown logo, most often in grocery stores or farmers' markets. Within this group, about 83% had purchased products labeled with Missouri Grown. Of those who had not seen the label before, 80% would like to buy products with the label if they see them. Some reasons to purchase Missouri Grown products reported by the participants were supporting Missouri farms (87%), supporting communities (63%), Missouri Grown products have better quality (32%), and familiarity with Missouri Grown products (31%) (see Figure 4). Regarding the reasons for not buying Missouri Grown products, too expensive and not different from other products were most common (94% and 84%, respectively), followed by not being familiar with Missouri Grown products (66%).

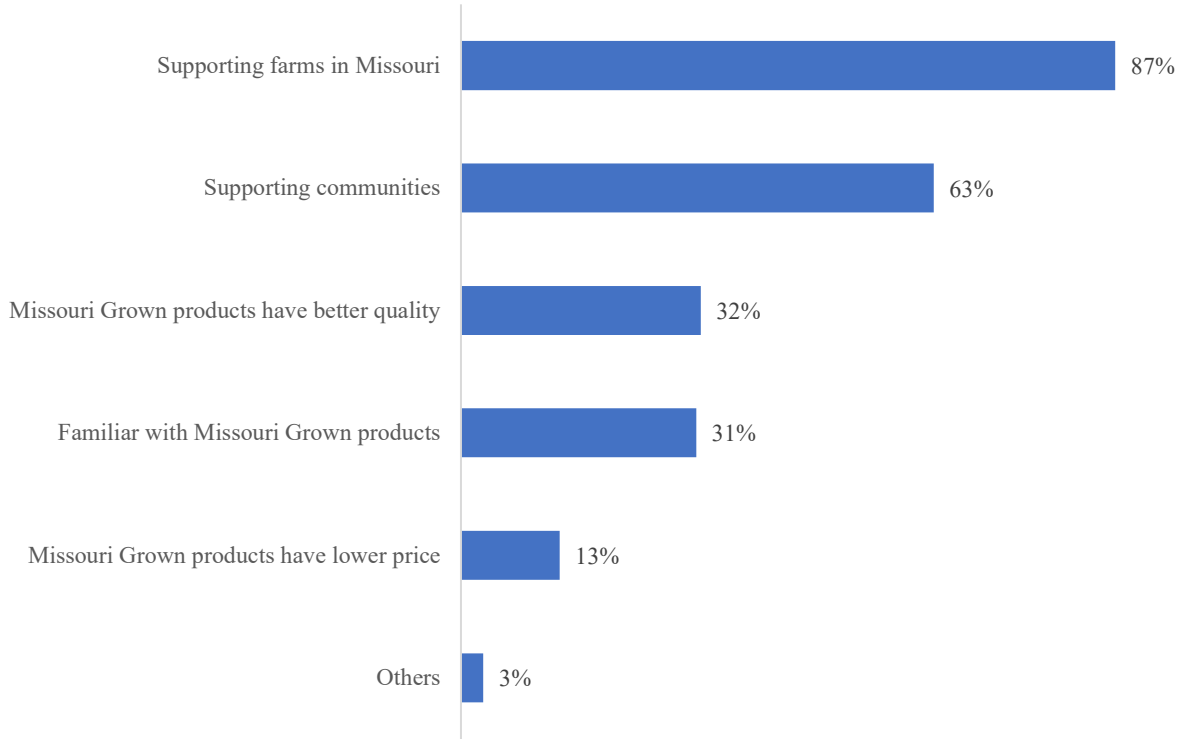

Figure 4. Reasons for Buying Missouri Grown Food (Percentage of Responses)

Consumer Preferences for Missouri Grown and Local Food

Using the estimated results of model 1, we found that respondents preferred tomatoes with local and Missouri Grown labels produced by family farmers rather than their counterparts, non-local, non-Missouri Grown, or non-family farms (see Table 4). Consumers would pay a premium of 41 cents/lb for Missouri Grown and 11 cents/lb for local tomatoes compared to non-labeled products, equivalent to a premium of 21% for Missouri Grown and 6% for local. The premium for the Missouri Grown label is comparable with the 27.5% premium for state-branded fresh produce found by Carpio and Isengildina-Massa (2009). However, the premium for local was small compared to the 41.4%–52.2% premium obtained from a meta-regression in Printezis, Grebitus, and Hirsch (2019). One possible explanation is that local is a loosely defined label and can vary significantly across individuals and products (Printezis et al., 2019). The Missouri Grown label may attract the attention of consumers who are seeking a more clearly defined concept of local, who are aware of the logo, or who are familiar with and support activities and policies of the Missouri Grown program. In our survey, more than 30% of consumers considered state-grown products local, indicating Missouri Grown products include not only local characteristics but also possibly additional features, such as state loyalty, pride, and benefits of the program. One evidence for additional benefits is that consumers would pay an extra 26 cents/lb for tomatoes produced by family farms rather than large corporations in this study. It is understandable because the two most important reasons to purchase local or Missouri Grown products were to support farmers and local communities, also suggested by Meas et al. (2015).

Table 4. Estimation Results of the Willingness-to-Pay Model

	Baseline Model	
Attribute-specific Variables	**Coefficient**	**Std.Error**
Opt-out	-7.231***	0.523
Price	-0.991***	0.058
Local	0.107*	0.057
Missouri Grown	0.411***	0.047
Organic	0.368***	0.050
50% reduced pesticide use	0.178**	0.049
Small, medium family farm	0.258***	0.065
Large family farm	0.260***	0.068
Heterogeneity (Standard Deviation)		
Price	2.389***	0.212
Local	0.038	0.113
Missouri Grown	0.595***	0.070
Organic	0.738***	0.058
Reduced 50% pesticide use	0.272***	0.076
Small, medium family farm	0.610***	0.062
Large family farm	0.109	0.224

To explore why consumers were willing to pay premiums for Missouri Grown and local tomatoes, we examined the estimated WTPs of different consumer groups: (i) consumers who were familiar with the Missouri Grown logo vs. those who were not, and (ii) consumers who supported Missouri farms vs. those who did not. For this purpose, we included interactions between the origin labels (local and Missouri Grown) and two dummy variables in model 1. One variable is awareness of Missouri Grown, and the other is supporting Missouri's farms. We found that the estimated WTP for local and Missouri Grown are significantly different across these consumer groups in the model with interactions (see Table 5). In particular, the two dummy variables, awareness of the Missouri Grown logo and supporting Missouri farms, both have positive effects on the premiums for Missouri Grown but negative effects for local tomatoes. Familiarity with the Missouri Grown logo influenced consumers' willingness to pay a premium of 29 cents/lb for Missouri Grown tomatoes but discounted local products by 15 cents/lb. Consumers supporting farms in Missouri would pay a premium of 19 cents/lb for Missouri Grown tomatoes but discounted local tomatoes by 72 cents/lb. Overall, the premium for the Missouri Grown tomatoes would be 48 cents/lb when consumers were familiar with the Missouri Grown logo, 38 cents/lb if consumers supported farms in Missouri, and 67 cents/lb if consumers knew the Missouri Grown logo and supported Missouri farmers (see Table 6). Table 6 shows changes in WTP for local and Missouri Grown tomatoes across consumer segments based on their familiarity with the Missouri Grown logo and supporting attitudes toward farms in Missouri. The premiums for Missouri Grown increased when consumers were aware of the state logo, supported farms in the state, or had both characteristics. However, consumers' WTP to pay for local decreased when they knew the Missouri Grown logo or supported Missouri farms. The findings support the state investments in local food marketing promotion programs and indicate that local producers can improve their sales using state brands.

Table 5. Estimation Results of Willingness-to-Pay Model with Interactions

	Extended Model	
Attribute-Specific Variables	**Coefficient**	**Std.Error**
Opt-out	-6.940***	0.490
Price	-1.079***	0.065
Local	0.675***	0.114
Missouri Grown	0.193**	0.093
Organic	0.314***	0.046
50% reduced pesticide use	0.191***	0.046
Small, medium family farm	0.361***	0.049
Large family farm	0.202***	0.045
Interaction terms		
Local * Missouri Grown awareness	-0.148*	0.080
Missouri Grown * Missouri Grown awareness	0.288***	0.101
Local * Support Missouri farmers	-0.721***	0.121
Missouri Grown * Support Missouri farmers	0.192**	0.098

Table 6. WTP for Local and Missouri Grown Labels ($/lb) with Interaction

	Consumers Who Are Not Familiar with Missouri Grown Logo and Not Supporting Farms in Missouri	**Consumers Who Are Familiar with Missouri Grown Logo**	**Consumers Who Are Supporting Farms in Missouri**	**Consumers Who Are Familiar with Missouri Grown Logo and Supporting Farms in Missouri**
No. of consumers	46	161	260	124
WTP for local	0.68	0.53	-0.04	-0.19
WTP for Missouri Grown	0.19	0.48	0.38	0.67

Conclusions and Policy Implications

In this research, we examined whether consumers treated local food and state-branded products differently using the case of Missouri. We found that 30% of consumers defined products grown in Missouri as local geographically, but the rest defined local based on different distances from their location. About 87% of consumers have purchased local food in the past 12 months. Almost half of the consumers have seen the Missouri Grown label before, and more than 80% of them have purchased Missouri Grown products. Supporting farms in Missouri and supporting local communities were the two most important reasons consumers purchased local or Missouri Grown products. Supermarkets and farmers' markets were the most important shopping channels for local

and Missouri Grown products. Familiarity with the Missouri Grown Program and logo and supporting farms in Missouri can increase consumers' WTP for Missouri Grown products but decrease their WTP for local food.

The higher premium for the Missouri Grown label implies that Missouri Grown members can increase their sales by using the Missouri Grown logo and targeting the consumers who know the state logo and those supporting Missouri farms. Missouri Grown and other similar state-sponsored programs can improve the effectiveness of these programs by raising familiarity with the state logo among their residents and expanding the consumer segment. This would be helpful not only for Missouri Grown products but also generally local promotion in terms of competition with products from other states or other countries.

Acknowledgment

This project is funded by the USDA-NIFA Capacity Building Grant No. 1024566 and NIFA/AFRI grant No. 2022-67024-36111

References

Bazzani, C., V. Caputo, R.M. Nayga, and M. Canavari, M. 2017. "Revisiting Consumers' Valuation for Local versus Organic Food Using a Non-hypothetical Choice Experiment: Does Personality Matter?" *Food Quality and Preference* 62:144–154.

Brown, C. 2003. "Consumers' Preferences for Locally Produced Food: A Study in Southeast Missouri." *American Journal of Alternative Agriculture* 18(4):213–224.

Cameron, T.A., and M.D. James, M.D. 1987. "Efficient Estimation Methods for 'Closed-ended' Contingent Valuation Surveys." *The Review of Economics and Statistics* 69:269–276.

Carpio, C.E., and O. Isengildina-Massa. 2009. "Consumer Willingness to Pay for Locally Grown Products: The Case of South Carolina." *Agribusiness: An International Journal* 25(3):412–426.

Helveston, J.P., E.M. Feita, and J.J. Michalek. 2018. "Pooling Stated and Revealed Preference Data in the Presence of RP Endogeneity." *Transportation Research Part B-Methodological* 109:70–89.

Meas, T., W. Hu, M.T. Batte, T.A. Woods, and S. Ernst. 2015. "Substitutes or Complements? Consumer Preference for Local and Organic Food Attributes." *American Journal of Agricultural Economics* 97(4):1044–1071.

McFadden, D. 1974. "Conditional Logit Analysis of Qualitative Choice Behavior." In P. Zarembka, ed. *Frontiers in Econometrics*. New York: Academic Press.

Patterson, P.M. 2006. "State-Grown Promotion Programs: Fresher, Better?" American Agricultural Economics Association. *Choices.*

Printezis, I., C. Grebitus, and S. Hirsch. 2019. "The Price Is Right? A Meta-regression Analysis on Willingness to Pay for Local Food." *PLoS ONE* 14.

Train, K., and M. Weeks. 2005. "Discrete Choice Models in Preference Space and Willingness-to-Pay Space." In R. Scarpa and A. Alberini, eds. *Applications of Simulation Methods in Environmental and Resource Economics. The Economics of Non-Market Goods and Resources*, vol 6. Dordrecht, Netherlands: Springer.

Train, K. 2016. "Mixed Logit with a Flexible Mixing Distribution." *Journal of Choice Modelling* 19:40–53.

Witzling, L. 2021. "Fresh, Grown, Made, and Proud: How State Governments Use Stewardship to Collectively Promote Their State's Food Products." *Journal of Applied Communications* 105(4):Cov6–Cov6.