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## **Picking up Pawpaws: An Evaluation of Consumer Willingness to Sample Unusual Regional Products**

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### **Abstract**

Product sampling is a widely used strategy to introduce consumers to unusual products in an effort to build market penetration and demand. Two products that are especially popular in the mid-south of the U.S. include pawpaw fruits and sorghum syrup. This study examines regional differences of consumer interest sampling products made from pawpaws and sorghum syrup in farmers markets while considering possible spatial and demographic characteristics influencing consumer interest. The results showed stronger state-by-state differences for sorghum products than for pawpaw products with particularly higher likelihood to sample products in the deep southern states.

**Keywords:** farm market, locally produced products, pawpaw, sampling, sorghum syrup

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## Introduction

Consumers have been showing significant interest in locally produced products, and the demand for local foods has further been shown in some cases to vary by region (Hu et al. 2012). Specialty value-added products that include regional favorites such as pawpaw fruits and sorghum syrup have been explored by producers directly selling in farmers' markets (Pomper and Crabtree 2010; Pomper 2009; Mask and Morris 1991). Product sampling is a widely used strategy to introduce consumers to unusual products in an effort to facilitate market penetration and increase demand. Producers of both products are exploring market expansion and the possible development of value-added products that could help overcome limits of perishability and limited use and thereby reach beyond the region. This study examines regional differences in consumer interest in sampling and identifies other influential demographic characteristics.

Processed value-added pawpaw products have the potential to extend the marketing season, but marketers perceive they need to build on existing consumer demand and recognition for the fresh product. Sweet sorghum<sup>1</sup> is native to Ethiopia, and introduced to America in the colonial times (Bomford, 2012). Since then, sweet sorghum syrup has been produced at some level around the contiguous 48 states. Currently, however, sweet sorghum syrup production in Kentucky makes up about 90% of the total U.S. output among the Southeastern and Midwestern states (Bitzer 1997). Sweet sorghum syrup, however, is produced on a smaller scale than most sweeteners and also marketed in a relatively narrow geographic segment (Ravensthorpe 2012). Interest in value-added products from sorghum syrup has been less driven by perishability limits but more by expanded market utilization.

Consumers with limited market access to traditional pawpaw and sorghum syrup products may be willing to consider value-added forms of these products. This study investigates sampling interests at farmers' markets as a starting point for measuring the potential marketability of pawpaw and sorghum syrup products.

## Empirical Models and Data

This study looks at sampling interest for pawpaw and sorghum products in farm markets where traditional product forms are typically sold. Specifically, it examines (1) the various food retail locations where those responding favorably to these products have sampled other products and (2) the regional and demographic differences of explaining variation in consumer interest in sampling these products. Logit and probit models, which readily indicate marginal effect of the independent variables on sampling interest, were utilized in this study.

The likelihood to sample the products is measured by a seven point Likert scale from 1: "*not at all likely*" to 7: "*very likely*". The Likert scale (4) represents that respondents are at least somewhat likely to sample the products. Thus, the Likert scale range of 4 (anchored by "*somewhat likely*") to 7 ("*very likely*") is treated as an indicator that respondents have positive propensity to sample the products, and the rest of the Likert scale (from 1 to 3) indicate a negative propensity

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<sup>1</sup> The sweet sorghum is used to identify the variety of *Sorghum bicolor* (L.) Moench. The sweet sorghum profile can be retrieved from: <http://plants.usda.gov/java/profile?symbol=SOBI2>

to sample the products.<sup>2</sup> Therefore, the probability of propensity to sample the products can be presented as:

$$(1) p = pr(y_i = 1 | x_i) = F(x'\beta) = \begin{cases} \frac{\exp(x'_i\beta)}{1+\exp(x'_i\beta)} & \text{for logit} \\ \Phi(x'_i\beta) & \text{for probit} \end{cases}$$

where  $y_i = 1$  indicates positive propensity to sample;  $x_i$  denotes independent variables. The probability of the logit model is the cumulative density function of the logistic distribution; and the probability of the probit model is the cumulative density function of the standard normal distribution. The marginal effects are calculated as  $\partial p / \partial x_j = F'(x'\beta)\beta_j$  for the logit and probit models. The empirical specifications in this study for pawpaw and sorghum syrup products are:

$$(2) \text{pawpaw} = y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_{16} X_{16} + \varepsilon$$

$$(3) \text{sorghum} = y^* = \gamma_0 + \gamma_1 X_1 + \gamma_2 X_2 + \dots + \gamma_{15} X_{15} + \varepsilon$$

where the dependent variables (*pawpaw* and *sorghum*) are explained by sixteen and fifteen independent variables ( $X_s$ ), respectively, while the  $\beta_s$  and  $\gamma_s$  are parameters to be estimated. The explanatory variables consist of demographic and regional characteristic variables.

A web-based survey of 3,406 farmers' market patrons was conducted exploring a variety of food sampling questions in eight Mid-South U.S. states (including Virginia, West Virginia, Ohio, Indiana, Illinois, Missouri, Kentucky, and Tennessee) in 2012. The responses of the sample are proportional to the relative population of each state. This survey was conducted through an existing consumer panel maintained by Zoomerang.com, an affiliate of MarketTools, Inc.

The demographic independent variables included in this study are: *Female*, *Age*, *Race* (*white*, *non-white*), *Have kids*, *Education*, and *Income*. Residence was designated as either rural (countryside or farm) or urban (urban or suburban). State location is also identified, i.e. *MO*, *KY*, *TN*, *WV*, *VA*, *IL*, *IN*, and *OH*. Ohio is selected to be an intercept state for comparison.

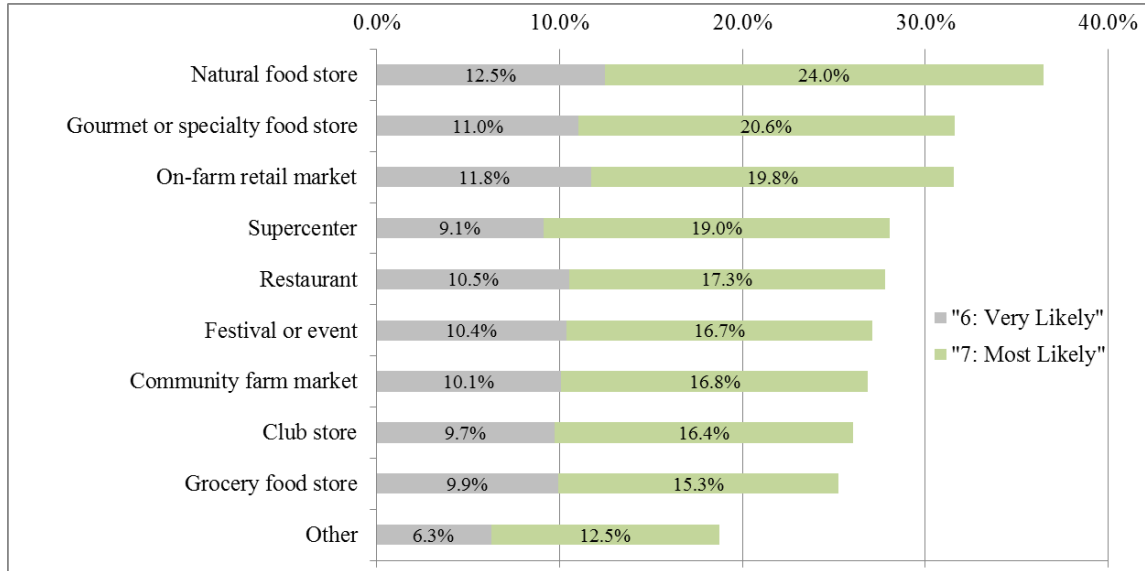
The definitions and sample descriptive statistics of these variables are presented in Table 1. Over half of the respondents have positive propensity to sample pawpaw and sorghum syrup products.

## Sampling Interests at Farmers' Markets

Farmers' markets are popular venues for vendors to introduce unusual and regional products to consumers with an interest shaped by their regional preferences. Pawpaw and sorghum syrup products are popular in the Mid-South of the United States. Respondents were asked how likely they would be to sample a variety of different products if offered during their farmers' market visit. Individuals responding to pawpaw and sorghum with Likert scores of 6 and 7 ("very

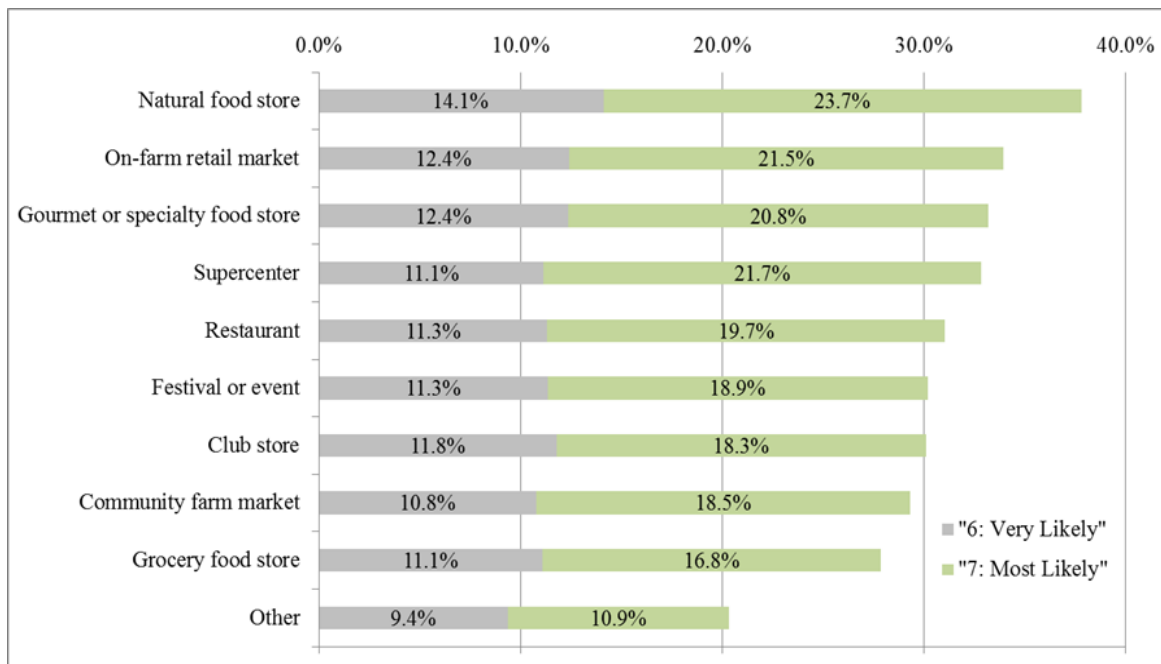
<sup>2</sup> An ordered logit model was applied first. However, it did not meet the proportional odds assumption (equivalent parameterization), so a generalized ordered logit model, also called partial proportional odds model, was applied. Since the findings of the generalized ordered logit model suggest no particular differences among each group comparison, here we provide the simplest set of outcomes by using binary probit and logit models. The full set of the generalized ordered logit outcomes is available upon request.

likely”) were further asked to indicate whether they had any sampling experiences within the past 12 months in ten sampling sites. Notably, respondents that are *very likely* to sample pawpaw products (Figure 1) and sorghum product (Figure 2) are sampling most frequently at natural food stores and gourmet or specialty food stores.



**Figure 1.** Recent General Food Sampling Sites Indicated by Likely Pawpaw Patrons

**Note:** N=3,406 respondents from MO, KY, TN, WV, VA, IL, IN, and OH



**Figure 2.**

**Note:** N=3,406 respondents from MO, KY, TN, WV, VA, IL, IN, and OH

**Table 1.** Definitions and Sample Statistics of Variables ( $N=3,406$ )

|                  | Description of Variables  | Mean  | Std. Dev. | Min. | Max.  |
|------------------|---|-------|-----------|------|-------|
| <i>Pawpaw</i>    | Binary variable=1 if respondent chooses <i>at least above somewhat likely</i> (4) to sample pawpaw products, 0 otherwise        | 0.62  | 0.48      | 0    | 1     |
| <i>Sorghum</i>   | Binary variable=1 if respondent chooses <i>at least above somewhat likely</i> (4) to sample sorghum syrup products, 0 otherwise | 0.63  | 0.48      | 0    | 1     |
| <i>Female</i>    | Binary variable=1 if respondent is female, 0 otherwise  | 0.61  | 0.48      | 0    | 1     |
| <i>Age</i>       | Continuous variable; years of age   | 47.93 | 14.24     | 10   | 70    |
| <i>White</i>     | Binary variable=1 if respondent's race is white, 0 otherwise  | 0.88  | 0.31      | 0    | 1     |
| <i>Have kids</i> | Binary variable=1 if respondent has kids under 18 years old at home, 0 otherwise  | 0.35  | 0.47      | 0    | 1     |
| <i>Education</i> | Continuous variable; years of education   | 14.37 | 2.14      | 8    | 18    |
| <i>Income</i>    | Continuous variable; total yearly household income before tax (\$ thousand)   | 62.16 | 42.79     | 7.5  | 237.5 |
| <i>Rural</i>     | Binary variable=1 if respondent is from countryside or farm, 0 otherwise (non-rural includes urban/suburban residence)          | 0.16  | 0.37      | 0    | 1     |
| <i>MO</i>        | Binary variable=1 if respondent is from Missouri, 0 otherwise (N=354)   | 0.10  | 0.30      | 0    | 1     |
| <i>KY</i>        | Binary variable=1 if respondent is from Kentucky, 0 otherwise (N=226)   | 0.06  | 0.24      | 0    | 1     |
| <i>TN</i>        | Binary variable=1 if respondent is from Tennessee, 0 otherwise (N=291)  | 0.08  | 0.27      | 0    | 1     |
| <i>WV</i>        | Binary variable=1 if respondent is from West Virginia, 0 otherwise (N=94)   | 0.02  | 0.16      | 0    | 1     |
| <i>VA</i>        | Binary variable=1 if respondent is from Virginia, 0 otherwise (N=385)   | 0.11  | 0.31      | 0    | 1     |
| <i>IL</i>        | Binary variable=1 if respondent is from Illinois, 0 otherwise (N=799)   | 0.23  | 0.42      | 0    | 1     |
| <i>IN</i>        | Binary variable=1 if respondent is from Indiana, 0 otherwise (N=395)  | 0.11  | 0.32      | 0    | 1     |
| <i>OH</i>        | Binary variable=1 if respondent is from Ohio, 0 otherwise (N=863)   | 0.25  | 0.43      | 0    | 1     |

## Empirical Regression Results

The estimated parameters from the logit and probit models are presented in Table 2. Table 3 reports the estimated marginal effects for the likelihood to sample pawpaw and sorghum syrup products. The estimated parameters are compared between the logit and probit models for *pawpaw* and *sorghum* in Tables 2 and 3.

**Table 2.** Results of Logit and Probit Models for the Likelihood to Sample for the Products

| Dependent Variable           | Pawpaw    |           | Sorghum   |           |
|------------------------------|-----------|-----------|-----------|-----------|
|                              | Logit     | Probit    | Logit     | Probit    |
| Estimator                    |           |           |           |           |
| <i>Female</i>                | -0.689**  | -0.422**  | -0.999*** | -0.606*** |
| <i>Age</i>                   | -0.013*** | -0.008*** | -0.012*** | -0.007*** |
| <i>Age*Female</i>            | 0.014***  | 0.008***  | 0.017***  | 0.010***  |
| <i>White</i>                 | 0.292***  | 0.181***  | 0.365***  | 0.224***  |
| <i>Have kids</i>             | 0.064     | 0.040     | -0.026    | -0.016    |
| <i>Education</i>             | 0.453**   | 0.284**   | 0.039**   | 0.023**   |
| <i>Education<sup>2</sup></i> | -0.014*   | -0.009*   | -         | -         |
| <i>Income</i>                | 0.001     | 0.0006    | 0.0005    | 0.0003    |
| <i>Rural</i>                 | 0.156     | 0.096     | 0.219**   | 0.131**   |
| <i>MO</i>                    | -0.080    | -0.050    | 0.335**   | 0.206**   |
| <i>KY</i>                    | 0.295*    | 0.180*    | 0.694***  | 0.418***  |
| <i>TN</i>                    | -0.039    | -0.024    | 0.582***  | 0.357***  |
| <i>WV</i>                    | 0.166     | 0.100     | 0.475**   | 0.290**   |
| <i>VA</i>                    | -0.160    | -0.098    | 0.025     | 0.015     |
| <i>IL</i>                    | -0.059    | -0.036    | 0.094     | 0.057     |
| <i>IN</i>                    | 0.099     | 0.062     | 0.130     | 0.081     |
| <i>constant</i>              | -2.668    | -1.675    | 0.165     | 0.102     |
| Log Likelihood               | -2241.898 | -2241.924 | -2203.740 | -2203.945 |
| LR $\chi^2$                  | 37.570    | 37.520    | 71.400    | 70.990    |
| Pseudo R <sup>2</sup>        | 0.008     | 0.008     | 0.015     | 0.015     |
| N. of observations           | 3406      | 3406      | 3406      | 3406      |
| Correctly predict            | 62.33%    | 62.33%    | 64.06%    | 64.12%    |
| Homoscedasticity test        | yes       | yes       | yes       | yes       |

**Note:** Asterisks indicate levels of significance: \*=0.10, \*\*=0.05, and \*\*\*=0.01.

Many estimated coefficients of the demographic characteristic variables are significant for both products. Race (white), gender (male), education, and residence (rural – for sorghum) have positive effects, while age has a negative effect.

The results showed stronger state-by-state differences for sorghum products than for pawpaw products with particularly higher likelihood to sample products in the deep southern states. Consumers in Kentucky were 7% more likely to have higher sampling interest compared to those in Ohio for pawpaw products; other state effects were not significant. Consumers in other states were more likely to have higher sampling interest than Ohio for sorghum products, including Kentucky (16%), Tennessee (13%), West Virginia (11%), and Missouri (8%). No differences were observed for consumers in Virginia, Illinois, or Indiana.

**Table 3.** Marginal Effects of the Likelihood to Sample Pawpaw and Sorghum Syrup

| Dependent Variable           | Pawpaw    |           | Sorghum   |           |
|------------------------------|-----------|-----------|-----------|-----------|
|                              | Logit     | Probit    | Logit     | Probit    |
| Estimator                    |           |           |           |           |
| <i>Female</i>                | -0.160**  | -0.159**  | -0.227*** | -0.224*** |
| <i>Age</i>                   | -0.003*** | -0.003*** | -0.002*** | -0.002*** |
| <i>Age*Female</i>            | 0.003***  | 0.003***  | 0.004***  | 0.003***  |
| <i>White</i>                 | 0.068***  | 0.068***  | 0.083***  | 0.083***  |
| <i>Have kids</i>             | 0.015     | 0.015     | -0.006    | -0.006    |
| <i>Education</i>             | 0.105**   | 0.107**   | 0.008**   | 0.008**   |
| <i>Education<sup>2</sup></i> | -0.003*   | -0.003*   | -         | -         |
| <i>Income</i>                | 0.0002    | 0.0002    | 0.0001    | 0.0001    |
| <i>Rural</i>                 | 0.036     | 0.036     | 0.049**   | 0.048**   |
| <i>MO</i>                    | -0.018    | -0.018    | 0.076**   | 0.076***  |
| <i>KY</i>                    | 0.068*    | 0.067*    | 0.158***  | 0.155***  |
| <i>TN</i>                    | -0.009    | -0.009    | 0.132***  | 0.132***  |
| <i>WV</i>                    | 0.038     | 0.037     | 0.108**   | 0.107**   |
| <i>VA</i>                    | -0.037    | -0.037    | 0.005     | 0.005     |
| <i>IL</i>                    | -0.013    | -0.013    | 0.021     | 0.021     |
| <i>IN</i>                    | 0.023     | 0.023     | 0.029     | 0.030     |

**Note:** Asterisks indicate levels of significance: \*=0.10, \*\*=0.05, and \*\*\*=0.01.

## Conclusion

Consumer interest in sampling pawpaw and sorghum syrup products has distinctive demographic and regional characteristics. The findings of this study have implications for marketing strategies geared toward expansion. There appears to be a strong connection between sampling interest for these products and gourmet/specialty food stores: retail venues that can be explored to help reach beyond the traditional farmers market. Demographics do seem to matter and can be considered for various product selection and merchandising strategies. Place is an important consideration. Consumers from different regions reflect different responses on unusual products sampling. Individuals from rural regions are more likely to sample sorghum syrup products. Individuals from Kentucky have positive likelihood to sample for both pawpaw and sorghum syrup products. Further, individuals from Missouri, West Virginia, and Tennessee are more positive likely to sample sorghum syrup products. The results showed stronger state-by-state differences for sorghum products than for pawpaw products, with particularly higher likelihood to sample products in the deep southern states.

These results should be informative to pawpaw and sorghum producers exploring value-added products and market expansion. The study goes beyond simply awareness and interest. Willingness to sample provides useful insight into who may be open to shopping for these kinds of products and where they may shop. Offering first-time sampling, or sampling what consumers understand to be an “unusual” product, is a widely used strategy in the market expansion process for food products. The results suggest regional markets and specific demographics where product development for pawpaws and sorghum syrup products is more likely to take place.



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