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## **Factors Affecting Producer Awareness of State Programs Promoting Locally Grown Foods: The Case of Fruit and Vegetable Growers in Tennessee**

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### **Abstract**

Interest in locally grown foods has increased over the past few years. Tennessee currently has two state-funded programs promoting the consumption of Tennessee agricultural products by linking producers and consumers-Tennessee Farm Fresh and Pick Tennessee Products. Factors associated with fruit and vegetable producer awareness of each of these programs are analyzed using a bivariate probit model. Findings suggest that awareness was associated with education, percentage of income from farming, use of University/Extension publications, attendance at University/Extension education events, and operation location. These results should be of assistance to individuals attempting to increase producer awareness of programs promoting locally grown foods.

**Keywords:** state-sponsored marketing programs, fruit and vegetable marketing, Tennessee producer awareness, bivariate probit regression.

## Introduction

Interest in locally grown foods (LGF) has dramatically increased over the past few years. In 2008, the U.S. market for LGF reached \$5 billion (Tropp 2008). Big box retailers and grocery chains increasingly dedicate shelf space to differentiate “locally grown” from “conventional” produce as evidenced by Wal-mart, the top buyer of LGF at \$400 million (Gambrell 2008). Interest in Community Supported Agriculture (CSA) programs is also growing (Brown and Miller 2008), and farmers markets are flourishing. Between 2000 and 2006, the number of farmers markets increased by 8.6% per year to 4,093 nationwide (Agricultural Marketing Service -USDA 2011). In Tennessee, the number of farmers participating in direct farm sales to consumers increased by 33% from 1997 to 2007. The number of farmers markets in Tennessee increased by 56% from 2006 to 2009.

There are several reasons for the increased interest in LGF (Onken, Bernard, and Pesek 2011). LGF may provide health and nutrition benefits because they may be fresher and their increased availability may encourage consumers to make healthier food choices (Martinez et al. 2010). LGF may also play a role in ameliorating a community’s concerns over food security<sup>1</sup>. LGF provide a way for consumers to support local farmers and local economies (Gregoire and Strohbehn 2002; Peterson, Selfa, and Janke 2010; Starr et al. 2003). The sales retained within a region as consumers substitute LGF for imported products increases local farm revenue and regional income (Swenson 2009). Finally, consumption of LGF may have environmental benefits in reducing food miles to market, thereby moderating the use of fossil fuels in transportation (Anderson 2007; Gomez 2010)<sup>2</sup>.

Because of these perceived benefits, federal and state governments have adopted a number of programs to support producers attempting to supply LGF (Martinez et al. 2010; Onken, Bernard, and Pesek 2011). Examples of federal programs include the Fresh Program, the Women and Infant Childcare (WIC) Farmers Market Nutrition Program (FMNP), and the Senior’s Farmers Market Nutrition Program (SFMNP). The Fresh Program is a partnership of the U.S. Department of Defense and the U.S. Department of Agriculture (USDA) to promote the consumption of fresh, locally grown foods by schools and other institutions. The FMNP and SFMNP issue coupons to seniors and WIC participants that can be used at authorized farmers markets, roadside stands, and CSAs.

There are also a number of state-level programs designed to promote the consumption of LGF. For example, in Tennessee there are currently two state-funded programs to support and develop markets for Tennessee-grown products. Pick Tennessee Products (PTP) was created by the Tennessee Department of Agriculture in 1986. In 2008, the Tennessee Department of Agriculture - this time in cooperation with the Tennessee Farm Bureau - created Tennessee Farm Fresh (TFF). The purpose of both programs is to link producers with marketing channels for LGF and to in-

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<sup>1</sup> Food security has been defined as all people at all times having access to enough food for an active, healthy life (Nord and Andrews 2002).

<sup>2</sup> The extent to which a shift toward LGF would actually engender environmental benefits is uncertain given that distance traveled is an imperfect measure of the environment impact of food transportation (Coley, Howard, and Winter 2009) and that the production of food typically has a larger impact on the environment than its transportation (Weber and Matthews 2008).

form consumers about opportunities to purchase LGF. The PTP program promotes all products available at Tennessee farms, farmers markets, and other retail outlets, while TFF focuses on the promotion of fresh products grown in Tennessee, including fruit and vegetables, nursery, dairy and some livestock products. The two programs offer an array of similar benefits, including: a listing on a web-site directory, the right to use the TFF and PTP logos, and advertising benefits. The two programs are differentiated by the following: the TFF program offers a banner with the TFF logo, TFF stickers, price cards, TFF reusable bags, and free access to workshops offered through the University of Tennessee Center for Profitable Agriculture to their members while the PTP program offers the right to participate in their on-line store but participation in this program does not guarantee access to marketing tools (e.g., banner, price cards, stickers, workshops) (Howard 2012). Additionally, there are no fees required to participate in the PTP program, but the TFF program charges a \$100 annual fee for participation.

A first step in gauging the effectiveness of these programs is to better understand awareness of the programs among those producers who would be most likely to benefit from the services offered by the two programs. Thus, the objectives of this study are to gauge awareness of the programs among Tennessee's fruit and vegetable producers and to identify and evaluate the factors associated with producer awareness. The study's focus is on fruit and vegetable producers because produce growers account for a large portion of direct agricultural sales (USDA 2007; Onken, Bernard, and Pesek 2011), which is one of the main marketing outlets for LGF (Martinez et al. 2010; Low and Vogel 2011). The information provided by this study should be of assistance to governmental agencies and other institutions that are interested in increasing producer awareness of programs or other efforts promoting LGF. Greater awareness of such programs or efforts to expand awareness may help producers increase profit margins through the adoption of new marketing strategies.

## **Description of Data**

This study uses data from a 2011 survey of Tennessee's fruit and vegetable producers. The list frame for the survey was provided by USDA's National Agriculture Statistics Service (NASS) and included the entire population of fruit and vegetable producers in Tennessee. On February 2, 2011, the survey, a cover letter explaining the importance of the survey, and a postage paid return envelope were sent to Tennessee's 1,954 fruit and vegetable producers by first class mail. Approximately three weeks later, reminder postcards were sent. One month later, a second wave of surveys was mailed to those who had not returned the survey. Of the 1,954 questionnaires mailed, 587 were completed and returned, providing a response rate of approximately 30%. After eliminating observations with missing data, 316 responses were suitable for this analysis.

The survey included questions about: marketing outlets used to sell fruits and vegetables; barriers producers faced when participating in different markets; perceptions of the characteristics that define a "local" market; awareness of, and participation in, Tennessee's programs promoting LGF (i.e., TFF and PTP); and general farm business and operator characteristics. Secondary data concerning food marketing and other environmental factors or community characteristics (e.g., metro/non-metro county, number of farmers markets in a county) were collected from the Food Environmental Atlas (USDA, ERS 2011).

## Empirical Model

Produce grower awareness of the TFF and PTP programs can be empirically specified as,

$$(1) \quad \begin{aligned} y_{i1} &= \beta_1' x_{i1} + e_{i1} \\ y_{i2} &= \beta_2' x_{i2} + e_{i2} \\ \text{Corr}(e_{i1}, e_{i2}) &= \rho \end{aligned}$$

where  $y_{i1}=1$  if a producer is aware of TFF, and zero otherwise;  $y_{i2}=1$  if a producer is aware of PTP, and zero otherwise;  $\beta_1$ , and  $\beta_2$  are parameters associated with each awareness equation;  $e_{i1}$ , and  $e_{i2}$ , are random disturbances for each equation; and  $x_{i1}$ , and  $x_{i2}$  are vectors of observed producer, farm, and county characteristics that may influence the likelihood that a producer is aware of either program. Given the similarities in the two programs, there are unobserved variables that are likely to similarly influence awareness of each of the programs and, thus, the error terms for the two equations are likely to be correlated ( $\text{Corr}(e_{i1}, e_{i2}) = \rho$ ). A description of the variables used in this analysis is presented in Table 1 (see Appendix).

Producer characteristics hypothesized to influence awareness of PTP and TFF are: age (AGE); highest level of educational attainment, expressed in dichotomous variables for some high school (SOMEHS), high school graduate (HSGRAD), some college (SOME COLL), associate's degree (ASSOCDEG), bachelor's degree (BACHDEG), and graduate degree (GRADDEG); the percentage of taxable household income coming from farming, expressed in a dichotomous variable for less than 25 percent (PF\_INCOME); the number of University/Extension educational events or presentations related to produce marketing that the grower had attended in the past five years (EDUC\_EVENTS); and whether the producer had used University/Extension publications to obtain information about how to better market produce in the last 5 years (PUBLICATIONS).

Age is expected to be negatively correlated with awareness as older producers tend to have shorter planning horizons and may be less likely to search for programs that offer alternatives to current marketing efforts. Education is expected to be positively correlated with awareness as marketing produce directly to consumers requires special skills and abilities, not all of which are likely to be directly related to agricultural operations (Uva 2002; Uematsu and Mishra 2011). Thus, given that direct marketing to consumers is one of the main marketing outlets for LGF (Martinez et al. 2010; Low and Vogel 2011), it is expected that more educated farmers may be more willing to experiment with LGF marketing strategies and more likely to be aware of programs promoting LGF. The percentage of household income from farming is hypothesized to be positively correlated with awareness of the programs, as producers with a high percentage of income from farming are more likely to be willing to invest the time and effort needed to improve their bottom line sales through novel marketing strategies and, therefore, more likely to be aware of programs designed to meet those needs. Attendance at University/Extension outreach events or presentations related to produce marketing strategies is expected to increase producer exposure to, and thus awareness of, the programs. Similarly, the use of University/Extension publications to obtain information about how to better market produce is also expected to increase producer awareness of these programs.

The characteristics of the producer's operation included in the analysis are: size of the producer's fruit and vegetable operation in acres (VEGSIIZE); percentage of sales made directly to consumers (TDS), intermediaries (TIN), and retail outlets (TRE); percentage of direct sales to consumers in different geographic areas, expressed in dichotomous variables for in: the producer's county of operation (YOURCNTY); neighboring counties (NEXTCNTY); elsewhere in the state of Tennessee (INSTATE); elsewhere in the U.S. (INUS); and elsewhere in the world (OTHCNTRY).

It is hypothesized that the size of the producer's fruit and vegetable operation will be negatively correlated with awareness of the two programs. Producers managing larger operations may be more inclined to market products through wholesalers, whereas smaller operations might rely more on alternative marketing channels such as farmers markets and CSAs (Lockeretz 1986; Low and Vogue 2011; Watson and Gunderson 2010) where the services provided by the two programs would be of more use.

The percentage of sales made directly to consumers is likely to be positively correlated with producer awareness of the PTP and TFF programs as the services offered by these programs would seem to be more directly applicable to these types of sales. In addition, it could be that the concept of "local" is more important to the consumers who purchase produce directly from producers (Lockeretz 1986). Similarly, farmers who market produce directly to consumers through farmers markets and CSAs may have a greater chance of being exposed to programs promoting LGF as other producers also selling through these outlets may be already participating in programs promoting LGF (Low and Vogel 2011). Producers who market a greater share of their produce through intermediaries (e.g. wholesalers, grower cooperatives) or retailers (e.g. groceries) are less likely to be aware of programs promoting LGF, because the services offered by these programs may be less relevant to these types of sales and because consumers who purchase their produce through these outlets might be more interested in price than other characteristics (Lockeretz 1986). The percentage of a producer's direct sales to consumers in Tennessee is likely to be positively correlated with awareness of the programs promoting LGF given that the goal of these programs is to promote Tennessee-grown products. Therefore it is hypothesized that producers with a larger percentage of sales elsewhere in the U.S. and other countries are less likely to be aware of these programs.

The characteristics of the county in which the producer operates that are included in this analysis are: whether the county is located in east (EASTTENN), middle (MIDTENN), or west (WESTTENN) Tennessee; whether the county is a metropolitan county (METRO); and the number of farmers markets operating in the county (FMRKT10). Geographic location could influence producer awareness in a number of ways. Direct-to-consumer sales drivers are affected by regional characteristics such as proximity to farmers markets and to farmland (Low and Vogel 2011). Therefore, geographic location may explain producer exposure to programs promoting LGF. It is hypothesized that producers located in regions producing more fruit and vegetables and other specialty crops, and closer to farmers markets and farmer-to-grocer's marketing channels are more likely to be aware of programs promoting LGF (Low and Vogel 2011). Thus, it is also expected that the number of farmers markets located in the producer's county will positively influence the likelihood of program awareness. The greater the number of farmers markets in a county the more likely farmers would be to market fresh produce to this outlet.

Given that farmers markets are one of the most popular direct to consumer outlets for LGF it is expected that the greater the number of farmers markets in a county the more likely farmers are to be exposed to programs promoting LGF (Low and Vogel 2011).

### Estimation Methods

The awareness equations presented in (1) may be correlated ( $Corr(e_{i1}, e_{i2}) = \rho$ ) as explained above. Therefore, a bivariate probit regression was used to model awareness of TFF and PTP programs. Awareness of programs promoting LGF is hypothesized to be a function of observable exogenous variables.

Marginal effects are computed given the bivariate nature of the model (Greene 2003). The expected value of awareness of one of the programs (say,  $y_{i1}=1$ ), conditional on the respondent being aware of the alternative program ( $y_{i2}=1$ ) is defined as,

$$(2) \quad E(y_{i1} | y_{i2} = 1, \mathbf{x}) = \text{Prob}(y_{i1} = 1 | y_{i2} = 1, \mathbf{x}) = \frac{\text{Prob}(y_{i1} = 1, y_{i2} = 1 | \mathbf{x})}{\text{Prob}(y_{i2} = 1 | \mathbf{x})} \\ = \frac{\Phi_2(\mathbf{x}'\gamma_1, \mathbf{x}'\gamma_2, \rho)}{\Phi(\mathbf{x}'\gamma_2)},$$

where  $\mathbf{x} = \mathbf{x}_1 \cup \mathbf{x}_2$ ,  $\mathbf{x}'\gamma_m = \mathbf{x}_1' \boldsymbol{\beta}_m$ . Therefore  $\gamma_1$  contains all the nonzero elements of  $\boldsymbol{\beta}_1$  and possibly some zeros in the positions of variables in  $\mathbf{x}$  that appear only in equation 2 in (1).

In order to simplify the marginal effects expression lets define  $q_{i1} = 2y_{i1} - 1$  and  $q_{i2} = 2y_{i2} - 1$ .

Thus

$$(3) \quad q_{im} = \begin{cases} 1 & \text{if } y_{im} = 1 \\ -1 & \text{if } y_{im} = 0 \end{cases} \quad m = 1, 2$$

Additionally, let  $z_{im} = \mathbf{x}'_{im} \boldsymbol{\beta}_m$ ,  $w_{im} = q_{im} z_{im}$ , and  $\rho_i^* = q_{i1} q_{i2} \rho$ , and

$$(4) \quad g_{i1} = \phi(w_{i1}) \Phi \left[ \frac{w_{i2} - \rho_i^* w_{i1}}{\sqrt{1 - \rho_i^{*2}}} \right],$$

where  $\phi$  represents the univariate standard normal density function and  $\Phi$  represents the univariate standard normal cumulative distribution function. The subscripts 1 and 2 are reversed in (4) to obtain  $g_{i2}$ .

The derivative of (2) was taken with respect to the explanatory variables of interest to estimate the conditional marginal effects

$$(5) \quad \frac{\partial E(y_{i1} | y_{i2} = 1, \mathbf{x})}{\partial \mathbf{x}} = \left( \frac{1}{\Phi(\mathbf{x}'\gamma_2)} \right) \left[ g_1 \gamma_1 + (g_2 - \Phi_2 \frac{\phi(\mathbf{x}'\gamma_2)}{\Phi(\mathbf{x}'\gamma_2)}) \gamma_2 \right],$$

where  $g_1$  and  $g_2$  are defined in (4).

### *Multicollinearity Tests*

Multicollinearity may compromise inferences by inflating variance estimates (Greene 2003; Judge et al. 1988). A condition index was used to detect collinear relationships (Belsley, Kuh, and Welsch 1980). Condition indexes between 30 and 100 indicate that the explanatory variables have moderate to strong association with each other. A condition index accompanied by a proportion of variation above 0.5 indicates potential collinearity problems (Belsley, Kuh, and Welsch 1980).

## **Results and Discussion**

### *Sample Overview and Descriptive Statistics*

The average age of respondents included in this analysis (n=316) was 61 years, close to the average farmer age in Tennessee (58 years) according to the 2007 Census of Agriculture (USDA/NASS). For about 26% of the respondents the highest level of educational attainment was a bachelor's degree, followed by 22% who earned a graduate degree and 22% who graduated from high school but did not attend college. About 69% of respondents earned less than 25% of their household income from farming. Respondents had attended an average of 1.2 University/Extension educational events or presentations related to marketing strategies over the past five years. About 30% of the respondents had used University/Extension publications to obtain information about improving their produce marketing within the past five years.

The average size of the fruit and vegetable operations was 10.8 acres. The majority (about 84%) of sales made by the respondents were direct sales to consumers. Most (about 69% on average) of the direct sales made by the respondents in 2010 took place in their home county. The average percentage of direct sales made in neighboring counties and elsewhere in the state were 24% and 5%, respectively. About 42% of the respondents were located in Middle Tennessee, 40% in East Tennessee, and the remainder in West Tennessee. About 47% of the respondents lived in metropolitan counties.

About 42% of the respondents included in this analysis were aware of the TFF program and 54% were aware of the PTP program. Greater awareness of the PTP program is probably not too surprising given that it has been in existence for about 22 years longer than the TFF program. Comparisons of the mean values for producer, producer operation and county characteristics, on the basis of awareness of the TFF and PTP programs, are presented in Table 2 (See Appendix). Differences in mean values between those who were aware and those who were not aware of each program were compared using t-tests. Significant differences for the variables associated with producer characteristics were evaluated. The proportion of producers with 25% or less of their household income from farming who were unaware of the TFF and PTP programs was larger (80% and 83%, respectively) than the proportion of producers with 25% or less of their income from farming who were aware of these programs (55% and 58%, respectively). As expected, producers with a higher percentage of income from farming are more likely to be aware of programs design to increase sales through alternative marketing strategies, given that they have a higher dependence on the economic viability of the farming operation. On average, respondents who were aware of TFF and PTP had attended more University/Extension



educational events or presentations related to produce marketing over the last five years (2.1 and 1.9 events, respectively) compared to respondents who were not aware of the programs (0.5 and 0.3, respectively); as hypothesized, producers who attend these educational events may be more interested in alternative produce marketing strategies and more likely to be exposed to information about programs promoting LGF. Finally, about 48% of the respondents aware of TFF and 42% of those aware of PTP have used University/Extension publications to obtain information about how to better market their produce within the last five years, which is significantly higher than the 17% and 15% of producers not aware of TFF and PTP, respectively who used University/Extension publications for this purpose. University/Extension publications related to produce marketing strategies may include information about programs promoting LGF and therefore producers using these publications are more likely to be aware of TFF and PTP.

Significant differences for the variables associated with characteristics of the producer's operation were also considered. The average size of the fruit and vegetable operations was larger for respondents aware of TFF and those aware of PTP (17.1 and 14.3 acres, respectively) than those who were unaware of the programs (6.6 and 7.0 acres, respectively). Contrary to the hypothesis that local food marketing is more likely to occur on smaller operations (Martinez et al. 2010), for this sample, it seems that larger operations are more likely to be aware of programs promoting LGF in Tennessee. The average percentage of fruit and vegetable sales made in the county in which a producer's operation was located was significantly higher for producers unaware of TFF and PTP (75% and 78%, respectively) compared to producers who were aware of the two programs (60% for both). However, the average percentage of sales made in neighboring counties and elsewhere in the State was significantly higher for producers who were aware of TFF and PTP (29% and 30%, respectively for sales in neighboring counties, and 8% and 7%, respectively for sales elsewhere in the State) than for those who were unaware of the programs (20% and 17%, respectively for sales in neighboring counties and 3% for sales elsewhere in the State). As expected, producers with relatively more sales in Tennessee are more likely to be aware of programs promoting LGF given that the goal of these programs is to promote products grown in Tennessee. Nonetheless, respondents selling a higher percentage of their produce within their county of operation were less likely to be aware of TFF and PTP.

Finally, significant differences associated with the characteristics of the county in which the grower operates were identified. About 54% of the producers who were aware of TFF live in metropolitan counties while only 42% of the producers not aware of the program live in metropolitan counties. This result is explained by the fact that marketing of LGF is more likely to take place in metropolitan counties (Martinez et al. 2010).

#### *Bivariate Probit Marginal Effects*

The marginal effects of the bivariate probit model used to examine the factors affecting awareness of the TFF and PTP programs are presented in Table 3. The correlation coefficient between the residuals ( $\rho$ ) was positive and statistically significant at the 1% level, supporting the hypothesis that the error terms in the TFF and PTP awareness equations were correlated, and also suggesting that the bivariate probit approach appears appropriate.

**Table 3.** Conditional marginal effects from the Bivariate Probit Model for estimating factors affecting awareness of Tennessee Farm Fresh and Pick Tennessee Products.

Independent Variables	Marginal Effects of the Bivariate Probit Model	
	Prediction Conditions	
	AWARE_TFF=1 given AWARE_PTP=1	AWARE_PTP=1 given AWARE_TFF=1
AGE	0.0037 (0.0032)	-0.0044** (0.0018)
SOMEHS	0.2710*** (0.0858)	-0.3469** (0.1609)
HSGRAD	0.1280 (0.0925)	-0.0636 (0.0620)
SOMECOLL	0.0934 (0.1066)	-0.0505 (0.0713)
ASSOCDEG	-0.0812 (0.1514)	-0.0698 (0.0967)
GRADDEG	0.0396 (0.0999)	-0.0130 (0.0528)
PF_INCOME	-0.0452 (0.0834)	-0.0704* (0.0377)
EDUC_EVENTS	0.0172 (0.0219)	0.0246* (0.0130)
PUBLICATIONS	0.1920** (0.0742)	0.0059 (0.0407)
NEXTCNTY	0.0001 (0.0011)	0.0009 (0.0006)
INSTATE	0.0032 (0.0023)	0.0003 (0.0011)
INUS	0.0028 (0.0043)	-0.0024 (0.0020)
OTHCNTRY	-0.0039 (0.0072)	0.0043 (0.0042)
VEGSIZE	0.0062** (0.0031)	-0.0014 (0.0012)
TDS	0.0036* (0.0020)	-0.0006 (0.0009)
TIN	0.0003 (0.0024)	0.0011 (0.0011)
EASTTENN	-0.0322 (0.0776)	-0.0006 (0.0385)
WESTTENN	-0.0196 (0.1025)	-0.0273 (0.0551)
FMRKT10	-0.0126 (0.0323)	-0.0091 (0.0161)
METRO	0.1763** (0.0708)	-0.0417 (0.0361)

Table 3 presents the conditional marginal effects for PTP and TFF, as described in (5). Five of the explanatory variables had statistically significant marginal effects on awareness of the TFF program, given that the producer was aware of the PTP program. These five variables were whether the producer had some high school education (SOMEHS), whether the producer had used University/Extension publications to obtain information about marketing produce within the past five years (PUBLICATIONS), the size of the producer's fruit and vegetable operation in acres (VEGSIZE), the percentage of the producer's total sales made directly to consumers (TDS), and whether the producer's operation was located in a metropolitan county (METRO). Although these marginal effects were statistically significant some of them were very small in magnitude (i.e., VEGSIZE, TDS). The results suggest that producers located in a metropolitan county are 18% more likely to be aware of the TFF program, and producers who used University/Extension publication are 20% more likely to be aware of TFF, given that they are already aware of the PTP program. The marginal effect associated with the education variable (SOMEHS) has a positive sign. This result suggests that producers with some high school education tended to be more likely to be aware of TFF than producers with bachelor degrees. This result runs counter the hypothesis that more educated farmers are more likely to be aware of programs promoting LGF. A possible explanation for this result is that more educated farmers may be more likely to be employed part time off the farm and therefore may have less time to look for alternative marketing opportunities such as LGF. Statistically significant conditional marginal effects for the PTP awareness equation were those associated with age (AGE), education (SOMEHS), percentage of total household income from farming activities (PF\_INCOME), and the number of University/Extension educational events or presentations related to produce marketing strategies attended within the past five years (EDUC\_EVENTS). Again, some of the statistically significant marginal effects were very small in magnitude (i.e., AGE). The results suggest that, given awareness of the TFF program, producers with some high school education are 35% less likely to be aware of PTP than producers with bachelor degrees, while producers with less than 25% of their income coming from farming are 7% less likely to be aware of the PTP program and, finally, attending an additional educational event increases the likelihood of being aware of PTP by 2.5%.

In summary, producers who are already aware of the PTP program and who have used University/Extension publications to obtain information about how to better market produce in the last 5 years, operate larger fruit and vegetable operations, derive a higher percentage of their sales from direct-to-consumer outlets, and are located in metropolitan counties are more likely to be aware of the TFF program. On the other hand, younger, more educated producers, with more than 25% of their household income from farming, who have attended more University/Extension educational events or presentations related to marketing strategies to sell produce in the past five years are more likely to be aware of the PTP program, given awareness of the TFF program.

## Conclusions

The marketing of LGF continues to grow in popularity. The goal of this study is to evaluate fruit and vegetable producer awareness of the two Tennessee programs designed to enhance LGF marketing opportunities – TFF and PTP. A bivariate probit regression was used to measure the

association between the characteristics of the producer, the producer's operation, and the county in which the producer's operation is located and producer awareness of these programs.

The factors affecting awareness of TFF and PTP programs differed between the two programs. Use of University/Extension publications, size of the fruit and vegetable operation, percentage of sales from direct-to-consumers outlets, and location in a metropolitan county all significantly affected awareness of the TFF program. On the other hand, attendance at University/Extension education events, age, education, and percentage of income from farming were factors significantly affecting producer awareness of the PTP program. Policymakers such as the Tennessee Department of Agriculture and organizations that operate similar programs in other states, as well as University/Extension personnel may benefit from this information to better market these programs. This information may also help policy makers adjust limited funds to better promote these programs by better targeting their clientele and increasing awareness of the programs across the state.

Attendance at University/Extension educational events or presentations related to produce marketing and the use of University/Extension publications to obtain information about how to better market their produce were significant factors affecting awareness of both the PTP and TFF programs. These results suggest that the partnership between policy makers and Extension may increase effectiveness in spreading the word about state programs promoting LGF. Therefore, it may be important for policymakers to continue working with Extension to increase producer awareness of state programs promoting LGF. Nonetheless, producers who are unaware of the TFF and PTP programs may not be attending University/Extension educational events or presentations related to marketing strategies to sell produce and/or using University/Extension publications. Therefore, reaching these producers will require alternative strategies.

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## Appendix

**Table 1.** Definitions and Descriptive Statistics of Variables (n=316).

Variable	Description	Mean
<b>A. Dependent Variables</b>		
<i>AWARE_TFF</i>	=1 if farmer is aware of Tennessee Farm Fresh, zero otherwise	0.4114
<i>AWARE_PTP</i>	=1 if farmer is aware of Pick Tennessee Products, zero otherwise	0.5380
<b>B. Independent Variables</b>		
<i>AGE</i>	Age of producer in years	60.7089
<i>SOMEHS</i>	=1 if some high school is the highest level of education attained by the farmer, zero otherwise	0.0633
<i>HSGRAD</i>	=1 if high school diploma is the highest level of education attained by the farmer, zero otherwise	0.2152
<i>SOMECOLL</i>	=1 if some college is the highest level of education attained by the farmer, zero otherwise	0.1519
<i>ASSOCDEG</i>	=1 if an associate's degree is the highest level of education attained by the farmer, zero otherwise	0.0949
<i>BACHDEG</i>	=1 if a bachelor's degree is the highest level of education attained by the farmer, zero otherwise	0.2595
<i>GRADDEG</i>	=1 if a graduate degree is the highest level of education attained by the farmer, zero otherwise	0.2152
<i>PF_INCOME</i>	=1 if less than 25% of farmer household income comes from farming	0.6962
<i>EDUC_EVENTS</i>	The number of educational events the farmer has attended in the past 5 years	1.1416
<i>PUBLICATIONS</i>	=1 if the farmer has used University/Extension publications in the past 5 years	0.2975
<i>YOURCNTY</i>	Percent of direct sales to consumers in the county where the farmer operates	68.5158
<i>NEXTCNTY</i>	Percent of direct sales to consumers in neighboring counties of where the farmer operates	23.8070
<i>INSTATE</i>	Percent of direct sales to consumers elsewhere in the state	5.3212
<i>INUS</i>	Percent of direct sales to consumers elsewhere in the country	1.7547
<i>OTHCNTRY</i>	Percent of direct sales to consumers in other countries	0.6013
<i>VEGSIZE</i>	Size of fruit and vegetable operation in acres	10.8920
<i>TDS</i>	Percent of direct sales obtained from direct to consumer outlets	84.4842
<i>TIN</i>	Percent of direct sales obtained from direct to intermediary outlets	7.9114
<i>TRE</i>	Percent of direct sales obtained from direct to retail outlets	7.6044
<i>EASTTENN</i>	=1 if the farmer is located in East Tennessee, zero otherwise	0.3956
<i>MIDTENN</i>	=1 if the farmer is located in Middle Tennessee, zero otherwise	0.4241
<i>WESTTENN</i>	=1 if the farmer is located in West Tennessee, zero otherwise	0.1804
<i>FMRKT10</i>	The number of farmers markets in the county where the farmer operates	1.0475
<i>METRO</i>	=1 if farmer is located in a metropolitan county, zero otherwise	0.4684

**Table 2.** Variable means for respondents aware of the Tennessee Farm Fresh and Pick Tennessee Products programs and those not aware of the programs.

<b>Independent Variables <sup>a</sup></b>	<b>Tennessee Farm Fresh</b>		<b>Pick Tennessee Products</b>	
	Not Aware (n=186)	Aware (n=130)	Not Aware (n=146)	Aware (n=170)
<i>AGE</i>	61.6129	59.4154	63.5069***	58.3059
<i>SOMEHS</i>	0.0591	0.0692	0.0822	0.0471
<i>HSGRAD</i>	0.1989	0.2385	0.2192	0.2118
<i>SOMECOLL</i>	0.1613	0.1385	0.1644	0.1412
<i>ASSOCDEG</i>	0.1183*	0.0615	0.1164	0.0765
<i>BACHDEG</i>	0.2473	0.2769	0.2055**	0.3059
<i>GRADDEG</i>	0.2151	0.2154	0.2123	0.2176
<i>PF_INCOME</i>	0.7957***	0.5538	0.8288***	0.5824
<i>EDUC_EVENTS</i>	0.4839***	2.0827	0.2877***	1.8750
<i>PUBLICATIONS</i>	0.1720***	0.4769	0.1507***	0.4235
<i>YOURCNTY</i>	74.5699***	59.8539	78.4041***	60.0235
<i>NEXTCNTY</i>	20.1613**	29.0231	16.5411***	30.0471
<i>INSTATE</i>	3.2957**	8.2192	3.1370**	7.1971
<i>INUS</i>	1.3817	2.2885	1.8151	1.7029
<i>OTHCNTY</i>	0.5914	0.6154	0.1027	1.0294
<i>VEGSIIZE</i>	6.5880***	17.0500	6.9802**	14.2515
<i>TDS</i>	84.3172	84.7231	86.9726	82.3471
<i>TIN</i>	7.7527	8.1385	5.6233*	9.8765
<i>TRE</i>	7.9301	7.1385	7.4041	7.7765
<i>EASTENN</i>	0.4032	0.3846	0.4178	0.3765
<i>MIDTENN</i>	0.3925	0.4692	0.3699**	0.4706
<i>WESTENN</i>	0.2043	0.1462	0.2123	0.1529
<i>FMRKT10</i>	1.0645	1.0231	1.1370	0.9706
<i>METRO</i>	0.4194**	0.5385	0.4452	0.4882

\*, \*\*, \*\*\* denotes significance at the 10%, 5%, and 1% levels respectively based on t-tests.

<sup>a</sup> For variable definitions see Table 1.