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★ 2015 Award Winner ★
Richardson-Applebaum Scholarship Award
for Outstanding Graduate Research in Food Distribution and Marketing

Does Experience Overcome Perception Bias for Consumers of Grass-Finished Beef?

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Abstract

This research examines the shift in consumers' willingness to pay (WTP) for beef from cattle raised on native warm season grass and on Bermuda grass, an exotic species to the United States. Subjects participate in the Becker-Degroot-Marshak mechanism to determine their individual WTP. Analysis of the data demonstrates how the premiums/discounts consumers place on these differentiated product change across information regimes. Results revealed strong preferences for NWSG-fed beef regardless of finishing methods, and positive impacts of the sensory results and label information on grass-finished beef steaks.

Keywords: grass-fed beef, willingingness to pay, experimental auction, Becker-Degroot-Markshak (BDM) mechanism

[Φ]Corresponding author

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★ 2015 Award Winner ★
Food Distribution Research Society Scholarship Award for
Outstanding Undergraduate Research in Food Distribution and Marketing

Waste Not, Hunger Not: The Logistical Solution. Bringing Smallholder Farmers to the Market using Third-Party Logistics Providers

Olivia Reicks[Ⓘa]

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Abstract

Currently, one third of the world's food is wasted. The majority of food loss in developing countries occurs in the production and handling stages due to inefficient distribution systems. In Malawi, intermediate buyers have an oligopoly in the market which often forces farmers to sell at harvest for a reduced price. On-farm storage is limited for smallholder farmers who do not have economies of scale to build appropriate storage facilities. By infusing new competition from third-party logistics providers (3PLs), food waste will be reduced by relocating the commodities to centralized storage and smallholder farmers will earn higher incomes.

Keywords: reducing food waste, distribution efficiency, centralized storage

Ⓘ Corresponding author

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Cost Estimates and Investment Analysis for Muscadine Grapes Production in Georgia

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Abstract

Muscadine (*Vitis rotundifolia*), also known as wild grapes are native to the Southeastern United States and well adapted to the warm and humid conditions of the region. Georgia is the largest producer of muscadine grapes in the United States and has enjoyed a market niche for decades consisting of fresh fruit processed for jams, juice and wine. In recent years, precision breeding using cisgenic technology has allow the development of new disease-resistant and seedless cultivars with potentials to serve different end-use market segments. However, the profitability of muscadine grapes cultivars newly developed with cisgenic technology relative to those developed with traditional transgenic technology is still questionable. This study takes a first step in bridging the gap in the literature with the objective to estimate the cost, revenue and profitability of producing transgenic-bred muscadine grapes in Georgia using a Single Trellis System with drip irrigation. Subsequently, we plan to derive similar estimates for a new cisgenic-bred rot resistant and seedless counterpart, currently in field trials, and compare both estimates to determine which of the two has the highest economic potentials in term of profitability and or net returns to the growers.

Keywords: muscadine grapes, budgets, production costs, net returns, biotechnology

[Φ]Corresponding author

Introduction

Muscadine (*Vitis rotundifolia*), also known as wild grapes are native to the Southeastern United States and well adapted to the warm and humid conditions of the region. Georgia is currently the largest producer of muscadine in the United States and also houses a pioneer Land Grant Institution (the University of Georgia) in muscadine breeding stemming as far back as 1909 (Connor 2005; Connor 2015) . During the last decades significant advances in biotechnology through transgenic process have enabled scientists to develop improved and disease-resistant cultivars more adapted to specific local climates. In response to the consumer's growing preferences for bio-engineering food, more recently, breeding programs are shifting towards "green genetic engineering" or "precision breeding (PB)". According to Gray et al. (2014) and Gray et al. (2015), precision breeding (PB) is a newly-enabled approach to plant genetic improvement that transfers only specific desirable traits among sexually-compatible relatives via the mitotic cell division pathway in order to avoid the significant genetic disruption imposed upon conventional breeding by meiosis (sexual reproduction). This technology has allow for the development of new disease-resistant and seedless muscadine grapes cultivars with potentials to serve the growing and increasingly diverse end-use market segments for muscadine.

Muscadine has enjoyed a market niche for decades, marketed as fresh fruits and also processed for jams, juice and wine. The growing popularity of muscadine in Georgia and the southeast region partly attributed to the medicinal, nutritional and therapeutic attributes (Pashrana-Bonilla et al. 2003; Poling et al. 2003) due to high levels of antioxidants present in the grapes.

While precision-bred muscadine cultivars could offer significant advantages over transgenic grapes in terms of consumer's acceptability, little is known how their production will be profitable to growers relative to transgenic-bred grapes.

This study takes a first step in bridging the gap in the literature with the objective to estimate the cost, revenue and profitability of producing a transgenic-bred muscadine grapes in Georgia using a Single Trellis System with drip irrigation, planted 20 x 6 feet (within row and between rows spacing respectively). Subsequently, we plan to derive similar estimates for precision-bred rot resistant and seedless counterpart, currently in field trials, and compare both estimates to determine which of the two has the highest economic potentials in term of profitability and or net returns to the growers.

Methods

Economic farm enterprise budgets remain the primary approach utilized by extension professionals to determine the financial lucrativeness in terms of profitability margins of a particular enterprise such as muscadine. This information serves as a guide to growers, ag-students, specialists, county agents, ag-policy makers and financial institutions such as ag-lenders and banker. These budgets are based on traditional input costs, yield and price estimates (Fonsah et al. 2012; Fonsah et al. 2008; Fonsah and Hudgins 2007; Fonsah et al. 2007; Krewer et al. 2000). In this study we also explored the sensitivity net present Value (NPV) analysis which involves calculating revenue trends under different price and yield scenarios. The use of secondary data source mainly from Mississippi State University (MSU) and North Carolina State

University were very useful in developing certain sections of this enterprise budget (Mississippi State University 2010; Carlos-Carpio et al. 2006). However, because of the differences in climatic and ecological conditions and the fact that there are similarities and dissimilarities in agricultural practices across states lines, our source of primary data was obtained from Paulk Vineyards, (1788 Satilla Rd., Wray, GA 31798) the largest muscadine producer and marketer in the state of Georgia. Our farm and office visit was important as Paulk Vineyards shared its input costs information with us and explained the rational and importance of certain field operations captured in the budget.

Assumptions

Muscadine yields can vary from five to ten tons (MT) per acre depending on how well the grower adheres to recommended good agricultural practices (GAP) and recommendations from the different University of Georgia Extension specialists. In this study however, we assumed 8 MT/Ac during full production. We also assumed 5% interest rate in both short and long-term. We also assumed the price of $450/ton. of fresh muscadine.

Result

The 1st year estimated cost of growing muscadine using single curtain trellis and drip irrigation was $5060.71. In the 2nd years, the costs were reduced to $982.38. In the 3rd and 4th years, the cost increased to $2,137.19 and $3,027.59 respectively (see Table 1). A sensitivity NPV analysis using different yields (from 7– 9.5 tons/acre and different prices (from $350–$600/ton) was conducted. Results depicted that with a yield of 7.5 tons/acre and price of $500/ton, the NPV was $376.12. With a yield of 8 tons/acre and $500/ton, the NPV was $2,810.86/acre (see Table 2).

Table 1. Summary of Estimated Cost of Producing Muscadine Grapes

Year	Total Costs
1st	$5,060.71
2nd	$982.38
3rd	$2,137.19
4th	$3,027.59

Note. Using a Single Trellis System and Irrigation in Georgia, 2015.

Table 2. Sensitivity Net Present Value (NPV) of Producing Muscadine Grapes

	Yield (Tons/acre)					
Prices ($)	**7.00**	**7.50**	**8.00**	**8.50**	**9.00**	**9.50**
350.00	(12614.95)	(10910.63)	(9206.31)	(7501.99)	(5797.67)	(4093.35)
400.00	(9096.17)	(7148.38)	(5200.59)	(3252.79)	(1305.00)	**642.79**
450.00	(5577.39)	(3386.13)	(1194.86)	**996.40**	**3,187.67**	**5,378.94**
500.00	(2058.62)	**376.12**	**2,810.86**	**5,245.60**	**7,680.34**	**10,115.08**
550.00	**1,460.16**	**4,138.37**	**6,816.59**	**9,494.80**	**12,173.02**	**14,851.23**
600.00	**4,978.93**	**7,900.62**	**10,822.31**	**13,744.00**	**16,665.69**	**19,587.38**

Note. Using Single Curtain Trellis and Irrigation in Georgia, 2015.

Conclusion

Muscadine is a doable but risky business. Establishment cost was highest in year 1 ($5,061/ac) compared to subsequent years. Sensitivity Analysis show that with a yield of 8 ton/ac and price of $450, NPV is negative (-$1195). However NPV was $996.40 with a yield of 8.5 tons/ac at the price $450/ton. Also, net return was $2,810.86 with a price of $500/ton and yield of 8 tons/ac. Muscadine production has potential in Georgia and profit margins can be extremely significant if the grower adheres to good agricultural practices (GAP), and have sufficient start-up capital. There is a growing interest in muscadine production in Georgia as shown by the increase in acreages and continuous research by UGA Scientists and specialists. The crop is attracting more and more consumers due to its medicinal properties and multifaceted uses (fresh, jam and wine production) and recent report shows that Georgia has position herself as the largest producer of muscadine in the United States.

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The Potential Impacts of Green Certification Programs Focused on Food Waste Reduction on the Tourism Industry

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Abstract

As food contributes to 40% of the solid waste generated by resorts, food waste is a primary concern for the hospitality industry, which seeks to decrease costs in a low-margin business. Thus, industry and non-govenmental organizations have begun to address the issue. While consumer demand and willingness to pay premiums for sustainable practices and green-certified destinations continues to grow, the hospitality industry struggles to provide the experience environmentally conscious consumers seek. Resorts and tourism destinations are known for overuse and abuse of resources, resulting in long-term negative social and environmental impacts to local communities. The current study sets forth a plan to assess consumer awareness of green certification programs, the importance of food waste reduction in such certification programs, and their willingness to pay premiums at certified resorts. Results will provide pertinent information about the potential benefits of third-party green certification programs to the hospitality industry.

Keywords: consumer willingness to pay, food waste, green certification, tourism

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Introduction

The US Department of Agriculture (USDA) estimates food waste in the United States comprises approximately 35% of the total food supply. An estimated 133 billion pounds of food was wasted in 2010, valued at $161 billion USD (Buzby et al. 2014). In 2008, $47 billion of food at grocery stores was discarded and the amount of uneaten food in households and restaurants was valued at $390 per resident (Buzby and Hyman 2012). The economic, social, and environmental impacts of food waste are so immense, the USDA and the Environmental Protection Agency (EPA) have joined forces to establish the "U.S. Food Waste Challenge" which seeks to reduce food waste by 50 percent by 2030. Additionally, the Food Waste Reduction Alliance, a cross-industry effort consisting of restaurants, supermarkets, and grocery stores was initiated to define opportunities to reduce food waste and lobby for policies aimed at reducing waste and rewarding waste reduction.

Food waste is a primary concern for the hospitality industry, seeking to decrease costs in a low-margin business, and thus, industry and non-govenmental organizations have begun to address the issue (Green Hotelier 2014). Third-party organizations like the International Eco Tourism Society, Green Key Global, Eco Crown Hospitality, and Earth Check provide eco-rating and green resort certification programs for the hospitality industry, many of which address food waste management and reduction. The Las Vegas hospitality industry implemented a comprehensive recycling program with intensive sorting procedures which saves the resorts and restaurants thousands of dollars monthly through reclaimed tableware and linens inadvertently tossed, as wellas waste hauling fees. Nearly 40 percent of the waste generated at resorts in Las Vegas is food, food waste is sorted and is then used for animal feed at local farms (Miller 2011).

While consumer demand and willingness to pay premiums for eco-labeled products, use of sustainable practices, and green-certified destinations continues to grow (Campbell et al. 2015; Jensen et al. 2004), the hospitality industry struggles to provide the experience environmentally conscious consumers seek. Resorts and tourism destinations are known for overuse and abuse of resources, in fact, eco-tourism has been cited as an oxymoron in the media (Rose 2013; Wilcox 2015), which documents the enormous waste generated, endangerment to wildlife, and long-term negative environmental impact of resorts on local communities. For example, Sealey and Smith (2014) show that one single resort in the Bahamas contributes 36% of the total waste generated on the island.

The hospitality industry feels the third-party and self-certification programs address the needs and concerns of the environmentally concerned traveler (Green Hotelier 2014), but studies show (Wink 2005) that certification programs do not sufficiently distribute the necessary information to consumers interested in eco-friendly or green tourism destinations. Further, a study by Blackman and Rivera (2010) found that in only six of 37 case studies did certification lead to actual environmental or socioeconomic benefits. Three of the case studies focused on tourism. The authors found that eco-certification at a resort in Costa Rica did generate significant economic benefits (through premium pricing), but two other studies found certification actually decreased environmental performance at two ski resorts in the United States.

The current study adds to the literature by assessing consumer awareness of green, eco-friendly, and sustainable certification programs, the importance of food waste reduction in their decision

making, and their willingness to pay premiums at certified resorts. Results will provide pertinent information about the potential impact and benefits of these programs to the hospitality industry.

Data Collection and Modeling

An experimental study conducted through a nationwide online survey will take place in the fall of 2016. The survey questions will assess traveler familiarity with green/sustainable certification programs, preferences for food waste reduction in the hospitality industry, demographics, psychographics, past travel experiences, and their willingness to pay for resort services at Green Key certified establishments versus those that not not cerify or self-certify. The choice sets will ask participants to choose among four separate resort brochures exhibiting resort features, various certification program labels, and pricing.

Each choice set will consist of three alternatives, two different resorts at stated prices, and a "neither" alternative. By showing six choice sets, each respondent is offered choices for every possible combination of resorts in the study (Resort 1vs. Resort 2; Resort 1 vs. Resort 3; Resort 1 vs. Resort 4; Resort 2 vs. Resort 3; Resort 2 vs. Resort 4; Resort 3 vs. Resort 4). The order in which these choices are presented to respondents, and the order of resort placement left to right, is randomized and also randomly distributed across respondents. One half of the surveys are randomly assigned the "Green Key Eco-Rating" label (Resort 3) and one half are randomly assigned the "sustainable practices" designation (Resort 4).

Other than the individual resort characteristics and sustainability designations, the only other attribute in the survey choice sets is price. The distribution of prices was constructed to ensure a realistic survey design covering a range of plausible prices. In consultation with travel agents, it was determined that resort prices per night typically fluctuate between $190 and $460. The choice sets are simple priving only price and resort attributes. This simplicity, combined with the fact that tastes and preferences vary across consumers, enables us to use prices that are, by design, orthogonal to the resort attributes without sacrificing realism or efficiency in estimation.

A standard random-utility framework is used (Train 2003), where the choices indicated are assumed to provide the highest level of utility to the respondent among the alternatives. As a simple starting point, we assume the unobserved or latent utility to respondent *i* of alternative *j* is a linear function of the attributes of the alternatives and an unobserved random component of utility:

$$(1) \quad u_{ij}^{*} = \beta \,\text{Price}_{j} + \delta\, X_{j} + \varepsilon_{ij}$$

The latent utility of respondent i for alternative j is denoted u_{ij}^{*}. The coefficient β represents the marginal utility associated with paying for alternative j (note that β is expected to be negative). The quantity X_j represented a vector of attributes describing alternative j and δ represents the vector of associated marginal increments to utility associated with each attribute. In this model, each alternative is described completely by a price and set of indicators for resort

and designation. Note that both $Price_j$ and the vector X_j are equal to zero for the "neither" alternative.

Random utility models, such as the one described above, can be estimated using maximum likelihood by assuming a distribution for the unobserved component of utility. Using the techniques described in Train (2003) we assume the errors are distributed jointly normal and estimate the models with an alternative-specific multinomial probit model. This model has the advantage of being free from the independence of irrelevant alternatives assumption inherent in logit models. The probit-based model also permits us to employ an error structure that allows for cross-alternative heteroscedasticity and an unstructured cross-alternative correlation pattern. To account for the panel, or repeated-choice, nature of the data we employee standard errors that are clustered at the respondent level.

To illustrate this methodology, consider a simplified version of the choice sets. Suppose there were only two resorts (Resort 1 and Resort 3) and one designation (Green Key Eco-Rating) that varied the label on Resort 3. The vector X_j would then consist of three variables, a constant for the omitted category (Resort 1 in this case), a dummy variable for Resort 3, and a dummy variable for the interaction between Resort 3 and the *Green Key* designation. Representative utility would then be modeled as:

$$(2) \quad u_{ij}^{*} = \beta \,\mathrm{Price}_j + \delta_0 + \delta_1 \,\mathrm{Re}\,sort3_j + \delta_2 GreenKey_j * \mathrm{Re}\,sort3_j + \varepsilon_{ij}$$

A test of the statistical significance of the parameter δ_2 indicates any meaningful difference to utility and choice probability when the *Green Key* designation is shown compared to simply being offered "Resort 3" with no designation. As an important extension, we also allow for a relaxation of the assumption of homogeneous preferences by allowing the parameters of the utility function to vary with respondent characteristics through the use of interaction terms.

Willingness to pay (WTP) for a particular alternative *j* can be estimated by solving for the price that would make the representative consumer with the indicated utility function indifferent between paying for alternative *j* at the stated price or not. Let this price be denoted Price_j^{*} and set utility equal to zero:

$$(3) \quad u_{ij}^{*} = \beta \,\mathrm{Price}_j^{*} + \delta\, X_j = 0$$

Solving for Price_j^{*} yields:

$$(4) \quad \text{WTP for alternative } j = \mathrm{Price}_j^{*} = \frac{\delta\, X_j}{-\beta}$$

The marginal WTP is calculated by taking the derivative of Price_j^{*} with respect to a given characteristic. Confidence intervals for WTP and marginal WTP are calculated via the parametric bootstrap method described by Krinsky and Robb (1986 and 1990), by taking a large number of draws from the estimated variance-covariance matrix of the parameter estimates. The

means of this distribution are given by the parameter estimates, and the covariance is given by the variance-covariance matrix of the parameter estimates (Hole 2007; Bosworth et al. 2009).

Results and Importance

Study results will provide the hospitality industry and certifiers with important information regarding consumer perceptions and awareness of green certification programs, the importance of food waste reduction, as well as their willingness to pay for services at certified establishments. Study results will illustrate any potential need for change or improvements to current certification programs in terms of sustainable or eco practices certified, such as food waste, resort monitoring, and other needs. Additionally, the results will illustrate the potential impact of increased consumer awareness of certifications programs on their decisions, as well as which promotional strategies may be more effective at reaching consumers. Finally, study results will provide valuable insight on traveler demand and pricing at certified resorts. All of these elements will assist resorts in understanding the certification benefits regarding cost reduction and/or revenue enhancement, which will ultimately impact their decision to not certify, self-certify, or use a third-party certifier.

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Food Manufacturing Industry in South Carolina: An Analysis of the Size, Structure, and Performance

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Abstract

Food manufacturing industries are traditionally considered to be a significance force of economic development of rural areas. By locating their establishments in a particular region, they create employment opportunities and increase demand for agricultural commodities grown in the region. South Carolina has a very diverse agriculture. A wide variety of agricultural commodities is grown in the state, including grains (soybeans, corn, wheat, oats), fruits, vegetables and nuts (peaches, melons, tomatoes, cucumbers, peanuts), poultry and eggs, livestock and dairy (USDA NASS 2014). A diverse agricultural sector creates incentives for food manufacturing companies to locate their establishments in this area. In addition, it encourages agricultural producers to get involved in food manufacturing businesses. Food manufacturing industries are important sectors of the South Carolina economy.

The objective of this research is to evaluate the size, structure and economic performance of food manufacturing industry in South Carolina during the period of 2000-2012. The analysis is conducted using a number of key economic indicators reported by the US Census Bureau Economic Census surveys. The analyzed economic indicators include the number of establishments, number of employees, annual payroll, value added and value of shipments. The results have implications for the food industry and policy decision-making process, as they provide evidence on the current and projected economic performance of food manufacturing industries in South Carolina.

Keywords: food manufacturing, economic performance, economic ratio analysis, value added.

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Data and Definitions

The analysis of economic performance of food manufacturing industries is conducted using the US Economic Census survey data (geographic series reports compiled on a five year basis) for 2002, 2007 and 2012. The analyzed food manufacturing industries include animal food manufacturing (NAICS 3111), grain and oilseed milling (NAICS 3112), sugar and confectionary product manufacturing (NAICS 3113), fruit and vegetable preserving and specialty food manufacturing (NAICS 3114), dairy product manufacturing (NAICS 3115), animal slaughtering and processing (NAICS 3116), bakeries and tortilla manufacturing (NAICS 3118) and other food manufacturing (NAICS 3119).[1] The following economic indicators are used in the analysis: number of establishments, number of employees, annual payroll, value of shipments, value added, cost of materials and capital expenditures.

An establishment is a single physical location at which business is conducted; it may or may not be identical with a company (firm or enterprise). *The number of employees* includes all full-time and part-time employees on the payrolls. *The annual payroll* includes the gross earnings of all employees on the payroll paid in the calendar year. *The value of shipments* includes the received or receivable net selling values, "Free on Board" (FOB) plant (exclusive of freight and taxes), of all products shipped (primary and secondary) as well as all miscellaneous receipts (i.e. contract work performed for others). *Cost of materials* refers to direct charges actually paid or payable for items consumed or put into production during the year; in particular, it includes the cost of materials and fuel consumed. *Capital expenditures* represent the total new and used capital expenditures reported by establishments in operation; these are the expenditures related to new and used machinery and equipment as well as permanent additions and major alterations to manufacturing establishments. *The value added* is an indicator traditionally used to characterize the economic performance of food manufacturing industries. It is the difference between the value of shipments and costs of materials, supplies, containers, fuel, plastic, purchased electricity and contract work. The value added avoids the duplication resulting from the use of products of some establishments as materials by others.

Methodology

The analysis includes two stages. At the first stage, an analysis of the size, structure and economic development trends of food manufacturing industries is conducted. This analysis uses the following economic indicators: number of establishments, number of employees, annual payroll, value added and value of shipments. At the second stage, six ratios characterizing the effectiveness of economic performance of food industries are calculated using the economic indicators already mentioned and cost of materials and capital expenditures. These ratios include: the ratio of value added to the number of employees ($ value added per employee), the ratio of the number of employees to the number of establishments (i.e. the number of employees per establishment (plant)), and the shares of annual payroll, cost of materials, capital expenditures

[1] One industry is excluded from the analysis due to a data confidentiality issue, this is a seafood product preparation and packaging (NAICS 3117).

and value added in the total value of shipments.[2] The ratios used in the analysis were used in previous studies that focused on evaluating economic performance of food manufacturing industries (Connor et al. 1985; Capps et al. 1988; Connor 1988; Christy and Connor 1989; Salin et al. 2002; Huang 2003; Bolotova 2008; Bolotova and Asiseh 2009).

Results

In 2012 there were 200 food manufacturing establishments located in South Carolina and approximately seventeen-thousand people employed in food manufacturing industries. As compared to 2002, the number of establishments decreased by 13%, but the number of employees remained approximately the same. All food manufacturing industries as a group generated $6.6 billion of value of shipments and $3.0 billion of value added in 2012. As compared to 2002, while value of shipments increased by almost 9%, value added decreased by almost 8%. Increasing cost of materials was likely to be a factor explaining a decrease in value added and an increase in value of shipments over time. Individual food manufacturing industries follow different trends.[3]

An analysis of the structure of the South Carolina food manufacturing industry in terms of value of shipments indicates the following.[4] Animal slaughtering and processing is the largest industry, with the share of almost 33% in the total value of shipments generated by all food manufacturing industries as a group. Fruits and vegetables processing is the second largest industry, with the share of 21.5% in the total value of shipments. It is followed by bakeries and tortilla manufacturing (13.5%), other food manufacturing (11%) and dairy product manufacturing (8%). Animal food manufacturing and grain and oilseed milling contribute 6.7% and 6.1% to the total value of shipments generated by all industries as a group.

The economic performance ratios are summarized in Table 1 (see Appendix). The ratios are calculated for all industries as a group and for individual industries. The ratios are expected to vary across different industries due to the specifics of production technology and the type of marketing and pricing strategies. The ratio of number of employees to the number of establishments is seventy-six for all food manufacturing industries considered as a group. It varies from 20–25 employees per establishment in grain and oilseed milling and animal food manufacturing, respectively, to 165 and 226 employees per establishment in animal slaughtering and processing and fruits and vegetables processing, respectively. The ratio of value added to the number of employees is 188 for all food manufacturing industries considered as a group. This ratio varies from $100 and $140 per employee in animal slaughtering and processing and bakeries and tortilla manufacturing, respectively, to $512 and $718 per employee in grain and oilseed milling and animal food manufacturing, respectively.

[2] For a more convenient interpretation some of the ratios are multiplied by 100% and are expressed as shares. In the case of economic indicators measured in monetary units (annual payroll, value added and value of shipments), the 2002 and 2005 $ values are converted into the 2012 $ values using various producer price indices (PPI).
[3] An analysis of a number of individual food manufacturing industries over time is not possible due to a data confidentiality issue. Some of the economic indicators are not reported for one or more years for some industries.
[4] The industry structure is based on 2002 data, the only year in which all industries are represented in the survey.

The share of annual payroll in value of shipments is 11.5% for all food manufacturing industries considered as a group. The grain and oilseed milling and animal food manufacturing are characterized by the lowest shares, 4.3% and 5.2%, respectively. Bakeries and tortilla manufacturing and animal slaughtering and processing are characterized by the highest shares, 18.3% and 15.8%, respectively.

The cost of materials, in particular cost of agricultural commodities used in food manufacturing, represents a significant share in the total value of shipments. The share of cost of materials in value of shipments is 45.6% for all food manufacturing industries considered as a group. Dairy product manufacturing has the largest share among the analyzed industries, 73.7%. It is followed by grain and oilseed milling (62.8%) and animal slaughtering and processing (54.6%). Capital expenditures represent a rather small share in the total value of shipments. The share of capital expenditures in value of shipments is approximately 2% for all food manufacturing industries considered as a group. The combined share of annual payroll, cost of materials and capital expenditures in the total value of shipments is 59% for all food manufacturing industries considered as a group. The combined share of annual payroll and cost of materials is approximately 57%.

The share of value added in value of shipments is 54.4% for all food manufacturing industries considered as group. Dairy product manufacturing and grain and oilseed milling have the lowest shares, 25.8% and 35.6%, respectively. The industries with the highest shares include fruits and vegetables processing (87.3%) and bakeries and tortilla manufacturing (54.3%).

A methodology used in the analysis and the results can be used in a number of ways. First, the economic performance of an individual establishment or a group of establishments belonging to the same company can be compared to the average economic performance characterizing a particular industry. Consequently, if required, production and marketing strategies may be modified to improve economic performance of the analyzed establishment(s). Second, the results on the industries' performance may be used when the decisions on whether to expand the existing food manufacturing operations are made. This type of information may be used by the decision-makers who consider getting involved in food manufacturing businesses. Thirdly, financial institutions operating in the region may utilize the results in their decision-making process. Finally, policy decision-makers may use this information during the process of development and evaluation of various agricultural and food promotion programs.

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Appendix

Table 1. The Ratios of Economic Performance: Food Manufacturing Industries in South Carolina, 2002.

Industry	Ratio of number of employees to number of establishments	Share of annual payroll in value of shipments (%)	Ratio of value added to number of employees ($ per employee)	Share of cost of materials in value of shipments (%)	Share of capital expenditures in value of shipments (%)	Share of value added in value of shipments (%)
Food manufacturing	*76*	*11.5*	*188*	*45.6*	*1.9*	*54.4*
Animal food manufacturing	25	5.2	718	50.2	1.0	49.7
Grain and oilseed milling	20	4.3	512	62.8	0.9	35.6
Fruits and vegetables preserving	226	7.4	435	12.7	1.2	87.3
Dairy product manufacturing	71	6.3	168	73.7	4.3	25.8
Animal slaughtering and processing	165	15.8	100	54.6	1.9	46.1
Bakeries and tortilla manufacturing	37	18.3	140	45.5	2.6	54.3
Other food manufacturing	49	9.6	204	49.8	1.9	49.8

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Private Label Products and Consumer Income: Is There a Curvilinear Relationship?

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Abstract

Supermarket scanner data are analyzed for five product categories across three income groups to test the premise of a curvilinear relationship between income and private labels (PLs). The three income groups are lower–, moderate–, and higher-income consumers and the premise tested is that moderate-income consumers are far more inclined to purchase PLs than lower– and higher–income consumers. The five product categories selected for this study are: butter and margarine; frozen potatoes; ice cream; jams, jelly and peanut butter; and yogurt. Statistical results derived for these product categories offer no support for a curvilinear relationship between income and PLs. Lower-income consumers are shown to be more prone to purchase PLs than moderate– and higher-income consumers across all product groups.

Keywords: scanner data, lower-income, moderate-income, higher-income, curvilinear relationship, private labels, national brands

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Introduction

In a meta-analysis review of fifty-four papers that address purchases of private-label (PL) products, Sethuraman and Gielens (2014) conclude that these papers offer limited to no support for an inverse relationship between PL purchases and income. Indeed they conclude that these papers support the premise of a curvilinear relationship between PLs and income. Further, other researchers have published papers that support the premise of a curvilinear relationship between PLs and income (Dick et al. 1995; Fitzell 1992; Erdem and Keane 1996; Sinha and Batra 1995). Simply expressed, this relationship states that moderate-income consumers are inclined to purchase large shares of PLs, while higher– and lower-income consumers are inclined to purchase small shares. This purported purchase pattern is partly explained by factors such as household education, product familiarity, product image, perceived risk, perceived quality variability, and quality sensitivity (Sethuraman and Gielens 2014). In essence, lower-income consumers are more price-sensitive than moderate and higher-income consumers but all of the aforementioned factors serve to lessen the effects of income, thereby generating a curvilinear relationship between PLs and income (Dick et al. 1995; Fitzell 1992; Sethuraman and Gielens 2014; Erdem and Keane 1996; Sinha and Batra 1995).

The primary objective of this paper is to test the premise of a curvilinear relationship between income and PLs. This relationship is of interest to this researcher because of previous research conducted on consumer purchases across income groups has offered no support for this premise (Jones 2015; 2014; 2010). Yet, because previous work has focused on just two income groups, higher– and lower-income consumers, this premise could not be dismissed with absolute certainty. That is, there is the possibility that a more refined accounting of income groups could reveal different results. As such, this study tests the curvilinear premise by utilizing supermarket scanner data for five product groups across three income groups: higher–, moderate– and lower. These data are collected for 87 weeks over calendar years 2013–2014 and the product groups are: butter and margarine; frozen potatoes; ice cream; jams, jelly and peanut butter; and yogurt. These groups are selected because products within them not only have strong appeal to all consumers but they are purchased frequently by all households. In short, they are products for which weekly observations are available for households across all income groups. Census tract data from the 2010 U.S. census are used to identify income groups.

Socioeconomic Characteristics for Income Groups

Since the primary objective of this study is to test whether a curvilinear relationship exists between income and private labels, it is imperative that consumers be selected from a wide range of incomes. To this end, data used for this study are collected from six supermarket stores that serve higher–, moderate– and lower-income consumers. The six stores are not only owned by a single supermarket chain but they are all within a single pricing zone, meaning identical prices across all stores. Census data for 2010 are used to identify store selections and these data are shown in Table 1. These data describe residents who live within a three-mile radius of each store, as researchers have confirmed that most consumers confine their shopping to this limited area (Drewnowski et al. 2012). From the three groups of stores identified in Table 1, it can be seen that major differences exist in household and family incomes. For example, median family income averages $137,000 for shoppers surrounding the two higher-income stores; averages

$75,000 for shoppers surrounding the two moderate-income stores; and averages $43,000 for shoppers surrounding the two lower-income stores. These sharp differences in income offer strong support for segmenting consumers into the respective groups.

Table 1. Socioeconomic Characteristics for Residents within Three Income Areas.

Store Type	Population	Median HI	Median FI	% Pop >25 College Grad	% Pop in Poverty
High Income					
Store 1	15,403	103,793	126,414	66.2	4.5
Store 2	21,338	128,950	147,719	76.1	2.7
Moderate Income					
Store 1	27,309	71,884	80,220	28.0	5.1
Store 2	20,991	64,548	69,900	32.7	5.9
Low Income					
Store 1	21,802	33,818	39,651	15.6	28.1
Store 2	26,775	44,389	47,183	23.8	21.4

Notes. [1] Data taken from the 2010 Census Tract Survey for Franklin County, Ohio. Income is expressed in 2012 inflation adjusted dollars. [2] HI is household income. FI is family income.

Other variables in Table 1 that offer support for segmenting three groups of consumers include statistics identifying college graduates and population in poverty. As shown, 71% of residents above 25 who live within higher-income areas have obtained a college education. By contrast, this percentage is 30.3% for moderate-income consumers and just 19.7% for lower-income ones. Further, a much lower percentage of residents within higher income areas are living in poverty, as compared to residents in moderate– and lower-income areas. Specifically, 3.6% of higher income residents live in poverty, as compared to 5.5% and 24.8% respectively for moderate– and lower income residents. In short, these data support the justification for identifying this study as one that comprises three, distinct income groups.

Empirical Estimation and Results

A page limitation for this article limits the discussion in this section to a subset of the econometric results derived from the full dataset. A seemingly unrelated regression (SUR) model is estimated for a total of forty product groups across six stores. Product groups for ice cream were the largest, with eight national brands, two private label brands (regular and premium), and a few smaller national brands combined into a single product group. The next largest product groups of national and private label brands were: yogurt, with ten; jams, jelly and peanut butter, with nine; butter and margarine, with eight; and frozen potatoes, with two. As hypothesized, all own-price elasticities were negative and statistically significant, most at the .01 level. Further, more than eighty percent of the expenditure elasticities were positive and statistically significant at the .01 level. In short, the SUR models performed well for all product groups, providing R^2's that ranged from .59 to .92.

Since a key objective of this research is to test the hypothesis that a curvilinear relationship exists between income and private label products, results derived for this test are the primary focus of this section. A secondary focus is the responsiveness of consumers to purchases of PLs as relative prices change for NBs and PLs (pNB-pPL). For this secondary section, the discussion is

limited to two product groups: ice cream and yogurt. As shown in Table 2, results from this study do not support the premise of a curvilinear relationship between income and PLs. For the five product categories shown in the top portion of the table, moderate income consumers clearly purchase more PLs than higher-income consumers, with butter and margarine being an exception. While these results are consistent with one part of the hypothesis, results in the bottom portion of Table 2 clearly contradict the premise of a curvilinear relationship between PLs and income. That is, consumption of PLs does not turn downward as income declines. Indeed consumption accelerates quite sharply, especially when the subset of products lower-income consumers purchase is expanded to include lower-priced NBs. This expanded subset explains the statistically insignificant Z tests for butter and margarine, and yogurt.

Table 2. Statistical Tests of a Curvilinear Relationship between Income and Private Label Products.

		Moderate Income				**Higher Income**				**Z-Tests**
Products	**Obs.**	**Store 1**		**Store 2**		**Store 3**		**Store 4**		**Mean Dif.**
		Mean	STD	Mean	STD	Mean	STD	Mean	STD	Z-Value
Butter & Margarine	87	0.3662	0.0680	0.3585	0.0757	0.3551	0.0604	0.3750	0.0676	-0.184
Frozen Potatoes	87	0.6054	0.0360	0.5415	0.0393	0.4475	0.0368	0.4621	0.0377	14.773
Ice Cream	87	0.4607	0.0404	0.3422	0.0429	0.2874	0.0324	0.2917	0.0399	13.416
Jams, Jelly & Peanut Butter	87	0.4241	0.0438	0.3961	0.0369	0.3509	0.0316	0.3350	0.0279	8.928
Yogurt	87	0.1633	0.0161	0.1620	0.0159	0.1325	0.0108	0.1278	0.0096	11.578

		Moderate Income				**Lower Income**				**Z-Tests**
Products	**Obs.**	**Store 1**		**Store 2**		**Store 5**		**Store 6**		**Mean Dif.**
		Mean	STD	Mean	STD	Mean	STD	Mean	STD	Z-Value
Butter & Margarine	87	0.3662	0.0680	0.3585	0.0757	0.3286	0.0515	0.3548	0.0571	1.528
Frozen Potatoes	87	0.6054	0.0360	0.5415	0.0393	0.7199	0.0441	0.6521	0.0360	-13.509
Ice Cream	87	0.4607	0.0404	0.3422	0.0429	0.6605	0.0387	0.5469	0.0353	-23.986
Jams, Jelly & Peanut Butter	87	0.4241	0.0438	0.3961	0.0369	0.4603	0.0352	0.4818	0.0322	-7.682
Yogurt	87	0.1633	0.0161	0.1620	0.0159	0.1523	0.0148	0.1739	0.0194	-0.129

Two of the lowest-priced brands of margarine are Blue Bonnet and Country Crock and, as shown in Figure 1 and Figure 2, these brands represent large purchases for lower- and moderate-income consumers. Indeed prices of Blue Bonnet margarine are generally statistically insignificant from prices for PLs; and prices of Country Crock margarine are no more than two to three pennies higher per ounce than prices for PLs. As such, both brands have strong appeal to lower-income consumers. As shown in the figures, lower-income consumers purchase these NBs in far larger quantities than moderate– or higher-income consumers. Further, moderate-income consumers purchase them in far larger quantities than higher-income consumers and this behavior explains

the statistically insignificant Z-value of -.184 (Table 2). Similarly, the Z value of 1.528 reflects the strong preference that lower-income consumers have for lower-priced NBs of margarine. These results suggest that statistical analyses must go beyond parameter estimates and examine the finer details that are embedded in data. When lower-priced NBs are unavailable within a product group, then consumers express strong preferences for PLs, as shown for frozen potatoes, ice cream, and jams, jelly and peanut butter. To be clear, the results show that none of the five product groups offer support for a curvilinear relationship between income and PLs.

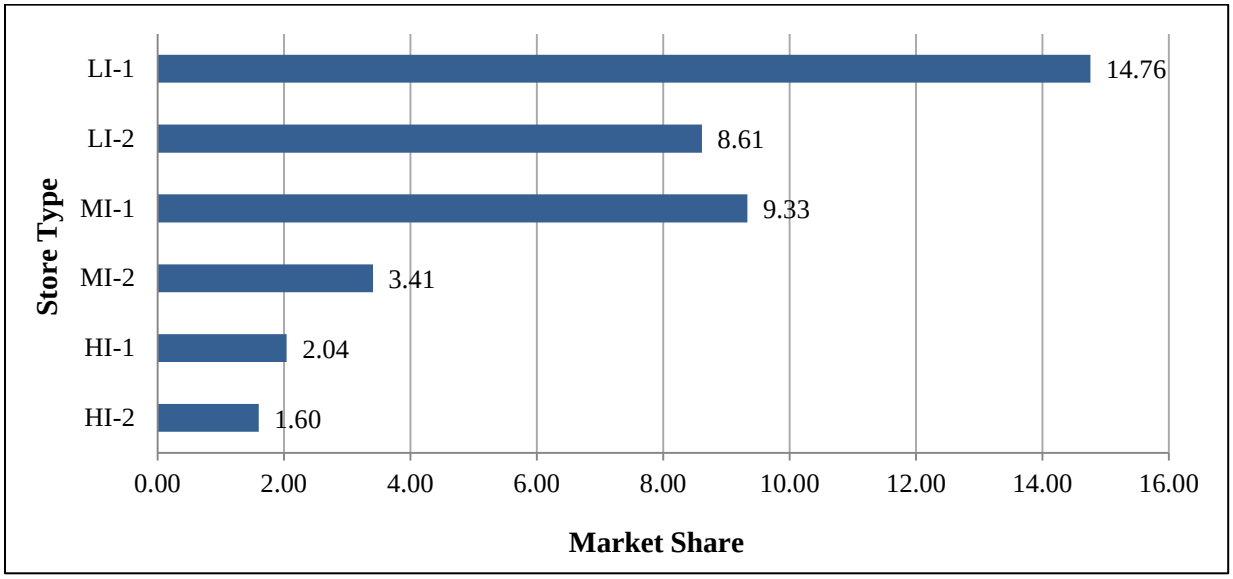

Figure 1. Market Shares of Lowest-priced National Brands of Margarine, Blue Bonnet.
Note. L1 and L2 are lower-income, M1 and M2 are moderate-income, H1 and H2 are higher-income.

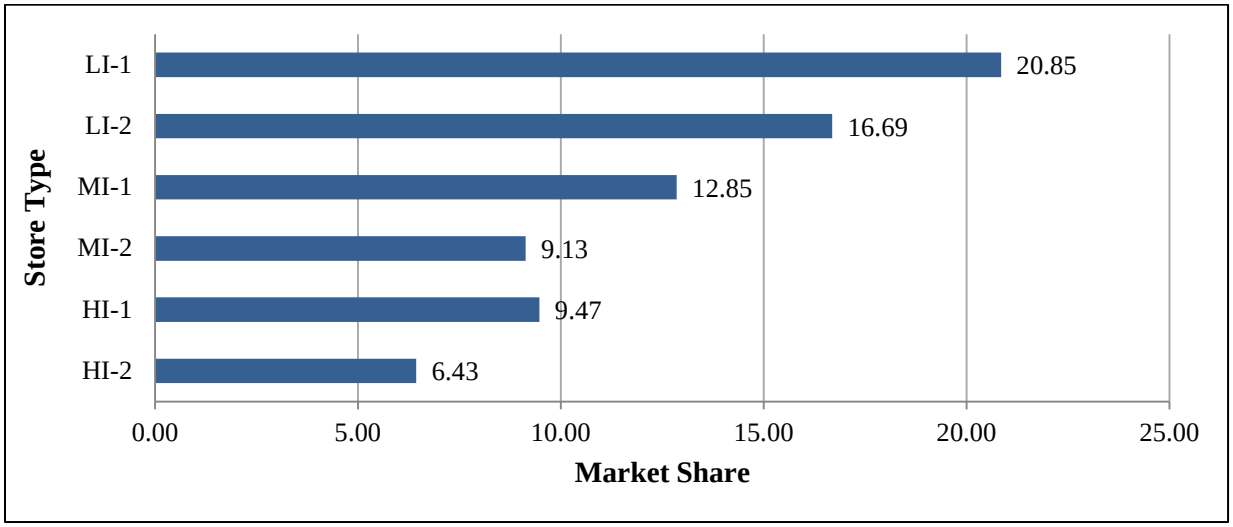

Figure 2. Market Shares of Lowest-priced National Brands of Margarine, Country Crook.
Note. L1 and L2 are lower-income, M1 and M2 are moderate-income, H1 and H2 are higher-income.

As shown in the bottom half of Table 2, no statistical difference exists in the purchase shares of PL yogurt for moderate– and lower-income consumers. By contrast, moderate-income consumers, as

expected, are shown to purchase far larger shares of PL yogurt than higher-income consumers. The unexpected small shares of PLs for lower-income consumers are easily explained by the purchased shares of Yoplait (Figure 3). Yoplait is a lower-priced NB of yogurt that is priced almost identical to the PL brand, especially during periods of price promotions. As evidence that lower-income consumers are attracted to Yoplait by its price, a comparison of consumer purchase behavior for Chobani, the highest-priced brand, is provided in Figure 4. As shown, lower-income consumers' purchased shares of Yoplait are nearly six times (5.82) as large as their purchased shares of Chobani. This suggests that lower-income consumers would purchase far larger shares of PL yogurt, in the absence of a lower-priced NB.

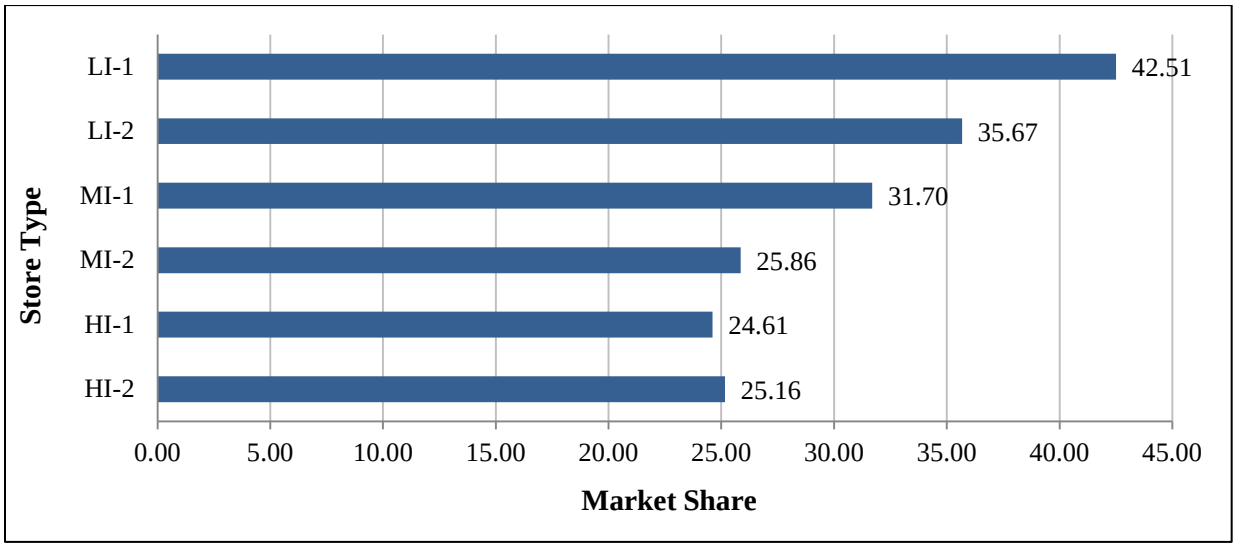

Figure 3. Market Shares for Lowest and Highest-priced NBs of Yogurt, Yoplait.
Note. L1 and L2 are lower-income, M1 and M2 are moderate-income, H1 and H2 are higher-income.

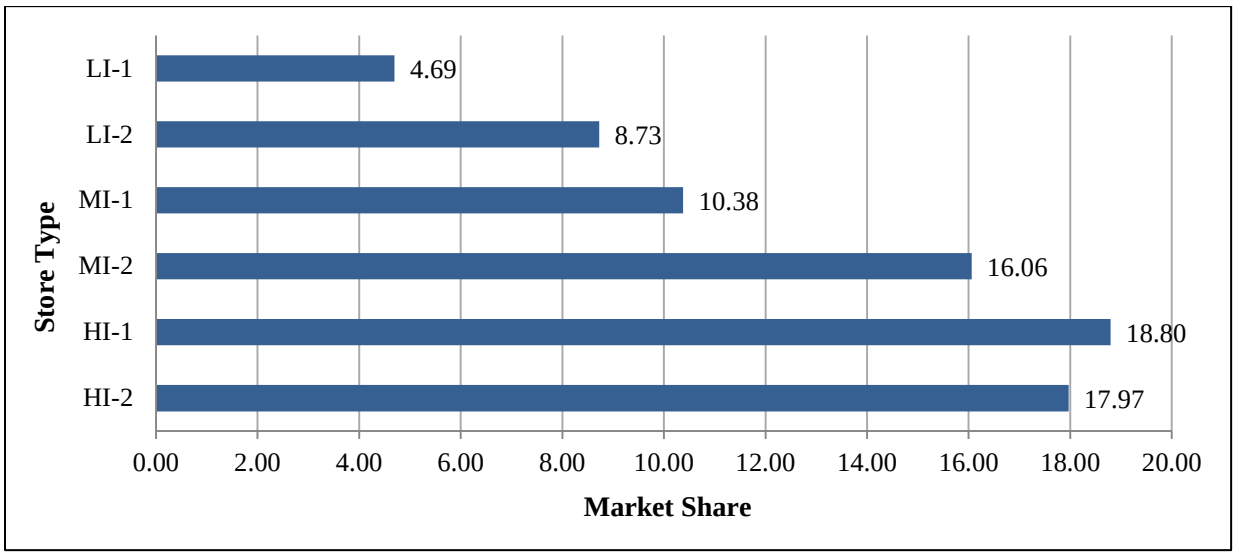

Figure 4. Market Shares for Lowest and Highest-priced NBs of Chobani Yogurt Market Shares.
Note. L1 and L2 are lower-income, M1 and M2 are moderate-income, H1 and H2 are higher-income.

A second hypothesis offered in the marketing literature is that PL shares are highly responsive to relative price changes for NBs and PLs, especially changes for leading national brands (Wang et al. 2007). For these analyses, PL quantity share is regressed against weighted price differences for all NBs and the regular PL brand of ice cream and yogurt. For both product categories, results are reported for just the top two NBs because retailers are supposedly more inclined to target leading national brands (Scott-Morton and Zettelmeyer 2004; Sayman et al. 2002). As shown in Table 3, the top two NBs of ice cream are Breyers and Edy's; for yogurt, these brands are Dannon and Yoplait. Market shares are reported for both NBs and PLs, as these shares provide insightful information for interpreting and understanding elasticity responses in the table.

Table 3. Market Shares and Price-Sensitivity Responses for Ice Cream and Yogurt by Brand

			Market Shares			
Ice Cream Brands	Higher Income Stores		Moderate Income Stores		Lower Income Stores	
	H1	H2	M1	M2	L1	L2
Bryers	13.05	11.83	12.20	11.52	8.62	10.01
Edy's	10.95	11.81	9.71	11.63	5.58	7.40
Private Label	28.95	28.59	45.94	33.98	65.90	54.52
			Price-Sensitivity Estimates			
Bryers	0.1514	0.1315	0.1267	0.1330	0.0601	0.0965
Edy's	0.1047	0.1399	0.0922	0.0922	0.0210	0.0765
Yogurt Brands			**Market Shares**			
Dannon	22.66	21.94	20.82	21.18	10.23	14.64
Yoplait	25.16	24.61	31.70	25.86	45.51	35.67
Private Label	12.74	13.23	16.27	16.13	15.11	17.24
			Price-Sensitivity Estimates			
Dannon	0.1949	0.1498	NSS	0.2573	NSS	NSS
Yoplait	0.1368	0.1560	0.2297	0.2253	0.2798	0.2065

Note. NSS = not statistically significant

Table 3 shows that there is a direct relationship between consumer price-sensitivity and income for two brands of ice cream. That is, with the share of PL ice cream as the dependent variable and price differentials as independent variables (pNB-pPL), higher-income consumers are shown to display more price-sensitivity toward the purchase of NBs than lower– and moderate-income consumers. On the surface, this finding seems counter-intuitive but a clearer picture is revealed when purchased shares of PLs are brought into the analyses. As shown in the table, shoppers within moderate– and lower-income stores purchase much larger shares of PLs and therefore they are less sensitive toward relative price changes (pNB-pPL). By contrast, shoppers of higher-income stores purchase larger shares of NBs and therefore relative price changes among the brands are more noticeable to them. In short, consumer price-sensitivity toward the purchase of PLs is a function of more than price differences between NBs and PLs. Specifically, consumers whose purchases consist mainly of PLs are less likely to respond to relative price changes than those who purchase smaller shares of PLs.

The bottom portion of Table 3 shows response rates for yogurt across income groups that are entirely different from those shown in the top portion of the table for ice cream. That is, there is an inverse relationship between price-sensitivity and income. A key difference between ice cream and yogurt is that PLs represent small shares for all income groups. Indeed the Yoplait brand represents a larger share than PLs for all income groups. As such, consumers are more aware of relative price changes between Yoplait and PLs and this leads lower-income consumers to express considerable price-sensitivity toward the purchase of PLs. For the second leading national brand of yogurt, Dannon, relative price changes between it and PLs do not generate a purchase response. This suggests that price changes for Dannon yogurt are less noticeable because consumers have most of their attention focused on Yoplait purchases. A similar pattern is observed for shoppers in one, moderate income store. For higher-income shoppers, less disparity in market shares exists for the two NBs and shoppers are shown to express price-sensitivity toward relative price changes for both brands. In short, market shares, whether NBs or PLs, can have an influence on the level of consumer price-sensitivity. Indeed price-sensitivity parameters can be misleading when they are interpreted independently of other relevant factors.

Conclusions

The premise advanced in the marketing literature that moderate-income consumers are far more inclined to purchase PLs than higher– and lower-income consumers is tested in this study. Supermarket scanner data for 87 weeks over the 2013-2014 calendar years are used for this study and these data cover five product groups: butter and margarine; frozen potatoes; ice cream; jams, jelly and peanut butter; and yogurt. Clear and convincing evidence is revealed to reject the premise of a curvilinear relationship for three of the five product groups: frozen potatoes; ice cream; and jams, jelly and peanut butter. Results for the other two categories are equally as convincing, once lower-priced national brands are factored into the analyses. Specifically, two lower-priced national brands of margarine, Blue Bonnet and Country Crock, have strong appeals to lower-income consumers and these consumers purchase large shares of these products. These lower-priced NBs are appropriately considered together with PLs because prices for them are almost indistinguishable from those for PLs. Similarly, the lower-priced NB of yogurt, Yoplait, is virtually identically priced with PLs, especially during periods of price promotions. In short, careful analyses of the data show that purchases for all product groups reject the curvilinear relationship between income and PLs.

Testing the premise of a curvilinear relationship between income and PLs is not a trivial issue, as the premise has important implications for supermarket sales and market planning. For example, the supermarket chain providing data for this study has stores across most geographic areas and many income groups. Thus, it is imperative that its stores are stocked with the appropriate combinations of NBs and PLs to maximize sales and profits. Findings from this study provide strong support for stocking lower-income stores with the large shares of PLs. By contrast, confirmation of a curvilinear relationship would have suggested a need to distribute larger shares of PLs to moderate-income stores. Admittedly results from this study are for a specific supermarket chain, covering a limited geographic area. Conclusions drawn from this study could be strengthened with results from a more comprehensive data set, say regional or national, as well as from a larger product group.

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Consumption Frequency and Perceptions of the Healthfulness of Selected Meat Products

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Abstract

Results from a sample of grade-level students suggest that they consumed tacos more frequently than frankfurters, hamburgers, nuggets, chicken, beef, or goat meat. The sampled students also perceived beef as more unhealthy than chicken or goat meat. Ninety-five percent of the students expressed some willingness to try new food products, and 80 percent indicated they would encourage their parents to buy goat meat products. Gender and grade levels did not affect eating frequencies of the selected meat products. However, more females perceived nuggets as unhealthy when compared to males. High-school students were also more likely to perceive nuggets as unhealthy when compared to students from elementary and middle schools.

Keywords: elementary, middle and high-school students, beef and chicken, goat meat, frankfurters, hamburgers, tacos, and nuggets

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Introduction

Recent data from the *Centers for Disease Control* and the *Prevention Behavioral Risk Factor Surveillance System* suggest that from 2012 through 2014 non-Hispanic Blacks had the highest prevalence of self-reported obesity (38.1%); followed by Hispanics (31.3%); and non-Hispanic whites (27.1%). The highest prevalence of obesity was in the South (39.5%) and the Midwest (38.8%), followed by the West (34.6%), and the Northeast (34.2%). The data also indicated that Louisiana's adult obesity rate was 33.1% and that more than one-third of adults and 17% of youth in the United States were obese (Odgen et al. 2014). Additionally, about 12.7 million children and adolescents aged 2–19 years in the United States are obese, with the prevalence highest among Hispanics and non-Hispanic Blacks (CDC 2011).

Overweight and obesity during childhood can have deleterious effects on the body. For example, research suggests that obese children have a greater risk of developing high blood pressure and high cholesterol (Freedman et al. 2007); type 2 diabetes, fatty liver disease, gallstones, and gastro-esophageal reflux (Whitlock et al. 2005); impaired social, physical, and emotional functioning and behavioral problems (Morrison et al. 2015); sleep apnea and asthma (Han et al. 2010. Children who are obese are also more likely to become obese adults with serious health maladies (Juonala et al. 2011; Freedman et al. 2009). These findings are disconcerting because medical costs for treating obesity-related illnesses now exceed $147 billion annually, and an obese person costs $1,429 more to treat than a normal-weight person (Flegal et al. 2010).

Meat consumption in the developed world including the United States has continued to increase with red meat and processed meat accounting for 58% and 22%, respectively, of overall consumption (Daniel et al. 2011). Meat contributes a high biological value protein, iron, zinc, selenium, vitamin B12, and crucial components of a well-balanced diet. However, because of its saturated fat and dietary cholesterol components, it is also linked to the risk for chronic diseases (Pereira and Vicente 2013). Other investigators have established relationships between the consumption of red and processed meat and risks for developing chronic diseases, such cardiovascular disease and type 2 diabetes (Micha et al. 2012), and some cancers (Chan et al. 2011).

Conflicting research findings on the relationships between consumption of red and processed meat and risks of chronic diseases drove Larsson and Orsini (2014) to conduct a meta-analysis of prior studies on red and processed meat consumption and mortality. They found that consumption of processed meat and total red meat had positive and statistically significant relationships with all-cause mortality, but there was no relationship with unprocessed red meat. The meta-analysis done by Chen and colleagues (2013) uncovered links between red meat and or processed meat and increased risks for ischemic stroke. Micha, Wallace, and Mozaffarian (2010) inferred that coronary heart disease and diabetes mellitus were associated with processed meat consumption, but not with red meat consumption. Wang and colleagues (2010) focused on the relationships between reduction in obesity, medical costs, and quality of life. They projected that under a best case scenario a one-percentage point reduction in overweight and obese 16 and 17-year-olds would reduce future obese adults by almost 53,000, medical costs by $586 million, and increase quality-adjusted life by about 47,000.

The demand for convenience meat products such as patties, sausages, nuggets, frankfurters, hamburgers, and hams has been increasing with the growing world population, ongoing urbanization, and busy lifestyles. However, consumption of convenience meat products made from beef and pork can contribute significantly to the daily requirement for fat, sodium, and overall calories. Nutritional analyses of products sold in fast-food restaurants indicate that they are typically high in energy density, providing a feasible mechanism for excess energy intake (Bowman et al. 2004).

According to the *USDA Nutrient Database for Standard Reference* (2011), a serving of chicken nuggets (approx. 100 grams) contains 19.82 g of fat, 43 mg of cholesterol, and 557 mg of sodium. Likewise, a 5-inch long beef frankfurter provides 13 g fat, 24 mg cholesterol, and 513 mg sodium, and a quarter pound hamburger contains 10 g fat, 63 mg cholesterol and 760 mg sodium. Based on the nutrition composition data, consumption of these products contributes significantly to the daily requirement for fat, sodium, and overall calories. The dietary reference intake states that the daily requirement, using that 2000 calorie/day diet plans, is 65 g of total fat, 300 mg of cholesterol and 2400 mg of sodium (US Department of Agriculture 2010).

Goat meat is a lean meat with favorable nutritional quality and attributes that conform to current demand for healthier meat. Reduction in childhood obesity, and an increase in the market share of goat meat in the meat industry may be achieved through the introduction of more convenient, healthier, and traditional product forms to the public. Thus, if Louisiana grade-level students who currently eat traditional meat products were to eat low-fat, healthier goat meat alternatives such as patties, nuggets, tacos, and frankfurters, then we may be able to lower childhood and adolescent obesity rates in the state.

Children and adolescents are powerful forces in shaping future demand and supply functions for goods and services. Therefore, their willingness to try new food products must be studied so that the meat industry can accurately anticipate future demand for traditional and nontraditional meat products and respond accordingly. Our study analyzes consumption, potential consumption, and health perceptions about selected meat products among a group of young consumers in Louisiana to ascertain the potential market for goat meat products.

Objectives

The study's objectives are to document consumption patterns and perceptions about selected meat products by a group of grade-level students. Specifically, we examine (1) eating frequency of convenience meat products such as frankfurters, hamburgers, tacos, and nuggets made from traditional meats; (2) perceptions of the healthfulness of traditional meats and convenience meat products; (3) willingness to try new products, including goat meat products; and (4) whether gender and grade levels affect eating frequency, and perceptions of selected meat products.

Data and Procedures

The study's data were compiled from a survey of 60 grade-level students aged 10–18 years who participated in two summer programs on our campus. Data were compiled on consumption frequency; perceived healthfulness of traditional meat products such as nuggets, hamburgers,

hams and frankfurters; perceptions about goat meat consumption; knowledge of the nutritive value of goat meat, chicken and beef; willingness to purchase goat meat products; and on participants' age, grade levels, and gender. Specific questions were as follows. How often do you eat chicken, beef, goat, frankfurters, tacos, hamburgers, or nuggets? Do you consider franks, tacos, hamburgers, or nuggets to be healthy? Are you willing to try new foods? Would you ask your parents to purchase goat products if offered in the market? Chi-square tests for independence were used to analyze associations between gender or grade levels, and selected response categories.

Empirical Results and Discussion

Descriptive Statistics

Female students comprised 63% of the survey. The composition of the grade levels was as follows: elementary-school students (17%); middle-school students (33%); high-school students (50%). From table 1, the highest consumption level reported was 2-4 times/month and the eating frequencies were as follows: tacos (47%); nuggets (45%); hamburgers (43%); frankfurters (40%); beef (40%); chicken (37%); goat (7%). Participants opined that chicken was healthier (53%) than beef (23%) or goat (23%), but ranked beef as the least healthy (63%). Table 2's results indicate that a majority of the students perceived the selected convenience meats as unhealthy—hamburgers (80%); frankfurters (75%); nuggets (68%); tacos (53%). Overall, participants (95%) were receptive to trying new food products; 80% would ask parents to buy goat products.

Table 1. Eating Frequency of Selected Meat and Meat Products (%).

Meats	>1-2 times/week	2-4 times/month	3-4 time/year	seldom
Frankfurters	18.3	40.0	11.7	30.0
Hamburgers	38.3	43.3	11.7	6.7
Tacos	20.0	46.7	23.3	10.0
Nuggets	30.0	45.0	20.0	5.0
Chicken	31.7	36.7	26.7	5.0
Beef	40.0	40.0	8.3	11.7
Goat	5.0	6.7	10.0	78.3

Table 2. Perceptions of the Healthfulness and Willingness to Try New Food Products (%).

Meats	Yes	No
Frankfurters	25.0	75.0
Hamburgers	20.0	80.0
Tacos	46.7	53.3
Nuggets	31.7	68.3
Willing to try new foods	95.0	5.0
Asks parents to buy goat products	80.0	20.0

Chi-Square Results

Table 3 shows the cross-tabulations among grade levels, eating frequency, and students' perceptions of the healthfulness of frankfurters, hamburgers, tacos, nuggets, and goat meat. The results suggest that consumption frequencies are independent of gender. More females than males perceive nuggets as unhealthy. However, there are no other differences in how students' perceive the healthfulness of the other convenience meat products. High-school students are more likely to perceive nuggets as less healthy than other meat products than elementary and middle-school students (see Appendix).

Table 3. Associations among Gender, Eating Frequency, and Health Perceptions.

Meats	Male	Female	x^2	P-value	Male	Female	x^2	P-value
	Eating Frequency				Health Perceptions			
Frankfurters								
Frequently	27.3	61.2	0.512	0.474	53.3	46.7	2.392	0.122
Seldom	38.8	72.7			31.1	68.9		
Hamburgers								
Frequently	39.1	60.0	0.097	0.755	25.0	75.0	0.879	0.348
Seldom	35.1	64.9			39.6	60.4		
Tacos								
Frequently	50.0	50.0	1.148	0.284	32.1	67.9	0.463	0.496
Seldom	33.3	66.7			40.6	59.4		
Nuggets								
Frequently	33.3	66.7	0.123	0.726	52.6	47.4	3.052*	0.081
Seldom	38.1	61.9			29.3	70.7		
Goat Meat								
Frequency	33.3	66.7	0.015	0.902				
Seldom	36.8	63.2						

Note. (*) implies statistical significance at the 10 percent level of probability.

Summary and Conclusions

Research from the Centers for Disease Control and Prevention (CDC) suggests that good nutrition is a precursor for proper growth and development of children and adolescents. Further, healthy eating in childhood and adolescence can reduce the likelihood of developing diseases such as high cholesterol, high blood pressure, cardiovascular disease, cancer, obesity, osteoporosis, iron deficiency, and diabetes later in life. Fast-food laden diets increase the likelihood of becoming overweight or obese and the risk for developing lung, esophageal, stomach, colorectal, and prostate cancers (CDC 2015). To complicate matters, a large majority of America's youth do not commune the recommended intake for meat, fruits and vegetables, or

whole grains each day. However, their daily consumption levels of sodium far outweigh the recommended daily intake of between 1,500 to 2,300 milligrams. Further, caloric intake of added sugars and fats have been steadily increasing among children and adolescents because of their increased consumption of soda, fruit drinks, dairy desserts, grain desserts, pizza, and whole milk (CDC 2015).

Unhealthy weight gain due to poor diet and lack of exercise is responsible for over 300,000 deaths each year. Foods from animal sources remain major contributors of total fat, saturated fat, and cholesterol in the American diet. Goat meat is gaining acceptance because of its low saturated fatty acid and cholesterol levels when compared to similar cuts in beef and chicken. If goat meat were adopted and used meat in school menus, this could lower grade-level students' daily intake of total fat, saturated fat, and cholesterol.

Children and adolescents will shape future demand and supply functions for goods and services. Therefore, their willingness to try new food products must be studied so that the meat industry can accurately anticipate future demand for traditional and nontraditional meat products and respond accordingly. Consequently, our study's objectives were to document consumption patterns and perceptions about selected meat products by a group of grade-level students. Specifically, we examined (1) eating frequency of convenience meat products such as frankfurters, hamburgers, tacos, and nuggets made from traditional meats; (2) perceptions of the healthfulness of traditional meats and convenience meat products; (3) willingness to try new products, including goat meat products; and (4) whether gender and grade levels affected eating frequency, and perceptions of selected meat products.

The results suggested that eating frequencies were invariant of gender and grade levels. Female students were more likely than males to perceive nuggets as unhealthy, while high-school students were more likely to perceive nuggets as unhealthy. Given these findings, female and high-school students could become potential consumers of goat-meat nuggets in the foreseeable future. Unfortunately, given our small sample, we cannot say definitively that the market for goat meat and goat meat products will be economically viable in the future. However, given goat meat desirable nutritional attributes; rising medical costs for treating diet-related illnesses; and budgetary challenges at the national and state levels, we must all become more proactive in improving our eating habits.

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Appendix

Associations among Grade Levels, Eating Frequency, and Health Perceptions.

Meats	Elem.	Middle	High	x^2	P-value	Elem.	Middle	High	x^2	P-value
	Eating Frequency					Health Perceptions				
Frankfurters										
Frequently	18.2	18.2	63.6	1.447	0.485	13.3	53.3	33.3	3.644	0.162
Seldom	16.3	36.7	46.9			17.8	26.7	55.6		
Hamburgers										
Frequently	21.7	26.1	52.2	1.199	0.549	8.3	41.7	50.0	0.938	0.626
Seldom	13.5	37.8	48.6			18.8	31.2	50.0		
Tacos										
Frequently	16.7	33.3	50.0	0.000	1.000	21.4	35.7	42.9	1.339	0.512
Seldom	16.7	33.3	50.0			12.5	31.2	56.2		
Nuggets										
>1-2 times/wk	5.6	44.4	50.0	2.857	0.240	36.8	21.1	42.1	9.395**	0.015
Seldom	21.4	28.6	50.0			7.3	39.0	53.7		
Goat Meat										
Frequency	0.0	66.7	33.3	1.754	0.416					
Seldom	17.5	31.6	50.9							

Note. (*) Implies statistical significance at the 10^{th} level of probability.

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Diversification into Specialty Crops Production as a Regional Economic Development Strategy for Northeast Arkansas: An Economic Impact Analysis

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Abstract

This study evaluates potential economic impacts on the region that may result from diversifying into vegetable crops. Five vegetables: okra, Southern peas, snap beans, summer squash, and sweet potatoes are evaluated. The evaluations entail analyses of potential regional economic impacts, using IMPLAN 3.0. The results exhibit strong multiplier effects and economic contributions in the region to output, employment, value-added, and income generation. The results also show that vegetable production can be important source of indirect and induced economic activities in the region. These indicate that vegetable production can have positive impacts and linkages in the region's economy and may not be ignored in developing economic strategies for the region

Keywords: economic impact, IMPLAN, vegetable production, Northeast Arkansas agriculture

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Introduction

Despite the large agricultural land base in Northeast Arkansas, economic development strategies in the region have over the years continued to rely on the production of few core traditional row crops. Consequently, row crop agriculture production has become the mainstay of the region, with over 2,400,000 acres of cropland in the seven-county study region (Clay, Craighead, Crittenden, Cross, Greene, Mississippi, and Poinsett counties—see Figure 1). However, between 2006 and 2010 row crop prices were very volatile while production expenses continued to rise. Average earnings in the region fell by 2.5% while that of the entire state of Arkansas fell by 2.0%. Unemployment rate rose to 7.8% compared to 5.4% nationally. The region had one in every six jobs in row-crop agriculture. Average per capita income in the region fell to $21,000 compared to $28,000 nationally. These statistics contributed in making Northeast Arkansas one of the poorest regions in the country and prompted the Arkansas Economic Development Administration's interest in possible alternate crop diversification to revitalize the region's poor economy. Commercial-scale specialty crop production was considered as one such alternatives, given the region's widespread experience with garden-scale vegetable production and its past experience with commercial-scale vegetable production, during the 1920s through 1990s.

Figure 1. Study Region: Seven Counties of Northeast Arkansas (Clay,Cross, Craighead,Poinsett, Green, Crittenden, Mississippi

This study evaluates the potential employment and economic impacts on the region that could result from expanded production of specialty crops. Five specialty crops: okra, southern peas, snap beans, summer squash, and sweet potatoes are evaluated. The evaluations entail economic

analyses of the five specialty crops, and an assessment of the potential regional economic impacts, using POLYSIS simulation and IMPLAN.

The economic analyses of the specialty crops include estimated production expenses, farm gate revenues, and net income. For each crop, a theoretical threshold of net income versus selling prices is established using estimated "processing grade" prices for the low end and USDA Terminal prices for the high end. Four net income scenarios: the farm gate price required to achieve a net income of $200 per acre per year- an estimated average net income per acre per year from conventional row crops grown in the region, and the farm gate price required to achieve a net income scenario of $1500—an estimated average net income per acre per year that may entice row crop producers to switch to the specialty crop in question.

Quantities of viable specialty crops that can be produced in the seven counties-region are determined by simulating price changes on the USDA baseline of the region's agricultural sector. In addition, POLYSIS simulation output of the changes on net farm incomes, prices, and land use changes for each of the specialty crop price scenarios, are aggregated to the county level and incorporated into IMPLAN, which provides information on changes in the regional economy as measured by total industry output and employment at the state and county levels. Unlike other non-farm economic sectors, the agricultural sector's resources in the region are not very mobile. Once the resources are employed by the agricultural sector they tend to be rigid or static in that sector. Northeast Arkansas (NEAR) farmers tend to use all of their productive capacity regardless of expected commodity prices.

Methods

Two steps are used to develop the economic impact analysis. First, a crop budget and four price scenarios for each of the five vegetables crops—southern peas, okra, snap beans, summer squash, and sweet potatoes are developed. Information on the crop budgets, prices and acreage to be planted with each vegetable are also developed. Next, this information is then used to estimate the impact that vegetable production will have on the economies of each of the seven counties using IMPLAN (IMPLAN 2010), an input-output modeling system.

IMPLAN is an acronym for "Impact analysis for Planning". The IMPLAN System comprises of software and regional data sets. For the purposes of this study changes that occur from the baseline are estimated and used as input to IMPLAN (IMPLAN 2010). Once IMPLAN is solved, information at the county level regarding changes in total industry output and employment is estimated for each sector of the economy.

POLYSYS

POLYSIS consists of a large-scale, comprehensive quantitative group of models of the US agricultural sector and that of some international countries. The analysis in this study uses the output from POLYSYS, simulation model of the region's agricultural sector that includes county level aggregate income modules, demand, and supply of agricultural products, and integrates that output into IMPLAN. Many POLYSYS model groups and IMPLAN have designed and published10-year USDA baseline projections and multipliers for the US agricultural sector for the counties in all the 50 states, and these models simulate deviations from the baseline. The

POLYSYS baseline module for the state of Arkansas includes eight major row crops (cotton, rice, soybeans, grain sorghum, oats, barley, and wheat that are mainly produced in Northeast Arkansas. The emphasis in this study is on how shifting row crops land to specialty crops production affects crop prices, farm incomes, and taxes paid to the government by farmers in the region. Changes in growers output and incomes resulting from specialty crops diversification are used for our POLYSIS simulation using the following model:

$$(1) \qquad \Delta \mathrm{GI}_{\boldsymbol{m.i.j.c}} = \sum_{j=1}^{5}(GR^{s}{}_{m.i.j.c} - \sum_{c=1}^{8}(GR^{b}{}_{m.i..c}$$

Where:

$\Delta \mathrm{GI}_{\boldsymbol{m.i.c}}$ is the change in growers' incomes for year (m), county (i), specialty crop (j), and row crop (c), $GR^{s}{}_{m.i.j.c}$ is the gross return for price scenario(s), for year (m), county(i), specialty crop (j), and row crop (c). $GR^{b}{}_{m.i..c}$ is the net return for the baseline price in POLYSIS for year (m), county(i), and row crop (c). The changes in growers' incomes for producing a specialty crop were summed over each crop and the result was placed in the model, along with total industry output for each row crop. The POLYSYS simulation outputs are then integrated into IMPLAN. The POLYSYS and IMPLAN models are combined to provide a detailed picture of the region's agricultural sector, potential impacts of growing specialty crops, and the impacts to the region's economy as row crop producers diversify into specialty crops production.

For the analysis, we used a price scenario that could earn specialty crop growers $200 net income per acre, the average net income for row crop producers in the region.

Price Scenario Development

Farm gate price data for different grades of the five specialty crops were unavailable, as a result, we developed four farm gate pricing scenarios for each of the five specialty crops for our analysis:

Price 1 scenario is the estimated processing grade price (if the entire crop were to be sold at that price). Price 2 scenario is the estimated farm gate price required to achieve a target net income of $200 per acre per year. Price 3 scenario is the estimated farm gate price required to achieve a target net income of $1,500 per acre / year that may entice row crop producers to switch to the specialty crop in question. Price 4 scenario is the estimated USDA Terminal price (if the entire crop were sold at that price).

Table 1. Estimated average agronomic yields and market clearing prices selected vegetables.

Price Scenarios		**Southern Peas**	**Okra**	**Snap Beans**	**Summer Squash**	**Sweet Potatoes**
Scenarios	Yield, pounds per year	1,000	12,000	5,750	10,500	18,000
Price1	Processing grade prices	$0.450	$0.220	$0.090	$0.190	$0.10
Price 2	Prices to achieve $100/acre	$0.924	$0.888	$0.222	$0.231	$0.11
Price 3	Prices to achieve $1,500/acre	$2.324	$1.355	$0.466	$0.36	$0.19
Price 4	USDA Terminal prices	$0.739	$1.463	$0.860	$0.70	$0.43

Terminal prices are wholesale prices for fruits and vegetables sold at selected U.S terminal markets. These terminal prices are compiled regularly by the USDA's Agricultural Marketing Service and are to a limited extent differentiated by the commodity's growing origin, variety, size, package and grade. The Terminal prices used in this analysis, are the average values for all grades for each specialty crop during 2010 at the three closest terminals to the region (Saint Louis, Atlanta, and Dallas).

Incorporating Changes in Growers Incomes and Output from POLYSIS Simulation into Region's IMPLAN Data Base

POLYSYS and IMPLAN models are combined to provide a detailed picture of the region's agricultural sector, potential impacts of growing specialty crops, and the impacts to the regional economy as row crop producers diversify into specialty crops production. The POLYSYS simulation output from the changes in growers' incomes, output, and acreage are placed into IMPLAN for impact analysis.

IMPLAN (Impact analysis for Planning) is an economic impact modeling system, developed by MIG, Inc. (Formerly Minnesota IMPLAN Group, Inc.). IMPLAN uses a Input / Output analysis (I/O). Input / Output analysis recognizes that relationships exist between industry groups and households, and quantifies the flow of dollars as transactions occur between these parties, and as value is added to a product or service from the producer to the final customers (Leontief 1936). IMPLAN has produced customized, location-specific social and economic characteristics and demographics of the location selected (IMPLAN 2010).

IMPLAN's social accounting system describes transactions that occur between producers, input suppliers, intermediate and final consumers by using social accounting matrix. IMPLAN's Social accounting matrices have been used in many impact studies including evaluating the economic impacts of bioenergy crop production on U.S. agriculture (De La Torre Ugarte et al. 2000). Because of its ability to provide detailed input-output impacts in any local economy, the methodology used in this study has been used in various localized impact studies (Schmit. et al. 2013; Mulkey. et al. 2012). The IMPLAN model can also be used for predictive purposes, by providing estimates of multipliers. Multipliers measure the response of a region's economy to a change in demand or production in the region This study uses IMPLAN 3.0 software and 2008 through 2010 Northeast Arkansas industrial sector (NAIC) data for the analysis (IMPLAN 2010).

Crop Budgets

The study estimated four price scenarios for each of the specialty crops. Crop budgets are developed for each of the specialty crops.

We created custom budgets for each specialty crop using crop budgets developed by the university of Arkansas (based on the jointly prepared vegetable crop budgeting model developed by multi states land-grant universities in Mississippi, Arkansas, Louisiana, Tennessee, Alabama and Georgia also called the MALTAG group). However, we incorporated additional unique expenses and our price scenarios to create custom budgets for each of the five crops using

Microsoft Excel so that additional unique expenses and our price scenarios could be incorporated and used for the analyses. A summary table of the custom budgets for each crop is shown in Table 2.

Table 2. Summary Specialty Crop Budgets

	Southern Peas	Okra*	Snap Beans	Summer Squash	Sweet Potatoes
Revenues	$1,024	$10,458	$1,378	$2,522	$2,079
Variable/operating expenses					
Fertilizer	53	502	41	87	68
Custom operations	$24	96	24	24	40
Agricultural chemicals					
Fungicides	–	–	25	25	30
Herbicides	10	35	32	–	23
Pesticides	16	84	19	11	288
Seeds/planting stock	20	5555	147	258	195
Irrigation	195	780	195	195	20
Other expenses				356	
Labor	107	288	110	338	206
Fuel	118	228	127	93	102
Repair and maintenance	24	31	32	11	19
Irrigation	27	1296	155	210	540
Subtotal variable Opex	$594	8895	907	1608	1531
Gross income	$430	$1,563	$471	$914	$548
Fixed operating expenses					
Land	50	200	50	50	50
Equipment owning cost	99	181	108	441	117
Interest on Capex	14	152	16	35	30
Subtotal fixed Opex	163	533	174	526	197
Operating income	$267	$1,030	$297	$388	$351
Management and overhead					
Farm management	30	369	43	84	67
Farm overhead	37	461	54	104	84
Subtotal M&A	67	830	97	188	151
Net Income	$200	$200	$200	$200	$200

Note. * Because of its high projected crop failures, four years of total expenses/revenues are used for Okra.

Acreage Data

The USDA 2007 Agricultural Census reports less than 1% or only 2,100 acres of specialty crops in the region, but does not break it out by crop type, and no other data was located that provides production information for the region by specialty crops. However, during the 1920s when the region had the highest acreage in commercial specialty crops production, only 5% of its cropland was devoted to specialty crops production. This study estimated 5% of the region's cropland for specialty crop diversification. The estimated acres are based on private discussions with

vegetable brokers / processors who have obtained specialty crops from the region in the past, and growers in the region. There are currently 2,400,000 acres of cropland within the seven-county region; thus, a total of 12,000 acres would entail re-directing 5% of the region's farmland to vegetable production.

Results and Conclusions

The results from the IMPLAN analysis provide an indication of the effect of the structural changes that can occur in the region's traditional row crop production, income generation, and output resulting from diversifying into specialty crops. Table 3 shows the summary results.

Table 3. Estimated Total Regional Impacts from Specialty Crops Diversification.

Impact Type	Employment	Labor Income	Value Added	Output
Direct Effect	215	$18,300,000.00	$14,600,000.00	$25,300,000.00
Indirect Effect	39	$1,400,000.00	$2,100,000.00	$3,600,000.00
Induced Effect	48	$1,400,000.00	$3,300,000.00	$5,400,000.00
Total Effect	302	$21,100,000.00	$20,000,000.00	$34,300,000.00

The results in Table 3 show that specialty crops production can have potential positive multiplier effects and economic contributions in the region in terms of output, employment, value-added, and income generation. These indicate that specialty crops production can be an important sources of indirect and induced economic production activities in the region. It also indicates that specialty crops production can have positive economic impacts and linkages in the region's economy and it must not be ignored when developing economic strategies for the region. The total regional impact results are *net* of employment, output, value added and income impacts that are associated with row crops that would be foregone if production of specialty crops were to be expanded to replace the 12000 acres that would have been used to produce row crops. For example, the 302 FTE employment created from expanded specialty crops production in the region reflect the total employment created from specialty crops production net the total employment associated with 12,000 acres of conventional row crops that would have been lost in the region by not producing row crops. Although Table 4 shows that expanded production of each of the five specialty crops in the region will have positive economic impact, sweet potatoes seem to have the highest economic impact in terms of employment income generation and output. The results of this study has also shown that to properly measure the economic impact and contribution of specialty crops to a region's economy, account must be taken of its potential effects on the generation of income, output, value-added and employment. As a major row crop production region, it is clear that while specialty crops may receive very little attention in terms of production and economic contribution in the region, this impact analysis shows that specialty crops have the potential to be important economic engines in the Northeast Arkansas region and that specialty crops production may not be ignored when designing agricultural development strategies for the region. This study has also shown that to properly measure the economic impact and contribution of specialty crops production to Northeast Arkansas region's economy, account must be taken of its effects on the generation of income, output, value-added and employment.

Table 4. Detail Regional Impacts from Specialty Crops Diversification.

	Employment	Labor Income	Value-Added	Output
Southern Peas				
Direct Effect	33	$3,900,000	$2,900,000	$5,500,000
Indirect Effect	10	$300,000	$600,000	$900,000
Induced	11	$300,000	$800,000	$1,200,000
Totals	54	$4,500,000	$4,300,000	$7,600,000
Okra				
Direct Effect	32	$2,600,000	$2,100,000	$3,600,000
Indirect Effect	6	$200,000	$300,000	$500,000
Induced	7	$200,000	$500,000	$800,000
Totals	45	$3,000,000	$2,900,000	$4,900,000
Snap Beans				
Direct Effect	27	$2,500,000	$1,900,000	$3,400,000
Indirect Effect	5	$200,000	$200,000	$500,000
Induced	6	$200,000	$400,000	$700,000
Totals	38	$2,900,000	$2,500,000	$4,600,000
Summer Squash				
Direct Effect	31	$2,600,000	$2,100,000	$3,700,000
Indirect Effect	6	$200,000	$300,000	$500,000
Induced	7	$200,000	$500,000	$800,000
Totals	44	$3,000,000	$2,900,000	$5,000,000
Sweet Potatoes				
Direct Effect	92	$6,700,000	$5,600,000	$9,100,000
Indirect Effect	12	$500,000	$700,000	$1,200,000
Induced	17	$500,000	$1,100,000	$1,900,000
Totals	**121**	**$7,700,000**	**$7,400,000**	**$12,200,000**

Source. IMPLAN 3.0, 2010 IMPLAN Results

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Farm Income and Food Hub Participation: Farmer Attributes, Attitudes and Perceptions

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Abstract

This study evaluated the relationship between gross farm income and producers' willingness to participate in a food hub. The preliminary findings of the study suggested that farm size based on gross farm income did not significantly affect farmers' willingness and ability to be part of a local food hub. Irrespective of the farm income, connecting to local buyers was the main function of the hub desired by the producers. More than 60% of the producers expected to achieve broader market reach through the food hub.

Keywords: food hub, willingness to participate, farmers' attitude

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Introduction

A strong community-based food system combines local production, processing, distribution and consumption to improve environmental, economic, social and nutritional conditions within a region(Garrett and Feenstra 1999). In recent years, there have been many public and private efforts in supporting such food systems. Food hubs are important part of those systems benefitting large and small producers, buyers, consumers, and food system initiatives including farm to school programs.

Food hubs provide opportunities for increased income to small farmers and ranchers through wider access to retail, food service and institutional markets. Many small farms rely on direct marketing channels, and are too small to compete effectively on the wholesale market. Farmers have been turning to food hubs in recent years in part to meet consumer demand for local food while saving on transportation and marketing costs (Low et al. 2015). United States Department of Agriculture (USDA) supports the development of food hubs as a critical strategy to encourage smaller farmers to scale up their operations; to develop local and regional food systems as a means of enhancing local economic development, and to improve access to fresh food in local communities. The earnings of local farmers, ranchers and other participants in the hub are more likely to be spent within their own communities, which has the potential of improving the overall economy of a region.

Objectives of the Study

This study evaluated the relationship between gross farm income and producers' willingness to participate in a food hub. It is believed that willingness is comprised of a mix of both farm/farmer attributes and the farmer's perception of the benefits of a food hub. Among the other variables that were expected to play a role in food hub participation were previous adaptation of new technology including marketing programs, level of risk acceptance, use of extension services, adoption of sustainable practices, farmer age, farm income, number of years farming, and whether a farmer believed that by participating in a food hub, he or she would reach new customers, increase business income or create more opportunity to focus on farming.

Data and Method

The study surveyed farmers from a nine county region in south central Missouri. The surveys were distributed as part of a feasibility study, supported by a research grant from the USDA Rural Development office in Missouri, meant to gauge capacity and interest in a food hub drawing from farms in the area. The questionnaires included sections intended to generate information about both farm/farmer attributes, such as number of acres farmed and years of farming experience, and farmer attitudes towards potential benefits of food hub participation. Those benefits included increased access to new customers and the ability to spend more time on the farm and less time marketing.

A total of eleven variables representing farm attributes and socio-demographics of farmers were determined to impact producers' decision to sell to a food hub and/or adjust supply to accommodate the hub's needs. (Table 1).

Table 1. Descriptive Statistics of variables included in the regression models.

Variable	Description of Variable	Mean	Std. Dev.
Dependent			
WTP_HUB	1="Likely" or "Very Likely" to Participate; 0=Not willing	0.62	0.49
WTA_Supply	1=Willing to add products, grow specific products, or expand production; 0=Not willing	0.76	0.43
Explanatory Farm Attributes			
PH_ONSITE	Composite variable summing six postharvest activities: sorting, cooling, packing, washing, grading and labeling	1.89	2.15
CERTIFICATIONS	Composite variable comprised of five certifications: GHP, GAP, Certified Humane, Animal Welfare Approved, USDA Certified Organic	4.55	3.81
CROPS_SU	Composite variable comprised of five activities related to crop production: cover crops, IPM, extended growing season, diversified crops, no till	7.59	4.53
NC_ORG	Composite variable comprised of avoidance of synthetic fertilizers and non-certified, but practicing organic	3.50	2.23
EXTENSION	Scored frequency of extension services use	2.24	1.84
TRADITIONAL	Composite variable comprised of five marketing practices: direct to consumer (u-pick, roadside shops, etc.), farmers market, restaurant, grocery, institutions	1.38	1.38
WHOLESALE	Composite variable comprised of three marketing venues: contract marketing, distributors/wholesales, cooperatives	0.29	0.59
NEW_MARKETING	Composite variable comprised of two marketing venues: CSA and internet sales	0.44	0.68
Attitude Toward Food Hub			
HUB_ATT	Composite variable comprised of three attitudes towards a food hub: finding new customers, increased business income and more time farming	10.05	3.11
Socio-Demographics			
EDUCATION	1=More than high school education; 0=high school or less	0.81	0.40
AGE	1=50 or older; 0=younger than 50	0.67	0.47

Farm Income and Farm Characteristics and Attitude

To analyze the relationship of farm income with other variables, a binary variable was created. Farms with incomes of less than $20,000 per year were given a 0 value and farm incomes of $20,000 or more were given a 1 value. A mean value of 0.32 indicated that most of the farms represented through the survey (n=211) were generating less than $20,000 per year. This variable was compared with other variables using ANOVA. (Table 2) Eight variables were found to be significant at a level of at least 10 percent.

Table 2. Farm Income and Farm Attributes and Attitude: A Mean Comparison.

Variables	Income < $20,000	Income > $20,000	F-Statistic
NC_ORG[1]	3.86	2.79	11.08**
NON-CERTIFIED, PRACTICING ORGANIC	1.99	1.36	11.03**
AVOID SYNTHETIC FERTILIZERS	2.16	1.58	11.98**
PERCENTAGE OF FARM INCOME FROM LIVESTOCK	35.45	66.39	24.73**
EXTENSION	1.99	2.74	7.75**
TRADITION	1.27	1.60	2.68*
WHOLESALE	0.23	0.44	5.91**
NEW_MARKETING	0.39	0.54	2.36
INCREASED INCOME[2]	3.37	3.63	2.67*

Note. [1]NC_ORG is made up of Non-Certified, Practicing Organic and Avoid Synthetic Fertilizers. [2] Q36_ATT is comprised of New Customers, Increased Income and Time Farming. ** Less than 5 percent significance; * Less than 10 percent sig.

The NC_ORG score (F-Statistic = 11.08) suggests that farms with annual incomes lower than $20,000 tend to adopt more organic practices. The score variable NC_ORG was formed using two separate variables namely, non-certified but practicing organic and avoidance of synthetic fertilizers. Both were independently significant when mean comparison tests were run against farm income. One reason for this may be because the farms that generate less income are likely to be smaller in terms of acreage and production as well, making organic practices more manageable. Additionally, smaller producers may also be marketing through direct to consumer venues, such as farmers markets, where they can communicate their practices directly to customers who likely value such methods.

Producers with farms generating $20,000 or more in annual income tended to use extension services more frequently (F-value = 7.75). This may be because smaller producers are less likely to seek out help from extension. It's also possible that extension services are geared towards larger scale production and production methods, although further research would be needed to determine the validity of such a statement. It does appear to be true that smaller producers perceive themselves to be in need of the educational resources needed to increase the scale of their businesses. Throughout the study, a number of small producers stressed that extension staff and offices were over-worked and did not have enough time or resources to do an adequate job of assisting specialty crop producers.

Producers with farms generating $20,000 or more per year appeared to utilize more than one type of distribution channel within various groups compared to those earning less than $20,000: the higher earners held higher scores when analyzing TRADITIONAL (mean score of 1.60 compared to 1.27), WHOLESALE (mean score .44 compared to .23) and NEW_MARKETING (mean score .54 compared to .39) variables. Few producers of any income level were using the CSA and internet sales measured in the group called NEW_MARKETING. Sixty-six percent of

respondents were using neither of the two new marketing channels. Twenty-three percent of producers were engaged in one of the two practices and 10.6 percent were doing both.

While HUB_ATT scores were not statistically significant when compared to farm incomes, one of the variables making up the score was: the belief that a food hub can help farms increase their incomes. Again, producers with larger farm incomes were more likely to believe that the hub could help increase their incomes. (Mean score of 3.63 compared to 3.37.) This may be because larger farmers have some experience selling at wholesale prices, and while smaller farmers focus on earning retail and farmers-market level prices by selling direct to consumers. Existing studies show that receiving less than retail price is typically a concern for small farmers who sell primarily at farmers markets (Gale 1997).

Significance of the Study to the Food Industry

The preliminary findings of the study suggest that farm size based on gross farm income was not significantly affecting farmers' willingness and ability to be part of a local food hub. Connecting to local buyers was the main function of the hub desired by the producers. More than 60 percent of the producers expected to achieve broader market reach through the food hub. Nearly two third of the producers surveyed were willing to obtain certificates including (Good Agricultural Practices) GAP and (Good Handling Practices) GHP if provided free of cost or for less than $500 per year. Study provides other important findings that can help the local buyers in implementing purchase strategies to enhance purchase of locally produced products.

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Preferences for Meat Labeling in Taiwanese Traditional Markets: What do Consumers Want?

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Abstract

Traditional markets provide a daily market platform for the majority of Taiwanese consumers. Food safety issues occurring in recent years have challenged traditional markets and eroded consumers' trust. This study investigates three types of meat product information: growth hormone, traceability, and nutrition labels, in a study designed to elicit how likely consumers at traditional markets are willing to pay for additional product information. Results show that younger females with higher education have a positive willingness to pay (WTP) for food safety related information, i.e., traceability and growth hormone. Implications from this study suggest that providing related information to ease the concerns of food-safety issues is a necessary strategy for traditional markets.

Keywords: growth hormone, traceability, nutrition label, traditional markets, willingness to pay

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Introduction

Traditional markets, also known as wet markets in Asia, have a long history of providing an important market platform in Asian countries. They are also called wet markets because they occur on wet ground, primarily for sanitary purposes. Most products sold at traditional markets come from local areas. Since vendors set their prices, getting the best price and the freshest food is the task of the purchaser. Based on the freshness characteristic, markets routinely provided customers live animals and seafood options—allowing them to choose the animal before it was butchered. With growing concerns about epidemic prevention and animal welfare, Taiwanese traditional markets are now prohibited from killing animals in front of customers.

Recently, a series of food safety issues have heightened consumer awareness. An incident concerning a meat adulteration scandal (Food Safety News 2014) occurred in Taiwan escalating consumers' concern for food safety and traceability while some market platforms, such as traditional markets still lack product information.

However, the cost of adding such information to labels impact the final price of the products, and it is debatable whether consumers of these traditional local markets really need additional information since they may rely on their accumulated product knowledge from their shopping experience (Berning et al. 2010). Indeed, consumers may not always need product information (Stranieri et al. 2010), and consumers may change their purchasing behavior depending on what type of information is provided (Derby and Levy 2001; Carneiro et al. 2005).

Although traditional markets in Taiwan have flexible pricing, diversity, and freshness, some types of product information is missing—such as growth hormone, traceability, nutritional information. Because meat safety is a concern, consumers are changing their purchasing behavior and sourcing food from more secure markets. This pioneer study investigates whether consumers need additional product information by surveying consumers' positive willingness to pay (WTP). Also examined is the type of consumer who is motivated to seek additional product information.

Empirical Models and Data

Consumers at traditional markets may or may not want additional product information due to their original purchasing behaviors. Since this type of information, can only be provided at an extra cost, consumers were asked if they are willing to pay more for it. A discrete choice format was used to assess each type of product variable. Every individual participating in the study is assumed to be a rational decision-maker. A random utility theory was adopted. Participants were provided a list of payment-card choices from zero and positive WTP. In order to find out whether consumers are willing to pay more for product information, the strategy in this paper treats the payment-card choices as a dichotomous choice set, i.e., zero and positive WTP choice.

Whether consumers at traditional markets would like to have this additional product information is highly related to purchasing behaviors which can be derived from their shopping experiences, i.e.: distance to markets, frequency of cooking (weekly), different types of meat in purchasing frequency, primary shopper for the family, frequency to the market, time spent at the market, and shopping time-of-day. Therefore, this study examines whether consumers are likely to give a

positive WTP for additional information with respect to their shopping experiences and demographic variables. A logit model was applied. Therefore, the probability of propensity to give a positive WTP can be presented as:

$$(1) \qquad p = pr(y_i = 1|\boldsymbol{x}_i) = F(x'\beta) = \frac{\exp(x_i'\beta)}{1+\exp(x_i'\beta)}$$

where y_i =1 indicates positive propensity to give a positive WTP; $\boldsymbol{x}_i$ denotes independent variables, including shopping experiences and demographic variables. The probability of the logit model is the cumulative density function of the logistic distribution. The marginal effects can be calculated as $\partial p/\partial x_j = F'(x'\beta)\beta_j$ for the logit model. The empirical specifications in this study for growth hormone, traceability, and nutrition label are:

$$(2) \qquad Growth\ Hormone = y_1^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_{22} X_{22} + \varepsilon$$

$$(3) \qquad Traceability = y_2^* = \gamma_0 + \gamma_1 X_1 + \gamma_2 X_2 + \cdots + \gamma_{22} X_{22} + \varepsilon$$

$$(4) \qquad Nutrition\ Label = y_3^* = \tau_0 + \tau_1 X_1 + \tau_2 X_2 + \cdots + \tau_{22} X_{22} + \varepsilon$$

where the dependent variables (*Growth Hormone, Traceability, and Nutrition Label*) are explained by twenty-two independent variables (X_s), while the β_s, γ_s, and τ_s are parameters to be estimated. The explanatory variables consist of demographic and shopping experience characteristic variables.

A total of 2,381 complete observations were collected in mid-July, 2015. The data used in this paper were collected from two sources: a web-based consumer survey (*N*=1,791) distributed and managed by an existing consumer panel maintained by emailcash.com.tw, an affiliate of EmailCash Marketing Pty Ltd.; and random street sampling survey (*N*=590). Each participant was double pre-screened, to ensure they were, at least, twenty-one-years-old, and they had visited a traditional market during the past twelve months. Although these two data sources are not the same, a pre-screening question helped us sort out the similarities.[1]

The definitions and sample descriptive statistics of these variables are presented in the Appendix. Most surveyed respondents are willing to give a positive WTP for *Growth Hormone* (86%), *Traceability* (83%), and *Nutrition Label* (63%). The independent demographic variables included: *Female*, *Age*, *Education*, *Family Income*, *Housewife*, *Northern Taiwan*, and *Central Taiwan*. Over 60% of the respondents have positive WTP for additional product information. The majority of the respondents are female (65%), which is similar to the traditional market purchasing structure; and the average age is about forty-one-years-old. The average education of the respondents is fifteen years. The average monthly family income is about NT $65,500 (about US $2,101 under US $1=NT $31.17). About 12% of the respondents identified themselves as full-time housewives. Over 52% of the respondents are from Northern Taiwan and 25% from Central Taiwan.

[1] Upon the request, the sample distribution for these two data sources are ready to provide.

Shopping experience characteristics assessed in this study include: *Distance to markets*, *Primary shopper*, *Frequency to markets*, *Time spent at markets*, *Shopping time-of-day*, *Cook at home*, and different types of meat bought in purchasing frequency. Over 70% of the respondents are close to their home—within one kilometer. About 48% of the respondents are sometimes or not at all the primary shopper in a family. Respondents on average are used to shopping in traditional markets more than once a week. The majority of the respondents on average spent around 30–60 minutes at traditional markets. Around 40% of the respondents visited traditional markets from 5:00 a.m. to 11:00 a.m. and only 23% from 11:00 a.m. to 5:00 p.m. About 52% of respondents cook at home between four to twelve times per week, while around 30% of respondents cook at home only 0–3 times in a week. Among the highly purchased frequency of different meat types, respondents most often purchase pork (61%), chicken (47%), fish meat (45%), and beef (13%).

Empirical Regression Results

The results of estimated coefficients and marginal-effects likelihood for selecting a positive WTP from the logit regressions are summarized in Table 1. A failed rejection regarding the goodness-of-fit examination shows that each regression model fits reasonably well. Many estimated coefficients of the demographic characteristics are significant for each type of product information. Overall, compared with males, female consumers are likely to select positive WTP for additional product information. Female consumers especially show a higher interest than males in nutrition labels. However, housewives are less likely to select a positive WTP for nutrition labels compared to other non-housewives. Possibly there is a linkage that housewives have more time to learn about the nutrition for the food they buy, and often try to save money for the family since they are not in charge of family income. Younger consumers with higher education and family income are likely to give a positive WTP for growth hormone and traceability. Central Taiwanese consumers are more likely to select a positive WTP for product information than Southern consumers.

The shopping experience variables identified many interesting outcomes. Consumers traveling a longer distance to traditional markets are likely to give a posit WTP if compared to those who are within 1 kilometer, or 1–3 kilometers of the markets. There may be a linkage between consumers who live far away from markets and consumers who are often willing to give a positive WTP for product information. Consumers who are infrequent shoppers for the family tend to give a positive WTP, compared to those who are most often the primary shopper. This implies that the demand for product information is highly related to occasional buyers who often look for product information to make purchasing decisions.

Consumers types who frequently shop at traditional markets, spending around 30–60 minutes at markets, and shop in the evening (after 5:00 p.m.) are likely to give a positive WTP for nutritional information; however, these types of shoppers do not show a significant level of food-safety concern about product information. This may imply that these types of shoppers are highly concerned with health-related factors if they have more free time at markets. Consumers who highly frequent the markets to purchase pork are less likely to select a positive WTP for nutritional labels. This may be linked to their long-term practice of using pork as the major protein source and pork is very common meat in Taiwan compared with other types of meat.

While consumers who most frequently purchase chicken and fish are more likely to give a positive WTP for traceability and nutritional labels.

Table 1. The Empirical Results of the Logit Model for Preferences of Product Information.

Dependent Variable / Independent Variables	Growth Hormone		Traceability		Nutrition Label	
	Coef/t	M.E.	Coef/t	M.E.	Coef/t	M.E.
Female	0.358***	0.043**	0.275**	0.038**	0.324***	0.074***
Age	-0.005	-0.001	-0.012*	-0.002*	0.002	0.000
Education	0.047	0.005	0.061**	0.008**	-0.017	-0.004
Family income	0.004**	0.000**	0.001	0.000	-0.001	-0.000
Housewife	-0.046	-0.005	0.057	0.008	-0.331**	-0.077**
Northern Taiwan	0.167	0.020	0.172	0.023	0.154	0.035
Central Taiwan	0.217	0.024	0.437***	0.055***	0.237*	0.053*
Distant to markets (Within 1 km)	-0.446	-0.048*	-0.530*	-0.066**	-0.345*	-0.076*
Distant to markets (1–3 km)	-0.333	-0.042	-0.547*	-0.082*	-0.537***	-0.125***
Primary shopper (Sometimes)	0.403***	0.044***	0.140	0.019	0.246**	0.055**
Primary shopper (Not at all)	0.033	0.004	0.052	0.007	0.017	0.004
Frequency to markets	0.000	0.000	0.001	0.000	0.006***	0.001***
Time spend at markets (30–60 mins)	0.022	0.003	0.110	0.015	0.184*	0.042*
Time spend at markets (1 hr above)	-0.318*	-0.040	0.088	0.012	0.139	0.031
Shopping time (5 a.m.–11 a.m.)	-0.040	-0.005	0.053	0.007	-0.187*	-0.042*
Shopping time (11a..m.–5 p.m.)	-0.051	-0.006	0.068	0.009	-0.170	-0.039
Cook at home (0–3 times weekly)	0.063	0.007	0.126	0.017	0.210	0.047
Cook at home (4–12 times weekly)	0.106	0.012	0.154	0.021	0.155	0.035
Pork	0.089	0.010	-0.129	-0.017	-0.450***	-0.100***
Chicken	0.085	0.010	0.240*	0.032*	0.204*	0.046*
Fish	0.186	0.022	0.043	0.006	0.185*	0.042*
Beef	0.098	0.011	0.104	0.014	0.156	0.035
Constant	0.767		0.887		0.494	
Number of observations	2,381	2,381	2,381	2,381	2,381	2,381
McFadden R^2	0.020	0.020	0.017	0.017	0.021	0.021
Correctly classified	86.27%		83.62%		64.26%	
Goodness-of-fit	2368.21		2364.16		2379.32	
Log-Likelihood	-933.51		1,043.39		1,534.44	

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

In sum, shoppers at traditional markets have a strong desire for and a positive WTP for product information concerning growth hormones, traceability, and nutritional labels. Particularly, demographic factors are highly related to gender, age, education, family income, and region. Shopping experiences are significantly linked to consumer proximity to the markets and how often they purchase food for the family. Finally, shopping experiences concerning shopping

frequency, the time spent at markets, and the shopping time-of-day in the evening are highly correlated with a demand for nutritional labels. With the exception of pork, consumers who more frequently buy chicken and fish requested food traceability and nutritional label information.

Conclusion

Taiwanese consumers have faced troubles in sourcing their food products from traditional markets. As food safety issues continue to raise consumers' tension in changing purchasing behavior, there is still a lack of product information available. Although these consumers are used to operating with limited product information, the escalating incidents of food safety scares, leads to new questions concerning whether consumers need or desire additional production information.

This study found that Taiwanese shoppers at traditional markets have a strong desire to receive product information for growth hormone, traceability, and nutritional labels in some instances. Especially, younger female consumers from central Taiwan with higher education and incomes are more likely to select a positive WTP. Consumers traveling longer distances to markets and only occasionally the primary shopper for the family are also concerned with additional product information. Implications from this study suggest that providing related information will help to ease the concern of food safety and is a necessary strategy at traditional markets.

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Appendix

Definitions and Sample Statistics of Variables (N = 2,381)

Variables	Description of Variables, BV=Binary Variable	Mean	Std. Dev.	Min.	Max.
Growth hormone	BV=1 if respondent was willing to give a positive WTP for growth hormone information, 0 o.w.	0.86	0.34	0	1
Traceability	BV=1 if respondent was willing to give a positive WTP for traceability information, 0 o.w.	0.83	0.36	0	1
Nutrition label	BV =1 if respondent was willing to give a positive WTP for nutrition information, 0 o.w.	0.63	0.48	0	1
Female	BV =1 if respondent is female, 0 o.w.	0.65	0.47	0	1
Age	Continuous variable; years of age	40.7	9.92	18	79
Education	Continuous variable: years of education	15.2	2.19	2	18
Family income	Continuous variable; total monthly household income before tax ($1,000)	65.5	31.0	10	105
Housewife	BV =1 if respondent's occupation is housewife, 0 o.w.	0.12	0.32	0	1
Northern Taiwan	BV =1 if respondent is from Northern Taiwan, 0 o.w.	0.52	0.49	0	1
Central Taiwan	BV =1 if respondent is from Central Taiwan, 0 o.w.	0.25	0.43	0	1
Distant to markets *(Within 1 km)*	BV =1 if respondent can reach traditional market within 1 kilometer, 0 o.w.	0.74	0.43	0	1
Distant to markets *(1-3 km)*	BV =1 if respondent can reach traditional market within 1-3 kilometers, 0 o.w.	0.18	0.39	0	1
Primary shopper *(Sometimes)*	BV =1 if respondent is sometimes the only one who buys groceries in a family, 0 o.w.	0.31	0.46	0	1
Primary shopper *(Not at all)*	BV =1 if respondent is not the only one who buys groceries in a family, 0 o.w.	0.17	0.37	0	1
Frequency to markets	Continuous variable: frequency to traditional market within half year	34.9	27.5	0	96
Time at markets *(30-60 mins)*	BV =1 if respondent spends time at traditional market within 30-60 minutes, 0 o.w.	0.51	0.49	0	1
Time at markets *(1 hr above)*	BV =1 if respondent spends time at traditional market over 1 hour, 0 o.w.	0.12	0.33	0	1
Shopping time *(5-11am)*	BV =1 if respondent used to go to traditional market at morning (5-11 Am), 0 o.w.	0.40	0.49	0	1
Shopping time *(11-5pm)*	BV =1 if respondent used to go to traditional market around 11 AM-5 Pm, 0 o.w.	0.23	0.42	0	1
Cook at home *(0-3 times weekly)*	BV =1 if respondent cooks at home about 0-3 times weekly, 0 o.w.	0.32	0.46	0	1
Cook at home *(4-12 times weekly)*	BV =1 if respondent cooks at home about 4-12 times weekly, 0 o.w.	0.52	0.49	0	1
Pork	BV =1 if respondent often or every chance possible purchases pork, 0 o.w.	0.61	0.48	0	1
Chicken	BV =1 if respondent often or every chance possible purchases chicken, 0 o.w.	0.47	0.49	0	1
Fish	BV =1 if respondent often or every chance possible purchases fish, 0 o.w.	0.45	0.49	0	1
Beef	BV =1 if respondent often or every chance possible purchases beef, 0 o.w.	0.13	0.33	0	1

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Economic Importance of Local Food Markets: Evidence from the Literature

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Abstract

In recent years, the demand for local food by consumers has grown significantly. The Direct-to-consumer marketing of local foods grossed $4.8 billion in 2008. Many studies have addressed purchases of local food directly from producers in the southeastern region of the United States. Many of these studies show that consumers of local foods are willing to pay premiums for local foods. Data from the 2012 US Census of Agriculture shows that, on average, direct-to-consumer food sales accounted for 5.5% of all farm sales. The goal of this paper is to enhance awareness of the growing demand for local foods. Specific objective is to discuss the contributions of local food markets to the economy. Secondary data from existing research and the Census of Agriculture were used in summarizing information presented in this paper. Evidence from literature reviewed shows that local markets have positive impacts on the local economy.

Keywords: local food, food markets, farmers' markets, food banks/stores, rural economies

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Introduction

Local food systems have developed at varying rates depending on regional differences (Goodwin 2013) with substantial growth in the last few years (Reynolds-Allie et al. 2013). The definition of LGF has varied as indicated in the literature. According to the 2008 Food, Conservation, and Energy Act, "local" includes food produced within 400 miles of its origin (Hand and Martinez 2010). Generally, local foods are foods sourced from nearby producers and farmers. Institutional markets have begun developing their own definition of local foods (Earth Fare 2014). Although interest is increasing and definitions have yet to be standardized, there is still a question of the importance of LGF to local, state, and national economies. Tropp (2013) highlighted data from a US Census of Agriculture, which showed that direct-to-consumer food sales only reflected 5.5% of all farms (on average) and 0.3% of total farm sales between 1978 and 2007. "Edible farm foods for human consumption" increased from $404 million to $1.2 billion from 1992 – 2007. This notwithstanding, the demand side of direct-to-consumer food sales is growing rapidly. In addition, the marketing of local foods through direct-to-consumer food sales and intermediary channels grossed $4.8 billion in 2008. Small farms (with sales less than $50,000) represented 81% of all local food sales (Low and Vogel 2011). There is growing interest in developing local food systems in the southeastern region. Palma et al (2013) highlighted the fact that the predominant food category sold at farmers markets was fresh fruits and vegetables as indicated in the 2007 Census of Agriculture. Ahearn and Stern (2013) found that size was positively correlated with performance of direct-to-consumer farms in the southeast.

Local Food Markets

Direct-to-consumer arrangements such as regional farmers' markets and direct-to-retail-foodservice arrangements such as farm sales to schools), are well-recognized as local food markets. Local food markets account for a small but growing share of total US agricultural sales. The structure of these supply chains can take numerous forms. Approximately 48,371 farmers sold about $4.8 billion of locally sourced food through intermediated marketing channels. Although fewer than 30% of local food farms reported intermediated sales of local food, they account for almost 80% of all local food sales (Vogel and Low 2015).

Objectives of Paper

This paper discusses the economic importance of local food markets on the local economy.

Review of the Literature

As noted in Palma et al. (2013), more than ever before, local food systems are attracting more attention from producers, food retailers and consumers. This peak in interest comes, not only from concerns for food safety, but from interests in consuming domestic products, the increasing demand for local food and lower transportation costs associated with buying local. Perceptions that local foods are of higher quality have also contributed to the expanded interest in local foods (Nonaka and Thiemann 2011). Interest in local foods has generated many regional food hubs. In recent years, the contribution of agriculture to rural employment and income has diminished, forcing them to explore alternative revitalization strategies to remain competitive. One

innovative strategy involves the establishment of local food markets that provide income opportunity for local farmers. From 2011 to 2012 there was a 9.6% increase in the number of farmers markets in the United States. In 2011, the USDA identified 7,175 farmers markets operating throughout the US compared to 7,864 in 2012, according to information provided by farmers' market managers across the country. Farmers markets are an important part of the local food system providing income opportunities for farmers and the community with fresh, healthy and nutritious foods. USDA's support for small and mid-sized farmers help local and regional food systems, and increase consumer access to fresh, healthy food in communities across the country. Through its Food and Nutrition Service (FNS) program, more farmers markets are now equipped with the ability to accept SNAP (Supplemental Nutrition Assistance Program, formerly food stamps), payments for purchases. The program provided $4 million dollars in available funding to equip farmers' markets with wireless point-of-sale equipment. Currently, over 2,500 farmers markets are using Electronic Benefit Transfer technology.

In 2015, a total of 161 farmers markets were identified in Tennessee with seventy-nine in Middle Tennessee, fifty-four in East and twenty-eight in West Tennessee (Figure 1). This represents a threefold increase from the fifty-five markets previously identified by Bruch et al. 2006. The number of farmer markets tripled from fifty-five markets to 161 markets. Farmers markets allow local farmers to offer consumers everything from food items (fruits, pumpkins, vegetables, agrotourism…agricultural related products to cut-your-own Christmas trees! Producer-to-consumer local food "Pick TN Products" directly connects consumers with local foods and farm experiences (Pickyourown.org – Tennessee 2015). The emergence of local food markets has led to significant growth in local food hubs in the United States. A study conducted by the US Department of Agriculture noted that there were about 240 food hubs in forty states (plus the District of Columbia), in 2012. Local food hub memberships usually consist of small family farmers who supply nutritious and fresh food year-round (Powers 2014). In whatever form or format they are organized, local food hubs allow money that could be spent elsewhere to be spent locally. Farmers are helped and encouraged to act as entrepreneurs and businessmen and women. Money generated and circulated in local economies help strengthen rural areas.

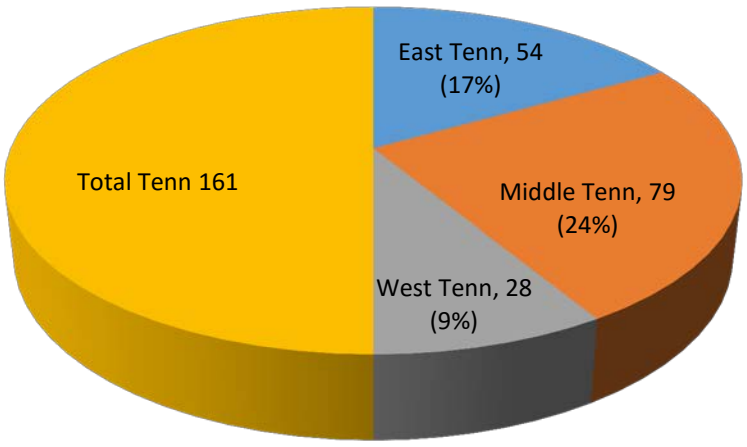

Figure 1. Farmers Markets in Tennessee.

Methodology

Secondary data from existing publications were collected and analyzed to accomplish the objectives of this paper. Descriptive techniques were used for organizing and presenting information.

Findings

The following section provides a discussion of some existing research in support of the contributions of local food markets to economic development and well-being. When consumers spend money on local foods rather than foods imported from other areas, the money stays within the local area, and their food dollars remain in their local communities. Local food systems can positively impact the local economy by generating economic development through income and employment growth. The expansion of local foods may be a development strategy for rural areas (Ross et al. 1999; Marsden et al. (2000); and marketumbrella.org 1999). Zepeda and Li (2006), Darby et al. (2008), Starr et al. (1999), and Starr et al. (2003) noted how farmers' were able to retain a greater portion of their food dollar by eliminating middlemen through shorter food supply chains. This benefitted the farmers and their communities. Ronnie et al. (2006) acknowledged that local food systems may encourage growth in local labor markets. Expansion in local food systems could impact local economies through import substitution. If consumers purchase food produced within a local area instead of imports from outside the area, sales are more likely to accrue to residents and businesses within the area. This may then generate additional economic impacts as workers and businesses spend additional income on production inputs and other products within the area (Swenson 2009). Existing literature showed that local foods can have positive impacts on local economic activity through localization of processing activities. Swenson (2009) used the Input-Output model to predict that locally produced fruits, vegetables, and meat products would increase output, employment, and labor incomes in Iowa by encouraging the development of direct marketing facilities including slaughtering and processing. Farmers' markets have positive impacts on local economies. Otto and Varner (2005) estimated that each dollar spent at farmers' markets in Iowa generated fifty-eight cents in indirect and induced sales, and that each dollar of personal income earned at farmers' markets generated an additional $0.47 in indirect and induced income. Each full-time equivalent job created at farmers' markets supported close to one-half of a full- time equivalent job in other sectors of the Iowa economy. Multi pliers associated with farmers' markets in Oklahoma have been estimated to be between 1.41 and 1.78 (Henneberry et al. 2009). In an effort to assess the economic impacts of expanding the local food production, the Plan East Tennessee Foodshed Assessment study examined the Knoxville Regional Foodshed System consisting of eleven counties in East Tennessee. The foodshed had 734,000 acres of farmland, at least twenty-two farmers markets selling food from fifty-nine farms. About forty-nine grocery stores, restaurants and manufacturing businesses were using locally sourced foods. Analysis conducted on data collected showed that growing and processing 20% of key food-groups locally would generate $500 million of additional economic activity, create nearly 5,000 new jobs, and generate $5.8 million in local and state taxes. The study showed that in 2013 dollars, estimated expenditure for the 20% local food consumption amounted to $340.0 million for the Knoxville Foodshed study area. Estimated expenditure level was able to support about 3,425 direct jobs with a direct income earned of $35.0 million. The direct value added impact was $71.0 million while the

indirect impact on the output of all the local suppliers for the foodshed was $103.9 million. Labor income impact was found to be $88.0 million. For value added and indirect business taxes, the total estimated impacts are $157.0 million and $5.8 million, respectively. A 20% increase in local food consumption in the foodshed would generate $5.8 million in state and local taxes and $11.1 million in federal taxes. For every dollar spent for local food consumption within the study area, an additional $0.51 in economic activity would be generated throughout the study region. The employment multiplier was 1.49 implying that for every job created from a local food consumption policy, an additional 0.49 jobs are created in other industries throughout the region.

Conclusions

This paper was an attempt to demonstrate that local markets are essential to the economy through a survey of existing research. The literature shows, these markets contribute significantly to enhancing incomes, employment and overall well-being of local communities. Research suggests they will continue to flourish and play a critical role in future economic development. Further research examining the structure and performance of farmers markets will shed more light on their impact in the context of the rural urban dialogue.

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An Analysis of Retail Milk Pricing in the Eastern United States

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Abstract

An analysis presented in the article evaluates the behavior of retail fluid milk prices, farm-level milk prices and farm-to-retail margins during the period of 2000-2010 in six cities located in the Eastern United States: Boston, MA; Syracuse, NY; Philadelphia, PA; Louisville, KY; Atlanta, GA; and Miami, FL. The empirical evidence presented in the article supports empirical findings reported in the existing literature: retail fluid milk prices tend to increase at a higher rate than farm-level milk prices and there is a presence of asymmetries in the farm-to-retail price transmission process. Furthermore, there is empirical evidence that may suggest that the patterns of behavior of fluid milk prices and farm-to-retail margins are different in the states with resale milk price control regulations (New York State and Pennsylvania) and states without resale milk price control regulations. In the former case, the pattern of changes in retail fluid milk prices is similar to the pattern of changes in farm-level milk prices. In the latter case, changes in the retail fluid milk prices do not necessarily reflect changes in the farm-level milk prices, which often causes farm-to-retail margin to increase.

Keywords: milk pricing, margins, market power, price regulations.

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Introduction

The behavior of fluid milk prices at the retail level and the relationship between retail milk prices and farm-level milk prices have raised concerns among dairy industry participants, policy decision makers and consumers' advocates. First, milk prices that consumers pay at the retail level have been increasing over the last decades. Second, the rate of the retail milk price increase has exceeded the rate of the farm milk price increase. As a result, the farm share of the retail milk price has decreased, and the farm-to-retail margin has increased. Apparently, dairy farmers do not benefit from higher retail milk prices. At the same time, higher retail prices decrease milk quantity purchased by consumers. The existing research suggests that increasing concentration and consolidation in milk processing, distribution and retailing and in particular increasing market power of supermarkets are likely to be a major force explaining the observed pattern of retail milk price behavior and the relationship between retail and farm-level milk prices (Carman and Sexton 2005; Chidmi et al 2005; Bolotova and Novakovic 2012).

The objective of this research is to conduct an analysis of the behavior of retail fluid milk prices and farm milk prices in selected cities in the Eastern United States during the period of 2000 to 2010. The Eastern U.S. cities have received a limited attention in the existing literature focusing on retail milk pricing. The cities included in the analysis are Boston (MA), Philadelphia (PA), Syracuse (NY), Louisville (KY), Atlanta (GA) and Miami (FL).

Factors Affecting Retail Fluid Milk Price Behavior

Farm-level Milk Pricing

Milk prices at the farm level have been historically set within the system of Federal and State Milk Marketing Orders. The Milk Marketing Orders determine the minimum prices for Grade A milk that the first-level handlers (milk processors) have to pay for milk based on the final use of milk. Currently there are four classes of milk. Class I milk is used to manufacture fluid (beverage) milk products. Dairy cooperatives may negotiate the over-order premium to the announced Class I milk price. Since 2000 Federal Milk Marketing Orders (FMMOs) use a series of formulas, according to which Class milk prices are related to wholesale prices of cheese, butter, dry whey and nonfat dry milk. The USDA Agricultural Marketing Service determines and publicly announces Class milk prices on a monthly basis. Dairy farmers do not receive the Class milk prices directly; they receive a mailbox price. The latter reflects prices of all Classes of milk sold in a particular Order and the utilization rate of each Class milk in the total volume of milk. The mailbox price typically includes adjustments, such as over-order premiums and payments to cooperatives for performing marketing functions.

Wholesale and Retail Milk Pricing

In the past, a substantial number of states had milk price control regulations at the wholesale and/or retail level. The design of wholesale and retail milk price controls varied across the states. Some states set minimum or maximum resale prices, and some states established margins requirements. Over the last decades the majority of states abandoned these regulations. New York State and Pennsylvania are the states which currently have resale milk price regulations

(Novakovic and Washburn 2008; Bolotova and Novakovic 2012). The New York State Milk Price Gouging Law (NYS MPGL) passed in 1991 aims to prevent unconscionably excessive fluid milk prices at the retail level. During the period of 1991-2008, the NYS Department of Agriculture and Markets (NYSDAM) calculated and announced the threshold prices that retail fluid milk prices were not supposed to exceed. The threshold retail price was equal to 200% of the Class I milk price. The NYS MPGL enforcement procedure was changed in October 2008. To consider whether retail fluid milk prices are unconscionably excessive, the NYSDAM now uses a $ retail margin standard ($ per container). Pennsylvania established milk price regulation controlling wholesale and retail prices of fluid milk. Pennsylvania Milk Marketing Board calculates and publicly announces on a monthly basis the minimum wholesale milk prices and the minimum retail milk prices.

The nature of supermarket pricing practices is another factor affecting the behavior of retail fluid milk prices and in particular their response to changes in the farm-level milk prices. Supermarket industry is a concentrated industry; typically there are a few supermarket chains located in the area. Supermarkets have a potential to exercise a seller market power to increase fluid milk prices paid by consumers. The exercise of market power can take different forms, including a direct setting (fixing) of retail milk prices (retail price stabilization practice) and asymmetric transmission of changes in farm prices onto retail prices.

Data and Methodology

The analysis includes a descriptive statistical analysis and a graphical analysis of (a) the behavior of retail prices for fluid *whole* milk sold in supermarkets and convenience stores in gallon containers, (b) farm-level milk prices and (c) farm-to-retail margins. The cities included in the analysis are Boston (MA), Philadelphia (PA), Syracuse (NY), Louisville (KY), Atlanta (GA) and Miami (FL).

The retail fluid *whole* milk prices are obtained from monthly surveys conducted by the USDA Agricultural Marketing Service (include whole milk and reduced fat milk). The surveys report prices charged by the first largest food store chain, second largest food store chain, and largest convenience store chain. The average price over the three outlets is reported. The average retail fluid whole milk price measured in $ per gallon is used in the analysis. The retail fluid milk prices are available in the USDA Milk Marketing Order Public Database.

The farm-level price used in the analysis is the announced Class I milk price. We use a location-specific price. The Class I milk price is announced on a monthly basis, approximately ten days before the beginning of the month in which it applies. The Class I milk price is announced in $ per hundredweight (cwt). The announced Class I milk prices are available in the USDA Milk Marketing Order Public Database. To be comparable to retail prices, Class I milk prices are converted from $ per cwt to $ per gallon. The farm-to-retail margin is calculated as the difference between retail price and Class I milk price, it is measured in $ per gallon. The margin is also expressed as a percentage of retail price.

In the case of each analyzed city, the averages and the coefficients of variation are calculated for retail price, Class I milk price ("farm price" to be referred further in the article) and farm-to-

retail margin ("margin" to be referred further in the article). The minimum and maximum values of the analyzed variables are recorded. The period of analysis is 2000-2010. Table 1 presents the results of a descriptive statistical analysis. Figures 1-6 depict the analyzed prices and margins expressed as a percentage of the retail price.

Table 1. Retail Fluid Whole Milk Prices, Farm Prices and Margins: Selected Eastern United States Cities (2000-2010).

	Average	CV	Minimum	Maximum
Boston, MA				
Farm price ($/gallon)	1.47	0.18	1.09	2.16
Retail price ($/gallon)	3.25	0.10	2.81	3.92
Margin ($/gallon)	1.78	0.11	1.41	2.48
Margin (% of retail price)	54.86	0.10	42.40	68.63
Syracuse, NY				
Farm price ($/gallon)	1.41	0.19	1.03	2.10
Retail price ($/gallon)	2.84	0.12	2.19	3.84
Margin ($/gallon)	1.43	0.10	1.05	1.79
Margin (% of retail price)	50.77	0.09	38.64	63.05
Philadelphia, PA				
Farm price ($/gallon)	1.45	0.18	1.07	2.15
Retail price ($/gallon)	3.28	0.12	2.75	4.12
Margin ($/gallon)	1.82	0.13	1.40	2.34
Margin (% of retail price)	55.75	0.08	45.56	66.56
Atlanta, GA				
Farm price ($/gallon)	1.47	0.18	1.10	2.15
Retail price ($/gallon)	3.28	0.12	2.52	4.49
Margin ($/gallon)	1.80	0.15	0.99	2.46
Margin (% of retail price)	55.08	0.11	39.37	64.27
Louisville, KY				
Farm price ($/gallon)	1.38	0.19	1.01	2.07
Retail price ($/gallon)	2.88	0.13	2.42	4.02
Margin ($/gallon)	1.50	0.19	0.87	2.29
Margin (% of retail price)	51.98	0.13	34.10	68.41
Miami, FL				
Farm price ($/gallon)	1.60	0.17	1.20	2.30
Retail price ($/gallon)	3.40	0.12	2.92	4.49
Margin ($/gallon)	1.80	0.12	1.37	2.48
Margin (% of retail price)	53.13	0.08	40.98	61.83

Notes. Farm price is the announced Class I milk price for the analyzed city. CV is the coefficient of variation (the ratio of standard deviation to the mean).

Results

The average *farm price* (Class I milk price) is in the range of $1.38 per gallon in Louisville to $1.60 per gallon in Miami. The average *retail price* is in the range of $2.8 per gallon in Louisville and Syracuse to $3.40 per gallon in Miami. The average *margin measured in $ per gallon* is in the range of $1.43 per gallon in Syracuse to $1.8 per gallon in Philadelphia and Miami. The average *margin measured as a % of retail price* is in the range of 50.77% in Syracuse to 55.75% in Philadelphia. The *highest average margins* are in Boston (54.86%), Atlanta (55.08%) and Philadelphia (55.75%). The *lowest average margins* are in Syracuse (50.77%), Louisville (51.98%) and Miami (53.13%). The following patterns are revealed by the analysis of minimum and maximum margins. The *minimum margin* ranges from 34.10% in Louisville to 45.56% in Philadelphia. The *maximum margin* ranges from 61.83% in Miami to 68% in Louisville and Boston.

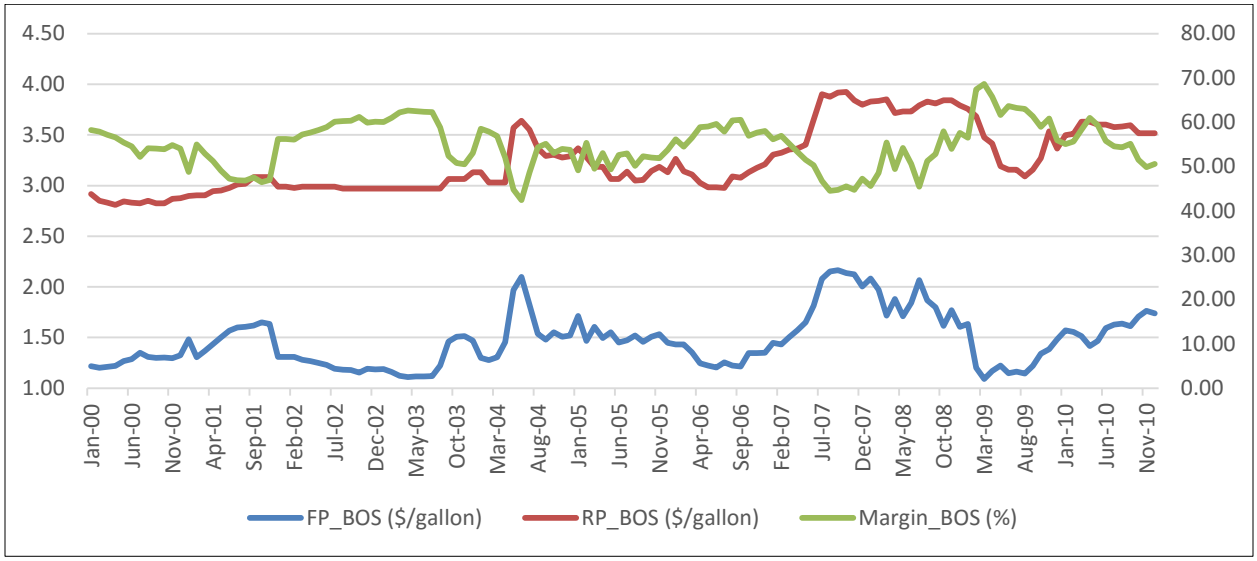

Figure 1. Retail Fluid Whole Milk Price, Farm Price and Margin: Boston, MA (2000-2010).

There is empirical evidence indicating that the retail milk price volatility is considerably lower than the farm price (Class I milk price) volatility. The coefficients of variation (CV) are used to measure price volatility. CVs for farm milk prices are very similar across the cities: 0.17-0.19. This reflects that fact that farm milk prices are set within the Federal and State Milk Marketing Orders and move in a similar manner across different locations. CVs for retail fluid whole milk prices are 0.10 for Boston, 0.12 for Syracuse, Philadelphia, Miami and Atlanta, and 0.13 for Louisville. The variability of retail milk prices is lower than the variability of farm milk prices, which may be evidence of asymmetric farm price transmission process. A graphical analysis reveals the following patterns supporting the presence of asymmetries in the transmission of farm price increases as compared to the transmission of farm price decreases.

Scenario A: farm price increases, retail price increases at a higher rate. Scenario B: farm price decreases, retail price decreases at a lower rate. In both scenarios margin increases. The patterns revealing these two scenarios can be seen on practically all graphs. Scenario C: farm price decreases, retail price does not change; this causes margin to increase (Boston, Atlanta, Miami

and Louisville). Scenario D: farm price decreases, retail price increases; margin increases as a result (Boston, Miami and Louisville). Scenario D pattern typically lasts for a very short period of time. Asymmetries in the farm price transmission process may indicate a presence of the seller market power exercised by retailers.

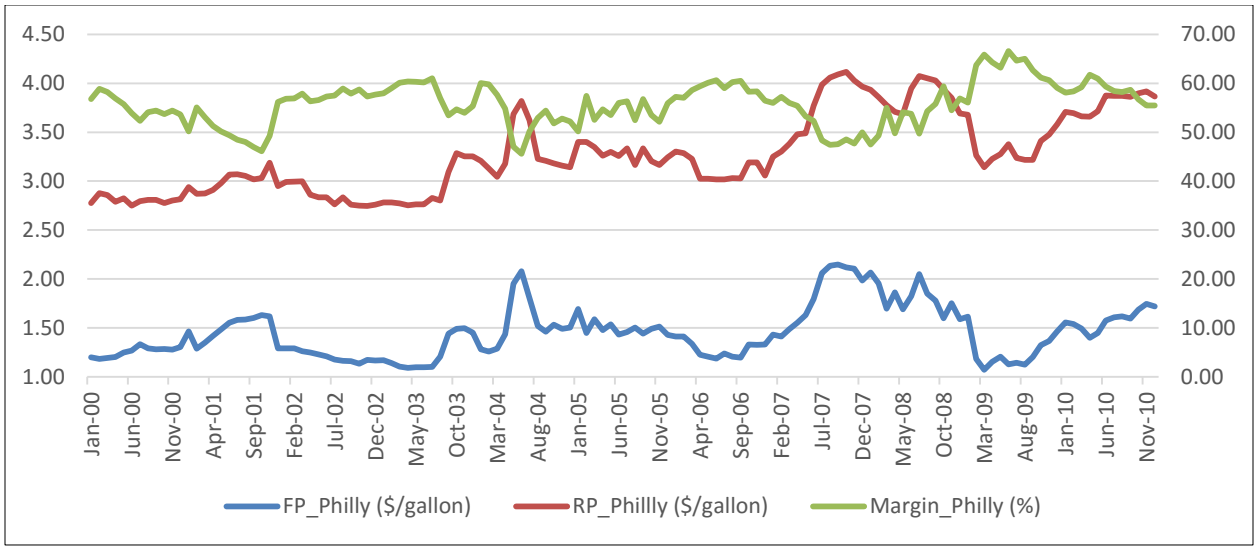

Figure 2. Retail Fluid Whole Milk Price, Farm Price and Margin: Philadelphia, PA (2000-2010).

Syracuse, NY and Philadelphia, PA are the cities located in the states with resale milk price control regulations. The behavior of retail prices in these two cities reflects the nature of milk price controls. The New York State Milk Price Gouging Law (NYS MPGL) enforcement procedure included announcing the threshold prices that were equal to 200% of the Class I milk price. Retail fluid milk prices were not supposed to exceed the threshold prices. This NYS MPGL enforcement procedure took place during the majority of the analyzed period of time. Figure 3 indicates that the behavior of retail milk price practically mirrors the behavior of farm price (Class I milk price), and the margin is rather stable during the period of 2000-2008. The margin is at the 50% of retail price on average, which is consistent with the 200% rule. The Syracuse average and minimum margins are the lowest among the analyzed cities. In Philadelphia, the behavior of retail milk price also follows the behavior of farm milk price (Class I milk price). However, the margin tends to increase over time. The Philadelphia average and minimum margins are the highest among the analyzed cities.

In contrast to Syracuse and Philadelphia, retail prices respond somewhat differently to changes in farm prices in Boston, Atlanta, Miami and Louisville. These cities are located in the states without resale milk price control regulations. A graphical analysis of the retail milk price behavior in these cities indicates that there are periods when retail prices are practically fixed, while farm prices change. The examples include Boston during the period of 2002-2003 (Figure 1), Atlanta during the period of 2000-2001 and during the period of 2004-2006 (Figure 4), Miami during the period of 2000-2003 (Figure 6) and Louisville during the period of 2000-2003 and 2005-2006 (Figure 5). In Boston, Atlanta, Miami and Louisville retailers tend to vary their milk pricing strategies from time to time.

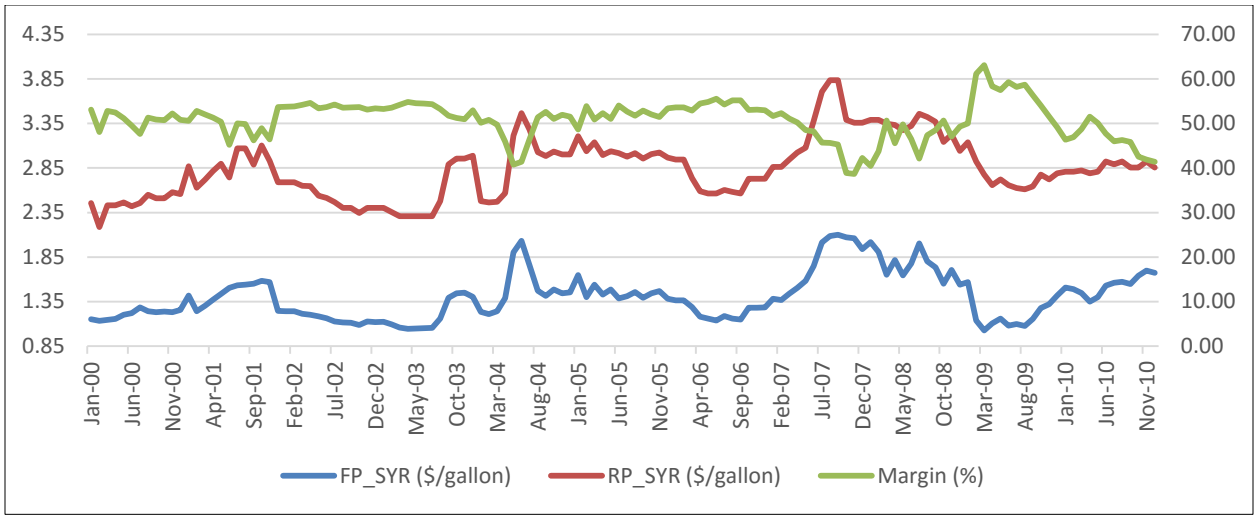

Figure 3. Retail Fluid Whole Milk Price, Farm Price and Margin: Syracuse, NY (2000-2010).

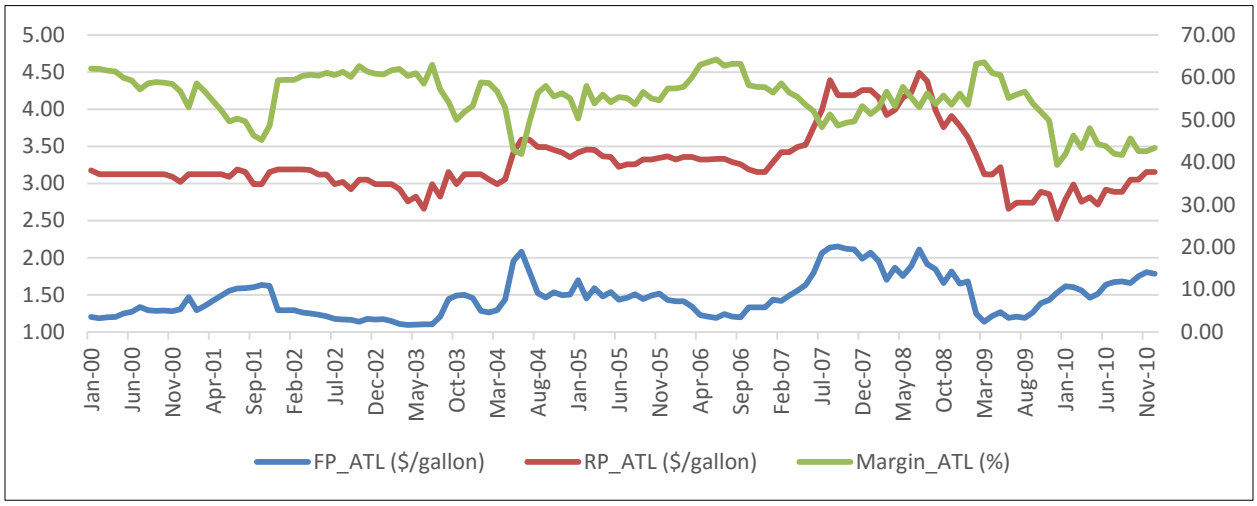

Figure 4. Retail Fluid Whole Milk Price, Farm Price and Margin: Atlanta, GA (2000-2010).

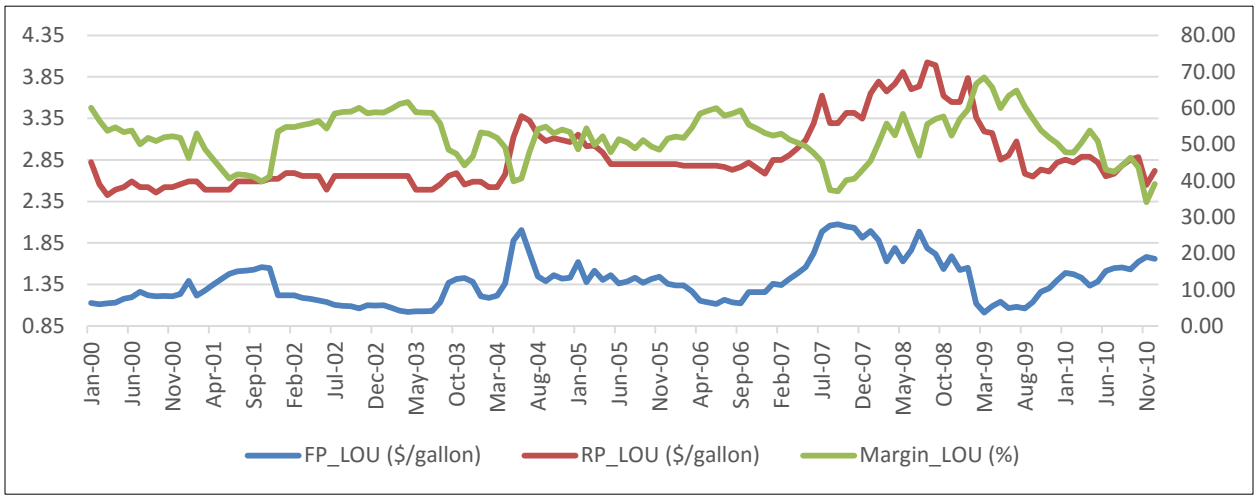

Figure 5. Retail Fluid Whole Milk Price, Farm Price and Margin: Louisville, KY (2000-2010).

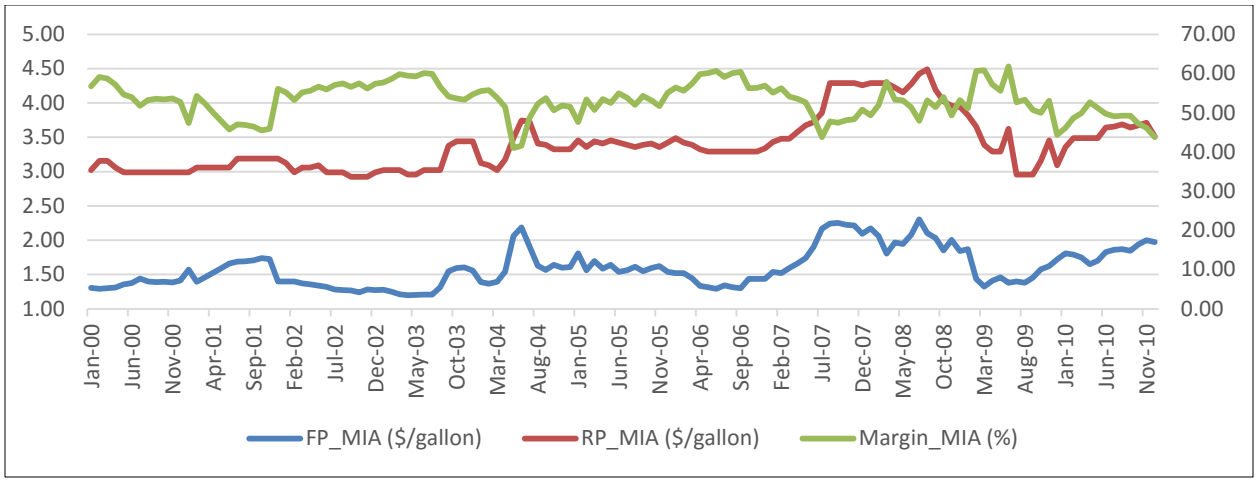

Figure 6. Retail Fluid Whole Milk Price, Farm Price and Margin: Miami, FL (2000-2010).

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Opportunities for Local Food Systems Research and Extension in the South – A Land Grant University System Initiative

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Abstract

Acknowledging regional differences in the development of Local Food Systems across the United States, Southern Experiment Station Directors and Extension Directors decided to commission the development of an effective collaboration plan between southern Land Grant University (LGU) faculty in the area of Local Food Systems (LFS). The United States southern region's unique characteristics, such as the historically large concentration of underserved and small farms (Goodwin 2013), could impose unique challenges and opportunities for the development of LFS, and therefore a regional approach to addressing this region's unique needs may be appropriate.

With the support of the Southern Risk Management Education Center (SRMEC), the SRMEC Local Food Systems Work Group was created in 2013. During the first two years, this group identified research and extension priorities for LFS in the south. The ultimate goal of this group is to establish LFS programing that can help the southern LGU system more effectively address key factors supporting the successful development of LFS in this region.

This group identified ten research and extension priorities for LFS in the south, also represented graphically in Figure 1, from the perspective of agricultural economics and risk management: 1) market and supply chain logistics; 2) financial and risk management for LFS; 3) economic, social, and environmental outcomes; 4) consumer demand; 5) food safety; 6) financial and risk management for enterprises; 7) food security; 8) food access; 9) food system policies; and 10) general knowledge associated with LFS.

A complete discussion of identified priorities one to five was published in an invited issue of *Choices* entitled "Developing Local Food Systems in the South" (Goodwin 2013). In this issue, the SRMEC LFS Work Group specifically discussed the role of the LGU system in supporting each of the priorities identified. For example, this group highlights the important role the southern LGU system plays in the development of LFS-focused education and capacity building programs to support LFS development (Woods et al. 2013). Additionally, this group acknowledges the importance of creating a network of researchers and extension professionals providing objective feedback on research areas that could guide the allocation of resources for the development of LFS such as the evaluation of social, economic, and environmental outcomes associated with LFS (Lamie et al. 2013).

Future plans of the SRMEC LFS Work Group include expanding the discussion of priorities six to ten, as well as the identification and implementation of research and extension outreach collaboration opportunities.

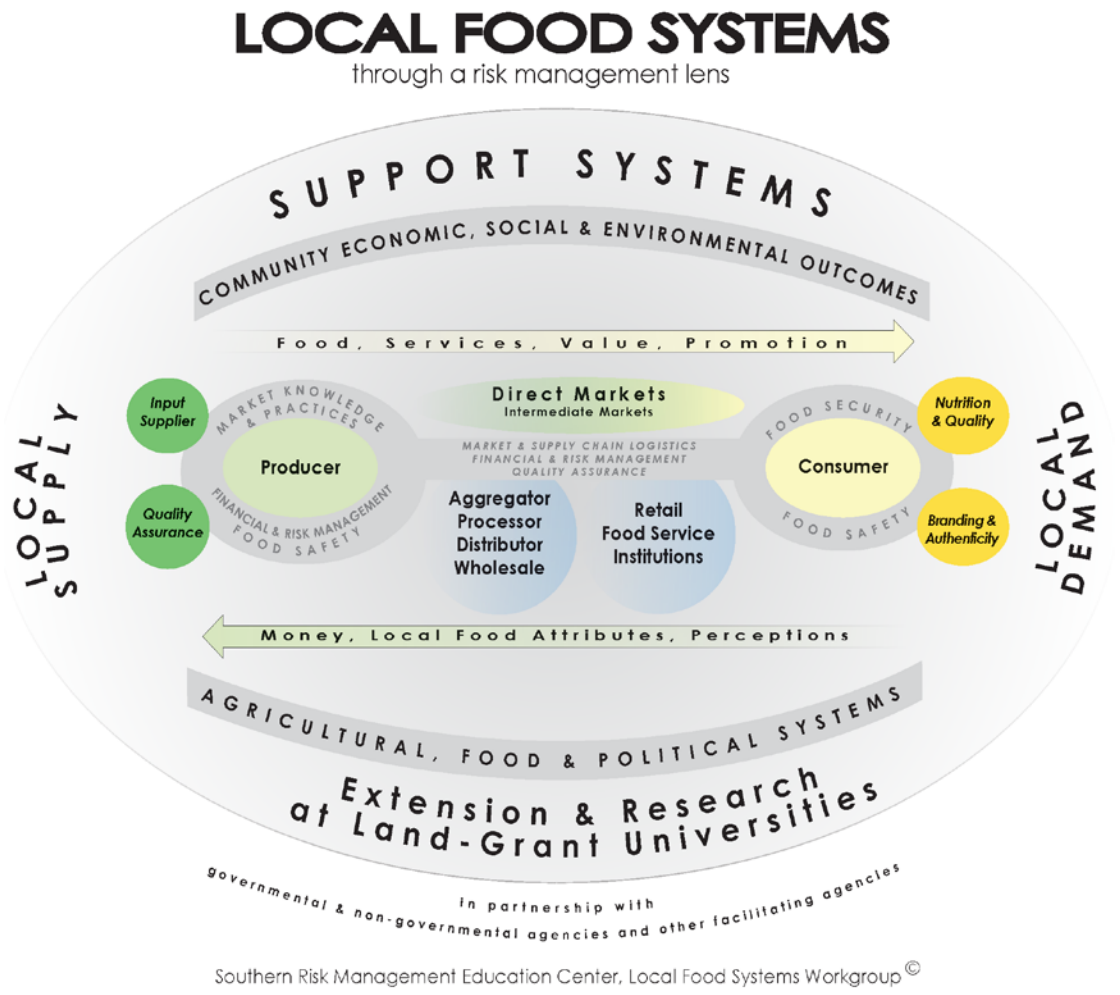

Figure 1. Info-graphic Relating LFS Operations and LGU Priorities.

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Production, Marketing, and Distribution of Produce to Local Residents

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Abstract

This case study introduces an agricultural operation located in Franklin, Tennessee set up as a nonprofit organization. The first objective of the farm is to promote the production of various types of produce in order to supply low-income households in Nashville with fresh produce. The owner provides land to those interested in participating for a minimal charge. Produce currently grown at the farm includes: turnip greens, garlic, cabbage, tomatoes and peppers. The proceeds are split fifty-fifty between the producers and the land owner. Those who commit additional time towards maintaining the farm are compensated for their contribution. Produce is marketed directly to consumers—especially low income urban residents that do not have ready access to fresh vegetables. There is a plan to expand operations to include other niche products such as herbs, sweet potatoes, blackberries, blueberries and cherries. This collaborative approach promises to benefit not only producers, but consumers who will have access to more products and choices. The second objective of the farm is to provide training for new farmers, high school– and college students from different states. This initiative is critical to maintaining continuity of the agricultural enterprise. It will also enhance development of growing local and regional food systems. Students work during breaks and summer months while new farmers work throughout the year. The number of participants—both students and new farmers vary over time. The collaborative model is directly relevant to food production, marketing and distribution and can be replicated by others with appropriate modification.

Keywords: Mamushi Nature Farm, Franklin Tennessee

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What is Driving the Demand for Goat Meat in Tennessee?

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Abstract
The USDA (2012) data documented the existence of 2.6 million-goat inventory on 128,456 farms in the U.S. About 1.2 million goats were sold, generating $152.1 million. Tennessee goat sales contributed about five million dollars to the state's economy. A glimpse of the American Community Survey (ACS) shows that the nation's immigrant population hit a record high of 41.3 million in 2013. This represents an increase of 1.4 million people from 2010. Since 2000, the immigrant population went up by 10.2 million. The share of immigrants coming to Tennessee in 2000 was 159,004. By 2013, that number almost doubled to 304,801 (Zong et al. 2013). The growth in US ethnic populations, increasing incomes, the desire for healthy diets, and cultural need are some of the factors driving the demand for goat meat. This project offers opportunities for goat producers to meet current demand for goat meat. The goal of this research update is to provide better understanding of goat meat consumer buying decisions. Objectives are to: (1) discuss existing relevant literature on demand, supply and consumption of goat meat, (2) Identify current markets where goat meat is sold, and (3) Analyze factors influencing consumption of goat meat in Tennessee.

Keywords: Goat meat, demand and supply, ethnic consumption preferences

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Methodology

Consumers who shop in selected farmers' markets will be solicited to take part in a face-to-face survey of randomly selected consumers. Selected supermarkets, smaller grocery stores, specialty stores and farmers' markets will be targeted for data collection. Appropriate statistical models will be used to analyze secondary and primary data.

Expected Outcomes

Research will document consumers and marketers who enhance their knowledge, express interest in goat meat or earned additional income from meat goat. Study will discuss the economic implications of expanding goat meat consumption to non-traditional goat meat consumers in Tennessee. Research findings will be used for education, policy analysis and assisting target audience in making informed decisions about goat meat.

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The Environmental and Economic Impact of Withdrawing Antibiotics from US Broiler Production

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Abstract

Rising consumer interest in how food is produced has resulted in the growth of antibiotic-free meat production and consumption. The antibiotic-free classification is most prominent in the poultry market as several producers and retail-chain companies have moved their marketing in that direction. This study examines the environmental and economic impacts of withdrawing antibiotics (including animal-only ionophores) from U.S. broiler production. Two systems—conventional and 100% antibiotic-free (ABF)—are modeled, examining differences between average survivability, space requirements, days to grow-out a defined sized bird, and days between production cycles. Data were obtained from the USDA, industry sources (e.g., Agri Stats, Vantress, Aviagen), and expert knowledge. Total output is calculated to compare the average quantity of edible broiler meat produced within each system.

Results reveal a decline in average production in the ABF system for a given broiler house compared to the conventional system. Compared to broilers produced in a conventional system, birds raised in a single broiler house under ABF conditions will have an annual reduction of between 50,000–100,000 lbs of edible meat (breast, legs, thighs, wings) equivalent to between 265,000–530,000 individual 3 oz. single servings. This loss represents enough to feed 600–1,000 people annually, based on average annual consumption of chicken in the United States in 2012. In order to maintain the same supply of meat under ABF conditions, a typical broiler house will require between 15,000–33,000 more marketed broilers per year.

Due to the additional broilers needed, eliminating antibiotic use has an environmental impact. Compared to a conventional house, chickens raised in a single broiler house under ABF conditions will require between 185,000–390,000 additional lbs. of feed per a year; between forty-two and ninety additional acres a year to produce that feed; between 33,000 and 78,000 additional gallons of water consumed; and between 157,000 and 333,000 additional tons of manure produced. In addition, the cost to produce edible prime meat in a broiler house under ABF conditions is between $52,000 and $110,000 per year.

Findings suggest that eliminating the use of antibiotics in the raising of broilers may have a negative effect on the conservation of natural resources as well as a negative economic effect via increased prices to the consumer. Results suggest the need to communicate to consumers the supportive role that prudent, responsible use of antibiotics for animal disease treatment, control, and prevention plays in the sustainable production of broilers.

Keywords: antibiotic-free, broiler, chicken, sustainability, environment, economic

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Is Being Big Better? Shoppers Compare Food Merchandisers

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Abstract

Sixty undergraduate students enrolled in AAEC-3100, Food and Fiber Marketing, developed a survey with IRB approval, gathered the information, and compiled the results from 3,018 food shoppers in North Georgia and the Atlanta Metro counties concerning the shoppers' opinions about their shopping experiences and store attributes. Although chain store names were identified, WalMart references, for instance, were not all Supercenters combining grocery and mass-merchandise and specialty departments, or all Neighborhood Market (grocery only) formats. Surprisingly, America's largest grocer, WalMart, did not fare the best responses for customer shopping experience. WalMart received subpar scores for checkout speed/open checkout lanes, employee courtesy and service, stockouts of advertised specials, and fresh meat and produce quality, although customers were drawn to these stores by the advertised low prices. Shoppers viewed many other regional grocery chains as having comparable prices with WalMart or Sam's Club – namely, Costco, Trader Joe's, Krogers, Ingles, Bells, Harris Teeter, BiLo, Piggly Wiggly, and Publix—all have prominent market share in the Southeast.

Food shoppers are promiscuous in their willingness to try many different grocers; grocery shoppers averaged an estimated eighty-three trips per year to purchase groceries with an estimated average annual household expenditure of $5,120. For the survey, stores known to have grocery formats were identified/grouped into several store type categories: regional chains (i.e., Publix, Harris Teeter, Piggly Wiggly, BiLo, Ingles, Bells, Earthfare), warehouse clubs (i.e., Costco, Sam's Club, BJ's), national chains (i.e., Trader Joe's, Whole Foods, Kroger (and affiliates)), neighborhood pharmacies (i.e., Walgreens, CVS, RiteAid), mass merchants or department stores (i.e., Target, WalMart), and convenience stores (i.e., 7-Eleven, Quick Trip). Customer experience maps were developed and plotted to reflect the customers' shopping experience across the variety of store formats. Customer satisfaction indices (CSI) were also calculated with respect to the customers' overall shopping experience, the service, the product variety and selection, quality, prices, cleanliness, and ease of shopping. For overall shopping experience, regional chains scored the highest CSI and convenience stores the lowest CSI.

To gain an understanding of customer retention and loyalty, net promoter scores were determined for each of the store formats. To compare prices, a common grocery list was

"shopped" by the students at the various outlets, noting the store-brand price. Venues offering lowest prices for food products varied with the products being priced. The significance of the survey is for students to learn smarter shopping and understand how goods are priced and marketed.

Keywords: grocery stores, food merchandisers, loyalty, customer experiences, prices

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