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Journal of Food Distribution Research
Volume XLVIII, Number 1 / March 2017

Table of Contents

2016 FDRS Conference Awards and Recognitions

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

MS Thesis: **Farmed and Wild-Caught Shrimp in Kentucky and South Carolina: Consumer Preference for Homegrown by Heroes, Community Supported Fishery, and Other Quality Attributes** *Graham Soley* vi

PhD Dissertation: **Trust, Perceptions, Intentions and Behaviour in Meat Consumption** *Violet Muringai*..... viii

Research Briefs

- 1 **A Snapshot of Undergraduate Students' Nutritional Awareness, Levels of Food Label Use, and Perceptions of Their Health Status** *Patricia E. McLean-Meynsse, LaPorchia A. Collins, and Shervia S. Taylor* 1–8
- 2 **Grouped Data Probability Model for Shrimp Consumption in the Southern United States** *Ferdinand F. Wirth and Kathy J. Davis*..... 9–15
- 3 **Evaluating Overall Performances of the Banana Industry in West Bengal State, India** *Esendugue Greg Fonsah and Bani Amin* 16–21
- 4 **Factors Affecting the Banana Agricultural Value Chain in Bangladesh** *Esendugue Greg Fonsah, Tanvir Manower, Arshad Hussain, Somashree Chattapadhya, Saiful Islam, Md. Serajul Islam, Md. Jasim Uddin, Ahmad Sadequl Amin, and Bani Amin* 22–32
- 5 **Local Food Vitality Index: Measuring Consumer Attitudes toward Food System Attributes** *Tim Woods, Jairus Rossi, and Alison Davis*..... 33–41
- 6 **Economic Impacts of the Opening of the Bonnet Carre Spillway to the Mississippi Oyster Fishery** *Benedict C. Posadas and Benedict Kit A. Posadas, Jr.*..... 42–45

7	Innovative Food Tourism Development Strategies for Sustainability on American Indian Reservations <i>Kynda Curtis, Susan Slocum, Trent Teegerstrom, Carol Bishop, and Malieka Landis</i>	46–53
8	Determinants of Argentinean Wine Prices <i>Graciela Andrango and Elizabeth Canales</i>	54–60
9	Assessing Market Channel Performance for Colorado Fruit and Vegetable Producers <i>Jeremiah Christensen, Dawn Thilmany, Becca Jablonski, Martha Sullins, and Ellie Naasz</i>	61–67
10	Extension Avenue Use Among Small-Scale Goat Producers in Missouri and Arkansas <i>Benjamin Onyango, Christine Sudbrock, Elizabeth Walker, Melissa Remley, Charlotte Clifford-Rathert, and Mohammed Ibrahim</i>	68–72
11	Determinants of Food Insecurity in Huntsville, Alabama, Metropolitan Area <i>James O. Bukenya</i>	73–80
12	Assessment of Price Volatility in the Fisheries Sector in Uganda <i>James O. Bukenya</i>	81–88
13	Local Food Distribution in the SC Midlands: Identifying Barriers to and Opportunities for Food Producing Farmers Entering Wholesale Markets <i>Katie Welborn and R. David Lamie</i>	89–93
14	Factors Influencing Potential Demand for Goat Meat in Georgia <i>Mohammed Ibrahim, Nalini Pattanaik, Benjamin Onyango, and Xuanli Liu</i>	94–98

Abstracts

15	Consumer Testing for the Local Food Start-Up: Update <i>Catherine Durham, Ann Colonna, and James B. Miller</i>	99–100
16	An Analysis of Organic Fresh Produce Choice: A Consumer Preference Study in the Mid-Atlantic USA <i>Surendran Arumugam, Ramu Govindasamy, Isaac Vellangany, and Hemant Gohil</i>	101–102
17	Willingness to Pay a High-Premium for Organic Produce: An Econometric Analysis <i>Ramu Govindasamy, Surendran Arumugam, Isaac Vellangany, and Burhan Ozkan</i>	103–104
18	Impacts of Values-Based Supply Chains on Small and Medium-Sized Farms <i>Hikaru Hanawa Peterson, Gail Feenstra, Marcy Ostrom, and Keiko Tanaka</i>	105–106
19	Distributor vs. Direct: Farmers, Chefs, and Distributors in the Local Farm to Restaurant Supply Chain <i>Graham Givens and Rebecca Dunning</i>	107–108

20 Segmenting the Sustainable Wine Consumer *Marianne McGarry Wolf and Lindsey M. Higgins*109–110

21 Local Meat Brands Attract Consumer Demand *Marianne McGarry Wolf and Steven McLennan*111–112

22 The Local Foods Resource Mapping Project *Chance McDavid, Stephan Goetz, Leslie Hossfeld, Steve Turner, Mark Skidmore, Don Albrecht, Stacey McCullough, Amanda P. Perez, Alison Davis, Tim Woods, Jairus Rossi, A. Lee Meyer, Susan Jakes, Becky Bowen, Joanne Lelekacs, Stephen Brown, Mark Apel, Trent Teegerstrom, Darlene Knipe, Duane Sears Smith, and Timothy Bowman*113–115

23 Apple Market Expansion through Value-Added Hard Cider Production: Supply Chain Coordination in Vermont *Nicolas Fabien-Ouellet, David Conner, Florence Becot, Terence Bradshawd, and Amy Trubek*116–117

24 What Drives the Trade Purchaser’s Decision to Purchase a Specific Wine? *Marianne McGarry Wolf and Lindsey M. Higgins*.....118–119



Journal of Food Distribution Research
Volume 48, Issue 1

★ 2016 Award Winner ★
**Richardson-Applebaum Scholarship Award for Outstanding Graduate
Research in Food Distribution and Marketing: MS Thesis**

Farmed and Wild-Caught Shrimp in Kentucky and South Carolina: Consumer Preference for Homegrown by Heroes, Community Supported Fishery, and Other Quality Attributes

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Abstract

As information regarding origin, production method, and environmental certifications characterize a progressing seafood market, scare analysis has been made to understand market responses. This study focuses on consumer preference for wild-caught and farm-raised shrimp with several attributes. These include the Homegrown By Heroes label and Best Aquaculture Practices certification, as well as other existing attributes including the Marine Stewardship Council and each state's local label. Also considered are hypothetical labels including Community Supported Fishery (CSF) and National Oceanic & Atmospheric Administration (NOAA). This study surveys consumers in Kentucky and South Carolina while utilizing a choice experiment to elicit willingness-to-pay measures for these various product attributes.

Both wild-caught and farm-raised shrimp are considered since these species have significant market potential. Like previous studies, a strong preference for fresh as well as local shrimp was found. Furthermore, preference for Homegrown By Heroes was found to be highly valued by consumers, as well as the NOAA label signifying a federally operated ecolabel. Consumers were

also found to value BAP and MSC certifications, two third-party agencies currently existent in the seafood market. Marketing and policy recommendations are given based on consumer willingness to pay estimates for these various seafood attributes in both states.

Keywords: choice experiment, ecolabels, homegrown by heroes, willingness to pay for seafood

[Ⓞ]Corresponding author.



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★ 2016 Award Winner ★

**Richardson-Applebaum Scholarship Award for Outstanding Graduate
Research in Food Distribution and Marketing: PhD Dissertation**

Trust, Perceptions, Intentions and Behaviour in Meat Consumption

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Abstract

Consumers' concerns about animal diseases, production and processing methods could drive their choices of food products. Consumers' choices of food products will influence their nutritional status. Understanding preferences for food products could inform policy and assist in forecasting future demand for food products. In this study, the effects of generalized trust in people and trust in food agents regarding the safety of food on the demand for different forms of meat products, on preferences for pork production characteristics and on human health risk perceptions about bovine spongiform encephalopathy (BSE) and chronic wasting disease (CWD) are analysed. The following hypotheses are tested (i) consumers who have lower levels of trust (both general and agent specific trust about food safety) are more likely to purchase fresh meat products and less likely to purchase processed meat products as compared to those consumers who have higher levels of trust. Consumers who have lower levels of trust might be more concerned about the use of additives, flavors and the public information on cancer risks of processed food, for example as compared to those consumers who have higher levels of trust; (ii) consumers who have lower levels of trust (both general and agent specific trust about food safety) are willing to pay higher premiums for pork produced under more traditional forms of production as compared to those consumers who have higher levels of trust. Consumers who have lower levels of trust might prefer traditionally raised pork over conventional pork as compared to those consumers who have higher levels of trust due to concerns about the use of antibiotics, the feed given to animals and the use of hormones, for example; (iii) trust (both general and agent specific trust about food safety) is negatively related to human health risk perceptions about BSE and CWD. The three studies are linked in that the effects of trust on

viii

consumer behaviour are analysed in three different contexts and trust is measured using the same questions. The first hypothesis is tested using cluster analysis, demand system analysis, probit models, data from two Canada wide surveys (2008 and 2011) and meat purchase data for the period 2002 to 2009 for the same households. The second hypothesis is tested using cluster analysis, conditional and random parameter logit models and data from choice experiments and surveys in Canada in 2011 and in Edmonton in 2009 and 2011. The third hypothesis is tested using ordered probit regressions and data from surveys conducted in Canada in 2009 and 2010, in the U.S. in 2010 (two surveys) and in Japan in 2009. In summary, the results suggest that households with respondents who have lower levels of trust generally purchased more fresh meat products and fewer processed meat products as compared to households with respondents who have medium or higher levels of trust. Households in the low trust cluster generally substitute fresh and semi-processed meat products more than households in the medium and higher trust clusters. Households in the high trust cluster generally substitute semi-processed and fully processed meat products more than households in the low and medium trust clusters. A little surprising but respondents who have higher levels of trust are generally willing to pay higher premiums for traditionally raised pork as compared to those respondents who have lower levels of trust. Although the effects of trust on consumer's human health risk perceptions about BSE and CWD are not generally the same across countries or between the two diseases, trust does play a role in influencing risk perceptions in each country. In conclusion, trust is an important influence on consumer behaviour.

Keywords: animal diseases, bovine spongiform encephalopathy, chronic wasting disease, consumption, demand, human health risk, meat, natural pork, production attributes, quality perceptions, risk perceptions, traditionally raised pork, trust, willingness to pay

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A Snapshot of Undergraduate Students' Nutritional Awareness, Levels of Food Label Use, and Perceptions of Their Health Status

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Abstract

College freshmen and sophomores exhibited lower levels of awareness of the health problems caused by insufficient intake of fiber than did seniors. Age and gender influenced awareness of calcium's role in the body. Age was also a determinant of students' awareness about cholesterol intake and health. Seniors and those living in households with more than three persons were more likely to read nutrition labels. Students who perceived themselves to be in excellent health had lower body mass indices, exercised more, and were more aware of the links between fiber intake and health status.

Keywords: calcium, cholesterol, fiber, health problems, nutritional awareness, students

[ⓐ]Corresponding author.

Introduction

Rising overweight and obesity rates in the United States have resulted in more severe health problems and a reduction in the pool of young adults healthy enough to serve in the military. Recent statistics suggest that two-thirds of Americans are overweight or obese and that adult obesity rates exceed 20% in all states. In 2016, Louisiana had the highest adult obesity rate in the United States, at 36.2%. Additionally, 13.2% of the two-to-four-year-old participants in the Women, Infant, and Children nutritional program and 21.1% of ten-to-seventeen-year-olds in the state were obese. Obesity-related diseases such as diabetes, hypertension, heart disease, arthritis, and cancer and the associated costs of treatment have risen steadily over the past decade, a trend that is projected to continue for the foreseeable future (Trust for America's Health and the Robert Wood Johnson Foundation, 2016a, b).

The 2009 *Report Card on Physical Activity & Health for Children and Youth* (Pennington Biomedical Research Center, 2009) documented that

- (i) only 25% of Louisiana high-school children met the recommended 60 minutes of daily physical activity;
- (ii) 36% of children between 10 and 17 years old were obese;
- (iii) 27% of high-school students did not drink fruit juice and less than 4% ate fruits at least four times per day;
- (iv) 57% of high-school students watched television more than two hours daily;
- (v) almost 18% of high-school students smoked cigarettes;
- (vi) 40% of male and 41% of African American high-school students were overweight or obese;
- (vii) more than 30% of children in grades 6–12 exhibited symptoms of depression and about 12% had more than two chronic health conditions;
- (viii) a higher proportion of children and youth living below the federal poverty level were overweight or obese compared to children at other socioeconomic levels.

Given that overweight and obese children often become overweight and obese adults and that the state is currently ranked first in adult obesity in the United States, some of the children and youth in the Pennington study must have maintained their obesity status. In fact closer examination of available statistics indicates that Louisiana residents ages 18–24 are becoming obese at the fastest rate. Thus, this segment of the population is a prime target for nutritional intervention programs.

Problem Statement

Undergraduate students make up a large percentage of the 18-to-24-year-old age group. Many of these students are living away from home for the first time and are completely responsible for their meals and other health-related decisions (Rozmus et al., 2005). Research suggests that many undergraduate students do not handle the freedom and independence of college life very well. In fact, they are more likely to engage in risky behaviors that can jeopardize their health (Matthews, Doerr, and Dworatzek, 2016; Brunt and Rhee, 2008). Students are notorious for skipping meals, avoiding nutritious foods (such as fresh fruits and vegetables), consuming less

than the recommended daily amounts of calcium, iron, and vitamin A, and eating high-fat diets (Smith, Taylor, and Stephen, 2000). They are also less likely to use nutrition facts labels when making food purchase decisions.

Nutrition facts labels are an important tool for expanding nutritional knowledge and fostering healthy eating habits, thereby reducing rates of overweight and obesity. Facts panels provide nutritional information at points of purchase and allow consumers to judge the overall healthiness of food products so that they can make informed purchasing decisions. However, consumers cannot effectively assess a food product's nutritional value unless they understand the labeling information (Cannoosamy, Pugo-Gunsam, and Jeewon, 2014). Thus, for nutrition educational programs to be successful, researchers must know how labels are currently used as well as participants' interest in learning how to use the labels and overall attitudes toward diet and health.

Objectives

The study's overall objective is to document nutritional awareness, food label use, and perceptions of health status among a randomly selected group of university students. The specific objectives are to (i) determine awareness about health problems caused by excessive intake of cholesterol and insufficient intake of fiber and calcium (as well as factors shaping awareness); (ii) assess how frequently participants read food labels and factors associated with label use; (iii) examine the extent to which nutritional awareness, label use, weight status, and exercise routine influence students' perceptions of their health.

Methods and Procedures

The study's data were compiled from a random sample of 441 university students during the spring and fall of 2008. The survey captured students' general attitudes toward health and diet, use of food labels, perceptions of their health status, and demographic characteristics (age, academic classification, household size, marital status, family's total annual household income, race, and gender). To assess awareness, students were asked whether they had heard about any health problems caused by not eating enough fiber and calcium or by eating too much cholesterol. The response categories were "yes" and "no." For frequency of food label use, students were asked how often they read food labels. The response categories were "often," "sometimes," "rarely," and "never." For overall health status, students were asked to rate their own health as "excellent," "very good," "good," "fair," or "poor."

Empirical Models

The dependent variables FIBAWARE, CALAWARE, CHOAWARE, LABLUSER, and HEALTHOV are discrete; therefore, ordinary least squares regression models are inappropriate because the estimated coefficients will be biased. With this in mind, we selected discrete modeling techniques to estimate the unknown parameters. Based on our hypothesis that awareness and food label use influence perceptions of health status, we used a two-stage approach to incorporate the predicted values from the awareness and label use models into the

health status model. For modeling purposes, the response categories for label usage were reduced to two: those who read labels often or sometimes (“often/sometimes”) and those who rarely or never read them (“rarely/never”); those for perception of health status were reduced to three (“excellent,” “very good/good,” and “fair/poor”). Collapsing categories is permissible because the categories are nominal and the widths between categories are meaningless. The dependent and independent variables, their definitions, and summary statistics are displayed in Table 1. We used the binomial probit and ordered probit models to analyze the data and generate the unknown parameters.

Table 1. Variable Definitions and Summary Statistics.

Definitions	Names	Means	Standard Deviation
<i>Explanatory Variables</i>			
Age in Years	AGE	20.4444	7.7176
Household Size	H SIZE	3.3084	1.6855
Female=1; Male=0	FEMALE	0.5805	0.4940
Freshman=1; Otherwise=0	FRESHMAN	0.3537	0.4187
Sophomore=1; Otherwise=0	SOPHMORE	0.2041	0.4035
Junior=1; Otherwise=0	JUNIOR	0.1678	0.3741
Senior=1; Otherwise=0	SENIOR*	0.2132	0.4010
Weight Status	BMI	26.6109	6.0470
Minutes Exercised	MINEX	37.0272	38.3856
<i>Dependent Variables</i>			
Awareness of Fiber (Yes=1; No=0)	FIBAWARE	0.3628	0.4814
Awareness of Calcium (Yes=1; No=0)	CALAWARE	0.6485	0.4780
Awareness of Cholesterol (Yes=1; No=0)	CHOAWARE	0.6667	0.4719
Label Use (“Often/Sometimes”=1; “Rarely/Never”=0)	LABLUSER	0.7664	0.4236
Health Status (Poor/Fair=0; Very Good=1; Excellent=2)	HEALTHOV	0.9433	0.7592

Notes: *Reference or omitted variable.

Empirical Results and Discussion

Descriptive Statistics

From Table 1, the average age of students was 20 years and the average household size was about four persons. Women comprised 58% of the sample, and the majority of participants were freshmen (35%). On average, participants were overweight (BMI of 26.6) and exercised about 37 minutes per week. Participants reported awareness about the health benefits of fiber consumption (36%), calcium (65%), and cholesterol (67%). Prior to collapsing the response categories, 31.1% of respondents reported that they read labels often, 28.6% reported reading labels sometimes, 16.8% said they rarely read labels; and 11.6% indicated that they never read food labels. The reported findings for perceptions of overall health were poor (7.3%), fair (24.5%), good (42.2%), very good (20%), and excellent (6.1%).

Binomial Probit Results

The results from the four binomial models are displayed in Tables 2–5. Except for Table 4, the models' chi-square coefficients are statistically significant at the 1% level, suggesting that these models are better predictors of the relationships between the dependent and independent variables than the intercept-only models. The marginal effects in the tables measure the changes in probability for unit (1 or 0) changes in a particular discrete independent variable while holding the other independent variables at their sample means. Age and body mass indices are continuous variables; therefore, their marginal effects represent the partial derivatives of the dependent functions with respect to those variables while holding the other variables at their sample means.

Table 2. Binomial Probit Results for Awareness about Fiber.

Explanatory Variables	Estimated Coefficients	Standard Error	Marginal Effects	Standard Error
CONSTANT	-0.6532***	0.2431	-0.2438***	0.0895
AGE	0.0239***	0.0086	0.0089***	0.0032
HSIZE	0.0265	0.0384	0.0099	0.0143
FEMALE	0.0745	0.1274	0.0277	0.0473
FRESHMAN	-0.5138***	0.1641	-0.1844***	0.0560
SOPHMORE	-0.5346***	0.1855	-0.1844***	0.0578
JUNIOR	-0.2355	0.1892	-0.0850	0.0657
χ^2 (6)	27.2863***			

Notes: Triple asterisks (***) indicate statistical significance at the 1% level.

Awareness about fiber is influenced by age and academic classifications. According to these results, older students are more likely to be aware than younger students. Further, freshmen or sophomores are 18 percentage points less likely to know about the health-related illnesses associated with fiber consumption compared to seniors.

Table 3. Binomial Probit Results for Awareness about Calcium.

Explanatory Variables	Estimated Coefficients	Standard Error	Marginal Effects	Standard Error
CONSTANT	-0.0072	0.2411	-0.0027	0.0889
AGE	0.0178**	0.0089	0.0066**	0.0033
HSIZE	0.0092	0.0386	0.0034	0.0142
FEMALE	0.3401***	0.1257	0.1262***	0.0467
FRESHMAN	-0.3509**	0.1661	-0.1313**	0.0626
SOPHMORE	-0.1945	0.1878	-0.0732	0.0618
JUNIOR	-0.1381	0.1987	-0.0518	0.0756
χ^2 (6)	20.6924***			

Notes: Double and triple asterisks (**, ***) indicate statistical significance at the 5% and 1% level.

Awareness about calcium is influenced by age, gender, and academic classification (Table 3). Female students are about 13 percentage points more likely to know about calcium than male students. Seniors are also about 13 percentage points more likely to know about calcium than freshmen.

Table 4. Binomial Probit Results for Awareness about Cholesterol.

Explanatory Variables	Estimated Coefficients	Standard Error	Marginal Effects	Standard Error
CONSTANT	-0.0704	0.2430	-0.0255	0.0881
AGE	0.0255***	0.0093	0.0092***	0.0033
HSIZE	0.0173	0.0384	0.0062	0.0139
FEMALE	-0.0504	0.1271	-0.0182	0.0458
FRESHMAN	-0.0390	0.1651	-0.0147	0.0601
SOPHMORE	0.0074	0.1882	0.0027	0.0680
JUNIOR	-0.1513	0.1947	-0.0559	0.0732
χ^2 (6)	9.8774			

Notes: Triple asterisks (***) indicate statistical significance at the 1% level.

Age is the major determinant of awareness about cholesterol intake and diseases (Table 4), but as the overall model is statistically insignificant, this result should be interpreted cautiously.

Table 5. Binomial Probit Results for Label Use.

Explanatory Variables	Estimated Coefficients	Standard Error	Marginal Effects	Standard Error
CONSTANT	0.1426	0.2519	0.0425	0.0746
AGE	0.0139	0.0094	0.0041	0.0028
HSIZE	0.1263***	0.0419	0.0376***	0.0124
FEMALE	0.0972	0.1360	0.0291	0.0409
FRESHMAN	-0.3360*	0.1783	-0.1035*	0.0564
SOPHMORE	-0.2421	0.2019	-0.0759	0.0661
JUNIOR	0.1883	0.2299	0.0533	0.0616
χ^2 (6)	23.1251***			

Notes: Single and triple asterisks (*, ***) indicate statistical significance at the 10% and 1% level.

The likelihood of reading food labels rises with household size and falls with being a freshman (Table 5). Respondents from larger households are 3 percentage points more likely to read labels than those living in smaller households. First-year students are 10.35 percentage points less likely to read food labels than seniors.

Ordered Probit Results

Table 6 shows the results for the ordered probit model. The chi-square coefficient ($\chi^2 = 75.3101$) and the threshold parameter ($\mu_1 = 1.2395$) are statistically significant at the 1% level of probability, indicating that the model performs better than the intercept-only model. The statistically significant threshold parameter indicates that the response categories for health status are ordered. Four of the independent variables (PREFIBER, PRECAL, PRECHOL, and PRELABEL) are instrumental variables—the predicted values from the four binomial models. Their inclusion is based on our hypothesis that awareness and label use affect perceptions of overall health. From the results, health perceptions are associated with body mass indices, minutes exercised, and awareness about fiber and calcium. The signs on the statistically

significant coefficients and the marginal effects (Table 7) suggest that students are less likely to perceive their health to be good, very good, or excellent as their BMI increases. Students who exercised regularly are more likely to rate their health as good, very good, or excellent. Further, participants who are aware of the health problems associated with insufficient fiber intake are 63 percentage points more likely to perceive themselves as having excellent health. Conversely, students who are unaware of the calcium-disease link are 89 percentage points more likely to rate their health as poor or fair.

Table 6. Ordered Probit Model's Results for Health Status.

Explanatory Variables	Estimated Coefficients	Standard Error
CONSTANT	0.7131	0.8074
BMI	-0.0330***	0.0095
MINEX	0.0091***	0.0016
PREFIBER	2.0447**	0.9229
PRECAL	-2.5624***	0.9807
PRECHOL	0.9338	1.0438
PRELABEL	0.8566	0.8646
χ^2 (6)	75.3101***	
μ_1	1.2395***	0.0769

Notes: Double and triple asterisks (**, ***) indicate statistical significance at the 5% and 1% level.

Table 7. Marginal Effects for Ordered Probability Model for Health Status.

Variables	Marginal Effects		
	Poor/ Fair Prob (y=0)	Very Good Prob (y=1)	Excellent Prob (y=2)
BMI	0.0114	-0.0012	-0.0102
MINEX	-0.0031	0.0003	0.0028
PREFIBER	-0.7084	0.0738	0.6346
PRECAL	0.8878	-0.0925	-0.7954
PRECHOL	-0.3235	0.0337	0.2898
PRELABEL	-0.2968	0.0309	0.2659

Summary and Conclusions

Louisiana's obesity rates have risen steadily over the past 20 years. Most of the growth has occurred in the 18–24 age group, with a disproportionate percentage among African Americans. The majority of the student body from which the sample was drawn was 18 to 24 years old and African American, making this setting an excellent choice for studying nutritional awareness, label use, and health perceptions among this demographic. Our results suggest that students are more likely to be aware of the health problems associated with insufficient intake of fiber and calcium than they are to be aware of the role of cholesterol. In all instances, freshmen are less likely to understand the disease-nutrient links or to use labels. Participants of normal weight or who exercised regularly are more likely to perceive their health as good, very good, or excellent.

Because levels of awareness and label use are low among freshmen, this group needs to be targeted for nutritional intervention. Our suggestion is that nutritionists and food scientists at the university partner with colleagues in other disciplines who teach the majority of freshmen to help them to incorporate nutritional information in their course syllabi. The approach would strengthen collaboration among scientists and expand the opportunity for students to receive nutritional information in a classroom setting.

Acknowledgements

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Grouped Data Probability Model for Shrimp Consumption in the Southern United States

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Abstract

Shrimp represents 27% of total U.S. seafood consumption. A shrimp farming industry has been developing in the southern United States in response to shrimp market demand. To provide farmers with market information needed to develop successful marketing strategies, this analysis examines sociodemographic determinants of at-home and away-from-home shrimp consumption behavior. A survey was mailed to 5,000 households in nine southeastern U.S. states. A probability model was developed to estimate the influence of consumer characteristics on the frequency of shrimp consumption. Using the estimated coefficients, the probability distribution for shrimp consumption frequency can be calculated for any combination of explanatory variables.

Keywords: consumer behavior, consumption, grouped data regression, shrimp

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Introduction

Per capita consumption of shrimp—the leading seafood consumed in the United States—increased by more than 185% between 1980 and 2014, from 1.4 pounds to 4.0 pounds per person. Shrimp consumption in 2014 represented 27% of total U.S. seafood consumption. Because demand for shrimp far exceeds the amount supplied by U.S. commercial fishermen and aquaculture producers, about 90% of the total supply is imported into the United States, primarily from Southeast Asia (National Marine Fisheries Service, 2015). A U.S. shrimp farming industry has been developing in the southern states in response to domestic market demand.

Several studies have examined determinants of shrimp consumption in the United States. Coastal residents are significantly more likely to consume seafood than inland residents; experience with fresh seafood and purchase frequency of seafood decline with increasing distance from the sea (Nauman et al., 1995; Dore, 2000). The southeast region, together with the inland border states, consumes approximately 37% of shrimp consumed in U.S. homes (Prochaska and Andrew, 1974).

Dore (2000) reported that the most frequent consumers of shrimp or seafood in general tend to be well-educated, affluent adults between 35 and 55 years of age. Hispanics are more likely to eat shellfish at home than non-Hispanics, and African Americans are more likely to eat shellfish at home than Caucasians (Nayga and Capps, 1995). White households are only about half as likely as non-white households to be frequent at-home consumers of seafood (Nauman et al., 1995), so the growth of immigrant populations and the increasing popularity of ethnic cuisines is probably a positive indicator for shrimp consumption in the United States (Dore, 2000).

Zhang et al. (2004) used a double hurdle model to examine factors influencing at-home consumption of shrimp, oysters, and catfish and found that Caucasian consumers were less likely to frequently consume shrimp than non-Caucasian consumers. Religion was also significant, with Catholic consumers more likely to consume shrimp at home. Groups with higher levels of education were also more likely to consume shrimp at home.

To provide shrimp farmers with the current market information necessary for developing successful production and marketing strategies, this analysis examined sociodemographic determinants of at-home and away-from-home shrimp consumption behavior in the United States. We developed a probability model to estimate the influence of consumer characteristics on the probability distribution for the frequency of shrimp consumption.

Methods and Model

A six-page survey instrument was developed and administered by mail to a randomly selected, stratified sample of 5,000 households in the southeastern United States. Addresses were selected from Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee. The number of addresses selected in each state was proportional to that state's share of the total southeastern U.S. adult population (age 18 and older) as reported in the 2000 U.S. Census (U.S. Department of Commerce, 2001).

The survey instrument consisted of 53 questions. Consumers were asked a range of questions relating to demographic characteristics, general shopping habits, and shrimp preferences and purchasing behavior. The shrimp purchasing behavior questions elicited information about both away-from-home shrimp consumption (i.e., restaurant consumption) and at-home shrimp consumption. Shrimp preference questions identified consumer preferences for various refrigeration states, product forms, and sizes of shrimp.

The frequencies of at-home and away-from-home shrimp consumption were each modeled as a function of consumer sociodemographic characteristics. The explanatory variables included sex, age, race, marital status, household size, education, income, religion, and diet as well as the type of area (urban, suburban, rural, resort) in which the consumer resides.

- (1) Purchase Frequency (at-home consumption) = f (sex, age, race, marital status, household size, education, income, area of residence, religion, diet)
- (2) Purchase Frequency (away-from-home) = f (sex, age, race, marital status, household size, education, income, area of residence, religion, diet)

As with most survey data, the variables measured in this study are categorical in nature, either nominal or ordinal. This leads to the use of a probability model designed for limited dependent variables, similar to the ordered probit model. This study used the grouped data regression model, a modification of the ordered probit model that differs from probit analysis in that the category thresholds for the observed variable y are known and need not be estimated. This model is appropriate because the thresholds limits for each response category were explicitly specified in the questionnaire.

The response categories and response frequencies for the dependent variables (at-home consumption and away-from-home consumption) are shown in Table 1. There were six ordered categories of response frequency, ranging from “never purchase” to “purchase once or more per week.” Consumption behavior is often modeled as a double hurdle to explain the primary decision to consume and the secondary decision of consumption frequency. However, the number of respondents reporting no consumption of shrimp at home (1%) or away from home (2%) is so small that there appears to be no need to analyze the decision not to consume shrimp.

Table 1. Dependent Variables: Frequency of At-Home and Away-From Home Shrimp Consumption.

Response Categories Frequency of Shrimp Purchase	Response Frequency	
	For At-Home Consumption	For Away-From-Home Consumption
Never	1.0%	2.0%
Once per six months	15.6%	15.1%
Once per three months	26.8%	24.9%
Once per month	25.8%	28.2%
Twice per month	25.3%	21.1%
Once or more per week	5.6%	8.7%

Table 2 describes the explanatory variables, which were modeled as dummy variables (i.e., set to 1 if the patron reports the indicated characteristic, 0 otherwise). To avoid perfect collinearity, one category for each of the explanatory variables was dropped from the model. The base element for this analysis was a white female between the ages of 36 and 50, married with a household size of two. She had some college or a bachelor's degree, an annual household income of \$20,001–\$40,000, and lived in a suburban area. She was not Catholic, was not on a diet, and had no special health concerns.

Table 2. Explanatory Variables for Shrimp Purchase Frequency Model.

Variable	Definition
male	1 if male; 0 otherwise
younger	1 if age ≤ 35 ; 0 otherwise
older1	1 if age > 50 and ≤ 65 ; 0 otherwise
older2	1 if age > 65 ; 0 otherwise
nonwhite	1 if not white; 0 otherwise
single	1 if not married; 0 otherwise
hhone	1 if household size = 1; 0 otherwise
hhthree	1 if household size = 3; 0 otherwise
hhfour	1 if household size = 4; 0 otherwise
hhmore	1 if household size > 4 ; 0 otherwise
lowed	1 if high school education or lower; 0 otherwise
highed	1 if higher than bachelors degree; 0 otherwise
lowinc	1 if income \leq \$20,000; 0 otherwise
medinc	1 if income $>$ \$40,000 and \leq \$60,000; 0 otherwise
highinc1	1 if income $>$ \$60,000 and \leq \$80,000; 0 otherwise
highinc2	1 if income $>$ \$80,000 and \leq \$100,000; 0 otherwise
wealthy	1 if income $>$ \$100,000; 0 otherwise
rural	1 if area of residence is rural; 0 otherwise
urban	1 if area of residence is urban; 0 otherwise
resort	1 if area of residence is resort; 0 otherwise
catholic	1 if Catholic; 0 otherwise
diet	1 if on a special diet; 0 otherwise

Results and Discussion

Of the 5,000 surveys mailed, 778 were undeliverable and 532 were returned completed, for an overall response rate of 12.6%. Almost 55% of respondents were female; 85% were white, 8% were black, and 2.4% were Hispanic. Two-thirds of survey respondents were married, with almost half from two-person households. Respondents represented a wide distribution of age, income, and education.

The data were analyzed in LIMDEP, using the grouped data regression model and maximum likelihood estimation. The estimated coefficients are shown in Table 3. Although there is no general measure of fit for non-linear models, several values provide some insight. The log likelihood ratio, λ , compares the maximized model to a restricted (constant only) model. The ratio λ has a chi-squared distribution with the degrees of freedom equal to the number of

estimated coefficients ($df=22$). For the at-home consumption model, $\lambda = 1212$ with $p=0.0000$, and $\lambda = 1512$ with $p=0.0000$ for the away-from home consumption model. Thus, both models have significant explanatory power. Another commonly reported measure for nonlinear models is McFadden's pseudo- R^2 (MF), which offers some indication of model fit, with $MF = 1$ for a perfectly predictive model. For this analysis, $MF = 0.83$ for the at-home consumption model and $MF = 0.81$ for the away-from-home model.

Table 3. Coefficients for Dependent Variables Purchase Frequency for At-Home and Away-From-Home Shrimp Consumption.

Variable	At-Home Consumption	Away-From-Home Consumption
Male	-4.10*	3.95
younger	-1.91	-4.43
older1	-1.51	0.77
older2	5.72	0.55
nonwhite	19.10**	9.69**
Single	3.10	-1.49
Hhone	10.83**	5.08
Hhthree	4.46	1.79
Hhfour	-2.58	-3.61
Hhmore	-3.40	1.16
Lowed	3.83	-1.38
Highed	3.42	-1.23
Lowinc	-3.90	-9.39**
Medinc	5.14	1.23
highinc1	3.98	-1.62
highinc2	6.75	1.95
Wealthy	7.05	-2.89
Rural	1.11	-0.92
Urban	-4.73	-7.49*
Resort	-0.86	0.07
Catholic	7.07**	3.98
Diet	4.09*	6.08**

Notes: Single and double asterisks (*, **) indicate significance at the 10% and 5% level.

Because the model is probabilistic, the β s are the coefficients of the explanatory variables in the linear function that generates the latent variable. In that context, the sign and significance of the coefficients, as well as their relative magnitude, are easily understood. For at-home consumption, the explanatory variables non-white, Catholic, diet, and household size of one each exert a statistically significant positive influence on the latent variable, with the variable male exerting a statistically significant negative influence. Non-white is the most influential characteristic for at-home consumption. For away-from-home consumption, variables non-white and diet again exert a significant positive influence, with urban residence and low income exerting a negative influence. The magnitude of the influence of non-white is comparable to that of low income.

The effect on the observed variable is subtler. The probability distribution for the observed variable can be calculated for any vector of explanatory variables. Tables 4 and 5 give the

probability distribution for at-home and away-from-home shrimp consumption for the typical respondent (the base element, $x_k = 0$ for all k) and for respondents that differ from the base element in exactly one of the significant explanatory variables.

Table 4. Probability Distribution for At-Home Shrimp Consumption Frequency.

	Base	Base & Non-white	Base & Catholic	Base & Diet	Base & hhsz One	Base & Male
prob (never)	0.30	0.00	0.09	0.16	0.04	0.48
prob (once/six months)	0.13	0.01	0.07	0.10	0.04	0.14
prob (once/three months)	0.22	0.03	0.18	0.21	0.12	0.19
prob (once/month)	0.28	0.22	0.43	0.39	0.42	0.17
prob (twice/month)	0.06	0.69	0.23	0.14	0.38	0.02
prob (once/week or more)	0.00	0.05	0.00	0.00	0.00	0.00
prob (once/month or more)	0.34	0.96	0.66	0.53	0.80	0.19

Table 5. Probability Distribution for Away-From-Home Shrimp Consumption Frequency.

	Base	Base & Non-white	Base & Diet	Base & Urban	Base & Lowinc
prob (never)	0.18	0.04	0.07	0.41	0.48
prob (once/six months)	0.08	0.03	0.05	0.11	0.11
prob (once/three months)	0.17	0.08	0.11	0.17	0.16
prob (once/month)	0.34	0.29	0.34	0.23	0.19
prob (twice/month)	0.23	0.51	0.41	0.08	0.06
prob (once/week or more)	0.01	0.05	0.02	0.00	0.00
prob (once/month or more)	0.58	0.85	0.77	0.31	0.25

The typical respondent is most likely to purchase shrimp for at-home consumption or away-from-home consumption once per month. The probability of purchasing shrimp twice per month rises from 0.06 to 0.69 for at-home consumption and 0.23 to 0.51 for away-from-home consumption for a similar respondent who is non-white. A similar respondent who is male is most likely to never purchase shrimp for at-home consumption. The final row in each table illustrates the change in the probability that shrimp is purchased at least one per month by respondents who differ in the significant explanatory variables. The probability that shrimp is purchased at least once per month for at-home consumption rises dramatically, from 0.34 for the typical respondent to 0.80 for a household size of one and to 0.96 for non-white. Similarly, the probability that shrimp is purchased at least once per month for away-from-home consumption increases from 0.58 for the typical respondent to 0.77 for dieting and 0.85 for non-white.

From a marketing and promotional strategy development perspective, the ideal target customer for at-home shrimp consumption appears to be a non-white Catholic female with small household size who is currently dieting. The ideal target customer for away-from-home shrimp consumption appears to be a dieting non-white with higher income living in a suburban area.

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Evaluating Overall Performances of the Banana Industry in West Bengal State, India

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Abstract

With 29.7 million tons per annum, India produces 20% of world banana production. Despite this success, the country is not ranked as either a major or a minor banana exporting country. The goal of this exploratory research was to evaluate the banana sector in the banana producing areas of Kolkata, West Bengal State of India, in order to identify possible strengths and weaknesses that might impact the complete banana value chain (VC). We found major problems in the complete value chain, including production, transportation, distribution, marketing, and overall quality.

Keywords: banana, distribution, marketing, production, quality, transportation, value chain

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Introduction

With a volume of 29.7 million tons per annum, India is the largest producer of bananas in the world, accounting for about 20% of the world banana production. Despite this success, the country is not ranked as either a major or a minor banana exporting country. The principle goal of this exploratory research was to evaluate the banana sector in order to identify possible strengths and weaknesses that might impact the complete banana value chain (VC). We found major problems in the complete value chain, including in production, transportation, distribution, marketing, and overall quality.

By studying the banana value chain business model of the Keventer Agro Limited Company in Kolkata, we specifically set out to

1. Assess domestic banana production technologies in Bengal State;
2. Evaluate domestic and export market competitiveness;
3. Investigate SWOT (strengths, weaknesses, opportunities, threats) in the value chain;
4. Review India's import/export policies for fresh fruits, with a special focus on West Bengal State.

Material and Methods

This exploratory research took place from July 5–10, 2015. During this time we visited almost all of the banana producing regions in the West Bengal State of India. We first visited Keventer Agro Limited Fresh Company, a Kolkata-based banana-ripening facility in Basarat. A field director was assigned to guide us through the production regions of the state up to the Bangladesh border. We also visited middlemen, stakeholders, cooperatives, and individual growers to collect production and marketing information aimed at tracing the complete banana value chain.

Most growers in Kolkata cultivate a G9 banana cultivar also known as “Grand Nain,” a Cavendish variety belonging to the *Musa acuminata* spp. (Fonsah and Chidebelu, 2012; Fonsah et al., 2007a,b; Fonsah et al., 2010). Grand Nain is classified as an AAA genotype and is a triploid, which makes it susceptible to disease pressures (Stover and Simmons, 1997; Robinson, 1995; Fonsah et al., 2007b). The word “Grand” is actually borrowed from French, meaning “Big” or “Big Bananas.” At this time, production is not a major problem in the Bengal State. Indian growers have some successful banana production and planting techniques that produce big, healthy banana bunches with an average bunch weight of 40 kg. Planting distance was 6 x 6 ft. with an overall density of 400 plants/bigha¹ (Fonsah et al., 2005; Fonsah et al., 2006). Planting distance and density were the same for both G9 (Grand Nain) and local cultivars. Tissue cultures were obtained from Keventer. Various forms of N-P-K fertilizers were used but no one had ever done a soil test (Fonsah, 2003; Robinson, 2003; Fonsah et al., 2005).

Findings

Good Agricultural Practices (GAP) and Quality

Good agricultural practices (GAP) are still lacking. For instance, no de-leafing or fruit obstacle removal were practiced. Bananas don't do well with weeds. Additionally, fruit quality was compromised; fresh fruits were loaded and transported in trucks, increasing both quality defects and post-harvest injuries (Fonsah and Adamu, 2004; Fonsah and Chidebelu, 1995, 2012).

Disease Problems

The major problem in Indian banana production is disease, including yellow Sigatoka disease caused by *Mycosphaerella musicola* and black Sigatoka caused by *Mycosphaerella fijiensis*. There is also banana bunchy top virus (BBTV), which can spread fast if not well controlled. However, due to the production cycle—which goes through mother-daughter-granddaughter or plant crop – first and second ratoon—before crop rotation takes place, it might be easier to manage the disease pressures economically. The three-crop cycle takes from 27 to 30 months (Fonsah and Chidebelu, 1995; Fonsah and Chidebelu, 2012; Stover and Simmons, 1987; Robinson, 1993; Robinson, 1996; Fonsah et al., 2010).

Production Costs

On an average, total annual production cost for a G9 banana farm is about 60,000 rupees²/bigha. Producers reported total net returns of about 300,000 rupees (INR) in a two-year farming cycle constituting three harvests. Total reported production costs for the local variety were 80,000 INR, which and generated net returns of approximately 200,000 INR in a 27-month farming cycle with three harvests. High profitability was causing farmers to switch from Jute-plant production to bananas (Fonsah et al., 2007a; Fonsah et al., 2007b; Fonsah et al., 2011).

Banana Retail Prices

The supermarket in downtown Kolkata displayed four kinds of bananas on the shelf: the Cavendish (G9), two local varieties that looked like Champa-kola and Shabri-kola, and—surprisingly—a local organic banana. The G9 sold for 30 INR/kg. The organic option sold for 35 INR for four small fingers and the two local varieties sold for 6 INR and 5 INR/finger each, respectively. Banana blossoms, which are eaten as a vegetable in some Asian countries, were also available for purchase at 27 INR each. This product could be a readily exploitable niche market. Most farmers did not know that banana flowers could be eaten; they cut and threw them in the field.

Banana Supply Value Chain Model

Market Share and Profit Margins

We were told that an operation like Keventer requires a supply of 10 metric tons (MT) of fruit per day to be sustainable. At the moment, Keventer has exceeded that target fourfold, producing 40 MT/day in seven ripening chambers. Kolkata consumes around 400 MT of bananas daily; Keventer supplies approximately 40 MT/day, roughly 10% of total market share, which leaves them room for expansion. Expansion plans are being finalized, with the aim of opening facilities in Siliguri and Ranchi (Jharkhand), each with a capacity of 10 MT/day (Fonsah et al., 2011).

Infrastructural set-up costs for a small ripening operation with a 10 MT/day capacity are 7–8 million INR. Including working capital, the required investment is about 20 million INR. In West Bengal the peak season for banana is the Ramadan Holy Season, when bananas are important for Iftar.

Import/Export

Presently, demand for bananas in India is higher than supply. As a result, import/export ventures are not appealing to businesses. Moreover, Indian import/export policies for fresh produce—especially bananas, which are a staple—are a major hindrance with too many bottlenecks involved. Trade barriers between India and Bangladesh have encouraged smuggling practices and discouraged official import/export trading between the two countries. Many tariffs and non-tariff barriers discourage businesses, especially for perishable goods like bananas.

World Banana Suppliers

Recent reports show that India ranks first in terms of world banana production, followed by China and the Philippines. Most big producers are not exporters. It is possible that their production is just enough for local consumption, creating an equilibrium. Empirically, the story might have another twist. If modern banana agricultural production technologies could be implemented to improve overall quality to meet export requirements, then India could be a player in the banana export market by producing for both domestic and foreign markets.

Conclusion

Although India is the largest producer of bananas in the world, they have not yet exploited their full potential to become producers, marketers, and exporters of premium quality bananas. Domestically, India has huge market demand and per capita consumption is skyrocketing. Projections show that India will surpass China and become the most populated country in the world by 2028. Given this growth rate, demand for bananas—a favorite fruit—will continue to increase. The problems plaguing the industry are pest and disease control and a lack of modern agricultural practices in producing quality bananas. If producers opt to attempt exporting they will need to address these issues (Fonsah, 2002). A Total Quality Management (TQM) strategy

(an integrated banana management approach) is recommended to revamp the entire India banana industry, which would render Keventer Agro Limited even more profitable and efficient.

Recommendations

Although India leads Bangladesh in banana production and marketing, the country trails other banana-growing countries, especially exporting countries in Africa, Central and South America, and Asia (particularly the Philippines). Keventer Agro Limited and other companies that have developed models to improve the entire banana value chain in India deserve recognition and praise. However, their models are still below international norms and standards. Fortunately, there is a high degree of willingness to learn and improve. USAID/DAI can capitalize on that willingness and provide necessary assistance through transferred technology, capacity building, training, and education.

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Notes

¹A bigha is approximately equal to 0.4005 acres. However, in Punjab, 4 bigha = 1 acre

²One (1) Indian rupee = \$0.015 (as of October 23, 2016).

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Factors Affecting Banana Agricultural Value Chain in Bangladesh

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Abstract

Agriculture accounts for 17% of total Bangladeshi GDP. Bananas represent 20% of all fruits crops produced in Bangladesh, with a domestic market share of 36%. This study analyzes banana production, marketing, distribution, and value chain functions and relationships. The study focused on the major banana producing area of Bangladesh. Our results show that the major problems are lack of good agricultural practices, which affects overall quality, distribution, and marketing of this important fruit.

Keywords: banana, distribution, marketing, production, quality, value chain

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Introduction

Agriculture accounts for 17% of total Bangladeshi GDP. While the country produces over 118 different fruit crops, bananas are the only fruit crop available year round and have the highest per capita consumption (Bangladesh Bureau Statistics and Information, 2014). This study investigates the factors affecting banana agricultural value chain in Bangladesh, from producers to end users (Fonsah et al., 2007a).

Material and Methods

Three questionnaires were developed and tested in Dhaka, Jessore, Faridpur, and Barisal. Production questionnaires were designed to determine growers' present agricultural practices, production trends, and willingness to adopt new technology (Fonsah and Chidebelu, 2012). The second questionnaire, aimed at intermediaries, asked about market- and distribution-level channels, wholesaler price determination, and wholesalers' willingness to pay (WTP) premium prices for high-quality bananas (Fonsah and Chidebelu, 2012; Fonsah et al., 2007b). The third survey was for customers or end users and asked about consumer WTP for quality bananas, preferences for different banana cultivars/varieties, and preferences for various quality attributes (Fonsah, 2002; Fonsah et al., 2007c).

Data Collection

A total of 177 survey questionnaires were distributed among the three groups of key value chain (VC) participants, of which 130 were usable. Of 41 production survey questionnaires distributed to farmers in Jessore, Jdeniada, Harinakunda, Jhinaidah Sadar, Sailkupa, Kinshargoni, Narayangoni, Shyllet, Barisal, and Faridpur, 26 were usable. Of 33 questionnaires distributed to intermediaries, wholesalers, and retailers in Khamarmundia, Kaligonji, Jhedaideh, Shinhutola Bazar, Hakimpur, Chaugacha, Jessore, and Dhaka, 25 were usable. Of 103 surveys sent to consumers in Dhaka, Barisal, and Faridpur, 79 were usable.

Data Analysis

The data collected from the three different segments of the Bangladesh banana VC were entered into an Excel spreadsheet. Basic statistics were used to analyze the data.

Results

Production Survey Results and Analysis

Growers were asked to define their professions. The majority (77%) were strictly farmers, while 19% were farmers and retailers and 3.8% of them were farmers and wholesalers (Figure 1).

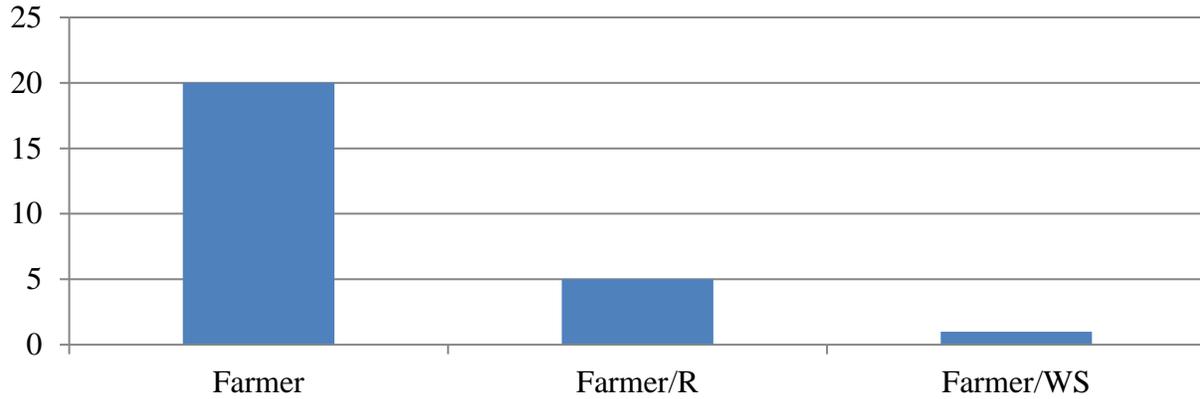


Figure 1. Growers’ Professions

Respondents were asked about the size of their farms. Most farms (30.8%) were 26–50 decimals,¹ while 19.2% were 51–75 and 23.1% were 1 acre. Interestingly, a sizable minority (22.3%) of farms were over 1 acre in size (up to 13 acres). The number of new farmers and expanded farm size observed in the production farmer’s survey was a clear indication that farmers were gradually switching from jute plant to banana cultivation. The 3.8% of respondents with farms smaller than 25 decimals were likely new entrants (Figure 2).

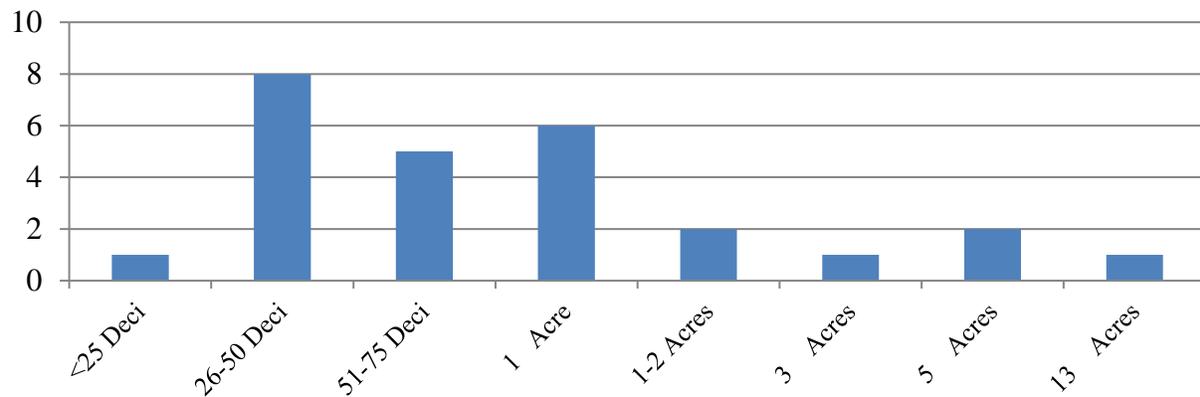


Figure 2. Farm Size

Respondents were asked about what other crops they cultivated in addition to bananas. Common crops were rice (26.4%) and jute plants (25%). Fewer respondents grew mangos (13.9%), mixed vegetables (11.1%), potatoes (11.1%), and sugar cane (4.2%) (Figure 3).

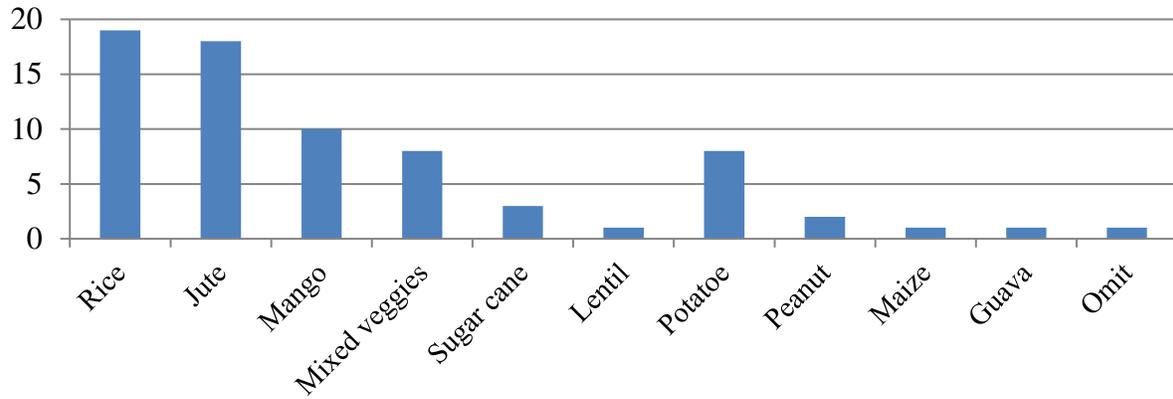


Figure 3. Additional Crops Cultivated

The most popular variety of banana cultivated was Sabri-kola (30.8%), with 21.2% cultivating Rongin Sagor-kola and 15.4% cultivating Champa-kola. Additionally, 23.1% cultivated green or cooking bananas. Less-cultivated varieties were Thota-kola (3.8%) and Bangla-kola, Bitchi-kola, and Baishara-kola (1.9% each) (Figure 4).

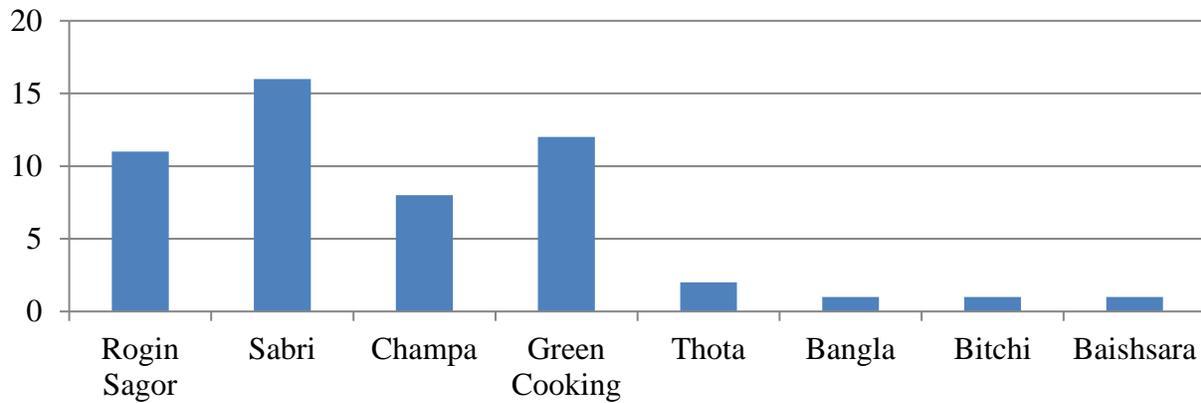


Figure 4. Variety of Bananas Cultivated

One important question was aimed at determining what the growers got for their bananas compared to what consumers were willing to pay, which helped us to determine profitability margin. Among growers, 38.5% reported receiving 151–200 Bangladeshi taka (BDT)/bunch,² 43.3% received 201–225 BDT/bunch, and 19.2% received 226–250 BDT/bunch. The average price among all respondents was 193–225 BDT/bunch (Figure 5).

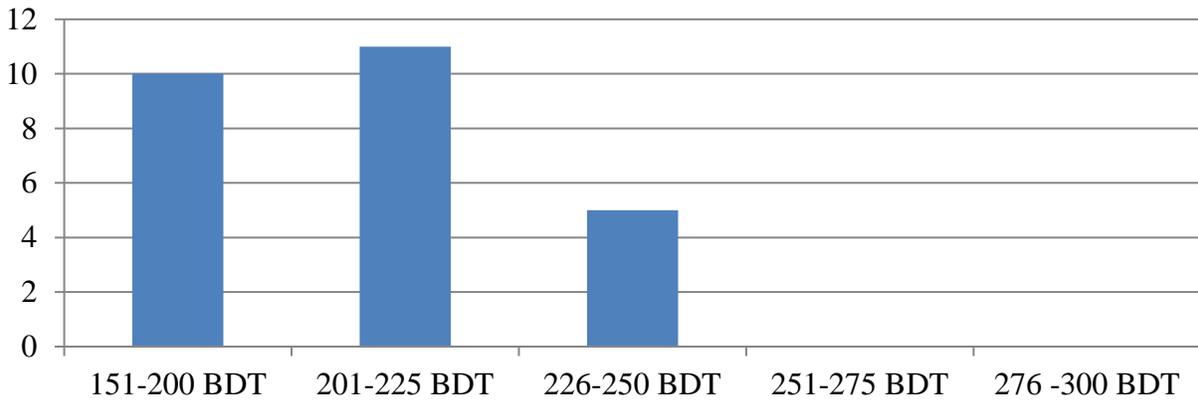


Figure 5. Average Price Received by Farmers

Most farmers (63%) were 31–40 years of age; 11% were younger (20–30 years) and 11% were middle-aged (41–50) (Figure 6). This could partially explain why the majority of farmers (80.80%) were willing to adopt new technologies. Empirically, we observed that growers were eager to learn new agricultural practices during our visits, asking several pertinent questions about diseases and agriculture generally.

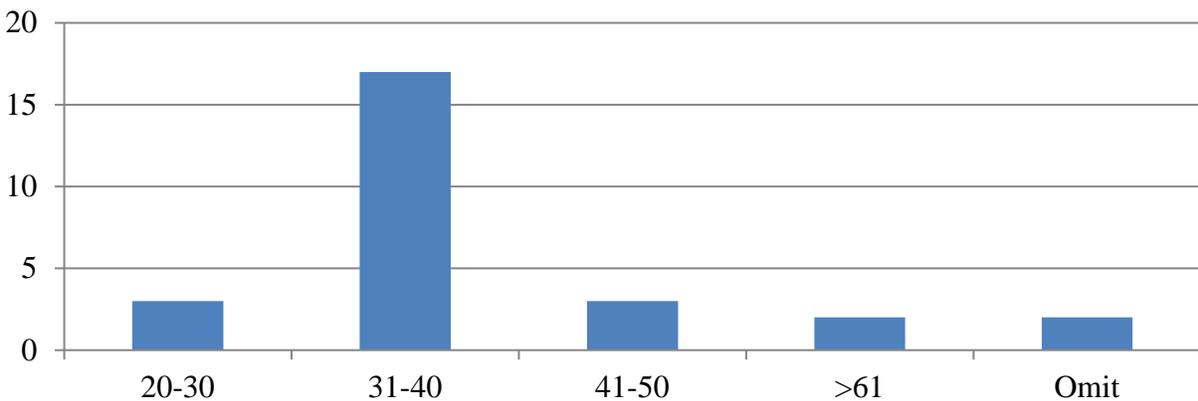


Figure 6. Growers' Ages

Intermediary Survey Results

Among intermediaries, 60% were retailers and 24% were wholesalers. Additionally, 12% were both wholesalers and retailers, while 4% served in all three links in the banana VC (i.e., farmers, wholesalers, and retailers) (Figure 7).

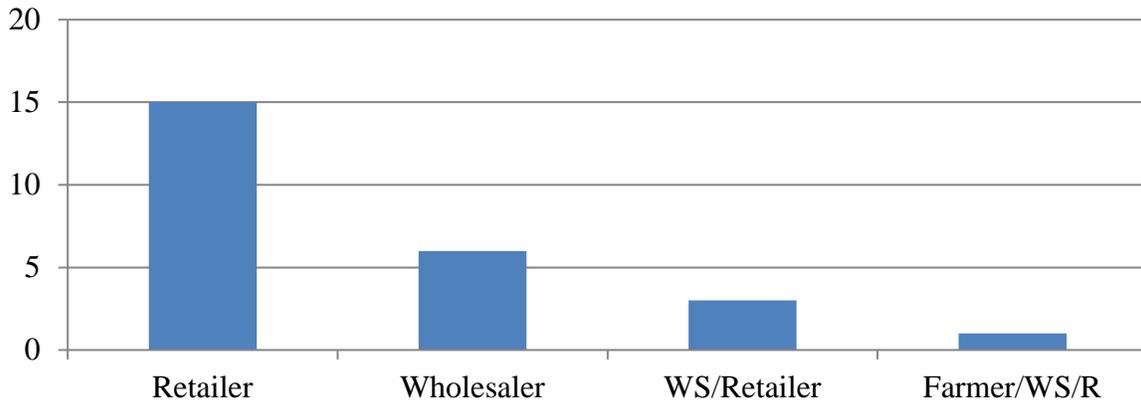


Figure 7. Intermediary Location in the Banana VC

At the farm gate level, there were local, urban, and supermarket wholesalers. For instance, 40% of respondents said their business was located in cities like Dhaka, while 32% reported rural locations and 28% claimed to be supermarket wholesalers (Figure 8).



Figure 8. Business Location

An important question was asked to help us determine whether growers still had room to increase profitability. Fortunately, 76% of respondents were willing to pay between 200 and 400 BDT/bunch for good-quality bananas and only 12% indicated they would pay less than 200 BDT/bunch.

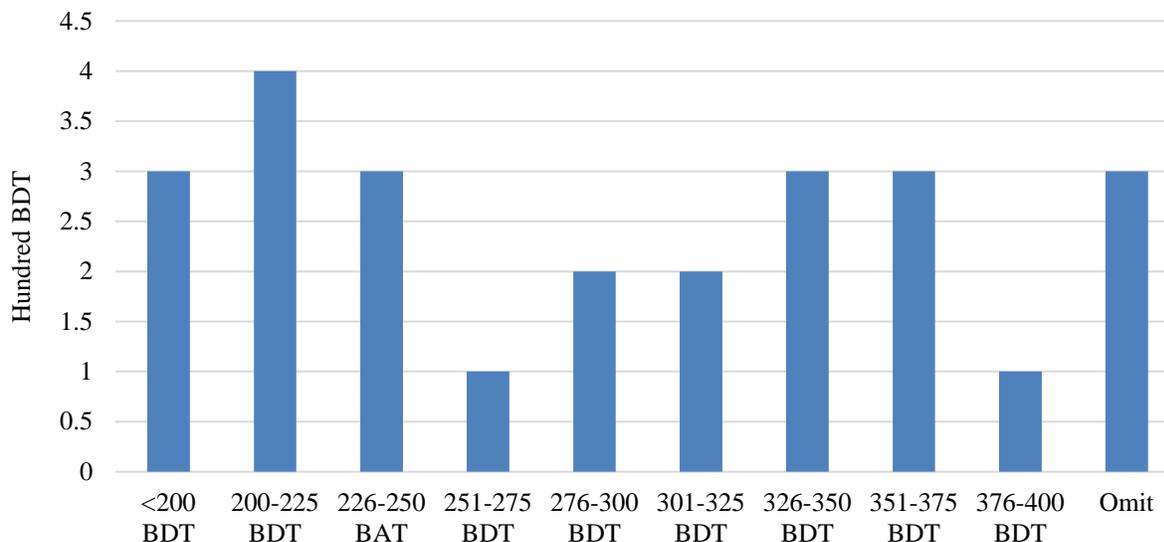


Figure 9. Intermediary WTP for Good-Quality Bunch of Any Variety of Bananas

Although price preferences were mixed among the intermediaries, 16% indicated they would pay 200–225 BDT/bunch, while 12% indicated they would pay 326–350 BDT/bunch and 12% indicated WTP of 351–375 BDT/bunch. A sizable minority (36%) indicated that they would be willing to pay 326–400 BDT/bunch for any variety of good quality bananas. This is a clear indication that adopting new technology and good agricultural practices would be beneficial to growers in terms of increasing income in addition to benefitting intermediaries and consumers looking for high-quality fruit (Figure 9).

Consumer Survey Results

Consumer behaviors and preferences in the different distribution districts—particularly urban versus rural—were exceptionally diverse. Faridpur and Barisal are both fairly rural areas while Dhaka is urban. For instance, 38% of Dhaka consumers preferred Sabri bananas compared to 0% in Faridpur and 13% in Barisal, while 30.4% of Dhaka consumers preferred the Champa variety compared to 19% in Barisal and 15% in Faridpur.

Additionally, 85% of Faridpur consumers preferred the Shagor variety compared to 34.8% in Barisal and 13% in Dhaka. Other significant differences were in preferences for green/cooking bananas, which were preferred by 21.7% of Barisal respondents compared to 0% in Faridpur and 9% in Dhaka. Finally, 12% of the respondents in Dhaka preferred the Bangla variety compared to 0% in Faridpur and 0% in Barisal. (Figure 11).

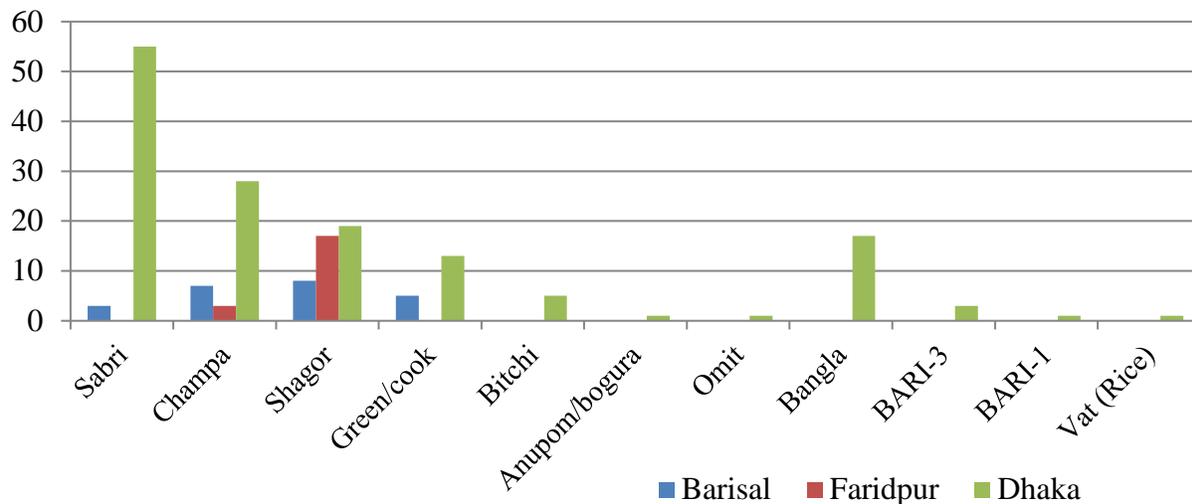


Figure 11. Preferred Varieties of Locally Grown Bananas

Taste and flavor stood out in the three districts as preferred banana attributes. Dhaka respondents ranked high in all the preference categories such as sweetness, multiple uses, availability, price, cooking, and overall cosmetic appearance. Faridpur district ranked second, followed by Barisal (Figure 12).

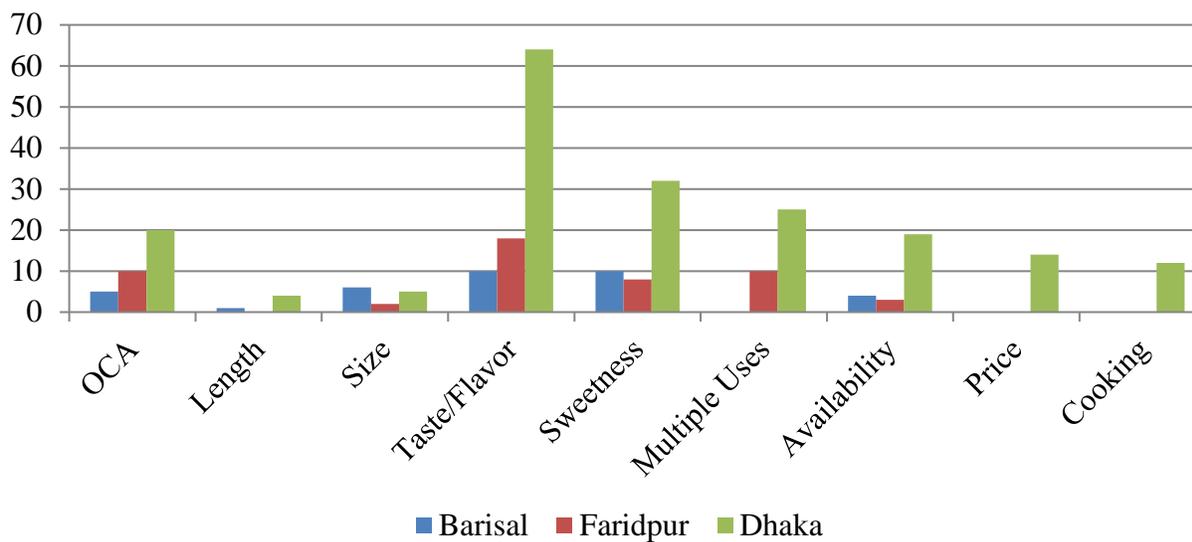


Figure 12. Preferred Banana Attributes

We also asked about consumers' WTP for bananas. Dhaka ranked highest in all categories, followed by Faridpur and Barisal. In Faridpur, the respondents were willing to pay (WTP) 11–25 BDT/kg of bananas, while respondents in Barisal stretched the range from 11–30 BDT/kg (Figure 13).

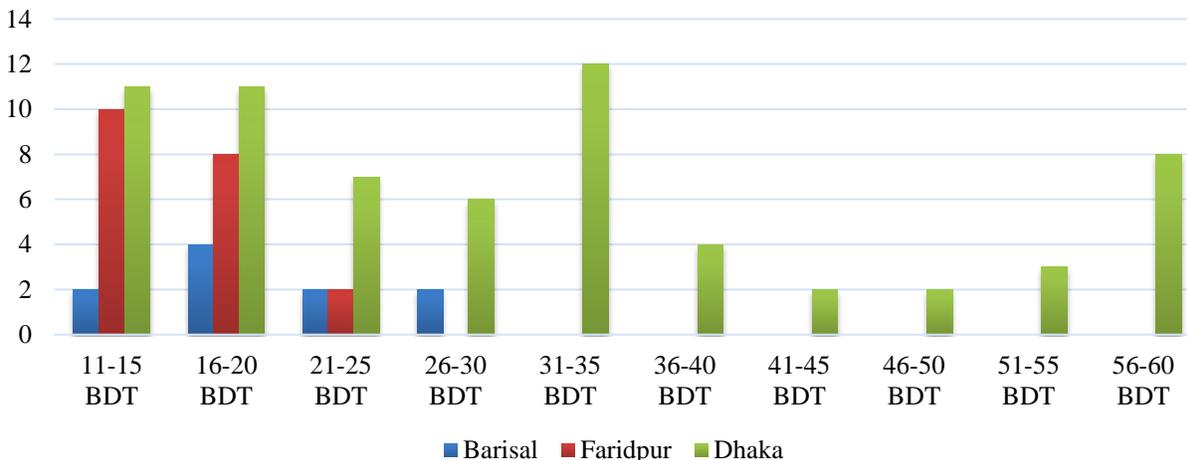


Figure 13. Consumer WTP for 1 kg of Bananas

Conclusion

Bangladesh has the potential to become a producer, marketer, and exporter of premium quality bananas. Market demand is growing domestically, and per capita consumption is more than 4.3 kg/year. With a population growth rate of 1.6%, demand for bananas will continue to increase. The problems plaguing the industry are pest and disease control and a lack of modern agricultural practices in producing quality bananas for both local and export markets. Survey results across the complete banana value chain indicate a willingness to adopt new technology and WTP higher prices for any variety of high-quality bananas. A Total Quality Management (TQM) strategy—which is an integrated banana management approach—is recommended to revamp the whole industry.

Acknowledgement

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Notes

¹A decimal (or decimel) = 1/100 acre (40.46 m²). One (1) decimal in Bihar = 435 sq² (Wikipedia, 2016).

²Bangladeshi Taka (BDT): 1BDT = US \$0.013 (September 27, 2016)

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Local Food Vitality Index: Measuring Consumer Attitudes toward Food System Attributes

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Abstract

A local food system vitality index is estimated based on resident consumer performance measures over an array of food market channels, community engagement, and promotion effectiveness. An index is created for individual elements and for the local food system overall. A survey examined consumer performance measures for Lexington, Kentucky, with additional reference to evaluating recent previous communities of these consumers. The resulting index allows food systems participants and economic development interests to gain a resident consumer perspective of what elements are working well but also determine how individual elements might contribute to the overall score provided for the community in question.

Keywords: index, local food, performance

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Introduction

Local food systems (LFS) are complex networks of markets, institutions, and community values (Feagan, 2007; Hinrichs, 2000; Selfa and Qazi, 2005). Understanding the actual performance of such networks is confounded by numerous measurement and interaction complexities. Despite these challenges, many development organizations—such as the Southern Risk Management Education Center and the Southern Rural Development Center—have called for or are engaging in efforts to better understand and measure these systems (Goodwin, 2013; Palma et al., 2013; Lamie et al., 2013). The recent development of *The Economics of Local Food Systems Toolkit* by Thilmany McFadden et al. (2016) is one response to the need to measure economic impacts of local food initiatives (Hughes and Boys, 2015). Because stakeholders in different LFS have different priorities and criteria for what constitutes an active, healthy food system, it is critical to develop a tool to evaluate a robust set of LFS components. This article describes the ongoing creation of a *Local Food System Vitality Index*, which measures the performance of LFS components based consumer perceptions of the LFS in Lexington, Kentucky.

In 2015, the local food coordinator in the Lexington-Fayette Urban County Government office in Lexington, Kentucky, commissioned a demand systems study for local food among buyers and producers in various market channels. Rossi and Hyden (2015) conducted over 60 interviews with food buyers and producers to identify the assets and barriers to expanding the local food economy in central Kentucky. In 2016, the same organization, along with a community-economic development non-profit, asked for an assessment of the state of processing infrastructure in central Kentucky (Brislen, Rossi, and Stancil, 2016).

These two efforts were critical to identifying how well certain LFS components met the expectations of various stakeholders and where potential growth opportunities existed. They also noted LFS components that residents valued but which were felt to be underdeveloped. These studies were quite time intensive and led us to recognize the utility of developing a quantitative and somewhat generalizable process or tool that could more quickly measure the state of our LFS from a resident consumer perspective. This tool could be used to explore the complexities of an LFS in component interaction and examine performance changes over time.

We propose the development of a Local Food System Vitality index. While a few existing indices attempt to quantify local food activity, they generally rely on secondary data, are only applicable to specific geographic regions, and overvalue the quantity rather than the quality of LFS components (Ricketts Hein, Ilbery, and Kneafsey, 2006; Benedek and Balázs, 2014; Locavore Index, 2015). Subsequently, most economic and place-based indices provide little useable information for LFS producers, facilitators, and consumers. Index data are too coarse-grained to capture novel social arrangements and consumer preferences that would be useful for developing LFS production and distribution strategies.

Our index addresses these issues by measuring 20 different components of LFS performance. By focusing on how residents in specific communities understand and value different LFS components, our index provides meaningful information on where investments in the community might effectively be made. As each LFS has geographically distinct features, challenges, and

opportunities, we expect that different communities place will evaluate their LFS uniquely. The index is designed to help LFS market participants and development entities identify relative performance measures for the community in question, both overall and in its component parts.

Methodology

The index model is based on consumer perception of overall and component LFS performance. LFS components model were identified through qualitative interviews with Lexington-area producers, distributors, and buyers and consumer focus groups. Two focus groups were asked to identify and rate the aspects of the LFS that were most important to them. We provided a short list, but they discussed additional components they considered critical to a creating a strong, vibrant LFS. We refined these responses to reflect 20 components of an LFS most valued by participants. We then developed a web-based survey that asked participants to “Rate the functioning of the following aspects of your food scene” on a 1–5 Likert scale (“Extremely Poor”= 1, “Poor” = 2, “Average” = 3, “Good” = 4, and “Excellent” = 5). “Don’t Know” responses scored as 1 for regressions but were omitted in index calculations.

Components were classified as belonging to one of three main categories: i) food market channel components, ii) community engagement components, and iii) local food promotion components (Table 1). These components are evaluated on their own and as potential determinants in a regression for variations in the overall community vitality ratings. Additionally, survey respondents were asked to rate the “overall vitality of your local food scene” on a 1–5 Likert scale where vitality is defined as “the strength and activeness of the local food scene.” This question serves as a measure of overall vitality and is used as the dependent variable in a regression as a function of the perceived performance of the 20 individual components of the LFS.

Table 1. Survey Questions on LFS Components.

How Would You Rate the Functioning of the Following Aspects of Your Local Food Scene?		
Food Market Channel Components	Community Engagement Components	Local Food Promotion Components
Farmers’ market quality	Low income neighborhoods have access to fresh food	Label that identifies locally grown or raised items
Retail cooperatives offer food from local farms	Community food festivals	Overall diversity of local food items
Grocery stores offer food from local farms	Food banks are accessible and offer fresh foods	Microbreweries and distilleries promote local food
Restaurants serve local food	On Farm Events	Local government support of the food scene
CSA program quality	Community gardens	Local food is competitively priced
Schools engage with local farms	Cooking, food preservation, and consumer education programs	Private investment in local food business
Food trucks use local ingredients		

Notes: Survey participants were asked these questions twice: once to evaluate Lexington and once to evaluate a previous community.

This survey was first distributed to a “young professionals” group in Lexington through a Facebook invitation. Young professionals were initially targeted because they are distinctly mobile and would provide an assessment of Lexington LFS function through comparisons to communities where they had recently lived. By generating a pool of rankings for each aspect of “all previous communities” (APC), we created a baseline score by which we could compare the scores of Lexington’s LFS aspects or any other future surveyed location. Of the 84 individuals who responded to the survey in Lexington, only 34 had lived in a community other than Lexington in the past 10 years. In the future, we will survey more communities—especially elsewhere in the South—to break up and aggregate the APC measures based on different community types (e.g., city size) and consumer segments.

Analysis

Figure 1 provides an overview of the methodology employed to calculate the overall vitality of the LFS as well as the vitality of individual components. We divided the mean of each component by the corresponding APC means to generate component index scores. To measure overall vitality, we similarly divided Lexington’s vitality score by the APC vitality score. This provides a simple analysis of the current vitality of the LFS in the community and allows the user to view components that are working well in terms of absolute scores and others that are not faring as well. It also allows between-community comparisons.

Figure 1. Index Analysis – Overall and Component Performance Compared to Previous Community.

<u>Overall Vitality</u>	$LFVI_{overall} = \left(\frac{Y_L}{Y_{APC}} \right) \times 100$
Y _L = LFS vitality mean for Lexington, Y _{APC} = LFS vitality mean for all previous communities	
<u>Individual Component</u>	$LFVI_i = \left(\frac{X_{i,L}}{X_{i,APC}} \right) \times 100$
X _{i,L} = mean performance score for component <i>i</i> in Lexington X _{i,APC} = mean performance score for component <i>i</i> in all previous communities	

To understand how each component’s performance is associated with overall measures of LFS vitality, we estimated an OLS regression model with the collected data. In the regressions, Lexington’s overall vitality was regressed against its individual LFS component scores (Figure 2), recognizing that a logit model may be more appropriate with a larger sample size. The regression results indicate the specific components that are significant to the overall rating of the LFS. Components that are significantly positive to the overall LFS vitality measure are considered important to or valued by consumers in their LFS. Components that are significant but negatively correlated to overall vitality are harder to interpret. This may indicate that the surveyed residents do not have a clear idea of how well that aspect is functioning. For regressions, “don’t know” is coded as 1 and remains part of the regression results because a lack of knowledge about a certain component means that it is less visible or has a smaller niche within the LFS and thus is not as critical to overall perceptions of consumer vitality. These scores provide a starting point for more detailed case studies on the food system.

Figure 2. Regression of Overall Vitality as a Function of Individual Component Vitality.

<p>OLS or Logit Regression</p> $Y_L = \gamma_0 + \gamma_1 X_1 + \gamma_2 X_2 + \gamma_3 X_3 + \dots + \gamma_{20} X_{20} + \theta_j D_j + \varepsilon_c$ <p>Y_L = LFS vitality mean for Lexington X_i = mean performance score for component <i>i</i> in Lexington D = demographic variables</p>
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Table 2. Component Performance by Community and Comparative Index Measures.

Components	All Previous Communities N=(20-30)*		Lexington N=(50-84)*		Index
	Mean	Std. Dev.	Mean	Std. Dev.	
<i>Market Channel Performance</i>					
Coop Grocery	2.76	1.14	3.73	0.95	135
Restaurants**	2.72	1.36	3.62	0.86	133
Farmers Market**	3.52	1.34	4.25	0.85	121
Retail	2.55	1.15	3.02	0.95	119
CSAs	3.56	1.36	4.01	0.87	113
Food Truck**	3.27	1.42	3.62	0.92	111
Farm to School	2.65	1.22	2.64	1.21	100
Ethnic Markets	3.12	1.50	2.85	1.09	91
<i>Community Measures Performance</i>					
Food Festivals**	3.14	1.42	3.54	1.02	113
Food Education**	2.87	1.22	3.14	1.00	110
On-farm Events	3.05	1.23	3.16	1.02	104
Low Inc. Comm.	2.26	0.93	2.36	0.94	104
Community Gardens	3.05	1.22	3.00	1.05	98
Food Banks	3.18	1.42	2.79	1.05	88
<i>Local Food Promotion Performance</i>					
Local Food Label***	3.08	1.47	3.72	0.94	121
Breweries Promote LFS	3.59	1.18	4.29	0.71	120
Local Product Diversity*	3.07	1.46	3.53	0.90	115
Govt. Support of LFS	3.19	1.56	3.38	0.93	106
Private Investment in LFS	3.23	1.24	3.37	0.98	104
Price Competitive	3.12	1.14	3.24	0.92	104
Overall Vitality	2.71		3.65		135

Notes: Observations were excluded from means when respondents answered “I don’t know.” As this response indicates a respondent’s lack of knowledge about component performance, more obscure but important component functioning would be pulled down by scoring this as 0. Single, double, and triple asterisks (*, **, ***) indicate statistical significance of that component in a regression of overall vitality at the 10%, 5%, and 1% level.

Results

The general resident consumer performance estimates of Lexington's LFS components are provided in Table 2 below. Each component is listed separately in the left column; overall LFS vitality is at the bottom of the table. For each component, we present the mean scores for both Lexington and survey-takers' previous community. Lexington scores are indexed to the component means for the APCs in the column furthest to the right. Without considering APC means, Lexington scores high in absolute performance for its farmers' market, breweries promoting local food, local food label, and restaurants sourcing locally. It scores low in its food banks, low-income community food access, farm-to-school programs, and ethnic markets.

In comparison to other communities, however, index scores are a bit different. Lexington is comparatively higher in terms of its co-op grocery, restaurant sourcing, farmers' markets, retail, breweries, and the Kentucky Proud local product label. Other components also score comparatively higher, including CSAs, food trucks, food festivals, food education opportunities, and local product diversity. Some of these components—such as food education programs—perform better in Lexington than in other locations but could still be improved upon based on their middling overall score in Lexington (mean: 3.14). Other components—such as the farmers' markets—score quite high overall (mean: 4.25) but are comparatively better than other locations by a smaller margin (index: 121) than something like the co-op grocery (mean: 3.73, index: 135). Higher index scores also indicate that components that are more visible on the LFS landscape. In Lexington, a few components score low compared to other communities, such as the community gardens, food banks, and ethnic markets. These are areas where improvements could potentially be made.

Regression models are used to better understand the relationships between individual LFS components and overall LFS vitality. Table 3 provides estimates of the components with the most significant impact on the overall vitality score based on an OLS model. A few components are positively associated with higher overall vitality, including farmers' markets, restaurants, food education programs, food festivals, local product diversity, and the Kentucky Proud local food label. According to the model, these components are the main drivers of Lexington's local food activity. Only one component—food trucks—was negatively significant. This relationship might suggest that this market channel had little impact on how a person scored the overall vitality of their local food system. In other words, the strength of the food truck scene is not a critical component for Lexington to achieve a strong LFS. Another way to interpret this is that most Lexingtonians have no real understanding of whether or not food trucks are sourcing local products. This may indicate that only a subset of the population knows about what food trucks are doing in the city, especially since the absolute score of this component is 3.62 (see Table 2). This is better than average and scores higher than retail grocery for those who felt they knew enough about the component to rate it.

Table 3. OLS Regression on Lexington Vitality using LFS Performance Measures.

	Coef.	Std. Err.	t	P>t
<i>Market Channel Performance</i>				
Farmers Market**	0.162	0.066	2.45	0.017
Coop Grocery	-0.040	0.044	-0.92	0.362
Retail	-0.062	0.071	-0.87	0.385
Restaurants**	0.170	0.058	2.94	0.005
CSAs	-0.025	0.039	-0.65	0.517
Farm to School	0.031	0.042	0.73	0.468
Food Truck**	-0.072	0.036	-2	0.05
Ethnic Markets	-0.028	0.036	-0.77	0.447
<i>Community Measures Performance</i>				
Low Inc. Comm.	0.040	0.053	0.75	0.454
Food Education**	0.106	0.043	2.43	0.018
Community Gardens	-0.014	0.048	-0.28	0.778
Food Festivals**	0.121	0.052	2.33	0.023
Food Banks	0.004	0.039	0.09	0.927
On-farm Events	0.047	0.043	1.11	0.271
<i>Local Food Promotion Performance</i>				
Local Product Diversity*	0.101	0.057	1.76	0.083
Local Food Label***	0.204	0.066	3.11	0.003
Price Competitive	0.060	0.067	0.91	0.368
Breweries Promote LFS	0.050	0.046	1.09	0.279
Govt. Support of LFS	-0.038	0.048	-0.79	0.432
Private Investment in LFS	-0.006	0.037	-0.15	0.879
_cons	0.765	0.333	2.3	0.025
F	5.88			
Prob > F	0.0000			
R-squared	0.6511			
N	84			

Notes: Single, double, and triple asterisks (*, **, ***) indicate statistical significance of that component in a regression of overall vitality at the 10%, 5%, and 1% level.

These results could be used by a local food coordinator to allocate more resources toward strengthening the farmers' market, marketing the Kentucky Proud label, or identifying incentives or marketing programs to increase a restaurant's use of local foods in its menu. These components had high LFS index scores in Lexington and were significant factors of the overall food vitality score. Food festivals and local product diversity are significant to LFS vitality but had lower mean scores compared to other components in the Lexington LFS. A local food coordinator might also direct more investment to these areas to improve performance. Similarly,

lower scoring but important components such as food education programs may represent critical growth areas for improving local food vitality.

Interestingly, the regression results mostly reveal what had already been highlighted in the 2015 Lexington Local Food Demand Assessment. Buyers cited farmers' markets, the Kentucky Proud food label, and the farm-to-restaurant movement as the most important factors in supporting the LFS (festivals and education were not mentioned). That assessment was both time intensive and detailed, but our vitality index highlighted similar findings using significantly fewer resources.

Moving Forward

We will continue to develop this process by focusing on an expanded evaluation of high local food interest groups in Lexington as well as in different-sized communities in the region. These inquiries will create a larger pool of observations by which we might compare how LFS components are valued by distinct geographic and demographic segments. We will also engage in case studies in some surveyed communities to tell a deeper story about why LFS vitality performance measures appear a certain way. These stories will identify the agencies, marketing initiatives, social dynamics, and producer initiatives that contribute to these vitality ratings.

Larger and more diverse samples of the resident consumer populations are needed to more substantially evaluate performance-rating differences across consumers within and across communities. More observations will allow for richer evaluation of the relationships among various LFS components. Finally, this study emphasizes a resident consumer perspective on the performance characteristics of the LFS. An additional perspective on these markets that we intend to explore with a different set of components is producers' characterizations of a high-performing local food market. This index approach will help LFS development stakeholders quickly assess areas of need, high performance, or potential growth.

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Economic Impacts of the Opening of the Bonnet Carre Spillway to the Mississippi Oyster Fishery

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Abstract

The negative economic impacts of the prolonged Bonne Carre Spillway opening in 2011 were evaluated using two methods: (i) preliminary and updated assessments method and (ii) economic recovery modeling method. The cumulative foregone landing values of commercial oyster harvesting ranged from \$21.8 million to \$46.0 million, depending on the method used. The negative output impacts reached \$9.6 million in 2011, \$19.6 million in 2012, \$19.9 million in 2013, and \$8.9 million in 2014. Mississippi lost 145–324 jobs per year during the period. Labor income lost ranged from \$1.8 million to \$8 million per year.

Keywords: economic losses, freshwater intrusion, oyster restoration, shellfish harvesting

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Introduction

The preliminary assessment of the economic impacts of the prolonged Bonne Carre Spill (BCS) opening in 2011 (U.S. Geological Survey, 2016) was prepared in late 2011 to support the state application for federal fisheries disaster declaration. Using disaster funding, Mississippi had been in the process of restoring oyster reefs after Hurricane Katrina (H. Katrina) in 2005 and the Deepwater Horizon oil spill in 2010 when the BCS opening resulted in 85% oyster mortalities

(Mississippi Department of Marine Resources, 2011). These massive mortalities halted the recovery process of the oyster fishery to its baseline levels in 2002–2004.

Prolonged exposure to freshwater caused massive mortalities of the state's oyster populations and required restoration projects to enable the recovery of the fishery to its baseline status. The restoration efforts included but were not limited to the dredging of unaffected oyster seedstock and relaying them to affected reefs. Oyster shells and other cultch materials were purchased and planted at affected areas.

These restoration efforts will enable the oyster reefs to replenish the damaged oyster populations and become available for harvest when the resources reach market size. These restoration efforts will allow oyster reefs to reproduce more oysters for future openings of the oyster season in the state.

Economic Models

The economic impacts of the prolonged BCS opening were assessed using the preliminary assessment method, when commercial landings data after 2010 were not yet available at the NOAA Fisheries website, and the post-assessment method and economic recovery model (ERM) when landings data from 2011 to 2014 became available in 2016. The preliminary and post-assessment methods used the pre-Katrina years 2002–2004 as the baseline period.

The preliminary assessment of the economic impacts of the BCS opening was prepared in late 2011 to support the application for federal fisheries disaster declaration by the state of Mississippi (Posadas, 2011). A more rigorous assessment of the impacts of the BCS opening was added as part of an overall assessment of the individual and joint impacts of natural and technological disasters to the state oyster fishery since 2005. The oyster relaying and cultch planting ERM attempted to measure the effects of economic, biological, technical, and environmental factors on commercial oyster landings during the past two decades (Posadas and Posadas, 2017).

Once the post-BCS foregone annual oyster harvesting values associated with the prolonged BCS opening were computed, the negative economic impacts were estimated using IMPLAN (2016) models for Mississippi. Oyster harvesting corresponds to NAICS (2016) sector 114112 or shellfish fishing. The income, value-added, and sales impacts are expressed in dollars for the year specified by the user. Foregone output or sales are the gross sales lost by businesses within the economic region affected by the disastrous event. Foregone labor income includes lost personal income such as wages and salaries and proprietors' income or income from self-employment due to the disaster. Foregone employment impacts are expressed in terms of a mix of both full-time and part-time jobs lost associated with the disaster.

Direct Economic Losses

Three different methods were used to estimate the direct losses to Mississippi commercial oyster landings associated with the prolonged BCS opening. The preliminary approach used predicted

data for the H. Katrina model since no data from 2011–2014 were available at that time. Under this method, direct losses equals “predicted monthly landings using H. Katrina model less monthly baseline oyster landings in 2002–2004” (Posadas and Posadas, 2017). The cumulative direct losses under this method reached \$37.6 million (Figure 1).

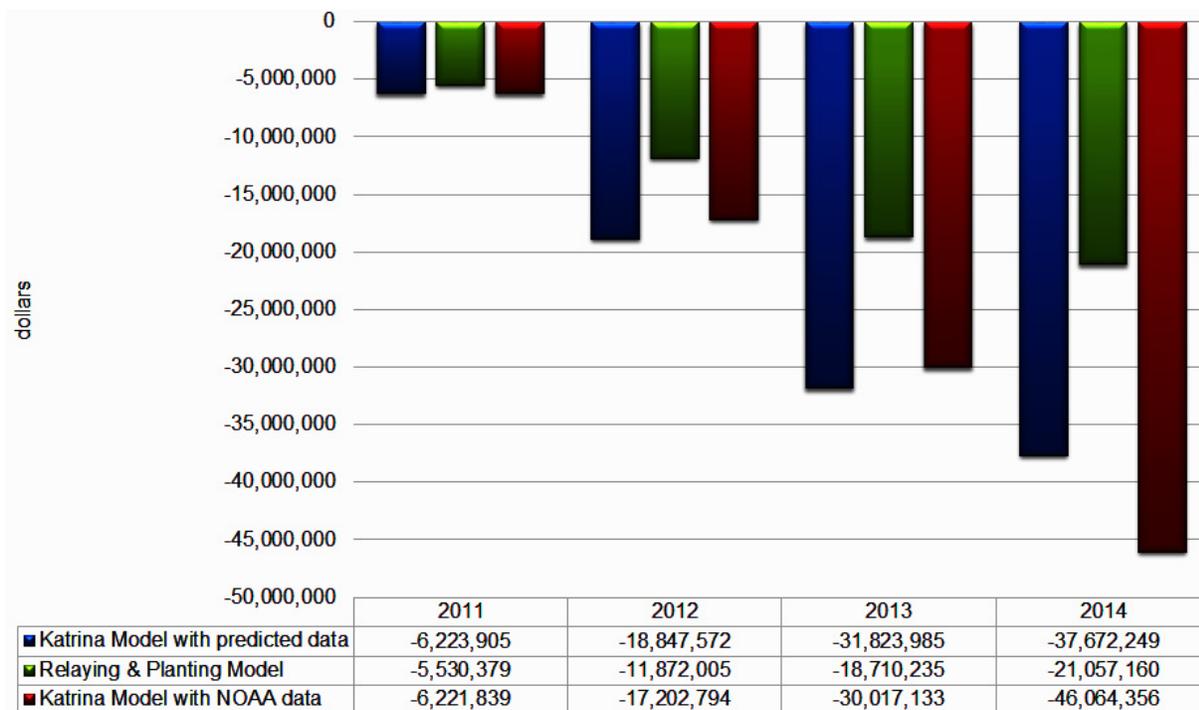


Figure 1. Comparative Direct Losses to Mississippi Oyster Commercial Landings.

With 2011–2014 data available, the preliminary H. Katrina model was modified by estimating the direct losses associated with the prolonged BCS openings as equal to “actual monthly landings minus monthly baseline oyster landings in 2002–2004” (Posadas and Posadas, 2017). With this approach, the cumulative direct loss to Mississippi commercial oyster landings was \$46 million.

With the oyster relaying and cultch planting ERM, the effects of the prolonged BCS opening on commercial oyster landings were calculated. Under this method, direct losses were equal to “actual monthly landings minus predicted monthly landings without disaster” (Posadas and Posadas, 2017). Cumulative direct losses amounted to \$21 million.

Total direct losses estimated by the preliminary H. Katrina model were applied in calculating the negative economic impacts of the prolonged BCS opening. Using the IMPLAN (2016) economic impact program and 2014 data for Mississippi, the negative economic impacts of the BCS opening were calculated (Table 1). Negative output impacts reached \$9.6 million in 2011, \$19.6 million in 2012, \$19.9 million in 2013, and \$8.9 million in 2014. Mississippi lost 145–324 jobs per year during the period as a result of the downturn in oyster harvesting. Labor income lost was \$1.8–8.0 million per year.

Table 1. Negative Economic Impacts to the Mississippi Oyster Harvesting Industry.

Year	Employment	Labor Income	Total Value Added	Output
2011	-238	-1,758,557	-3,618,312	-9,620,179
2012	-318	-7,855,340	-10,581,350	-19,574,876
2013	-324	-7,994,211	-10,768,414	-19,920,932
2014	-145	-3,566,886	-4,804,690	-8,888,394
Total	NA	-21,174,995	-29,772,766	-58,004,380

Notes: NA refers to not applicable since the number of jobs pertains to the same pool of commercial oyster fishermen and workers in related industries.

The Mississippi oyster harvesting industry underwent economic hardships due to the massive destruction and frequent closures of the state public reefs associated with natural and technological disasters. The absence of access to public reefs caused the shutdown of oyster harvesting activities and associated economic activities. The cumulative values of commercial oyster landings lost in 2011–2014 reached up to \$46 million. Negative economic impacts of the prolonged BCS opening consisted of the reduction in economic output by \$58 million, loss of 145–324 jobs per year, and decline in labor income of more than \$21 million in 2011–2014.

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Innovative Food Tourism Development Strategies for Sustainability on American Indian Reservations

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Abstract

The goal of this project is to enhance the economic sustainability of agricultural production in Southwest Indian Country through food/agritourism enterprise and supply chain development. This strategy takes advantage of increasing traveler demand for local and heritage foods and activities and the need to diversify Southwest agriculture to increase its resiliency to climate change. Project objectives include assessing tourism behaviors and motivations, assessing the production and marketing needs of tribal food producers, and evaluating various models for incorporating food/agritourism into current operations. Project outcomes will increase business opportunities for tribal members and strengthen tribal economies while preserving traditional tribal customs and knowledge.

Keywords: agritourism, cottage foods, economic development, heritage foods, Southwest Indian Country

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Introduction

The American Indian reservations of the Southwest are rich in natural resources such as uranium, coal, and natural gas, but tribal populations are among the poorest in the country (United Nations, 2007) and American Indian poverty rates are higher than those of any other ethnicity in the United States (27% below poverty; McCartney, Bishaw, and Fontenot, 2013). The Navajo Nation—which occupies portions of Utah, Arizona and New Mexico—is the second largest indigenous population in the United States and comprises the largest area assigned to a Native American jurisdiction. It is estimated that 168,000 individuals live in Navajo Nation, with 82% still speaking the Navajo language and practicing the traditional Navajo lifestyle (Navajo Nation, 2013a). The 2007 Census of Agriculture reports that 43% of the population lives below the poverty line, with an average personal income of just over \$7,000 and an unemployment rate of 42%. While 56% of the Nation have a high school education, only 7% have a college degree (U.S. Census of Agriculture, 2009). Economic opportunity is at the forefront of the Nation’s agenda, which focuses on current economic sectors include mining, tourism, and agriculture. With three million tourist visits each year, the Navajo Nation has recognized tourism as an economic growth strategy (Navajo Nation, 2002).

Agriculture and livestock ownership are recognized as core foundations of Navajo spirituality and economic prosperity (Navajo Nation, 2013b). The Navajo have a long-standing divine connection with the land, and agriculture is considered a gift bestowed by the Holy One. It is estimated that there are over 18,000 Navajo farmers, with more than half of Arizona farms and ranches owned by members of the Navajo Nation (Yurth, 2009). Navajos generate an estimated \$40.5 million in the informal economy, and much of this undocumented income is derived from family-based agriculture and crafts enterprises (Moore, Benally, and Tuttle, 2008). Of the 12,000 farms and ranches, over 11,000 are family or individually managed, and they average less than nine acres in size (U.S. Census, 2009). Over 57% of these farms earn less than \$1,000 per year, with another 19% earning less than \$2,500 per year (U.S. Census, 2009). The Navajo Nation recognizes that there is an urgent need to implement agricultural programs, policies, regulations, and conservation programs to revitalize their economy for self-sufficiency (Navajo Nation, 2002).

In recent years, Native Americans communities in Arizona, New Mexico, and Utah have increasingly sought to revive traditional agrarian lifestyles to strengthen the ties of younger Native Americans to their heritage, culture, and religion. The resurgent interest in small-scale crop and livestock operations on reservations is also driven by the desire for healthier foods and the chance to share in the economic opportunities being created by the nation’s growing “local food” movement. Native Americans were the nation’s first agriculturalists, and their knowledge and practices over time have contributed to the success of the U.S. food and fiber industries (Diné, Inc., 2012). However, physical, cultural, and linguistic isolation has prevented most Native American producers from accessing the wealth of production, marketing, management, and financing information and services available to most producers. Failure to access and use these resources is impeding the efforts of Native American producers to benefit from today’s emerging market opportunities for their crops and animals (Diné, Inc., 2012).

American Indian farmers and ranchers provide an important economic base for rural areas in the Southwest. Sustaining agricultural production (e.g., crops, food, livestock) on tribal lands will become progressively more challenging in the future due to decreased water availability, extended droughts, changes in precipitation amounts and timing, surface water availability, and declining groundwater supplies. Close cultural and economic ties to natural resources, geographic remoteness, and economic challenges have led some to characterize American Indian reservations as some of the most vulnerable populations to climate change impacts (U.S. Global Climate Change Research Program, 2014).

For example, Patrick (2013) conducted focus groups with over 200 Navajo farmers and ranchers from 20 chapter houses in Arizona, New Mexico, and Utah. He identified several recurring challenges facing producers across the Navajo Nation, including limited farming opportunities and low crop yields due to water shortages stemming from enduring droughts and inadequate water storage and distribution infrastructure; soil erosion and poor soil quality due to open ranges, lack of fencing, overgrazing, and depleted organic material; lack of knowledge of modern crop production and risk management practices, limited access to equipment and technical assistance, and lack of knowledge of market and sales opportunities. Livestock (e.g., cattle, sheep, and goat) production and market and sales opportunities are also limited by the poor quality of the animals, again due to lack of knowledge of modern production and risk management practices (Patrick, 2013).

Project Overview

This project seeks to investigate the tourism destination image of Southwest Indian Country and traveler motivations and needs related to food and agritourism; examine the production, distribution, and marketing needs of tribal agricultural producers and small food processors interested in entering agricultural and food tourism; evaluate various models for incorporating food/agritourism into the marketing portfolio of agricultural and food processing operations in Southwest Indian Country; and disseminate study results and information to agricultural producers, food processors, tourism enterprises, and policy makers in Southwest Indian County.

Tourism is vital to economic expansion in Southwest Indian Country. The area is home to a dozen national monuments, tribal parks, and historic sites that draw over 600,000 visitors each year (Cothran, Combrink, and Bradford, 2012). In its Comprehensive Economic Development strategy, the Navajo nation recognized that “Manufacturing and Agriculture are normally considered to be the leading ‘Basic Industries.’ Here, on the Navajo Nation, tourism can be added to the list” (Navajo Nation, 2002, p. 11). In 2011, a study found that the \$112.8 million in tourism spending on Navajo Nation generated a total economic impact (including indirect and induced impacts) of \$143.7 million and supported 1,788 full-time-equivalent jobs (Cothran, Combrink, and Bradford, 2012).

The tourism industry is subject to high economic leakages when nonlocal corporate ownership controls the majority of tourism business (Telfer and Wall, 2000). Slee, Farr, and Snowdon (1997) argue that local food can greatly enhance the economic impact of tourism, leaving a larger percentage of tourism revenue in the local economy. The Navajo Economic Development

Plan (Navajo Nation, 2002) recognizes that “tourism development stands a very good chance of reducing unemployment here. People from all around the world already come to this region. The Nation just has to do a better job of capturing the tourist dollars” (p. 45). This project proposes to increase those indirect effects of tourism by incorporating local food products into the tourism value chain to create additional employment and job opportunities for all tribal members across the region.

Agritourism is a concept that has gained significant attention in recent academic literature. It is recognized as a vehicle that can enhance a destination’s tourism offerings and create backward linkages that generates additional economic opportunities for local residents in tourism destinations (Telfer and Wall, 2000). Especially in areas where farming and food production constitutes a large economic sector, agritourism provides an avenue to promote and distribute local agricultural production while simultaneously providing tourists with a way to explore unfamiliar cultures (Everett and Aitchison, 2008).

According to the Navajo Nation Traditional Agriculture Outreach (Navajo Nation, 2013b), adding value to agricultural products is a priority. Arizona, New Mexico, and Utah are among the over 30 states that have enacted Cottage Food Rules, allowing specific types of nonhazardous foods to be produced in inspected home kitchens. No such rules currently exist among the tribal governments, possibly precluding those located within the reservations from cottage production. Cottage food production would create opportunities for small farms, especially important given the scarcity of restaurants and certified kitchens on the reservations. Familiarizing these residents with current state regulations would allow them to organize and petition their tribal governments to adopt similar regulations if needed.

The advantages of food and agritourism include increased economic opportunity for local farmers in tourism destinations and the enhancement of the visitor experience in relation to the consumption of local food products, recipes, and rural spaces as an experiential form of cultural expression (see Table 1 for overview of activities and products). Agritourism is important in strengthening a region’s identity, sustaining cultural heritage, and supporting a region’s economic and socio-cultural foundation (Everett and Aitchison, 2008). Therefore, community identity and cultural distinctiveness can be expressed through agritourism whilst providing an avenue for economic development (Rusher, 2003). Due to the different attributes of the tourism and agricultural sectors in the economy, many communities have struggled to provide successful best practices that can be easily accessible to small and medium-sized businesses in each sector (Slocum and Everett, 2010).

Project Outcomes and Impacts

Project outcomes are provided in Table 2. Short-term impacts include increased awareness, knowledge, and changes in attitudes related to the capacity and skills of tribal government officials and American Indian farmers and ranchers. Increased knowledge will strengthen the capacity of tribal nations to diversify and establish food and agritourism partnerships, to react successfully to market changes, and to absorb climate change stresses, thus maintaining function of agricultural land and customs.

Table 1. Food and Agritourism Products and Activities.

Agritourism	Farm stays	Farm activities (hay rides, corn mazes)	Pick-your-own	Farm stands	Fishing and hunting
Buildings or Structures	Food processing facilities	Wineries and breweries	Farmers' markets	Food stores	Food- related museums
Consumer Shows and Festivals	Food and drink shows	Cooking demonstrations	Food festivals	Beer and wine festivals	Harvest festival
Consumption	Dining at restaurants	Picnics utilizing locally-grown products	Purchasing retail food/beverages	Tasting local recipes	Food-based souvenirs
Touring	Wine regions/routes	Agricultural regions	City food districts	Food routes	Gourmet trails
Land uses	Farms	Orchards	Vineyards	Urban restaurant districts	
Organizational	Restaurant classification or certification systems	Food/wine classification systems (organic, local)	Associations (e.g. Slow Food)		
Educational	Cooking schools	Wine tasting	Visiting wineries	Food and beverage magazines	

Notes: Adapted from Everett and Slocum (2013).

Medium-term impacts will identify changes in behaviors of these individuals to coalesce around achieved knowledge gains and proactively plan strategies and policies. Behavioral changes may include, for example, tribal members developing reservation-wide plans for sustainable agriculture that focus on establishing tourism and food/agritourism partnerships and supply chains. They may also include increased and improved use of existing USDA agricultural assistance programs to implement agritourism activities on reservation lands. Long-term impacts will include documented plans and policies that specifically address sustainable agriculture and economic development actions on reservation lands. Targeted impacts will lead to long-term change in economic, social, and environmental conditions on the reservation.

To measure short-, medium-, and long-term impacts, primary and secondary data will be collected prior to, during, and immediately following the project to provide baseline and subsequent data points to monitor targeted changes through the project life. Additionally, data will be collected 12 months following project completion to provide a retrospective evaluation of cumulative project impacts.

Table 2. Project Outcomes/Impacts (Knowledge, Actions, and Conditions).

<p>Knowledge Occurs when there is a change in knowledge and/or attitude</p>	<p>Actions Occur when there is a change in behavior or the participants act upon what they have learned</p>	<p>Conditions Occur when economic, environmental, or social conditions improve due to actions taken by the participant as a result of their participation</p>
<ul style="list-style-type: none"> • Increase producer understanding of tourist preferences for food tourism & agritourism • Increase producer knowledge of tourism outlets & distribution options • Increase producer knowledge of cottage food production & distribution • Increase producer awareness of cultural foods & production methods • Increase producer ability to evaluate the economic feasibility of food and agritourism products/enterprises • Increase producer ability to diversify & adapt to market & climate changes 	<ul style="list-style-type: none"> • Tribal producers investigate diversification opportunities • -Tribal agriculture & food producers create new products or services for tourists/visitors • Tribal communities initiate tourism planning & partnership development • Establishment of tourism & food/agritourism partnerships & supply chains • - Ongoing education, information sharing, & activities involving project partners & USDA agencies to enhance project impacts 	<ul style="list-style-type: none"> • Sustainable tribal agricultural operations • Improved tribal economic development & business opportunities • Improved partnerships with tribal & non-tribal tourism/food operations • Improved social, environmental, & economic conditions on the reservations • -Sustained tribal traditions & culture • -Enhanced partnerships with 1994 and 1862 college, Extension, & USDA agencies • -Resilient & thriving tribal communities

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Determinants of the Argentinean Wine Price

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Abstract

Argentina is among the largest players in the New World wine market. The aim of this study is to identify the determinants of Argentinean wine prices in the United States by analyzing data from *Wine Spectator Magazine*. A hedonic model approach was used to explain how variables such as variety, age, geographic origin, quantity supplied, and other special descriptors impact wine prices. Findings indicate that score and age have a positive effect on wine price while number of cases has a negative effect. Malbec and Malbec blends enjoy higher price premiums. Additionally, Achával-Ferrer enjoys higher premiums compared to other wineries.

Keywords: Argentina, hedonic model, origin, price, quantity, wine

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Introduction

Fundamental changes have shaped the global pattern of wine production in the last few decades. The most notable changes have been the emergence of New World wine producers, an increase in per capita consumption of wine, and changes in consumer preferences (Aleixandre et al., 2016; Artopoulos et al., 2013).

Argentina, a traditional wine-consuming country, is among the largest players in the New World wine market (Hussain, Cholette, and Castaldi., 2008; Khachatryan, Schuele, and Khachatryan, 2009). Prior to the 1980s, most Argentinean wine was destined for the domestic market, primarily due to its low quality. Beginning in 1994, policies were implemented to improve the quality of wine production and the wine sector overall (Khachatryan, Schuele, and Khachatryan, 2009). Wine producers started to allocate efforts toward producing high-quality wine to access the international market (Stein, 2008). While initial efforts focused on advertising individual firms, the creation of a “distinctive identity” as a country allowed Argentinian wine to penetrate the international market (Stein, 2008).

In spite of the importance of Argentina’s wine industry, few studies have examined the determinants of Argentinean wine prices in the international market. The aim of this study is to identify the determinants of Argentinean wine prices in the United States by analyzing data from *Wine Spectator Magazine*. A hedonic model approach was used to explain how wine characteristics impact wine prices. Results of this study are expected to contribute to the wine industry by providing quantitative evidence of the implicit prices associated with Argentinean wines’ attributes.

Literature Review

Various factors affect the price consumers pay for a bottle of wine. These factors can be directly associated with the attributes of a wine or with external factors such as consumer knowledge and characteristics or purchase occasion (Neeley, Min, and Kennett-Hensel, 2010). Some studies have focused on examining purchase situation effects in consumer purchase decisions (Martinez-Carrasco et al., 2006; Neeley, Min, and Kennett-Hensel, 2010; Aqueveque, 2006). Other studies have analyzed the implicit price of wine attributes using a hedonic model approach, which makes it possible to identify associated price premiums or discounts (Thrane, 2004).

In a study of domestic and imported wines in the United States, Schamel (2006) found that expert ratings and age were important price determinants, with red wines enjoying larger premiums. Old World wines were also found to enjoy higher regional reputation premiums. Combris et al. (2000) examined the price of Bordeaux wines as a function of objective attributes and sensory variables and found that the price of a wine was related to the attributes included in the label, while the ranking of the wine was associated with its sensory characteristics. The authors proposed that objective label attributes are easily observed by customers and therefore may be better descriptors of wine premiums and discounts than quality attributes. Oczkowski (2001) also found that when reputation and quality attributes are included in the analysis, reputation attributes have a larger and more significant impact than quality attributes.

Carew and Florkowski (2010) evaluated the price of Burgundy wine prices in Canada and found that the Village appellation was significantly correlated with price premiums and discounts and that wine ranks from quality classifications enjoyed higher prices. In their study, vintage was also found to be a significant factor in price determination, although wine age was not significant. Another study by Steiner (2004) also found that red wines enjoyed a premium relative to white wines and that regional appellations were associated with price premiums relative to varietal or table wine appellations.

Almost no study has examined Argentinean wine prices. San Martín et al. (2008) examined the variables affecting the price of a bottle of Argentinean wine in the United States using a hedonic model to examine the effect of sensory quality rating, quantity of cases produced, vintage year, region of origin, producer name, and grape variety on retail prices. Their study identified geographic origin, reputation, quantity of cases, and wine age as important determinants of Argentinian wine prices by using a sample of Argentinean wine from the period between 1977 and 2005 obtained from the database of the digital version of *Wine Spectator Magazine*. This study analyzes data from the same source from 1989 to 2010. The updated dataset may provide new information about the determinants of the prices of wine from Argentina.

Model and Data

A hedonic price function relates the price of a commodity to its various attributes or characteristics (Rosen, 1974). Hedonic models have been widely used to examine the determinants of wine prices around the world (Carew and Florkowski, 2010; Steiner, 2004; Schamel, 2006). This study examines the price of Argentinian wines in the United States as a function of wine attributes using a hedonic price model:

$$(1) \quad \ln Price = \beta_0 + \beta_1 Score + \beta_2 Age + \beta_3 \ln Cases + \beta_4 Region + \beta_5 Subregion + \beta_6 Appellation + \beta_7 Designation + \sum_{k=8}^{15} \beta_k Variety_k + \sum_{j=16}^{25} \beta_j Winery_j + \nu$$

where ν is the error term. The independent variable *Price* represents the price of a bottle of Argentinean wine in the United States. Wine characteristics included for analysis are score, age, number of cases, region, subregion, appellation, designation, variety, and winery. *Score* is a rate from 0 to 100 given to wines by experts during a blind tasting. This variable is related to quality; a higher score reflects higher quality. *Age* is the difference between release year and vintage year. *Cases* represent the quantity of cases of a specific kind of wine produced in a particular year. *Variety* represents grape variety. Eight grape varieties and blends were included: Malbec, Merlot, Chardonnay, Cabernet Sauvignon, Other reds, Other whites, Malbec blends, and Other red blends. *Region* was included to measure the effect of geographic region on price. *Region* was included as a binary variable and assigned a value of 1 if the label indicated any of the following six regions in Argentina: La Pampa, La Rioja, Mendoza, Patagonia, Salta, and San Juan; and 0 otherwise. In addition to region, wine labels could also include *Subregion* information; this is the specific place where the wine was produced or grapes were cultivated (e.g., vineyard). Thus, a binary variable for *Subregion* was included in the model to indicate whether the label included

this information. A binary variable for special wine *Designation* was also included for analysis to determine if designations such as Año Cero, Collectibles, Grand Reserve, Premium, and Selection reported in the label have an impact on wine prices. A binary variable *Appellation* was included to examine whether distinctions or denominations beside the winery name on the wine label affected its price. The variable *Winery* represents the eight Argentinean wineries with the largest number of cases supplied. The major wineries included in the analysis are Achával-Ferrer, Bodega Catena Zapata, Bodega Norton, Dominio del Plata, Familia Zuccardi, Pascual Toso, Trapiche, and Viña Doña Paula. Two categories for “Other” wineries were also included to designate wineries with few cases (Other wineries-Few) and very few cases supplied (Other wineries-Fewer). The data analyzed in this study were obtained from *Wine Spectator Magazine* for the period 1989–2010. Summary statistics of the variables examined are reported in Table 1.

Table 1. Descriptive Statistics of Variables Included in the Hedonic Wine Price Model.

Variable	Mean	Std. Dev.	Min	Max
Inprice	2.76	0.65	1.39	5.16
Score	85.35	4.44	55.00	96.00
Age	2.66	1.11	0.41	11.41
Incases	8.43	1.48	3.91	12.43
Region			0	1
Subregion			0	1
Appellation			0	1
Designation			0	1
Variety: Malbec			0	1
Variety: Cabernet Sauvignon			0	1
Variety: Chardonnay			0	1
Variety: Malbec blends			0	1
Variety: Merlot			0	1
Variety: Other reds			0	1
Variety: Other whites			0	1
Variety: Red blends			0	1
Winery: Achával-Ferrer			0	1
Winery: Bodega Catena Zapata			0	1
Winery: Bodega Norton			0	1
Winery: Dominio del Plata			0	1
Winery: Familia Zuccardi			0	1
Winery: Other wineries- Fewer			0	1
Winery: Other wineries- Few			0	1
Winery: Pascual Toso			0	1
Winery: Trapiche			0	1
Winery: Viña Doña Paula			0	1

Notes: N = 1,807

Results and Discussion

Results of the hedonic model estimated are reported in Table 2. Results indicate that *Age* and *Score* had a statistically significant and positive effect on price. The number of cases was statistically significant and had a negative effect on the price of wine sold in the United States, in

Table 2. Results of the Hedonic Wine Price Model.

Lnprice	Coefficient	Std. Err.	P> t	Impact Dummy Variables (%)
Constant	0.990 ***	(0.344)	0.004	
Score	0.052 ***	(0.003)	0.000	
Age	0.115 ***	(0.011)	0.000	
Lncases	-0.182 ***	(0.007)	0.000	
Region	-0.768 ***	(0.190)	0.000	-53
Subregion	0.090 ***	(0.022)	0.000	9
Appellation	-0.035	(0.023)	0.137	-3
Designation	-0.020	(0.026)	0.444	-2
Variety: Cabernet Sauvignon	-0.104 ***	(0.029)	0.000	-10
Variety: Chardonnay	-0.091 ***	(0.035)	0.009	-9
Variety: Malbec blends	0.179 ***	(0.034)	0.000	20
Variety: Merlot	-0.121 **	(0.049)	0.014	-11
Variety: Other reds	-0.142 ***	(0.036)	0.000	-13
Variety: Other whites	-0.213 ***	(0.039)	0.000	-19
Variety: Red blends	0.196 **	(0.087)	0.025	22
Winery: Bodega Catena Zapata	-0.268 ***	(0.081)	0.001	-23
Winery: Bodega Norton	-0.710 ***	(0.081)	0.000	-51
Winery: Dominio del Plata	-0.676 ***	(0.086)	0.000	-49
Winery: Familia Zuccardi	-0.797 ***	(0.088)	0.000	-55
Winery: Other wineries- Fewer	-0.747 ***	(0.067)	0.000	-53
Winery: Other wineries- Few	-0.573 ***	(0.070)	0.000	-44
Winery: Pascual Toso	-0.709 ***	(0.083)	0.000	-51
Winery: Trapiche	-0.503 ***	(0.083)	0.000	-39
Winery: Viña Doña Paula	-0.893 ***	(0.082)	0.000	-59

Notes: Asymptotic standard errors are reported in parentheses under each coefficient estimate. Double and triple asterisks (**, ***) indicate statistical significance of an explanatory factor or attribute at the 5% and 1% level of significance

accordance with the law of demand and with findings in other studies (e.g., Carew and Florkowski, 2010).

Unlike other studies, wines that specified the region on the label were found to be discounted compared to wines with no region information on the label (Carew and Florkowski, 2010 and San Martin et al. 2008). However, this result may indicate that consumers are interested in buying a bottle of wine from Argentina regardless of the specific Argentinean region the wine comes from. A different result may be expected if a similar study was conducted at a regional level where consumers are more aware of the different wine-producing regions in Argentina. In contrast, wines that specify a *Subregion* enjoy higher prices compared with those that do not

provide this information. This is an unexpected result, given that subregion is more specific than region. However, consumers may associate subregion (e.g., specific vineyard) with wine quality and potentially vineyard reputation. This result may imply that reputation is important to consumers (San Martin et al., 2008).

Results in this study also indicate that having an appellation or distinction on the wine label—other than the brand—has a negative effect on the price of wine. Similarly, designations (e.g., Reserve) have a negative effect on the price. However, those results are not statistically significant. Malbec blends and red blends were found to enjoy larger premiums than other varieties and blends. High-end wines in Argentina are commonly Malbec blends. In addition, our findings indicate that Achával-Ferrer, one of the oldest wineries in Argentina, enjoys higher premiums compared to other wineries.

While some attributes are important in price determination, not all consumers pay the same attention to them. Consumers pay more or less attention to attributes like region, appellation, and even price based on their level of wine involvement (e.g., frequency of purchases). Hollebeek et al. (2007) found that region of origin was more important (and price was less important) for consumers with higher purchasing involvement.

This study has some limitations. First, the dataset is not representative of all the Argentinian wines sold in the United States, thus caution should be exercised when extrapolating results. In addition, the hedonic model has limitations as it does not examine consumer preferences and purchase situation, which can have a large effect on consumer purchases (Thrane, 2004; Xue, 2008). Future studies may be improved by using scanned data, which may help to better identify consumers of Argentinean wines and what they look for in Argentinean wines.

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Assessing Market Channel Performance for Colorado Fruit and Vegetable Producers

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Abstract

Though data have long been collected to educate producers about how to improve farm performance through benchmarking, this information is almost exclusively available by commodity and not by market channel. Further, there is evidence that the small and mid-scale producers that dominate these markets often do not keep detailed financial records, despite clear evidence that doing so improves the viability of operations. This paper uses a Colorado case study of the Market Channel Assessment Tool (MCAT) to determine recruitment methods that maximize participation among small and mid-scale producers. We find there are four best practices associated with successful farmer recruitment.

Keywords: farmer recruitment, local food markets, market performance, primary data collection

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Introduction

There is growing evidence of the differential performance of food marketing channels (e.g., LeRoux et al., 2010; Hardesty and Leff, 2010), with most transactions involving intermediary businesses (e.g., aggregators, distributors, wholesalers) (Low et. al, 2015). The U.S. Department of Agriculture (USDA) and a number of state agencies have implemented a wide array of policies and programs to support new market channels. A major goal of these programs is improving farm and ranch viability, with emphasis on small and mid-scale, young, and beginning operators (U.S. Department of Agriculture, 2016). Critics note, however, that programs are promoted without adequately evaluating how local and regional foods affect market performance and the welfare of key stakeholders.

Though the USDA, Farm Credit, and several land grant universities have long collected data to educate producers about how to improve farm performance through benchmarking, this information is almost exclusively available by commodity and not by market channel. Further, there is evidence that the small and mid-scale producers that dominate these local and direct food markets (in terms of farm numbers) often do not keep detailed financial records, despite clear evidence that doing so improves the viability of operations (e.g., Muhammad et al. 2004).

In 2008, Cornell University developed a Market Channel Assessment Tool (MCAT), which utilizes recordkeeping techniques and data analysis to aid individual producers with marketing decisions. It also allows for aggregation of industry-level data of specialty crop growers to establish state-wide or regional benchmarks by market channel. The MCAT uses a “representative week” of harvest and sales during peak production to generate a snapshot of the farm’s whole season. For one week, each worker records the time they spend harvesting, processing, transporting, and selling each crop for each market channel (Figure 1). Information on pay rates, the distance to each market, and the farm owner’s perception of risk and lifestyle preferences is also compiled.

Anonymous Farm		WORKER NAME:		DATE:	
TIME SPENT (to nearest 5 min):			PRODUCT(S):		
ACTIVITY: (Each log sheet should cover one activity at a time)					
<input type="radio"/> Harvest e.g., create pick list, organize staff for harvest, harvest		<input type="radio"/> Process/Pack e.g., cull, grade, sort, wash, bunch, bag, package		<input type="radio"/> Travel/Delivery e.g., load/unload truck, travel to/from market, deliveries	
				<input type="radio"/> Sales/Bookkeeping e.g., bookkeeping, billing, sales calls, sales time, set up/take down	
<input type="radio"/> Other (please describe):					
PRODUCT DESTINATION: (Check all that apply)					
<input type="radio"/> Farmers Mkt 1		<input type="radio"/> Farmers Mkt 2		<input type="radio"/> Distributor	
<input type="radio"/> Restaurant 1		<input type="radio"/> Restaurant 2		<input type="radio"/> Farm 2 School	
				<input type="radio"/> Other _____	
NOTES (e.g., case split out -6 cases of cukes harvested, 2 for FM 4 for restaurants, including names of markets):					

Figure 1. Example Labor Log.

Using the week of records and the supplemental information, a MCAT report is developed for each farm. The report is designed to show producers how their marketing labor is used by activity, market channel, and worker to help them identify and expand efficiencies or identify and correct bottlenecks. One of the first ways to identify inefficiencies is to compare a channel's percentage of sales relative to its percentage of total marketing labor used (Figure 2). Finally, the report ranks the market channel portfolio using five criteria: sales volume, labor requirements, profit margin, financial risk, and lifestyle preferences (Figure 3).

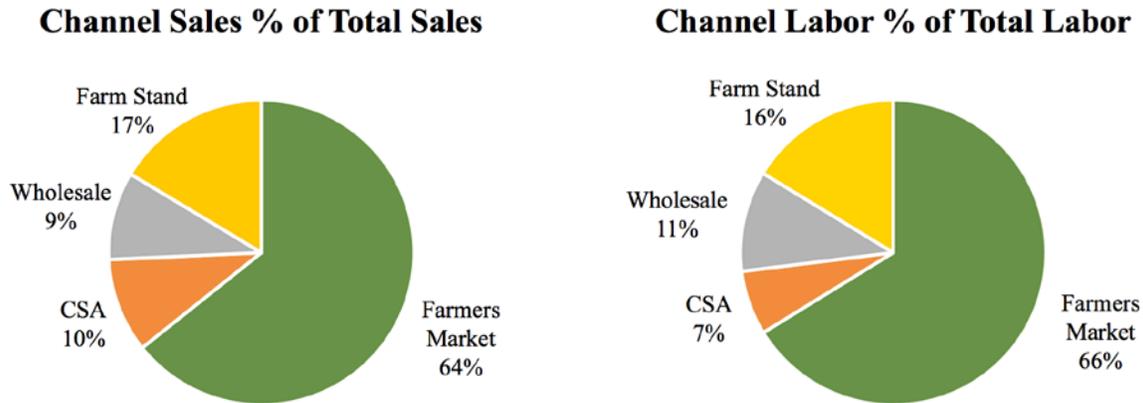


Figure 2. Sales versus Labor Percentages.

Market Channel	Sales Volume Rank	Labor Hours Rank	Profit Margin Rank	Financial Risk Rank	Lifestyle Rank	Final Scores	
						Unweighted	Weighted
Farmers Market	1.00	4.00	2.16	1.00	4.00	2.4	2.4
CSA	3.96	1.00	1.00	1.00	1.00	1.6	2.2
Wholesale	4.00	1.19	4.00	1.00	1.00	2.2	2.7
Farm Stand	3.61	1.48	2.11	1.00	2.00	2.0	2.5
Factor Weighting	0.40	0.20	0.15	0.05	0.20		

Figure 3: Example Market Channel Ranking.

Since Cornell completed its preliminary assessments (Schmit and LeRoux, 2014), researchers from Oregon State University have also utilized the MCAT (Murray and Gwin, 2016). Both studies, however, reported small sample sizes (31 and 6, respectively) due to recruitment challenges. Despite preliminary success, both LeRoux et al. (2010) and Murray and Gwin (2016) found recruitment to be one of the most challenging aspects of implementing the MCAT. The small and mid-scale fruit and vegetable growers that this tool is designed to support are often reticent to participate, primarily because of the added time requirement of recordkeeping. Similarly, a 2013 SARE grant to improve recordkeeping for small-scale specialty crop producers in West Virginia had only two out of the six producers eventually report because the burden of collecting information caused a majority of producers to drop out of the study, despite a \$250 incentive (Teets, 2013).

LeRoux et al. (2010) designed the MCAT to specifically track marketing labor, which is consistently the largest share of total marketing cost. Ironically, reducing labor requirements might increase time available for recordkeeping such as the information this research requires. Accordingly, this paper uses a case study of MCAT application in Colorado to determine recruitment methods that maximize participation among small- and mid-scale producers. We find there are four best practices associated with successful farmer recruitment: (i) build strong relationships with partners; (ii) visit regional farm markets to facilitate producer referrals; (iii) collect data at the farm, supporting farming activities; and (iv) identify incentives of value for participants.

Case Study

In 2016, Colorado State University (CSU) partnered with the Colorado Department of Agriculture (CDA) on a Federal-State Marketing Improvement Program grant, the goal of which was to improve the profitability of fruit and vegetable producers by assessing the market channel performance of non-commodity marketing strategies (e.g., wholesale, farmers' markets, CSA, farm-to-school). Colorado represents an interesting case, as it has experienced greater than average growth in local and regional food markets, despite flatter sales reported in the 2012 Ag Census. Further, opportunities presented by the mayor of Denver's interest in purchasing local food products may create opportunities for local producers if marketing networks can develop viable logistics (Angelo and Goldstein, 2016).

Colorado's fruit and vegetable industry is becoming more diverse in terms of production and marketing (U.S. Department of Agriculture, 2014). Between 2007 and 2012, the number of farms reporting vegetable sales increased from 738 to 780—a 6% increase. Fruits and vegetables represent about 12% of all crop revenues and are produced on a little more than 83,000 acres in 48 counties. Most of Colorado's fruit and vegetable acreage (about 79,000 acres) is targeted at the fresh market sector. In 2012, 2,896 farms included direct sales in their marketing portfolio. The number of farmers' markets increased from 106 in 2009 to 159 in 2013. Additionally, in 2012, 234 farms reported having a CSA marketing arrangement (U.S. Department of Agriculture, 2014).

Between July and October 2016, CSU Extension staff and students surveyed 20 fruit and vegetable producers in three regions: Montezuma Valley in the southwest (30% of surveyed farms), Uncompahgre Valley in the west (30%), and the Northern Front Range (40%). The farms ranged from 1/10 of an acre to 10 acres with an average of 2.4 acres in production. Weekly sales during the week surveyed ranged from under \$400 to over \$20,000, averaging \$1,188 in weekly revenue. Farms surveyed produced 2 to 45 different crops with an average of 27 crops. Ninety percent of farms produced vegetables, 70% produced fruit, and 60% produced both fruit and vegetables. Table 1 shows the breakdown of market channel categories used; only one farm did no direct marketing.

Table 1. Market Channel Utilization by MCAT Participants.

Market Channel Type	Farmers Market	CSA	Farm-Stand	Restaurant Sales	Retailer Sales	Distributor	Other
Percentage of Respondents	75%	45%	70%	50%	30%	50%	25%

Recruitment Procedure

In July 2016, Cornell University's Matt LeRoux spent one week in Colorado, training the team, producing a webinar for Colorado Fruit and Vegetable Growers Association (CFVGA) members, and conducting practice MCATs with select growers. Based on this interaction as well as feedback from farmers around the state, we find there are four best practices to facilitate recruitment: (i) build strong relationships; (ii) visit farmers' markets to gain producer referrals; (iii) collect data at the farm, supporting farming activities; and (iv) offer producer-valued incentives for participation.

At the project's onset, the Colorado State University team worked hard to ensure buy-in from key partners throughout the state who have strong relationships with fruit and vegetable growers, including the CDA (Markets Division), the CFVGA, the CSU Extension (Food Systems Team), the Colorado Farmers' Market Association, the Northern Colorado Food Cluster, and the Building Farmers in the West program. As part of this process, we advertised the project in each of our partners' newsletters and, in some cases, asked for nominations.

These strong relationships with project partners played a vital role as enumerators went into the field in 2016. Although the geographic diversity accurately represents the state as a whole, it also posed a set of challenges, most notably that the CSU enumerators were over 300 miles from home and lacked relationships with regional growers. Support from our partners, notably CSU Extension field offices, was pivotal in establishing credibility, trust, and social capital between producers and enumerators. The first week in a new region, enumerators met with local CSU extension and research centers, visited farmers' markets, assisted with food distributor deliveries (to gain access to their vendors), and met with restaurants and grocery stores that were buying locally-grown produce. After explaining the MCAT as well as benefits to producers, these networked professionals were willing to make introductions. The referrals helped to secure farm visits.

Though the referrals from buyers were helpful, it was notably more difficult to get the requisite time and attention from producers during the peak season to fully explain the process of data collection. Enumerators can address this issue by working alongside producers with harvesting, weeding, or other farm functions. Though this requires substantial effort and additional time on the part of the enumerator (a 20–30 minute interview often took multiple hours), it ensures producer trust and gives them time to converse, ask questions, and fully understand the data collection process. The trust is important given that producers are asked to share their sales information and pay rates. Though these producers were often hesitant to release information at first, after hours of working alongside them and explaining how the numbers would be used,

enumerators reported a higher likelihood of establishing the necessary trust to get the information needed—and sometimes get referrals for more farms in the community.

Another important aspect of successful recruitment involves identifying appropriate producer incentives. Participation in the MCAT study has many direct producer benefits. The most tangible, recommended by LeRoux et al. (2010), includes \$100 cash upon completion. However, producers noted several additional incentives that were valuable, including a personalized MCAT report, economic advising from a university-based agricultural economist, and the opportunity to be the first group of farmers in the state with the ability to track their marketing performance relative to statewide benchmarks.

Of note are some trends in how the characteristics of a farm or producer responded to these incentives. In Colorado, farms in their first year or two of production were still determining the effectiveness of different market channels. These producers seemed much more interested in participating to improve their business planning and were especially responsive to financial incentives. Farms in operation for 3–5 years employed varying levels of recordkeeping but agreed almost unanimously that they needed better records. These farms were the most cooperative about keeping records because having a researcher compile and report the results was very appealing. More established farms were less interested because of their experience with their own production. However, they were very responsive to having a customized report and perhaps most motivated by the opportunity to receive consulting and to see how their marketing benchmarks compared to state averages.

Next Steps

In addition to improved knowledge of farm performance for participating growers, CSU, CSU Extension, and the CDA will begin to use this preliminary data collected to develop benchmarking reports for fruit and vegetable growers who participate in these alternative markets. These benchmarking reports will allow producers to compare their businesses to an average of other producers, facilitating their ability to analyze their financial situation, set future goals and make sound financial and investment decisions.

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Extension Avenue Use Among Small-Scale Goat Producers in Missouri and Arkansas

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Abstract

This study uses multivariate statistical procedures to explore extension avenues used by goat producers in Missouri and Arkansas. Use of an avenue is influenced by a number of factors including nature of issue, time, and scale of operation. The results show that professional avenues, which are deeply rooted in tradition and history, are the main outreach avenues, but the

Internet is emerging as an important and increasingly utilized avenue by many goat producers. Demonstrational, family based, and specific client need based avenues are used less frequently.

Keywords: extension utilization, goat production, small-scale producers

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Introduction

Cooperative extension has had wide-ranging impacts on agricultural production in the United States and globally (Hoag, 2005). While a significant proportion of U.S. farms (71%) have annual gross sales of less than \$25,000, there is no evidence to suggest that these farms get more of extension's resources and support. A number of researchers (e.g., Jones and Garforth, 1998) have recognized the role of agricultural extension in delivering information and advice to the farming community.

Extensive literature exists on cooperative extension efforts on knowledge transference pertaining to large-scale producers of crop and livestock, particularly beef and dairy (Trauger et al., 2008). However, a sharp contrast emerges when technology transfer to small-scale producers, particularly small ruminant producers, is considered. Small-scale producers, particularly those producing sheep and goats, are a special clientele with unique needs compared to more established crop farmers (Muhammad, Isikhuemhen, Basarir, 2009). To date, programming from research stations to extension frontline personnel and ultimately to farmers has not addressed issues specific to small-scale farmers. Little attention has been paid to changing economic and technological developments that increase uncertainty and risk in small-scale operations.

This research focuses primarily on the utilization of outreach avenues for veterinary services, a source of management information and technology transfer for goat producers. Extension services use a number of techniques and methods to deliver programming, including individual or group visits, organized meetings, use of model farmers, demonstration plots, information and communication technologies, and farmer field days schools (Chase, Ely, and Hutjens, 2006). Extension and outreach are more amenable to established crop and livestock farmers, and it is generally assumed that the plurality of alternative service delivery options offers opportunity to reach various types of farmers with different needs in various settings, with the understanding that small-scale producers have special issues and concerns that sometimes render the modes of delivery out of reach. In an effort to provide greater opportunity for identifying effective mechanisms for ensuring that such farmers acquire the information they need to enhance their businesses, we attempt in this research to explore what adaptations, if any, to the current delivery mechanisms would enhance delivery efficiency and create user-friendly programming that is accessible to those—such as small-scale producers—endowed with fewer resources and greater time and labor constraints.

Goat production is one of the fastest growing agricultural production systems in the United States today (Okpebholo and Kahan, 2007). To sustain this growth and tap into the growing demand, farmer-friendly outreach efforts are necessary to bridge the information gap in production, processing, and marketing. In so doing, it is hoped farmers will quickly get solutions to issues that impede the smooth running of their enterprises. While there are well-established mechanisms for effective control of internal parasites, issues on marketing strategies for goat products, inadequate expert information, and capital availability continue to hinder the full potential of the goat industry.

The research question therefore is how effective and responsive are the outreach avenues with respect to this segment of producers. What factors influence outreach avenue use? The study's main objective is to identify extension/outreach avenues targeting small-scale producers and their efficacy in enhancing goat production. Specifically, we (i) identify and estimate the relative importance of the factors underlying use of outreach avenues; (ii) develop a profile of each outreach avenue; and (iii) explore the relationship between producers' socioeconomic characteristics and use of different outreach avenues.

The study uses survey data from Missouri and Arkansas collected in 2013. The information generated by this study is useful not only to farmers but also to policymakers to improve effectiveness of the relationship between outreach providers and farmers. It may also contribute to the development of efficient and effective outreach strategies for the goat industry in particular and other small ruminants in general. A unique contribution of this study is a better understanding of what underlies successful outreach/extension efforts for small ruminant producers.

Methods

The survey instrument was developed by researchers at Missouri State University with collaborating investigators from Lincoln University and Arkansas State at Monticello. Before implementation, the survey instrument benefited from expert evaluation (from veterinarians, university professors, extension personnel, and experienced goat producers). The survey elicited information on personal demographics, farm characteristics, farm management protocols, product marketing, and information sources.

The target population was dairy and meat goat producers in Missouri and Arkansas. Producer addresses and emails were obtained from national registry organizations and university extension services mailing lists. Duplication between species and resources was removed to prevent sending more than one survey to any one operation. A total of 1,087 producers made up the final email list. Most producers were sent the survey in November 2013 via a Survey Monkey online questionnaire, and printed copies were prepared and mailed by Missouri State University to 37 producers with limited Internet access. Printed copies were mailed with a cover letter and postage paid return envelope enclosed. A reminder email was sent to non-respondents two weeks later. The survey required approximately twenty minutes of respondents' time. Approximately 73% of the email list consisted of Missouri producers and 27% were Arkansas producers. Fifteen surveys were returned by producers who no longer owned goats, three surveys were returned by

producers outside of the target area, and 98 surveys were deemed undeliverable by Survey Monkey. Of the web-based and mailed surveys, 206 were viable and are used in analysis, for a response rate of 21.2%.

The study analysis is based on responses to 21 questions relating to extension/outreach avenues. Respondents were asked to rate on a Likert scale of 1 (never) to 4 (often) how often they received veterinary services, how often they used sources of information for production management or animal husbandry, and how often they used particular sources when seeking out new technologies on goat production. A score of 2 indicated an indifferent or neutral response. Each respondent answered a set of questions relating to the three areas:

1. *“How often do you receive the following services from your veterinarian? (e.g., care for sick animals, veterinary supplies, etc.)*
2. *How often do you use the following sources to get information about your goat health and production management? (e.g., university extension system, family, friends, Internet, etc.)*
3. *How often do you consult the following sources to learn about new goat practices? (e.g., university extension system, family, friends, Internet, etc.)*

Principal components factor analysis (PCA) was used to reduce the 21 questions exploring outreach avenues with respect to producer’s use of veterinary services, information sources for current animal health and production management, and information sources for new goat production technologies to a smaller set of factors. A standard latent root equal to 1 and a Scree test were used to establish how many factors to retain, followed by a confirmatory analysis to ensure internal reliability of the factors. Finally, a two-stage cluster analysis was employed to identify clusters of outreach avenues serving the particular aspect of a goat production enterprise.

ANOVA tests were applied to examine inter-cluster heterogeneity. The selection of the analytical methods is based on the variable measures, all of which were ordinal; however, in the presence of continuous and ordinal measures, alternative methods are called for. All the 21 variables used in the analysis were ordinal measures, and factor analysis was the logical analytical method to identify underlying factors that explain the pattern of correlations within a set of observed variables. The factor analysis was followed by clustering, the strength of which strength lies in its ability to discover hidden patterns.

Results and Implications

Results indicate that outreach avenues used for services, sources of information on production management, and sources of information on new technology among goat producers falls into six categories, including traditional approaches relying on land grant university cooperative extension and using the Internet to transfer and share information. Goat farmers use specialized or need-based approaches when they are dealing with health and reproductive issues. As in beef, dairy, and crop farming, goat famers obtain information from other famers (friends and family). Additionally, they use demonstration-based approaches through farm visits and on-farm

demonstrations on certain aspects of goat production. Though the frequency was below average, goat farmers used management approaches on issues relating to kid disbudding, tattooing, recordkeeping and nutrition education. The results of cluster analysis suggest that different groups of goat producers place varying importance on different outreach delivery mechanisms. Some expressed strong sentiments about using the Internet as their tool for getting information, resolving animal health issues, or obtaining information about new technologies on goat production. Others were more attuned to using traditional approaches, while some preferred to resolve their farming issues with the services of a veterinarian. Significant results rejecting the null hypothesis were those relating to enterprise type, education, income, and farming experience. On the other hand, there was failure to reject the null in relating the cluster/famer groupings on basis of age, gender, and state.

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Determinants of Food Insecurity in Huntsville, Alabama, Metropolitan Area

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Abstract

This paper attempts to examine the food insecurity situation and identify the determinants of food insecurity in the Huntsville, Alabama, metropolitan statistical area. The primary data source was the household food security and socioeconomic survey administered to 700 households in August and September 2016. The main tools of analysis include descriptive statistics and a tobit regression model. The tobit model result revealed that household income; age, gender, and education of household head; and presence of children in the household were significant determinants of food insecurity in the study area.

Keywords: food desert, food insecurity, tobit model, urban households

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Introduction

Food security, defined by Anderson (1990), is defined as “access by all people at all times to enough food for an active, healthy life and includes at a minimum: (a) the ready availability of nutritionally adequate and safe foods, and (b) the assured ability to acquire acceptable foods in socially acceptable ways (e.g., without resorting to emergency food supplies, scavenging, stealing, or other coping strategies)” (p. 1560). Food insecurity exists when such foods are unavailable or a person’s ability to acquire them is limited. This paper investigates the determinants of food insecurity among low-income households in the Huntsville Metropolitan Statistical Area (HMSA). Located in north Alabama (Madison and Limestone Counties), the HMSA is one of the fastest growing and second largest urban areas in Alabama. Like other states in the southern United States, Alabama’s household food insecurity rate is above the national average. Recent data (average of 2013–2015) from the U.S. Department of Agriculture’s Economic Research Service (USDA/ERS) show that the prevalence of household food insecurity in Alabama is 17.6% compared to the national average rate of 13.7% (Coleman-Jensen et al., 2016). Local data also paint a similarly dismal picture, with household food insecurity rates of 15.5% in Madison County, 13.5% in Limestone County, and 16.1% in Congressional District 5 (Feeding America, 2014).

The paper adds to existing studies that have addressed food insecurity and hunger in urban areas in the United States. While most of these studies have focused on major urban areas, little is known about the determinants of food insecurity in relatively small and/or emerging urban areas, especially in the South, making it difficult for city authorities and local governments to broaden their strategies to quantify the challenges and proactively plan to reduce the prevalence of food insecurity.

Methodology

Data Sources and Sampling Technique

Primary data were collected through a household food security and socioeconomic telephone survey conducted between August 27 and September 17, 2016. The questionnaire was administered in 14 low-income neighborhoods located in a cluster of census tracts defined as a food desert.¹ These neighborhoods were chosen because they are typical in many ways of inner city communities in the southern United States. Their populations include a large proportion of minorities and female-headed households with incomes below the poverty line and high unemployment and crime rates, among other disparities.

¹ Low-income neighborhoods include Chelsea, West Huntsville, Huntsville Park, Brandontown, Oakwood, Rutledge Heights, Lakewood, Vaughn Corners, Rideout Village, Terry Heights, Brookhurst, Meadow Hills, Cavalry Hill, and Edmonton Heights. Food deserts are defined as parts of the country, usually found in impoverished areas, devoid of fresh fruits, vegetables, and other healthful whole foods. This is largely due to a lack of grocery stores, farmers’ markets, and healthy food providers. (American Nutrition Association, 2010).

Within these neighborhoods, a three-stage cluster random sampling with probability proportion to size sampling technique was used to select a sample of 700 respondents. After cleaning the data for incomplete responses, the analyzed sample was reduced to 679 respondents. The household food security section of the survey adopted the standard six-item subset of the USDA/ERS core-module indicator questions (Bickel et al., 2000). The advantage of adopting the six-item subset is that the survey findings can be compared directly with national and state-level standard benchmark statistics published annually by the USDA and with many national or regional tabulations of population subgroups available in the USDA reports.

Data Analysis

The responses to the six items on the USDA/ERS Household Food Security survey were scored for each respondent and summed to generate each respondent’s raw score (Figure 1). The raw scores (ranging from 0 to 6) were used to group the sample into food insecure and food secure households. Having identified the food insecure and food secure households, the next step was to examine the socioeconomic characteristics expected to be correlated with food insecurity.

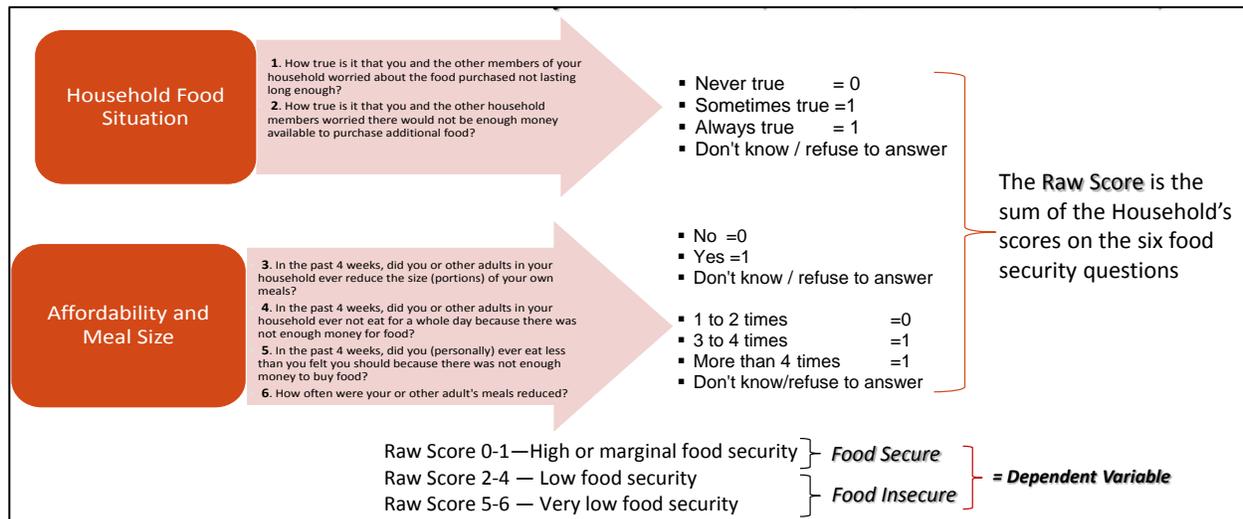


Figure 1. U.S. Household Food Security Questions (USDA/ERS Six-Item Module)

Source: Generated by author using information from Bickel et al., (2000).

To assess the factors that are expected to influence food security status among the food insecure part of the sampled population, a tobit regression model was adopted and estimated. The standard Tobit model can be defined as (Amemiya, 1984)

$$(1) \quad y^* = \beta X_i + e_i,$$

where

y^* = A latent variable that is unobserved for values <0 and >1 .

X_i = An (nxk) matrix of the explanatory variables that includes factors affecting nutritional status among children.

β_i = A (kx1) vector of unknown parameters.

e_i = An independent normally distributed error term with zero mean and constant variance (σ^2); that is, $e_i \sim N(0, \sigma^2 I)$ and $I = 1, 2 \dots n$, where n is number of observations.

Denoting y_i , the raw score of food insecurity status of the household, as the observed dependent (censored) variable, then

$$(2) \quad y_i = \begin{cases} y_i & \text{if } y_i \leq 0 \\ y^* & \text{if } 0 < y_i^* < 1 \\ 1 & \text{if } y^* \geq 1 \end{cases}$$

Using the two-limit tobit, the food insecurity score was regressed against proxies for the explanatory variables hypothesized to influence the food security status of the household. The disturbance term of the tobit model is a function of the independent variables; therefore, attempting to estimate the functional form using the Ordinary Least Squares (OLS) method will produce biased and inconsistent estimates. If the unobserved y_i^* is assumed to be normally distributed, the estimation of the tobit model can be performed using the Maximum Likelihood Estimation (MLE) method. The likelihood function is expressed as

$$(3) \quad L = \prod_{y_i^* > T} (1 - G_i) \prod_{y_i^* \leq T} \frac{1}{2\pi\sigma^2} e^{-\frac{1}{2\sigma^2}(y_i - \beta X_i)^2}$$

where G_i = the distribution function of T_i .

The resultant coefficients of the likelihood function are consistent, asymptotically efficient, unbiased, and normally distributed. Additionally, marginal effects were estimated to quantify the effects of each variables in the model. The actual estimated model was specified as

$$(4) \quad INSECURITY = \beta_0 + \beta_1 * AGE + \beta_2 * ETHNICITY + \beta_3 * GENDER + \beta_4 * EDUCA + \beta_5 * INCOME4 + \beta_6 * MARITAL4 + \beta_7 * CHILDREEN + \beta_8 * HHSIZE + e$$

Descriptions of the variables in equation 4 are provided in Table 1.

Results

Descriptive Analysis

The overall results (Table 1) show significant statistical differences between food secure and food insecure households. For example, age of the household head is as an important variable with an impact on household food security status. The mean difference test revealed significant differences in mean age of household head between the two samples. Previous studies have concluded that households with larger family size were more likely to be at risk of becoming food insecure. The survey result indicated some significant differences in mean family size between food secured and food insecure households. We found no significant differences between the two samples with regard to marital status (never married), ethnicity (African American), employment status, or income (between \$25,000 and \$40,000).

Table 1. Mean Differences between Food Secure and Insecure Households.

Variable	Description	Total Sample	Mean Difference		<i>p-value</i>
			Food Secure	Food Insecure	
AGE	Age of head of household	49.48	50.74	53.78	0.001
ETHNICITY	African American	0.55	0.53	0.57	0.129
GENDER	Female headed HH	0.76	0.72	0.84	0.000
EDUC1	High school or lower	0.34	0.27	0.47	0.000
EDUC2	Associate degree	0.08	0.05	0.12	0.000
EDUC3	College degree	0.38	0.49	0.31	0.000
EDUC4	Post graduate degree	0.17	0.16	0.09	0.069
MARITAL1	Single (never married)	0.43	0.44	0.47	0.313
MARITAL2	Divorced	0.06	0.05	0.09	0.000
MARITAL3	Separated	0.01	0.02	0.03	0.069
MARITAL4	Married	0.49	0.49	0.41	0.000
INCOME1	Less than \$10k	0.15	0.13	0.29	0.000
INCOME2	Between \$10k - \$25k	0.24	0.29	0.34	0.029
INCOME3	\$25k - \$40k	0.20	0.18	0.19	0.742
INCOME4	More than \$40k	0.32	0.30	0.13	0.000
CHILDREN	Household with children	0.10	0.06	0.20	0.000
HHSIZE	Household size	2.23	2.06	2.40	0.000
COMM	Food bank, Comm. garden	0.47	0.23	1.52	0.000
GOVT	SNAP and WIC assistance	0.15	0.06	0.45	0.000
UNEMPLOY	Unemployed	0.65	0.62	0.59	0.405

Econometric Model Analysis

Tobit regression was employed to examine the hypothesized determinants of household food insecurity. Before fitting the model, it was important to check whether serious problems of multicollinearity and association exist among explanatory variables. For this purpose, Variance Inflation Factor and contingency coefficient tests were used for the continuous and discrete variables, respectively. The choice of the final variables in equation 3 were best on the aforementioned analyses. The problem of heteroskedasticity was also checked using a Breuch-Bagan test. Table 2 presents the results showing that the model fitted the data reasonably. As specified, the model explained significant non-zero variations in factors influencing food insecurity among the respondents. The estimated coefficient of determination (Pseudo R-square) was fairly high, suggesting that 81% of the variation in food insecurity is explained by variations in the specified explanatory variables.

The estimated results show that educational status of household head is statistically significant at the 5% level and carries a negative sign. This result implies that households with household heads with relatively better education are more likely to be food secure than those headed by uneducated (illiterate) household heads. This finding is not surprising given that education is related to food security through proxies such as employment, household income, and decision making. These proxies have effects on the access, utilization, and availability dimensions of food security in an urban setting. Estimation of the marginal effects revealed that holding other variables constant, food insecurity decreases by a factor of 3.7% as education increases by one level.

Table 2. Estimated Tobit Model Results.

	Coefficient	Std. Error	z-Statistic	Prob.	Marginal Effects
	Primary Index Equation for Model				$\partial E(y/x)/\partial x_k$
CONSTANT	-1.470	0.314	-4.683	0.000	
AGE	0.010**	0.004	2.248	0.025	0.0234**
ETHNICITY	-0.011	0.143	-0.074	0.941	-0.0006
GENDER	0.317*	0.184	1.722	0.085	0.0415*
EDUCATION	-0.262*	0.151	-1.742	0.082	-0.0365*
INCOME	-0.988***	0.195	-5.066	0.000	-0.1236***
MARITAL4	-0.117	0.161	-0.731	0.465	-0.0175
CHILDREN	0.695***	0.218	3.190	0.001	0.1246***
HHSIZE	0.016	0.061	0.262	0.793	0.0009
Observations	679				
Psedo R ²	0.813				
Log likelihood	-438.413				
Left censored observations at ratio <=0	536				
Uncensored observations	143				
Right censored observations	0				

Notes: Single, double, and triple asterisks (*, **, ***) indicate significance at the 10%, 5% and 1% level.

Gender, as represented by female-headed household, has a positive and statistically significant coefficient, implying that female-headed household are more likely to experience food insecurity compared to male-headed households. As previous studies have noted, gender does not act in isolation to determine household food security but in conjunction with other variables such as education and access to well-paying jobs. Thus the result can be related to the survey responses, which indicated that more than half of female-headed households reported low educational attainment (high school or lower). Keeping other factors constant, food insecurity increases by a factor equal to 4.2% for female-headed household.

Although the estimated coefficient for age of household head was found to be statistically significant, it is contrary to the expected negative sign, suggesting that age has a positive and significant influence on household food insecurity. The plausible explanation could be that as a household head ages, the opportunities to engage in meaningful income-generating activities are minimized. This results reflects the survey responses, which showed that on average the respondents in the sample were 50 years old. Keeping other factors constant, food insecurity increases by 2.3% when the age of household head increases by one year.

For income, the survey results show a highly significant ($p < 0.01$) negative relationship between household income and food insecurity. Food insecurity, holding other variables constant, decreases by a factor of 12.4% as income increases by one level. This result corresponds with a prior expectation that income determines purchasing power of the household, so that households with higher daily income are less likely to become food insecure than low-income households.

As expected, the results show a positive and significant influence of presence of children on food insecurity of a household. As noted in the literature, the presence of children exerts more pressure on consumption than it contributes to production, and previous studies have shown that households with children have almost twice the rate of food insecurity as households without children (National Coalition for the Homeless, 2011). Holding other variables constant, food insecurity increases by 12.5% as the number of children increases by one level.

Other variables—including ethnicity, marital status, and household size—have only a weak correlation with food security and are not explored further.

Conclusions

The findings reveal that food insecurity exists severely in the selected low-income neighborhoods of the Huntsville Metropolitan Area. The key variables shown to have the strongest effect in determining household food security status were household income and presence of children. These results reflect findings in previous studies, which have noted that food insecurity is inherently intertwined with income. For instance, a report by the National Coalition for the Homeless (National Coalition for the Homeless, 2011) noted that “the low income population group is most likely to experience food insecurity, and also most affected by food insecurity because of the complexity of the interrelated issues they must overcome just to put a meal on the table.” The findings here concur with their conclusion that the most important policy to counter food insecurity, hunger, and food deserts is to even out income distribution so

that those at the bottom of the scale are more able to live on their own income. In summary, food insecurity is often geographically determined; as such, local and state governments must work together to do their own research and determine the best specific policies for their regions.

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Assessment of Price Volatility in the Fisheries Sector in Uganda

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Abstract

This paper examines price volatility in the African catfish (*Clarias gariepinus*) supply chain in Uganda. The volatility process in the catfish markets was analyzed based on monthly price data from January 2006 to August 2013. A GARCH model is used to estimate the volatility parameters. Empirical results revealed that the value of the first-order autoregressive term and the value of the first-order moving average term were significant for both aquaculture and wild-harvest catfish supply chains. The observed long persistence of volatility in both supply channels suggests a fundamental level of uncertainty and risk in the catfish subsector over the studied period.

Keywords: aquaculture, catfish, GARCH model, price volatility

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Introduction

In sub-Saharan Africa, several price volatility studies have explored output markets for staple foods (Sukati 2013; Minot, 2014; Ngare, Simtowe, and Massingue, 2014), but very little research has been done in the fisheries sector. This paper explores volatility persistence in Ugandan catfish markets. An understanding of the structure of price volatility in Uganda's catfish supply chain is of great interest because catfish has become an important traded species, with exports to regional markets rising even faster than production (Bukenya and Ssebisubi, 2014). There have also been extensive efforts by the government and international donors to increase the country's fish production through investments in aquaculture, and the African catfish has become the predominant cultured species.

However, the consequences of increased catfish production from aquaculture subsector development on price stability in the domestic market have yet to be studied. If monthly fluctuations can be detected and measured, it will be easier to make predictions about prices and to understand their behavior over time. Ideally, well-functioning markets transmit price signals, which allow changes in demand to be met by supply. When demand is greater than supply, producers increase production in response to price signals; this increased production, in turn, helps stabilize prices.

Background

Uganda is a small, landlocked country in East Africa surrounded by Kenya, Tanzania, Rwanda, the Democratic Republic of Congo, and South Sudan. Fisheries resources are among its most significant natural resource endowments. Because about 20% of its surface area is covered with water, Uganda has enormous fisheries resources potential for capture fisheries and aquaculture production (Department of Fisheries Resources, 2012). Capture fishery is basically artisanal and is supported by small-scale fishing communities around the lakes.

The African catfish has recently emerged as the most favored species for aquaculture, accounting for more than 60% of aquaculture production. Farmed catfish is primarily produced by farmers who practice fish farming as one of many other farming activities. With improved market prices, government intervention for increased production, and stagnating supply from capture fisheries, aquaculture has attracted entrepreneur farmers seeking to exploit the business opportunity provided by the prevailing demand. Although the operation of the local marketing system has been the subject of previous studies, the distribution of fish and fish products has improved over the last fifteen years, with increased channels involving middle agents supplying fish to factories involved in industrial fish processing and export and traders supplying fish to rural and urban markets. Pricing is mainly by negotiation, as there are no binding contracts between chain actors and markets are open access. Capture catfish—currently at low volume—is mainly consumed locally, while some farmed catfish finds its way into the regional export market.

Methodology

Data

The time series data used in this analysis consist of monthly farm-raised/aquaculture and wild-harvest catfish prices from January 2006 to August 2013. The data are taken from secondary source data recorded by the Aquaculture Management Consultant (2013). All prices, expressed in Uganda Shillings per kilogram, were deflated using a consumer price index (CPI) deflator to adjust for inflation over the period covered. CPI data were obtained from the Uganda Bureau of Statistics (Uganda Bureau of Statistics, 2013). Table 1 presents the characteristics of the dataset.

Both farm-raised and wild-harvest price series are moderately skewed to the right, indicating that the data have longer right tails than left tails. The kurtosis values are lower than 3, implying that the series distribution produces fewer and less extreme outliers than does the normal distribution. The large value of standard deviation in mean price suggests wide fluctuations in the catfish price series. It is always good practice to plot the time series while searching for potential outliers, trends, structural breaks, and the general characteristics of the data-generating process. Visual inspection of the series (Figure 1) clearly suggests that volatility was present at several points in time. Farm-raised catfish prices are more unstable, particularly between 2008 and 2011.

Table 1. Descriptive Statistics

	Farm-Raised	Wild-Harvest
Mean	5,995	3,282
Maximum	8,212	4,818
Minimum	4,153	1,899
Std. Dev.	875	690
Skewness	0.24	0.20
Kurtosis	2.69	2.44
Observations	92	92

Stationarity Tests

The basic assumption in time series econometrics is that the underlying series is stationary in nature. The test for stationarity of the catfish price series under consideration was done using Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) test statistics. The ADF test relies on parametric transformation of the model, while the PP test uses nonparametric statistical methods to take care of the serial correlation in the error-terms. The optimal number of lags was determined using the Schwarz criterion information criteria. The ADF and PP tests were found to be insignificant at the 5% level of significance for both price series (Table 2), confirming the non-stationarity of the level series. However, on differencing the series once, both tests were found to be highly significant at the 1% level, confirming stationarity. Therefore, the need of first differencing of the series was felt for proper modelling of the catfish price series.

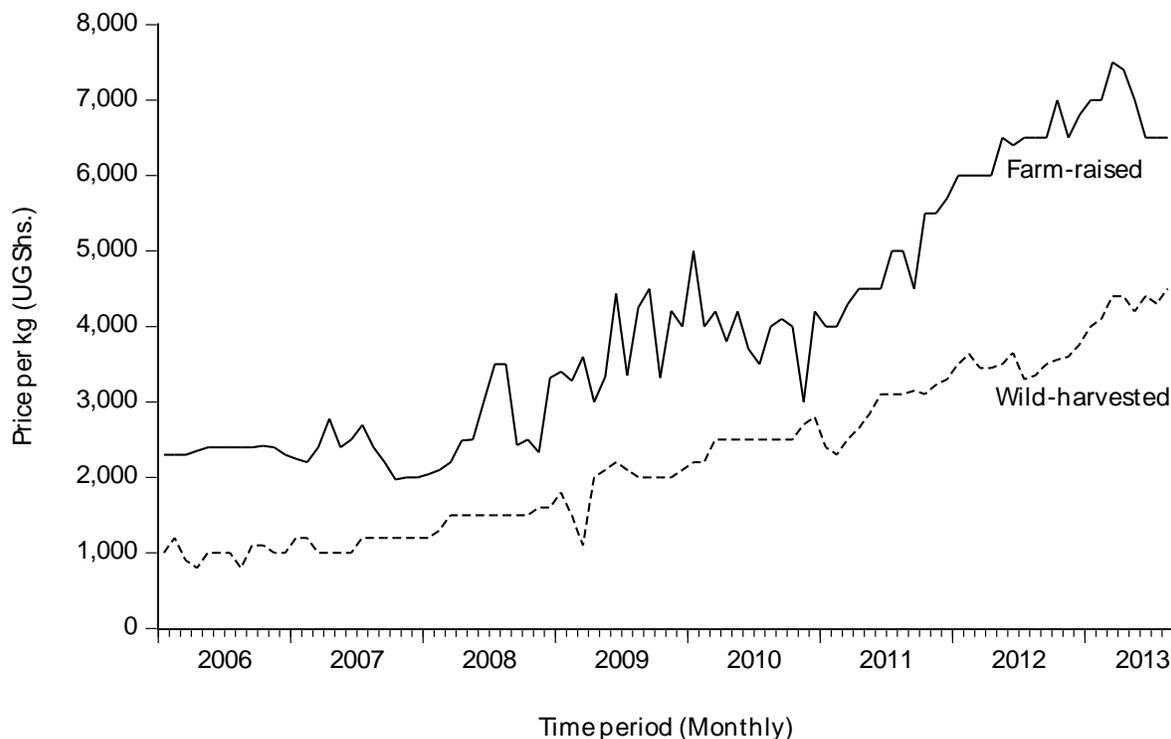


Figure 1. Price Movement in the Catfish Supply Chain.

Source: Aquaculture Management Consultant (2013).

Table 2. Stationarity and LM Test Results.

	Farm-Raised	Wild-Harvest
Levels		
ADF	-0.23 [1]	0.24 [0]
PP	-0.118 (17)	1.34 (21)
First Difference		
ADF	-13.67*** [0]	-10.19*** [0]
PP	-19.75*** (18)	-11.81*** (15)
LM Test		
F-stat.	75.88	355.68
Obs*R ²	42.08	73.42
Prob.	0.00	0.00

Notes: [] represents lags while () represents bandwidth, 0.01 critical values: -2.591, Lag Length- based on SIC, maxlag=11.

Price Volatility

Volatility refers to variations in economic variables over a period of time. Large variations in prices that do not reflect market fundamentals become problematic because they can lead to incorrect decisions. The focus in this study was on variations in the catfish price series over time. The series are said to be volatile when a few error terms are larger than the others and are responsible for the unique behavior of the series. This phenomenon is known as

heteroscedasticity. The popular and non-linear model for dealing with heteroscedasticity is the autoregressive conditional heteroscedastic model proposed by Engle (1982) and extended by Bollerslev (1986).

Autoregressive Conditional Heteroscedastic (ARCH) Models

The ARCH(q) model for the series $\{\varepsilon_t\}$ is defined by specifying the conditional distribution of ε_t given the information available up to time $t-1$. Letting ψ_{t-1} denote this information, it follows that ψ_{t-1} consists of the knowledge of all available values of the catfish series and anything that can be computed from these values (e.g., innovations, squared observations, etc.). It can be said that the process $\{\varepsilon_t\}$ is ARCH(q) if the conditional distribution of $\{\varepsilon_t\}$ given the available information ψ_{t-1} is

$$(1.1) \quad \varepsilon_t | \psi_{t-1} \sim N(0, h_t)$$

and

$$(1.2) \quad h_t = a_0 + \sum_{i=1}^q a_i \varepsilon_{t-i}^2,$$

where $a_0 > 0$, $a_i \geq 0$ for all i and $\sum_{i=1}^q a_i < 1$. Equation (1.1) implies that the conditional distribution of $\{\varepsilon_t\}$ given ψ_{t-1} is normal, $N(0, h_t)$. In other words, given the available information ψ_{t-1} , the next observation $\{\varepsilon_t\}$ has a normal distribution with a (conditional) mean of $E[\varepsilon_t / \psi_{t-1}] = 0$, and a (conditional) variance of $\text{var}[\varepsilon_t / \psi_{t-1}] = h_t$. Equation (1.2) specifies the way in which the conditional variance h_t is determined by the available information. Note that h_t is defined in terms of squares of past innovations. This, together with the assumptions that $a_0 > 0$ and $a_i \geq 0$, guarantees that h_t is positive, as it must be since it is a conditional variance.

The GARCH Model

The GARCH model proposed by Bollerslev (1986) is an extension of the ARCH model, in which conditional variance is also a linear function of its own lag. In this study, the GARCH (1,1) model was employed to measure the extent of price volatility in the catfish price series. The model was specified as

$$(2.1) \quad Y_t = X_t \theta + \varepsilon_t$$

$$(2.2) \quad \sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2$$

where the mean equation given in equation (2.1) is written as a function of exogenous variables with an error term. Since σ_t^2 is the one-period ahead forecast variance based on past information, it is called the conditional variance. The conditional variance equation specified in equation (2.2) is a function of three terms: a constant term, ω ; news about volatility from the previous period, measured as the lag of the squared residual from the mean equation, ϵ_{t-1}^2 (the ARCH term); and last period's forecast variance, σ_{t-1}^2 (the GARCH term), while the error in the squared residuals is given by $v_t = \epsilon_t^2 - \sigma_t^2$. Substituting for the variance in the variance equation and rearranging the terms, the model can be written in terms of the errors as

$$(2.3) \quad \epsilon_t^2 = \omega + (\alpha + \beta) \epsilon_{t-1}^2 + v_t - \beta v_{t-1}.$$

Thus, the squared error follows a heteroscedastic ARMA (1,1) process. The autoregressive root that governs the persistence of volatility shocks in the price series is the sum of α and β . The ARCH parameter corresponds to α and GARCH parameter to β . If the sum of the ARCH and GARCH coefficients is close to 1, this implies that volatility shocks are quite persistent.

Results

The first step in the specification and selection of the model was to test for ARCH effects in the series. This was accomplished using the ARCH – Lagrange multiplier (LM) test on the square of the residuals obtained after fitting the ARIMA model on the two price series. The idea here was to test whether residuals do in fact remain constant. The results test (Table 2) revealed the presence of the ARCH effect for both price series. The implication of these results was that both catfish price series were volatile and needed to be modeled using the Generalized ARCH model (GARCH).

The estimated univariate GARCH (1,1) parameters for the variance equations are reported in Table 3. In this model, the sum ($\alpha_1 + \beta_1$) measures the degree of volatility persistence in the market, which reveals the degree of efficiency in the market. If a market is completely efficient it should immediately correct to any shock. The observed volatility in the monthly catfish price series of wild-harvest supply chain revealed that both the values of the first-order autoregressive term ARCH ($\alpha = 0.458$) and the value of the first-order moving average term GARCH ($\beta = 0.404$) were statistically significant at the 1% level. The observed volatility coefficient ($\alpha + \beta$) was quite persistent of the order of 0.862 (Table 3).

Similarly, both ARCH and GARCH terms ($\alpha = 0.212$ and $\beta = 0.780$, respectively) for the monthly catfish price series of farm-raised supply chain were statistically significant at the 5% and 1% levels, respectively, and the persistent volatility was measured at the order of 0.99. The quite large value of the GARCH term compared to ARCH term in the farm-raised supply chain shows reasonably long persistence of volatility in the price series over the studied period. The results suggest that the wild-harvest catfish price series display a larger degree of efficiency than

Table 3. GARCH (1, 1) Estimates.

Variable	Coefficient	Std. Error	Prob.	Volatility	Half-Life
	Variance Equations			($\alpha + \beta$)	(Month)
Wild-Harvest					
Constant	0.00149**	0.0006	0.015	0.862	4.7
ARCH	0.45750***	0.1584	0.004		
GARCH	0.40400***	0.1092	0.000		
Farm-raised					
Constant	0.00039	0.0004	0.282	0.992	89.7
ARCH	0.21192**	0.0975	0.030		
GARCH	0.78033***	0.0721	0.000		

Notes: Double and triple asterisks (**, ***) indicate significance at the 5% and 1% levels.

the aquaculture price series. The observed degree of persistence in the respective supply chains was used to estimate the half-life of a volatility shock, $[\log(0.5)/\log(\alpha + \beta_1)]$, which measures the time it takes for a shock to fall to half of its initial value. The results (Table 3) show half-life estimates of 4.7 months for the wild-harvest catfish supply chain and 89.7 months for farm-raised supply chain.

Conclusion

Price levels of farm-raised and wild-harvest catfish supply chains in Uganda have increased over the period of study. The large value of standard deviation in mean price suggests wide fluctuations in catfish price levels during 2006–2013. Empirical results of the GARCH model revealed that the value of first-order autoregressive term ARCH and the value of first-order moving average term GARCH were significant for both supply chains. The quite large value of the GARCH term in comparison to the ARCH term in the aquaculture supply chain showed reasonably longer persistence of volatility. Based on these results, a reliable market information system and up-to-date information on supply, demand, and stocks may help in reducing price volatility. Government action is needed to support efforts geared at increasing the capacity of the fisheries sector to undertake systematic monitoring of fish production, improved short-run production forecasts, and market analysis. As noted by previous studies, adequate fish stock is a necessary component of a well-functioning market, particularly to smooth out seasonal fluctuations and time lags in the fish trade (FAO et al., 2011).

Limitation: The data used in this analysis are for a period of almost eight years, a limited set of data to which to apply GARCH models. The findings should therefore be treated cautiously.

Acknowledgements

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Local Food Distribution in the SC Midlands: Identifying Barriers to and Opportunities for Food Producing Farmers Entering Wholesale Markets

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Abstract

Many farmers in the Midlands of South Carolina are interested in expanding their market reach by selling to wholesale markets, but there are challenges associated with this expansion. The Midlands Local Food Collaborative conducted interviews with regional food distributors to better understand their relationships with local farmers. This paper highlights hurdles and opportunities for farmers entering wholesale markets gleaned from these interviews. Hurdles to distributors included food safety standards, quality of product, quantity of product available, the amount of food production in the area, and consumer understanding of the benefits of local food products.

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Background

In 2014, small-scale food-producing farmers in the Midlands region of South Carolina were surveyed to understand their interest in and barriers to growth (Welborn and Draper, 2014). A major finding included their interest in expanding by selling to wholesale markets. To gain an understanding of hurdles and opportunities for small-scale producers to sell to these markets, we conducted interviews with a sample of food distribution companies in South Carolina. We present the major hurdles identified from these interviews, which include food safety standards, quality and quantity of products, the amount of food production in the Midlands, and consumer understanding of the benefits of locally produced foods. Also presented are recommendations from interviewees for overcoming these hurdles.

Food Safety

Food safety is one of the largest hurdles to distributors purchasing products from local farmers. Midlands distributors regularly receive calls from growers who lack food safety plans and are unsure about food safety certifications such as USDA GAP (Good Agricultural Practices). One distributor noted that if a grower is rejected, it is typically because of their inability to be audited for food safety. At the same time, another distributor shared that they do take the risk of buying from SC growers who are not GAP certified to meet some of their customers' demands for local food because they do not have enough farmers to choose from who meet these food safety certifications. Their choices are to either buy from non-GAP growers in SC, buy from food-safety certified farms elsewhere, or to abandon this line of business. Food safety will continue to be an increasingly important issue as the Food Safety Modernization Act, "which aims to ensure the U.S. food supply is safe by shifting the focus from responding to contamination to preventing it" is enforced (U.S. Food and Drug Administration, 2011). Midlands distributors do not directly take on the role of educating farmers on how to reach specific food safety certifications.

Recommendations from distributors included increasing awareness of discounted or prorated food safety audit options for small growers from third-party audit companies (e.g., PRIMUS), state budgeted free or discounted food safety audits for growers, and hiring someone in the Midlands who understands food safety to link growers and distributors and to work through the various nuances involved as the levels of food safety requirements vary across firms.

Product Quality

Distributors noted that during the growing season they turn away farm products that are not up to USDA No. 1 standards or packaged or delivered in the way that they require. According to the USDA's Agricultural Marketing Service, "U.S. Grade Standards for vegetables are voluntary and provide the fruit, vegetable, and specialty crop industry with uniform language for describing the quality and condition of commodities in the marketplace" (U.S. Department of Agriculture, 2016). Many distributors are accustomed to or required by their customers to accept products that meet, or appear to meet, these standards. Some distributors have strict procedures on how products should be delivered, with distributors having the right of refusal upon delivery.

One distributor spoke about much food is wasted, not only at distribution warehouses as a result of the quality of product that farmers sometimes attempt to sell to them, but also in the fields where growers must leave product that they know do not meet requirements for wholesale distribution.

Recommendations from distributors included farmer training to collectively educate growers on wholesale standards and how various distributors need USDA No. 1 product delivered and setting up bulk buying systems or cooperatives so farmers could collectively purchase and share costs of appropriate packaging materials.

Sufficient and Consistent Supply Considerations

Wholesalers typically work with larger quantities at cheaper prices as opposed to limited quantities at retail, niche market prices. Distributors must often purchase a certain quantity of product to make it worthwhile, particularly if they are going to pick up on-farm. Some distributors have minimum delivery requirements for growers delivering product to them and some do not. Typically, a distributors' customers will receive better prices on a larger orders. It is easier for distributors to aggregate from smaller farms that join together as one entity because it simplifies purchasing and pickup for the distributor. Even so, this approach could disrupt farm- or parcel-level traceability if not managed well.

Recommendations from distributors included farmers forming cooperatives and/or creating food nodes (local food drop off locations for growers with appropriate storage where distributors can pick up their products) and having someone in the Midlands specifically tasked with crop planning between distributors and area farmers.

Consumer Demand for Local Products

Wholesale distributors face strong demands for local products, yet the general public does not understand how difficult it is to meet these demands or that what they request as local product is not grown locally. The end consumer's understanding of what is local and in season, as well as the understanding of entities purchasing from distributors were identified as hurdles to motivating distributors to aggregate local products. Some produce vendors can and do advertise and sell their products alongside the "Certified SC Grown" label or call their products local, even when the product is not grown in South Carolina.

Distributors shared examples of consumers requesting local options for products that do not typically grow in South Carolina. One distributor was asked to provide a school district with SC Grown bananas. Certain products—such as pineapples and bananas—simply do not grow best in South Carolina; at present there is no choice other than to buy outside the state. Besides the basic economics involved, many consumers do not have much knowledge of the production process involved in bringing specific products to market. Distributors have found that older generations have more knowledge about produce and what is in season, while younger generations do not seem to cook or know about produce.

Recommendations from distributors included educating consumers and decision makers that the supply from food producing farmers in South Carolina and the infrastructure at present are not conducive to meeting all of their demands for local product.

Summary of Recommendations

- Increase food safety training supports and funding for farmer food safety audits.
- Educate farmers about general wholesale standards as well as standards for each individual distributor in South Carolina.
- Hire a Midlands organizer to build relationships between distributors and growers and coordinate crop planning according to farmer capacity and distributor needs.
- Conduct a feasibility study for the Midlands to assess farmer capacity and needs as well as distributor capacity and needs for aggregation and distribution of locally farmed products at wholesale prices.
- Organize local food aggregators (such as farmer cooperatives or food nodes) throughout the Midlands with the intention of selling to distributors, the developing food hub network in South Carolina, and other market opportunities.

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Factors Influencing Potential Demand for Goat Meat in Georgia

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Abstract

Growth in U.S. ethnic populations and a desire for healthy diets are driving demand for goat meat. Inventory of meat goats in Georgia has increased in recent years. A consumer survey was conducted in Georgia to determine potential driving factors determining the future outlook of goat meat demand in Georgia. About 56% of participants who had never tasted goat meat before expressed willingness to try it if grocery stores in their area gave out goat meat samples. A binary logit model was used to examine the demographic factors that impact consumers' willingness. Result shows that consumers' education, gender, and household size significantly affect willingness to consume goat meat.

Keywords: goat meat, marketing strategies, potential market, substantial demand

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Introduction

Growth in U.S. ethnic populations and a desire for healthy diets are driving U.S. demand for goat meat. U.S. imports of sheep or goat meat increased by 12%—from \$258.8 million to \$290.7 million—over the first four months of 2016 compared to the same period in 2015 (World City Trade Numbers, 2016; U.S. Bureau of the Census, 2010). In addition, U.S. consumers are prepared to pay a large premium for domestically produced fresh meat over the frozen imported product (Johnson, 2016). According to the USDA Food Composition Databases (2016), goat meat is a lean meat with more favorable nutritional qualities than chicken, beef, lamb, or pork. Goat meat is a good match for consumers' demands for leaner and more nutritious meat (Webb, Casey, and Simela, 2005).

Raising meat goats is an affordable livestock enterprise (Solaiman, 2007). Because of the U.S. commercial agriculture system, goat meat is a new commodity to American consumers (Simon 2013), and goats are new enterprises for American producers, which has resulted in an undeveloped market structure and infrastructure currently available to goat producers compared to cattle, poultry, and swine producers. Even though meat goat marketing is highly unstructured in the United States, goat meat prices are generally higher than other red meat-producing species (Glimp, 1995). Studies have also indicated that there is an emerging demand for goat meat as a gourmet item. Several studies have mentioned that goat meat has previously mostly consumed by people with ethnic ties to Latin America, the Middle East, Asia, and the Caribbean (Luginbuhl, 2007). Today, a larger portion of general population is being introduced to the tasty and healthy product (McLean-Meynsse, 2003).

The number of meat goats and other goat inventory in Georgia have increased from 65,100 heads in 2012 to 72,000 heads in 2016; in 2016 Georgia has the fifth largest goat inventory among U.S. states (U.S. Department of Agriculture, 2012, 2016). According to World City Trade Numbers (2016), \$283,031 worth of fresh, chilled, or frozen sheep and goat meat were shipped through the Atlanta/Savannah customs district through April 2016. However, very few studies have focused on Georgia's goat meat market. The purpose of this paper is to determine potential driving factors to assess the future outlook of meat goat demand in Georgia using a logit model to explore marketing opportunities regarding potential meat goat consumers in Georgia.

Data and Empirical Model

The data used in this study are from a random-sample telephone consumer survey conducted through the Survey Research Center of the University of Georgia in 2012. More than 593 Georgia residents age 18 and older were interviewed. To identify current goat meat consumers, respondents were asked whether they or their family members had ever tasted or eaten goat meat. About 15% had tasted goat meat and about 85% had not. Those who had never eaten goat meat were further asked, "What are your reasons for not eating goat meat?"

Answers included no particular reason, no desire for goat meat, or that they did not find it appealing. Some answered that they had never thought about eating it, and some thought of goats as pets. We also observed a considerable interest expressed from buyers or end consumers about

goat meat. For about 24% of those who had not eaten goat meat, the reason was closely related to unavailability: “not readily available,” “It is not available in the stores or local market,” “not marketed very well,” or “never had seen in supermarkets.” About 16% of respondents indicated that they had never had a chance to taste goat meat: “never had opportunity,” “I have not been introduced to it,” “never had the chance,” or “never had it before.” Very few answered that it was expensive or that they had no reason.

In an effort to raise an awareness about goat meat consumption and its nutritional knowledge/taste, individuals who never tasted or eaten goat meat before were further asked, “Suppose your area grocery store is giving out goat meat samples. Would you be willing to try it?” Out of the total 487 respondents who never tasted goat meat before, 56% expressed willingness to consume goat meat and 44% did not want to try, even if their area grocery stores gave away samples. The willing consumers can be considered as potential goat meat consumers in Georgia. This paper determines the demographic and socioeconomic variables that may affect potential goat meat consumers in Georgia or consumers’ willingness to consume goat meat.

Demographic and socioeconomic factors such as gender, age, race, marital status, education, and household size were considered as the potential factors that could influence willingness to consume goat meat in Georgia. Table 1 shows the variable definitions and descriptive statistics. Additional explanations for the independent variables of interest follow.

Table 1. Variable Definition and Percentage for Those Who Had Never Tasted Goat Meat.

Variable	Description	Percent
DEPENDENT	Suppose your area grocery store is giving out goat meat samples. Would you be willing to try it?	
	Yes (273)	56.06
	No	43.94
HSHOLD	Number of people in the household	
MALE	Gender: 1= if respondent is a male; 0 otherwise	30.29
AGE	Age of consumer: 1= if respondents age is 35 or more years; 0 otherwise	78.58
EDU	Highest level of education	
1	Less than high school	5.33
2	High school diploma	21.31
3	Associate/ Technical degree/ some college	28.42
4	College Graduate	26.29
5	Post Graduate	18.65
MARRIED	Marital status: 1= if respondent is married; 0 otherwise	58.32
BLACK	Race: 1= if respondent is black; 0 otherwise	67.97

Model

Logistic regression has applications in such diverse fields as epidemiology, medical research, banking, marketing research, and social research; one of its advantages is that model interpretation is possible through odd ratios, which are functions of model parameters (Stokes, Davis, and Koch, 2000). A binomial logit model was used to estimate willingness to consume

goat meat and consumers’ demographic and socioeconomic characteristics. The dependent variable is valued with the “yes’ and “no” response to the question, “Suppose your area grocery store is giving out goat meat samples. Would you be willing to try it?”

The binomial model can be expressed as (Greene, 2013)

$$(1) \quad y_i^* = \gamma'x_i + \varepsilon_i.$$

The random variable y_i^* takes two values, 1 and 0, with probabilities

$$(2) \quad \begin{aligned} \text{Prob}(y_{i=1}|x_i) &= \text{Prob}(y_i^* > 0|x_i) \\ &= \text{Prob}(\gamma'x_i + \varepsilon_i > 0) \\ &= \text{Prob}(\varepsilon_i > -\gamma'x_i). \end{aligned}$$

The model is completed by the specification of a particular probability distribution for ε_i . In terms of building an internally consistent model, we require that the probabilities be between 0 and 1 and that they increase when $\gamma'x_i$ increases. One of the dominant models in the literature on binary choices is the standard logistic distribution, $f(\varepsilon_i) = \exp(\varepsilon_i) / [1 + \exp(\varepsilon_i)]^2$, which produces the logit model (Greene, 2013).

Results

SAS software version 9.4 was used to conduct the logit model to examine the demographic and socioeconomic factors that impact consumers’ willingness to consume goat meat in Georgia. Due to missing values, only 422 observations were used in this model.

Respondents’ education, gender, and household size significantly affected their willingness to consume goat meat (Table 2). The variables AGE, MARRIED, and BLACK are not significant.

Table 2. Consumers’ Willingness to Consume Goat Meat.

Parameter	Estimate	Standard Error	t Value	Approx Pr > t	Mean Marginal Effect
INTERCEPT*	-1.0478	0.5517	-1.90	0.0575	--
HSHOLD**	0.1925	0.0787	2.44	0.0145	0.0449
MALE ***	0.7386	0.2367	3.12	0.0018	0.1725
AGE	0.0794	0.1346	0.59	0.5555	0.0185
EDU*	0.1236	0.0684	1.81	0.0707	0.0289
MARRIED	0.0880	0.1116	0.79	0.4304	0.0206
BLACK	-0.3350	0.2316	-1.45	0.1481	-0.0782

Notes: Single, double, and triple asterisks (*, **, ***) indicate significance at the 10%, 5%, and 1% level.

The EDU variable is positive and significant at the 10% level, meaning that individuals with higher levels of education are more likely to consume goat meat. The marginal effect of EDU explains that with each additional level of education, an individual will be 2.89% more likely to consume goat meat. Possibly, higher educated groups may be the types of consumers seeking

specific health attributes that may increase potential demand for goat meat. The variable MALE was significant at the 1% level and the marginal effect explains that males are 17.25% more likely to consume goat meat than females.

Individuals with larger household size are more likely to eat goat meat. The mean marginal effect explains that with each additional member of a household will be 4.49% more likely to consume goat meat. Household size could represent a collective impact on food consumption patterns, as food requirements increase with the increase in household size.

Conclusions

The current value of goat meat imported to Georgia markets and the size of the goat inventory represent substantial demand for goat meat in Georgia. In the future, demand for goat meat may expand among potentially willing consumers. Multiple factors—such as education, family size, and gender—influence consumers' willingness to consume goat meat. From these results, marketing and promotional efforts must be directed toward males, higher educated populations, and larger households.

Taste could be a future avenue of study. Education regarding the nutrition of goat meat is needed to promote goat meat. Possibly, this is an informative study for the U.S goat meat producers about a potential market. Marketing strategies targeting consumers' exposure to this low-fat meat and availability of goat meat by direct sales to consumers may promote the market.

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Consumer Testing for the Local Food Start-Up: Update

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Abstract

A self-executed consumer test protocol for food entrepreneurs has been designed and tested in Portland, Oregon. The protocol (Durham and Colonna, 2016) includes an Excel workbook that uses user-supplied cell entries to develop a single-sheet ballot and a data-entry sheet. Once the data are entered, the spreadsheet automatically produces useful tables and charts from the survey data. Videos demonstrate ballot creation and survey data entry. The workbook is accompanied by a manual that describes how to run a consumer test. These materials are available free of charge, but access to the workbook requires completion of a survey.

The survey template begins with standard consumer test questions assessing concept and liking (nine-point scales), followed by sensory attribute Just-About-Right questions. The second page begins with a set of priced purchase intent questions. A price range including six prices is listed vertically, and consumers are asked to indicate their willingness to pay for the product at each price. The results for these purchase intent questions can be used to produce a pseudo-demand curve.

The purchase intent question is followed by a question about the quantity they would buy per year at a specific price. This provides a means by which total annual demand for informed buyers could be estimated. Two check-all-that-apply (CATA) are next. The default CATA offerings include a question providing a list of possible locations where they regularly shop for food and a question about production and ingredient preferences relevant to the product (for example,

organic and gluten-free). In combination with the purchase intent questions, these could provide a convincing sales presentation to a retailer or to be included in a business plan. The ballot ends with four multiple choice questions.

Keywords: entrepreneurs, market research tool, purchase intent,

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An Analysis of Organic Fresh Produce Choice: A Consumer Preference Study in the Mid-Atlantic USA

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Abstract

Global sales of organic food and drink reached \$80 billion in 2014, a more than four-fold market expansion since 2000 (\$18 billion in organic sales). Demand for organic products is concentrated in North America and Europe, which create 96% of global revenues. Organic production expanded during the 1980s, with different certifiers developing their own standards and certification processes. Since that time, the industry has grown from experimental garden plots to large farms with surplus products sold under a special organic label. In the United States, sales of organic products topped \$35 billion (USD) in 2013 (an increase of 11.5% from 2012) and grew by more than 11% in 2015.

Market development in this area could enhance both the net profits and the sustainability of small farms by serving the organic niche market. This study profiles a typical organic consumer in the mid-Atlantic United States. An online survey was conducted to capture organic consumers' interests in and expectations of organic fruits and vegetables. Data were collected through an online survey of 1,100 participants who were pre-screened and whose identities were checked from a selection of 5,191 candidates provided by a private online survey company. We developed a multinomial logit model to predict organic consumers' choice of fresh fruits and

vegetables. The seven most important fruits and vegetables were identified for this study, the rest were included in the “other” category. The choice of “other” fruits and vegetables has been left out of the regression as the base case.

Results show that consumers who think that organic food tastes better and consumers who are college graduates are more likely to choose bananas compared to other fruits and vegetables. Respondents who are concerned about freshness, provide support to local farmers, have a two-year college degree, and are Caucasian are more likely to choose carrots. Those who provide support to local farmers and who have an education above high school are more likely to choose lettuce. Respondents with a two-year college degree are more likely to choose strawberries, while those who prefer organic wine are more likely to choose apples. Caucasians are more likely to choose tomatoes but less likely to choose spinach. Those living in urban areas are less likely to choose spinach. Producers of organic fruits and vegetables can target customers for sales based on their demographics and their preferences.

Keywords: consumer choice, fruits and vegetables, mid-Atlantic region, multinomial logit (mnl) model, organic fresh produce

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Willingness to Pay a High-Premium for Organic Produce: An Econometric Analysis

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Abstract

U.S. consumer demand for organically produced goods has grown continuously since the USDA established national standards for organic production and processing in 2002 (www.USDA.gov). Organic food sales have increased from approximately \$11 billion in 2004 to an estimated \$35.9 billion in 2015. As previous literature suggests, a large portion of consumers view organics favorably, but very few routinely choose to buy organic food over conventional food. It is assumed that this is due to—among other things— socioeconomic disparities.

The objective of this paper is to predict the characteristics of consumers who are willing to pay high premiums for organic produce in the mid-Atlantic United States. In the context of this paper, a high premium is defined as at least 16% more for organic fruits and vegetables compared to conventional produce. Data were collected from 1,100 consumers using a private online survey company. A logit model was developed to predict which consumers are more likely to pay a high premium for organic produce.

Results indicate that the overall model is highly significant, with a correct prediction rate of 71%. Those who have a graduate degree and an annual income above \$100,000 are more likely

to pay high premiums. Moreover, those who use food advertisements, certified organic labels, and natural labels to purchase produce are more likely to pay high premiums. Caucasians are more likely to pay high premiums, as are those who frequently buy at farm direct markets. As expected, consumers who think that organic food tastes better than conventional food and those who switch supermarkets to buy organic produce are more likely to pay high premiums. Those who want to buy organic jam, jelly, marmalade, juices, sauces, and dried chips are more likely to pay a high premium for organic produce. Those who regularly shop at more than one food store are less likely to pay a high premium. The model indicates that those who are influenced by the naturally grown label and prefer conventionally grown but local produce are less likely to pay high premiums. Those who consider buying organic food to be a waste of money are less likely to pay a high premium for organic fresh fruits and vegetables. Producers of organic vegetables and fruits can target customers with these specific traits to enhance their profitability.

Keywords: high-premium, logistic regression model, mid-Atlantic region, organic fresh produce, willingness to pay

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Impacts of Values-Based Supply Chains on Small and Medium-Sized Farms

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Abstract

The U.S. agricultural system comprises enterprises of various scales. At one extreme, undifferentiated farm products are traded in commodity markets, where all enterprises need to handle sufficient volume to generate revenue from narrow margins. At the other extreme are direct marketing channels, where farmers interact directly with consumers, typically on a limited scale.

Recently, various marketing entities between these extremes have emerged, providing outlets for small and medium-sized farmers who are too large or otherwise unsuited to sell via direct marketing but too small to compete in commodity markets. These entities regard producers as integral members and differentiate their goods by “values” associated with the production practices, the qualities of the food, or the business relationships along the supply chain to elicit premiums from consumers. Some of these entities have been referred to as “values-based supply chains” (VBSCs).

This USDA AFRI-funded project is designed to better understand, evaluate, and improve the performance of VBSCs as profitable outlets for diverse, small and medium-sized farms. Project

objectives include: (1) analyzing the **current state of knowledge** on Values-Based Supply Chains (VBSCs) and their impacts on farmers; (2) investigating **farmers' perceived benefits and challenges** of participating in VBSCs, their degree of dependence on VBSCs, and their views on the impacts of VBSCs on the viability of their farms and farming practices; and (3) engaging small and medium-sized farmers and VBSCs to **generate and share knowledge** with other farmers, supply chain organizers, research and extension professionals, and policy makers.

The project team has developed an online database of VBSCs with forward and backward supply linkages to specific groups of small and medium-sized farms. The database lists features of VBSCs—including type of business, products, and value claims—and can be used to analyze key trends in VBSCs. A survey instrument has been developed to be administered in early 2017 to a national sample of farmers who supply to VBSCs to learn how and in what ways these farmers participate in VBSCs and to what extent they benefit from their associations.

Our research and outreach efforts address the continuing decline of “agriculture of the middle” by investigating innovative intermediated marketing solutions that allow medium-sized farms to successfully differentiate their products in the marketplace and remain the backbone of resilient food and agricultural systems.

Keywords: agriculture of the middle, mid-scale farms, small farms, values-based supply chains

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Distributor vs. Direct: Farmers, Chefs, and Distributors in the Local Farm to Restaurant Supply Chain

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Abstract

For the past ten years, the National Restaurant Association’s “What’s Hot” Culinary Forecasts have placed local and hyper-local produce, meat, and seafood near the top of the list. As a result, serving “local food” has become a necessity for many restaurants. The two major supply chain channels from local farms to chefs are direct connections, with a farm delivering to a restaurant or chefs shopping at a local farmers market, and through distributors.

This research compares fresh produce supply chain relationships, efficiency, and value to chain members when local farm products travel from farms directly to chefs or via produce distributors. Existing research on the farm-to-restaurant supply chain has been confined to understanding chefs’ perceptions (Murphy and Smith 2009), but the entire supply chain and the value for chain members derived from intra-chain information exchange and collaboration must be considered (Dunning 2016; Kwon and Suh, 2004). Our research consists of first-person interviews with chefs, farmers, and a collaborating food service distributor as well as observations of meetings between these three groups of actors over a one-year time period. Additionally, we collect the post-harvest costs and returns to farmers for each distribution channel. The aims of the research are to understand what factors influence chefs in selecting direct versus intermediated local products and under what circumstances direct versus intermediated supply chains most benefit small and mid-scale producers.

Keywords: collaboration, farm to table, food system, restaurants, supply chain, value chain

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Segmenting the Sustainable Wine Consumer

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Abstract

There has been sizable growth in sustainably produced wines, with 40% of California producers participating in the Code of Sustainable Wine Growing Practices program. Research suggests that purchasers of sustainable foods have distinct personality, lifestyle, and behavior characteristics and that preferences for environmental characteristics of wine are based on consumer knowledge (Verain et al., 2012). Further, among international consumers, older female millennials living in urban areas and following healthy lifestyles are more likely to buy sustainable wines (Mollá-Bauzá et al., 2005; Forbes et al., 2009).

Prior research has developed an understanding of consumer preferences for sustainable products. However, while California leads the nation in wine production and consumption, little is known about which California wine consumers are most likely to purchase sustainable wines. The purpose of this research was to examine the attitudes of wine consumers regarding sustainable production practices and identify the segment most likely to pay for sustainable wine. Consumer understanding of sustainable practices and willingness to pay were also examined. Investment in “sustainability” can take multiple years; this research will help wineries identify their target markets.

A survey was conducted among 206 California wine consumers. Respondents were asked to rate the desirability of fourteen wine features. *Produced sustainably* was an extremely or very desirable characteristic for 42% of respondents, who were therefore identified as sustainable consumers. These consumers were more likely to be female, married, and well educated. The most important attributes of wine for these consumers were varietal, sustainable production,

good value, produced with concern for the health and well-being of employees, and water conserving methods. The top wine attributes for non-sustainable consumers were good value, brand, sale priced, and premium quality.

Almost two-thirds of sustainable consumers were somewhat familiar with sustainable production practices. When asked to describe wine that is *produced sustainably*, most respondents indicated minimal impact on the environment and water conservation. However, 7% of sustainable consumers and 20% of non-sustainable consumers indicated that they didn't know the meaning of *produced sustainably*. A quarter of consumers thought that organic and sustainable were the same, and almost 1/3 think sustainable produced wines are more expensive. Nearly 90% of sustainable wine consumers were willing to pay a premium of over \$5.00 for sustainable wine.

This research shows the importance of sustainability to a sizable consumer segment but suggests that consumer education related to sustainability claims is needed.

Keywords: consumer segmentation, sustainability, wine

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Local Meat Brands Attract Consumer Demand

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Abstract

Research has shown that good value for money is the top attribute driving consumers to choose one meat product over another from among the products on retail shelves (Wolf and Thulin, 2000). The aim of this research was to determine how consumers define “local,” examine whether local is an important driver of meat purchase decisions, and profile local consumers.

The Food, Conservation, and Energy Act of 2008 defines as local any product that is transported less than 400 miles from its place of origin (Martinez et. al, 2010), but consumers define local differently. Adams and Adams (2011) found local to be less than 100 miles from the home, while the Hartman Group (2008) indicated less than 100 miles was considered to be local, followed by within the consumer’s state.

To examine local meat attitudes, this research conducted personal interviews in San Luis Obispo County in 2012 among 290 meat consumers. Respondents rated the desirability of seven features of meat. Fifty-two percent of respondents indicated *a local brand* is an extremely or very desirable meat characteristic and were therefore identified as local meat consumers. The local meat consumers were more likely to be Baby Boomer females who purchased meat in locally owned retail markets. They spent more in a typical month on meat, particularly beef, making them a valuable market segment. Local consumers rate good value as their top attribute, which is tied with local.

What does local mean to consumers? Sixty-nine percent of respondents indicated that local meant more to them than mileage. Eighty-one percent of meat purchasers defined local to be grown and/or raised within their city or county. When respondents were asked to define local in

a sense of mileage, almost 75% said grown and/or raised less than 50 miles from home. When asked to rate the importance of local food products, consumers rated fresh fruits and fresh vegetables as very important. Local meats were somewhat to very important and local wines were somewhat important.

This research shows that local brands are important to a large consumer group. It is recommended that retail food outlets include local products on their shelves and identify them based on geographic area rather than mileage.

Keywords: local, meat, purchasers

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The Local Foods Resource Mapping Project

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Abstract

The purpose of this USDA/AMS-funded project is to develop web-enabled, comprehensive state food system directories in six pilot states; to provide a more complete representation of the local food system instead of merely connecting buyers and sellers; and to identify and potentially create business opportunities for entrepreneurs by identifying gaps in local food systems.

Gaps exist in the understanding of the overall picture of statewide local food systems. Further, barriers to entry may prevent the deepening and growth of local food systems in rural and urban communities. Much remains unknown about how local food moves from farms to consumers, and consumer demand varies across states and remains relatively poorly understood.

At focus group events for the Local Foods Resource Mapping project, diverse groups of invited participants were presented with a series of state-level maps showing basic production, distribution, and consumption data as well as questions designed to guide discussion and provide actionable insights. Following the focus groups, participants were invited to respond to a more detailed online survey about the local food system.

An early conclusion is that a web-based mapping service that serves two distinctly different needs may be required. There is a recognized need for and value in providing food systems analytics in the form of maps showing where different supply chain firms are located and benchmarks such as location quotients that may point to opportunities for new businesses to emerge or improve the functioning of the supply chain. There are also opportunities to enhance the usefulness of MarketMaker and to expand its adoption for more immediate transactions between buyers, sellers, and market intermediaries.

Sustainability over time is a key issue, as secondary data rapidly become obsolete; however, this could represent a potential entrepreneurial opportunity. In general, participants see value in mapping where the production of different crops occurs in each state and where processors, distributors, and different markets are located. In addition, there is perceived value in combining and overlaying maps from public data sources to identify potential patterns and relationships.

Keywords: business development, food system maps, linking producers and consumers, MarketMaker

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Apple Market Expansion through Value-Added Hard Cider Production: Supply Chain Coordination in Vermont

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Abstract

Hard cider production in the United States increased annually by 27.3% between 2011 and 2016, totaling \$300.4 million in revenues in 2016. Yet the production of cider-specific apples—apples with the unique flavor, acid, and tannin characteristics suited only to hard cider production—remains limited. This research project is a follow-up of Becot, Bradshaw, Conner's (2016) study, which highlighted the mismatch between cider-makers' preferred cultivars and current apple production in Vermont and suggested potential opportunities for the Vermont economy if cider-makers increased their production using state-grown cider-specific apples. Their study highlighted that the planting of new apple cultivars is a long-term investment and a commitment that apple growers most likely will not undertake unless they have assurances that cider-makers will buy the apples at an attractive price when the trees start producing. They concluded that one of the main challenges facing orchard diversification for hard cider is to create successful collaboration between supply chain actors.

This research update presents the results of 15 semi-structured interviews conducted with apple growers and cider-makers between February and September 2016 to assess the optimal strategic partnership mechanisms to jump-start the cider industry in Vermont. Two strategic partnership mechanisms were presented to interviewees: production contracts (used in the well-established English cider industry) and cooperatives (used in the well-established French cider industry). Interviewees rejected both mechanisms to put new cider-specific apple trees in the ground in Vermont on a short-term timescale. Apple growers expressed a need for more support on how to grow cider-specific cultivars.

The most pressing issue is not the cider-specific fruit supply but a lack of consumer demand for ciders made from cider-specific fruits. A clearer distinction between cider styles (stereotyped by the “beer-like” and “wine-like” ciders) may be needed to develop consumers’ cider-literacy and increase demand. In November 2016, a survey was sent to the 17 Vermont cider-makers asking whether they would like to craft and market some of their ciders under a label that would differentiate and define the different cider styles. Three types of labels were proposed: one that is place-based, one that is process-based, and one that is taste-based.

Keywords: hard cider, place-based label, process-based label, strategic partnership, taste-based label

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What Drives the Trade Purchaser's Decision to Purchase a Specific Wine?

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Abstract

Trade purchasers, who decide which wines will be sold at retail outlets, have significant purchasing power and influence on the wine industry. Research has shown that consumers perceive the region where wine is produced to have an impact on wine quality (Johnson and Bruwer, 2007). Additional research indicates that wines from different regions generate different market prices (Schamel and Anderson, 2003). How does region influence trade purchasers? This research examines the attitudes of trade wine purchasers regarding drivers of purchase decisions, their familiarity with California growing regions, how often wine region influences their purchase decisions, and their wine quality perceptions based on region. Differences based on business type and location were examined.

A November 2014 survey used a database of 1,785 email addresses and had a response rate of 8.5%. Respondents were from 29 states, with the most responses from Florida (24%) and California (22%). A quarter of responses were retail-only buyers, half were from on-premise businesses, and another quarter were from wine bars (8% of which were also wine shops).

Respondents were asked to rate the desirability of eight wine features. Features indicated as very desirable were *premium quality product* and *grapes are from a respected wine grape growing region*. The characteristics *from a well known AVA*, *sustainably produced*, *cool climate grapes*, and *produced in California* were rated somewhat to very desirable. Somewhat desirable features were *high Wine Spectator rating* and *high Robert Parker rating*.

When choosing a wine, 44% choose based on production location always or very often and 88% make the decision based on location at least somewhat often. This is similar to 83% of respondents indicating that *well known region* is extremely or very desirable.

Respondents from the Midwest and the East rated both *grapes are from a respected wine grape growing region* and *from a well known AVA* higher than California respondents did. Wine bars rated *sustainably produced* and *produced from cool climate grapes* as more desirable than retail outlets did. Respondents were very familiar with California regions examined, with Napa and Sonoma rating most familiar and highest quality.

This research shows that trade decision makers use growing region to decide which wines to purchase. Therefore, it is important for wine regions to allocate resources toward trade education concerning characteristics of their growing region and its quality.

Keywords: AVA, retail, trade purchasers, wine bars, wine region

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