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Research Updates

How Have Agribusiness Firms Fared Transitioning from a Planned Economy to a Market-Based Economy in Bulgaria? A Case Study Analysis

Albert J. Allen, Charlie Forrest, Steve Murray, and Albert E. Myles

One of the conditions for an economically efficient system is that a market-based economy must exist. A market-based economy exists when consumers, with limited government involvement, provide answers to the questions of what to produce, how to produce, when to produce, who should produce, and for whom should goods be produced (Seperich et al. 1994). Consumers make these decisions by purchasing the goods and services they want and need. In a planned economy the answers to the aforementioned five questions usually are decided by the government with very little, if any, direct participation by consumers (Seperich, Woolverton, and Beirlein 1994). In that system there usually is a surplus of unwanted goods and services and a shortage of wanted goods and services. The process of transitioning from a planned economy to a market-based economy can be difficult, especially in countries of the former Soviet Union. This paper seeks answers to questions that arose regarding the economic impact of changes, positive or negative, that occurred in the Bulgarian agribusiness sector following the breakup of the Soviet Union. Agribusiness firms that have experienced the changes first-hand offer a unique and personal perspective. Thus we wanted to look at how a set of agribusiness firms fared during the transition from a planned economy to market-based economy in Bulgaria.

Objectives, Data, and Methodology

This project obtained information on the economic changes that have occurred between 1996 and 2009 and evaluates how these changes have impacted a select set of agribusiness firms in Bulgaria. Primary and secondary data were used to accomplish this. Primary data were obtained through an informal questionnaire and the personal observations of the authors. Secondary data sources included government statistical reports, company brochures, company websites, and United Nations FAO statistics (2009). The case study research method (Soy 1997) was used to obtain information and data from ten agribusiness firms between May 23, and June 3, 2009 in the Stara Zagora oblast in Bulgaria.

Allen is Professor and Forrest is Professor Emeritus (Retired), Department of Agricultural Economics; Murray is Extension Professor (Retired), Mississippi Cooperative Extension Service; and Myles is SRDC Interim Director, Mississippi Cooperative Extension Service, and Extension Professor, Department of Agricultural Economics, Mississippi State University, Mississippi State.

Results

This section of the analysis provides information on the ten agribusiness firms that the authors visited and interviewed. Due to page limitations, only brief discussions of the ten firms are presented below. Individuals who want more detailed information should refer to Forrest, Murray, and Allen (2010).

Case Study 1: Tunja73—Fish Farm

This firm produces common carp, bighead carp, silver carp, pikeperch, European catfish, and sturgeon. The firm exports fish to Romania, Serbia, and Greece. Bulgaria's entry into the EU is opening new markets for the firm. The farm has a contract to supply fish to Metro stores in Bulgaria. The fish farm has reduced farm labor from 12 workers to six.

Case Study 2: A.P.P. Zoohraninvest Ltd.—Feed Factory in Stara Zagora

This firm produces pellets and supplements for its customers. The company delivers feed ingredients to farm customers with its own trucks. The firm has 13 large trucks and four small trucks; seven retail shops throughout south Bulgaria; and 50 feed distributors throughout Bulgaria. The firm exports wheat, barley, sunflower, and wheat bran. Turkey and Greece are its major export markets. Entry of Bulgaria into the EU has made trade easier for the

firm. The firm's income is generated in the following manner: 30 percent from import of feed additives, 50 percent from production and sale of feed, and 20 percent trading and storing grain. The firm has 150 employees.

Case Study 3: Nomicom—Fish Farm

This fish farm, established in 1990 (NOMICOM 2009a), offers fresh and chilled fish for consumption with excellent qualities through out the year. It produces carp, grass carp, European catfish, American catfish, zander, crucian carp, bream, and bleak (NOMICOM 2009b). The manager indicates that most farms in Bulgaria are privately owned and operated and are set up as sole (single) proprietorships. The farm has had a relatively stable financial position from 1996 to 2009, with the best financial position in 2006. The farm has increased the number of employees from six in 1995 to 32 in 2009.

Case Study 4: Ivan Sagov—Grain Farm

This farm is headquartered in Stara Zagora and produces grain and fish products. The farmer produces wheat that is sold to mills to produce bread and corn is produced sold to an oil production facility. The farmer also produces barley and sells it to a barley processing facility for beer production. The farmer indicates that the EU subsidizes grain production based on hectares rather than on yields. The farmer reveals that this subsidy is lower than that for the rest of the European Union members, but payment will increase to parity with other EU members in 2016 because the Bulgarian government negotiated a five percent annual increase until that point is reached. The farmer produces 78 metric tons of fish per year: 60–70 percent carp, with the remaining fish including bighead carp and European catfish. The farmer has a one-year contract with Metro retail grocery stores allowing him to sell all of his carp. The farmer has seven full time employees and five to seven part-time employees.

Case Study 5: Ivan Genchev—Grain Farm

This grain farm was established in 1997 as a grain production entity with only a small amount of land owned by the farmer. The farmer has 1700 hectares of farmland available for crop production in four different locations in the region and has to deal with 50–200 land owners for each of the four locations. The farmer feels that the EU is really going to help the production agriculture sector in Bulgaria. The farmer acknowledged that the European Union subsidized new equipment purchases at the rate of 50 percent from 2007–2009, with the ratio declining to 40 percent in 2010. With the EU subsidy, this farmer has been able to get better equipment to improve his production efficiency. The farmer has 12 employees.

Case Study 6: Malka Akadia (Little Arkadia)—Guest House

This guest house is located in the Village of Kipilovo, Municipality Kotel. The Renaissance-style house has four guest rooms, a relaxation hall, satellite services, sound, Jacuzzi, a small tavern with a fireplace, and facilities for those wishing to have barbecued foods (Little Arkadia 2009)**.** The guest house is suitable for family tourism and is also a starting point for those on hunting trips. The owners of the guest house produce about 70 hectares of medicinal herbs for several European markets and want to export herbs to the United States. The owners believe that with access to the United States market, profits would be greatly enhanced. The owners employ about 20 people at the facility.

Case Study 7: Pokap—Hog Production and Meat Processing Facility

This facility is a four-partner meat processing plant located in Stara Zagora with a capacity of 8.5 metric tons per eight hour day. Employment grew from 25 in 1995 to 90 in 2009. The plant produces traditional Bulgarian sausages, salamis, and processed meats. The company uses its 18 refrigerated vans to deliver mainly to Billa and the 25 largest wholesale distributors located in Bulgaria. The firm also makes deliveries to over 500 small shops in the Stara Zagora region by using four smaller buses. The company sells 25 percent of the daily production to its largest customer, a French and German firm located in Burgas. The company relies solely on the domestic market, as it is not licensed to ship abroad; only 50 plants in Bulgaria are licensed to export. With this strategy, the firm has an eight percent profit margin and a history of steady growth.

Case Studies 8 and 9: E.T. Michaela and Firm Dimes 2000—Hog Production and Meat Processing Facilities

These firms consist of two partners involved in grain production, hog production, and meat processing. The firms were started in 1995. Employment consists of 14 people in the processing plant and 36 in the farming operation. The processing facility produces fresh meat, sausages, salami, and meatballs. The facility is operating at 50 percent of its slaughter capacity at present. The company sells about 50 percent of its production to wholesale distributors who then transport it to 300 local shops, while the remaining production is sold directly to local shops. The owners revealed that 400 slaughter facilities in the country are operating at about 25 percent of total capacity. The owners also revealed that high grain prices during 2007–2008 forced 30 percent of Bulgaria's hog farms out of business. The owners described their financial condition as good given the current weak economy. The owners pointed to EU subsidies and a stable currency as the most important factors in their success.

Case Study 10: Nova Zagora Cattle Farm—Dairy, Beef, and Grain Farm

This farmer started a large grain and hog operation near Nova Zagora in the mid-1990s. He closed the hog operation in 2004 due to poor profitability. The farmer continued to produce grain, but was not utilizing all of the barns and other facilities on the farm. The owner started cattle production in 2005 to better utilize his facilities and to improve the profitability of grain production on the land he farms. The dairy operation was started about six months ago. The farmer produces wheat, corn, and barley for grain and native grass and alfalfa for hay and silage. The farmer has a milking herd of 150 cows, with 90 cows in production at any one time, producing about 2000 liters of milk per day. The farmer sells the milk under contract to a local processor in Sliven at a current price of €0.25 per liter. The farmer divided his operation into two distinct legal entities in order for his son to receive an EU subsidy for young farmers.

Summary and Conclusions

The ten agribusiness firms have done quite well since 1996. For example, several of the agribusiness firms have increased the number of employees and profitability. Some of the most important observations and conclusions made about the study period are: EU subsidies, standards, and regulations have changed agriculture in Bulgaria and will continue to do so in the future; a stable currency has probably done as much to improve the economic situation in Bulgaria as any other single factor; business entities are primarily individual ownership or partnerships; and entry of Bulgaria into the EU has made it easier for firms to access markets and increase productivity and economic efficiency.

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Wine Price Markup in California Restaurants

William Amspacher

This study quantifies the relationship between retail wine price and restaurant mark-up. Ordinary Least Squares regressions were run to estimate how restaurant mark-up responded to retail price. Separate regressions were run for white wine, red wine, and both red and white combined. Both slope and intercept coefficients for each of these regressions were highly significant and indicated the expected inverse relationship between retail price and mark-up.

Both industry and academia have shown interest in restaurant wine pricing. Choi and Silkes looked at customer satisfaction with wine orders in restaurants and concluded that "the most important single consideration for the respondents when they order wine was type of wine (40 percent) and price (25 percent)." (Choi and Silkes 2010, p. 139). Preszler and Schmidt (2009) looked at buying decisions from the restaurant side in New York restaurants. Respondents rated the influence of 23 attributes on their wine purchasing decisions. The top two attributes were taste and value/profit margin potential, and price category was fourth. Lacey, Bruwer, and Li (2009) looked at perceived risk in restaurant wine purchases. Their review of similar studies referred to wine price in terms of "financial risk" or "economic risk." They concluded that these and other risk factors could be significantly reduced by helpful wait staff.

At the industry and/or consumer level one can easily find restaurant wine pricing discussed in publications such as the *Wall Street Journal*, *Wine Enthusiast Magazine*, and *Wine Business Monthly*, just to name a few. Gretchen Roberts writes, "A bottle priced at $10 wholesale might sell for $15 retail, but $25 to $30 in a restaurant. " She then defers to a wine list consultant who states, "Everyone knows you pay more in restaurants than at retail, but what really aggravates a lot of consumers is how wacky prices can be. A bottle may be $25 at one restaurant, $15 at another, and $40 at a third." Finally, in a remark directly related to the current study, Roberts notes, "Most lists follow a graduated markup, with the highest markups on the cheapest wines, and lower markups on higher-end wines. A $10 wholesale wine may be marked up to $30, but a $50 wine might be just $80." (Roberts 2010)

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Michael Bauer, a food and wine critic for the *San Francisco Chronicle* writes in response to a question on restaurant wine pricing, "Generally, retail is 1.5 times higher than wholesale. That means a $10 bottle of wine would sell for $15 in a store. However, this is the 'suggested retail' and many retailers mark it up less. In a restaurant, a markup on that $10 bottle of wholesale wine would be $25 for 2.5, or $30 for 3 times" But, he then notes, When I write the review, I'll often use a retail price for comparison, because that's what most recognize" (Bauer 2010)

The most succinct statement from the consumer's point of view came from the *Wall Street Journal*: "Never mind trying to understand oil prices; for complexity, inscrutability, and sheer Customer frustration, its hard to match restaurant wine pricing" (Chung 2008). Most literature relates restaurant mark-up to the wholesale price, but wine patrons can only observe the retail price. Although this may vary from definition to definition, the basic restaurant pricing formula is Restaurant Price = 3X Wholesale or 2X Retail.

Current Study

In the Fall of 2009, students were given an assignment to complete over their Thanksgiving break. Each student was to obtain a wine list from a restaurant in their home town. Only lists that included at least ten whites and ten reds were to be used. They were further instructed to include this list with their report and to assure the restaurant that no names would be published without their permission and only aggregated numerical results would be released. Students were then instructed to pick one white wine and one red wine from the list and find two local retail outlets that carry this wine and to record the price at each of these establishments, being certain to indicate precisely where these prices were obtained.

The majority of restaurants were concentrated in the San Francisco Bay area and the Los Angeles/ San Diego area. There were 59 usable wine lists obtained, with a total of 3,843 wines. A detailed breakdown of these wines is presented in Table 1. For all red and white wines recorded on the wine lists the average prices were statistically different at $\alpha = 0.05$. For the red wines and white wines chosen for retail price comparison the average prices were statistically different at $\alpha = 0.05$, but there was no significant difference for mark-ups.

Results

Ordinary Least Squares regressions were run to estimate how restaurant mark-up responded to retail price. Separate regressions were run for white wine, red wine, and both red and white combined. Results are presented in Table 2, 3, and 4. Both the slope and intercept coefficients for each of these regressions are significant at the 99.95 percent confidence level.

From Table 2 one sees that for every $1 increase in the retail price of white wine, the markup at the restaurant decreases nearly four percent. Since one might not even notice a $1 change at retail, it might be more meaningful to look at the impact of a $10 change in retail price.

For every $10 increase in the retail price of white wine, the markup at the restaurant decreases nearly 40 percent. For Every $10 increase in the retail price of red wine, the markup at the restaurant decreases approximately 15 percent (Table 3). Finally, for every $10 increase in all of the wines included for evaluation, the markup at the restaurant decreases approximately 20 percent (Table 4).

Summary

Restaurant owners may not conduct detailed searches of local retail price for wines included on their list, but it seems safe to assume that they have educated guesses of approximate retail values based on the wholesale price they pay. Furthermore, they understand that a proportionally smaller markup must be applied to higher priced wines.

While the scope of this study was somewhat limited, and the methodology far from the frontiers of academic endeavors, the results are important in quantifying the relationship between retail price and restaurant price for wine. Since these are the only prices that restaurant customers can readily observe, this may well impact purchase decisions by restaurant patrons. Furthermore, it was found that the average restaurant-over-retail markup for all of the wines evaluated averaged 106 percent, thus lending support to the often quoted industry rule of thumb that Restaurant Price = 2X Retail Price.

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Table 1. Price Summary for All Wines.

	Number	Percent of sample	Average restaurant price
California reds	2000	52	$65.90
Other domestic reds	67	2	$70.00
Imported reds	448	12	$90.02
California whites	977	25	$41.77
Other domestic whites	29	1	$31.24
Imported whites	322	8	$39.42
Total	3843	100	$56.39

Table 2. Markup of Restaurant White Wine Price over Retail.

Regression statistics			
Multiple R	0.57		
R square	0.33		
Adjusted R square	0.32		
	Coefficients	Standard error	t Stat
Intercept	1.817	0.108	16.812
Price	–0.039	0.005	–7.246

Table 3. Markup of Restaurant Red Wine Price over Retail.

Regression statistics			
Multiple R	0.48		
R square	0.23		
Adjusted R square	0.23		
	Coefficients	Standard error	T Stat
Intercept	1.395	0.085	16.431
Retail price	–0.016	0.003	–5.654

Table 4. Markup of Restaurant both Red and White Wine Price over Retail.

Regression statistics			
Multiple R	0.49		
R square	0.24		
Adjusted R square	0.24		
	Coefficients	Standard error	t Stat
Intercept	1.498	0.064	23.520
Price	–0.021	0.002	–8.265

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The Economic Impact of Ethanol Production on Arkansas Corn-Based Livestock Feed Prices

Paul Armah

This study evaluates the impact of corn used in ethanol production on livestock feed prices. Using graphical, correlation, and causality analyses and 3-month lead and lagged price series, the study forms and tests three main hypotheses: corn-based livestock feed prices are affected by crude oil prices; corn-based livestock feed prices are affected by ethanol prices; corn-based livestock feed prices are affected by beef prices. The graphical analyses show close relationships in the trend of corn-based livestock feed prices and crude oil, ethanol, and beef prices. The results of the correlation analyses indicate highly significant positive coefficients at lag zero for all pairs of price series, suggesting an instantaneous relationship between livestock feed prices on one hand and crude oil, ethanol, and beef prices on the other. This instantaneous relationship could be attributed to the high use of crude oil in the production of corn as well as to the use of corn in the production of ethanol and livestock feed. The results of the causality analyses indicate strong bidirectional causality relationships between the prices of ethanol, beef, and livestock feed. However, there is a weak causality relationship between crude oil prices and livestock feed prices. These results imply that higher crude oil prices in recent years have created higher incentives for the demand for and production of ethanol, thus stimulating demand for corn, the primary input or feedstock for ethanol. This has put upward pressure on corn-based livestock feed prices.

Current demand for biofuels in the U.S. has been driven largely by high crude oil prices, dependence on unstable and hostile countries for crude oil, environmental concerns, the weak U.S. dollar, and initiatives by the federal government and several states to expand the use of biofuels. The Renewable Fuels Standard (RFS), part of the national 2005 Energy Policy Act, requires blending of renewable fuels with gasoline to reach 7.5 billion gallons by 2012 (U.S. EPA 2006). The Energy Independence and Security Act of 2007 (The White House 2007) compels fuel producers to use no less than 36 billion gallons of biofuels by 2022. These stimuli have fueled renewable energy production in the U.S. in recent years and have created an alternative market for agricultural commodities used as feedstocks in bioenergy production, such as corn used for ethanol production. This alternative market for agricultural commodities has the potential to impact commodity prices.

A number of reports have emerged in the past three years which attempt to account for the factors associated with food price inflation throughout the world (Kruse et al. 2007; Elobeid et al. 2007; Abbott, Hurt, and Tyner 2008; Henderson 2008; Trostle 2008). These prominent studies have indicated that the main drivers associated with the rise in food prices are the increased energy costs (and the trickle-down impact on farm input costs, especially for fertilizers, livestock feed, and chemical control products), devaluation of the U.S. dollar, global weather conditions, high energy demand from emerging economies (mainly India and China), and the use of commodity crops (especially corn and soybean) in the production of biofuels. Trostle (2008) and Abbott, Hurt, and Tyner (2008) have specifically indicated that prices of all commodities (food and non-food) have increased in a corresponding manner with the price of oil. Furthermore, there is a direct link between cost of energy and price of fertilizers, agricultural chemicals, propane and diesel used in production agriculture (Abbott, Hurt, and Tyner 2008). To illustrate this point, the Arkansas State University Farm experienced a 251 percent increase in fuel costs to operate the farm machinery comparing the 2007–2008 actual expenditures to those of 2005–2006 (Pendegraft and Johnson 2008). In that same period, fertilizer costs increased 329 percent at the ASU Farm and livestock feed prices increased 266 percent. It is noteworthy in this example that the trickle-down impact of increased cost of commodities used in livestock feed tracks closely to the cost of energy.

In the U.S., corn classified as "field corn" is used mainly in livestock feeds and ethanol production. About 55 percent of corn produced in the U.S. is used in animal feed (Leibtag 2008). Less than ten

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percent of field corn is directly used in the production of products such as corn meal, corn starch, and corn flakes for human consumption. Consequently, any diversion of field corn for ethanol production has the potential to impact the prices of livestock feed (Leibtag 2008; Molseed 2008). Furthermore, much attention from the public media has been placed on the use of corn for ethanol production, and that this alternate demand for corn has been the primary reason for increased food prices. While there is consensus on the impact of ethanol production on the price of corn, it is unclear whether the increased corn prices have impacted the prices of livestock feed or cattle (Farrell et al. 2006; Hill et al. 2006; U.S. EPA 2006). However, data gleaned by Abbott, Hurt, and Tyner (2008) indicate that the rise in oil price from $40 to $120 per barrel was mirrored by the rise of corn from $2 to $6 per bushel; of the $4 increase in the price of corn, $3 is attributed to the price of oil and $1 to ethanol.

Currently there is a U.S. government mandate to produce five billion gallons of corn-based ethanol by the year 2012 (Platts 2009). Ethanol production in the U.S has been increasing at a faster rate than corn production (NASS 2009). Furthermore, since corn is an important input in livestock feed, its increased use in ethanol production has had a stronger impact on the prices of livestock feed and meat products (Harris 2008; Hoffman 2007; Leibtag 2008). For example, the index of prices received by U.S. farmers for all products increased by 34 percent from 2006 to 2008 (Collins 2008). However, during the same period, the index of prices for feed grains increased 144 percent, mainly due to increased corn prices. It is not surprising that average beef cattle prices in Arkansas increased significantly, from $53.00 in 1998 to $80.40 per hundredweight in 2008 (NASS 2009). Indeed, using a simple pass-through model the Bureau of Labor Statistics estimated that in 2007 the average retail price of beef rose by 14 cents, or about 8.7 percent, compared to 1997 average prices (U.S. Department of Labor 2008; Leibtag 2008). With the price of livestock feed rising, the questions on the mind of many cattle producers include the following: What are the effects of high corn prices on cattle feed prices? What are the effects of livestock feed prices on cattle prices? Will the diversion of corn for ethanol production affect the prices of livestock feed and cattle? Will there be sufficient corn available for livestock feed production? What are the effects of ethanol production on corn and livestock feed prices? What are the effects of crude oil prices on the production and prices of ethanol and livestock feed?

Methodology

Production and price-series data for corn-based livestock feed (field corn), crude oil, ethanol, and beef were used to analyze and evaluate the impact of crude oil, ethanol, and beef on corn-based livestock feed prices. To overcome the problems of suspected serial correlation, the price series were indexed using 1994 as the base year and pre-filtered using the logarithms of the indexed series, the pre-filter used was sufficient to remove suspected autocorrelations problems. Using graphical, correlation and causation regression, three hypotheses—livestock feed prices are affected by crude oil prices; livestock feed prices are affected by ethanol prices; and livestock feed prices are affected by beef prices—were tested to evaluate the impact in the price series. Theoretical interdependence or feedback, causation, and independence price-relationship hypotheses were formulated and used to test and evaluate the three hypotheses. Theoretical causation procedures used were originally developed by Granger (1969), Haugh (1972), and Sims (1972).

Graphical Price Relationships

The logarithms of the indexed price series of livestock feed, crude oil, ethanol and beef were graphed to evaluate their relationships.

Correlation Price Relationships

The cross-correlation function was used to test independence in the price series. The method used is based on Haugh (1972, 1976) interdependence test that showed that:

a) under the null hypothesis of interdependence, the cross-correlation function of the price series has zero value at all positive and negative lags,

b) under the null-hypothesis of feedback causality, the cross-correlation function of the observations of X and Y has non-zero values at positive and negative lags, and

c) under the hypothesis of instantaneous causality the cross-correlation function has non-zero values at a lag of zero.

Causality Price Relationships

Price relationships between crude oil, ethanol, and beef prices in relation to livestock feed prices were used to propose the three hypotheses in order to test the economic effect—i.e., whether livestock feed producers rely on crude oil, ethanol, and beef prices in their production decisions. A causation regression of livestock feed prices on past, present and future values (leads of three months and lags of three months) of crude, ethanol, and beef prices was run to capture the direction of the impact or causation.

Causality Model: The causality model used states that "X_t is causing Y_t if we are better able to predict Y_t using all available information than if the information apart from X_t had been used" (Granger 1969). That is, X causes Y if current values of Y can better be predicted using past values of X than simply using past history of Y.[1]

The Granger causality theory on which our regression is based gave rise to a set of procedures for testing the hypotheses of interdependence or feedback, causation, and independence in price relationships that avoid correlation problems (Granger and Newbold 1974; Pierce and Haugh 1977; Feige and Pearce 1979). The procedures for testing the hypotheses of independence, feedback, and instantaneous causality were developed by Haugh (1972) and Haugh and Pierce (1977), and that for testing the direction of causation was developed by Sims (1972).

Direction of Causation Test: The direction of causation model states that in a regression of X on past, present and future values of Y, the null hypothesis of unidirectional causality from X to Y is equivalent to all the coefficients on all future values of Y being equal to zero or insignificantly different from zero (Sims 1972).

That is, X does not cause Y if the future coefficients of Y as a group equals zero and X does not cause Y at all if the future coefficients of Y are all zero. An analogous regression of Y on past and future X is then estimated to determine whether Y causes X. However, because the error term (e_t) in the regression of time series is generally suspected to be serially correlated, Sims (1972) suggested pre-filtering the X and Y series to eliminate serial correlation problems.[2]

Results

Results of Graphical Analysis

Figure 1 shows that from 1994 to 2004 corn-based livestock feed, field corn, and beef prices moved strongly together with ethanol and crude oil prices. However, these trends changed significantly from 2003 to 2007, when crude oil prices rose more significantly than those of ethanol, field corn, feed, and beef, although the trends in all prices are upward. Figure 1 also shows that after 2008 crude oil prices declined significantly and this trend was reflected in ethanol, field corn, livestock feed, and beef prices. The implication from Figure 1 is that there are close relationships in the trend of prices of crude oil, ethanol, field corn, feed, and beef—i.e., there is a high probability that ethanol, field corn, feed, and beef prices follow the trend of crude oil prices.

Results of Correlation Analysis

Table 1 shows the result of the cross correlation calculated at lead/lags of one, two, and three months[3] to capture the relationships between crude oil, ethanol, beef, and livestock feed prices. Applying the asymptotic standard deviation of 1/sqrt(181) = 0.07, it is noted that in most cases the cross-correlations are significant at lead/lags of one, two and three months—i.e., the cross correlation coefficients, T-statistic, and P-values are significant at the one percent level. This suggests that there is some evidence of two-way or feedback causality—i.e., the corn-based livestock feed price series are explained by those of crude oil, ethanol, and beef. Moreover, the prominence of the highly significant positive

[1] This concept is fully explained in Granger (1980).

[2] See Sims (1977) for discussion of the nature of this problem.

[3] We originally suspected direct leads and lags at low values; say zero to three months, and feedback, if it existed, to be running from crude oil, ethanol, and beef prices to livestock feed prices, at maximum lags of about one to three months. Thus calculations for cross correlations were made with lags of one to three periods in each direction.

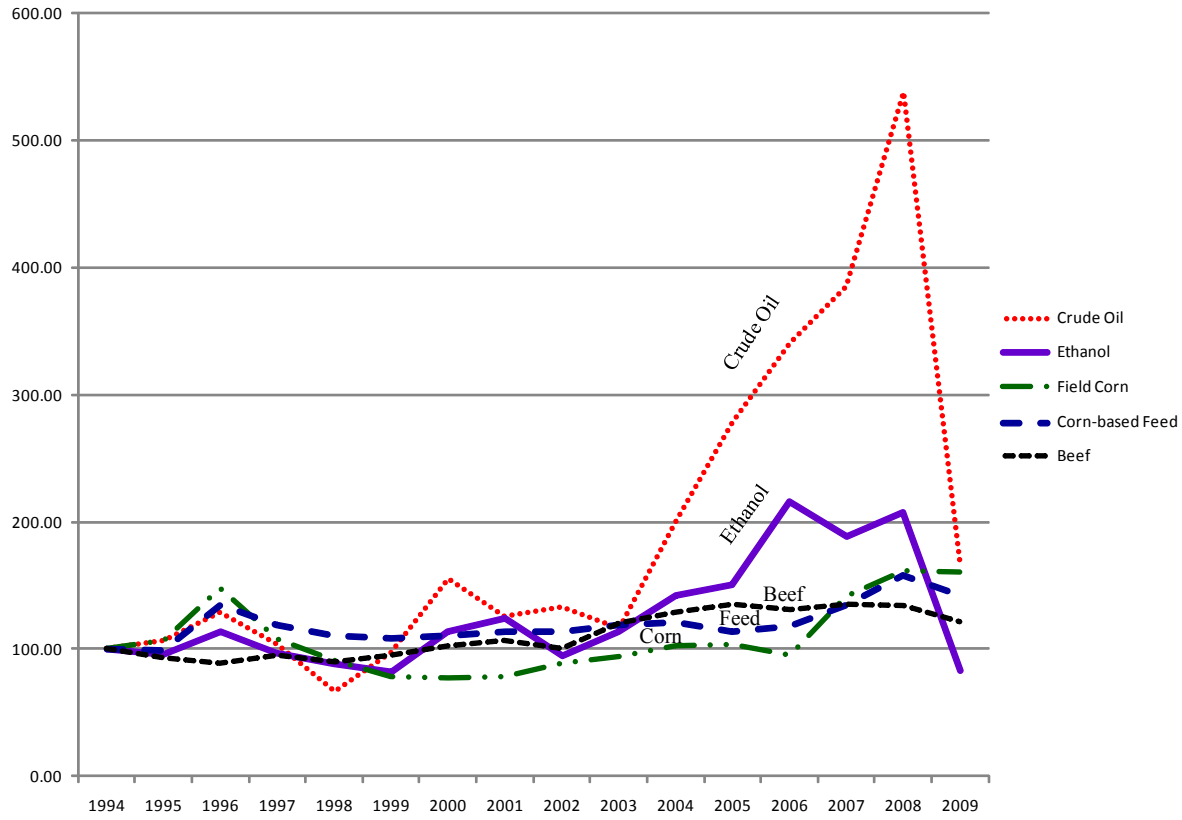

Figure 1. Livestock Feed, Corn, Ethanol, Crude Oil, and Beef Prices, 1994–2009.

Source: Drawn from EIA (2009), NASS (2009), and Nebraska Energy Office (n.d.).

coefficients at lag zero for all pairs of price series suggests an instantaneous relationship between livestock feed prices on one hand and crude oil, ethanol, and beef prices on the other. This instantaneous relationship may be attributed to the use of crude oil in the production of field corn (fertilizer and gasoline) and the high use of corn in the production of both ethanol and livestock feed.

Thus Table 1 shows that the null-hypothesis that livestock feed prices are independent of crude oil, ethanol, and beef prices is rejected at the one percent level; the null hypothesis of feedback causality is accepted at one percent level, since the results of the cross-correlation function at positive and negative lags has non-zero values; and the null hypothesis of no instantaneous causality is rejected at the one percent level, since the results of the cross-correlation functions have non-zero values at a lag of zero. The implications from these results are that livestock feed prices depend on crude oil, ethanol, and beef prices and that livestock feed producers employ equivalent past and future price information on crude oil, ethanol, and beef in forming their production decisions.

Results of Regression Analysis

The causality regression results are shown in Tables 2 and 3 and 4. The hypothesis of no dependence between all the price series is rejected at the one percent level since the results of all coefficients in Tables 2, 3 and 4 are significantly different from zero. The hypothesis of unidirectional causality between all price series is also rejected at the one

Table 1. Cross-Correlation of Livestock Feed with Beef, Crude, and Ethanol Prices.

Lead Lag	Beef Value	T-test results		Crude Value	T-test results		Ethanol Value	T-test results	
		T-value	P-value		T value	P-value		T-value	P-value
3	0.4697	1.7126	0.0282	0.5918	1.2857	<0.0001	0.5366	9.2459	0.0043
2	0.4688	2.2612	0.0103	0.6157	1.1028	<0.0001	0.5688	2.4300	0.0018
1	0.4607	9.8946	0.0096	0.6335	1.0872	<0.0001	0.5797	4.8795	0.0013
0	0.4508	**4.2319**	**0.0016**	**0.6413**	**1.3217**	**<0.0001**	**0.5691**	**1.1245**	**0.0009**
–1	0.4402	3.3132	<0.0001	0.6388	3.6208	<0.0001	0.5683	5.9234	<0.0001
–2	0.4472	2.8644	<0.0001	0.6352	1.0207	<0.0001	0.5432	2.0324	<0.0001
–3	0.4197	1.4322	<0.0001	0.6352	2.9329	<0.0001	0.5678	6.2852	<0.0001

It was suspected that direct leads and lags at low values e.g., (0–3 months) and feedback, if it existed, would run from crude oil, ethanol, and beef prices to cattle feed prices, at maximum lags of about 1 to 3 months. Thus calculations for Haugh's S-statistic were made with lags of 1 to 3 periods in each direction.

Source: NASS (2009), EIA (2009), and Nebraska Energy Office (n.d.).

Table 2. Regression Results of Livestock Feed with Crude Oil Prices.

Lead/lag months	Coefficients	R^2	F-statistics	Std. error
Lag 3 months	0.230	54.20	101.845	0.377
Lag 2 months	0.267	66.60	8.081	0.617
Lag 1 month	0.170	78.90	3.789	0.634
Lag 0 month	**0.151**	**81.20**	**3.423**	**0.633**
Lead 1 months	0.006	99.20	3.356	0.634
Lead 2 months	0.173	66.10	3.293	0.623
Lead 3 months	0.170	53.60	3.533	0.381

Tabular F value is $F_{0.01}(3, 305) = 3.273$. Empirical values of F greater than this tabular value suggests the null hypothesis of sum of the coefficients being zero is rejected at the one percent level.

Source: NASS (2009) and EIA (2009).

percent level since none of the future coefficients in Tables 2, 3 and 4 is equal to zero. The future coefficient values in Tables 3 and 4 are as large as their corresponding past values. This implies that (for one to three months past and future prices) causality runs bi-directionally between ethanol and beef prices on one hand and the livestock feed prices on the other. The future coefficients in Table 2 shows that the bi-directional relationship between crude oil and livestock feed prices is rather weak. However, comparisons of the F values and standard errors indicate rather strong causality running from beef, ethanol, and crude oil prices to livestock feed prices—i.e., for lags and leads of no longer than three months, livestock feed prices seem to follow beef, ethanol, and crude oil prices more strongly than vice versa.

Table 3. Summary Regression Results of Livestock Feed with Ethanol Prices.

Lead/lag months	Coefficients	R^2	F-statistics	Std. error
Lag 3 months	0.523	86.56	11.43	0.027
Lag 2 months	0.536	83.62	9.54	0.026
Lag 1 month	0.416	74.28	9.21	0.026
Lag 0 month	**0.486**	**56.72**	**11.56**	**0.022**
Lead 1 months	0.403	55.81	9.33	0.019
Lead 2 months	0.400	54.33	4.38	0.022
Lead 3 months	0.496	48.56	3.50	0.026

Tabular F value is $F_{0.01}(3, 305) = 3.273$. Empirical values of F greater than this tabular value suggests the null hypothesis of sum of the coefficients being to zero is rejected at the one percent level.

Source: NASS (2009) and Nebraska Energy Office (n.d.).

Table 4. Summary Regression Results of Livestock Feed with Beef Prices.

Lead/lag months	Coefficients	R^2	F-statistics	Std. error
Lag 3 months	0.846	78.61	29.72	0.369
Lag 2 months	0.627	67.01	24.33	0.369
Lag 1 month	0.364	53.92	18.31	0.255
Lag 0 month	**0.246**	**41.23**	**13.23**	**0.183**
Lead 1 months	0.324	37.65	9.16	0.182
Lead 2 months	0.512	38.43	6.33	0.185
Lead 3 months	0.467	36.81	6.24	0.176

Tabular F value is $F_{0.01}(3, 305) = 3.273$. Empirical values of F greater than this tabular value suggests the null hypothesis of sum of the coefficients being zero is rejected at the one percent level.

Summary and Conclusions

The results from the analyses in the study have shown that crude oil, ethanol, and beef prices impact or have strong relationships with corn-based livestock feed prices. The implications from the from the results are that higher crude oil prices in recent years may have created higher incentives for the production and increased demand for ethanol, thus stimulating demand for corn, the primary feedstock or input for ethanol. This has put upward pressure on corn-based livestock feed prices, as corn is the major input for the production of livestock feed. Therefore the emerging demand for ethanol, which is mainly produced from corn, may have been one of the key factors in the surging prices of corn-based livestock feed in recent years. The inference from this conclusion is that cattle producers utilize past and future crude oil, ethanol, and beef price information in their production decisions.

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The Role of Sensory Attributes in Marketing Organic Food: Findings from a Qualitative Study of Italian Consumers

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This paper uses a qualitative marketing research technique to explore in-depth sensory experiences, expectations, and perceptions of organic consumers when purchasing and eating organic food. Five focus-group interviews supported by semi-structured questionnaire were performed in Italy during 2009.

Findings suggest that sensory attributes may be more relevant for older than for younger participants. Consumers largely agree that organic food should differ from conventional items, but variety is also expected among organic products themselves. Appearance and odor appear to be the most important sensory attributes when consumers purchase food, while taste and odor are the most important attributes when eating. Sensory-related information seems to play a crucial role when consumers are choosing which product to buy for the first time.

During last decade the European organic food market has been characterized by an uninterrupted growth (Hamm and Gronefeld 2004; Sahota 2009), leading to changes in its original supply chain structure and characteristics. According to Padel, Schaak, and Willer (2009), the total value of European organic market was estimated at approximately €16.2 billion in 2007 (about US$22 million at the 2007 exchange rate), an increase of nearly two billion euros compared with 2006. Moreover, the organic food market in Europe has grown on average about 10 percent per year with an average per-capita spending of €27 across all European countries. Despite the world economic crisis, Italian consumers are increasing their consumption of organic food. Italian consumption of organic products amounted to €1,970 million in 2008 (Stolz et al. 2010) with an increase of 6.9 percent in 2009 (Ismea 2010), representing about three percent of overall Italian food consumption.

Although the European organic market is moving from "exclusive" to "mass" market status, where large retailers are gaining market share (Hughner et al. 2007), in 2005 the share of organic food sales in large retail chains in Italy was only 39 percent, much lower than in most European countries. Therefore in Italy organic food still is mainly sold by traditional grocery stores and by specialized retailers (e.g., the organic retail chain NaturaSì). However, the share of organic products sales at large retailers has increased in the last few years (Schaak and Willer 2010).

Presently, organic food consumers seem to pay more attention to "hedonistic" motives for purchasing organic food, such as health, taste, and wellness, rather than to "altruistic" purchasing motives, such as environmental protection and animal welfare. Moreover, sensory attributes are gaining importance in food choices (Shepherd, Magnusson, and Sjödén 2005). In this context, organic practitioners are also starting to take into account sensory properties, such as taste, smell, appearance, touch, odor, etc. as important elements to be considered in food product development and marketing communication strategies in order to quickly respond to the new consumers' needs and to shifted expectations.

Research on organic consumers' sensory analy-

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sis has not been explored widely in the literature. Some studies showed that taste and other sensory attributes represent important product features for specific consumers segments who approach the purchase of organic food products pragmatically (Pellegrini and Farinello 2009) and tend to evaluate them according to the same parameters applied to conventional products (Berardini et al. 2006). Other studies revealed that taste and appearance are among the most important criteria in organic food purchase (Castellini et al. 2008; Kuhar and Juvančič 2010; Magnusson et al. 2001; Roddy, Cowan, and Hutchinson 1994). These findings were confirmed by Lüth and Spiller (2005), who reported that consumers are willing to pay higher prices for organic products solely if they feature aspects beyond the fact of being organically produced, such as a unique taste or smell. Finally, some scientists pointed out that sensory attributes are important elements that should be taken into account in the marketing strategies by organic food operators (Brennan and Kuri 2002; Padel and Foster 2005).

To our knowledge, few studies focused specifically on consumers' sensory experiences and preferences for organic food have been conducted in Italy (Stolz et al. 2010). Some authors explored consumers' sensory experiences and preferences concerning organic extra-virgin olive oil (Bracco et al. 2009; Midmore et al. 2005), while other contributions focused on Pecorino cheese (Napolitano et al. 2009) and organic vegetable baby food (Vairo and Zanoli 2009).

Because sensory properties are a relatively new issue in the organic food market, an exploratory approach is of paramount importance for providing useful insights to design more extensive consumer surveys in order to segment consumers and help food distributors improve their marketing strategies. This paper in particular explores in-depth sensory experiences, expectations and perceptions of organic consumers when purchasing and eating organic food. An exploratory approach and a qualitative marketing research technique have been used. Findings elicit some key elements which may enable further research and provide useful recommendations to food industry and distribution practitioners interested in marketing organic food.

Section 2 of this paper describes the qualitative method used to collect and analyze information about experiences and expectations of organic consumers linked to sensory attributes. Section 3 presents the findings of this research about relationships between consumers and sensory attributes of organic food. Section 4 summarizes the main findings and indicates the need for more extensive and in-depth investigations.

Methodology

We applied the focus-group interview as the most suitable qualitative research technique. Focus groups are frequently used in market research to explore in-depth topics in order to allow the discovery of elements that could be used in further investigations (Molteni and Troilo 2007).

During Fall 2009 we conducted five focus groups in five different cities across Italy: Trieste, Genoa, Rome, Bari, and Matelica. The locations were chosen to include large and small cities spread across the country, addressing both areas where organic food are already a well-established market and areas where it is not. Recruitment of organic consumers, conducted by the researchers, was carried out using a short and simple questionnaire aimed at complying with quota restrictions that take into account gender (67 percent women and 33 percent men), age (50 percent between 18–45 years and 50 percent between 46–75 years), and level of organic food consumption (heavy users and light users)[1]. The selected consumers were invited to join group discussions in rooms endowed with all the facilities necessary to conduct focus groups (e.g., round table, chairs, board and pin up cards, audio and video-recording equipments, etc.).

The discussions were conducted following a semi-structured interview schedule, previously designed and pre-tested with personnel of the University of Bologna. The interview outline was divided into sections that reflected the themes under investigation: associations related to sensory characteristics of organic food, expectations on sensory properties in terms of standardization/variability, and expectations to marketing sensory aspects of organic food.

Table 1 describes in detail the characteristics of the 41 organic consumers interviewed during the

[1] Light users are occasional consumers who ate organic food once or twice during the last six months, while heavy users are frequent consumers who ate organic food more than twice during the same period.

Table 1. Characteristics of the Focus Group Interviews.

FG	1	2	3	4	5	
Type of users	Light users	Heavy users	Heavy users	Light users	Light users	
Location	Trieste	Genoa	Rome	Bari	Matelica	Total
Number of consumers	8	8	9	6	10	41
Female	5	6	5	3	6	25
Male	3	2	4	3	4	16
18 to 45 years	4	4	5	3	5	21
46 to 75 years	4	4	4	3	5	20

focus groups and how they are stratified according to age ranges and gender.

Two focus-group discussions involved heavy users and three discussions regarded light users of organic food. The choice to separate heavy users from light users was made to avoid the risk that heavy consumers could influence the opinions of light users during a joint discussion because of their supposed better knowledge of the issue. Each interview lasted about one hour and was video and audio recorded. The interview content was transcribed, and the transcripts were read and concepts and meanings extracted from the text were categorized and classified according to the different themes investigated. Data were then analyzed using a qualitative content analysis and meaning condensation approach.

Results

It appears that some consumers are still somewhat confused about the meaning of the term "organic food." Organic food is often associated with a set of desired features of food such as naturalness, freshness, taste, safety, no chemical contamination, and "home-made" foods, while compliance with a well-defined production standard and its certification is rarely mentioned. This finding confirms that many consumers are interested in the final result rather than in the process In addition, although some of the mentioned attributes may be considered as a consequence of the adoption of the organic standard (e.g., reduction of the risk of contamination by agrochemicals), others (such as freshness) are only indirectly and sometimes weakly linked with the organic standard or they are the expression of other underlying concepts. For example some consumers said, "For me organic food is a food produced in a small farm" and "Organic food comes from the vegetable garden cultivated by my grandparents." Furthermore, some consumers link organic food to particular food products (e.g., milk, fruit, vegetables, natural, fair trade, etc.), animals (e.g., insects), people/occupations (e.g., farmer, baker), and colors (e.g., green, yellow, etc.).

The importance of organic food sensory attributes when consumers purchase and eat food differs depending on age. Older consumers seem to pay more attention to sensory and safety attributes than do younger consumers, who instead pay more attention to environmental protection, animal welfare, and absence of chemical preservatives or additives when they purchase organic food. The greater attention paid by elder consumers to sensory attributes of organic food may be linked to childhood memories which apparently serve as a "personal sensory-quality term of reference," when taste experiences of the past are compared with current sensory characteristics of food. However, among attributes that consumers take into account when purchasing and eating organic food, sensory attributes still appear to be less important than attributes such as environmental protection, animal welfare, absence of additives, etc.

Regarding consumers' expectations in terms of standardization/variability of sensory properties, participants largely agree that organic food should differ from conventional food in terms of shape, odor, color, taste, texture, etc., but variety is also expected among organic food items themselves. For example, an organic light user of organic fruit said, "The shape of organic food should not be standardized. It has to be natural and each fruit must have a different shape, because it has to depend on Nature." However, a few consumers expected organic food to mimic some successful branded products.

Sensory attributes may play different roles at the purchasing and eating levels. In particular, important sensory attributes when consumers purchase organic food appear to be appearance and color, as indicated by one consumer who said, "Food has to be attractive and must have a particular color that outlines natural characteristic and that exalts smell."

On the other hand, for many consumers taste and odor represent the most relevant sensory attributes when eating organic food, as noted by one participant who said, "Taste of food has to be consistent and accompanied by a strong personality."

The difficulties shown by consumers in describing sensory experiences and expectations and the existence of many different patterns in perceiving sensory differences between organic and conventional food products confirm that sensory perception is a complex issue to analyze.

Consumers often mention that information about ingredients, additives, and origin of the products have the highest relevance for their buying decision. However, sensory-related information is deemed to play a crucial role when consumers are choosing which product to buy for the first time.

In addition, consumers underlined the importance of symbols and images concerning nature or people reported on the packaging labels, which may increase the chances to purchase organic food. For example, an image of rainbow or sun could be associated with organic food or "a picture of grass with people walking with kids among trees, or parents with kids who walk among nature remind me of organic food."

Finally, keywords associated with organic food were discussed in the focus groups, and some participants highlighted that odor or taste mentioned on the labels may be very attractive to consumers, as indicated for example by consumers who said, "coming back to nature" and "information about taste and odors reported on the label of jar of honey could increase the chance of purchasing."

Conclusions and Recommendations

Although it is risky to make conclusive statements on the basis of a qualitative study based on a small sample, we drew some conclusions that could represent a good starting point for further investigations based on a quantitative approach.

First, consumers still appear to be confused about the correct meaning of "organic food," which is sometimes associated with closely related but different meanings, depending on personal knowledge, experiences, etc. This problem was widely investigated in the late 1980s and early 1990s, but recently it has lost the attention of practitioners and researchers, even though it still is an issue of utmost importance.

Second, older consumers' comments seem to assign more relevance than to the role played by sensory attributes when purchasing and eating organic food than do those of younger consumers. This may be due to the fact that older consumers expect that organic food will mimic food that they used to eat when they were children. This may have important implications for marketing strategies, suggesting that experience, education, and training in food taste may play a role in shifting preferences.

Third, consumers largely agree that organic food should diversify in terms of sensory characteristics such as shape, taste, odor, etc., in comparison with conventional products.

Fourth, even though sensory attributes appear not to be the most relevant factors for purchasing organic food—a result confirmed by other studies (Magnusson et al. 2001; Schifferstein and Oude Ophuis 1998)—they may play an important role at both the purchasing and eating levels. In particular, at the purchasing level appearance and color are expected to be relevant attributes, while taste and odor are important when consumers eat organic food and they play a role in building expectations, satisfaction, and loyalty mechanisms.

Fifth, in terms of sensory marketing, consumers appear to be attracted by particular colors, images, symbols, or keywords linked to organic food. If suitably emphasized (e.g., by using sensory la-

bels), these elements could increase the chances of purchase. Thus sensory marketing could be an important tool to build awareness, and training consumers in particular sensory properties of organic food could be very important in order to enhance the conscious consumption of organic food. On the other hand, food marketers could inform consumers about production methods of organic agriculture and processing, nutritional components, and modification of taste during shelf-life when these factors are directly linked with sensory attributes.

The use of an experiential marketing approach—for instance, reproduction of sounds associated with organic production method as well as tastings, contests, games, and oral advice at the point of sale on how to prepare and consume organic food—may contribute to stimulating and enhancing the interest for these products.

Finally, we suggest that further marketing research should address the need for segmenting organic consumers on the basis of preferences for sensory characteristics in order to design better sensory marketing actions. In addition, willingness to pay (WTP) of consumers for organic food claiming particular sensory attributes needs to be explored.

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Farm-Direct Food Sales in the Northeast Region: A County-Level Analysis

Mei-luan Cheng, Nelson Bills, and Wen-fei Uva

As articles on local foods appear frequently in the mass media, interest in local food markets has increased significantly around the United States. Growing consumer interest in fresh and local foods, sustainable agriculture, and local community development have fueled demand for purchasing directly from farms. Many small and medium farms have adopted direct marketing to consumers as an alternative to sustain business vitality, obtain higher prices, and maintain a competitive edge in the market. Local food markets typically involve small farmers, various products, and farm-direct marketing channels. Farm-direct sales are only one portion of local foods. However, due to the vague and inconsistent definitions of "local," farm-direct sales become the most visible aspect of a growing interest in local foods.

The USDA Agricultural Census provides farm-direct sales at the county level that include crops, livestock, poultry, or agricultural products that were sold directly to consumers for human consumption. Farm-direct food sales account for a small but fast-growing segment of U.S. agriculture, increasing by an inflation-adjusted 59 percent from 1997 to 2007 and reaching $1.2 billion in 2007 (Timmons and Wang 2010). Recent growth in direct-to-consumer marketing sales has come from large operations with annual sales higher than $50,000 and from beef, fruit, and vegetable farms (Martinez et al. 2010).

Assessing the future growth in local food requires an understanding of the factors that influence farm-direct food sales. There has been considerable research on the consumer characteristics and attitudes that influence farm-direct food sales, while previous research relative to farm characteristics is limited. Surveys are the basis of most studies of direct-marketing farms and farmers (Govindasamy, Hossain, and Adelaja.1999; Uva 2002; Hunt 2007). General research reviews for farm-direct marketing are provided by Brown (2002), Brown and Miller (2008), and Martinez et al. (2010). A few studies analyzed major factors associated with farm-direct food sales at the county level using USDA Agricultural Census data (Brown, Gandee, and D'Souza 2006; Timmons and Wang 2010). However, additional attention should be given to the types of participating farms and the full range of direct marketing channels (Lev and Gwin 2010). More research into the actual linkages between the variables and observed direct food sales based on regional differences is needed (Brown 2002; Timmons and Wang 2010).

This study uses 2007 USDA Census of Agriculture data and regression analysis to identify major factors associated with farm-direct food sales across counties in the Northeast region. The Northeast region includes Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, New Jersey, Delaware, and Maryland. The role of farm-direct food sales in the agricultural sector is most prominent in this region because all six New England states, New Jersey, and New York are among the top ten states in farm-direct food sales as a share of total agricultural sales (Diamond and Soto 2009). In addition, New York, Pennsylvania, and Massachusetts have appeared among the top ten States in terms of overall direct marketing sales over the three census years from 1997 to 2007. Our regression analysis examines significant variables of agricultural production, direct marketing options, and socio-economic characteristics that impact the level of farm-direct food sales in the Northeast region.

Data and Methodology

The Census definition of direct farmer-to-consumer sales does not separate out the value of agricul-

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tural products that pass through different marketing channels of farmers markets, roadside stands, pick-your-own sites, community-supported agriculture (CSA), etc. It excludes non-edible products such as craft items and flowers. Farm-direct food sales also exclude food purchased by retail stores, restaurants, co-ops, and institutions, and any processed food such as jellies, sausages, etc. Although the USDA direct sales data are likely a low estimate of actual farm-direct food sales in the U.S, no other data source provides better accuracy of direct food sales and greater insight into consumption of local foods (Timmons and Wang 2010).

This study analyzes farm-direct food sales per square mile as a dependant variable to estimate an ordinary least squares (OLS) linear model. Variables included in the regression model and data source are described in Table 1. The farm-direct food sales equation is $DFS_i = \beta X_i + \varepsilon_i$, where DFS_i is the natural logarithm of farm-direct food sales per square mile in county i and X_i is a vector of explanatory variables; ε_i is the random error component. Note that some data of the 2007 Census of Agriculture were suppressed to avoid disclosing information on individual farms. We excluded counties for which farm-direct sales were not reported. Therefore, our sample of the Northeast region includes 225 counties in 11 states. The explanatory variables include farm characteristics, direct marketing channels, and socioeconomic factors related to demand and supply at the county level.

Results and Discussion

Regression results of the Northeast model, along with summary statistics of variables in the model are presented in Table 2. We include average farm size and type of farming to analyze the impact of farm characteristics. Gale (1997) suggested that small farms and fruit and vegetable growers are more likely to sell directly to consumers. As expected, average farm size (FARMSIZE) was strongly and negatively related to farm-direct sales per square mile. A higher percentage of farms reporting vegetable sales (VEGGI) is significantly associated with higher farm-direct sales in a county, whereas fruit farming (FRUIT) is not a significant factor influencing the level of direct market sales in the

Table 1. Variable Definition and Data Source of the Farm-Direct Food Sales Model.

Variables	Definition	Data source
DFS	Natural log of farm direct food sale per square mile ($K/ square mile)	USDA-NASS (n.d.)
FARMSIZE	Natural log of average farm size (acres)	USDA-NASS (n.d.)
CATTLE	Cattle farm percentage /100	USDA-NASS (n.d.)
VEGGI	Vegetable farm percentage/100	USDA-NASS (n.d.)
FRUIT	Fruit farm percentage/100	USDA-NASS (n.d.)
FRMMKT	Number of farmers markets per 1,000 population in 2009	USDA-ERS (n.d.)
CSA	Ratio of farms marketing through community supported agriculture to total farms	USDA-NASS (n.d.)
SCHOOL	Counties with one or more farm-to-school programs in 2009 (Yes = 1, No = 0)	USDA-ERS (n.d.)
LAND	Land area proportion in farms (%)	USDA-NASS (n.d.)
INCOME	Natural log of median income in 2008 ($K)	U.S. Census Bureau (n.d.)
POP	Natural log of population in 2007	U.S. Census Bureau (n.d.)
MSA	Metropolitan Statistical Area (Yes = 1, No = 0)	U.S. Census Bureau (n.d.)

Table 2. Summary Statistics of Variables and Direct Food Sales Model Estimates.

	Descriptive statistics		OLS regression			
Variables	Mean	Std. deviation	Coeffi-cients	Std. error	p-value[1]	
DFS	0.855	1.164				
Farm characteristic						
FARMSIZE	4.837	0.522	–0.86	0.126	0.000	**
CATTLE	0.228	0.118	1.93	0.532	0.000	**
VEGGI	0.094	0.049	6.21	1.248	0.000	**
FRUIT	0.081	0.069	1.05	0.772	0.174	
Direct marketing options						
FRMMKT	0.044	0.042	3.13	1.388	0.025	*
CSA	0.013	0.013	11.89	4.399	0.007	**
SCHOOL	0.195	0.397	0.52	0.127	0.000	**
Socioeconomic factors						
LAND	23.644	15.958	0.04	0.004	0.000	**
INCOME	10.821	0.249	0.86	0.267	0.002	**
POP	4.669	1.123	0.26	0.064	0.000	**
MSA	0.562	0.497	0.16	0.126	0.218	
(Constant)			–7.93	3.029	0.009	**
			N = 225			
			Adjusted R^2 = 0.66;			

[1] * significant at 5 percent level; ** significant at 1 percent level.

Northeast. Although produce dominates all of the most visible farm-direct marketing channels, it is surprising that livestock farms constituted 58 percent of direct marketers in 2007 (Lev and Gwin 2010). Our results show that a higher percentage of farms reporting cattle and calf sales (CATTLE) in a county is significantly associated with higher farm-direct sales.

Farmers markets are the most important direct marketing channel, concentrated in densely populated areas of the Northeast, Midwest, and West Coast. The number of farmers markets grew to 5,274 in 2009, a 92 percent increase from 1998 (USDA-AMS 2009). The influence of farmers markets (FRMMKT), represented by the number of farmers markets in a county, was strongly positive and significant. The other two direct marketing options—CSA and farm-to-school (SCHOOL)—also show a positive and significant impact on farm-direct sales. Although farm-to-school programs do not directly contribute to the farm-direct sales figure, they may be an indicator of institutional and public support for local food systems.

On the production side, the percentage of farmland (LAND) is used to capture the general suitability of agriculture in a particular area. Farm-direct sales were positively related to this explanatory variable. On the consumer side, population (POP) and median household income (INCOME) are positively correlated with farm-direct sales.

Conclusion

The regression analysis show that nine variables—household income, population, average farm size, available farmland, vegetable production, beef production, number of farmers markets, CSA, and participation of the farm to school programs—together explain most of the variation in farm-direct food sales at the county level in the Northeast. These results imply potential marketing plans and policy construction for the future. Our findings may also serve as a baseline for future research that intends to understand the recent growth and trends of farm-direct food sales in the Northeast, using previous USDA Census of Agriculture data.

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Are All Direct Market Consumers Created Equal?

Kynda R. Curtis

Extension programming focused on assisting farmers in moving to or expanding their direct marketing efforts often considers all direct marketing outlets and associated consumers as one general marketing channel or group. However, the benefits and costs to agricultural producers vary across direct marketing outlets, and it is likely that the customers they serve and appropriate marketing strategies vary as well. Common direct market outlets include farmers markets, community supported agriculture programs (CSAs), roadside stands, and restaurants. Success at each direct outlet entails a different set of skills, risks, and impacts on farm profitability. Producers may benefit from primarily focusing on the direct marketing outlet which more closely aligns with their skills, risk tolerance, and other preferences.

Farmers markets, a primary direct market, gained popularity in the 1990s, with the number of markets doubling between 1994 and 2004 (USDA AMS 2010). Since 2004, the number of markets has steadily increased 65 percent. An increasingly popular direct market outlet is the CSA, or basket program. While CSAs were few in 1990, numbering only 60 (Groh and McFadden 2006), their numbers have doubled since 2004, expanding from 1,700 to 3,300 in 2010 (Local Harvest 2010a). Local Harvest estimates that CSAs currently provide 380,000 shares across the country, accounting for one-half of one percent (0.5 percent) of all households in the U.S. CSAs offer many benefits to both producers and consumers, which is likely the reason behind the dramatic expansion in CSA programs (Local Harvest 2010b).

Studies have examined the general demographics, attitudes, and concerns of farmers market consumers (Wolf, Ahern, and Spittler 2005; Govindasamy, Adelaja, and Italia 2002), and some have looked at differing consumer segments within the farmers market group (Curtis et al. 2010). Other studies have examined CSA consumers and what motivates a consumer to join a CSA (Lea et al. 2006; Lang 2005; Bougherara, Grolleau, and Mzoughi 2009). These studies point out that both CSA and farmers market consumers tend to purchase local foods due to environmental and social concerns and for health and food safety reasons, are generally highly educated, and have a higher than average household income level. But very little has been done to assess the potential differences between consumers in these two popular direct markets. Do they have different lifestyles? Do they have similar concerns and/or attitudes? Are the demographic profiles similar? What characteristics of the direct market outlet are more closely aligned with their preferences? What are they willing to expend on local food purchases?

This study examines consumer demographics, attitudes, and lifestyle measures in an effort to compare farmers market and CSA consumers through the use of two surveys conducted in Nevada. Study results show that CSA consumers are more educated; more fully employed; and more involved in meal and food preparation activities such as canning/preserving, wine/beer making, and home gardening. They are more commonly vegetarians, concerned with health and diet, and looking to support local farmers. Variety, price, and product appearance were more important to farmers market consumers. CSA consumers spent 43 percent more per week on their CSA basket than farmers market consumers spent.

Data and Results

Data were collected through a farmers market survey conducted by 664 in-person interviews at 12 urban markets across Nevada in the summer and fall of 2008 and through a survey provided to members of the Great Basin Basket CSA in northern Nevada in the fall of 2009. The survey was conducted by Internet using Survey Monkey, with 135 members completing the survey. The Great Basin Basket CSA is the largest in Nevada in terms of membership, and

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depending on the year has as many as eight growers providing products to the program. The CSA member survey was completed as a student service project by undergraduate agricultural marketing students at the University of Nevada, Reno.

Demographics

The survey sample statistics regarding demographics are provided in Table 1. The largest differences between the two samples can be seen in respondent educational level, gender, and employment status. Both samples show a high level of education, but 51 percent of the CSA respondents versus 24 percent of the farmers market respondents have a graduate degree or higher. Given that only 28.3 percent of Reno, Nevada residents have a bachelor's degree or higher (U.S. Census Bureau 2008), this is quite remarkable. Additionally, the CSA respondents were more fully employed (60 percent versus 47 percent) and a greater number were female. The CSA sample demographics are consistent with pre-

Table 1. Farmers Market (FM) and CSA Survey Sample Demographics

Variable	Description	Frequency/mean FM (%)	Frequency/mean CSA (%)
Income	<20,000	5.0	2.0
	20,001–50,000	19.0	17.0
	50,001–100,000	31.0	
	>100,000	45.0	37.0
Children	No children	64.7	63.4
	Children in household	35.3	36.6
Education	Middle school	0.6	0.0
	High school	9.4	1.0
	Some college	25.5	7.0
	2-yr associate's degree	17.0	5.0
	4-yr college degree	23.0	36.0
	Graduate degree or higher	24.5	51.0
Employment status	Full-time employed	47.0	60.0
	Part-time employment	12.0	22.0
	Unemployed	5.0	1.0
	Homemaker	11.0	3.0
	Retired	21.0	9.0
	Student	4.0	4.0
Married	Married	65.6	70.0
	Single	34.5	30.0
Age		46.00	44.00
Gender	Male	27.5	16.0
	Female	72.5	84.0

vious studies on CSA members (Russell and Zepeda 2008; Brown, Dury, and Holdsworth 2009; Kane and Lohr 1997). Income levels in both samples are high. Median household income for Reno, Nevada residents is $49,957(Census 2008); annual household income levels for CSA respondents were higher, in the $50,000–$100,000 range, but slightly lower than the farmers market respondents, in the $100,000-and-above category.

Purchasing Habits and Activities

Survey sample statistics regarding purchasing habits and respondent activities are given in Table 2. CSA respondents were more involved in recycling and composting than were the farmers market respondents. However, this may be due to the higher education level of the CSA respondents, as Duggal, Saltzman, and Williams (1991) and Leonas and Cude (1991) find that recycling and composting are more common among the highly educated. The CSA respondents were also more involved in home gardening, food canning/preserving, and beer/wine making, and prepared more meals at home, with 69 percent consuming 16–21 meals at home per week, versus 49 percent of farmers market respondents. The CSA respondents purchased groceries more often at traditional grocery stores and specialty stores such as Whole Foods, and shopped at bulk stores and multi-purpose stores less often. A larger percentage traveled 16–20 miles to the purchase groceries, likely the result of the greater distance between specialty stores. Additionally, CSA customers traveled less distance to the basket pick-up location than farmers market customers traveled to the farmers market but spent $32.50 weekly on the CSA basket, roughly 43 percent more than was spent at farmers markets.

Product Attributes

Survey respondents were asked to evaluate 11 produce attributes on a scale of 1–5 with 1 indicating "Not Important," 2 indicating "Somewhat Important," 3 indicating "Important," 4 indicating "Very Important," and 5 indicating "Extremely Important." The comparison of importance rankings between the two samples is provided in Figure 1 and the average ranking for each sample is given in Table 3. Both samples rated product taste as the most important attribute, but the CSA sample rated quality, local origin, and organic as more important than did the farmers market sample. Additionally, product appearance, value, and variety were less important to the CSA respondents. Although product pricing was ranked seventh by both samples, it was of less overall importance to the CSA respondents, 3.43 out of 5, versus 3.91 to the farmers market respondents. Knowledge of the producer and the product being a specialty product were also rated lower by the CSA respondents.

Attitudes and Lifestyle

Survey respondents were asked to indicate their level of agreement with eleven statements regarding their attitudes, lifestyle, and concerns. Agreement levels were based on a five point scale, with 1 indicating "Strongly Disagree," 2 indicating "Disagree," 3 indicating "Unsure," 4 indicating "Agree," and 5 indicating "Strongly Agree." The results for both samples are shown in Figure 2 and Table 4. Among the CSA respondents, supporting local farmers, concern for health/diet, vegetarianism, and home meal preparation were more prevalent. Physical activity as a part of daily routine was more common as well. Concern for food safety and food origin were less prevalent in the CSA sample.

Discussion and Suggestions

Consumers responding to the farmers market survey were asked why they attend the farmers market and were given seven alternatives. The primary reason was purchasing produce (80 percent); the other 20 percent was due to social interaction, purchasing prepared foods, and attending events/activities. These results are consistent with Oberholtzer and Grow (2003) who found that farmers markets are places for social activity, sense of community, and fresh food. Interestingly, almost half of the farmers market respondents would not consider joining a CSA (46 percent) or needed more info before doing so (20.5 percent). Those looking for social interaction or events/activities at the farmers market would not find CSA membership a suitable substitute. As the farmers market respondents placed a higher value on variety and product appearance (also shown in Bougherara, Grolleau, and Mzoughi [2009] and Lea et al. [2006]), farmers markets pro-

Table 2. Farmers market (FM) and CSA Survey Sample Purchasing/Activities.

Variable	Description	Frequency/mean FM (%)	Frequency/mean CSA (%)
Activity participation	Composting	24.5	58.0
	Home gardening	51.0	72.0
	Recycling	70.0	93.0
	Food canning/ preserving	24.0	48.0
	Home beer/wine making	8.0	18.0
	4-H or FFA	8.0	10.0
	Master gardener	4.0	8.0
	Youth groups	16.0	9.0
	Earth Day	26.0	43.0
Primary food purchaser	Yes	85.0	93.0
	No	15.0	7.0
Weekly FM/CSA expenditure		$22.78	$32.50
Primary grocery outlet	Grocery (Raley's)	45.0	48.0
	Bulk (Costco)	10.0	7.0
	Multi-Purpose (WalMart)	17.0	6.0
	Specialty (Whole Foods)	23.0	27.0
	Discount (Savers, Winco)	5.0	12.0
Miles to grocery	1–7 miles	84.5	75.0
	8–15 miles	12.0	14.0
	16–20 miles	1.5	9.0
	21 or more miles	2.0	2.0
Miles to FM or CSA pick-up	1–7 miles	70.0	86.0
	8–15 miles	23.0	11.0
	16-20 miles	4.0	1.0
	21 or more miles	3.0	2.0
Home meals	<5	4.0	1.0
	6–10	14.0	13.0
	11–15	32.0	17.0
	16–21	50.0	69.0

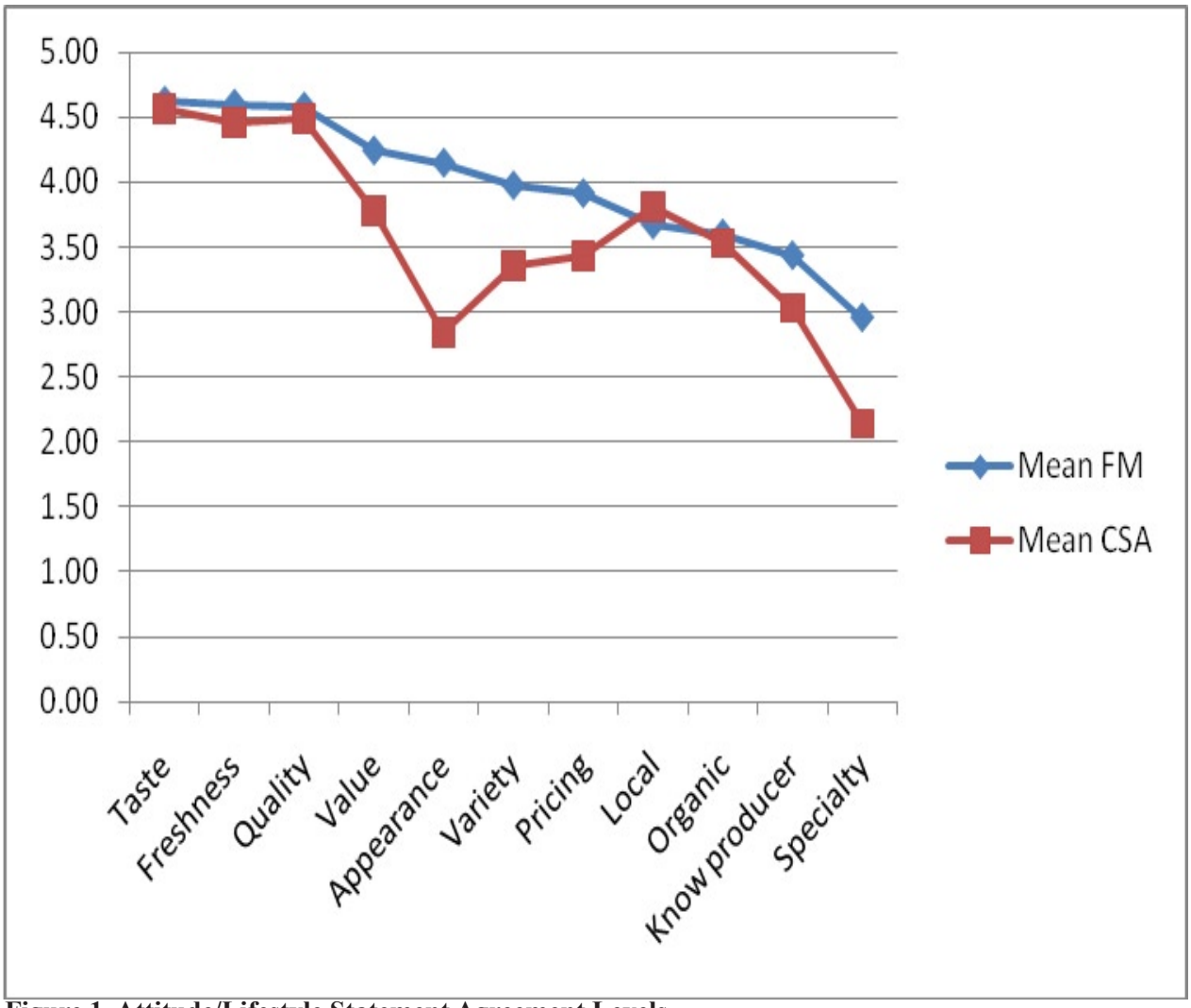

Figure 1. Attitude/Lifestyle Statement Agreement Levels.

vide them opportunities to choose product variety and appearance according to their preferences. These choices would not normally be possible with CSA membership.

The CSA members were asked why they joined the CSA and were given four options to choose from. Respondents rated purchasing local produce and supporting local farmers equally, 85 percent. Product freshness/taste/flavor was second, 77 percent, and purchasing organic produce was 65 percent. These results, especially the high importance of supporting local farmers is consistent with the literature on CSA members (Bougherara, Grolleau, and Mzoughi 2009; Lea et al. 2006; Cone and Myhre 2000).

Russell and Zepeda (2008) found that CSA consumers were more likely to modify their cooking habits, and thus were less concerned about product variety, had an increased consideration of food seasonality, and an appreciation for farming. The CSA respondents in our study were very similar, but producers may find that offering recipes and cooking demonstrations, especially for vegetarian dishes, as well as own-share packaging, half shares, and

Table 3. Importance Rankings of Produce Product Attributes.

	Ranking	
Attribute	Farmers market	CSA
Taste	1	1
Freshness	2	3
Quality	3	2
Value	4	5
Appearance	5	10
Variety	6	8
Pricing	7	7
Local	8	4
Organic	9	6
Know producer	10	9
Specialty	11	11

consumer education on seasonality will help their members more easily adjust to variety concerns and unfamiliar products. Cone and Myhre (2000) and Farnsworth et al. (1996) find that lack of choice and variety are the primary reasons people leave CSAs. Providing to-the-door delivery service may also be helpful due to the prevalence of full-time employment among the CSA sample.

Interestingly, 85 percent of the CSA respondents indicated that they also attend local farmers markets, perhaps seeking occasional social interaction or attending events. The respondents indicated that the primary way in which they found out about the CSA was through word-of-mouth, with Internet/websites a close second. Offering incentives to current members who bring in new members may be a good way to enhance participation, as Kolodinsky and Pelch (1997) find that those who heard of the CSA through word-of-mouth were 35 percent more likely to join the CSA.

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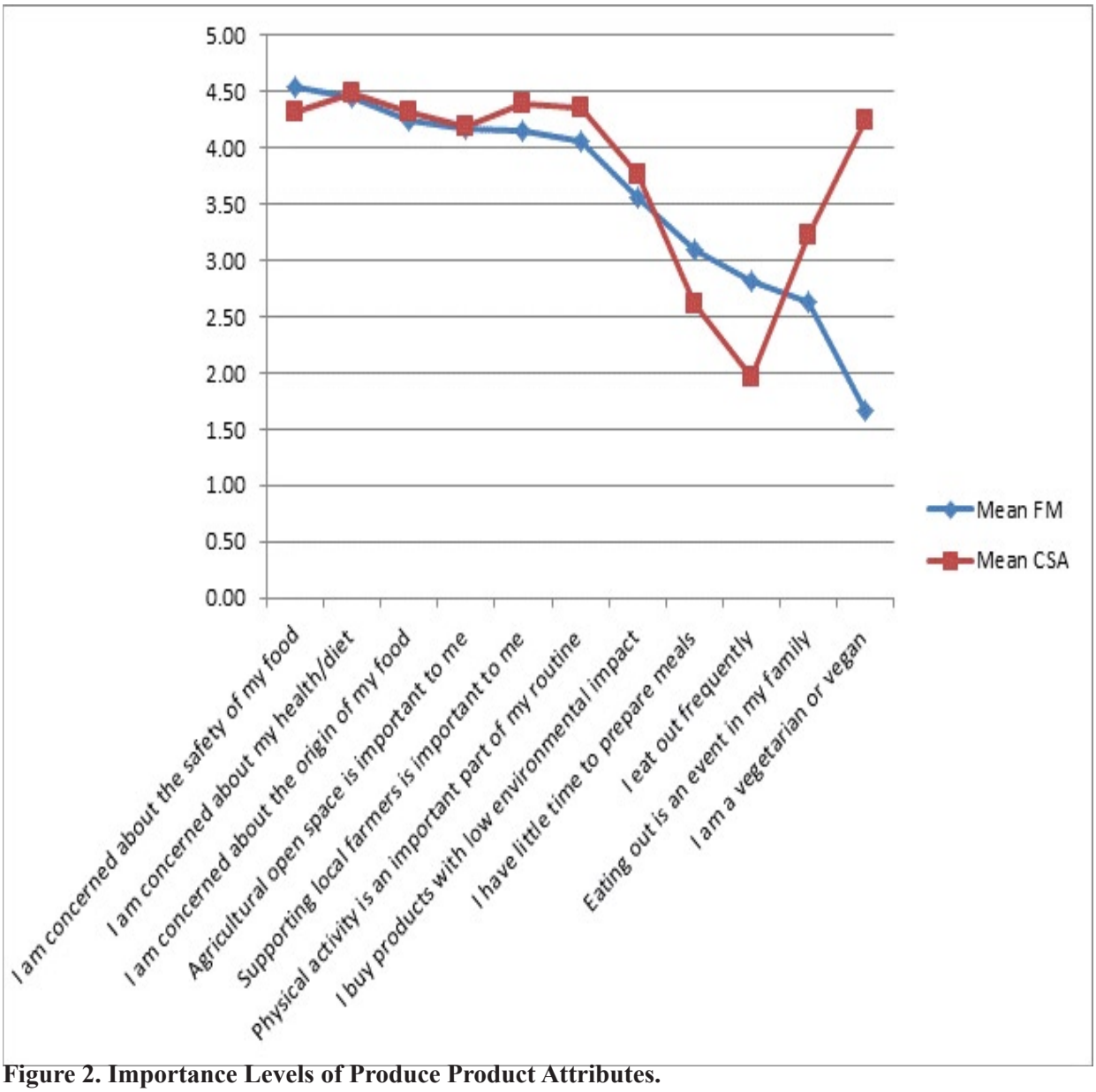

Figure 2. Importance Levels of Produce Product Attributes.

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Table 4. Attitude and Lifestyle Statement Agreement Rankings.

	Ranking	
Attitude	Farmers markets	CSA
I am concerned about the safety of my food	1	3
I am concerned about my health/diet	2	1
I am concerned about the origin of my food	3	4
Agricultural open space is important to me	4	7
Supporting local farmers is important to me	5	2
Physical activity is an important part of my routine	6	6
I buy products with low environmental impact	7	8
I have little time to prepare meals	8	10
I eat out frequently	9	11
Eating out is an event in my family	10	9
I am a vegetarian or vegan	11	5

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Industry and Firm Strategies for Good Agricultural Practices and Good Handling Practices

Catherine A. Durham, Jason D. Miller, Heidi Mannenbach, Kristyn Anderson, and Lindsay Eng

In the 1990s retailers began to consider procurement practices with respect to concerns over consumer safety, reducing liability, and market retention. In 1999 the first major U.S. retailer started calling for audits, and shippers, packers, and producers nationwide asked for help from the Federal/State Inspection Service to develop audit programs. In 2000 Oregon, along with several other states, worked with the federal government to create a standardized, nationally uniform audit program that would provide unbiased and professional third-party certification with a systems-based approach to minimizing risk of microbial contamination of fresh fruits and vegetables. In 2002 the State of Oregon Department of Agriculture (ODA) was the first state to implement official Good Agricultural Practices (GAP) and Good Handling Practices (GHP) certification under the federal/state audit program. In 2006 auditors performed more than 70 audits on 24,000 acres. By 2009 there were 192 GAP (51,660 acres) and twenty-six GHP certifications for Oregon producers and handlers. The ODA auditors (inspectors from ODA Commodity Inspection Division), make evaluations according to other public or private programs as well as USDA GAP/GHP: currently these include USDA organic and product identification.

This study conducts an exploratory analysis of farmers' perceptions of certification programs. By examining the attitudes, actions, and comments of farmers, we came to better understand the incentive structure they face. Our conclusions ultimately could be utilized by those who seek to foster an environment where farms and intermediate firms deliver to consumers the higher levels of safety, traceability, and social responsibility which they would be willing to fund, if their information were perfect and bargaining power organized.

Producers and handlers currently certified under USDA programs for GAP and GHP are recorded at the USDA Agricultural Marketing Service website (USDA-AMS 2010) organized by state or by commodity group. Certifications are for one year, with pages listing the month of expiration. When examined in September 2010, Oregon had approximately 244 farms/handlers listed as certified. For comparison we sampled states that might have been heavy users during the same period. Michigan and Idaho also appeared to have over 200 USDA GAP and GHP certifications, with Michigan nearly as varied in commodities certified as Oregon, while in Idaho almost all certifications are for potatoes. New York has well over 100 certifications, largely in apples, as does Washington, with approximately 177 certifications listed. South Carolina had 18, Texas 33, and Wisconsin 47. Somewhat surprisingly, California only had 75 certifications listed, but it was found that two commodity groups that have been impacted by food safety scares—leafy greens and strawberries—have independently developed GAP protocols and certify separately from the USDA program. There were 99 leafy vegetable certifications and over 200 for small fruit (mostly blueberries). Root crops (mostly potatoes) and tree fruit (led by apples) had the highest numbers.

Oregon appears to have had one of the highest levels of adoption of the USDA GAP program. The high number is likely due to several factors, including the large number of specialty crops produced in the state, the ease of access to certification within the state, and several commodities that are exported. Several states have large numbers of producers in specific commodity groups that are handled by distributors who may have product shipped overseas. Buyers in Europe and Japan frequently demand GAP and GHP certification. Another influence on food handlers or processors toward requiring GAP certification from their suppliers is the requirement that commodities sold into USDA commodity

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purchasing programs "must pass a yearly plant or packing facility audit that ensures that the vendor produces products in a clean, sanitary environment in accordance with the Food and Drug Administration's Good Manufacturing Practices" (USDA-AMS 2009). Noted specifically is that "fresh fruit and vegetable suppliers must also pass yearly Good Handling Practices and Good Agricultural Practices Audits" (USDA-AMS 2009).

The evolution of agricultural certifications has become a major multidisciplinary focus, fueled internationally by increasingly liberal global trade, greater awareness of food-borne illness outbreaks, globalization of the agri-food system, vertical integration in the food industry, concerns over genetically modified (GM) food products, and the formation of the World Trade Organization in 1995 (Giovannucci and Ponte 2005; Giovannucci and Reardon 2000; Hatanaka, Bain, and Busch 2005; Hatanaka and Busch 2008; Hobbs 2003). Standards may be designed or (more often) facilitated by government entities (such as the USDA), private market organizations (first-, second-, or third-party), or a hybrid of the two (Giovannucci and Ponte 2005; Hatanaka, Bain, and Busch 2005; Hatanaka and Busch 2008). In this sense, agreements on certifications and standards may be seen as social contracts between producers, retailers, consumers, and governments, in place of traditional publically authored and administered regulation (Giovannucci et al. 2005). This could be a particularly promising market solution to changes in demand and supply, since national-level government-only regulation has been determined to frequently fail to adapt to quickly emerging industry practices (Hatanaka, Bain, and Busch 2005; Reardon, Timmer and Berdegue 2008). However, this solution can only be promising if it results in an incentive structure for firms that leads to levels of consumer information, traceability, cleanliness, and social responsibility consistent with prevailing normative standards.

Literature Review

While many of the macroeconomic repercussions of certification programs have been discussed in the literature, and large private firms such as supermarkets invest in their own research, too little investigation has examined outcomes specific to producers, laborers, and consumers. Some useful analysis has been conducted, such as those informing the U.N.'s Food and Agricultural Organization (FAO), which spent many years developing its Good Agricultural Practices (GAP). This work included a report on GAP incentives (Hobbs 2003) that found that GAP certification provided "value-adding diversification opportunities" for producers in addition to the intended positive impact on food quality and the environment. In the same analysis, Hobbs (2003) outlined ways in which GAP standards could potentially mitigate or repair market failures, most notably by promoting consumer information (such as origin, growing conditions, inspection, etc). The study determined that farmers have strong incentives to adopt GAP guidelines from higher price premiums for their produce, increased access to markets upon certification, and a theoretical stabilization of revenue, in addition to many less influential but positive incentives. Simultaneously, farmers also were found to face strong disincentives to the adoption of GAP, including increased variable (e.g., labor) costs, increased direct (e.g., equipment) costs, reduced output, increased average unit cost, and investments in the human capital necessary to both perform and record compliance.

This conflict underscores the difficulty of finding a solution that increases quality, reduces environmental impact, and does not unfairly burden players such as small- and medium-sized farms, which were identified in many studies in the literature as being typically the most negatively impacted group, particularly smaller and impoverished producers in developing nations. These firms face the same mixed incentives as larger farms as described by Hobbs (2003), but as size declines the costs become greater than expected returns, which may lead smaller farms to fail to adopt certification programs, violate existing standards agreements, or simply fail to enter the market as a result of increased barriers (Hobbs 2003; Reardon, Timmer, and Berdegue 2008). Even in the U.S. adoption costs are much more of a concern for small than for large producers. Woods and Thornsbury (2005) examined costs of adopting GAP practices for strawberry production. They estimate that the cost of GAP adoption per pound of strawberries produced would vary from over eight cents per pound in New York to 0.1 cents per pound in California. Most of the variation appears to be due to spreading the more fixed costs of adoption (training, additional labor, personal hygiene facilities, etc.)

and certification itself across production, and thus both farm size and yield per acre play a role.

Researchers have identified several instances where private retailers may come together to agree on certifications that are less stringent than government alternatives and as a result are more affordable for smaller farms and their laborers. Policy analysts note that overall economies should benefit from certifications such as GAP, ISO 22000, HACCP, and GlobalGAP (Hatanaka, Bain, and Busch 2005; Hobbs 2003). The overall increase in economic efficiency affords several potential responses to mitigate the small-farm "losers" of certain policies or certification programs. Economic "winners," such as consumers, could compensate the small farms from their gains. This, in a way, has occurred naturally as some third-party certification (TPC) groups have incorporated small-farm assistance along with other social measures into their programs, which are funded from the increase in exports as demonstrated in the Sri Lankan seafood market's adoption of HACCP and the UK's experience with ISO standards in animal based foods (De Silva and Yamao 2010; Hatanaka, Bain, and Busch 2005; Hatanaka and Busch 2008; Zaibet and Bredahl 1997). Still, the natural advantage for larger producers in terms of cost has given rise to a serious debate in the WTO over subsidies, various taxes or tariffs, and other trade interventions (Paarlberg, Bredahl, and Lee 2002). On the other hand, some investigators have suggested that a key to designing effective and responsible agricultural standards is to utilize only policies that deter the most developed nations from providing farm subsidies at the expense of small and medium producers abroad. Some authors have suggested policies which shift small farms out of these most demanding markets (Humphrey 2006, 2007; Humphrey and Schmitz 2008). Small farms may be exempted from certain regulations contained in the U.S. food safety modernization bill.

Design and Data Collection

To explore farm-level incentives as they actually exist, we conducted a series of exploratory interviews throughout Oregon. Both in-person interviews and telephone surveys were used to maximize the amount of qualitative information extracted from our relatively small sample. We polled the person most involved in decision-making with respect to practices and certification (and/or its management) on their perceptions, behaviors, anticipated future behaviors, and general conditions as they relate to agricultural certifications. A standardized ballot was read to each respondent and they were encouraged to expand on any point on their experience related to certification. Eleven interviews were completed. We recorded not only perceptions and participation but also measures of crop composition, sales destinations (within state, out of state but domestic, and exports), cash expenditures on certification, time expenditures on certification (record keeping, preparation, etc.) awareness of certifications beyond those currently held, motivations for certification, satisfaction with certifications held (if any), future plans for certification, predictions of any changes in participation if more certificates could be "bundled" into fewer inspections, and economic and demographic characteristics.

Respondents were referred to us primarily by the Oregon Department of Agriculture or commodity commissioners as farms with varying levels of certification, size, and production. Although neither random nor broadly representative of a larger population, this sample was selected on the basis of the utility they provided to this discussion (subject to logistical constraints). Specifically, we sought to maximize information obtained by choosing farms with significantly varying sizes, types of produce, program adoption (if any), and distribution markets (e.g. direct-to-consumer, processors, handlers, retailers, etc.) or downstream integration. The unifying theme of this design is that by non-random sample selection and use of "holistic" (qualitative and quantitative) analysis, this pilot exploration of the farm-level drivers of agricultural certification maximized coverage of farm types and our ability to describe certification phenomena, with a near-zero budget and little directly relevant guiding literature.

Findings

Most of those surveyed had a current or past USDA GAP or GHP certification. Those that no longer hold a USDA certification said they have replaced it with something else as demanded by customers. Three are now certified by the private firm PrimusLabs.com, headquartered in California; one mentioned having been certified under EurepGAP

(now GlobalGAP) along with PrimusLabs.com, but found the latter unnecessary and dropped it. Another indicated having both GlobalGap and USDA GAP currently and another indicated having USDA GAP, PrimusLabs.com, and GlobalGap. A few reported other certifications: two had American Institute of Bakers certification, two had Safeway food handling audits, two had the eco-label Food Alliance, and two had organic certification. One of the latter said he had certified part of his production as organic, which he attributed to the relatively low cost of that certification in an "experiment" to determine if organic sales would justify his efforts. Possibly the low cost of the organic certification was due to a subsidy, since the actual cost is generally higher than that of USDA GAP.

In our sample four respondents were neither USDA GAP nor GHP certified; one of these was primarily a processor and another was one of those firms GAP-certified by Primuslabs.com, which they reported was far more expensive for them than the state-audited USDA certifications. The producers that were neither GAP nor GHP were organic certified. One producer was GHP certified with the USDA but GAP certified with PrimusLabs.com; five had both USDA GAP and GHP certification.

Perceptions of agricultural certifications varied between participants. Five participants had generally positive comments on agricultural certification as a whole, and five had generally negative comments; one respondent felt that state-sponsored certifications were "entirely unnecessary" and that the more rigorous and expensive private certifications were "absolutely necessary" because they were required by overseas customers, and that given those more stringent certifications it should not be necessary to have the USDA program certifications as well. Redundancy was a frequent complaint. Seven participants said that they appreciated current bundling of GAP and GHP offered in the Oregon inspection program and any further bundling of certifications throughout the system would be valuable.

When demonstrating positive perceptions regarding certifications, the most common reason given was that it was important as a means of safety or responsibility; in most cases GAP or GHP was cited as important to maintaining global access. Negative comments were often related to excessive time and paperwork costs and perceptions of ineffectiveness of certifications in affecting quality. To quote one mid-size farm operator, "Certification is ineffective at improving quality, but effective in shifting more liability on the growers, driving up costs and creating an illusion of safety." This operator indicated that farms in his area had begun to informally "unionize"—that is, some local farms have begun to pool their bargaining power to resist their customers' demands for certification.

The primary driver of adoption of GAP and or GHP certification identified by firms was market access (for export sales, government sales, processor, or handler requirements). A number noted that it was good to ensure that proper practices were undertaken to ensure food safety, but many stated they already were doing what was necessary. Some expressed a broader perspective related to the risk to their businesses from health incidents that have harmed several agricultural industries.

Industry-Level Strategies

Food-borne illness incidents not only can affect the source product but generally affect others in the same industry as products are withdrawn by retailers as a precautionary measure or from consumers losing confidence in the product in the short- and sometimes the long-term. Many agri-food industry leaders have taken steps to handle food safety in advance of regulation. Among other things, producers have jointly developed programs for commodity-specific safety precautions and/or to ease the steps to certification. For example, in California the vast majority of leafy greens producers have signed-on to a marketing agreement requiring adoption of GAP and GHP, and strawberry producers have developed specific protocols, training materials, and documentation for GAP. The Oregon Blueberry Commission is subsidizing up to $150 of the cost of certification for first-time certifiers who are small producers. Oregon's hazelnut producers are in the process of developing their own GAP program. In some instances, commodity commission activities can lead to a degree of subsidization by large farms to smaller farms since all farms in a commodity group can benefit from the materials developed jointly.

Many state governments also have subsidized specific groups. In Oregon, those farming on 30 acres or less or who have farmed for ten years or less can be reimbursed for 75 percent of the cost of

GAP up to $250; typical annual certification costs are $350. The Virginia Department of Agricultural and Consumer Services secured grant funding via USDA's Specialty Crop Block Grant Program to reimburse 50 percent of the cost of the GAP / GHP certification charges. The North Carolina Department of Agriculture & Consumer Services is using a USDA grant to pay up to $600 of the cost of having a third-party audit to verify a farm's food safety program.

Another interesting issue is the variation in required practices and the related issue of who does the certification. The private firm Primuslabs.com was once involved in the training of inspectors in Oregon and Idaho. However, the State of Oregon now audits for the USDA GAP certification, while Idaho currently offers GAP certification as a contractor for Primuslabs.com as well as under the USDA program. Auditing by PrimusLabs.com does take place in Oregon, but not take through a state agency. Interestingly, the costs being charged in Idaho under their PrimusLabs.com contract appear to be considerably less than those reported in Oregon based on responses of two firms that provided an estimate of the costs. However, we cannot measure how these costs relate to the depth of the auditing required. A conversation with a California producer indicated that one can and should negotiate charges and coverage with private certifiers. Interestingly, that producer split the testing (for example, for water quality) required for certification and general auditing between different private firms that can do both. Possibly this is a strategic approach to keep these providers vying for their business. Producers and agricultural organizations might benefit from more information about charges for auditing services along with the ultimate requirements of buyers in terms of developing strategies to contain costs.

Conclusions

Positive analysis supports the existence of unmet demand for improved quality throughout food distribution systems and indicates that normative values dictate that as scientists we should help consumers and business move through the complexities to attain a higher level of cost-efficient quality in food. This study provides a preliminary exploration of some factors which scientists and policymakers must impact if this demand for improved quality is to be met. The complexities involved in this process include the larger impact on costs for smaller farms for adoption and certification. Strategies to address this may be market-based, which might entail allowing private demand to gradually raise the level of quality, perhaps driving some smaller firms out of business and rewarding the larger firms that can afford more in-depth and expensive certifications demanded by overseas customers. On the other hand, it may be possible to achieve our goal of higher quality without sacrificing smaller farms if an adequate subsidy regime can be developed.

In addition, broader discussion between producers, handlers, retailers, and manufacturers about which certifications are necessary seems to be called for in light of producers being asked for overlapping certifications by different customers. As noted above, several firms had multiple certifications related to food safety. Producers groups also could collect information on certification costs and represent with buyers on certification issues as they often do in trade.

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Determinants of Interest in Food-Safety Training: A Logistic Regression Approach

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Training in food safety and safe food handling has become critical in recent years as a result of the millions of Americans who are sickened or hospitalized as a result of consuming unsafe food. Food- safety issues have consequently become of utmost importance to consumers, processors, and other food handlers in general. The increasing number of recalls of contaminated food suggests also that there is a continued need to do all that is economically feasible to protect the food system. Despite the importance of food safety, few studies have assessed the need for food safety and/or safe food handling by consumers. These authors are not aware of any studies that have assessed interest in food safety training in Tennessee. A major objective of this paper is to investigate the factors that determine interest in food safety training in Tennessee. In summer 2009, a face-to-face interview of Tennessee consumers was used to assess knowledge, concerns, and training needs for Tennessee consumers. Data were collected from participants in a one-day Small Farm Expo in middle Tennessee. A 21-item questionnaire was used to collect the information presented in this paper. The paper examines issues identified as being of the greatest concern to consumers and identifies factors influencing interest in food -safety training. A logistic regression model was formulated and estimated using the Statistical Package for the Social Sciences (SPSS). Policy implications were drawn from results generated from data analyzed. The paper concludes with suggestions for further research.

Global concern with food safety is currently exacerbated by increasing openness and a more integrated world economy. Bioterrorism and agro-terrorism concerns have led to increased food inspections and more food recalls. In the U.S., for example, the number and size of food recalls have dramatically increased (Mathews, Bernstein, and Buzby 2004). Buzby 2003). Between 1993 and 1996, Class I meat and poultry recalls averaged about 24 per year, amounting to 1.5 million pounds, while between 1997 and 2000 the recalls averaged 41 per year and amounted to 24 million pounds (Buzby 2003). Overall food imports also increased significantly in the last decade. The U.S. now has a protection plan to ensure the safety of food imports (US DHHS and FDA 2007. This paper shares survey results from a study undertaken in Tennessee to investigate the determinants of food safety training in the state, outlines the food recall situation in the U.S., presents survey results, and discusses policy implications.

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Food-Borne Illnesses: Hospitalizations and Deaths in the United States

Food safety issues have become increasingly important in the face of the millions who become ill from consuming unsafe food or the thousands who are hospitalized or die from food-borne illnesses each year (Acheson and Fiores, 2004a, 2004b; Jones and Gerber 2001). Food-borne illness is responsible for 76 million illnesses, 325,000 hospitalizations, and 5000 deaths in the U.S., annually. (Mead et al, 1999). Foodborne illness results from improper food handling practices by food handlers in foodservice establishments. Food safety education and training can improve knowledge and attitudes of food handlers about proper food handling. Food safety training is usually conducted using traditional methods—lecture and/or viewing videos. (Rajagopal and Strohbehn 2010; Olsen 2010; National Restaurant Association 2008).

The medical costs, productivity losses, and premature death costs associated with food-borne diseases from five sources of pathogens amounted

to $6.9 billion in the United States, according to the ERS (USDA-ERS, 2004; Frenzen et al. 1999). Food safety in the U.S. is the responsibility of the Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA). While the FDA has jurisdiction over food, pet and farm animal feed, the USDA regulates meat, poultry products, and eggs (U.S. Consumer Product Safety Commission n.d.). Recalls are classified as follows: Class I recalls are for health hazard situations where there is a reasonable probability that the use of the product will cause serious, adverse health consequences or death. Class II recalls are for health hazard situations where there is a remote probability of adverse health consequences from the use of the product. Class III recalls are for situations where the use of the product will not cause adverse health consequences. All recalls have information on the specific product being recalled, reason(s) for the recall, class of recall, recall number and date. USDA-FSIS 2010). All product recalls in the U.S. are voluntary.

Methodology

A 21-item questionnaire was developed and used to collect information. Data were collected using face-to-face interview of participants in Nashville in 2009. Seventy useable questionnaires were collected out of one-hundred-and-fifty passed out during a one-day Small Farms Expo organized by Tennessee State University. A logistic regression model was formulated and estimated using the Statistical Package for the Social Sciences (SPSS 2009). Policy implications were drawn from the results thus generated.

Conceptual Model

The binary choice model to be estimated was

(1) Prob (event j occurs) = Prob(Y = j) = F (relevant effect: parameters),

where Y = 1 if the respondent is interested in training and Y = 0 otherwise.

The general model is

(2) Prob (Y = 1) = F($\beta'x$)

(3) Prob (Y = 0) = 1– F($\beta'x$),

where β reflects the impact of changes in the independent variable x on the probability.

A linear logistic regression model $F(x, \beta) = \beta'x$ was estimated. Since $E[y|x] = F(x, \beta)$, the regression model took the form

(4) $y = E[y|x] + (y - E[y|x]) = \beta'x + \varepsilon$.

The marginal effect in probability terms can be calculated as

(5) $\partial/\partial x(\text{Prob } (Y=1|x)) = \beta^*[e^{-x\beta}/(1+ e^{-x\beta})^2]$

Table 1 presents the definitions and expected signs of the explanatory variables in the binary choice model.

Results and Discussion

About 90 percent of study participants considered food safety to be a very important or important issue while seven percent considered it to be somewhat important. Only three percent of respondents considered it to be unimportant. Sixty percent of respondents were male and 40 percent were female. About 34 percent of respondents were 25 years of age or younger, 26 percent were between 26 and 43 years of age, and 40 percent were older than 43 years. More demographic results of survey participants are displayed in Table 2. Further analysis of data showed that while 44.3 percent of the seventy respondents to the survey indicated that they received some food safety training, 55.7 percent indicated that they did not receive any. The binary choice model can be used as a tool in research to better target food safety training to food service workers. A carefully targeted and coordinated training could lead to efficient use of scarce training resources (time and money). Expanding the research to include other regions could provide findings that are more generalized to a larger population.

Furthermore, results show that the estimated binary choice model was very significant, $\chi^2 = 33.827$, $p < 0.001$, –2 log likelihood 49.350 with Negelkerke R-square value of 0.575.

Tennessee consumers' food safety concerns included the following:

Table 1. Estimated Binary Choice Model: Definition of Explanatory Variables and Expected Signs.

Variable	Definition
q3	f(q1, q2, q4, q6,q15, q16, q17, q18, q19, q20)
q1	Respondent assessment of food safety
q2	Food safety training [0 = no; 1 = yes]
q3	Interest in training [0 = no; 1 = yes]
q4	Current in food service [0 = no; 1 = yes]
q6	Adequate training [0 = no; 1 = yes]
q15	Gender [0 = male; 1 = female]
q16	Age [0 = less than 35 years; 1 = older than 35]
q17	Marital status [0 = otherwise; 1 = married
q18	Race [0 = African-American; 1 = other]
q19	Education [0 = <high school; 1 = >high school]
q20	Income [0 = <$20,000; 1 = >$20,000

Variable	Expected Sign
q1 = Assessment of food safety	?
q2 = Food safety training	–
q4 = Currently in food service	?
q6 = Adequate training	–
q15 = Gender	+
q16 = Age	–
q17 = Marital status	?
q18 = Race	?
q19 = Education	+
q20 = Income	–

- Sickness from contaminated food
- Cleanliness of food
- Proper food handling
- Handlers' food safety education
- Harmful bacteria (salmonella e-coli)
- Cross contamination

The binary choice model estimated using the Statistical Package For the Social Sciences (SPSS) shows the following results:

(1) Respondents who believed that food safety was important were more likely to be interested in food safety training.

(2) Participants who thought that Tennessee food-service workers had adequate food safety training were less likely to be interested in training.

(3) Ethnicity was an important variable in explaining interest in food-safety training. Respondents from ethnic groups other than African-Americans were less likely to be interested in food-safety training

(4) Higher income was significantly related to interest in food-safety training.

Table 2. General Demographic Variables.

Variable	Percent
Gender	
Male	60.0
Female	40.0
Age	
Less than 16 years	2.9
17–25 years	31.4
26–34 years	15.7
35–43 years	10.0
44 years or older	40.0
Marital status	
Never married	38.6
Married	52.9
Divorced	4.3
Separated	2.9
Widowed	1.4
Race	
Black or African-American	52.9
White	45.7
Not reported	1.4
Education	
Less than high school	2.9
High school graduate or GED	14.3
Trade or vocational school	7.1
Some college, no degree	12.9
Associate degree	2.9
Bachelor's degree	24.3
Graduate/post-graduate degree	35.7
Annual income	
Less than $20,000	25.7
$20,000–$29,000	8.6
$30,000–$39,000	18.6
$40,000–$49,000	18.6
$50,000–$59,000	7.1
$60,000 or more	18.6

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Table 3. Interest in Being Trained in Food Safety.

Variable	Percent
Very interested	21.4
Interested	45.7
Somewhat interested	22.9
Not interested	7.1

Table 4. Respondent Work Responsibility.

Variable	Percent
Cooking	8.8
Serving	2.9
Keeping kitchen and dining area clean	4.3
Others	42.9

Table 5. Workers Have Adequate Training.

Variable	Percent
No	35.7
Yes	21.4
Do not know	41.4

Table 6. Coefficients of Estimated Model (Dependent Variable: q3, Interest in Food Safety Training).

Variable	Beta (β) coeff.	Wald statistic	Sig. prob.	Expd. (β)	Marginal effect
q1, Assessment of Food Safety [0 = no; 1= yes]	2.709	9.345	0.002	15.018	0.159
q6, Adequate training [0=no; 1= yes]	–1.163	5.837	0.016	0.312	0.211
q18, Race [0 = African-American; 1= other]	–1.909	5.135	0.023	0.148	0.214
q20, Income [0 =< $20,0001; => $20,000]	1.645	3.795	0.051	5.180	0.223

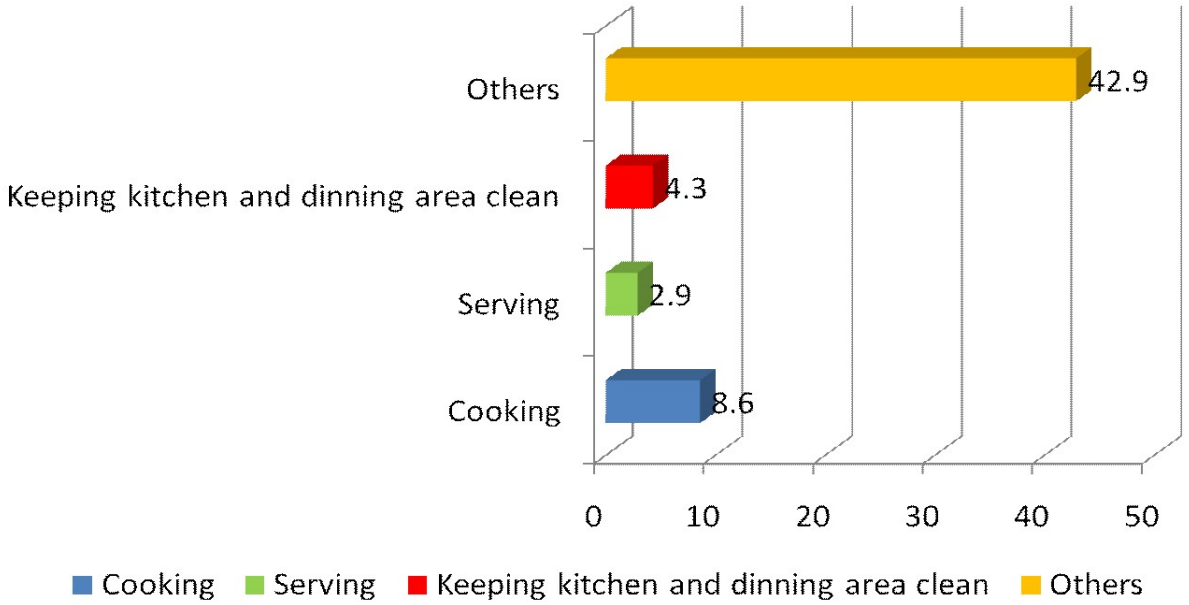

Figure 1. Work Responsibility.

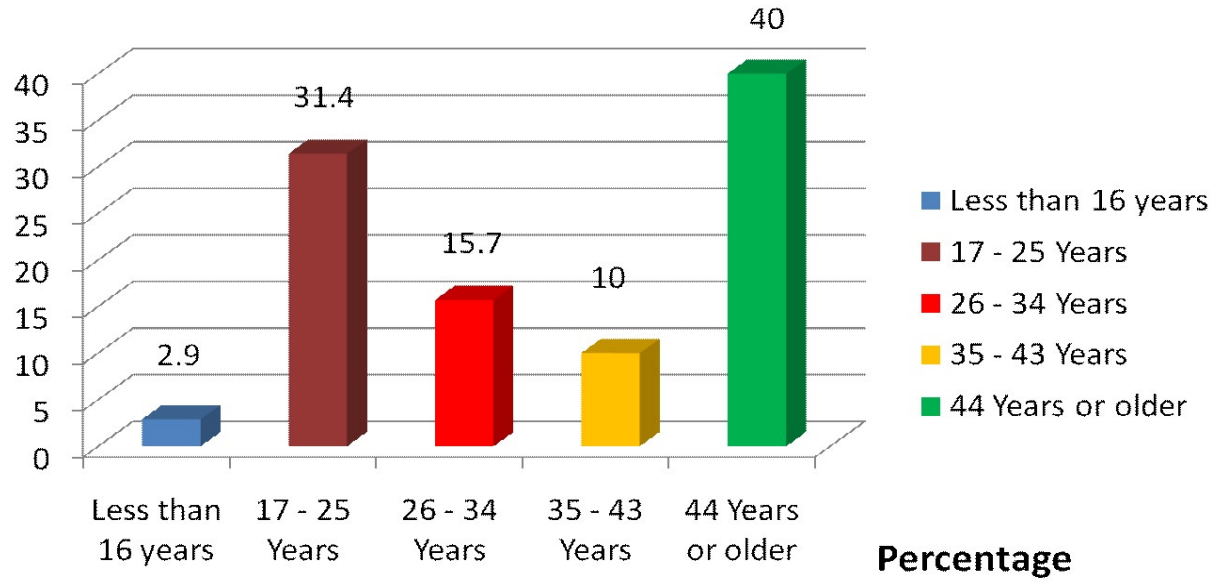

Figure 2. Age.

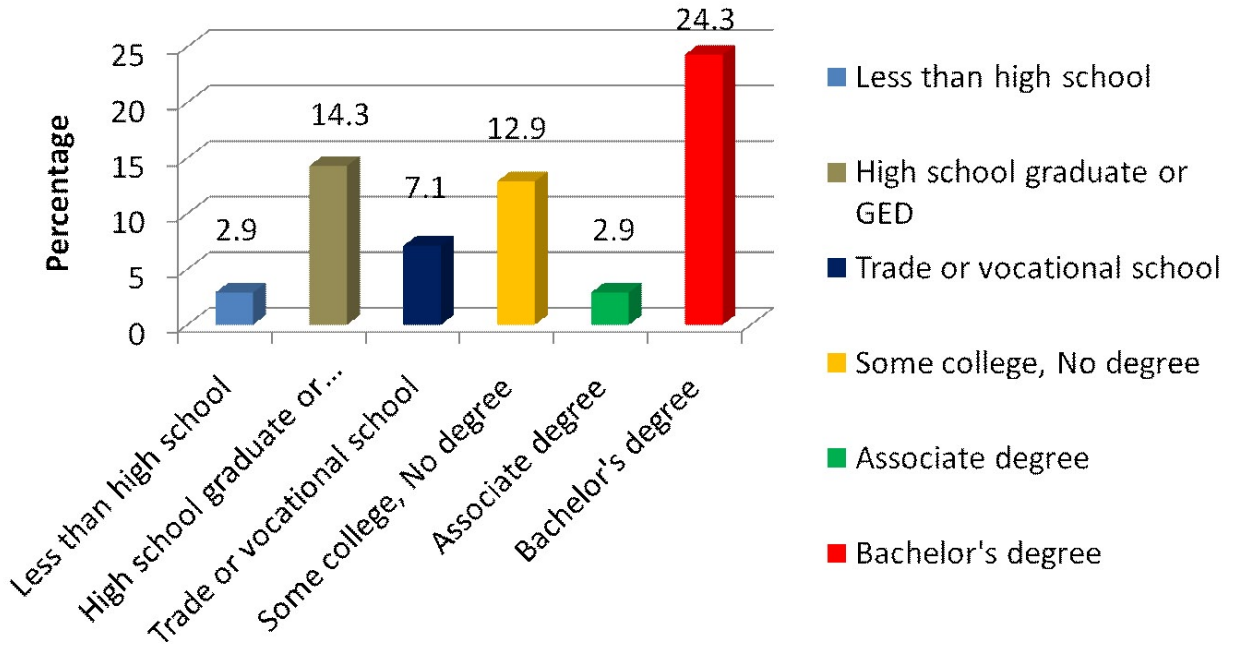

Figure 3. Education.

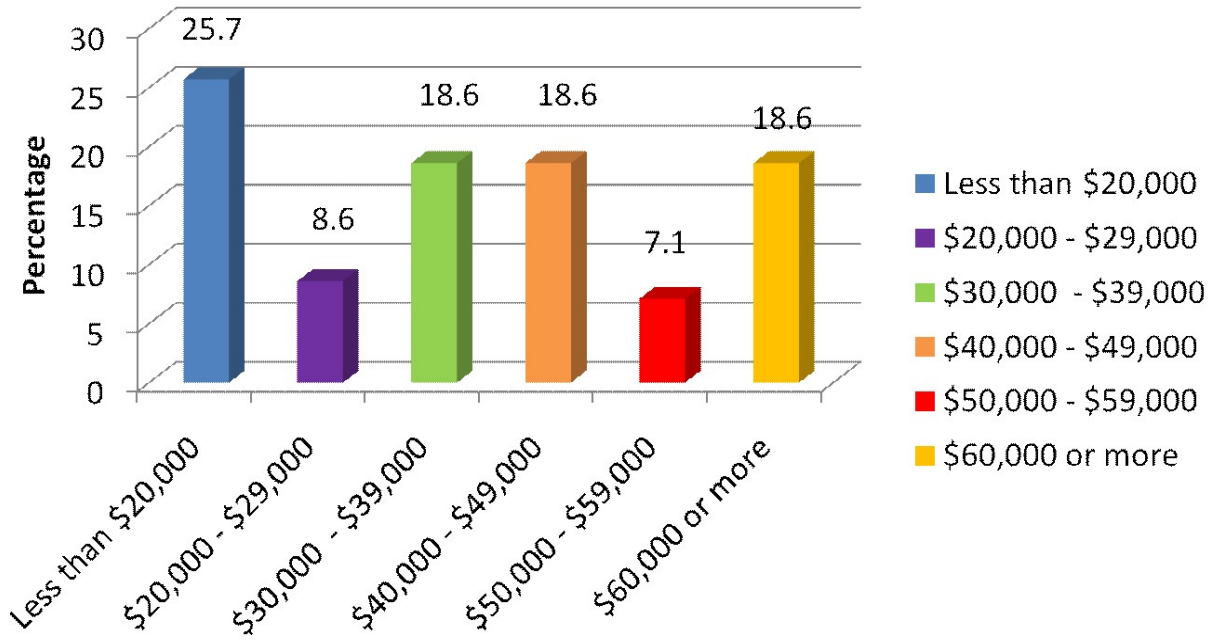

Figure 4. Annual Income.

Growth Performance and Economic Potential of '*Veinte Cohol*': A Short-Cycle Banana Cultivar Produced in the Coastal Plain of Georgia

Esendugue Greg Fonsah, Will Hudson, Paul Sumner, and Julien Massonnat

Researchers have been conducting trials on the potential of banana production at various locations in Savannah, Georgia since 2003. In 2009, new banana research was initiated at the University of Georgia, College of Agricultural and Environmental Sciences, Tifton Campus. This research has identified several cultivars with cold hardiness capabilities and a short-cycle cultivar, '*Veinte Coho*l' that has potential to become a specialty commercial crop in addition to several other fruits that are produced in the state. This paper addresses the growth performance and productive cycle of the *Veinte Cohol* cultivar and its economic potential as a commercial crop.

The '*Veinte cohol*' banana cultivar belongs to the family Eumusa since it is edible (Fonsah et al. 2010; Wallace, Krewer, and Fonsah 2007a, 2007b). The *Eumusa* banana family originated from two wild species, *Musa acuminata* and *M. balbisiana*. According to the taxonomic banana cultivar scoring characteristics, *Veinte Cohol* could well belong to the *Musa acuminata* subspecies because of the pseudostem color, petoilar canal shape, downward-looking peduncle pedicels, bract shape, and dull purple color (Figure 1) (Simmonds and Shepherd 1955; Stover and Simmonds 1987).

Several studies have demonstrated that *Veinte Cohol* is actually a short-cycle banana suitable for food/fruit production in climate zone 8A, the Southeast region of the United States (Fonsah et al. 2010 Wallace, Krewer, and Fonsah 2007a, 2007b). However, no study has investigated the growth performance and financial viability of the crop. This paper therefore addresses the growth performance and productive cycle of the *Veinte Cohol* cultivar and its economic potential as a commercial crop in Georgia in particular and the Southeast region of the U.S. in general.

Fonsah is Associate Professor, Hudson is Professor, and Sumner is Senior Public Service Associate, University of Georgia Rural Development Center, Tifton. Massonnat is a student, Ecole Nationale Supérieure Agronomique de Toulouse, Institut National Polytechnique de Toulouse, France and intern, University of Georgia Rural Development Center, Tifton.

The authors would like to express their gratitude to INIBAP, Belgium and USDA, Puerto Rico for providing the plants used to conduct this research. We thank the University of Georgia for approving and signing the MTA agreement with INIBAP and the Assistant Dean of UGA Tifton Campus for allocating the plot for the field experiment.

Material and Methods

The *Veinte Cohol* banana cultivars used in this research were obtained from three different sources: the International Network for the Improvement of Banana and Plantain (INIBAP) Germplasm in Belgium; the United State Department of Agriculture (USDA) Germplasm in Puerto Rico; and Savannah, GA (suckers from plants originating in Homestead, Florida). The experimental design, data collection, and analysis are described in Fonsah et al. (2010).

Results

Growth/Vegetative Performance

Our research on the vegetative morphology and physiology revealed that the average *Veinte Cohol* plant height was 1.54 m and the average pseudostem (trunk) circumference was 34.2 cm. Average suckers per plant was 4.8. The average number of leaves was 14.6 per plant, with average width of 54.4 cm and average length 1.28 m (Table 1). Our investigation of some of the pomological characteristics revealed an average hand-class of 6.7, average number of fingers per bunch of 98.1, and 3.6 kg average bunch weight (Table 1). The *Veinte Cohol* pseudostem has patches of a dark brownish color. *Veinte Cohol* is not cold tolerant and would not survive under any temperature below 32°F.

Financial Performance

A risk-rated enterprise budget economic model was used to determine financial viability of *Veinte*

Figure 1. Growth Performance and Taxonomic Characteristics of *Veinte cohol* Banana Cultivar Research Trial in South Georgia Coastal Plain, Tifton, 2010.

Table 1. Vegetative Performance of *Veinte Cohol* Banana Cultivar in the Coastal Plain Research Plot, Tifton, Georgia.

Cultivar	Plant height (m)	Pseudo-stem circum (cm)	# of leaves	Leaf width (cm)	Leaf length (m)	Hand class	# of fingers	Bunch weight (kg)	# of suckers
1. VC/BG/TC [a]	1.18	30	15	58	1.07	8	108	3.8	5
2. VC/PR/TC [b]	1.59	37	12	57	1.3	7	97	4.1	5
3. VC/PR/TC	1.36	29	15	54	1.1	6	88	4.3	3
4. VC/BG/TC	1.56	34	13	51	1.3	6	110	3.3	3
5. VC/BG/TC	1.49	35	15	49	1.2	6	81	3.9	7
6. VC/BG/TC	1.79	38	15	56	1.3	6	111	4.2	4
7. VC/PR/TC	1.51	32	16	50	1.04	7	91	2.3	6
8. VC/PR/TC	1.64	35	17	56	1.08	7	95	2.3	4
9. VC/GA/FL[c]	1.59	34	13	58	1.12	6	99	3.5	6
10. VC/GA/FL	1.69	38	15	55	1.28	8	101	4.3	5
Total	15.41	342	146	544	11.79	67	981	35.9	48
Average	1.54	34.2	14.6	54.4	1.179	6.7	98.1	3.6	4.8

[a] *Veinte Cohol* tissue culture plants from Belgium.
[b] *Veinte Cohol* tissue culture plant from Puerto Rico.
[c] *Veinte Cohol* sucker from Georgia with parent plant originating from Florida.

Cohol bananas produced in Georgia. Although the average yield in our studies was 3.6 kg (~8 lbs.), other studies in Georgia have reported yields of up to 6.8 kg (15 lbs.) (Wallace, Krewer, and Fonsah 2007b; Duque 2008). Our risk-rated model with five risk-rated alternatives (best, optimistic, median, pessimistic, and worst) is discussed in Fonsah et al. (2008), Fonsah, Krewer, Harrison, and Bruorton (2007), and Fonsah and Hudgins (2007) (Table 2).

We used the worst yield of 7000 lbs./ac and the best yield of 11,000 lbs./ac in our studies. Ethnic and niche market banana prices in the Atlanta Farmers Market range from $1.29/lb. to $1.99/lb. depending on the cultivars. In our estimation, we used the worst-case scenario of $0.50/lb. and the best-case scenario of $1.50/lb. to determine profitability (Fonsah, Krewer, Harrison, and Bruorton 2007).

Pre-Harvest Variable Cost

Table 3 shows that the pre-harvest variable cost of producing *Veinte Cohol* in Georgia was $4,935/ac. The most expensive cost components were fertilizers, plants, and bagging operation. Fertility was based on soil test and it is recommended for any grower. Some of these costs could be reduced or increased substantially, but that depends on many factors including the experience of the farmer.

Marketing and Harvesting Costs

The total harvesting and marketing cost was $1,173. We assumed 1000 bunches/ac in our calculation, with a five percent field loss; we therefore harvested 950 bunches. Custom packing was 950 bunches times an average of nine lbs./bunch divided by ten lbs./box. The total of pre-harvesting variable cost plus harvesting and marketing costs is $6,101 (Table 4).

Fixed Costs

Fixed costs included a tractor for land preparation (which most farmers in Georgia already have); overhead and management based on 15 percent pre-harvest variable cost; and irrigation installation material, including a well. The total fixed cost was $1.218, and the total budgeted cost of production per acre was $7,327 (Table 5).

Break-Even Analysis (BE)

Break-even analysis is used by financial analysts and economists to determine the maximum expenditure needed per operation in an enterprise in order to remain sustainable. The result shows that the pre-harvesting break-even cost (BE) is $0.55/lb., while the harvesting and marketing BE is $0.13/lb. The fixed BE is $0.14 and the total budgeted BE per pound is $0.82. The result further tells us that as long as we can produce 7,327 lbs./ac we will not be losing any money (Table 6).

Risk-Rated Returns Over Total Costs

In our risk-rated return studies, best and optimistic returns were obtained seven percent, 16 percent, and 31 percent of the time whereas pessimistic and worst returns were obtained 31 percent, 16 percent, and 7 percent of the time. The expected return was $1,673/ac and was obtained 69 percent of the time, with an 88 percent chance of making profit. Additional revenue of $10,000 was accrued from sales of suckers at the rate of $10 each and $1,000 from the sales of male flowers. Suckers normally sell for between $15 and $22 each in nurseries, male flowers sell for $3–$5 each in Atlanta farmers markets, and leaves sell for $2/bundle. Our study shows that an average of 4.8 suckers can be produced by *Veinte Cohol* plant (Table 1). Additional revenue of $100

Table 2. Risk-Rated Yields and Prices of "*Veinte Cohol*" Bananas Produced in Georgia.

Description	Best	Optimistic	Median	Pessimistic	Worst
Yield (lbs.)	11000	10000	9000	8000	7000
Price per lb. ($)	1.50	1.25	1.00	0.75	0.50

Table 3. Pre-Harvest Variable Costs of Producing *"Veinte Cohol"* Bananas in Georgia.

Item	Application	Unit	Quantity	Price	$Amt/ac
Fertilizers					
Fertilizer (N – urea)	5/yr.	Ibs.	2800.00	0.24	672.00
Potash (K20)	5/yr.	Ibs.	5500.00	0.30	1650.00
Lime	1/yr.	Ton	1.50	27.00	40.50
Fertilizer (10-10-10)	5/yr	lbs	800.00	0.24	192.00
Labor	6/yr	Hrs	12.00	8.00	96.00
TC plants	1/yr	Thou	1000.00	1.50	1500.00
Labor	6/yr	Hrs.	6.00	8.00	48.00
Tractor (land prep)	1/yr	Acre	3.00	12.00	36.00
Labor	1/yr	Hrs	3.00	9.00	27.00
Weed control	3/yr	Acre	1.00	37.20	37.20
DE leafing	3/yr	Acre	3.00	8.00	24.00
Sucker pruning	3/yr	Acre	3.00	8.00	24.00
Bagging operation	1/yr	Plants	1000.00	0.15	150.00
Equipment (tractor, mower, & maint.)	4/yr	Hrs	4.00	10.00	40.00
Irrigation		Acre	1.00	75.69	75.69
Interest on operation costs		$	4612.39	0.07	322.87
Total pre-harvest variable costs					4935.26

Table 4. Marketing and Harvesting Costs of '*Veinte Cohol*' Bananas in Georgia.

Operations	Unit	Quantity	Price	$Amt/ac
Harvesting	Bunches	950.00	0.20	190.00
Custom packing including packaging materials	Boxes	855.00	1.00	855.00
Cooling, handling, & brokerage	Boxes	855.00	0.15	128.25
Total harvesting & marketing costs				1173.25
Total variable costs				6108.51

Table 5. Fixed Costs of Producing '*Veinte Cohol*' Bananas in Georgia

Items	Unit	Quantity	Price	$Amt/ac
Tractor & equipment	Acre	1.00	136.60	136.60
Overhead & management	$	4935.26	0.15	740.29
Irrigation	Acre	1.00	341.35	341.35
Total fixed costs				1218.24
Total budgeted cost per acre				7326.74

was obtained from the sales of leaves. Total net return was $12,773 (Table 7).

Price and Yield Sensitivity Analysis

Sensitivity analysis is used to determine uncertainties and errors that might exist in making business decisions (Ragsdale 2007; Fonsah and Chidebelu 1995). It also helps to address "what if" questions in business decision making. For instance, although our result depicts that at $1/lb. the expected return is $1,673, what if the price dropped to $0.75/lb.? Our sensitivity analysis clearly illustrate that the expected returns at $0.75/lb. will be –$577 with an 84 percent chance of making a profit. However, if the yields increase to 10,000 lbs. the net returns 30 percent of the time would be $3,361 (Table 8).

Conclusion

The *Musa Veinte Cohol* cultivar is a short-cycle banana that, based on research findings, can be successfully produced in Georgia and the Southeast region 8A of the United States. Several studies have investigated its growth performance and food/fruit production capabilities in this climate but none has

Table 6. Breakeven (BE) Analysis for *Veinte Cohol* banana fruit production in Georgia.

Items	Amount
BE Pre-harvest variable cost per lb.	$0.55
BE Harvesting & marketing cost per lb.	$0.13
BE Fixed costs per lb.	$0.14
BE Total budgeted cost per lb.	$0.82
BE Yield per lb. (lb.).	7,327

Table 7. Risk-Rated Returns Over Total Costs of Producing '*Veinte Cohol*' Bananas in Georgia.

	Best	Optimistic		Expected	Pessimistic		Worst
Returns ($)	6,510	5,304	4,098	1,673	1,685	479	–727
Chances (%)	7	16	31	69	0.69	0.84	1
Chances (%)	93	84	69	31	31	16	7
Chance for profit =	88%			Base budgeted net return ($)			1,673
Additional revenue							
Sales of suckers[a] ($)							10,000
Sales of male flowers[b] ($)							1,000
Sales of leaves[c] ($)							100
Net returns per Acre ($)							12,773

[a]Assuming 1sucker/plant x 1,000 plants = 1,000 suckers @ $10/sucker.
[b]Assuming 1,000 male flowers @ $1.0 each.
[c]Assuming 100 bundles @ $1.0 each.

investigated its economic impact. This study has demonstrated its financial viability and capabilities as a specialty commercial crop especially for niche and ethnic markets. The *Veinte Cohol* banana cultivar could be an excellent addition to small and limited-resource farmers, part-time farmers, master gardeners, ornamental landscapers, and ornamental nursery owners, with profit margin ranges from $1,600 to $12,000 per acre.

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Table 8. Price and Yield Sensitivity Analysis Over Total Costs of Producing *Veinte Cohol* Bananas in Georgia.

	Best	Optimistic		Median	Pessimistic		Worst	Chance of profit
Yield (lbs.)	12,000	11,000	10,000	9,000	8,000	7,000	6,000	
% chance	7	16	30		–30	–0.16	–7	
Price								
$0.50	$5,912	$4,275	$2,638	–$2,827	$244	-$514	–$1,271	45%
$0.75	$6,190	$4,775	$3,361	–$577	$973	-$10	–$975	84%
$1.00	$6,510	$5,304	$4,098	$1,673	$1,684	$479	–$727	88%
$1.25	$6,901	$5,880	$4,858	$3,923	$2,389	$941	–$507	90%
$1.50	$7,454	$6,563	$5,672	$6,173	$3,079	$1,377	–$326	90%

Economic Analysis of Rabbiteye Blueberry Production in Georgia Using Enterprise Budget

Esendugue Greg Fonsah, Gerard Krewer, John Ed Smith, Danny Stannaland, and Julien Massonnat

Blueberries are experiencing a major increase in acreage in Georgia and the Southeast region. The demand for blueberry crop budgets is at an all-time high. Due to the world economic crisis, agricultural input prices are constantly fluctuating. The increase or decrease in input prices has a direct impact on productivity and profitability of blueberries. Unfortunately, the existing blueberry economic analyses in Georgia are outdated. The prices Georgia farmers receive given the existing market window for fresh rabbiteye and frozen blueberries have also been unstable. Since 2005 when the last economic analysis using enterprise budgets was developed, there have been huge changes in terms of input prices, agricultural practices, and production technologies. Consequently there is a high demand from stakeholders for new studies, as they provide marketing and price guidance and projected production costs in this rapidly growing industry. This study summarizes the resources and estimates current costs associated with producing blueberries in Georgia.

Blueberries were not grown in Georgia about a quarter of a century ago, but they are now the second most important fruit crop in the state in terms of farm gate value. Georgia's fruit industry as a whole is rapidly growing. Farm gate value increased from $144 million in 2002 to $366.3 million in 2009. Figure 1 shows that in 2009 pecans were rated first in farm gate value, contributing 46.7 percent of the total, followed by blueberries (28 percent) and peaches (16.3 percent). There has been a huge change in the dynamics from a decade ago, when pecans were number one with 61.5 percent, peaches were 18.9 percent, and blueberries were barely 10.5 percent (Boatright and McKissick 2010).

Economic analysis is a vital part of planning and analyzing risk for any agricultural production operation. The importance of a budget to agricultural businesses cannot be overemphasized. Agriculture businesses and operators are all interested in the cost estimates and resources provided by any kind of budget, enterprise or partial. Because the demands from these audiences for enterprise budgets are increasing daily, This study summarizes the resources and estimates current costs associated with producing rabbiteye blueberries in Georgia.

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There are three kinds of blueberry production systems in Georgia: rabbiteye, southern high bush, and high density. Although rabbiteye blueberry (*Vaccinium ashei*) is the most important type of blueberry grown in Georgia (Fonsahet al. 2008), it is subject to market distortions and price and yield fluctuations just like other fruits. Market volatilities depend on several factors, including the variety produced and sold (i.e., fresh or frozen), locality, aggregate productivity, targeted market, and timing, which makes it difficult to determine profitability.

Materials and Methods

This economic analysis is an update of the work previously done by Fonsahet al. (2008). To successfully accomplish our task we visited several farms and worked with blueberry growers who provided us with critical information to develop the variable-cost section of the budget and familiarized ourselves with new procedures involved in producing rabbiteye blueberries. We consulted with specialists, Extension Agricultural Economists, Horticulturists, Agricultural Engineers, and County Extension Agents to gather agronomic, irrigation, and equipment use data required for this estimate. We interviewed vendors of agricultural inputs (fertilizers, chemicals, and equipment) to obtain current prices needed to generate variable- and fixed-cost components. We also consulted USDA-ERS (2010) and other publications to obtain historical information on productivity, marketing, price, and overall outlook of blueberries. The risk-rated method which

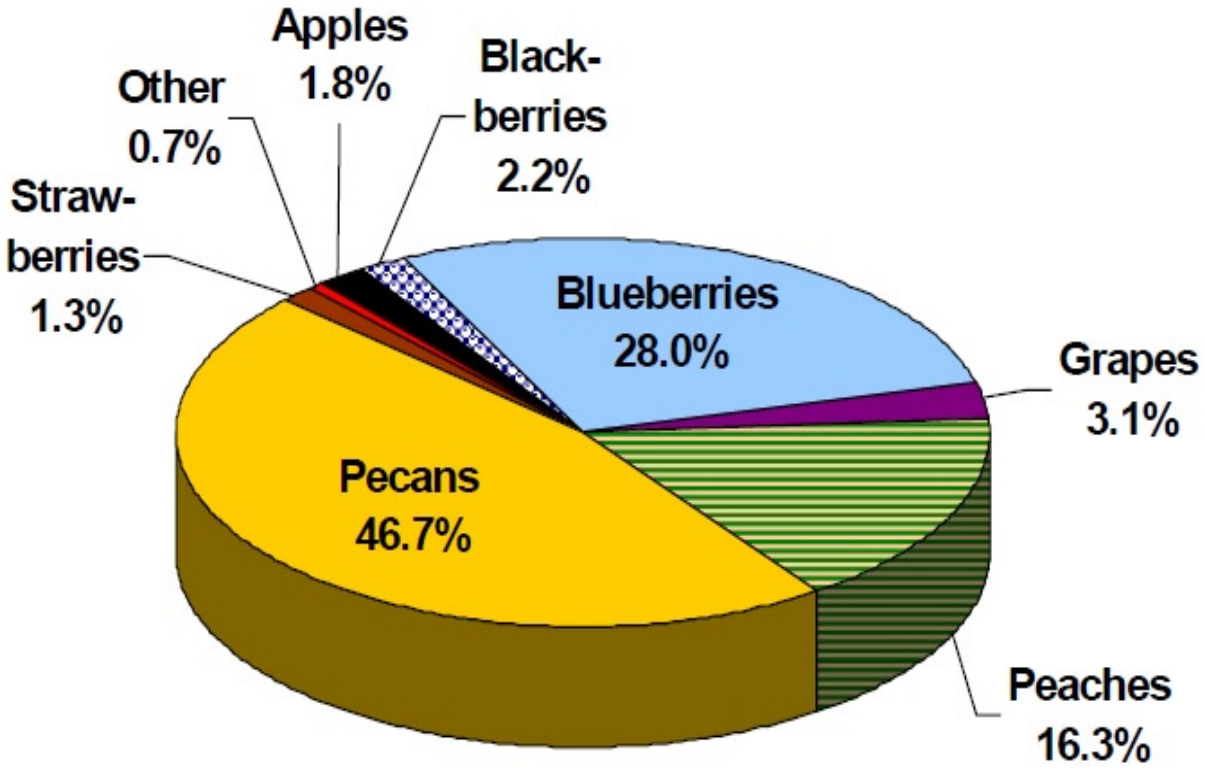

Figure 1. Percentage Breakdown of Georgia Fruit and Nut Industry, 2009.

Source: Boatright and McKissick (2010).

assigns five categories of yield and price per pound of rabbiteye blueberry ("Best," "Optimistic," "Median," "Pessimistic," and "Worst") was adopted from previous work (Fonsah et al. 2007, 2008; Fonsah 2006, 2007).

Results

Yields

The average or median yield obtained by Georgia rabbiteye blueberry producers was 6,000 pounds per acre in the fifth year, which is considered full production. The best yield was 8,000 pounds per acre, farmers who obtained this yield are those who did everything right and followed all the recommendations from the University of Georgia Scientists. The optimistic, pessimistic, and worst yields were 7,000 pounds, 5,000 pounds, and 4,000 pounds, respectively (Table 1). Worst yield could be zero during extreme situations like natural disaster or extreme weather conditions (Fonsah 2006, 2007).

Prices

There were two sets of prices, for fresh and processed blueberries. The average/median price for fresh blueberries was $1.50, compared to $0.80 for processed blueberries. Fifty percent of rabbiteye blueberries were sold as fresh and the other 50 percent as processed. The best and worst fresh prices were $1.90/lb. and $1.10/lb., respectively (Table 1).

Table 1. Risk-Rate Yields, Fresh and Processed Rabbiteye Blueberries in Georgia, 2011.

	Best	Optimistic	Median	Pessimistic	Worst
Yield (lbs.)	8000	7000	6000	5000	4000
Fresh price per lb. ($)	1.90	1.70	1.50	1.30	1.10
Price per I process ($)	1.00	0.90	0.80	0.70	0.60

Pre-Variable Costs

Total pre-variable cost was $1,274/ac in the full production year (fifth year). The major pre-variable costs were fertilizers, weed control, insect and disease control, bee hives, and interest rates on operation costs (Table 2).

Harvesting and Marketing Costs

Harvesting and marketing costs included custom harvesting, packing, cooling, handling, and brokerage (Table 3). Custom harvesting was $0.18 per pound. Custom packing was $0.62 for fresh blueberries and $0.20 for frozen blueberries. Total harvesting and marketing cost was $3,916. Total variable cost, which is the sum of pre-variable cost and harvesting and marketing cost, was $5,190 per acre.

Fixed Costs

Total fixed cost included tractor and other equipment, overhead and management, irrigation, and recaptured costs (Table 4). The use of tractor and other equipment was $695 per acre. Recaptured cost from year one to the full production was $654 per acre. Total fixed cost was $1,756 per acre. Total budgeted cost per acre—the sum of variable and fixed costs—was $6,946 (Table 4).

Returns over Total Cost

The return over total cost was calculated based on a risk-rated scenario. A grower who did everything perfectly could obtain the best return of $4,810 per acre five percent of the time, whereas he/she might also obtain –$866 per acre seven percent of the time if recommended agricultural practices were not strictly followed during a natural disaster or extremely unfavorable weather conditions. In this study, the base budgeted net revenue was $2,054, with an 86 percent chance of obtaining profit (Table 5).

Conclusion

Generally, blueberries are the most rapidly growing crop in the Georgia fruit and nut industry. For the past decade the state blueberry industry has grown in acreage, production, yields, and farm gate value. Blueberry is the second most important fruit and nut crop in Georgia, after pecans, and contributed 28 percent of Georgia 2009 farm gate value for fruit and nut crops. However, rabbiteye, which is the favorite blueberry of Georgia growers, is losing share in favor of the southern high bush blueberry cultivar for several reasons. The southern highbush is sold fresh only, and fresh berries obtain a premium price compared to frozen. As a result, profit margin is maximized with southern high bush blueberries, making rabbiteye blueberries less attractive to growers, some of whom are gradually switching to southern high bush production. A shortage of migrant labor has been another discouraging factor that has negatively impacted the production of rabbiteye blueberries in Georgia.

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Table 2. Pre-Variable Cost of Producing Rabbiteye Blueberry in Georgia.

Item	Application	Unit	Quantity	Price	$Amt/ac
Fertilizers					
Fertilizers	yr	lbs.	56.00	1.87	104.72
Weed control (4' band)					0.00
Pre-emergence	2/yr	Acre	2.00	50.00	100.00
Post-emergence	3/yr	Acre	3.00	25.00	75.00
Tractor & sprayer	5/yr	Hrs.	5.00	12.00	60.00
Labor	5/yr	Hrs.	5.00	9.00	45.00
Insects & disease control					0.00
Fungicide	5/yr	Acre	5.00	52.71	263.55
Insecticide	4/yr	Acre	4.00	12.00	48.00
Tractor & sprayer	9/yr	Hrs.	9.00	12.00	108.00
Labor	9/yr	Hrs.	9.00	9.00	81.00
Pollination					
Bee hives	1/yr	Acre	2.00	45.00	90.00
Gibberelic acid (growth regulator)	2/yr	Ozs	48.00	1.50	72.00
Tractor & sprayer	2/yr	Hrs.	2.00	12.00	24.00
Pruning					
Pruning (manual)	1/yr	Acre	1.00	75.00	75.00
Drip irrigation	yr	Acre	1.00	44.63	44.63
Interest on operation costs		$	1190.90	0.07	83.36
Total pre-variable costs					1,274.26

Table 3. Harvesting and Marketing Costs of Producing Rabbiteye Blueberries in Georgia.

Operations	Unit	Quantity	Price	Total
Custom harvesting	Ibs	6,000	0.18	1,080.00
Custom packing - fresh	lbs	2,850	0.62	1,767.00
Custom packing - frozen	lbs	2,850	0.20	85.50
Cooling, handling, & brokerage (15 percent)	Ibs	855	1.15	983.25
Total harvesting & marketing costs				3,915.75
Total variable costs				5,190.01

Table 4. Fixed Cost of Producing Rabbiteye Blueberries in Georgia, 2011.

Description	Unit	Quantity	Price	Amount
Tractor & equipment	Acre	1.00	695.18	695.18
Overhead & management	$	1274.26	0.15	191.14
Drip irrigation	Acre	1.00	215.98	215.98
Recaptured costs	Acre	1.00	653.53	653.53
Total fixed costs				1755.83
Total budgeted cost per acre				6945.84

Table 5. Risk-Rated Returns Over Total Cost of Producing Rabbiteye Blueberries in Georgia.

	Best	Optimistic	Expected	Pessimistic		Worst
Returns ($)	4,810	3,995	2,854	1,287	211	–866
Chances (%)	5	16	48	75	84	1
Chances (%)	95	84	52	25	16	7
Chance for profit =	86%					
Base budgeted net revenue =	$2,054					

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Consumers' Perceptions of Non-Traditional Vegetable Products in the Southern United States: Summary of Preliminary Results

Alena Funtikova, Dovi Alipoe, and Magid A. Dagher

Lifestyles have changed in this fast-paced world in comparison to few decades ago. As one of the consequences, obesity is considered to have reached epidemic levels throughout the United States, with more than 34 percent of adults over age 20 and 12–17 percent of children and adolescents being obese (Ogden and Carroll, 2010a, 2010b). The situation is even worse in Mississippi, which is the most obese state. Obesity may be due partially to diets that do not contain enough fruits and vegetables. The problem of obesity is being tackled by nutritionists through research and outreach. Behavioral scientists are also contributing to this issue. For example, economists are studying, among other things, consumers' behavior related to food choices and consumption patterns.

Objectives

The overall goal of the study was to generate new knowledge about consumers' attitudes toward new vegetable products and non-traditional crops such as Japanese eggplants, Indian cucumbers, Chinese okra, asparagus beans, Chinese peas, Malabar spinach, guar, tindora, ginger, coriander, and organic vegetables. More specific objectives were to identify factors affecting consumers' vegetable consumption habits, identify the decision criteria used by consumers in selecting (or accepting) new non-traditional vegetables in their diets, and determine the relative importance of consumers' various motivators of purchase and consumption of the selected non-traditional vegetable products in the Southern region. This research report presents a brief preview of the results obtained.

Funtikova is Assistant Professor and Alipoe is Professor and Interim Chair, Department of Agriculture, and Dagher is Professor, Department of Agricultural Economics and Director, Small Farm Development Center, Alcorn State University, Alcorn State.

Research Methodology

The methodology chosen for the research was a quantitative telephone survey of residents (head of household or the person responsible for making food purchases). The survey questionnaire was designed so that the critical issues were addressed in more than one way in order to ascertain the subtle consumer perceptions, attitudes, and behaviors associated with the purchase and/or use of a product. The consumer research project included 750 residents of Alabama, Arkansas, Georgia, Louisiana, Mississippi, Tennessee, and Texas. The final sample was expected to accommodate sub-group analysis (i.e., geographic areas, behavioral, and demographic segments, etc.). A random selection procedure was used in order to secure survey participants. The maximum error factor associated with a consumer sample of 750 is ±3.5 percent at a 95 percent level of confidence.

A random-digit-dialing sample frame was generated for the designated survey area, which included listed and unlisted phone numbers. The computer system used a random selection procedure in order to select the initial set of potential survey participants (e.g., the total number of records in the sample frame was divided by the number of interviews to be completed in order to determine the "nth" number to select for initial calls). In order to enhance the representativeness of the sample, at least three call-back attempts were made to each number dialed for which there was no answer (call-backs were made on different days and at different times). These procedures enhanced the validity of the research results, as hard-to-reach respondents were included in the sample.

The telephone data-collection facility features a CATI system with 150 online interviewing stations and a staff of experienced supervisors and interviewers. A team of experienced interviewers was assigned to the project. The interviewing team received specialized instruction from the team's supervisor prior to the pre-test. An initial briefing

was conducted to ensure that all procedures were fully understood. During the briefing session, each question was read aloud by the supervisor, including response categories. Meanings of response codes were clarified as needed. Special attention was paid to the pronunciation of words and proper names. Other technical details such as termination points, rotation patterns, and skip patterns were reviewed. The project supervisor monitored each interviewer during the pre-test using a sophisticated monitoring system with both audio and CRT monitoring. After the first 30 interviews were completed, the interviewing team met to review and report any potential problems with the survey instrument to the project leader. Consumer interviewing was conducted during the hours of 5:00 p.m. to 9:00 p.m. on Monday to Friday, 10:00 a.m. to 7:00 p.m. on Saturday, and 2:00 p.m. to 8:00 p.m. on Sunday.

Summary of Preliminary Results

The percentage of respondents who have previously tried the new products covered in the study is shown in Table 1; taste is a more important motivator in making vegetable choices than are price and nutritional value (Figure1, Figure 2).

In terms of promotion of uncommon and exotic vegetables (Figure 3), a small number of respondents (less than 1.5 percent) pay attention to chemical additives. Almost 40 percent of respondents indicated that they usually try new products in response to "offers of free samples at the point of purchase."

Conclusion

The survey data allow several conclusions about consumers' perceptions of non-traditional vegetable products in the southern United States. In addition, the data are used to determine the most effective ways of promoting uncommon and exotic vegetables. The effects of socio-economic factors and consumers' motivators of purchase are explored to shed new light on how they affect the decision to consume new products. The results of this study would be useful in developing promotion strategies for these vegetables, as they could become income-enhancing alternatives for farmers in the region.

Table 1. Frequency of Respondents Who Have Tried Specific New Products/ Produce (%).

Specific product/produce	
Seedless watermelon	78.23
Culinary herbs	62.30
Organic vegetables	48.10
Shiitake mushrooms	36.07
Chinese peas	35.47
Asparagus beans	26.42
Coriander	24.90
Japanese eggplant	19.75
Chinese okra	15.62
Indian cucumber	16.70
Malabar spinach	8.90
Guar	5.55
Tindora	4.01

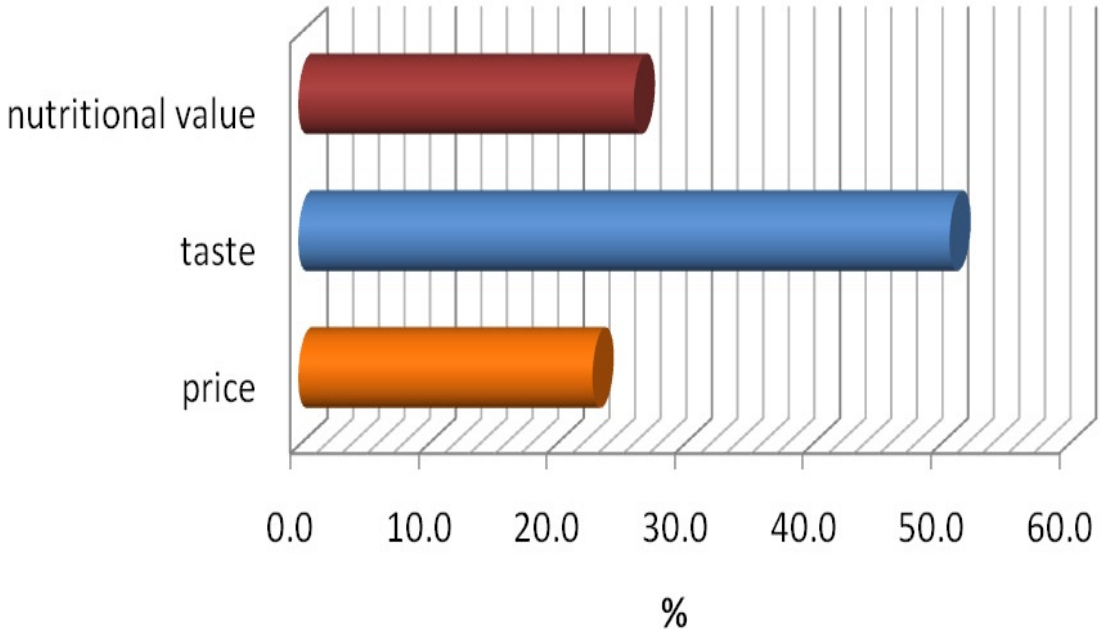

Figure 1. Factors Affecting Vegetable Choices.

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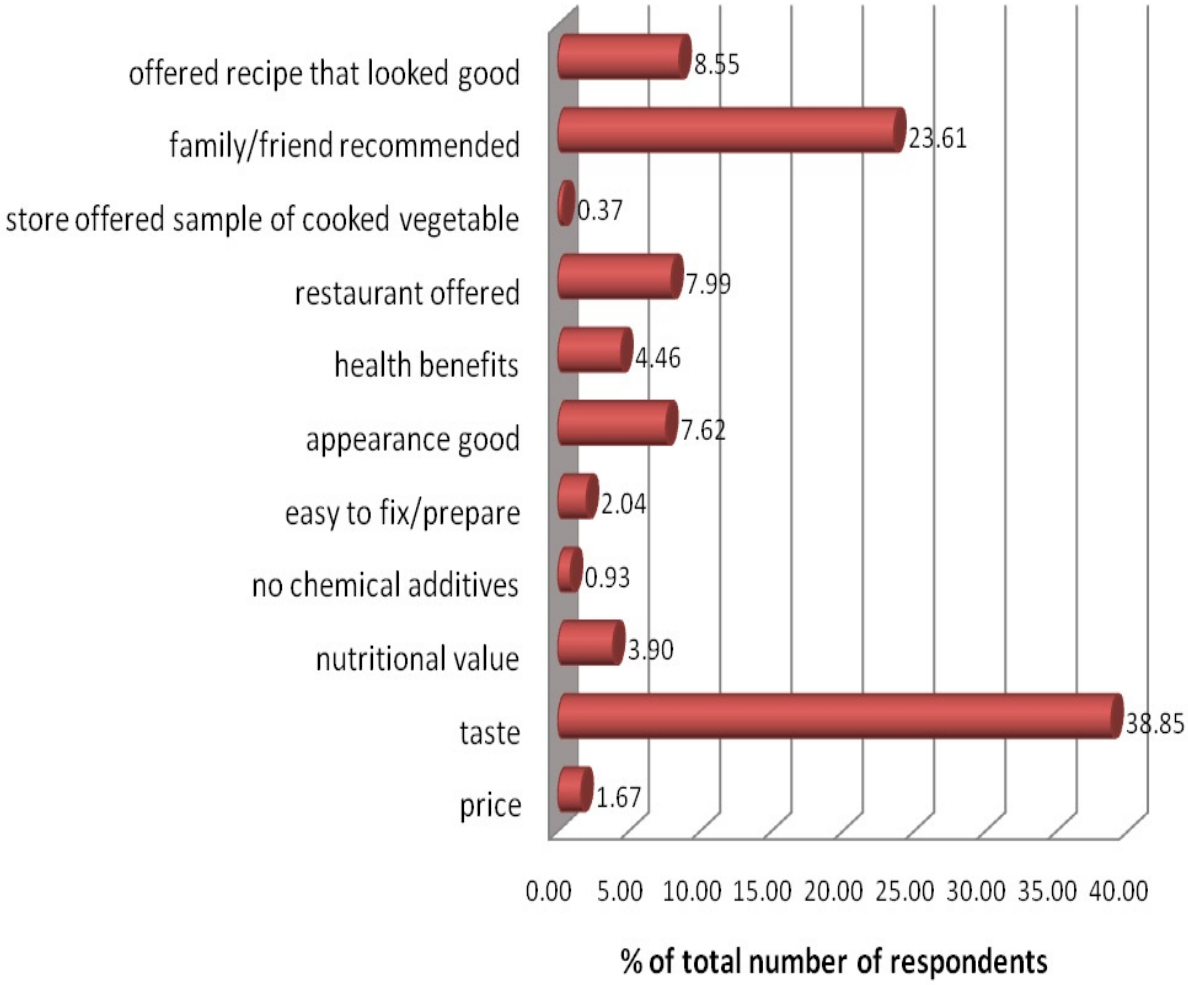

Figure 2. Reasons to Try New Vegetables.

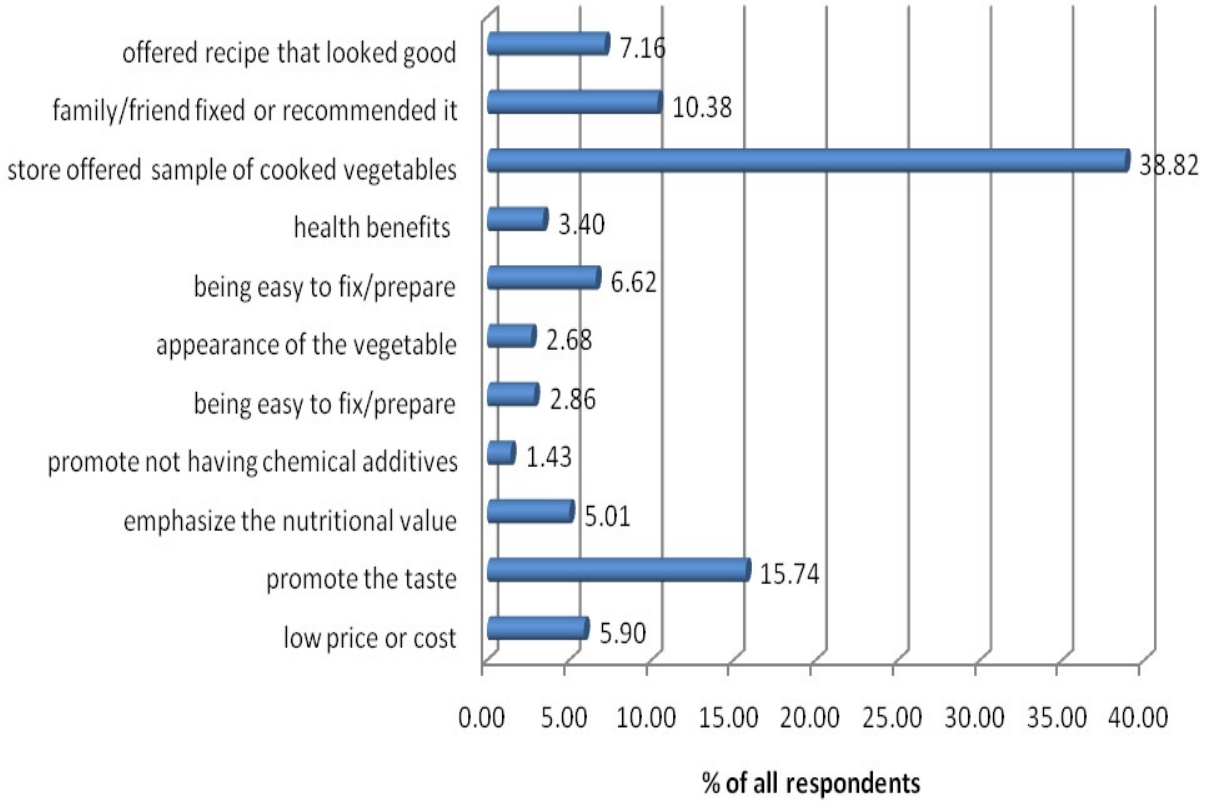

Figure 3. The Most Effective Ways to Get People to Try New Vegetables.

Introducing the 21st Century Online Interactive Grain Marketing Primer

Carl L. German, Ulrich C. Toensmeyer, Linda H. Smith, and Jamie Wasemiller

The dilemma facing Extension marketing educators is how to effectively educate the farming audience. In other words, the use of grain marketing alternatives has historically been beyond the reach and knowledge of most commercial grain farmers. Much of the reason for this could be summed up in the old adage "use it or lose it." Extension audiences typically attend meetings and workshops only to be bombarded with information that may or may not be retained. The delivery method used in this project is all about repetition, thereby improving the farmer's access to reviewing the various grain marketing and crop insurance alternatives that are available to them. The authors of this paper contend that this method of teaching has cross-applicability to other teaching, research, and extension programs. Since every picture is worth a thousand words, we welcome the opportunity to share the teaching method described in this project with our teaching, research, and extension colleagues.

Grain and oilseed crops are an important source of farm income for Delaware, Maryland, Pennsylvania, New Jersey, West Virginia, New York, and, to a lesser extent, the rest of the Northeast region. Just as importantly, this production supports the region's poultry, dairy and livestock industries—the source of local milk, cheese, eggs, and meat for the dense population along the coast. An estimated 400 million bushels of grain and oilseeds are grown in the region, valued at over $2.5 billion. Farmers who do a good job of marketing a crop can expect to increase their net price received by ten percent. A ten percent increase in the value of production that Northeast farmers capture due to better marketing decisions can increase net farm income by $250 million.

Corn ethanol demand in the Midwest makes it more costly than ever to grow and transport grain to the East. At the same time, ever-higher land values boost the cost of production for Northeastern farmers. The right combination of crop insurance and pricing strategies can ensure profitability under a wide range of yields/prices.

This project provides Northeast grain farmers, Extension agents, and agribusiness professionals with a comprehensive, electronically available primer that addresses risk-management strategies regarding marketing and crop insurance decisions.

Project Objectives

Upon completion of this project:

- Farmers will have ready access to online material that teaches them and illustrates the use of cash market alternatives, hedging in futures, options on agricultural futures, use of basis in making marketing decisions, and the interplay between price protection and crop insurance in managing risk.
- Grain and oilseed farmers will be able to more confidently choose marketing tools and better integrate crop and revenue insurance products into their marketing plans and thus be able to make more effective grain marketing decisions.
- Farmers will be able to increase the net price received for their grain and oilseed production by ten percent.
- Extension educators will be able to use the material in their marketing educational programs.

Evaluation results will be obtained via an online evaluation form and phone interviews.

Project Description

The material developed in this project provides Northeast farmers with a practical, self-help, interactive risk-management primer. The primer addresses the "how to" for various marketing and

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crop insurance alternatives. It is easily accessible and readily available on the Internet, providing links to other educational materials and applicable Web sites. The URL for the primer is www.GrainMarketingPrimer.com. Topics covered include Market Planning, Basis, Cash Market Alternatives, Futures, Options, Insurance, Profitability—How to Market Better, and Online Resources. A supplemental decision aid at www.webixi.com/grainguide can be used to help depict how to choose the appropriate marketing alternative when considering basis offers and fundamental indicators.

The material is designed so that a farmer can begin with entry-level information or skip to more advanced strategies depending upon his/her knowledge level. Self-testing quizzes reinforce concepts and allow farmers to identify material they should review.

Due to price volatility and a variety of other reasons during the past two marketing years, producers had the chance to effectively use put options on agricultural futures. Profitable sales prices for corn, soybean, and wheat production were available in mid-summer for both years. In many cases, the opportunities to price at profitable levels were foregone because of a lack of availability of a comprehensive primer for learning to make sound risk management decisions.

The primer developed in this project uses quizzes and spreadsheets to help farmers gain the confidence they need to use the best combination of marketing and crop insurance alternatives for their individual farming operations. The educational modules and decision aids assist them in selecting the right insurance policy while providing invaluable and comprehensive information on how to go about the task of marketing and/or selling their crops.

Considering that corn production costs are running as much as $600 per acre, a 140-bushel yield loses money even at $4.50 per bushel. A 200-bushel crop loses money at $3.00 per bushel. Yet a combination of revenue insurance, options, and making grain sales can bring profitability to a grower even with reduced yields and a low price.

Options on agricultural futures, when used at appropriate times, can reduce a farmer's price and production risks. Yet farmers in general do not understand how to incorporate options into their marketing programs. This project assists growers in understanding the risk profiles of different crop insurance products, how they can be combined with various marketing strategies, and how that choice changes the farm's risk profile.

The primary types of risk that grain producers face are yield and price risks. Most marketing alternatives do not adequately allow for protecting production risks, while most crop insurance alternatives do not adequately allow for protecting the price risk involved in selling a crop. To adequately protect price and production risk, a comprehensive approach to deciding what to grow and how to market the production is required. This primer is designed to improve understanding of the tools available to grain producers for making informed production and marketing decisions.

A major developing problem in grain marketing today involves the number of bushels that can be forward priced prior to harvest. Frequently, grain producers no longer can forward price all of their sales needs in a given growing season/marketing year using only cash market alternatives. In some production areas, producers can only forward price a limited amount of their total production—about half of the amount that was historically contracted. Additionally, grain producers can cover only a certain percentage of their production risk using crop insurance. This primer addresses both of these problems.

Since the fall of 2007, price volatility has increased for farm commodities, making the importance of effective risk management at the farm gate more important than ever. This primer shows farmers how to use their marketing alternatives in order to take advantage of price volatility to increase crop sale profits while improving their bottom line.

Risk management involves many vehicles, including crop insurance, cash markets, hedging in futures, and options on agricultural futures, and these products interact with each other as well. Because the relationship between cash and futures prices (basis) in the Northeast is different from the more widely covered Midwest, the development of specific educational materials is crucial to assist Northeast farmers in making the best and most profitable decisions.

Traditionally, farmers are drawn to their profession by a love of working the soil and/or caring for animals—not a love of dealing with financial derivatives or learning about a crop of risk management tools. Young, beginning, and female farmers,

especially, often have experience in field operations gained by working for their parents or others, while they have had little or no responsibility planning and/or making risk-management decisions in the office.

Likewise, lenders often do not understand the role of futures and options in protecting against risk. In the current atmosphere and in the Northeast, where agriculture may play a smaller role in a lender's portfolio, education that demonstrates hedges as sound business practice and margin calls as a line item in the producer's cash-flow budget could mean the difference between a lender providing loans or not.

With the product developed in this project, grain producers are able to make informed marketing decisions using cash market alternatives, hedging in futures, options on agricultural futures, basis (current bids and historical offerings), and crop insurance alternatives.

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Appendix

Market News, Quotes, Basis and Other Information. For a listing of these sources go to www.grainmarketingprimer.com and click on Resources.

Grain Marketing Basics Blog by Linda H. Smith.
http://www.agweb.com/TopProducer/Blogs/BlogHome.htmlx?ID=09f18369-75db-4c3f-a72b-64335101193e

Grain Marketing Discussion Group – Carl L. German, List Owner.
This forum is an electronic grain-marketing club. Participants in the grain marketing discussion group can enter or receive information on any and all aspects of grain marketing, marketing alternatives, and marketing strategies. Participants receive a weekly grain market analysis/update. To subscribe to the grain marketing discussion group send a message to clgerman@udel.edu with the only message in the text that reads: subscribe grn-mktdg@udel.edu. The discussion group operates as a closed group, meaning the integrity of the site is maintained by listings to the group having to be approved by the list owner.

College Students' Opinions of U.S. Farm-Raised Catfish

Terrill R. Hanson and Patrick Rose

A survey focusing on factors related to consumption of fish and seafood, including catfish, and targeted at college-aged students was developed and administered in conjunction with Auburn University's Earth Day dining promotion. Six hundred forty completed surveys were obtained over two days in April, 2010. Findings suggest that students had an overall positive opinion toward catfish, citing enjoyment of flavor (44 percent), better texture (38 percent), less expensive (43 percent), and greater availability in the area (52 percent) than other seafood choices as reasons to consume catfish. Twenty-seven percent of respondents consumed catfish at least once a month. Student non-consumers indicated a dislike of taste, texture, and/or smell (54 percent) as their reason for non-consumption. Factors that would increase catfish consumption included having local Alabama farm-raised catfish products available (48 percent), lower price (56 percent), and if they thought catfish had greater nutritional value compared to other fish products (40 percent). Students also believe that they would be more likely to consume catfish products that are locally grown (34 percent) and farm-raised (28 percent). When students eat catfish, 23 percent "always" or "frequently" cook it at home or enjoy it at a sit-down restaurant (23 percent). Sixty-nine percent of students preferred catfish fried, 46 percent preferred it grilled, and 18 percent preferred it baked. Environmental and sustainability concerns were important to 21 percent, who would increase consumption because catfish are grown in eco-friendly ways. Overall results suggest development of consumer-oriented products that address young adults' preferences for locally grown, environmentally friendly, easy-to-access, and easy to prepare catfish dishes.

Fish is an important nutritional component of our diet, and in the southern U.S. farm-raised catfish is widely consumed (NFI 2010). However, the quantity of U.S. farm-raised catfish grown, processed, and sold in the U.S. has been declining in recent years due to less-expensive imported catfish, substitute fish products, and increased costs of production (NOAA 2010; USDA-NASS 2010; Hanson and Sites 2010). Past studies have looked at factors explaining U.S. consumer attitudes and consumption patterns toward catfish, but did not focus on young adults (House et al. 2003).

The importance of marketing catfish products to young adults is critical to the U.S. farm-raised catfish industry's long-term sustainability, and consumption preferences developed at a young age will persist throughout a lifetime. It is believed that young consumers have very different expectations compared to their elders. Catfish marketing strategies need to be tailored to address the evolving preferences of these young consumers. Today's young adults are more racially and ethnically diverse, their attitudes and values toward life are much different, and their lifestyles and jobs fluctuate more than those of previous generations (Jayson 2006). These characteristics require catfish marketers to adjust communication strategies and refocus product development with these and other relevant factors in mind. In order to increase catfish consumption among young adults, it is important to uncover the motivational factors that encourage young people to add more catfish to their diets. To address this problem, we conducted a study of Auburn University college students' opinions about catfish. The study interviewed young adults to discover the factors which influence their consumption choices.

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Data and Methods

A two-page survey consisting of 17 questions taking approximately five minutes to complete was developed by the Department of Fisheries and Allied Aquacultures at Auburn University (AU) with input from the AU Center for Governmental Services (CGS). The questionnaire was based upon a prior effort with similar research objectives (House et al. 2003) and having a general population sample, not a youthful population focus as in this study.

Surveys were conducted in conjunction with AU Earth Day activities hosted at the student center. Earth Day activities focused on educating

students about the locally grown food products that are generally believed to be more eco-friendly and supportive of rural Alabama farm communities. All participants were prescreened for age (>19), an AU Institutional Review Board requirement to participate in the study. Six-hundred forty completed surveys were obtained over two days, representing approximately 2.5 percent of the total AU student population.

Survey data were entered into a database by CGS researchers trained in proper data entry and data collection techniques. Throughout the study, CGS professional staff monitored, supervised, and evaluated survey data entry in order to maintain survey quality. The Statistical Package for Social Science (SPSS) was used to analyze and test the data. A profile of the respondents who consumed catfish or did not consume catfish was prepared using descriptive data analysis.

Results

The results reveal that 89 percent of the survey respondents were between the ages of 19 and 25, about half of respondents were female (54 percent), and slightly more than three-quarters were Caucasian (77 percent), largely consistent with the characteristics of the AU student population. Forty-two percent reported that their parents have a combined income of over $90,000 per year, and three-quarters (74 percent) are originally from urban areas. Most respondents (55 percent) have never lived within 100 miles of a coastal area, and nearly seven out of ten respondents (67 percent) are Alabamians. Sixty-eight percent of all AU students are catfish consumers. Congruent with the characteristics of the sample as a whole, the majority of consumers are originally from Alabama (70 percent) and Georgia (10 percent). Within Alabama and Georgia, the largest number of consumers were from the urban areas of Birmingham (19 percent), Auburn (14 percent), Huntsville (12 percent), Montgomery (eight percent), and Atlanta (seven percent).

Table 1 compares the demographics of catfish consumers and non-consumers. Results reveal that 52 percent of consumers are male and 48 percent are female. These results are reversed in the case of non-consumers: 34 percent are male and 66 percent are female. The percentage of non-consumers coming from more affluent families is higher. Forty-nine percent of non-consumers reported their parents' combined income to be greater than $90,000, ten percent greater than the number of consumers who reported this level of income. The percentages of African-American and rural respondents were also much higher among consumers. Fifteen percent of catfish consumers are African American and 11 percent are from rural areas, compared to seven percent and three percent, respectively, of non-consumers. Lastly, 70 percent of catfish consumers come from Alabama; this percentage drops to 59 percent in the case of non-consumers.

The data suggest that 27 percent of students eat catfish at least once a month. Shrimp, salmon, and catfish are students' three most favorite fish/shellfish. Twenty percent of students prefer shrimp, 13 percent salmon, and 9 percent catfish. Seventeen percent of students reported that oysters were their least favorite fish/shellfish, 13 percent said tuna, and seven percent reported that catfish was their least favorite fish.

Non-consumers were asked to identify the top reasons for their lack of consumption. Fifty-four percent of students who do not eat catfish reported that "they do not like the taste, texture, and/or smell of catfish" and 50 percent reported that they "do not like catfish in particular." Half (50 percent) of non-consumers indicated that they "do not eat fish in general." Twenty-one percent of students who do not consume catfish report that they "had a bad past experience" with the product and 18 percent explained that catfish is "too time consuming to prepare."

When consumers were asked to report the location where they mostly eat catfish, the majority of students reported that they "never" or "seldom" consume catfish from convenience stores (86 percent), grocery stores (70 percent), and fast food restaurants (65 percent). Instead, students seem to prefer eating catfish at sit-down restaurants (23 percent) or after preparing it themselves at home (23 percent) (Table 2).

When consumers were asked how they preferred catfish to be cooked, they reported frying, grilling, and baking as the most popular ways to prepare catfish. Approximately two out of three students (69 percent) preferred catfish fried, 46 percent preferred it grilled, and 18 percent preferred it baked.

The survey revealed an overall positive attitude toward catfish among consumers. Catfish was re-

Table 1. Comparison of Demographic Characteristics between Catfish Consumers and Non-Consumers, 2010 (%).

	Consumers	Non-consumers
Age		
19–21	64	71
22–25	24	23
26+	12	6
Gender		
Male	52	34
Female	48	66
Household income		
<$50,000	16	9
$50,000–90,000	25	21
>$90,000	39	49
Don't know	20	21
Ethnicity		
African-American	15	7
Caucasian	75	83
Other	10	10
Size of hometown (population)		
Large (>100,000)	33	41
Medium (10,000–100,000)	38	40
Small (<10,000)	18	16
Rural area	11	3
States		
Alabama	70	59
Georgia	10	15
Other Southeastern state	12	14
Other	8	12
Educational major		
Business	8	14
Science/mathematics	13	15
Engineering	20	14
Liberal Arts	25	26
Agriculture/animal science	8	4
Other	25	22

Table 2. "How Often Do You Consume Catfish at or from the Following Locations?" (%).

Location	Always	Frequently	Sometimes	Seldom	Never
Cooked at home	9	14	31	30	16
Fast food restaurant	1	9	25	25	40
Convenience store (prepared food)	1	3	10	23	63
Sit-down restaurant	2	21	43	25	19
Grocery store (prepared food section)	1	6	23	27	43

ported to be a traditional type of seafood for 41 percent of students. Thirty-seven percent of students believe that catfish looks better than other types of fish, 44 percent claim that catfish has better taste than other fish, 38 percent state that it has better texture, and 32 percent believe that catfish smells better and is easier to cook. In addition, 27 percent considered catfish to have better nutritional value than other fish, 52 percent reported that catfish is more available in their area, and 43 percent found catfish less expensive.

The findings suggest that given a choice, consumers prefer local (i.e., Alabama farm-raised) catfish over catfish produced outside the state. Almost half of the students (48 percent) reported that they would be more likely to purchase Alabama farm-raised catfish. Thirty percent of the student respondents did not have an opinion on the issue.

The survey results indicate a number of factors that would increase the consumption of catfish (Figure 1). Fifty-six percent of consumers indicated that a lower price would play a significant role in encouraging them to consume more catfish. Students also believe that they would be more likely to consume catfish products that are locally grown (34 percent), farm-raised (28 percent), and have high nutritional value (40 percent). Environmental and sustainability concerns are important to about one in five respondents, as shown by 21 percent who would increase consumption because catfish are grown in eco-friendly ways. A demonstrated low carbon footprint of the industry would increase consumption for one in ten respondents. Product-safety assurance would increase consumption for one in five respondents.

Conclusions

More knowledgeable and health conscious consumers tend to eat more fish, and the lack of consumer knowledge about the benefits of catfish has persisted for generations. The results of this research may serve as a springboard for developing new educational strategies that address this dilemma by informing consumers about the improved safety, taste, eco-friendly, and nutritional qualities of U.S. farm-raised catfish. The study's findings suggest that the catfish industry should focus on developing products that address young adults' preferences for locally grown, environmentally friendly, easy-to-access, and easy to prepare catfish dishes. Many current products meet these criteria, so it is important to increase promotion of these themes through advertising and education. The results also draw attention to differences in preferences for catfish among subpopulations, which stresses the need for more precisely targeted product marketing.

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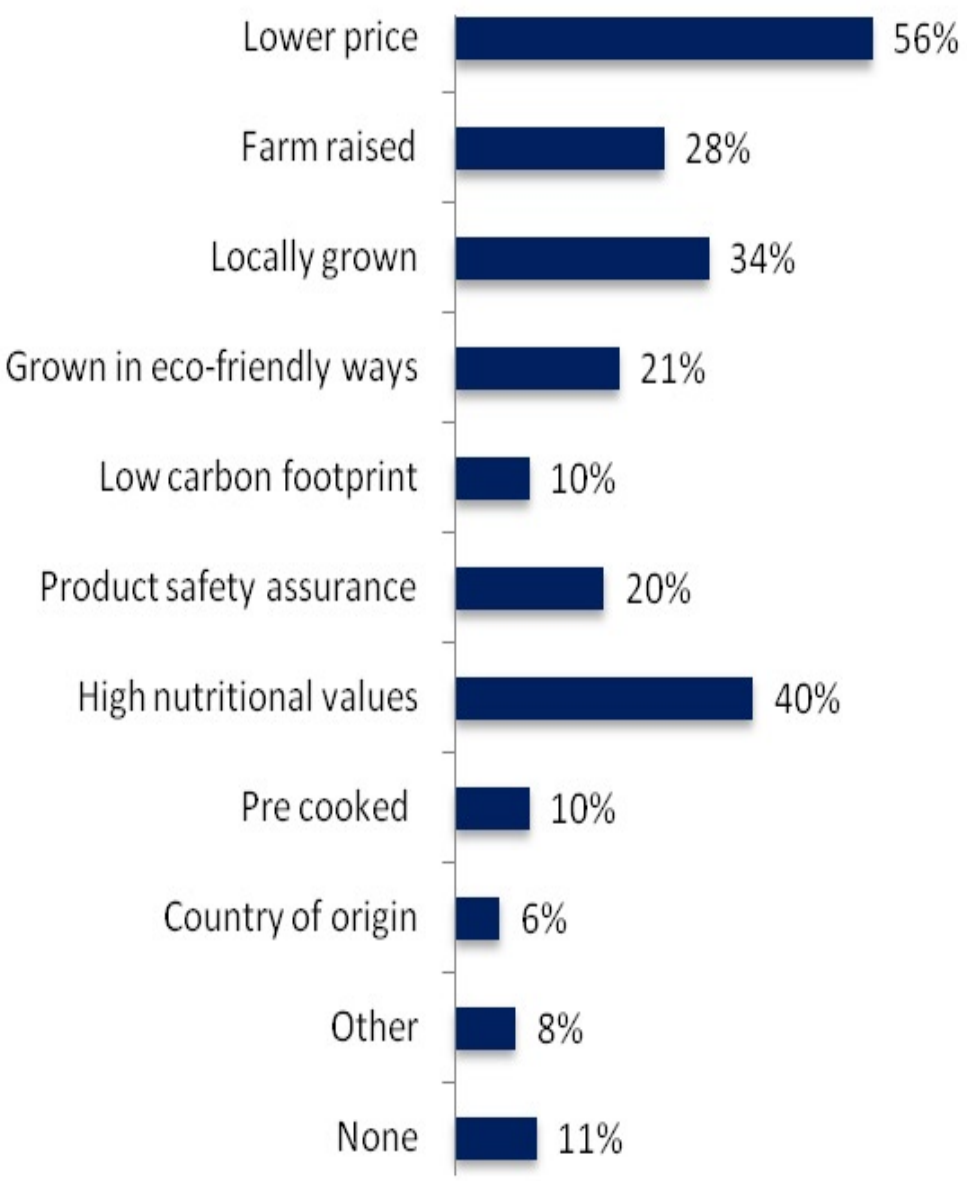

Figure 1. "What Factors Would Most Likely Increase Your Consumption of Catfish?"

Consumer Willingness to Pay a Premium for Halal Goat Meat: A Case from Atlanta, Georgia

Mohammed Ibrahim

The growth in goat meat demand is attributed to the influx of immigrants from goat-meat-eating countries into the U.S. This paper examines the willingness to pay a premium for halal goat meat. The factors that significantly impact the willingness to pay a premium for halal goat meat in Atlanta include income, current consumption, household size, and marital status. Results suggest that the mean willingness to pay a premium for the halal attribute is 50 cents per pound of goat meat.

Over the past two decades the U.S. has experienced a significant increase in demand for goat meat. This has made the U.S. a net importer of competitively priced goat meat from Australia and New Zealand into major U.S cities such as Atlanta (USDA-FAS 2006). The growth in goat meat demand is attributed to the influx of immigrants from goat-meat-eating countries into the U.S. (Gipson 1999). The fact that goat meat imports from Australia have steadily increased over the years creates difficulty for domestic meat goat producers given the costs involved in producing goats in the U.S. The literature shows that Australians only incur rounding-up costs since most Australian goat meat is produced from feral goats (Gipson 1999). This has forced U.S. meat goat producers to find new or alternative markets through value-added marketing. Atlanta has become of particular interest to both Georgia meat goat producers and goat meat suppliers.

The goat meat market is highly segmented (Nelson et al. 2004; Mclean-Meyinsse 2003). One such segment is the Muslim segment, which prefers halal meat. Halal means "permissible," and it is a preferred method of animal slaughter among Muslims. Muslims are mandated by their religion to consume meat products that are halal. This study focuses on the halal niche market of actual goat meat consumers in the metro Atlanta area. We hypothesize that Muslims will pay a premium price for halal goat meat. This study determines the price premium consumers are willing to pay and the factors that influence willingness to pay for halal goat meat.

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Muslim Consumers

The halal niche market for goat meat is patronized mostly by Muslims. This market is one of the major goat niche markets in the metro Atlanta area. It is believed that the demand for halal goat meat among goat-meat-eating Muslims may be profitable for goat producers. Although there are no exact figures for the Muslim population in Atlanta, the estimated population ranges between 45,000 and 75,000 (al-Farooq Masjid of Atlanta n.d.; Prothero 2002). This study assumes the upper bound of 75,000 in recognition and consideration of the existence of an illegal Muslim population in Atlanta.

Data and Methods

The data used in this report were collected using a survey instrument. Respondents were randomly solicited after Friday prayers at different locations (mosques) for their voluntary participation in the survey. Initially, the mosque intercept method was chosen because of its relatively low cost and flexibility. After discovering that few people were willing to participate in the survey, we conducted the rest of the survey online. Emails were sent to mosques in Atlanta with web pages requesting that imams direct their congregations to the website via a link. The sole qualifier for the survey subjects was that they should be Muslims and eat goat meat. The total number of returned useable questionnaires was 89 from both the on-site survey and online survey. The survey was conducted over three months from late 2006 to early 2007 in the metropolitan Atlanta area.

A multiple bounded model was used to determine the willingness of consumers to pay a premium for

halal goat meat. The multiple bounded model was the appropriate model because it was developed to suit the payment-card format used in the survey to elicit respondents' willingness to pay (Alberini 1995; Cameron and Huppert 1989; Loureiro and Hine 2002). For example, the crucial question was "What premium, if any, would you be willing to pay per pound for halal goat meat, assuming non-halal goat meat priced at $3.00 per pound?" (Premium is defined as the price difference between halal meat and non-halal meat). The following bid intervals were presented to respondents: $0/lb, $0.01–$0.09/lb, $0.10–$0.49/lb, $0.50–$0.99/lb, $1.00–$1.49/lb, $1.50–$2.00/lb, and over $2.00 /lb. Willingness to pay by interval is shown in Table 1.

Following Cameron and Huppert (1989), we assume that the respondent's true willingness to pay falls within an interval defined by lower and upper thresholds t_{li} and t_{ui} of the payment card. The expected willingness to pay, $E(WTP_i \mid x_i)$, is therefore assumed to be some function $g(x_i, \beta)$, for which a linear in-parameters form is computationally convenient. The model is stated as

$$(1)\quad WTP_i = x_i'\beta + \varepsilon_i,$$

where x_i is a vector of explanatory variables corresponding with β coefficients. ε_i is assumed to be normally distributed with mean 0 and standard deviation σ. We can therefore standardize each pair of interval thresholds for WTP and state that

$$(2)\quad \Pr(WTP_i \subseteq (t_{li}, t_{ui})) = \Pr((\log t_{li} - x_i'\beta)/\sigma < z_i < (\log t_{ui} - x_i'\beta)/\sigma)),$$

where z_i is the standard normal random variable. The probability of expressed in Equation 2 can be rewritten as the difference between two standard normal cumulative distribution functions (CDFs):

$$(3)\quad \Pr(WTP_i \subseteq (t_{li}, t_{ui})) = \Phi(z_{ui}) - \Phi(z_{li}).$$

The log-likelihood function can thus be written as

$$(4)\quad \log L = \sum_{i=1}^{n} \log\left[\Phi\left(z_{ui}\right) - \Phi\left(z_{li}\right)\right].$$

The likelihood function was estimated using the LIMDEP software package.

Model Specification and Variable Definition

Willingness to pay a premium for halal goat meat was estimated using Equation 1:

$$(5)\quad WTP_i = \beta_0 + \beta_1 \text{Posths} + \beta_2 \text{Income1} + \beta_3 \text{Male} + \beta_4 \text{Age1} + \beta_5 \text{Yus1} + \beta_6 \text{Fresh} + \beta_7 \text{Cons} + \beta_8 \text{Hshld} + \beta_9 \text{Married} + \varepsilon_i,$$

where *Posths* is a dummy variable that equals 1 if a consumer's education level is higher than

Table 1. Distribution of WTP for Halal Goat Meat (%).

Interval	WTP for halal goat meat
WTP = 0	31.46
WTP between $0.01–$0.09/lb	12.36
WTP between $0.10–$0.49/lb	7.87
WTP between $0.50–$0.99/lb	10.11
WTP between $1.00–$1.49/lb	14.61
WTP between $1.50–$2.00/lb	6.74
WTP over $2.00/lb	16.85

high school, *Income1* represents income less than $50,000, *Male* is a dummy variable that equals 1 if the respondent is male, *Age1* is a dummy variable representing a respondent less than 35 years old, and *Yus1* is a dummy variable that captures the number of years (ten years or less) the respondent has been in the U.S. *Fresh* is a subjective importance of fresh goat meat over frozen goat meat, *Cons* represents a continuous variable that reflects the amount (pounds) of goat meat consumed per month, *Hshld* is a continuous variable representing the consumer's household size, and Married is a dummy variable that equals 1 if the respondent is married. Summary statistics of the relevant variables are shown in Table 2.

Results

The results of the multiple bounded probit model are presented in Table 3. According to the results, *INCOME1* and *HSHLD* variables are both significant at the one percent level and *CONS* and *MARRIED* variables are significant at the ten percent level. Education, gender, age, years in the U.S., and preference for freshness of goat meat are not significant.

An income below $50,000 (INCOME1*)* seems to have a negative effect on willingness to pay a premium for halal goat meat. Specifically, consumers earning less than $50,000 are willing to pay a premium of 1.06 cents less than are those earning $50,000 and over. In addition, the sign of the monthly consumption (CONS) variable is positive and significant. The positive sign means that for each one-pound increase in monthly consumption of halal goat meat, the consumer is willing to pay a premium of 0.02 cents per pound.

The variable *HSHLD* is negative, implying that respondents are willing to pay an average of 0.31 cents less as the family size increases. This makes intuitive sense and is in accordance with Goktolga and Gunduz (2006). The marital status of the consumer (MARRIED) seems to have positive effect on willingness to pay a premium for halal goat meat, but the impact (0.001 cents) is very negligible.

Mean WTP for the halal attribute was estimated using the model results reported in Table 2. According to our results, the halal attribute carries a potential premium of about 50 cents per pound of goat meat in the larger Atlanta area. This finding can be used by stakeholders in the goat industry to earn a price premium through halal slaughter.

Conclusions

This paper examines consumer willingness to pay a premium for halal goat meat. Georgia meat goat producers are looking for new ways to profitably market their goats. A sample of 89 consumers was interviewed in Metro Atlanta and analyzed using the multiple bounded probit model that is more appropriate for payment card data. The variables that significantly impact the willingness to pay a premium for halal goat meat in Atlanta include income, current consumption, household size, and marital status. Mean willingness to pay a premium for the halal attribute is 50 cents per pound of goat meat. This finding can be useful to Georgia meat goat producers who are looking for new and alternative ways to remain competitive in the goat industry. For further studies, it may be necessary to conduct a statewide survey to determine whether these findings can be generalized.

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Table 2. Socio-Demographic Characteristics of the Sample.

Variable	Description	Mean	Standard dev.
POSTHSl	Highest level of education completed: = 1 if education is higher than high school; 0 otherwise	0.934	0.249
INCOME1	Household income level: = 1 if household income is less than $50,000; 0 otherwise	0.521	0.505
YUS1	Number of years in U.S.: = 1 if respondent has been in the U.S. for 10 years or less; 0 otherwise	0.586	0.497
MALE	Gender = 1 if respondent is male; 0 otherwise	0.750	0.435
AGE1	Age of consumer: = 1 if respondent's age is less than 35 years; 0 otherwise	0.460	0.503
FRESH	Fresh meat: Likert scale from 1–5	1.839	0.860
HSHOLD	Number of people in the household	3.826	1.638
CONS	Number of pounds/month	17.283	15.279
MARRIED	Marital status = 1 if respondent is married; 0 otherwise	0.476	0.502

Table 3. Willingness to Pay a Premium for Halal Goat Meat.

Variable	Coefficient	P-values
Constant	5.245***	0.000
POSTHS	–0.0007	0.310
INCOME1	–1.058***	0.002
MALE	0.298	0.513
AGE1	0.233	0.462
YUS1	–0.141	0.662
FRESH	–0.209	0.265
CONS	0.016*	0.082
HSHLD	–0.313***	0.004
MARRIED	0.001*	0.081
Sigma	0.866***	0.000
Log Likelihood	–85.899	

* significant at 0.10 level. ** significant at the 0.05 level. *** significant at the 0.01 level.

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Panhandle Model Farms: Case Studies of Texas High Plains Agriculture

Diana L. Jones, Jonathan R. Baros, and Steven L. Klose

In an effort to facilitate communication between agricultural producers and their local officials, the Texas AgriLife Extension Services' risk-management specialists and county agricultural agents developed region-specific model farms through the FARM Assistance program. Financial and Risk Management (FARM) Assistance is a highly specialized Extension effort aimed at helping farmers and ranchers with strategic planning and risk management. The program is a computerized decision-support simulation model that uses both farm-level information supplied by participating producers and market price forecasts from the Food and Agricultural Policy Research Institute (FAPRI) at the University of Missouri. It provides a ten-year financial forecast of the individual farm or ranch. Additional work has focused on identifying the characteristics of successful versus struggling producers.

Case studies for 22 Northern Texas Panhandle counties were developed in an attempt to illustrate production agriculture in five distinct regions of the Northern Texas Panhandle. Five different crops were analyzed, both dryland and irrigated: corn, cotton, wheat, sorghum, and peanuts. Many operations also incorporated leased stockers, owned stockers, and/or cow-calf herds. Based on focus-group model farm characteristics and FARM Assistance analyses, the Northwest and Northeast Texas Panhandle farms (Clusters 1 and 2) have the strongest financial performance. These clusters project high profitability, equity, and financial efficiency, accompanied by low debt levels. The Western and Eastern Texas Panhandle (Clusters 3 and 5) indicate moderate financial performance, with lower but acceptable financial performance measures. The Southeast Texas Panhandle (Cluster 4) is the only county group to project an unacceptable position across all financial measures. A conclusion can be drawn that operations with the highest percentage of grain crops fared better than did cotton and peanut entities. It is important to note that these model farms are based on the input of focus-group participants. While they appear to be good indicators of regional production, they do not and are not intended to portray all producers within each region.

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Are We Outsourcing Confinement Livestock and Poultry Production?

Randall D. Little and David L. Zartman

Concentrated animal feeding operations (CAFOs) are large livestock and poultry operations that raise animals in a confined situation. What is the future of CAFOs in the U.S.? Major changes are in store if current trends and pressures continue unabated. Vocal and organized segments of the American public are pushing for policies that discourage concentrated animal centers and favor more pastoral and natural kinds of food production. This paper explores emerging trends that will influence the future of confinement animal production.

Key forces seem to be coming into play, almost in the manner of a "perfect storm" that will cause major restructuring within animal production agriculture. These forces are environmental concerns, farm labor issues, and animal rights.

The sheer volume of manure produced presents potential risks to air and water quality; effective waste management is a must. EPA's "CAFO Rule" sets a zero-discharge standard for manure from CAFOs, with severe penalties for discharges into waterways. CAFOs will be required to submit detailed information normally included in a Clean Water Act CAFO permit even if there is no evidence of improper manure management. A possible unintended consequence of this rule is even greater concentration in animal production because of the costs of compliance.

In areas with growth in animal production and processing, demand for labor often exceeds local supply; immigrants satisfy that demand. Societal pressures call for greater advantages to low-income people; it is reasonable to expect employee wages and benefits to continue to trend upwards, even to levels unsustainable for CAFOs. Also, if any immigration reform grants residency to farm workers currently in the U.S. illegally, it is unknown if those workers will they remain in production agriculture.

Concern for animal welfare has increased in recent decades. Animal-welfare issues are championed by public-interest groups with their own agendas, ranging from improving the conditions in which farm animals are raised to the complete elimination of farm animal use for food and fiber. A key delineating question is, "Do animals have rights in the same way that humans do?" Those who adhere to the concept of animal rights believe animals and people are equal and deserve the same rights, thus one would necessarily reject the use of animals for food.

Increasingly burdensome regulations, stemming from any of the "perfect storm" forces, on animal production will increase the cost of production. Such changes favor countries with little or no regulatory control.

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The Potential for Supply Management of Southeastern Sweet Onions Revisited

H. Luo and J. E. Epperson

A study completed in 1994 showed substantial potential to increase revenue through supply management of Southeastern sweet onions. We revisit the potential for supply management of Southeastern sweet onions in a recent study covering the period 1998–2008. We find that the industry has grown dramatically. On average, weekly shipments have grown from a range of 14 to 400 100 cwt in the earlier study to a range of 193 to 1,713 100 cwt in this study. Moreover, because of technological advances and consumer demand, the shipping season has increased from ten weeks in the 1980s to as many as 25 weeks in recent times, depending on the season. Results show that market planning has improved greatly since the earlier study. The potential for increased seasonal revenue has declined from just over a 76 percent increase in the previous study to almost 24 percent in this study.

This study revisits previous research on the potential for supply management of southeastern sweet onions which examined data for the decade of the 1980s, an era prior to the advent of controlled-atmosphere (CA) storage of sweet onions (Epperson and Huang 1994; Hancock and Epperson 1990). Thus in the previous study the shipping season was about ten weeks in the spring. In this study the shipping season has been extended via the new technology to as many as 25 weeks. On average, weekly shipments have grown from a range of 14 to 400 100 cwt in the earlier study to a range of 193 to 1,713 100 cwt in this study.

A federal marketing order continues to be used by the Southeastern sweet onion industry.

A marketing order, one of several marketing policy tools utilized in U.S. agriculture, is a program that integrates industry with government and may facilitate the regulation of quantity and/or quality of specified commodities entering the market channel (Neff and Plato 1995; Knutson et al. 1986).

To review, three broad categories of activities encompassing quality control, market support, and quantity control are managed via federal marketing orders for fruits and vegetables (Jesse and Johnson 1981; Jesse 1982; USDA-ERS 1981; U.S. General Accounting Office 1985; Zepp and Powers 1988). See the original study (Epperson and Huang 1994) for greater details on the uses of marketing orders.

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For our purposes here we focus on market support activities. Such activities include research, promotion, and the coordination of shipping container/pack standards in order to enhance marketing efficiency. Both quality control and market support activities contribute to the indirect change of supply (Price 1967; Knutson et al. 1986; U.S. Department of Agriculture 1981; Jesse 1979).

The Southeastern sweet onion federal marketing order was established specifically for onions grown in southeastern Georgia (Federal Register 1989, 1990). The initial order restricts use of the name "Vidalia Onions," to onions produced within the specified territory and provides for a check-off mechanism to support advertising and research.

This study reevaluates the potential for the regulation of intraseasonal market flows directly or indirectly for sweet onions produced in the southeastern United States. As with the previous study, this study is carried out in two steps. First, the intraseasonal weekly shipping pattern that maximizes total revenue collectively for Southeastern sweet onion producers and the actual intraseasonal shipping pattern are ascertained. Second, the effectiveness of the controlled shipping pattern is measured relative to the actual case in terms of shipments, prices, and total revenue.

The paper is organized as follows. The dynamic econometric model used in the analysis is depicted. Empirical results are presented for the two market scenarios—the actual case and the marketing order case. Conclusions and implications regarding implementation follow.

Empirical Formulation, Estimation, and Solution

Estimation of the Southeastern supply and demand model is based on weekly shipments and prices for sweet onions from mid-April to the end of September for 1998 through 2008. Variables used in the empirical estimation are described in Table 1.

The number of weeks for the sweet onion season—up to about 25 weeks—was determined empirically. The starting shipping week of the season in each year is identified as the first week in that time series. Because of biology and weather, the number of shipping weeks for each year of the study period varies, ranging from 9 to 25 weeks. The data series for sweet onions encompasses 219 observations. Weekly shipment (SQ_t) and f.o.b. price (SP_t and PYO_t) data were obtained from the U.S. Department of Agricultural Agricultural Marketing Service (1998–2008). Total weekly shipments for competing regions (RQ_t) encompass shipments for Arizona, California, Texas, and Washington. Regional production and total sweet onion production were used in the previous study instead of shipments. Previously, production coincided with the shipping season. Now the season is greatly extended beyond the production period through CA storage. Thus in order to incorporate the effects of competing regions in this study, shipment data are used. U.S. per capita personal income (PI_t) data were obtained from the U.S. Department of Commerce Bureau of Economic Analysis (1998–2008). Price and per capita income data are deflated by the consumer price index (CPI) (2005 = 100). The CPI was obtained from the U.S. Department of Labor Bureau of Labor Statistics (1998–2008). Real per capita income in the t^{th} week of the year corresponds to reported quarterly per capita personal income.

As in the previous study, dynamic adjustment is introduced through the assumption that shipments cannot change immediately in response to new economic conditions. Thus the actual change in shipments in week t is a fraction of the planned change in shipments. Similarly, price changes are also assumed to reflect the partial adjustment process. The supply and demand model is estimated encompassing an inverse demand equation (Tomek and Robinson 2003).

The structural model depicted in Table 2 is estimated using the generalized method of moments (GMM) with HAC (heteroskedasticity-autocorrelation) robust standard errors to obtain structural coefficients and weekly price flexibilities in order to select weekly shipment targets (Hayashi 2000; Baum 2006). All of the coefficients in the model are significant at the 0.05 level or better and have signs consistent with economic theory and biology except for the PI_t (income) coefficient, which is negative. Over the study period southeastern sweet onion prices on an annual basis are relatively flat while real per capita personal income trends up, thus the negative sign for the PI_t coefficient. Southeastern per capita income was used in the previous study because of the regional nature of consumption in the 1980s. As in the previous study, lag length for the dynamic variables is limited to one week because of the highly perishable nature of sweet onions. Given the short time frame for supply response, activities in one week have a strong relationship to activities in the subsequent week. In other words,

Table 1. Definition of Variables for the Empirical Model.

Variable	Definition
SQ_t	Shipments of sweet onions from Georgia in week t (100 cwt)
SP_t	Real f.o.b. price of sweet onions for Georgia in week t ($/100 cwt)
RQ_t	Total weekly shipments of sweet onions in competing regions in week t (100 cwt)
PYO_t	Real f.o.b. price of pungent yellow onions in week t ($/100 cwt)
PI_t	Real U.S. per capita personal income in week t ($)

Table 2. GMM Coefficient Estimates and Z-Values for Southeastern Sweet Onions.

	Equation	
Variable	Supply (SQ_t)[a]	Demand (SP_t)[b]
Constant	–144.8381 (–2.50)	7126.2330 (2.78)
SQ_t		–0.6505 (–4.27)
SQ_{t-1}	0.7204 (53.56)	
SP_t	0.0136 (2.39)	
SP_{t-1}		0.6997 (12.75)
RQ_t	0.0770 (8.61)	
PI_t		–0.6642 (–2.61)
PYO_t		0.3924 (8.99)

Z-values are shown in parentheses.
[a] The instrumented variable is SP_t and the instruments are SQ_{t-1}, RQ_t, SP_t, SP_{t-1}, PI_t, and PYO_t. $R^2 = 0.7182$.
[b] The instrumented variable is SQ_t and the instruments are SP_{t-1}, PI_t, PYO_t, SQ_{t-1}, and RQ_t. $R^2 = 0.8586$.

supply and demand can shift from week to week within limits dictated by the coefficients of lagged and other exogenous variables.

Sweet onion shipments (RQ_t) in competing regions are included as an indicator of Southeastern shipping opportunities. As the sign of the coefficient for RQ_t is positive, it appears that U.S. sweet onion shippers in general are responding to similar price signals from week to week. This is contrary to the situation found before the start of CA storage in the previous study. The price of pungent yellow onions (PYO_t) is included to reflect the substitution effect. Interestingly, in the previous study, when sweet onions were relatively novel, the substitution effect was not found to be important.

Computed price flexibilities at mean values of weekly demand based on coefficients from Table 2 range from –0.02 to –0.34, generally moving closer to zero as price becomes less responsive to shipments over the course of the southeastern season. As with the previous study, prices are not very responsive to changes in shipments for a given week. This is indicative of partial adjustment from week to week.

Computed own-price supply elasticities for Southeastern sweet onions at mean values of weekly shipments range from 0.03 to 0.44, increasing in the last part of the season when prices are relatively high. This is markedly different from the previous study, which found much higher own-price supply elasticities at the beginning of the season. It seems that with the new CA storage capability, growers are finding it more beneficial to more evenly spread shipments over the course of the season.

Results and Implications

The results of the study are summarized in Table 3. Shipments, corresponding prices, and total revenue by week of the season are provided for the two market scenarios examined—the actual case and the marketing order case. The values for the marketing order case are obtained via solution to maximize total revenue with target values that yield unitary own-price flexibilities of demand.

Comparison of the values for the actual case and the marketing order case reveal noticeable differences. Shipments are more evenly spread, with less price variability and almost 24 percent higher total revenue over the course of the season for the marketing order case. Though such potential improvement is not trivial, the results in this analysis compared with those of the previous study demonstrate tremendous learning of how to improve revenues

Table 3. Actual Average and Marketing Order Shipments and F.O.B. Prices for Southeastern Sweet Onions by Week of the Season and Total Revenue.

	Actual average marketing order			
Week	Shipments (SQ) (100 cwt)	FOB price (SP) ($/100 cwt)	Shipments (SQ) (100 cwt)	FOB price (SP) ($/100 cwt)
1	1008.182	4552.755	978.2776	4519.781
2	1713.091	4070.434	978.2776	4241.367
3	1689.273	3585.794	985.1292	4009.789
4	1695.909	3236.180	981.5153	3839.358
5	1611.818	3029.263	968.7865	3910.913
6	1480.364	2967.431	946.9347	4059.227
7	1348.818	3039.537	954.2665	4363.661
8	1190.818	3229.488	961.6003	4311.621
9	1055.545	3481.789	961.6003	4368.865
10	1006.600	3728.346	965.2673	4407.895
11	913.800	3899.026	968.9342	4441.721
12	804.100	4180.185	978.5634	4428.711
13	683.500	4403.679	982.1707	4488.557
14	659.300	4536.162	983.9744	4522.383
15	562.800	4690.545	944.5848	4242.668
16	525.400	4724.805	985.9398	4626.463
17	440.100	4843.096	985.9398	4618.657
18	413.778	5380.328	989.5536	4649.881
19	388.571	5181.702	1005.767	4540.597
20	277.167	5532.864	1011.350	4595.239
21	263.000	6095.299	1019.618	4600.443
22	193.000	6314.438	1023.752	4639.473
Total revenue	7.65[a]		9.46[a]	

[a] 10^7 dollars.

over the course of a shipping season. In the previous study the potential for increased seasonal revenue was found to be just over 76 percent, substantially higher potential than in the present study. Furthermore, the quality/small-onion problems evident in the previous study with weeks of lower shipments coupled with lower prices are not apparent in the present study.

Conclusions

This study uses recent data (1998–2008) to revisit previous research on the potential for supply management of Southeastern sweet onions in the 1980s, prior to the advent of controlled-atmosphere (CA) storage of sweet onions. The degree of effectiveness of weekly shipment controls was examined through

a comparison of price, shipment, and total revenue measures with those of the actual case. The results of the study suggest that supply management continues to be highly beneficial to Southeastern sweet onion producers.

We found that the industry has grown dramatically. On average, weekly shipments have grown from a range of 14 to 400 100 cwt in the earlier study to a range of 193 to 1,713 100 cwt in this study. Moreover, because of technological advances and consumer demand, the shipping season has increased from 10 weeks in the 1980s to as many as 25 weeks in recent times, depending on the season. Results show that market planning has improved greatly since the earlier study. The potential for increased seasonal revenue has declined from just over a 76% increase in the previous study to almost 24 percent in this study.

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Examining the Prevalence of Food-Label Use by University Students

Patricia E. McLean-Meyinsse, Janet V. Gager, and Derek N. Cole

Results from a random sample of 441 university students suggest that 31.3 percent of the participants read food labels frequently, while 28.6 percent read labels sometimes. The three nutrients read most frequently are calories, total fat, and sugars. Overall, juniors and seniors read labels more frequently than do freshmen and sophomores.

The Nutrition Labeling and Education Act Congress passed in 1990 mandated that food manufacturers place standardized Nutrition Facts labels on most processed food products by mid 1994 (Temple et al. 2010). The labeling legislation resulted from mounting scientific evidence linking diet and health to the rising medical costs for treating diet-related diseases. On implementation the new Facts labels were to contain standardized ingredient labeling, portion sizes, and the Percent Daily Value of the recommended intake in a serving of a specific food item (Neuhouser, Kristal, and Patterson 1999). Specifically, the new labels were to contain information on serving size, servings per container, amount of calories per serving, and Percent Daily Value for recommended intake of total fat, cholesterol, sodium, total carbohydrates, dietary fiber, sugars, and protein, among others. The main tenet of the Act was that if consumers had easier access to standardized nutritional information on nutrients linked to chronic diseases, they would make healthier dietary decisions—and if diets improved, the population would become healthier.

Kreuter et al. (1997) argue that dietary change can occur if consumers read and understand nutritional labels. Their findings suggest that patients who consume lower levels of fats and greater levels of fruits, vegetables, and fiber are more likely to be frequent readers of food labels than are patients who read labels infrequently. Neuhouser, Kristal, and Patterson (1999) observe that participants who used labels consume less fat, but use did not increase consumption of fruits and vegetables. To these researchers, label use was related to beliefs about the importance of following a low-fat diet, beliefs about the association between diet and cancer and at which stage of change participants found themselves. Those in the maintenance stage of change were more likely to read food labels. Similar results were found by Satia, Galanko, and Neuhouser (2005), who intimated that the strongest predictors of nutrition label use were healthful eating self-efficacy, strong belief in a diet-cancer relationship, and whether respondents were trying to lose weight.

The effectiveness of food labels in changing the diet of young adults is mixed. Huang et al. (2004) studied the relationship between reading nutrition labels and percentage of calorie intake from fat and found that adolescent boys who read labels had a higher intake of fat. In the case of adolescent girls, there was no difference between fat intake and frequency of reading labels. Thus reading Nutrition Facts panels did not lead to healthier eating habits among adolescents (Huang et al. 2009). Gerend observed that female college students were more likely to choose lower-calorie items and cheaper meals when calorie information was provided to them than when information was absent. Male students' selections, however, were not influenced by availability or unavailability of information on calories or prices. Other researchers found that students who read nutrition labels consumed less energy from both low- and high-energy-density food sources (Temple et al. 2010). Adolescents who showed good self-control ate greater amounts of fruits and vegetables, participated more in sports, and were involved in less sedentary behavior. However, those who exhibited poor self-control or greater impulsiveness consumed greater amounts of saturated fat

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and were less involved in physical activities (Wills et al. 2007).

Despite mixed results on the effectiveness of the Nutrition Facts labels in changing eating habits, it is an indisputable fact that 16 years after implementation the number of obese and overweight persons in the United States has grown rapidly and the costs for treating weight-related diseases have skyrocketed. For example, an August 2010 report from the Centers for Disease Control and Prevention (2010) indicates that more than 72 million adults in the United States are now obese, that medical costs are $1,429 higher for obese individuals than for those of normal weight, that between 2007 and 2009 about 2.4 million adults became obese, that in every state more than 15 percent of the adults are obese, and that in nine of these states obesity rates exceed 30 percent. Medical care costs associated with obesity are estimated at around $147 billion annually.

Louisiana's obesity rate now stands at 33 percent, and the largest growth rate is among 18–24 year olds. Louisiana spends an estimated $2,906,143,070 annually treating obesity-rated diseases, and this total is expected to rise for the foreseeable future (24/7 Wall Street 2010). Given the state's budget challenges, expenditures for treating health-related illnesses, and rising overweight and obese rates, Louisiana residents must begin to take greater responsibility for their health. Because Louisiana residents between the ages of 18 and 24 are becoming obese at the fastest rate, this group should be a prime target for nutritional intervention. A large percentage of undergraduate students in Louisiana are between the ages of 18 and 24; therefore, every effort should be made to expand nutritional knowledge and awareness in this segment of the population.

Smith, Taylor, and Stephen (2000) argue that studying the food choices of university students is important because they are in the process of transitioning from home, where they often had minimal control over their food choices to being in charge of these choices. Furthermore, food selection skills and habits developed in college can have long-term health effects. Because a university campus is such a fertile ground for nutrition educators to sow seeds for healthier lifestyles and eating habits, our study assesses the level of food-label use among a group of university students in Louisiana.

Objectives

This study determines the frequency of label use by a randomly selected group of university students in Louisiana, examines the labeling information they read most often, and assesses whether frequency of label use is associated with academic classifications.

Data and Procedures

Data were complied from a random sample of 441 university students during spring and fall of 2008 The survey captured students' general attitudes toward health and diet; food-label use; perceptions of their health status; and demographic characteristics (age, academic classification, household size, marital status, family's total annual household income, race, and gender). The nutrition-label–related survey items were divided into three sections. The first question inquired about the prevalence of label use. Response options to the question on how often students read food labels were as follows: often, sometimes, rarely, or never. Those who read the Nutrition Facts labels were asked how frequently they read the labeling information on serving size, calories, sodium, total fat, trans fat, saturated fat, cholesterol, potassium, total carbohydrates, sugars, dietary fiber, and protein. The final set of questions measured respondents' level of agreement or disagreement with information pertaining to the usefulness of labels, levels of confidence in knowledge about labels, degrees of difficulty in interpreting labeling information, and interest in learning more about labels. The chi-squared test statistic is used to determine whether decisions to read food labels are independent of students' academic ranks (freshmen, sophomores, junior, senior).

Empirical Results and Discussion

The average age of students in the survey was 20 years old, the majority of the participants were freshmen (35 percent), the average household size was about four persons, 83 percent of the students were unmarried, women comprised 58 percent of the sample, 87 percent of respondents were African-Americans; and average reported household income ranged from $25,000 to $34,999. For food-label use, 31.3 percent of the participants read food la-

bels often; 28.6 percent read labels sometimes; 16.8 percent rarely read labels; 11.8 reported that they had never read labels, while 11.6 percent refused to answer the question. Labeling information read most often was, in decreasing order, calories (32.9 percent); total fat (30.2 percent); sugars (28.8 percent); serving size (27.4 percent); saturated fat (25.2 percent); cholesterol (24.9 percent); trans fat (23.8 percent); total carbohydrates (23.6 percent); protein (23.6 percent); sodium (20.2 percent); potassium (14.5 percent); and dietary fiber (14.3 percent). The results also suggest that less than 50 percent of the participants read food labels on a regular basis—a finding consistent with Satia, Galanko, and Neuhouser's (2005) study on African-Americans in North Carolina.

The chi-square coefficients in Table 1 suggest that the frequency of reading labels depends on academic classifications for serving size, calories, sodium, trans fat, saturated fat, cholesterol, potassium, total carbohydrates, sugars, dietary fiber, and protein. The decision to read the labeling information for total fat is independent of academic classifications. Juniors and seniors are more likely to use labels sometimes or often than are freshmen and sophomores and thus are also more likely to read most of the nutritional information on the food labeling packages.

Conclusion

The statistics reported in Centers for Disease Control and Prevention (2010) are sobering reminders of the enormous health care issues facing the United States. Adult obesity now cuts across all racial, ethnic, and socioeconomic groups. Therefore each of us must begin to take greater responsibility for what we eat. Food labels provide an easy access to nutritional information. However, it appears that only a small fraction of undergraduate students in Louisiana read food labels on a regular basis. Given the rising overweight and obesity rates among young adults in Louisiana, annual budget shortfalls, and rising health care costs, we will continue our efforts to help undergraduate students learn how to use food labels and how to use the information to make healthier food choices.

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Table 1. Frequency of Food Label Use by Academic Classifications (%).

Categories	Never	Rarely	Sometimes	Often	Refused	X^2
Use labels						
Total	11.8	16.8	28.6	31.3	11.6	53.119***
Freshmen	19.2	23.1	24.4	23.1	10.3	
Sophomores	15.6	12.2	33.3	30.0	8.9	
Juniors	4.1	13.5	29.7	43.2	9.5	
Seniors	5.3	12.8	31.9	39.4	10.6	
Refused	0.1	18.5	22.2	22.2	37.0	
Serving size						
Total	15.6	16.6	29.5	27.7	10.7	31.243**
Freshmen	23.7	15.4	26.9	20.5	13.5	
Sophomores	17.8	16.7	26.7	26.7	12.2	
Juniors	6.8	16.2	31.1	39.2	6.8	
Seniors	10.6	19.1	31.9	33.0	5.3	
Refused	3.7	14.8	40.7	22.2	18.5	
Calories						
Total	12.2	15.0	29.3	32.9	10.7	27.664**
Freshmen	17.3	15.4	26.9	26.9	13.5	
Sophomores	13.3	16.7	26.7	30.0	13.3	
Juniors	9.5	10.8	32.4	41.9	5.4	
Seniors	3.2	17.0	34.0	40.4	5.3	
Refused	18.5	11.1	25.9	25.9	18.5	
Sodium						
Total	13.4	24.5	30.4	20.2	11.6	31.761**
Freshmen	19.2	27.6	23.7	14.7	14.7	
Sophomores	12.2	25.6	30.0	18.9	13.3	
Juniors	10.8	18.9	39.2	24.3	6.8	
Seniors	5.3	25.5	33.0	29.8	6.4	
Refused	18.5	14.8	37.0	11.1	18.5	
Total fat						
Total	10.9	14.3	34.0	30.2	10.7	22.330
Freshmen	17.3	14.1	28.2	26.9	13.5	
Sophomores	7.8	13.3	35.6	31.1	12.2	
Juniors	6.8	14.9	41.9	29.7	6.8	
Seniors	6.4	16.0	35.1	37.2	5.3	
Refused	11.1	11.1	37.0	22.2	18.5	

Table 1. Frequency of Food Label Use by Academic Classifications (%) (Continued).

Categories	Never	Rarely	Sometimes	Often	Refused	X^2
Trans fat						
Total	13.8	21.3	29.9	23.8	11.1	28.255**
Freshmen	20.5	21.2	25.0	18.6	14.7	
Sophomores	8.9	22.2	31.1	25.6	12.2	
Juniors	10.8	18.9	37.8	25.7	6.8	
Seniors	7.4	24.5	30.9	31.9	5.3	
Refused	22.2	14.8	29.6	14.8	18.5	
Saturated fat						
Total	13.4	20.2	29.9	25.2	11.3	30.442**
Freshmen	20.5	18.6	24.4	22.4	14.1	
Sophomores	10.0	18.9	31.1	27.8	12.2	
Juniors	9.5	20.3	40.5	23.0	6.8	
Seniors	6.4	26.6	28.7	31.9	6.4	
Refused	13.4	20.2	29.9	25.2	11.3	
Cholesterol						
Total	13.8	23.4	26.5	24.9	11.3	24.117*
Freshmen	19.2	23.1	22.4	20.5	14.7	
Sophomores	13.3	28.9	21.1	23.3	13.3	
Juniors	12.2	18.9	33.8	28.4	6.8	
Seniors	7.4	23.4	31.9	31.9	5.3	
Refused	11.1	18.5	29.6	22.2	18.5	
Potassium						
Total	20.9	24.7	28.1	14.5	11.8	26.012*
Freshmen	25.6	23.7	24.4	10.9	15.4	
Sophomores	21.1	31.1	22.2	13.3	12.2	
Juniors	17.6	20.3	35.1	20.3	6.8	
Seniors	14.9	22.3	39.4	16.0	7.4	
Refused	22.2	29.6	11.1	18.5	18.5	

Table 1. Frequency of Food Label Use by Academic Classifications (%) (Continued).

Categories	Never	Rarely	Sometimes	Often	Refused	X^2
Total carbohydrates						
Total	15.4	19.7	28.8	23.6	12.5	27.449**
Freshmen	20.5	18.6	24.4	21.2	15.4	
Sophomores	17.8	23.3	28.9	15.6	14.4	
Juniors	10.8	16.2	33.8	31.1	8.1	
Seniors	6.4	20.2	34.0	31.9	7.4	
Refused	22.2	22.2	22.2	14.8	18.5	
Sugar						
Total	11.6	15.9	32.9	28.8	10.9	31.115**
Freshmen	16.7	10.3	30.8	27.6	14.7	
Sophomores	12.2	20.0	28.9	26.7	12.2	
Juniors	9.5	21.6	32.4	31.1	5.4	
Seniors	2.1	18.1	41.5	33.0	5.3	
Refused	18.5	11.1	29.6	22.2	18.5	
Dietary fiber						
Total	22.9	27.7	23.4	14.3	11.8	43.496***
Freshmen	32.1	26.3	17.3	8.3	16.0	
Sophomores	26.7	27.8	20.0	13.3	12.2	
Juniors	13.5	33.8	29.7	17.6	5.4	
Seniors	10.6	25.5	31.9	24.5	7.4	
Refused	25.9	25.9	22.2	7.4	18.5	
Protein						
Total	13.8	20.4	30.6	23.6	11.6	34.212***
Freshmen	19.9	15.4	23.1	26.3	15.4	
Sophomores	12.2	25.6	33.3	15.6	13.3	
Juniors	9.5	20.3	37.8	25.7	6.8	
Seniors	6.4	22.3	38.3	27.7	5.3	
Refused	13.8	20.4	30.6	23.6	11.6	

The Political Economy of GM Food Regulation in LDCs: Adoption or Rejection?

Rebati Mendali, Glenn C.W. Ames, and Lewell F. Gunter

The introduction of Genetically Modified (GM) crops has the potential to increase agricultural productivity, which could contribute substantially to global food security and poverty reduction. Herbicide-tolerant and insect-resistant traits in GM plants protect crops, reduce input costs through reduced pesticide/insecticide use, and improve crop yields, creating socioeconomic and environmental benefits. Moreover, GM crops may offer significant benefits to consumers through lower consumer food prices. Today, more than 25 countries are producing GM crops. However, many developing countries are lagging behind in the approval process or they have yet to approve the commercialization of GM food crops. We explain the factors affecting GM crop adoption or non-adoption in developing countries. We also evaluated the economic aspects of GM crops by examining the opportunity costs that are foregone due to non-adoption.

Research results indicate that international and country-specific political and economic factors are critical to GM technology adoption. The foremost objection to GM adoption stems from concerns about its environmental and food-safety impacts. Marketing concerns also affect adoption. European Union and Japanese trade restrictions and GM regulations have affected the decision making of some developing countries, especially countries which export food products to Europe and Japan. In addition, weak scientific and institutional capacity has made the approval process sluggish in many developing countries. On the other hand, by not adopting GM technology, opportunity costs are increasing in terms of foregone benefits that society could have captured if GM technology had been adopted. For example, increases in income per hectare from Bt cotton adoption ranged from $23 to $470, in Argentina and China, respectively. Developing countries should devote more public expenditure into GM crop research to improve their capacity to analyze all the regulatory and environmental issues, and market requirements that encompass this new technology adoption.

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The Impact of Trade Liberalization on Persian Rugs: A Policy Analysis Matrix Approach

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Persian rugs are woven in different parts of the Islamic Republic of Iran. However, the rugs woven in Eastern Azerbaijan, Esfahan, and Qum have a worldwide reputation. A Policy Analysis Matrix (PAM) is used to study the rug industry in these provinces. Our analysis is concentrated on the most-exported hand-woven rug—named 65-Radj Cheleh Abrishami Silk Flower—using 2006 data. The results indicate that the export competitive indexes for the three provinces are 0.81, 0.88, and 0.93, respectively. Based on these indices the 65-Radj Cheleh Abrishami Silk Flower rug can compete in the world markets. The comparative advantage indices for the three provinces are 0.83, 0.79 and 0.84, respectively. These numbers show that the provinces have a comparative advantage in the production of the rug in question.

In order to expand non-oil exports and play an active role in international markets, the Islamic Republic of Iran (IRI) has been trying to join the World Trade Organization (WTO) for some time. Since Persian rugs are a major non-oil export of the IRI, it is important to study and analyze the level of competitiveness of this industry. This study uses a Policy Analysis Matrix (PAM) to estimate certain indices to evaluate the ability of the Persian rug industry to compete internationally before and after joining the WTO. In this method the revenue and the costs of said industry will form a 3×4 matrix through which the impact of different government policies on a certain type of Persian rug can be evaluated. This study covers the provinces of Eastern Azerbaijani, Esfahan, and Qum.

Methodology

Since the topic of comparative advantage plays an important role in the field of international trade, several indices have emerged to quantify this concept. Some of these measures are Domestic Resource Costs (DRC), Revealed Comparative Advantage (RCA), Net Present Value (NPV), Profitability Index (PI) and Social Benefit Cost Ratio (SBCR). However, these indices have been criticized on certain grounds, including that these indices, applied individually, only cover part of the comparative advantage phenomenon. To overcome this shortcoming we have used the Policy Analysis Matrix (PAM) approach to study the competitiveness of the Persian rug industry. PAM provides a framework through which we can compute the comparative advantage index, the protection coefficients, and the cost competitiveness index simultaneously. These measures can be used to assess the impact of economic freedom on economic units. The PAM matrix also can be used to analyze the economic policies of the government and offer ways to improve them.

Table 1 represents a PAM matrix as first presented by Monk and Pearson (1989). The first row shows the revenue of a firm (A), the cost of tradable inputs (B), the cost of the non-tradable inputs (C) and the domestic profitability matrices (D). The second row consists of the same entries as the first row but computed using shadow prices for both the products and inputs. The third row is obtained by subtracting the elements of the second row from the first row; this row is used to analyze the government policies.

Determining the Shadow (Social) Prices

As is evident from the elements of the matrix in Table 1, we need to compute the shadow prices of three main groups: the non-tradable inputs, the tradable inputs, and the exchange rates. Shadow prices reflect the real social cost of the resources used in producing a product. This is important because in many developing countries resource prices are distorted by government interventions.

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Table 1. Policy Analysis Matrix.

		Cost		
	Revenue	Tradable resources	Non-tradable resources	Profit
Private prices	A	B	C	D
Social prices	E	F	G	H
Effects of divergences	I	J	K	L

The Shadow Price of Non-Tradable Resources: In the rug industry there are factors which are of domestic nature and as such are not imported. For example, the process of natural coloring or Cheleh Keshi is a domestic factor. The shadow price of such factors was approximated by their opportunity costs. The shadow wage rate in the rug industry was considered to be the highest wage paid to such workers in the rest of the economy. We used the Jorgensen approach for the shadow price of capital (Branson 1979).

The Shadow Price of Tradable Resources: Tradable inputs are produced internally, and if not used domestically can be exported. In the rug industry such inputs are silk cream, silk thread, wool, and cotton thread. Therefore we can use the free-on-board price of such inputs as their shadow prices. We used a formulation developed by Londero and Cervini (2003) to compute the exchange rate shadow price. The real exchange rate was computed using Dehghani's (2003) formulation.

Setting up the Policy Analysis Matrix (PAM)

To set up the policy analysis matrix we need the individual costs items for the rugs in questions. These items were obtained from Iran Carpet Company (n.d.). Tables 2 through 4 present the PAM matrices for the three provinces.

As explained before, based on the elements in the above matrices we can analyze the government policies and their impacts on the rug producers. We now proceed by explaining the elements of PAM as presented in Table1. I is the difference between the revenue at private (market) and at social prices of the product, and is positive in all provinces. In other words, the revenue generated from the sale of one square meter of rug in question is I rials more than the revenue generated if the shadow (social) prices had been used. K is the difference between the costs of the non-tradable inputs for weaving one square meter of the rug in question at market prices and at shadow prices. $K > 0$ implies that the domestic prices of such inputs are higher for the producers than are the shadow prices. In other words, the producers face negative protection. The opposite holds if $K < 0$.

J is the difference between the costs of the tradable inputs for weaving one square meter of the rug at market prices and at shadow prices. If $J > 0$, the domestic producer pays more for these inputs than their international prices. But if $J < 0$ the domestic producers pay less. This implies that the producers enjoy governmental protection. D shows whether or not this type of rug is profitable at private prices. D is positive in all of the provinces studied, which means the production of the rug is profitable. H shows the profitability of the same rug at shadow prices. The results indicate that H is positive in all three provinces, too. $H > 0$ implies that the production of the rug will be profitable if Iran is accepted to the WTO (the situation in which the private prices are replaced by the shadow prices). L shows the difference in profitability between producing the rug using private prices versus shadow prices. The results show that L is positive for all provinces.

Computing the Indices for PAM

Comparative Advantage Indices

The Domestic Resource Costs (DRC) = $G/(E - F)$. This index shows the ratio of the domestic costs to the value added in the rug producing plant. If

Table 2. PAM for One Square Meter of 65 Raj Hand-Woven Rug in Eastern Azarbayjan Province in 2006 (Rials).*

		Cost		
	Revenue	Tradable resources	Non-tradable resources	Profit
Private prices	15000000	864267	7784667	6351066
Social prices	10576800	470520	8378530	1727750
Effects of divergences	4423200	393747	–593863	4623316

* US$1 = approximately10,000 Iranian rials.

Table 3. PAM for One Square Meter of 65 Raj Hand-Woven Rug in Qum Province in 2006 (Rials).

		Cost		
	Revenue	Tradable resources	Non-tradable resources	Profit
Private prices	14000000	808767	7683007	5508226
Social prices	9107800	468581	7222754	1416465
Effects of divergences	4892200	340186	460253	4091761

Table 4. PAM for One Square Meter of 65 Raj Hand-Woven Rug in Esfahan Province in 2006 (Rials).

		Cost		
	Revenue	Tradable resources	Non-tradable resources	Profit
Private prices	12000000	947934	6810501	4241565
Social prices	8814000	528692	6485668	1799640
Effects of divergences	3186000	419242	324833	2441925

DRC < 1, the producer has a comparative advantage in the production of the product.

The Comparative Advantage Based on Unit Cost: (UCs) = (F + G)/E. This index shows the cost of producing the product when all price distortions are omitted. If UCs < 1, the producer has a comparative advantage in the production of the rug.

The Net Social Profit: (NSP) = E – (F + G). This index computes profit using input and output prices in terms of shadow (social) prices. If NSP > 0, the production of the product is socially profitable.

Table 5 shows the value of each of the above three indices for the three provinces under study for one square meter of the rug in question. The DRC and the UCs indices for all provinces are less than one. This implies the existence of comparative advantage of the carpets in all cases. The fact that NSP is positive indicates that the production of this type of rug is socially profitable.

The Protection Coefficients

These coefficients show the degree of protection awarded to the production of this type of rug.

The Nominal Protection Coefficient of Output (NPCO) = A/E. If NPCO > 1, the domestic price of the output is more than its shadow price and hence the product has received production subsidy.

The Nominal Protection Coefficient of Input (NPCI) = B/F. If NPCI > 1, the cost of tradable inputs is higher with domestic prices than with shadow prices. This implies that producers are paying indirect taxes.

The Effective Protection Coefficient (EPC) = (A – B)/(E – F). This index gives a measure of the ratio of the value added due to production at domestic prices to the value added due to production at shadow prices. By computing this index we can evaluate the impact of government intervention policies in the input market and in the product market simultaneously. EPC > 1 implies that the government favors the production of the rug.

Table 6 shows the above three protection coefficients for the three provinces studied. Since the NPCO is greater than one in all provinces, we can conclude that the price of the product, based on the domestic or internal prices, is greater than the product price based on the shadow prices. In other words the product enjoys government protection. The NPCI index is larger than one in all three provinces. The value of EPC is greater than one in all three provinces as well. This indicates that as a whole the government policies favor the production of the rug.

The Cost Competitiveness Criteria

These criteria can tell if the product can compete in domestic and international markets.

The Unit Cost (Domestic) UCd = (B + C)/A. This index shows if a producer can compete domestically based on current market prices. An index less than one implies that a producer can compete.

The Unit Cost (Export) UCx = (B + C)/E. This index shows whether a producer can compete internationally based on current market prices. An index less than one implies that a producer can compete.

Table 7 shows the above two indices for the three provinces. Since the indices for all provinces are less than one, we can conclude that the producers of the rug can compete both domestically and internationally.

Conclusions

Based on the results found for the DRC & UCs indices, the provinces studied all have a comparative advantage in producing the Cheleh Abrishami Silk Flower hand-woven rug**.** If Iran joins the WTO these regions will have the ability to compete freely (without any governmental protection). Based on the initial results, setting up more local weaving shops, especially in the rural areas with high unemployment rates, is suggested. The economic conditions in Iran and the market facts call for such a move. Because Iran has a comfortable comparative advantage in rug production, its joining the WTO should benefit rug weavers. Also, since rugs are produced in provinces where people on average earn less than the rest of the population, the expansion of rug weaving shops should reduce poverty, especially since rug production is labor intensive and does not require any sophisticated or advanced technology.

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Table 5. Comparative Advantage Indices of Producing One Square Meter of Hand-Woven Rug in Eastern Azarbayjan, Qum, and Esfahan Provinces.

Comparative advantage indices	Abbreviation	Eastern Azerbaijan	Qum	Esfahan
Based on domestic factors	DRC	0.82	0.83	0.78
Based on unit costs	UCs	0.83	0.84	0.79
Net social profit	NSP	1727750	1416465	1799640

Table 6. Protection Coefficient Indices in Producing One Square Meter of Hand-Woven Rug in Eastern Azarbayjan, Qum, and Esfahan Provinces.

Protection coefficients	Abbreviation	Eastern Azarbayjan	Qum	Esfahan
Nominal protection coefficient of output	NPCO	1.41	1.53	1.36
Nominal protection coefficient of input	NPCI	1.83	1.72	1.79
Effective protection coefficient	EPC	1.39	1.52	1.33

Table 7. The Cost Competitiveness Criteria of Producing One Square Meter of Hand-Woven Rug in Eastern Azarbayjan, Qum, and Esfahan Provinces.

	Abbreviation	Eastern Azarbayjan	Qum	Esfahan
Unit cost (domestic)	UCd	0.57	0.6	0.64
Unit cost (export)	UCx	0.81	0.93	0.88

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U.S. Demand for Fresh Fruit and Vegetable Imports

Kilungu Nzaku, Jack E. Houston, and Esendugue Greg Fonsah

U.S. demand for fresh fruits and vegetables has been on the rise since the 1970s, due to increased purchasing power, changing consumer perceptions of and habits toward better health, and a fast-growing population of immigrants accustomed to fresh-produce diets (Huang and Huang 2007, Lucier, Pollack, and Perez 1997; Wells and Buzby 2008; Pollack 2001). Climate and farm labor supply hamper U.S. producers' ability to respond to the increased demand. As a result, the U.S. increasingly depends on imports from NAFTA, banana-exporting countries, and the Southern Hemisphere to satisfy the demand for fresh produce (Huang and Huang 2007, Fonsah et al. 2007). These studies analyze the dynamic (monthly) demand for fresh, primarily tropical, fruit and vegetable imports into the U.S. We also explore the demand relationships between the fresh fruits and vegetables from various exporting entities using a source-differentiated Almost Ideal Demand System approach (Deaton and Muellbauer 1980, 1993).

We first estimated the demand for tropical fresh fruits using a dynamic AIDS model. The fresh fruits chosen for the study include bananas, pineapples, papayas, mangoes/guavas, grapes, avocadoes, and other fresh fruit imports. Nonstationarity and cointegration in the data series justified an error correction specification of the AIDS model (Banerjee, Dolado, and Smith 1986, Karagiannis, Katranidis, and Velentzas 2000). The study findings show that NAFTA has not been influential in tropical fresh fruit imports, perhaps because these commodities originate largely from non-NAFTA countries, with the exception of mangoes. All the fresh fruit import expenditure shares positively and significantly respond to real income/expenditures, implying that consumer income is a major determinant of U.S. tropical fresh fruit imports.

Fresh grapes and other fresh fruit imports are found to be luxury commodities, while bananas are staples, as has been shown in the existing literature (You, Epperson, and Huang 1996, Huang and Lin 1987). Papayas and mangoes/guavas are price elastic, whereas bananas, pineapples, U.S. grapes, and other fruit imports are price inelastic. Imported avocadoes appeared to be substitutes for bananas, papayas, mangoes/guavas, and fresh grape imports. Fresh grape imports are also significant substitutes for domestic grapes, implying that besides supplementing supply during U.S. production off-season in winter, the imported fresh grapes compete with U.S. produced grapes in summer and fall seasons. This is understandable, since fresh grape imports come mainly from Chile and Mexico; they are produced year-round in Chile and some parts of Mexico. Other significant substitutes include bananas and mangoes/guavas, pineapples and papayas, and mangoes/guavas and grape imports. Complementary fresh fruits include bananas and grape imports, avocadoes and other fruit imports and U.S. grapes. To some extent, these findings reinforce known fresh fruit consumption patterns. For example, bananas and fresh grapes are both often eaten as snacks and can be consumed together.

A dynamic source-differentiated AIDS model estimation of selected fresh vegetables included fresh tomatoes, peppers, cucumbers, and asparagus. The origin of the fresh vegetables is categorized into U.S. domestic source and total imports. All the data series were found to be nonstationary and cointegrated, and therefore an ECM-AIDS model was used. Most fresh vegetable imports were shown to be more price elastic than their domestic vegetable cohort. Cucumbers and asparagus are shown to be price elastic, and all the fresh vegetables were found to be responsive to real expenditure changes, as expected. Most of the U.S. fresh vegetable imports were shown to significantly compete with domestic fresh vegetables, and in particular with tomatoes, peppers, and cucumbers. Asparagus, on the other hand, show no significant relationship between imports and U.S.–produced commodities. This implies that asparagus is the only fresh vegetable commodity whose imports are independent of local produce.

Finally, a source-differentiated AIDS model is

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used to analyze the relationships between U.S. tropical fresh fruit imports from various sources. Bananas, pineapples, papaya, mangoes/guavas, and other fresh fruit imports are selected and their respective sources differentiated by the top countries of origin. Due to endogeneity in expenditure and prices, an iterative 3SLS method of estimation is used. Results show that most of the source-differentiated tropical fresh fruit imports are luxury commodities, as their expenditure elasticities are very elastic, except for bananas, which appear to be a staple. Within commodity groups, U.S consumers have a preference for Guatemalan bananas, Costa Rican pineapples, and rest of world (ROW) papayas and mangoes over commodities from other sources. Honduran pineapples, Mexican papayas, Ecuadorian and Mexican mangoes/guavas, and other fruit imports are also highly sought after, as their expenditure elasticities are greater than one in magnitude.

The cross-price elasticities from the source-differentiated AIDS model also show a strong competitive relationship between bananas from Ecuador and those from Colombia, Costa Rica, and the ROW. Costa Rican bananas also have a competitive relationship with those from the ROW. Bananas from the ROW also show a competitive relationship with those from Costa Rica and Ecuador. Bananas appear to be facing a lot of competition from the other tropical fresh fruits, mainly mangoes/guavas and pineapples, which is evident from the positive and significant cross-price elasticities. This is consistent with our expectations, due to the declining banana import share, which is documented in recent literature (HASS 2001; Fonsah, Krewer, and Rieger 2004; Fonsah et al. 2007, Huang and Huang 2007).

Results also show that papayas from Brazil and the ROW, pineapples from Costa Rica and Mexico and from Costa Rica and the ROW, and mangoes/guavas from Mexico and Ecuador are substitutes and therefore are competitors. Complementary relationships are found to exist between mangoes/guavas from Guatemalan and Mexico and among pineapples from Honduras, Costa Rica, and the ROW. Other commodities that are shown to have complementary relationships include bananas from Costa Rica and Colombia and those from Guatemala and Ecuador.

Elasticity estimates from the error correction version of the AIDS model are compared to estimates from a seasonal trigonometric AIDS model for tropical fresh fruits and vegetable imports. Table 1 presents income/expenditure and own-price elasticity estimates of a seasonal trigonometric and error correction versions of the AIDS model for tropical fresh fruit and vegetable imports. Statistically significant expenditure/income and own-price elasticities of demand are shown in bold. By magnitude, estimates of own-price elasticities of demand for bananas, pineapples, avocadoes, and peppers are very close in both models, whereas there are substantive differences in the expenditure elasticity estimates.

Table 2 shows the demand relationships between tropical fresh fruits and vegetables based on the seasonal trigonometric and error correction estimates; that is, it shows whether fresh produce commodities are statistically significant substitutes or complementary goods. Significant substitutes in the trigonometric and error correction AIDS models are denoted 1_S and $2_{S,}$ respectfully. The designations 1_C and 2_C are used to represent significant complementary commodities in the trigonometric and error correction AIDS model versions, respectively. Results show imports of papayas and pineapples and of avocadoes and pineapples to be significant substitute commodities in both the error correction and trigonometric AIDS models, while those of tomatoes and asparagus are complementary commodities.

Overall, NAFTA has no apparent impact on imported fresh fruits, because most originate from tropical regions. But NAFTA does impact fresh vegetable imports. Our results confirm that most tropical fresh fruits are luxury commodities, while bananas are a staple food. Bananas face strong competition from other tropical fresh fruits. With the exception of asparagus, all the fresh vegetable imports significantly compete with domestically grown fresh vegetables. These findings support prior studies, particularly on fierce competition between Florida tomatoes and imports from Mexico (VanSickle 1996; VanSickle, Evans, and Emerson 2003). Fresh imported grapes also directly compete with U.S.–produced fresh grapes instead of complementing each other seasonally. Results also indicated that U.S. consumers have a preference for tropical fresh fruits from various sources due to quality differences. For example, Guatemalan ba-

Table 1. Elasticity Estimates of a Seasonal Trigonometric and Error Correction AIDS Model for Fresh Fruits and Vegetable Imports, 1989–2008.

		Trig. model	ECM fruits	ECM veg.	Trig. model	ECM fruits	ECM veg.
		Expenditure elasticities			*Own-price elasticities*		
Fruits	$BANANA_{IM}$	**1.1056**	**0.2491**		–0.0922	**–0.0952**	
	$PINEAPPLE_{IM}$	**0.7077**	**0.4179**		–0.2049	**–0.3883**	
	$PAPAYA_{IM}$	**0.8391**	**0.4612**		–0.1121	**–1.3211**	
	$MANGO_{IM}$	**0.5468**	0.0810		–0.5862	–1.3869	
	$GRAPES_{IM}$	**0.9533**	**3.3193**		0.2391	**–0.6062**	
	$AVOCADO_{IM}$	**1.1387**	**0.7998**		–0.8499	–0.8524	
	OTHER $FRUIT_{IM}$)		1.2355			–0.4212	
	$GRAPES_{US}$		0.7884			–0.3758	
Vegetables	$TOMATO_{IM}$	**1.0824**		0.1111	**–0.9194**		**–0.5317**
	$PEPPER_{IM}$	**0.8000**		0.2692	–0.6774		**–0.6284**
	$CUCUMBER_{IM}$	**0.8931**		0.3749	–0.6005		**–1.0987**
	$ASPARAGUS_{IM}$	**1.0531**		**0.1844**	–0.1237		**–0.9003**
	OTHER VEG_{IM}			0.4086			**–0.5197**
	$TOMATO_{US}$			1.5056			**–0.4505**
	$PEPPER_{US}$			0.9905			0.0326
	$CUCUMBER_{US}$			0.4825			**–0.2366**
	$ASPARAGUS_{US}$			1.5193			–0.7084

Statistically significant estimates at 1, 5, or 10 percent levels are shown in bold. IM = Imports. US = U.S. domestic supply.

nanas, Costa Rican pineapples, and ROW papayas and mangoes/guavas are preferred over the same commodities from competing countries.

The findings from this study provide some insights into demand relationships for fresh fruit and vegetable imports in the U.S. A major policy implication of this study is that the U.S. may need to re-examine the impact of fresh vegetable imports on the domestic fresh produce industry, as they are not contra-seasonal and pose a threat to domestic producers. International fresh fruit and vegetable trade players and countries of origin could use the results from this study to determine their export promotion strategies in the U.S. fresh produce market based on their commodity's expenditure, own-price, and cross-price elasticities.

The key market players in fresh fruit and vegetable trade and the countries of origin for these commodities might use the findings in determining how much they could increase their market share if price competition is a viable option. The U.S. might also find the results useful in deciding which fresh produce commodities need assistance in terms of research and infrastructure development to enhance the ability of the U.S. fresh fruit and vegetable industry to fairly compete with imports and to identify the exotic fresh fruits that are most in demand.

A major limitation of these studies was the lack of data on monthly consumption of domestically produced fresh fruits and vegetables. Monthly fresh fruit and vegetable shipments are available from the Agricultural Marketing Service and serve as proxies

Table 2. Summary of Cross-Price Elasticities of Demand of Fresh Fruit and Vegetable Imports.

		Fruits								**Vegetables**								
		$BANA_{IM}$	$PINEA_{IM}$	$PAPA_{IM}$	$MANG_{IM}$	$GRAP_{IM}$	$AVOC_{IM}$	$OTHER\ FRUIT_{IM}$	$GRAPE_{US}$	$TOMA_{IM}$	$PEPP_{IM}$	$CUCU_{IM}$	$ASPA_{IM}$	$OTHER\ VEG_{IM}$	$TOMA_{US}$	$PEPP_{US}$	$CUCU_{US}$	$ASPA_{US}$
Fruits	$BANANA_{IM}$			1_C	2_S	2_C	2_S		2_S	1_S	1_S		1_C					
	$PINEAPPL_{IM}$			1_S 2s			1_S 2_S						1_S					
	$PAPAYA_{IM}$				1_C		2_S						1_S					
	$MANGO_{IM}$					2_S	2_S	2_S		1_S			1_S					
	$GRAPES_{IM}$						2_S	2_S	2_S									
	$AVOCAD_{IM}$								2_C		1_C							
	OTHER FRUIT$_{IM}$																	
	$GRAPES_{US}$																	
Vegetables	$TOMATO_{IM}$										2_C		1_C 2_C	2_C	2_S		2_C	
	$PEPPER_{IM}$													2_S	2_S	2_S		
	$CUCUM_{IM}$												2_S		2_S		2_S	
	$ASPAR_{IM}$													2_S	2_S		2_S	
	OTHER VEG$_{IM}$																	2_C
	$TOMATO_{US}$																	1_C
	$PEPPER_{US}$																	
	$CUCUM_{US}$																	
	$ASPARA_{US}$																	

of the U.S. monthly consumption. Another limitation is the dominance of U.S. fresh produce sector by a few multinational companies, which decide where to produce and ship each commodity. Thus the source-differentiation is not purely a consumer decision. Also, different varieties of tomatoes, pineapples, papayas, mangoes, and, in essence, all the fresh produce commodities fetch different prices due to quality differences, a consideration that was not captured in our study.

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Assessing Preference of Small Tennessee Farmers for Risk-Management Training

Simbarashe Pasirayi, Fisseha Tegegne, Surendra P. Singh, and Enefiok Ekanem

Small farms represent an important segment of the agricultural sector and rural communities in the U.S. (USDA 2010; Rossett 1999; Steele 1997). They account for 56 percent of the total U.S. value of agricultural land and buildings, about 91 percent of all U.S. farms, and more than half of the land in farms (United States Department of Commerce 2007). This trend holds true for the state of Tennessee, where 93.2 percent of the farmers were small-scale operators in 2007. Small farmers, however, face a number of problems that continue to challenge their viability. A 2006 USDA survey (USDA-NIFA 2010) indicated that Tennessee small-scale farmers' most pressing concerns were changes in government laws and policies/regulations (institutional risk), decreases in crop yields or livestock output (production risk), and uncertainty in commodity prices (price risk).

Agricultural risk remains the primary problem faced by small farmers in Tennessee, where more than one-third of farmers do not have proper risk management strategies (Ghosh and Brian 2001). In general, small farmers in Tennessee and elsewhere face limited resources such as lack of sufficient inputs, access to credit and technology, and above all limited education to manage agricultural risk. The farmers have to make use of risk-management tools and strategies to ensure economic viability and sustainability of their operations. Small farmers frequently struggle to find appropriate risk-management strategies. Thus it is important to understand their risk-management training needs in order to design effective risk-management education programs and efficiently allocate resources.

Objective

This study identifies risk-management training needs and preferred training delivery methods of Tennessee small farmers.

Pasirayi is Graduate Research Assistant, Tegegne and Ekanem are Research Professors, and Singh is Professor, Department of Agricultural Sciences, Tennessee State University, Nashville.

Data and Methodology

Data were collected between May and September 2010 through a mail-in survey administered to 250 randomly selected small farmers in Middle, East, and West Tennessee with the assistance of the Tennessee Agricultural Statistical Services.

The questionnaire was thoroughly pretested on selected small farmers having diverse enterprises on their farms in Davidson County, Tennessee. Questions contained in the questionnaire were aimed at identifying risk-management education needs of small farmers. The survey also included questions to identify characteristics of the farmers such as type of enterprises and size of operation.

Completed questionnaires were received from 92 farmers, a response rate of 36.8 percent. The data were checked for accuracy and completeness and then coded and organized for further analysis.

Farm types were divided into two major groups based on responses for analytical purposes. The first type included livestock farmers (dairy, sheep, beef, goat, etc.). The second included crop (fruit and vegetable) farmers. The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS).

Results and Discussion

Respondents' Characteristics

USDA (1998) defines small farms as having gross annual sales from agricultural commodities of $250,000 or less. Based on this definition all (100 percent) of the farms surveyed were small farms. In addition, 85.4 percent had less than $40,000 income from farm sales. A majority of the respondents were engaged in off-farm work and earned income from off-farm sources. Less than one-third (28.8 percent) of the respondents relied on farming as their sole source of income. 71.2 percent were employed off the farm, with 57.3 percent of those holding full-time jobs (Table 1).

Table 1. Distribution of Selected Farmers by Farm income, Off-Farm Income, and Level of Off-Farm Employment (%).

		Off-farm employment		
Gross annual income from farm enterprises	Full-time farmer	Part-time	Full-time	Total
Less than $10,000	2.1	0	3.2	5.3
$10,000–$19,999	0	3.2	5.4	8.6
$20,000–$29,999	5.4	4.3	17.3	27
$30,000–$39,999	14.1	5.4	25	44.5
$40,000–$49,999	1	1	4.3	6.3
$50,000–$100,000	6.2	0	2.1	8.3
Total	28.8	13.9	57.3	100

The average farm size of the selected farmers was 174.96 acres, with a standard deviation of 523.2. Only 4.8 percent of the farmers had more than 250 acres under production. Most (55 percent) of the respondents were livestock farmers and 45 percent were crop farmers (Table 2). In addition the analysis highlighted that 28.2 percent of the farmers considered their farming operation susceptible to very high levels of risk and 36.9 percent considered their operations to susceptible high levels of risk. Furthermore, the farmers who had moderate to low levels of risks were not concerned about risks.

As expected, the majority (92.1 percent) of the farmers selected were male and more than one-quarter had a high school or equivalent education, 22.8 percent of the respondents had some college-level education, 26 percent had a college degree, and another 16.3 percent had a graduate degree or some graduate-level education (Table 3).

Respondents' Risk Management Training Needs

The selected small farmers identified and ranked the risk-management training workshops which they felt they needed to attend in order to improve their operations. The farmers ranked the workshop on Marketing and Value-Added Agriculture as their major need. Additional examination revealed that 41.4 percent of the crop farmers and 31.3 percent of the livestock farmers ranked the workshop on Marketing and Value-Added Agriculture at the top, followed by the workshop on Farm Financial Analysis and Business planning (19.5 percent of crop farmers and 21.5 percent of livestock farmers) as their most critical needs (Table 4).

Chi square analysis was used to determine the association between the level of risk in farming operations as perceived by the farmers and their requirements for risk-management training workshops. The analysis showed a $\chi^2 = 0.041$, showing the relationship between the two to be significant. The selected small Tennessee Farmers with very high and high perceptions of risk in their farming operations ranked the workshop on Marketing and Value-Added Agriculture as the one they most needed (Table 5).

Respondents' Preferred Training Methods and Days

A high proportion of the farmers (64 percent) indicated that their preferred method of risk-management training was in-depth training by risk-management experts, 25 percent preferred to be trained by extension agents, and 11 percent preferred Internet- or computer-based educational modules. A majority of the livestock (58 percent) and crop (68 percent) farmers preferred to be educated about risk through in-depth training by risk-management experts. The farmers also pointed out that they wanted

Table 2. Distribution of Selected Farmers by Farm Size and Type of Enterprise (%).

	Type of Enterprise		
Farm size	Crop	Livestock	Total
Below 50 acres	2.1	7.6	9.7
50–99 acres	6.5	7.6	14.1
100–149 acres	13	9.7	22.7
150–199 acres	13	19.5	32.5
200–249 acres	8.6	7.6	16.2
Above 250 acres	1.8	3.2	4.8
Total	45	55	100

Table 3. Distribution of Selected Farmers by their Level of Education, Gender, and Marital Status.

		Gender		
Level of education	Marital status	Male	Female	Total
Attended grade school	Married	1		1
Some high school	Married	2		2
	Widowed	2		2
High school diploma or equivalent	Married	26		26
	Divorced	1		1
Some college or technical school but no degree	Married	16	3	19
	Divorced	2	0	2
College degree	Married	20	1	21
	Single	1	0	1
	Divorced	1	0	1
	Widowed	1	0	1
Some graduate school or graduate degree	Married	9	3	12
	Single	3	0	3
Total		85	7	92

Table 4. Selected Small Tennessee Farmers Ranking of Risk-Management Training Needs by Enterprise.

	Type of enterprise		
Required risk-management training workshops	Crop	Livestock	Total
Marketing and value-added agriculture	17	16	33
Farm financial analysis and business planning	8	11	19
Alternative enterprises and diversification	8	8	16
Crop insurance	2	1	3
Estate planning	4	8	12
Assistance available from USDA agencies	2	7	9
Total	41	51	92

Table 5. Selected Small Tennessee Farmers Ranking of Risk-Management Training Workshops and their Perceived Level of Farming Operational Risks (%).

	Farming operations level of risk					
Required risk-management training workshop	Very high	High	Moder-ate	Low	None	Total
Marketing and value-added agriculture	15.6	13	4.3	1	2.1	36
Farm financial analysis and business planning	6	10.8	2.1	2.1	0	21
Alternative enterprises and diversification	1	8.7	2.1	5.4	0	17.2
Crop insurance	1	0	2.1	0	0	3.1
Estate planning	7.7	4.3	0	1	0	13
Assistance available from USDA agencies	4.4	4.3	1	0	0	9.7
Total	35.7	41.1	11.6	9.5	2.1	92

to be trained on Saturdays (57 percent) rather than on weekdays (25 percent) or during the evenings (18 percent).

A comparison between the farmers' preferred the training days and their off-farm employment status was carried out. The result shows that 15.2 percent—those who did not have off-farm jobs—preferred to have training sessions during weekdays and farmers who had off-farm jobs opted for Saturdays.

The association between farmers' preferred methods of training and their level of education was tested. The results show that farmers who had the lowest levels of education preferred more personal risk-education methods (Table 6).

Additional analysis revealed a relationship between the farmers' perceived farm operations level of risk and their preferred training methods. The selected farmers who perceived risks in their operations as very high and high favored in-depth training by risk-management experts when it came to risk-management training techniques (Table 7).

Table 6. Selected Famers Preferred Training Methods and Their Level of Education (%).

	Level of education						
Training methods	Grade school	Some high school	High school diploma	Tech-nical school	College degree	Graduate school	Total
In depth training by risk-management experts	1	21.5	16.3	6.5	10.8	7.6	63.7
Training by extension agents	3.2	9.7	4.3	4.3	1	2.1	24.6
Internet- or computer-based educational modules	0	0	4.3	2.1	2.1	3.2	11.7
Total	4.2	31.2	24.9	12.9	13.9	12.9	100

Table 7. Perceived Farm Operations of Risk and Preferred Training Methods (%).

	Farming operations level of risk					
Training methods	Very high	High	Moderate	Low	None	Total
In-depth training by risk-management experts	22.5	25	9.7	5.4	1	63.6
Training by extension agents	8.6	10.8	2.1	3.2	0	24.7
Internet- or computer-based educational modules	4.3	5.4	0	1	1	11.7
Total	35.4	41.2	11.8	9.6	2	100

Summary and Implications

The survey results highlight small farmers' risk-management training needs and their preferred training delivery methods. Despite a relatively diverse sample in terms of education, farm size, type of enterprises operated, and farm income, the results show that there is considerable agreement on the relative importance of risk-management training needs among small farmers. Results also reveal the socioeconomic characteristics of the respondents.

Farmers ranked production risks (rainfall variability and pests [insects, weeds, and diseases]) as their most important category of risks, followed by market related risks (credit availability). In identifying the various sources of risk, this knowledge can be used to develop targeted educational programs and policies that will help small farmers improve their viability.

The survey also obtained both qualitative and quantitative information which can assist policy makers and others working with small farmers in the state. Extension professionals and other risk-management specialists can use the information when designing risk-management workshops, determining appropriate training schedules, and developing effective delivery methods that will be important for small farmers in Tennessee. This

study shows the need to make a concerted effort by all working with small farmers to implement risk-management strategies that will enhance small farmers' economic viability.

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Market Testing of Labeled and Unlabeled GMO Papaya Fruits in Honolulu Chain Stores

Sabry Shehata

According to the Statistics of Hawaiian Agriculture, in 2003 the value for most Hawaiian fruit sold was higher than it was a year earlier, totaling $129.7 million, three percent more than in 2002. Fresh papaya production totaled 40.8 million pounds in 2003, four percent below the previous year, the second consecutive year of decline. Fresh fruit accounted for virtually all production, 96 percent of the state's total; export shipments were responsible for 46 percent of fresh fruit utilization. Growers planted primarily Rainbow and Kapoho varieties of papaya, and Hawaii's August 2002 total papaya acreage was 2,145 acres, 21 percent less than at the same time one year earlier. Bearing (harvested) acres across the state were 24 percent lower in 2003 than in 2002.

Papayas in Hawaii are chiefly grown from genetically engineered papaya seed that is resistant to papaya ringspot virus. Japan is a major importer of Hawaiian papaya but it will not accept GM foods. No federal guidelines currently specify labeling of GM produce or products containing GM ingredients for U.S. marketing channels; growers and distributors in the United States are not required to label genetically engineered food in grocery stores. Only organic foods are required to be free of GM material, although "GM free" labels may be used by a retailer or wholesaler as part of their individual marketing strategy.

U.S. labeling requirements, if imposed, may affect exports of U.S. fruit because international markets may demand that GM products be labeled or may not accept them at all. Hawaii has been steadily losing market share in the Japanese papaya market to the Philippines since 1995. In 2002, the Philippines had 56 percent of the market, while Hawaii had 43 percent. The competitive disadvantage of Hawaii-grown papayas may stem from Hawaii's distance from Japan, the higher relative price of Hawaii papayas and a limited supply of non-GM papayas from Hawaii. Papayas from the Philippines are roughly half the price of Hawaiian papayas. Furthermore, the distance between the two countries is shorter, resulting in fresher, less-damaged fruit.

Organizations such as GMO-Free Hawaii wish to move Hawaiian agriculture away from genetically engineered crops and toward locally-based sustainable agriculture. They have members on each of the major Hawaiian Islands.

A survey is being conducted to determine the consumer's attitude toward GMO fruits in Hawaii. The results will be used to assess the present state of consumer knowledge about such fruits and to assist in the design of appropriate policy recommendations for decision makers in Hawaii. A similar survey will be conducted in Japan.

This research determines how Hawaii consumers react to the sale of genetically modified fruits. It will be used as a guide to penetrate the Japanese market.

Review of the Literature

Producers, distributors and grocers present consumers with a variety of label product claims in an effort to attract greater sales or higher prices for their fresh produce. In an attempt to disentangle the value that consumers place on two of these claims, Constanigro et al. (2010) presented shoppers with a choice of organically and locally grown produce. Using primary data from a choice experiment conducted in a grocery store that had conducted co-promotional efforts with the Colorado Proud program, they found that the value of "local" claims trumps that of "organic" in apples. (Constanigro, 2010)

James, Rickard, and Rossman (2009) found similar results. Consumers were asked to choose an applesauce product from a list of products differentiated by price and four other attributes. The products were differentiated by labels that described fat content, nutritional content, and whether the product was grown organically and/or locally. They found that consumers were willing to pay more for

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locally grown applesauce compared to applesauce that was labeled organic or low-fat and low-sugar. Furthermore, the analysis incorporated the effects of consumer characteristics on the demand for applesauce attributes and found evidence that increased knowledge of agriculture decreases the willingness to pay for organically and locally grown applesauce. (James, Rickard, and Rossman 2009)

Novotorova and Mazzocco (2008) used a conjoint analysis methodology in an online survey to measure consumers' preferences for apple attributes such as place of production, method of production, and price. The results of the analysis indicated that consumers are willing to make trade-offs between the studied attributes. Place-oriented consumers may, for example, be willing to pay 60 percent to 70 percent premiums for locally grown apples. Novotorova and Mazzocco suggest that the high consumer preferences for locally grown products, combined with environmental benefits transferred through genetic modification, provide an opportunity for producers to capture and build their markets. (Novotorova and Mazzocco 2008)

In a New Zealand study, where the genetically modified issue has been highly politicized, Knight, Mather, and Holdsworth (2005a) state that much of the resistance toward genetically modified foods appears to stem from public perceptions that they offer no consumer benefits. In order to test whether clearly defined consumer benefits would change behavior, the researchers conducted a purchasing experiment. Cherries labeled as spray-free genetically modified, organic, or conventional were offered for sale in a roadside stall, with price levels manipulated to test price sensitivity of the different options. Approximately 27 percent of consumers proved willing to purchase genetically modified labeled cherries when all three types were priced at the prevailing market price, and this market share increased to 60 percent when the price was discounted by 15 percent and organic was priced at a 15 percent premium. (Knight, Mather, and Holdsworth 2005a)

In a second paper from the same experiment, Knight, Mather, and Holdsworth (2005b) examined consumer willingness to buy genetically modified (GM) foods with a price advantage and other benefits, compared with organic and ordinary types of foods. The importance of this increases as the volume and range of GM foods grown and distributed globally increases. As before, customers chose among three categories of fruit (organic, GM, and ordinary) with experimentally designed levels of price in a roadside stall in a fruit-growing region of New Zealand. Buyers were advised, after choosing, that all the fruit was standard produce, and the experiment was revealed. The authors conclude that when the GM label is combined with a typical functional food benefit, GM fruit can indeed achieve significant market share among organic and ordinary fruit, even in a nation where the GM issue has been highly controversial; GM fruit can gain a sustainable competitive advantage from any price reduction associated with production cost savings; and market shares of organic fruit are least sensitive to pricing and the introduction of GM fruit. (Knight, Mather, and Holdsworth 2005b)

Methodology

In order to test consumer response to GM fruit, grocery stores on Oahu were selected to participate in the study. The Times Super Market chain of groceries was willing to participate in the research. Six stores were selected for the study based on location (two stores each in low-, middle-, and high-income neighborhoods). In all locations, the labels "Hawaiian Grown GMO Papayas" were placed onto the fruits and a scan number was designated. Nonlabeled papayas had a different scan number. The two fruits, otherwise identical, were displayed and marketed next to each other in the stores' produce departments. The data were collected daily in the first portion of the study, and weekly in the second portion. The experiment began in May and continued through June. The sale price for unlabeled papaya was fixed at $1.49 per pound.

In the first portion of the experiment, the fruits were placed in three of the stores and the price for both labeled and unlabeled fruit was set at $1.49. Later, the price for labeled papayas was increased to $1.69 per pound and for unlabeled to $1.59 per pound.

In the second portion of the experiment, we repeated the test using a more explicit label, spelling out "Hawaiian Grown Papaya—Genetically Modified Organism." The test period was six weeks, with data collected weekly. The price for the fruits was fixed at $1.49 per pound for the duration of the experiment.

Results and Analysis

Table 1 presents the sales of labeled and unlabeled papaya fruits at two different price points during the first portion of the experiment. The price elasticity of demand (PEoD) for unlabeled fruit is much higher than for labeled papayas, indicating that Honolulu shoppers are far more sensitive to changes in price for unlabeled papayas than for the labeled fruits.

Table 2 presents the results of the second phase of the experiment. In this case, the label was more explicit, spelling out "Hawaiian Grown Papaya—Genetically Modified Organism." During the three-month test period over 15,500 papayas were sold in the three stores. Of these, 65 percent were the labeled fruits. Average monthly sales of labeled papaya per store amounted to 3356 lbs per store compared to just 1811 lbs for the unlabeled fruits. These results are different at a significance level of 0.02. One can conclude that the label has a positive impact on the sales of the fruit.

Discussion and Conclusion

We can generalize from these results that the labeling of papaya fruits increases their sales in Hawaiian groceries. Explicitly identifying the fruit as genetically modified not only does not increase the market risk, it increases the sales of the product. Furthermore, the elasticity of demand for unlabeled papaya has a value of 2.83, almost twice that of labeled papaya, with a value of 1.49. This indicates that Honolulu consumers are substantially more sensitive to the price of unlabeled papaya than of the labeled counterparts.

These results could be attributed to a consumer perception that a labeled product implies a better quality item, a desire by the consumer to sample GMO fruits, or a general lack of knowledge regarding the terms "GMO" and "Genetically Modified Organism." Whatever the reason, the results were significant at the 0.002 level. The greater demand for labeled papaya, coupled with an equally significant lesser sensitivity to price changes in the labeled

Table 1. Price Elasticity of Demand for Labeled and Unlabeled Papaya. Label Indicates "Hawaiian Grown GMO Papaya."

	Fruit sold (lbs) @ $1.49/lb	Fruit sold (lbs) @ higher price	Increase in price ($/lb)	Price elasticity of demand
Labeled fruit	2759	2285	0.20	1.49
Unlabeled fruit	1053	864	0.10	2.96

Table 2. Monthly Sales of Labeled and Unlabeled Papaya. Label Indicates "Hawaiian Grown Papaya, Genetically Modified Organism" (lbs).

	Labeled fruit sold	Unlabeled fruit sold
Store #1	3609	1640
Store #2	4246	1626
Store #3	2215	2167

papaya, suggests that Honolulu consumers are not daunted by a product being labeled as genetically modified.

The benefits of labeling exceed the cost of labeling (lost sales from limited number of consumers who do not want to eat GMO food, label production and application costs, etc.). Based on these findings, it would seem that labeling papaya in Hawaii is positively indicated, but further research is needed to determine the impact of labeling on GMO papaya sales on the U.S. mainland and in Japan.

These results are relevant only to those genetically modified products which do not change their form and are not used as ingredients in other products, such as tomatoes, apples, fish, etc.

The cost of labeling will become a production/marketing cost but likely will not result in a significant price increase to consumers. Any firm or industry marketing GM food/fruit would likely benefit from providing information to supplement a label. It is expected that consumers in the Japanese market will be wary of GM papaya. While this research suggests that labeling of the papaya is likely warranted, this may not be sufficient information for consumers to fully understand the benefits and costs associated with consuming GM papaya. Therefore an educational effort, based on credible scientific information, is perhaps necessary for papaya or any genetically engineered fruit if producers plan to develop and maintain strong local and export markets.

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Government Policy and Ethanol: What Does the Future Hold?

Daniel Staley and Sayed Saghaian

The worlds of government and agribusiness have become intertwined with the increase in ethanol production that has occurred over the last decade. With tariffs and subsidies, the question regarding ethanol becomes whether these initiatives are needed. This paper investigates whether the government policies of the $0.54 per gallon tax on imported ethanol and the $0.45 ethanol blender tax credit are still needed.

Government policy concerning ethanol has a long history in the United States. It dates back to 1978, when subsidies were offered under the Energy Policy Act of 1978. In the beginning, subsidies were offered to boost farm income and to stabilize energy security (Taheripour and Tyner 2008b). The Clean Air Act required vendors of gasoline to "oxygenate" their product. Adding oxygen to gasoline enables fuel to burn cleaner, creating a cleaner environment as a result. Also at this time, ethanol and subsidies began to be offered to create a cleaner environment.

In 2004, when the price of crude oil began to rise at a very high rate, ethanol profitability began to rise at a very high rate. Adding to this profitability was the ban on MTBE in 2006 and lower corn prices. Once MTBEs were banned, leaving ethanol as the only additive, prices peaked at $3.58/gal. Since this peak, the price of ethanol has been steadily falling; it is priced now based on its energy content, which is about 70 percent that of gasoline (Taheripour and Tyner 2008a).

Background

The Energy Policy Act of 2005 enacted the Renewable Fuel Standard, which mandated 7.5 billion gallons of renewable fuel consumption by 2012. In regard to ethanol policy, the government provides policies with blenders' tax credits beginning at $0.54/gal and an ad valorem tariff of 2.5 percent for a $2.00/gal import price, a total of $0.59/gal. Since this policy came into effect in 2005, the fixed subsidy was changed with the 2008 Farm Bill to $0.45/gal of corn ethanol. In addition to these incentives and barriers, there is a cellulosic production tax credit of $0.46 and a small producer credit of $0.10. When combined with the general blenders' credit, cellulosic fuels receive a total subsidy of $1.01 (Taheripour and Tyner 2008b).

The United States Environmental Protection Agency met again on March 26, 2010 and published the Renewable Fuel Standard Program (RFS2) Final Rule, which made changes to the original Renewable Fuel Standard to guarantee that transportation fuel sold in the US contains a minimum volume of renewable fuel. The result of this was an increase in total volume of renewable fuel to be blended into transportation fuel, to 36 billion gallons by 2022 (US EPA 2010).

Impact on Commodity Markets

It has been believed that as production of ethanol increases, so does the price of corn and other input commodities. As shown by Saghaian (2010), however, there may not be a full causal relationship. Although ethanol production has increased over the years, it has not accounted for the entire rise in food prices across the world. Some things that have contributed to the higher food prices include bio-fuel policies, bad weather in production areas, higher oil prices, poor government policies (export bans and import subsidies), and storage behavior in reaction to these policies (Rosegrant 2008).

Land and water are two constraints that affect production of corn and other crops used in ethanol production. Due to these constraints on production, a higher yield per acre is needed. This has shown to be occurring as corn yields per acre continue to increase. This could affect the domestic food supply with an increase in ethanol production. According to the Renewable Fuels Association, 10.75 billion gallons of ethanol were produced in 2009, leaving

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much room for growth to the 36 billion gallons in 2022 as mandated by the RFS2. It has been found also that when the U.S. ethanol industry reaches 22 billion gallons, the U.S. will no longer have an excess amount of corn to export (Elobeid et al. 2007). According to the USDA Economic Research Service (USDA-ERS 2010), there was an increase in yield per harvested acre of corn from 2005 to 2009 (147.9 bu/acre to 165.2 bu/acre), so the 22 billion gallon limit found by Elobeid et al. may have increased slightly.

Biofuel demand has been shown to increase weighted grain prices up to 30 percent, since land must be taken to produce more corn. This demand also has affected an increase in the prices of maize (39 percent), rice (21 percent), and wheat (22 percent) (Rosegrant 2008). Farmers in the U.S. would begin to switch crop production from a corn-soybean rotation to corn-corn-soybean production to meet the new demand for corn. This change was found by Rosegrant to reduce soybean production nine million acres to meet corn demand.

Ethanol may not be the only contributing factor in the corn price increase, but it is definitely one factor that has increased price. This also puts a constraint on other industries such as the meat/livestock industry. According to Elobeid et al. (2007), with the increase in corn prices consumers would pay a higher cost for livestock products. The higher corn prices will have the largest effect on the pork and poultry industries, since these are the least able to switch to Dried Distillers Grains with Solubles (DDGS) based diets (Elobeid et al. 2007). The increase in total production costs in the pork industry will necessitate a 10–15 percent decline within the industry.

Cellulosic Fuels

Since one of the constraints on the production of ethanol and corn used for ethanol is land, it is important to look for other materials to use in ethanol production. One option that is yet to become commercially produced is cellulosic fuels, or energy crops. The energy crops used are those of perennial grasses miscanthus and switchgrass. Along with these "energy crops" are crop residues such as corn stover and wood chips.

There are many positives to cellulosic fuels but one potential difficulty to their production is the very high start-up costs involved—an initial investment of at least $400 million (at 2008 prices) would be required for a 100 million gallon cellulosic plant (Taheripour and Tyner 2008b). The Advanced Biofuel Investment Act of 2010 will increase the tax credit given to advanced biofuels upon investment into biorefineries. It is believed that this tax credit will show investors that investing in advanced biofuels is a safe and smart decision. This investment could prove to be the impetus that enables the U.S. advanced biofuel industry to reach the 2022 mandate.

Tyner (2010) found it unlikely that corn ethanol production will exceed the 15 billion gallon with the blending wall issues present, and the cellulosic fuels industry is a very expensive method even with the top technologies available. Many cellulosic fuel producers have put a halt to cellulosic fuel production facilities. It is not unreasonable to believe, however, that if oil prices were to return to previous high levels, more investment could be attracted to the cellulosic industry. With new investment as well as an increase in oil prices, cellulosic fuels could be a productive industry in regards to meeting the RFS2 level mandated.

Renewable Identification Numbers (RINs)

The discussion of mandates to reach the desired level of biofuels has shown that there must be ways to monitor and ensure that those in the industry are reaching the mandate. The EPA achieved this by creating a market for Renewable Identification Numbers (RINs). Each gallon of gasoline produced possesses a RIN number. Gasoline producers and importers are assigned a number of RINs that they must give to the EPA each year (Babcock 2010). The only way for producers and importers of ethanol to receive RINs is through the purchasing of biofuels. There is the possibility that RINs can be purchased through other sources that may have more RINs than required by the EPA.

This market achieves this goal because the demand for RINs increases when the quantity of biofuels purchased is insufficient to meet the mandate (Babcock 2010). If the relative price of the RIN is high due to a demand increase, producers and importers will choose to buy biofuels for their price benefits. When the RIN is factored into the wholesale price of ethanol, ethanol will become the

more appealing option if the total price is below or close to the wholesale value of gasoline.

Import Tariff

Brazilian ethanol, prior to the RFS2, competed directly with U.S. corn-based ethanol. Since the release of the new mandates ruling Brazilian sugarcane ethanol to be an advanced biofuel, the two no longer are competing directly. Advanced biofuels are predicted by Babcock (2010) to be higher in price than corn-based ethanol since they are scarcer relative to their mandate. To be a competitor of U.S. corn-based ethanol, Brazilian sugarcane ethanol will have to meet Brazil's internal demand along with the demand for U.S. advanced biofuel.

There is no fundamental benefit to keeping the import tariff. Since it is very specific in keeping Brazilian ethanol from being imported, all it accomplishes is to cause U.S. gasoline producers to pay enough to encourage Brazil to export enough to meet the U.S. mandated amount. This import tariff is increasing the price for Brazilian ethanol. Babcock (2010) states that if there is no alternative supply of domestically produced noncellulose advanced biofuels, there will be no benefit to the U.S. biofuel industry in maintaining the import tariff.

With the current import tariff it is difficult for ethanol produced outside of the United States to be imported. With recent prices it has become more difficult, since ethanol with an import value of $2.00 incurs a total import tariff of 59 cents per gallon, compared to a 45 cent per gallon subsidy for U.S. ethanol. The imported ethanol also receives the 45 cent per gallon subsidy, but that still leaves a net 14 cent per gallon penalty for imported ethanol (Tyner 2010). With this large difference between imported and domestic ethanol, the import tariff should be lowered. The reason for the import tariff was to help protect the U.S. ethanol industry and balance the levels of imported and domestic ethanol. With a net loss on imported ethanol, relatively more U.S. ethanol will be on the market. If the import tariff were to be lowered to the level of the subsidy, this would help balance the amount of imported and domestic ethanol in the U.S.. It is important to note that the price of sugar has increased, so production in Brazil has shifted slightly from sugarcane ethanol, which may make it more difficult for Brazilian ethanol to enter the U.S. market.

Conclusions

The new mandates have increased the ethanol production that will be seen over the next 12 years. With the subsidies and import restrictions in place, although mandates may be reached, it is questionable whether or not this will be done efficiently. The industry will find that there will be a market for ethanol products even if crude oil falls below $40 per barrel.

Tax credits will have no impact on industry profits unless oil prices rise high enough that the combination of market demand and tax credits push ethanol production higher than mandated levels. If oil prices were to rise to a certain level, the only impact a tax credit would have would be to push the price higher, while returning more to the ethanol producer. This could lead to a large impact on commodity prices that may be unnecessary and unwanted.

The Renewable Identification Numbers (RINs) are a useful and efficient way to reach the mandated levels at the lowest cost possible. By allowing the market to find the lowest possible cost on its own through RINs, mandated levels will be reached more efficiently. If motor fuel producers find it too difficult, or for some reason do not have the means to produce biofuels themselves, RINs give them access to reach the level set by the EPA at the lowest possible cost.

While it is important to note that the government and U.S. ethanol producers have made large strides in reaching the mandates set forth in the RFS2, it will be extremely difficult to meet the mandated levels in a realistic and efficient method. With the possibility of meeting the mandate, is important to note that there are staggering costs associated with the incentives put in place. U.S. ethanol will also need to find a way to become priced at its energy value compared to gasoline (70 percent), as this is the point where consumers will be indifferent between gasoline and biofuels.

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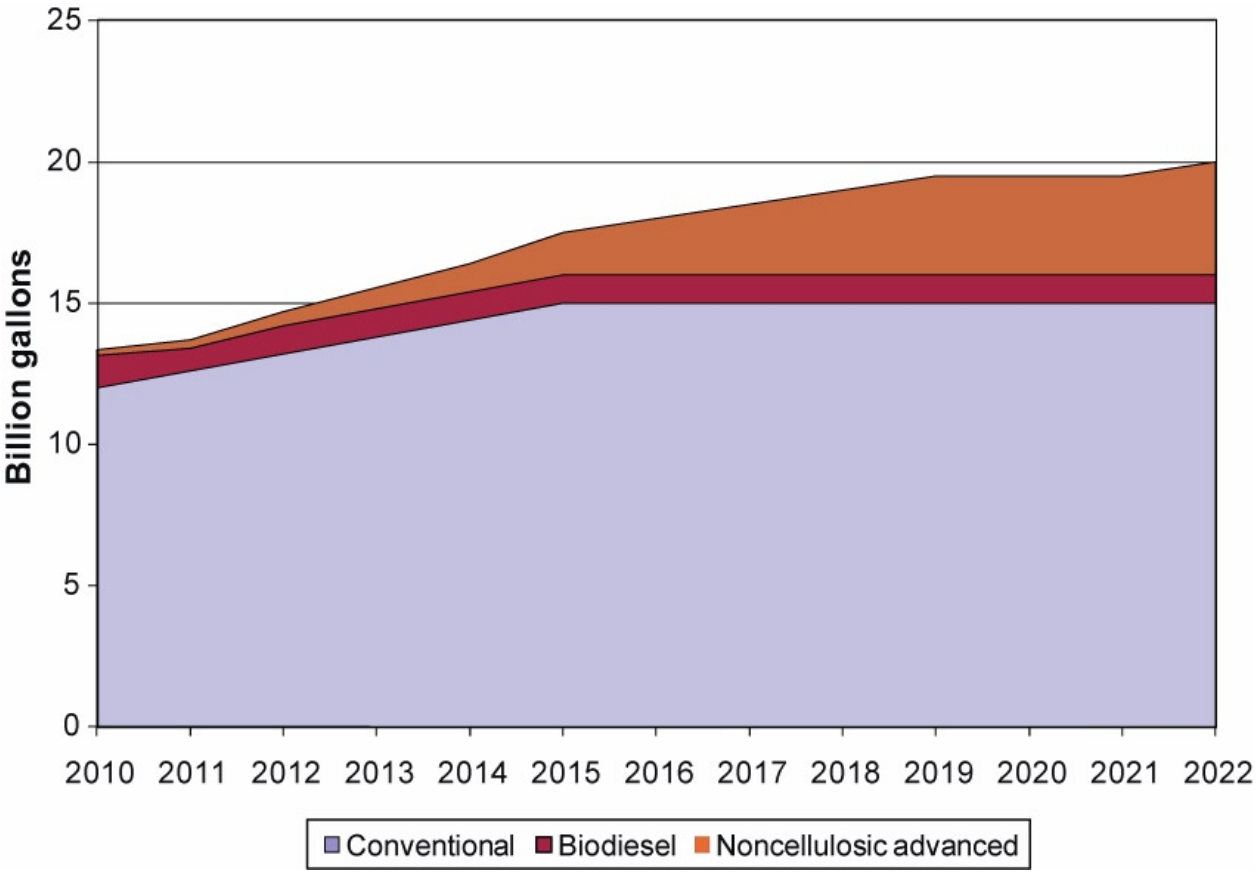

Figure 1. Biofuel as a Result of Government Mandates.

Source: Babcock (2010).

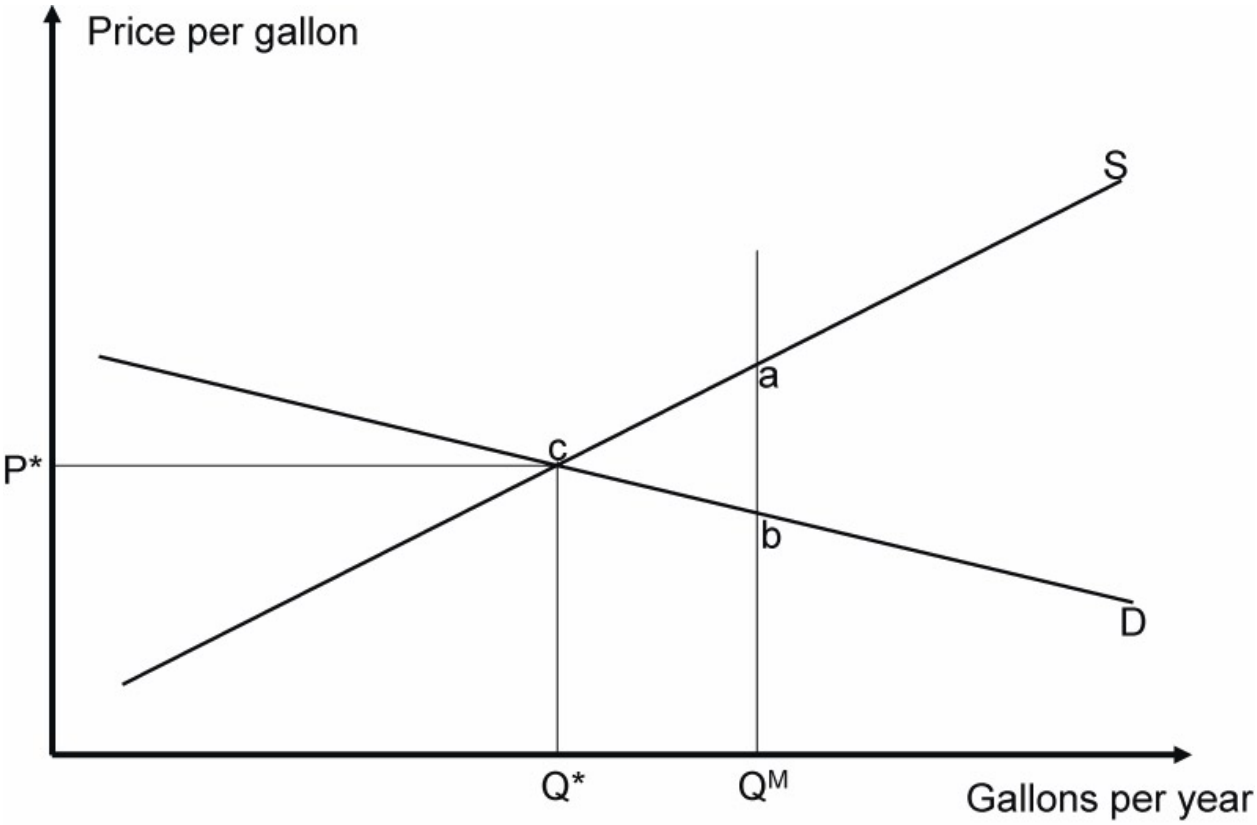

Figure 2. Ethanol Supply and Demand.

Source: Babcock (2010).

Comparing Second Generation GE Crops to First Generation GE Crops

Forrest Stegelin

In a little over a decade the adoption of genetically-modified or genetically-engineered crop varieties has increased dramatically (Figure 1). With this new technology comes a need to understand a new vocabulary or glossary of terms, including biotechnology, transgenic plants, Bt crops, HT crops, gene stacking, genetic engineering, and genetically modified organisms. These new crop varieties feature resistance to pests and the ability to tolerate herbicides.

First Generation and Second Generation Varieties

Input traits such as pest resistance and herbicide tolerance represent the first generation or wave of the new agricultural biotechnology, offering advantages to farmers in the production phase without changing the final product. Farmers' rapid-fire adoption of these varieties was propelled by potential cost savings, including reductions in input use—particularly chemical use—and conservation tillage. The first generation of genetically modified (GM) crops has the potential to increase farmers' net returns through savings in production costs, reductions in chemical use, increased flexibility in crops planted, and, in some cases, yield advantages.

The second generation or wave of genetic modifications focuses on output traits such as improved nutritional features and processing characteristics. Development of genetically modified organisms (GMOs) is an advance over conventional breeding techniques. The second generation varieties should have little or no direct impact on prices received by farmers, assuming the varieties are accepted by consumers and by other countries, because the products are basically indistinguishable from conventional crops. Output traits will, however, enhance the value of the crops for end-users, leading to more pronounced effects on pricing and marketing.

The driving forces behind the development of second generation GE crops include enhanced product quality, especially oils; stress tolerance (temperature, water); altered growth habits (biomass for alternative energy sources); and value-added proteins for pharmaceuticals. Cost savings, convenience, and reduction in management tasks for scouting, and simplification or elimination of pesticide (insecticide, herbicide, fungicide) use. Most of the new generation technology is not aimed explicitly at increasing yields, although yields may be effectively increased by cutting losses to pests or weeds, thereby protecting the yield potential of the particular hybrid. Benefits will vary from year to year and over different locations, depending on environmental factors.

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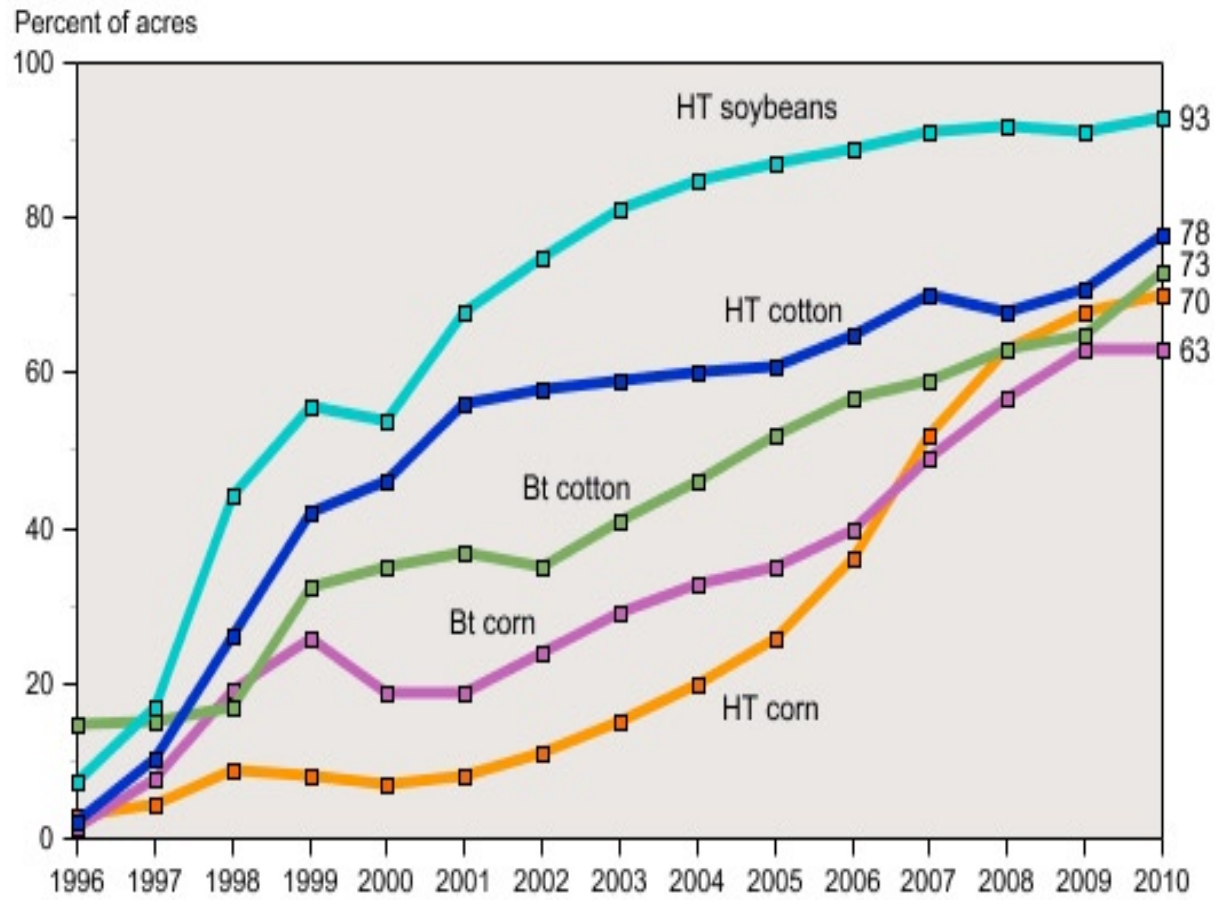

Figure 1. Rapid Growth in Adoption of Genetically Engineered Crops in the U.S.

Data for each crop category include varieties with both HT and Bt (stacked) traits.
Sources: 1996–1999 data are from Fernandez-Coprnejo and McBride (2000). Data for 2000–2010 are available in USDA-ERS (2010) Tables 1-3.

Health and Nutrient Claims in Processed Food Products: Are Consumers Gaining or Losing?

Kelleen Wiseman

Over the past decade consumers' knowledge of the relationship between select foods and a healthy lifestyle and/or disease reduction has increased significantly. Over that same time period, food companies have substantially increased their use of health messaging claims on their packaging (Caswell et al. 2003; Parker 2003). As the number of health messaging claims and products has increased, so has the wariness of the consumers regarding product efficacy (Datamonitor 2009; Garretson and Burton 2000). Governments support the inclusion of claims on food products to facilitate nutrition education to consumers and to provide the food industry with an incentive for reformulation and development of new innovative products (Health Canada 2007). Food companies use these health messaging claims to inform consumers of product features and increase sales (Brandt, Moss, and Ferguson 2009; Caswell et al. 2003; Herath, Henson, and Cranfield 2008). Consumers use these claims to make decisions that support healthy food choices. When making these decisions, consumers generally assume that the claim is valid (e.g., a low-fat claim implies lower fat grams) and that the other nutritional attributes (e.g., levels of sugar and fiber) for the product remain the same or improve, implying an overall healthier product. If instead there is a pattern of incongruence between claims and nutrient levels (e.g., low-fat products consistently provide higher salt), this is of concern to consumers, as the meaningfulness of these claims may be diluted and consumers may be obtaining unintended levels of nutrients. In other words, consumers may be purchasing products with a health messaging claim that provides a gain related to the nutrient associated with the claim but a loss due to decreased good nutrients or increased poor nutrients that are not associated with the claim (Colby et al. 2010). Government policy makers should also be concerned if a pattern of incongruence is prevalent in processed food products as this could imply that current health messaging regulations may not be assisting consumers to make informed choices and construct healthier diets (Nestle and Ludwig 2010).

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Objective

This research examines the relationship between the presence of a health messaging claim and the amount of key nutrients (i.e., amount of fat, saturated fat, sodium, sugar, protein, and fiber) found in a processed food product, excluding the nutrient associated with the claim. The specific purpose of this research is to determine if incongruence between nutrient levels and claim types are prevalent in processed food products.

Methodology

A field study was conducted at a grocery store in the Vancouver, Canada metropolitan area. The nutrition levels and health messaging claims from over 400 packages of cookies, crackers, and breakfast cereal processed food products were coded in database format. Health messaging claims found on the food products were categorized into the claim categories of fat, fiber, saturated fat, sugar, sodium, whole grains, ingredient, natural, check-off, and no claim. Products were categorized into the three product categories of cookies, crackers, and breakfast cereals. Each product's nutrition content of total fat, saturated fat, sodium, sugar, protein, and fiber were recalculated on a per calorie basis (e.g., fat grams per calorie or sodium milligrams per calorie). The difference between these calculated values and the Canadian Food Inspection Agency recommended daily intake (RDI) (also in units per one calorie) was calculated for each nutrient to obtain a relative difference in the nutrient content. This relative difference in the nutrient content (dependent variable) is regressed using OLS on a set of dummy variables that represent each of the health messaging claims (independent variables) and product categories

(independent variables), allowing a testing of the following hypotheses: Given a specific health messaging claim (e.g., fat-related, sodium, sugar, fiber, checkoff, ingredient, natural, or whole grain), ignoring the nutrient directly associated with the claim, the levels of all or some of the negative attribute items (sodium, saturated fat, total fat, and/or sugar) remain the same or decrease and the levels or all or some of the positive attribute items (protein and fiber) remain the same or increase. Rejection of the null hypothesis implies the meaningfulness of the claim to the consumer is diluted and that the consumer's nutritional gains from using the processed food product with a claim (e.g., a low-fat claim provides low fat nutrient) is offset by a nutritional loss due to higher unwanted nutrition attributes (e.g., a low-fat claim provides higher sodium). A separate regression was conducted with each nutrient—fat, saturated fat, sodium, sugar, protein, and fiber—as the dependent variable and using the health messaging claims and the product categories as independent variables.

Descriptive Statistics

The majority of the processed food products had some type of health messaging claim. The percentages of products with health messaging claims are presented in Table 1. Trans fat-, saturated fat-, and ingredient-related health messaging claims were found most often in these processed food products. Sugar- and sodium-related health messaging claims were found least often in these processed food products. Nineteen percent of the products had no claims at all (Table 1).

On average, the levels of fat, sodium, and protein nutrients were below RDI values (e.g., negative values), while the levels of saturated fat, sugar, and fiber nutrients were above the RDI values (e.g., positive values) in the processed food products surveyed. The value of the mean deviation of each nutrient is presented in Table 2. Because consumers generally want to decrease the fat and sodium in their diets, having these nutrient levels below the RDI is considered good. However, the negative value for protein is seen as poor, as consumers generally want to increase this nutrient in their diets. In addition, the positive values for saturated fats and sugar are seen as poor, as consumers generally strive to minimize these nutrients in their diets, while the positive value for fiber is viewed as good, as this is a nutrient that consumers generally want to increase in their diets.

Results

The analysis reveals a number of interesting and significant relationships between levels of fat, saturated fat, sugar, sodium, protein, and fiber and health messaging claims. The estimated results from the linear model are presented in Table 3. The estimated coefficients for fat, saturated fat, sugar, protein, and fiber are provided in a gram-per-calorie unit, while sodium is provided on a milligram-per-calorie basis; these units need to be kept in mind when reviewing the results. For example, the level of sodium is 0.207 milligrams per calorie more when a fat claim is made, which implies that a 100-calorie serving of a processed food product contains 21 milligrams more sodium when a fat health messaging claim is made.

Results indicate that the null hypothesis can be rejected in a number of cases. Specifically, the presence of specific health messaging claims in some cases has a negative impact on key nutrient levels in that all or some of sodium, saturated fat, total fat and/or sugar increases and/or protein and/or fiber decreases when a claim is present. For example, Rows 6 and 9 of Table 3 shows that sodium and sugar levels are greater when a fat-related health messaging claim is made. Rows 2 and 14 indicate that total fat levels are higher and fiber levels are lower when a sodium-related health messaging claim is made. Row 7 indicates that sodium levels are higher when a check-off health messaging claim is made. Rows 4, 10, 12, and 16 indicate that saturated fat and sugar levels are higher and fiber and protein levels are lower when an ingredient-related health messaging claim is made. Finally, Row 13 shows that the fiber level is lower when a saturated-fat claim is made.

Conclusions and Future Research

A field study was conducted at a grocery store in Vancouver, Canada to collect nutrition levels and health messaging claims from select processed food packages with the objective of reviewing the relationship between a specific health messaging claim and the level of select negative and positive attribute

Table 1. Percentage of Processed Food Products Surveyed with Select Health Messaging Claims.

Health messaging claims	Processed food products with the claim (%)
Fat [1]	21
Trans fat [2]	54
Saturated fat [2]	36
Fiber [2]	31
Ingredient [3]	45
Sugar [2]	2
Sodium [2]	8
Whole grains [4]	29
Natural [2]	20
Check-off [5]	23
No claim on package	19

1. Includes claims such as low-fat, fat-free, and % less fat.
2. Includes claims that specifically mention the trans fat, saturated fat, fiber, sugar, sodium, or natural.
3. Includes claims related to ingredients such as peanut-free, goodness of real fruit, made with real lemon, and wheat-free.
4. Includes claims that specifically mention whole grains of various varieties.
5. Includes all company and third-party–sponsored health-related endorsements in the form of logo, graphic, or text.

Table 2. Mean Deviation of Nutrient Content.

Nutrient	Mean deviation [1]
Fat [2]	–13.78
Sodium [2]	–5.12
Saturated fat [2]	14.25
Sugar [2]	186.65
Fiber [3]	29.29
Protein [3]	–66.46

1. Mean deviation is defined as the difference between the amount of the nutrient found in the product and the RDI, expressed as a percentage of the RDI
2. Fat, sodium, saturated fat, and sugar are nutrients that consumers generally want to decrease, and thus a positive value (content above RDI) for these nutrients is viewed as poor, while negative values (content below RDI) are viewed as good.
3. Fiber and protein are nutrients that consumers generally want to increase, and thus a negative value (content below RDI) for these nutrients is viewed as poor, while a positive value (content above RDI) is viewed as good.

Table 3. Significant Regression Estimates for Nutrients with Health Messaging Claims.

	Estimated coefficients [1]	t Stat
Total fat with (Adjusted $R^2 = 0.499$)		
Sodium claim	0.00425	1.64 [2]
Saturated fat with (Adjusted $R^2 = 0.454$)		
Ingredient claim	0.00175	2.06 [3]
Sodium with (Adjusted $R^2 = 0.418$)		
Fat claim	0.207	2.43 [2]
Check-off claim	0.240	2.64 [4]
Sugar with (Adjusted $R^2 = 0.596$)		
Fat claim	0.00564	1.76 [2]
Ingredient claim	0.00528	2.19 [3]
Fiber with (Adjusted $R^2 = 0.458$)		
Ingredient claim	–0.00450	–2.99 [3]
Saturated-fat claim	–0.00394	–1.95 [3]
Sodium claim	–0.00611	–2.18 [3]
Protein with (Adjusted $R^2 = 0.400$)		
Ingredient claim	–0.00210	–2.44 [3]

1. Positive coefficients indicate more of the nutrient is in the product when the claim is made, while negative coefficients indicate that less of the nutrient is in the product when the claim is made.
2. Denotes statistical significance at the ten percent level .
3. Denotes statistical significance at the five percent level.
4. Denotes statistical significance at the one percent level.

nutrients other than the claim nutrient. This study demonstrates that the presence of specific health messaging claims in some cases has a negative impact on key nutrient levels in that all or some of sodium, saturated fat, total fat, and/or sugar increases and/or protein and/or fiber decreases when a claim is present. Future research should focus on expanding product categories, variety of health messaging claims, and nutrient types to review the strength of these relationships in a broader context.

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Teens, Food Choice, and Health: How Can a Multi-Method Research Methodology Enhance the Study of Teen Food Choice and Health Messaging?

Kelleen Wiseman

This research report compares alternative approaches to analyzing the complex factors that influence teenagers' food choice. Specifically, a multi-method approach—which involves the integration of the qualitative and quantitative research methodologies, data, and analysis—is compared to a single methodological approach, which involves use of either a quantitative or qualitative methodology.

Methods

A quantitative-only, a qualitative-only, and a multi-method approach were each applied to the 2006–2009 teen-targeted milk promotion campaign of the British Columbia Dairy Foundation (BCDF). The quantitative approach examines the association between teenager-argeted health message events and healthy food consumption by analyzing longitudinal data in an event impact framework. The qualitative approach explores teens' views of additional healthy foods (e.g., whole grains, fruit,and vegetables) and messaging influences via a series of focus groups with teenagers. The multi-method approach requires that the two methodologies be integrated in some manner. The approach used in this case study involves a two-tage explanatory multi-method design where quantitative results are generated first and these results are further explained in the qualitative phase of the research.

Results

Results provided by the quantitative approach includes measurement of the strength of relationships between the dependent variable, which is the quantity of fluid milk purchased by households with teenagers in the home, and the explanatory variables, which include income, family size, education, number of siblings, province, substitute beverage purchases, fluid-milk price level, substitute beverage promotion events (current and lagged), and BCDF promotion event (current and lagged), for the regression equation.

Results provided by the qualitative approach include insight into teenagers' views on healthy food promotions and impact, importance of the message source, and milk versus other healthy foods.

Results from the application of the multi-method approach include each of the single approaches results noted above plus further explanation of the quantitative results gained through the two-stage approach, increased quality of evidence and strength of claims, utilization of both the inductive and deductive research cycles, and outcomes that are both generalizable and context-specific. These results all serve to improve the researchers' ability to address the complex and multi-faceted influences of teenagers' food choices and make multi-methods a key choice of methodology for this area of research.

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Time-Series Analysis of U.S. Pistachio Export Demand in North America

Zijuan Zheng and Sayed Saghaian

This study identifys the main factors influencing U.S. pistachio export demand in North America—i.e., to Canada and Mexico. A double-log econometric model is estimated using data for 1989–2009. The main findings indicate that Canadian GDP, U.S. walnut export prices, and food safety concerns explain the majority of the pistachio import demand variation in Canada, whereas Iranian pistachio export prices, the real exchange rate between the Mexican peso and the U.S. dollar, and U.S. pecan export prices explain the majority of the Mexican pistachio import demand variation. The paper also investigates the impact of food safety issue on export demand. In order to maintain its export market, the U.S. has to find solutions to current food safety problems.

The major pistachio producing countries in the world are Iran and the U.S. These two countries account for roughly 60 percent of world's pistachio trade (USDA-ERS 2010b). However, pistachio production yields in Iran, especially in recent years, have been lower than the world average, while both U.S. pistachio production and export quantities showed an increasing trend (Chizari and Somaieh 2007) from 1989 to 2007 (Figure 1). This study examines the main factors in U.S. pistachio export demand variation in North American countries—Canada and Mexico. Specifically, the effects of the following variables are analyzed: 1) U.S. pistachio export prices, 2) Iranian pistachio export prices, 3) GDP in the importing countries, 4) real exchange rate between the U.S. dollar and foreign currencies, 5) U.S. walnut export prices, 6) U.S. pecan export prices, and 7) food safety shocks in the U.S.

Figure 1 shows U.S. pistachio production, consumption, and trade from 1989 to 2007. Imports were relatively low and steady; however, domestic consumption corresponds to production. There is a big dip in consumption and production every other year. This is pistachios, like other tree nuts, typically have an on-and-off-year cycle in production, which means that one year there would be a high amount of pistachios produced and the next year would be a smaller volume. At the same time, exports increased gradually and were not affected by these dips in production because the U.S. government holds a stockpile to keep export prices steady.

As can be seen from Figure 2 and Figure 3, both Canadian and Mexican pistachio imports from the U.S. trended upward from 1989 to 2009, indicating an increasing import demand for U.S. pistachios.

Model Specification

Export price, competitor's export price (in this case, Iranian pistachio export price), GDP, substitutes for a product (walnuts and pecans, in this case), and real exchange rate are all important factors influencing export quantity. As stressed in the literature, food safety shocks can also threaten consumers' confidence, especially in purchasing an infrequently consumed product; as a result, a dummy variable is created to investigate the effect of such concern:

$$(1)\ \ln(Q_i) = ß_0 + ß_1\ln(REP_i) + ß_2\ln(RCEP) + ß_3\ln(RGDP_i) + ß_4\ln(RER_i) + ß_5\ln(RPW) + ß_6\ln(RPP) + ß_7(FS) + ß_1\ln(REP_i) + \varepsilon,$$

where Q_i is U.S. export quantity of pistachios to country i, REP_i is real export price to country i, RCEP is real competitor's (Iranian) export price, $RGDP_i$ is real GDP of country i, RER_i is real exchange rate of country i, $\ln(RPW_i)$ is U.S. export price of walnuts to country i, $\ln(RPP_i)$ is U.S. export price of pecans to country i, FS is food safety shock, and ε is an error term.

Using logarithms makes the functional form of the equation more flexible and makes interpretation of the coefficients as elasticities much easier. The first step is investigating heteroskedasticity and autocorrelation problems.

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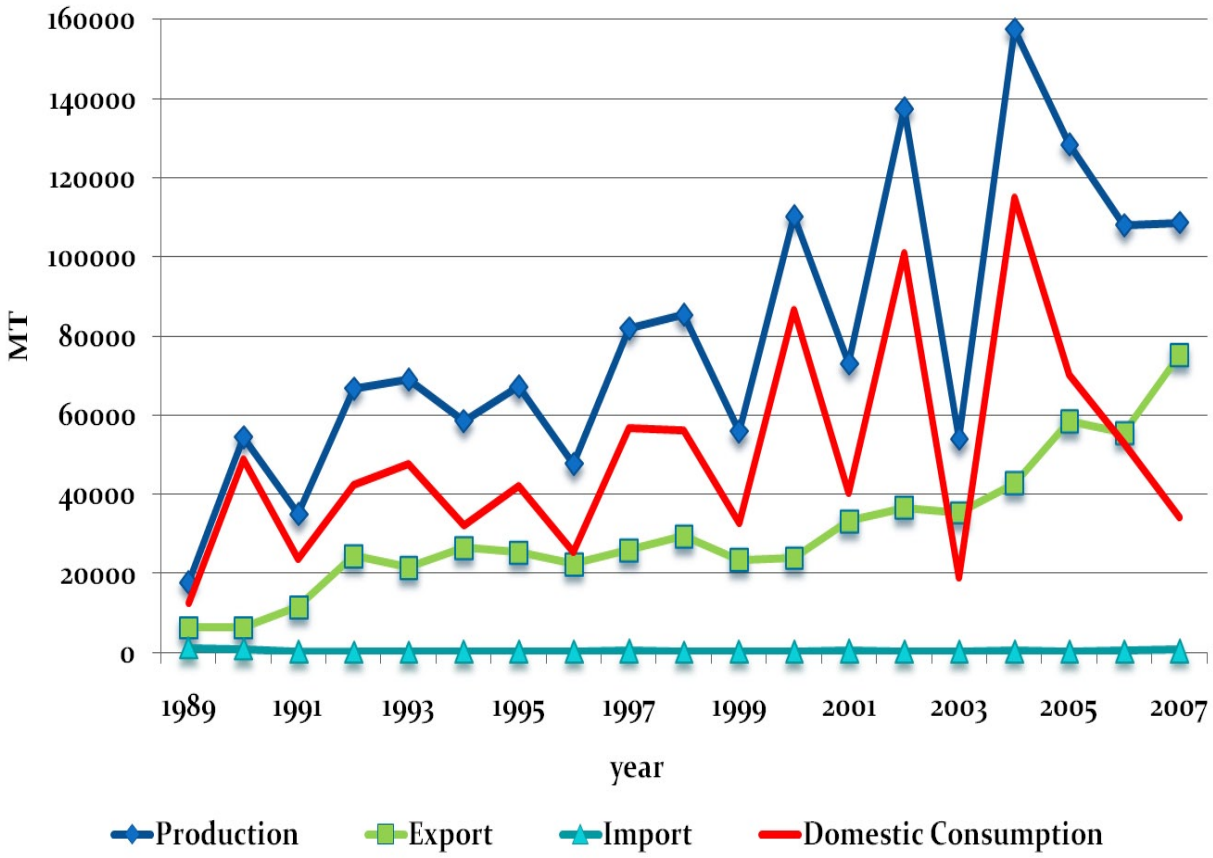

Figure 1. U.S. Pistachio Production, Consumption, Import, and Export Trends, 1989–2007.

First, a RESET test and a VIF test are conducted. Results from RESET test imply that there is no sufficient evidence that the model is suffering from either missing variables or misspecification error. The VIF test indicates no multicollinearity problem in the data. Second, a Breusch-Pagan test and a Durbin-Watson test are conducted. Both the B-P test and DW test indicate that the best approximation process for the two countries is Ordinary Least Squares (OLS).

Data

Using U.N. Food and Agriculture Organization statistics (FAO n.d.) and United States Department of Food and Agriculture GATS (General Agreement on Trade in Services) statistics (USDA-FAS 2010), Canada and Mexico are selected as main importing markets. Data for the variables mentioned above are collected for 1989–2009. Variables in the model are divided by their corresponding values in the base year 2000 in order to format them as real values. Using the real form not only helps to make each time series equivalent in magnitude but also helps to incorporate the data in a parsimonious way and thus helps to minimize specification errors.

Food-Safety Issues

Aflatoxin contamination in tree nuts has become a growing international food safety concern for over a two decade period (Buchanan, Sommer, and

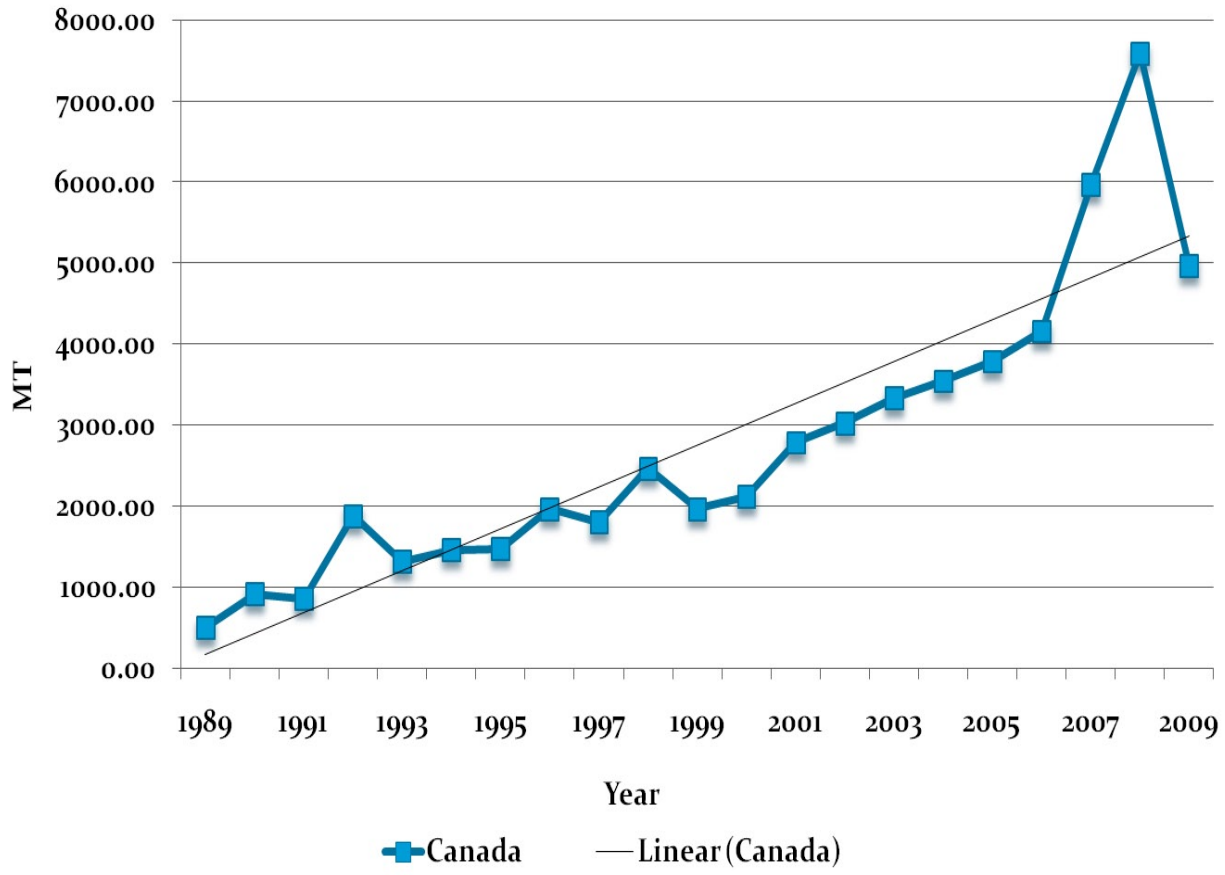

Figure 2. U.S. Pistachios Export Trend to Canada, 1989–2009.

Fortlage 1975). Aflatoxicosis is poisoning that result from ingestion of aflatoxins in contaminated food or feed. The aflatoxins are a group of structurally related toxic compounds produced by certain strains of the fungi Aspergillum's flavus and A. parasiticus. Under favorable conditions of temperature and humidity, these fungi grow on certain foods and feeds, resulting in the production of aflatoxins (De Lloyd 2000).

Two characteristics of the pistachio market make market failure concerns particularly important in the context of food safety assurances and quality standards. First, as with many fresh fruits and nuts, there is little brand identification with pistachios. Thus a customer who has an unsatisfying experience with a purchase of pistachios or who hears negative news about the safety of consuming pistachios is unlikely to associate this with a specific brand or supplier, but rather with the industry as a whole. Second, pistachios are purchased infrequently and often in relatively small quantities. Compared with more familiar foods, we would therefore expect a larger industry-wide reaction to an aflatoxin event in the context of food safety concerns (Brunke et al. 2004).

As stated above, a dummy variable is created to investigate the effect of food safety concerns, in which "1" indicates that there were one or more food safety shocks in the U.S. in the corresponding year, while "0" indicates no evidence of food safety concerns.

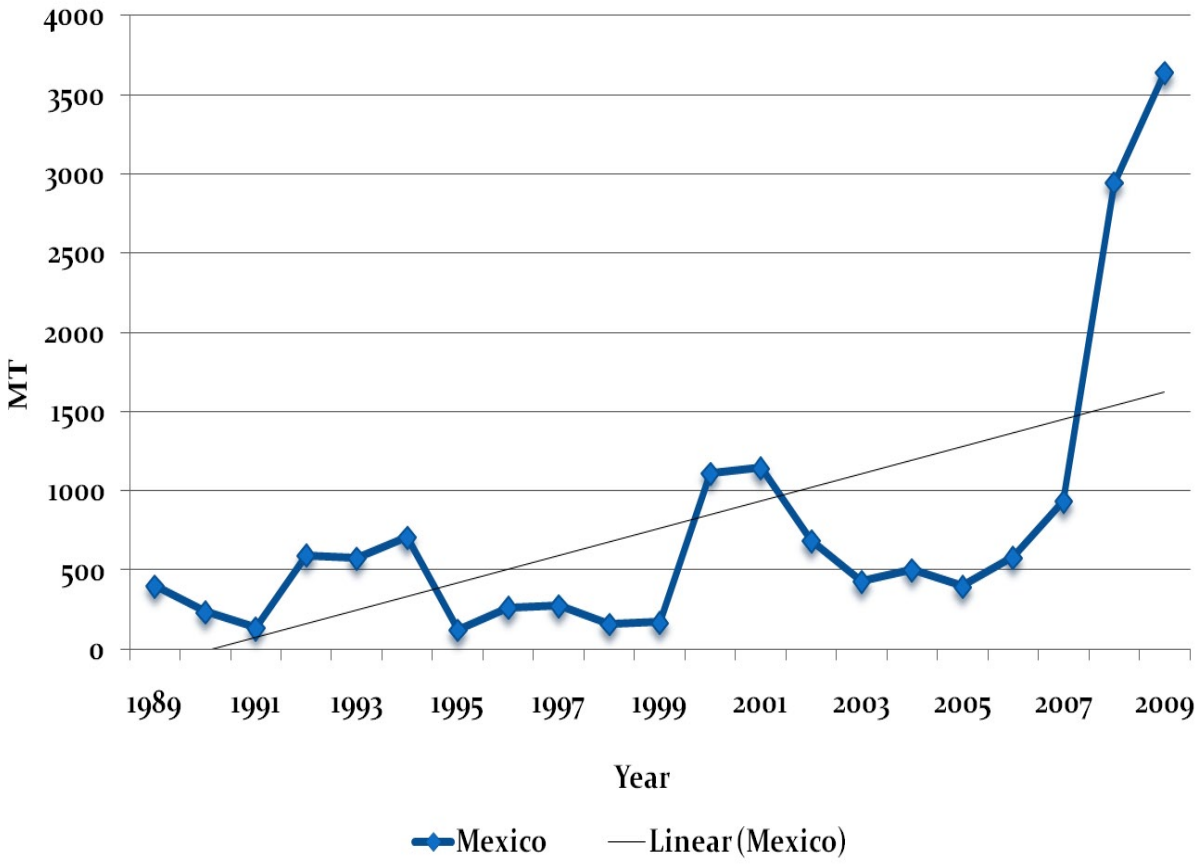

Figure 3. U.S. Pistachios Export Trend to Mexico, 1989–2009.

Estimation Results

The results from the estimation of Equation 1 are presented in Tables 1 and 2. The models are estimated using OLS (Ordinary Least Squares). Variables are included in natural logarithmic form.

In Table 1, results are generated by OLS with an $\bar{R}^2$ of 96.08 percent, and all the variables except real exchange rate between U.S. and Canadian dollars have signs as expected in the model specification. Of those coefficients having the expected signs, Canadian GDP and walnut export price are statistically significant at the one percent level. Food safety shocks is statistically significant at the five percent level. Canadian GDP, U.S. walnut export prices, and food safety concerns explain the majority of pistachio import demand variation in Canada.

In Table 2, results are generated by OLS with an $\bar{R}^2$ of 72.3 percent. Iranian pistachio export prices, real exchange rate between the U.S. dollar and Mexican peso, and U.S. pecan export price are statistically significant. This means that these three variables are important factors in determining pistachio import demand in Mexico. However, the food safety shock variable has an unexpected positive sign.

As the model is in logarithmic functional form, we can interpret the coefficients as elasticities. For each one percent increase in Canadian GDP, holding other factors constant, pistachio import demand in Canada will increase by 1.86 percent. In Mexico, every one percent increase in U.S. pecan export

Table 1. Estimation Results for Canada.

Variables	Expected signs	Coefficients
Constant	n.a.	7.938
Export price	–	–0.50966
Iranian export price	+	0.0365
Canadian GDP	+	1.85728***
Real exchange rate	–	0.89603
Walnut export price	+	1.46726***
Pecan export price	+	0.06492
Food safety shocks	–	–0.20899**

*Adj. R^2 = 0.9608, DW = 2.819.

Table 2. Estimation Results for Mexico.

Variables	Expected signs	Coefficients
Constant	n.a.	6.4101
Export price	–	0.07005
Iranian export price	+	1.50366**
Mexican GDP	+	0.70338
Real exchange rate	–	–2.6001*
Walnut export price	+	–1.99712
Pecan export price	+	1.57396**
Food safety shocks	–	0.30118

*Adj. R^2 = 0.723, DW = 1.731.

price will increase pistachio import demand by 1.57 percent, ceteris paribus.

Conclusions

This paper investigates the factors influencing U.S. pistachio export demand in North America and the impact of food safety shocks. According to the OLS results we conclude that Canadian GDP, U.S. walnut export prices, and food safety concerns explain the majority of pistachio import demand variation in Canada. Iranian pistachio export prices, real exchange rate between the Mexican peso and the U.S. dollar, and U.S. pecan export prices explain the majority of Mexican pistachio import demand variation.

Food safety issues are becoming an increasingly important topic in food industry and are statistically significant in Canada. Regarding globalization in today's market, this study shows that food safety issues that happen in one part of the world could potentially affect the import demand in other parts

of the world. To remain competitive in the world trade market, the U.S. has to find solutions to current food safety problems. This can be achieved through product quality improvement and developing stricter regulations for safe food production to meet the international demands.

There are several possible reasons for FS not having the expected sign in Mexico. First of all, there are limitations in the data. The dummy variable created in the model provides weak information. For example, it does not show exactly how many food safety shocks actually happened in each year and how important those events are. This could lead to potential specification error. Second, Mexico has a lower GDP than does Canada and Mexican consumers have a smaller per capita pistachio consumption than do Canadian consumers. Third, according to the data, Mexico imports a much smaller volume of pistachios than does Canada, which would result in a much smaller chance of encountering aflatoxin contamination. Last, there could be different standards of food safety regulation in these two countries and we would expect higher consumer confidence in the country that has less strict regulation.

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The Food–Fuel Tradeoff: An Economic Analysis

Godfrey Ejimakor and Obed Quaicoe

Rising prices for liquid fossil fuels has led to a substantial increase in the sourcing of such fuels from food items such as corn, soybean, and others. This has resulted in an increase in the demand for such crops, leading to higher prices for food, feed, livestock and dairy products. As prices for liquid fossil fuels increase, the need for more biofuels also increases. This involves a tradeoff for society in terms of the quantity of crops to be used for fuel versus that used for food. The optimal tradeoff for society is that combination of food and fuel enterprises that equate the opportunity costs. Consequently the optimal combination is expected to change as the prices of food and biofuel change. Recent evidence suggests that food and biofuel prices are affected by changes in fossil fuel prices (Ejimakor and Kyei 2011). The nature of the tradeoff between food and biofuel uses of corn could be useful in estimating how much of the crop to use for biofuels.

This study is assessing the tradeoff between the use of corn for food and ethanol. Time series data are used to estimate the production functions for corn ethanol (CE) and high fructose corn syrup (HFCS) with corn as the input. The preliminary estimates indicate that the elasticity of production for corn is 0.94 in CE production and 1.26 in HFCS production. Following Doll and Orazem (1984), the estimated production functions will be used to estimate an equation for the production possibility curve (PPC) for CE and HFCS based on the available corn supply. The optimal use of corn in CE and HFCS will be determined by equating the slope of the PPC to the ratio of the average prices of CE and HFCS. Past prices of CE and HFCS will be used to estimate the optimal combination for each year of the study period. The predicted combinations will be compared to observed combinations and used to ascertain how the allocation of corn to CE and HFCS differed from those predicted by the model. Results from the study are expected to provide useful insights for formulating policies on renewable energy and food.

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Ejimakor is Associate Professor and Quaicoe is Graduate Research Assistant, Department of Agribusiness & Applied Economics, North Carolina A&T State University, Greensboro.

Meat Goat Marketing Research at Tennessee State University: An Action Plan

E. Ekanem, S. Singh, F. Tegegne, R. Browning, and M. Mafuyai-Ekanem

The meat goat industry is important not just for the United States but for many countries around the world. Since the supply of goat meat has not kept up with demand, imports have risen to close the supply gap. According to published data cited in Browning, Leite-Browning, and Byars (2011), from 1987 to 2007 the global meat goat inventory increased about 92 percent in the U.S. The U.S. meat goat inventory increased 527 percent in that time to 2.6 million head. The United States imported about 23 million pounds of goat meat in 2007. Approximately 718,000 goat carcasses were imported, with an average weight of 32 pounds per carcass (eExtension 2010).

Specific objectives of this research are to (1) identity and analyze various marketing channels used by meat goat producers, (2) study supply and demand of goat meat, (3) investigate the feasibility of meat goat enterprise as an alternative for increasing income for small farms, (4) examine the role of networks among producers in the sharing of information and facilities, and (5) identify availability of processing plants and capacity to process goat meat in Tennessee. This research project will target traditional and non-traditional consumers, consumer groups and clubs, producer associations, meat goat processors, and retail and wholesale stores.

Secondary data for the project will be collected from existing USDA ERS, NASS, Census of Agriculture, and other available publications, while primary data will be collected from producer and consumer focus groups, surveys, and visits to selected meat goat farms, processing facilities, and markets.

This project will develop abstracts and publish manuscripts. Team members will participate in selected farmer and professional conferences and events. Educational materials for meat goat producers and consumers will be developed and communication with stakeholders will be accomplished through extension publications, reports, workshops, and community outreach. It is expected that producers will improve their awareness and knowledge of meat goat marketing to increase their income. Consumers will increase their knowledge of available marketing channels and have information on wholesale and retail stores and outlets.

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eExtension. 2010. "Goat Meat Import and Export." Available at http://www.extension.org/pages/26213/goat-meat-import-and-export.

Ekanem, Singh, and Tegegne are Professors and Browning is Associate Professor, School of Agriculture and Consumer Sciences, Tennessee State University, Nashville. Mafuyaki-Ekanem is Consulting Economist, LaRun & Associates, Greensboro, NC.

The project team consisting of E. Ekanem, S. Singh, F. Tegegne, R. Browning, and C. Thompson thanks the USDA for funding through the Evans-Allen Grants Program and the School of Agriculture and Consumer Sciences at Tennessee State University for assigning graduate and undergraduate assistants to work on the project. We also thank the consulting economist, M. Mafuyai-Ekanem, for assistance in developing the conference presentation and this manuscript.

Using Internet Bulletin Board Focus Group Sessions to Elicit Consumer Preferences for Ethnic Greens and Herbs

Ramu Govindasamy, Kathleen Kelley, and Venkata Puduri

In the Eastern United States, stakeholders agree that there is an urgent need to make farming more profitable to reduce the decline in the number of farmers and farmland acreage. New Jersey's vegetable marketing structure was recently reviewed by a team of national experts who concluded that the economic decline of the state's vegetable industry is imminent without a significant change in marketing strategies. Many state departments of agriculture and extension programs are trying to create or enhance networks between their farmers and niche-market distributors to create opportunities to thwart this decline. This paper primarily focuses on elucidating the market opportunities for ethnic greens and herbs. Furthermore, it explores ethnic consumers' preferences for local produce and their demographic characteristics. The ultimate goals of this project are to assist small and medium farmers to better understand consumer perceptions and factors that drive the ethnic greens and herbs market.

To best achieve the goals of the overall project and develop a meaningful survey instrument that can be used with a larger sample of four ethnic groups (Asian Indian, Chinese, Mexican and Puerto Rican) during Phase II of the project, four separate Internet bulletin board focus-group sessions were conducted to better understand consumer use of ethnic greens and herbs and perceived quality, price, and availability. Panelists participated if they met the screener criteria: belonged to one of the ethnic groups of interest, were the primary grocery shopper, lived within the East Coast region of the U.S., and were at least 18 years of age.

Focus-group results indicate that availability of ethnic greens and herbs depended on panelists' location. Panelists residing in more metropolitan areas expressed that they had access to ethnic greens and herbs through at least one outlet. A minority of panelist reported traveling distances up to 40 miles from their residence to purchase such ingredients. Responses were mixed as to whether panelists chose to purchase from conventional grocery stores, from ethnic markets, or from both. Availability of ethnic markets, product quality and freshness, and price influenced their purchasing decisions. Those who were able to compare conventional grocery stores with ethnic markets noted that greens and herbs tended to be of higher quality at ethnic markets and, since respondents believed stock rotated more frequently, were fresher and priced lower. While a few panelists provided prices for items sold at ethnic markets compared to conventional grocery stores, most of the panelist either believed prices or expected prices to be lower at ethnic markets.

Responses will be used to construct a telephone survey of ethnic consumers matching the criteria stated above. Data from both studies will provide growers and retailers with information vital for meeting demand and exceeding the needs of ethnic consumers they serve. This market intelligence can assist growers in tailoring their products and promotional activities to better meet the needs of the ethnic greens and herbs purchaser. Consumers will be able to purchase their familiar home-country produce from local farms, which will enable them to satisfy their social as well as community needs. Moreover, promotion of locally grown produce reduces food miles, resulting in environmental benefits to the community.

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Selling Cobia in U.S. Live Markets

Dan Kauffman

A small test market in Washington D.C. in 2009 indicated cobia (*Rachycentron canadum)* will sell in U.S. live markets. Because of the limited number of fish available, the test was run for just two weekends in three stores. All Cobia purchasers, responding to a survey, evaluated the fish positively and promised repeat purchases. The evaluations convinced Virginia Cobia Farms (VCF), the grower of the fish, to make its first marketing effort in domestic "international supermarkets." That effort is planned for 2011. A more complete marketing study will be done then.

Cobia, a marine fish virtually unknown to consumers, is rarely caught commercially. It has attracted world aquaculture interest because it tastes good, grows fast, and has an excellent feed-conversion ratio. VCF is in Saltville, VA, 400 miles from the Ocean. The cobia is grown in salinity levels that are less than a one-third of ocean levels.

Problems with water quality and other fish stressors, which resulted in fish mortality, caused the first weekend's test to be terminated early. However, a subsequent weekend test went well. Consumers, who filled out surveys after eating the fish at home, all liked it. None had tasted the fish before, but all planned repeat purchases.

Consumers were asked to take the survey only after they made a cobia purchase. Most declined the request, but ten agreed to mail back evaluations after tasting the fish at home. Eight of them did so.

All responding purchaser's families of origin were from Asia. Thirty-eight per cent were of Chinese or Vietnamese descent. The remainder were other Asians, most likely Korean.

Half of the respondents said they would purchase cobia once every two weeks or more often; the rest said they would purchase cobia once a month. All said they would drive out of their way to purchase live cobia.

Half of the respondents either steamed or baked the fish. The rest grilled or sautéed the cobia. This indicates various fish weights in the tank are desirable, as the different Asian cooking methods use different sizes of fish.

Seventy-five per cent of the respondents said being able to buy live cobia from the tanks was an important part of their purchase decision. The remainder said iced cobia is acceptable if the price is lower. For domestic producers the live market is advantageous because it has a relatively high technical barrier to entry for foreign competitors.

Kauffman is Seafood Business Specialist, Virginia Seafood Agriculture Research and Extension Center.

Communicating the Value of Texas Cooperatives

John L. Park, Jonathan R. Baros, Rebekka M. Dudensing, Matthew P. Murch

In reference to "Communicating the Value of Texas Cooperatives," a background to the focus of the proposed research updates can be found. The original survey circulated to locally owned Texas cooperatives produced the following findings:

As of June 2009, the Roy B. Davis Cooperative Management Program conducted an extensive survey addressing the need for a comprehensive evaluation of agricultural cooperatives. The Texas Agricultural Cooperative Council (TACC) partnered with Texas Agrilife Extension personnel and compiled data from 96 locally owned TACC member cooperatives in order to evaluate their contributions to local communities and the Texas state economy. Metrics produced from the survey indicated that these TACC member cooperatives potentially impacted the lives of one out of every three Texans and contribute more than $825 million to the Texas GDP. The compiled research enabled the TACC member cooperatives to accurately realize the vital role their individual businesses took in the Texas economy and aided lobbying efforts to advocate the necessity of Texas cooperatives (Baros et al.).

Continuing Efforts

In the coming year, Texas Agrilife Extension personnel will continue to work alongside TACC to bolster efforts to portray the importance of local cooperatives. The continued research will focus on the expansion of the survey population to include regional cooperatives and will update the metrics produced from the survey to reveal a current and accurate snapshot of the role Texas' local and regional cooperatives play within the Texas economy.

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Park is Professor and Extension Program Specialist, Baros is Extension Program Specialist, Dudensing is Assistant Professor and Extension Economist, and Murch is Graduate Research Assistant, Department of Agricultural Economics, Texas A&M University, College Station.

Long-Term Health Effects, Risk Perceptions, and Implications for Agricultural Markets: Modeling Consumption Patterns for Aquacultured Seafood

Cathy A. Roheim, Robert J. Johnston, and Seth Tuler

Eighty-seven percent of the U.S. seafood supply comes from imports (NMFS 2009), with approximately 50 percent of those imports from aquacultured (farmed) sources. The U.S. aquaculture industry provides only about five percent of the total U.S. seafood supply (NOAA 2009). One factor affecting the competitiveness of U.S. aquaculture is consumer perceptions of long-term health risks associated with consumption of certain farmed species. Even though most farmed fish have very low concentrations of contaminants relative to other species, or even other foods, on a per serving basis (Mozaffarian and Rimm 2006), risk concerns are often magnified by media coverage of selected health risks, which often focus on a small number of high-profile studies, as well as overlapping, conflicting, partial, or misleading reports of risks. This is compounded by consumers' difficulty in processing risk information and the difficulty of communicating consumption risk and benefit information across different seafood species and sources (Nesheim and Yaktine 2007).

This study integrates economics and risk communication by developing information tools that present relative risk/risk information to consumers, then tests the effectiveness of these tools on stated and revealed demand for farmed seafood products. Enabling consumers to better differentiate risks and benefits will improve consumer welfare and may improve industry competitiveness. The project is in its initial phases.

Early results from two focus groups conducted in Rhode Island during July and September of 2010 provide insight into consumers' seafood purchasing behavior, knowledge about seafood, and perceptions of health risks and benefits. Participants in these focus groups generally displayed a lack of knowledge about fish relative to other foods. Furthermore, in spite of often being frequent seafood consumers, consumers have mixed and conflicting perceptions of seafood as a healthy food option, while perceiving that seafood also carries risks due to contaminants. Consumers perceive that farmed fish have lesser health benefits and greater health risks than do wild fish. There is a lack of knowledge about where to obtain unbiased and objective information about seafood's attributes. As a result, consumers indicate that they have difficulty balancing health risks and benefits, in particular for farmed fish. One participant summed up the results of the focus groups aptly with by saying, "I make choices . . . based on what's a good value; I eliminate what's bad [for me], and buy what's good [for me] that's on sale because I have other choices."

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This project was supported by the Agricultural Food Research Initiative of the National Institute of Food and Agriculture, USDA, Grant # 2009-04125.

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Using a Transportation Alliance to Solve Distribution Issues for Buying Local

Forrest Stegelin

Most Georgia produce and green industry operations own their own box or container trucks and tow-trailers, owning multiple units of various sizes and capacities so that a match can occur between order size and appropriate vehicle for delivery. Among the factors that affect the expansion of horticultural crop (food or ornamental) operations, production, marketing, personnel, and transportation are considered the most relevant (Hodges and Haydu 2005). In the agricultural sector the importance of transportation costs is heightened as evidenced by the fact that transportation accounts for over ten percent of the wholesale value of total farm shipments (Stegelin 2009).

This update shares the results of a study to determine if a transportation alliance would reduce shipping costs and increase distribution efficiency among fresh produce suppliers in Georgia who are "selling local." The methodology includes conducting meetings with prospective collaborators to explain the reasons and benefits for participating in the evaluation, explaining what an alliance is, and identifying the data needed as input to develop a simple unit-cost allocation model that is adaptable and useable with the GIS software ArcLogistics 9.3. The last step is to evaluate and interpret the results to build a sensitivity analysis.

Once the order-sharing routings were developed, three alliances were considered, which represented most of the production among the small- to medium-sized operations. An attempt was made to determine the optimal number of orders per shipping cycle given the three location clusters (alliances). Time windows were also evaluated with respect to the delivery efficiency (time spent unloading at each delivery destination). With respect to each of the alliances, a central depot location (central to the producing operations in that alliance) and a major thoroughfare location were also evaluated. Although the study seemed to have buy-in from the fruit and vegetable growers, concerns among the cooperators and participating producers arose with respect to the survey.

Results

The net results for the three produce transportation alliances were:

- Average total cost savings to the participating operators were seven percent;
- Average total miles driven were reduced eight percent;
- Average numbers of trucks owned were reduced seven percent;
- Average hours driving time declined 12 percent; and
- Average CO_2 emissions (carbon footprint) were reduced seven percent.

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