Consumers' Willingness to Pay for Bacteriophage Technology Treated Fresh Produce

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Abstract

The United States is remarkably safe, when it comes to food supply. Nevertheless, food can become contaminated with a variety of germs. According to reports by a food safety group of the Centers for Disease Control and Prevention, food-borne illness caused by bacteria such as E. coli and salmonella not only take a huge toll on American consumers' health but they cost the United States an estimated $152 billion annually in health care and other losses. To curb this increasing phenomenon, there has been a reintroduction of bacteriophage in the treatment of bacteria on raw foods. This study utilized a survey questionnaire administered by telephone to consumers in four different states; Alabama, Georgia, North Carolina, and South Carolina. In this study, as in other willingness to pay studies, a binary Logit model was employed to estimate consumers' WTP an additional amount for fresh produce treated with bateriophage technology.

The Logit model expresses consumers' WTP as a function of income, education, race, gender and geographical location (States). Based on the estimation results, income was found to be significant at the 5 percent level in determining a consumer's WTP. In this particular study, Caucasians were willing to pay an additional amount relative to other races at the 10 percent significance level. Also, where a consumer lived (State) was found to be significant with consumers in the states of Georgia and North Carolina having higher WTP relative to Alabama and South Carolina.

Key words: willingness-to-pay, bacteriophage, fresh produce, logit model

Introduction

The availability of several fresh produce choices to consumers has increased in recent years primarily due to increased organic production and the introduction of genetically modified foods. While these innovations have affected numerous fresh produce categories positively, there is a hurdle in attempts to lengthen the shelf life of these fresh produce, be it organic or conventional. Therefore, there has been an introduction of a new technology to treat fresh produce at the farm gate with bacteriophages to combat bacteria and other harmful organism. This new technology hopes to extend the shelf life and preserve the freshness of produce on various counters in our supermarkets. Therefore, this is one innovation that should be welcomed in our society that is increasingly moving towards a healthy choice.

In the past, water has been the rinse tool of choice by many consumers in regards to their handling of fresh produce before consumption. With Bacteriophage technology, the need for washing fresh produce with water before consumption will not be a necessity. This is because, bacteriophages maintains the freshness of produce and will allow consumers the choice of eating fresh produce at their own conveniences directly out of packaging without rinse.

This study focuses on the influence and the impact of bacteriophage technology on the fresh produce industry by examining several factors that contribute to a consumer's willingness to pay an additional amount for bacteriophage treated fresh produce. In addition, this study will highlight the factors that affect consumer choice and their willingness-to-pay for an innovation that could significantly prevent food borne disease in the United States, thus, lessening the financial burden that according to the

Centers for Disease Control and Prevention (USA Today, 2010) is estimated to be $152 billion.

In order to accomplish this, it was first necessary to understand the technology being proposed and how its attributes affected demand for fresh produce and then secondly determine whether consumers were willing to pay an additional amount for fresh produce treated with bateriophage technology, as opposed to sticking with the status quo. The objective of this study is to determine the factors affecting consumers' willingness-to-pay (WTP) an additional amount for bacteriophages treated fresh produce to avoid getting sick through food-borne illness.

Background

The United States is remarkably safe, when it comes to food supply. Nevertheless, food can become contaminated with a variety of germs. According to reports by a food safety group of the Centers for Disease Control and Prevention (CDC), food-borne illness caused by bacteria such as E. coli and salmonella not only take a huge toll on American consumers' health, but they cost the United States an estimated $152 billion annually in health care and other losses. To curb this increasing phenomenon, there has been a reintroduction of bacteriophage for the treatment of bacteria found on raw foods (USA Today, 2010). In recent years, it has become widely recognized that bacteriophages have several potential applications in the food industry (Walker, 2006). They are being used as alternatives to antibiotics in animal health, as bio preservatives in food and as tools for detecting pathogenic bacteria throughout the food chain. Bacteriohages are natural enemies of bacteria and are not harmful to plants, animals, humans or the environment (Walker, 2006). They are the most common organisms on

earth, and they are naturally found in the environment, including on raw foods and in water. The effect of bacteriophage treatment on the survival of several food-borne pathogens, e.g. *Salmonella*, *E. coli*, and *Listeria monocytogens* has been tested (Walker, 2006).

According to the CDC an estimated 76 million cases of food-borne disease occur each year in the United States. The great majority of these cases is mild and cause symptoms for only a day or two. Some cases are more serious, and the CDC estimates that there are 325,000 hospitalizations and 5,000 deaths related to food-borne diseases each year. According to the CDC, the most severe cases tend to occur in the very old, the very young, those who have illness already that reduces their immune system function, and healthy people exposed to a very high dose of the organism causing the contamination.

Literature Review

The study of willingness to pay has taken on a variety of forms in the applied economics literature for some time now (Quagrainie, 2006). The traditional approach has been the use of contingent valuation, which is a questioning technique that asks individuals what they would be willing to pay, contingent on market availability of the product or service (see for example Quagrainie, 2006; Buzby, Ready and Skees, 1995; Gil, Gracia and Sanchez, 2000; Boccaletti and Nardella, 2000; Cranfield and Magnusso, 2003). Through the use of discrete choice techniques, stated choice experiments, and experimental auction methods, analysts have also derived estimates of money an individual is willing to pay to obtain a product (Hoffman et al., 1993; Lusk et al., 2001; Loureiro and Umberger 2003).

Though WTP techniques have been applied to examine different issues, it has not been applied to potential market opportunities for Bacteriophage technology treated fresh produce. Usage of Bacteriophage technology in the fresh produce industry is almost non-existent; therefore studies of this nature will help the industry to explore the immense potential for expanding the market beyond the status quo. This study will also contribute to literature on willingness to pay by employing a logit analysis of acquired data. The results of this study will provide pertinent information for the fresh produce industry that can help them develop valuable premium produce to be sold through the grocery market channel to a targeted clientele. In addition, fresh produce sales and possibly farmer profitability could be increased if consumers are willing to pay for fresh produce treated with Bacteriophage technology.

In the past 20 years consumer demand for niche products (including organic, natural, and locally grown) has grown substantially (Darby et al., 2006). Consumers value foods produced with a particular technology because they perceive the products to be healthier, to be more environmentally friendly, or to be more supportive of small scale agricultural and local rural communities (Darby et al., 2006). This preference may translate to consumers' willingness to pay an additional price for a particular product.

In addition to the aforementioned studies, there has been widespread research in the areas of Willingness to Pay. Of particular interest to this study, are efforts to evaluate consumer reaction to Bacteriophage technology treated fresh produce: more specifically, consumer willingness to pay for the previously mentioned technology. These previous studies have included both stated preferences and revealed preference approaches. Revealed preference studies on WTP examine consumers' actions in actual marketplace

settings (Ward et al., 2010, Anderson and Hansen, 2004; Bjorner et al., 2004). These studies are, however, rare compared to the stated preference variety because they tend to be more difficult and costly to perform. Stated preference research is a popular method in evaluating WTP because it allows the researcher to survey consumers in easily-controlled settings (Ward et al., 2010). Furthermore, some studies have even evaluated the same product in both scenarios to test the credibility of stated preference experiments (Adamowicz et al., 1994; Arnot et al., 2006). In general, these studies show a positive WTP for respective products regardless of their methodologies (Ward et al., 2010).

Survey Methods and Data

The dataset for the analysis reported in this study was obtained through a survey questionnaire administered by telephone to consumers in four different states; Alabama, Georgia, North Carolina, and South Carolina in the summer months of the year 2010. The survey questionnaire was structured in three sections: Section 1 focused on problem introduction, thus respondents were questioned on their awareness of fresh produce contamination in the United States, the commonality in their opinion on how consumers become sick from eating fresh produce contaminated with harmful bacteria. Also, respondents were asked to identify where they thought the source of contamination was; be it at the Farm, Distribution centers, Grocery stores or processing plants. Section 1 also elicited information on respondents' routine behavior before consumption of fresh produce; whether they washed them with water or chemical food sanitizers and the effectiveness of their cleansing methods in ridding bacterial contamination on fresh produce. Respondents were also asked about the use of chemical food sanitizers as a cleansing tool and their thoughts on them eventually being harmful to humans and the

environment. Lastly in section 1, respondents were questioned on their awareness of the bacteriophage technology as a means of reducing growth bacteria on fresh produce.

Section 2 provided a brief but precise description of proposed bacteriophage technology. This description was constructed in a manner that ensured that respondents were educated fully on the science of the bacteriophage technology without it being too scientific and mundane in its terminology, thus maintaining respondents' high level of cooperation and interest in the survey questionnaire to produce accuracy in their response. In addition to the description of the bacteriophage technology, section 2 also extracted from respondents, their level of accordance with the use of biocontrol agents to ensure food safety; their reservations on the technology leaving residues on fresh produce and it possibly being harmful to humans and the environment; and the effectiveness of the bacteriophage technology in reducing the growth of bacteria on fresh produce than general chemical sanitizers currently being utilized by the industry. Respondents were also questioned on whether they will patronize fresh produce treated with bacteriophage. Lastly, this section solicited from the respondents their willingness to pay (WTP) extra for fresh produce treated with the proposed technology. Respondents with affirmative on their WTP, were asked to indicate how much more than the current price they would be willing to pay by expressing them in the following percentages, <5%, 6-10%, 11-15%, 16-20%, or > 20%.

Section 3 of the survey questionnaire obtained information on the demographics and socio-economic factors of the respondents (i.e. gender, age, race/ethnicity, education, marital status, household formation, income of household, and finally their State of residence). Income of household was approximated in the following, (<$10,000;

$10,001-$25,000; $25,001-$50,000; $50,001-$75,000 and >$75,000) to capture all levels of income for the respondents. In addition, SAS software was utilized for data input and analysis for this study. Also, in this study, as in other WTP studies (Quagrainie, 2006), a binary Logit model was employed to estimate consumers' WTP for an additional amount for fresh produce treated with bateriophage technology. The Logit model expresses consumers' WTP as a function of income, education, gender, race, and States (Georgia, North Carolina, South Carolina, with Alabama being the reference state).

Empirical Model

Analyses of survey rankings in empirical work commonly utilize logit models (Quagrainie 2006). The logit model was selected as the regression method in this analysis because its asymptotic characteristic constrains the predicted probabilities to a range of 0 to 1. The logit model is commonly used in settings where dependent variable is binary (Govindasamy and Italia, 1999). Because the data source provided individual, rather than grouped, observations, the common estimation method of choice was the maximum likelihood (Gujarati, 1992). Among the beneficial characteristics of maximum likelihood estimation are its consistent and asymptotically efficient parameter estimates (Pindyck and Rubingfield, 1991).

The empirical model assumes that the probability of observing willingness-to-pay an additional amount for bacteriophage treated fresh produce, P_i is dependent on a number of independent variables (X_{ij}) associated with consumer i and variable j, and a number of unknown parameters β. The likelihood of observing the dependent variable was tested as a function of variables which included education, income, race, location, and gender.

$$Pi = F(Zi) = F(\alpha + \beta Xi) = 1/[1 + \exp(-Zi)] \quad (1)$$

Where:

F (Zi) = Cumulative density function of probabilities, expressed as function of Zi

Pi = the probability that an individual would be willing to pay an additional amount, which is at least 5 percent more than the current price for bacteriophage treated fresh produce.

α = Intercept

And βXi is a linear combination of independent variables so that

$$Zi = \log [Pi/(1-Pi)] = \beta Xi = \beta_0 + \beta_1 X_1 + \beta 2X\ 2 + \ldots + \beta nXn + \varepsilon \quad (2)$$

Where:

i = 1, 2,. .. , n are observations

Zi = the log odds of choice for the ith observation

Xn = the nth explanatory variable for the ith observation

β = the parameters to be estimated; and

ε = the error term

The dependent variable Zi, in the above equation is the logarithm of the probability that a particular choice will be made. However, when the independent variables are qualitative in nature as is the case with some of the explanatory variables in this model, δPi/δXij does not exist in that Xij is discrete, which means that it does not vary continuously. In this case, probability changes must be obtained by evaluating Pi at the alternative values of Xij. Probability changes are then determined by;

$$(\delta Pi/\delta Xij) = Pi\ (Yi : Xij = 1) - P(Yi : Xij = 0). \quad (3)$$

The following model was developed to predict the likelihood that a participant would be willing to pay an additional 5 percent for bacteriophage treated fresh produce. The model was tested under the specification:

$WTP_{Bacteriophage} = \beta_0 + \beta_1$ High School + β_2 College + β_3 Income + β_4 White + β_5 Female + β_6 Georgia + β_7 North Carolina + β_8 South Carolina + u

Where:

$WTP_{Bacteriophage}$ = 1 if the individual was willing to pay an additional 5 percent more than the current price for bacteriophage treated fresh produce and 0 otherwise;

High School = 1 if the highest level of education attained by the individual is High School and 0 otherwise;

College = 1 if the highest level of education attained by the individual is College and 0 otherwise;

Income was coded as follows;

=1 if income <$10,000

=2 if income $10,001-$25,000

=3 if income $25,001-$50,000

=4 if income $50,001-$75,000

=5 if income >$75,000

White = 1 if the individual was of the Caucasian race, and 0 otherwise;

Female = 1 if the individual is female, and 0 otherwise;

Georgia = 1 if the individual lives in Georgia, and 0 otherwise;

North Carolina = 1 if the individual lives in North Carolina, and 0 otherwise;

South Carolina = 1 if the individual lives in South Carolina, and 0 otherwise.

Results and Discussion

A total of 384 respondents were randomly selected from a pool of 750, maintaining the same proportional percentage per State. The survey was then fielded to 384 respondents and a total of 210 of 384 completed responses were received that yielded a 55% response rate. Of the 210 participants that responded, approximately 44% of the respondents indicated that they were High School graduates. Also, 35% of the participants responded with a College degree being the highest of their educational attainment (Table 1). There was a somewhat balanced distribution among the respondents in regards to income, where we found that approximately, 36% of participants fell within the $10,000-$25,000 income bracket; 31% in $25,001-$50,00; and 24% in $50,001-$75,000; and the remaining falling in either under $10,000 or over $75,000 brackets (Table 1). The racial make-up of the respondents also proved to be note worthy as 30% of completed survey respondents were of the African-American race, approximately 64% of respondents being Caucasians, and 6% other race (see also Table 1). Furthermore, roughly 62% of the participants were females and 38% male (Table 1, 4). The make-up of the respondents by state were as follows; 19% from Alabama, 30% from Georgia, 36% from North Carolina, and lastly 15% from South Carolina.

Table 2 presents the estimation results of the logit model and Table 3 shows the odds ratios corresponding to the estimates in Table 2. Figure 4 on the appendix page illustrates a respondent's willingness to pay relative to their income. Based on the

estimation results, income was found to be significant in determining a consumer's WTP, similar to other studies (Ifabiyi, 2011). At the 5 percent significance level, a consumer's income significantly influences their WTP, thus, an increase in one's income will produce a higher WTP for bacteriophage treated fresh produce.

Further analysis of the data showed that a consumer's race and their State were also significant in determining that individual's WTP an additional amount for fresh produce treated bateriophage as preservative. In this particular study, Caucasians were willing to pay an additional amount relative to other races (Table 2) at 10 percent significance level. As mentioned earlier, where a consumer lived (State) was found to be significant with consumers in states of Georgia and North Carolina having higher WTP relative to Alabama. The odds ratios for residents from Georgia and North Carolina are 34% and 40.5% respectively, over that of a resident from Alabama (Table 3). The observed higher WTP of Caucasians in this study could be due to their higher participation numbers in the randomly selected respondents' pool. Furthermore, the residing State of a respondent in the four previously mentioned states covered in this study that demonstrated a significance in a consumer's WTP could be due to a higher awareness and knowledge of the proposed technology.

Education and Gender (female) were hypothesized to be influential in an individual's WTP (Bawa, Ruchita 2011), with preliminary results showing that higher levels of a consumer's education yield an increase in their WTP. We discovered that consumers with high school and college degrees showed a higher WTP over those with less than high school degrees, based on a normal cross tabulation between education and one's willingness to pay (Tables 4, 6, and Figures 1, 3), although after full data was

statistically ran, they were found not to be significant at any conventional significance levels.

Conclusion

As the share of the fresh produce grown in the United States food supply continues to increase, additional research will allow food marketers to target specific consumer segments that are willing to pay a premium for bacteriophage treated fresh produce. The results of this study suggest that a significant amount of consumers would be willing to pay an additional 5 percent increase in the price of bacteriophage treated fresh produce over conventional ones. In addition, we discovered that certain demographic and socio-economic characteristics impact the willingness-to-pay (WTP) for bacteriophage treated fresh produce. From the findings, we can construct a profile of households most likely to purchase bacteriophage treated fresh produce at a premium price. Specifically, higher- earning households would be more likely to exhibit a higher willingness to pay for bacteriophage treated fresh produce at a 5 percent increase in price. Also, our findings show that Caucasians are most inclined to patronize premium priced fresh produce treated with bacteriophage relative to other races. Furthermore, our results illustrate that consumers living in the states of Georgia and North Carolina would be willing to pay higher prices for bacteriophage treated fresh produce, relative to consumers in Alabama and South Carolina. This may be due to higher awareness of the proposed technology and of preventive additives in general.

Together, each of the significant variables, exclusive of education and gender, create a consistent picture of the characteristics of households that patronize bacteriophage treated fresh produce. Therefore, it may be more advantageous to target

prospective bacteriophage treated fresh produce consumers on the basis of income, race, and state of residence rather than education and gender.

All in all, areas in which the local economy consists of higher income households may be most successful target areas for bateriophage treated fresh produce growers. A highly developed consumer markets in Georgia and North Carolina, as well as suburban areas surrounding major US cities may offer the highest concentration of consumers who are most likely to patronize premium priced fresh produce treated with bacateriophage technology. This analysis may be the first of its kind; however, it provides an initial introduction to the bacteriophage treated fresh produce for a rapidly changing agricultural sector in regions with higher income levels in the country. As bacteriophage technology expands, public perception and awareness may change as well, thus the identification of consumer characteristics that influence the likelihood of willingness-to-pay for bacteriophage treated fresh produce will be valuable as the market continues to grow.

References

Adamowicz, W., Louviere, J., Williams, M., 1994. Combining Revealed and Stated Preference Methods for Valuing Environmental Amenities. Journal of Environmental Economics and Management, 26 (3), 271-292.

Anderson, R.C., Hansen, E.C., 2004. Determining Consumer Preference for Ecolabeled Forest Products. Journal of Forestry, 102 (44), 28-32.

Arnot, C., Boxall, P.C., Cash, S.B., 2006. Do Ethical Consumers Care About Price? A Revealed Preference Analysis of Fair Trade Coffee Purchases. Canadian Journal Of Agricultural Economics, 54, 555-565.

Bawa, S.K., Ruchita, M., 2011. Awareness and Willingness to Pay for Health Insurance: An Empirical Study with Reference to Punjab India. International Journal of Humanities and Social Science, 1 (7)

Bernard, D.J., Mathois, A., 2005. Factors Affecting Consumer Choice and Willingness to Pay for Milk Attributes. Presented at American Agricultural Economics Association, July 24-27, 2005, Providence, Rhode Island.

Boccaletti, S., Nardella, M., 2000. Cusumer Willingness to Pay for Pesticide-free Fresh Fruit and Vegetables in Italy, International Food and Agribusiness Management Review, 3, 297-310.

Bjorner, T.B., Hansen, L.G., Russell, C.S., 2004. Environmental Labeling and Consumers' Choice- an Empirical Analysis of the Effect of the Nordic Swan. Journal of Environmental Economics and Management, 47, 411-434.

Buzby, J.C, Ready, R.C., Skees, J.R., 1995. Contingent Valuation in the Food Policy Analysis: A Case Study of a Pesticide-Residue Risk Reduction. Journal of Agricultural and Applied Economics, 27 (2), 613-625.

Cranfield, J.A.L., Magnusson, E., 2003. Canadian Consumer's Willingness to Pay for Pesticide Free Food Products: An Ordered Probit Analysis. International Food and Agribusiness Management Review, 6 (4), 13-30.

Darby, K., Batte, M.T., Ernst, S., Roe, B., 2006. Willingness to Pay for Locally Produced Foods: A Customer Intercept Study of Direct Market and Grocery Store Shoppers. Presented at American Agricultural Economics Association Annual Meeting. July 23-26, 2006, Long Beach, California.

Gil, J.M., Gracia, A., Sanchez, M., 2000. Market Segmentation and Willingness to Pay For Orgnaic Products in Spain, International Food and Agribusiness Management Review, 3, 207-226.

Govindasamy, R., Italia, J., 1999. Predicting Willingness-to-Pay a Premium for Organically Grown Fresh Produce. Journal of Food Distribution Research. 44-53.

Hoffman, E., Menkhaus, D.J., Chakravarti, D., Field, R.A., Whipple, G.D., 1993. Using Laboratory Experiment Auctions in Marketing Research: A Case Study of New Packaging for Fresh Beef. Marketing Science, 12 (3), 318-338.

Ifabiyi, I.P., 2011. Willingness to Pay For Water at Household Level in Ilorin, Kwara State, Nigeria. Global Journal of Human Social Science, 11 (2).

Loureiro, M.L., Umberger, W.J., 2003. Estimating Consumer Willingness-to-Pay for Country-of-Origin Labeling. Journal of Agricultural and Resource Economics. 28, 287-301.

Lusk, J.L., Fox, J.A., Schroeder, T.C., Mintert, J., Koohmaraie, M., 2001. In-Store Valuation of Steak Tenderness. American Journal of Agricultural Economics. 83 (3), 537-550.

Quagrainie, K.K., 2006. IQF Catfish Retail Pack: A Study of Consumers' Willingness to Pay. International Food and Agribusiness Management Review, 9 (2). 75-87

Walker, K., 2006. Use of Bacteriophages as Novel Food Additives. Food Regulation in The United States. FS06 ANR 490/811.

Ward, D.O., Clark, C.D., Jensen, K.L., Russell, C.S., Yen, S.T., 2010. Factors Influenting Willingness-to-Pay for the Energy Star Label. Presented at Agricultural and Applied Economics Association 201 AAEA, CAES, and and WAEA Joint Annual Meeting, July 25-27, 2010, Denver, Colorado.

Weise, E., 2010. USA Pays Price for Food-borne Illness: $152B a Year. 4 March. http://www.usatoday.com/news/health/2010-03-03-food-borne-illness_N.htm.

Appendix

Table 1. Summary of Variables

Variable	Frequency	Mean
Gender		
Female	132	0.628
Male	78	0.371
Race		
African-American	64	0.304
Caucasian	135	0.642
Hispanic	1	0.004
Other	10	0.047
Education		
Middle School	2	0.009
High School	94	0.447
College	74	0.352
Graduate	40	0.190
Income		
< $10,000	6	0.028
$10,001-$25,000	76	0.361
$25,001-$50,000	66	0.314
$50,001-$75,000	50	0.238
> $75,000	12	0.057
States		
Alabama	41	0.195
Georgia	63	0.300
North Carolina	75	0.357
South Carolina	31	0.147

Table 2. Estimation Results

Variable	Estimate	Standard Error	Pr > ChiSq
Intercept	-2.5997	1.2698	0.0406
High School	-0.7004	0.6466	0.2787
College	-0.6685	0.5071	0.1874
Income	0.6630**	0.2678	0.0133
White	0.7928*	0.4155	0.0564
Female	0.0152	0.3859	0.9686
Georgia	-1.0796**	0.5017	0.0314
North Carolina	-0.9038*	0.4769	0.0581
South Carolina	-0.9849	0.6138	0.1086

* is significant at the .10 level; ** is significant at the .05 level; and *** is significant at the .01 level.

Table 3. Odds Ratio Estimates

Effect		Point Estimate	95% Wald Confidence Limits	
High School		0.496	0.140	1.763
College		0.512	0.190	1.385
Income		1.941	1.148	3.280
White		2.210	0.979	4.989
Female		1.015	0.477	2.163
Georgia	GA vs AL	0.340	0.127	0.908
North Carolina	NC vs AL	0.405	0.159	1.031
South Carolina	SC vs AL	0.373	0.112	1.244

Table 4

Are you willing to pay extra for fresh produce that have been treated using the proposed technology? * What is your gender? Cross tabulation

% within Are you willing to pay extra for fresh produce that have been treated using the proposed technology?

		What is your gender?		
		Female	male	Total
Are you willing to pay extra for fresh produce that have been treated using the proposed technology?	No(if No go to question 19)	61.5%	38.5%	100.0%
	Yes	61.5%	38.5%	100.0%
	Don't Know	90.0%	10.0%	100.0%
Total		62.9%	37.1%	100.0%

Figure 1. Gender

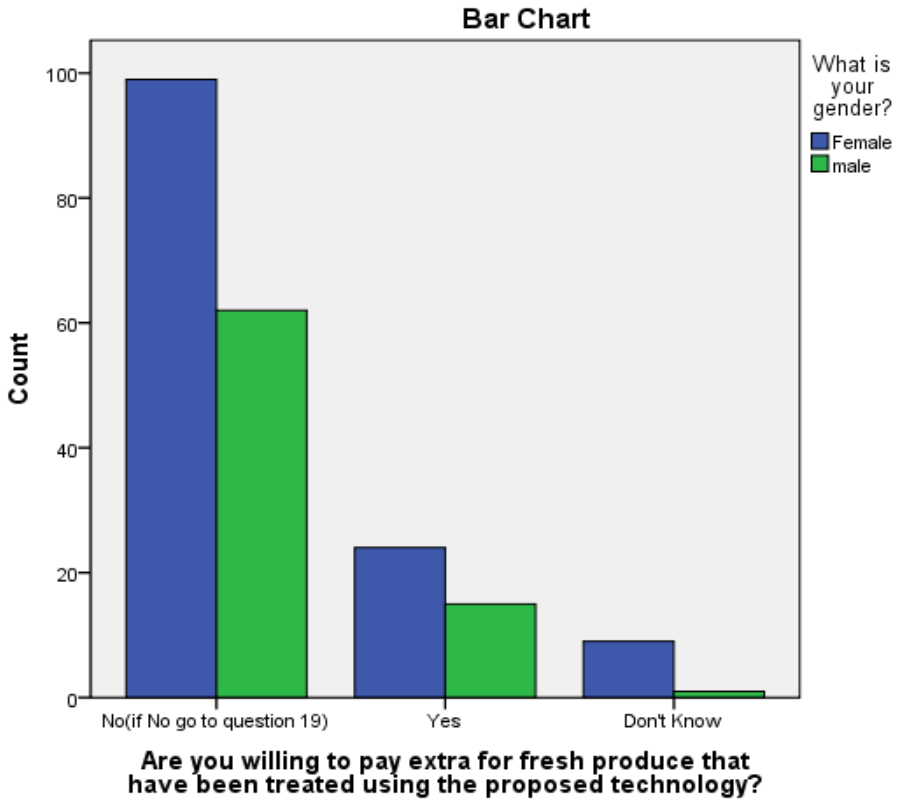

Table 5

Are you willing to pay extra for fresh produce that have been treated using the proposed technology? * What race do you consider yourself to be? Cross tabulation

% within Are you willing to pay extra for fresh produce that have been treated using the proposed technology?

		What race do you consider yourself to be?				
		Caucasian	African American/Black	Hispanic	Other	Total
Are you willing to pay extra for fresh produce that have been treated using the proposed technology?	No(if No go to question 19)	60.2%	32.3%	.6%	6.8%	100.0%
	Yes	74.4%	25.6%			100.0%
	Don't Know	80.0%	20.0%			100.0%
Total		63.8%	30.5%	.5%	5.2%	100.0%

Figure 2. Race

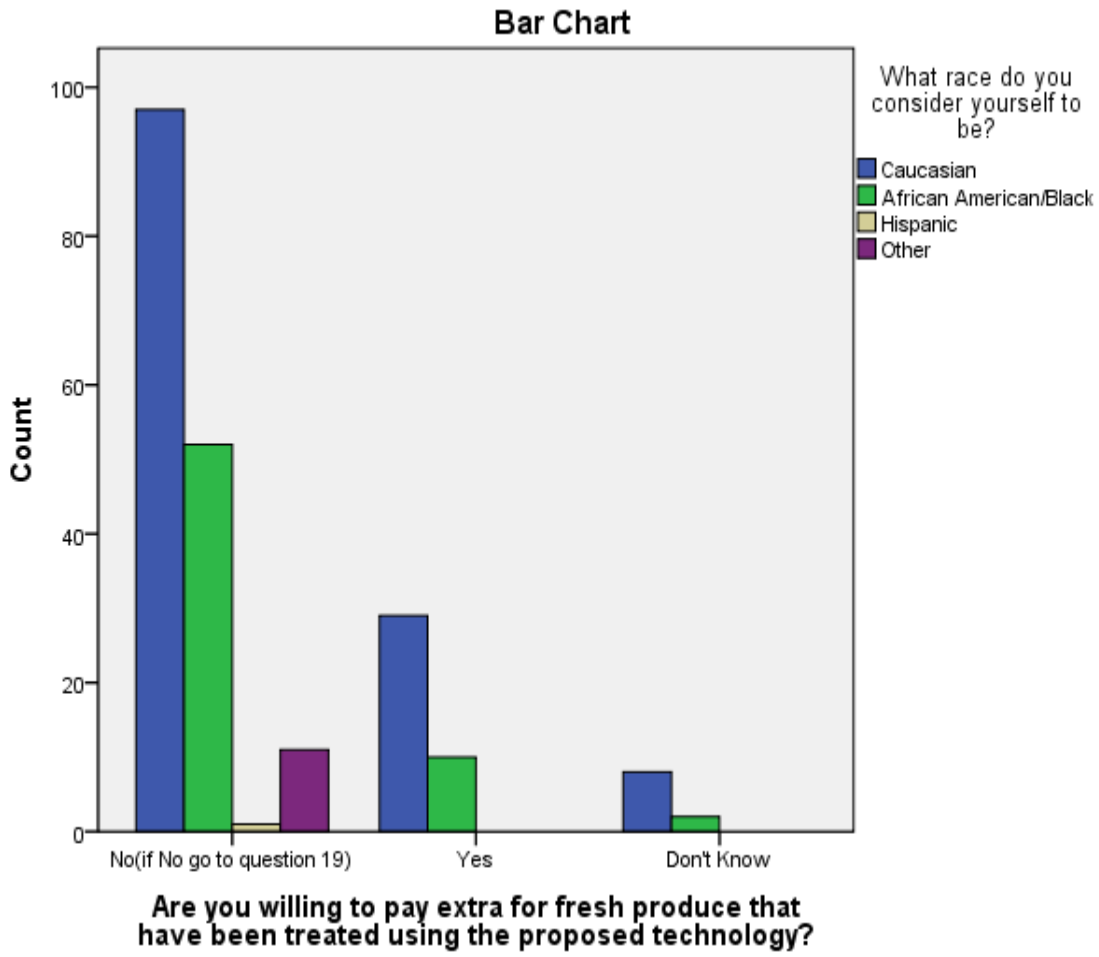

Table 6.
Are you willing to pay extra for fresh produce that have been treated using the proposed technology? * What is the highest grade of school you have completed Cross tabulation

% within Are you willing to pay extra for fresh produce that have been treated using the proposed technology?

		What is the highest grade of school you have completed				
		Middle School	High School	College	Graduate	Total
Are you willing to pay extra for fresh produce that have been treated using the proposed technology?	No(if No go to question 19)	.6%	51.6%	32.9%	14.9%	100.0%
	Yes	5.1%	28.2%	30.8%	35.9%	100.0%
	Don't Know			80.0%	20.0%	100.0%
Total		1.4%	44.8%	34.8%	19.0%	100.0%

Figure 3. Education

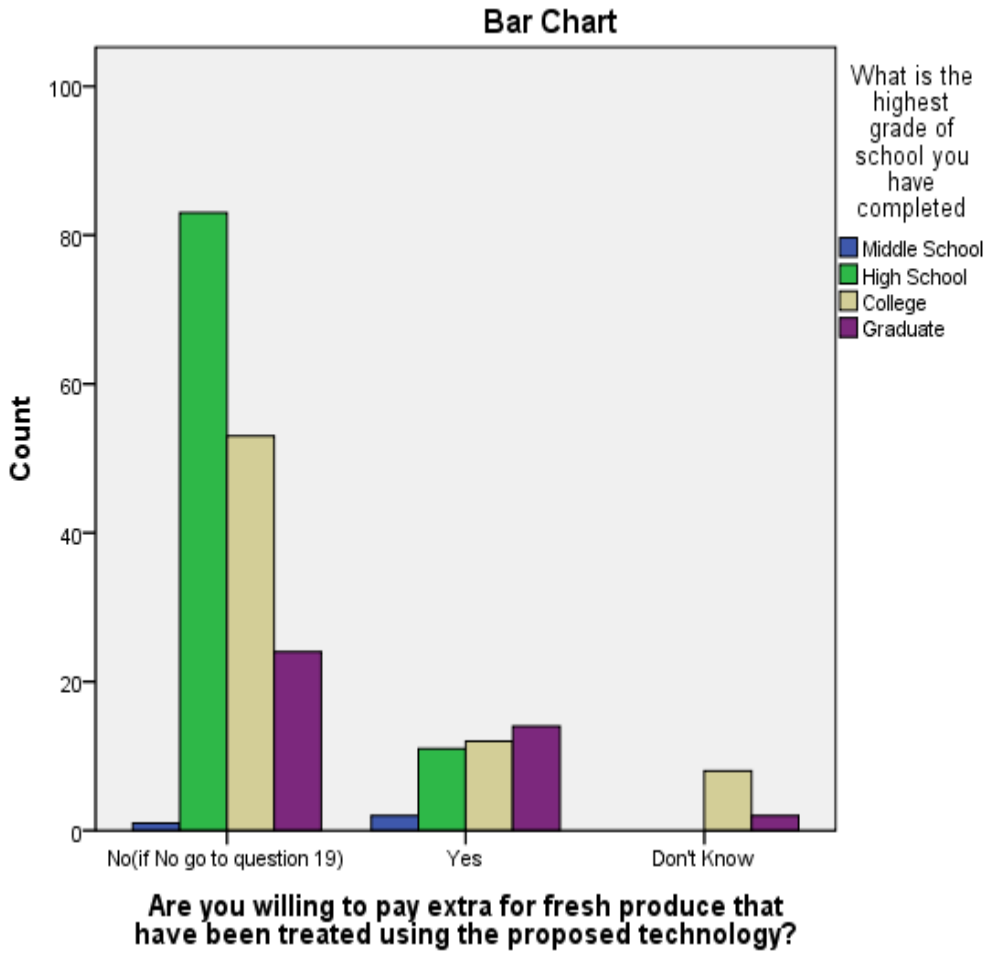

Table 7.

Are you willing to pay extra for fresh produce that have been treated using the proposed technology? * What is the approximate total family/household income per year? Cross tabulation

% within Are you willing to pay extra for fresh produce that have been treated using the proposed technology?

		What is the approximate total family/household income per year?						
		0	<$10,000	$10,000-$25,000	$25,000-$50,000	$50,000-$75,000	>$75,000	Total
Are you willing to pay extra for fresh produce that have been treated using the proposed technology?	No(if No go to question 19)	.6%	3.1%	42.5%	30.6%	18.8%	4.4%	100.0%
	Yes			20.5%	25.6%	41.0%	12.8%	100.0%
	Don't Know				70.0%	30.0%		100.0%
Total		.5%	2.4%	36.4%	31.6%	23.4%	5.7%	100.0%

Figure 4. Income