U.S. Consumer Purchases and Nutritional Knowledge of Pecans

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SUMMARY. The U.S. pecan (*Carya illinoensis*) industry is important to the country in both economic and cultural terms. Although the industry has expanded its export markets considerably, domestic pecan consumption has remained relatively flat. Expanding a domestic market is an important risk management strategy. To diversify, industry stakeholders may need to focus effort on growing domestic demand for pecans and pecan products, yet relatively little is known about U.S. pecan consumers because the majority of available information is garnered from supply side (production) data. This study used a web-based panel survey of 1009 U.S. food consumers to explore the demographics of pecan consumers, gauge their current tree nut nutrition knowledge, and examine the preferences surrounding their pecan purchases. Almost three-quarters (74%) of survey respondents consume pecans; demographic differences were observed between respondents who consume pecans and those who do not. Respondents' knowledge of general and tree nut nutrition concepts varied. Respondents most frequently purchase pecans from a grocery store, buy them shelled as a raw ingredient for baking/cooking, and consume pecans four to six times per year.

Tree nuts are a popular food in the United States, used as both a stand-alone snack and as ingredients in other food dishes. Common tree nuts, such as almonds (*Prunus dulcis*), pecans, and walnuts (*Juglans regia*), have a number of nutritional benefits that may be attractive to food consumers. For example, consumption of tree nuts may reduce the risk of coronary heart disease (Kris-Etherton et al., 2008) and cardiovascular heart disease (Blomhoff et al., 2006). These nutritional benefits may vary depending on the nut type because the underlying nutritional components, such as lipid and antioxidant content, also vary (e.g., Carlsen et al., 2010; Robbins et al., 2011). U.S. tree nut industries have attempted to capitalize on the nutritional aspects of their products by incorporating health messages into their marketing. An example of a well-known campaign is that of the Blue Diamond Almond growers cooperative, which promotes the healthfulness

of almonds and provides health-related educational material on the cooperative's website (Blue Diamond Growers, 2014). Providing education about the nutritional benefits of food products may influence consumers' preferences and purchasing habits (e.g., Chu et al., 2009; Freedman and Connors, 2010; James et al., 2009). Other U.S. tree nut industries [i.e., hazelnut (*Corylus avellana*), pistachio (*Pistacia vera*), walnut, and pecan] have also applied similar strategies to promote domestic consumption, with varying success as measured by increases in per capita consumption over the past decade (U.S. Department of Agriculture, 2013).

Although domestic (United States) per capita almond consumption has increased 5-fold since 1976, pecan consumption has remained relatively flat over the past three and a half decades. The pecan industry has focused its efforts on expanding export markets, with U.S. pecan exports growing by almost 2000% since 1980. The primary pecan export market, Hong Kong (a conduit to Asian markets), has experienced rapid expansion since 2004 and has been instrumental in increasing U.S. pecan prices despite flat domestic demand.

High export prices obtained over the last several years may be at risk for several reasons, including economic

uncertainty in popular export markets (e.g., China) expressed in various popular press outlets (e.g., Harjani, 2014; Silk, 2013; Wassener, 2013) and increased production in developing markets (e.g., Mexico and China), as well as U.S. acreage. For example, pecan acreage in Mexico has increased, on average, over 10,000 acres (4046.9 ha) per year during the last decade (Servicio de Información Agroalimentaria y Pesquera, 2012). One approach to managing these potential risks is to focus effort on growing domestic demand for pecans and pecan products in addition to the work that is taking place in foreign markets. Relatively little is known about U.S. pecan consumers because the majority of available information is garnered from supply side (production) data rather than demand-side data. Consumer and potential consumer information can provide valuable marketing insights for stakeholders looking to expand domestic pecan sales.

This study seeks to expand the exploratory work of Lombardini et al. (2008), who investigated consumers' pecan nutrition knowledge and purchases using a small convenience sample of U.S. respondents. Our study provides a more detailed exploratory attempt at gathering demand-related information by learning more about pecan consumers—who they are and their tree nut nutrition knowledge, preferences and purchase habits—to develop a more comprehensive picture of the demand side of the U.S. pecan market. More specifically, this study seeks to 1) explore the demographics of pecan consumers, 2) gauge their current tree nut nutrition knowledge, and 3) examine the preferences surrounding their tree nut and pecan purchases.

Materials and methods

An online panel survey was conducted 24–28 Oct. 2013 to collect primary data regarding consumers' pecan preferences and purchase behavior. The survey instrument was split into three sections to collect information on 1) respondents' general and tree nut nutrition knowledge, 2) pecan purchases and preferences, and 3) demographic characteristics of the respondents. Nutrition knowledge was measured using statements previously applied in scholarly literature for this purpose (e.g., Hoogenboom et al.,

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2009; Pawlak et al., 2009). These questions were used as a measure of each food consumer's general and tree nut-specific nutrition knowledge levels. Survey respondents were members of a group of online market research panels managed by Cint, an independent global market research corporation with U.S. offices in Atlanta, GA, and Los Angeles, CA. The market research company provided a small measure of compensation (i.e., \$0.50–\$2.00 cash incentive) to respondents for their participation in market research surveys. Survey respondents were required to be at least 18 years of age. A sample of 9299 panelists (representative of the United States in terms of U.S. Census region of residence) was invited to participate in the survey via e-mail to meet a sample quota of 1000 respondents (sample quota was determined by the research project budget), and a total of 1009 responses were used in the analysis.

For analysis, raw data from the web-based survey were collected using an electronic spreadsheet program, and categorical questions (e.g., multiple choice questions) were numerically coded. Simple descriptive statistical analyses (e.g., frequency tables, means), *t* tests, analysis of variance, and chi-square tests were performed on the data using SAS statistical analysis software (version 9.2; SAS Institute, Cary, NC).

Results and discussion

DEMOGRAPHICS OF PECAN CONSUMERS. Responses were received from all 50 states. On average, respondents lived with two other individuals and had one child under the age of 18 years living at home. Additional demographic characteristics of respondents are reported in Table 1.

Chi-square tests comparing frequencies of demographic variables commonly reported at a national level suggest that survey respondents diverged from the general U.S. population in age, census region of residence, gender, income, marital status, and race (Table 1). This fact may be explained by several factors relating to the survey methodology. To comply with institutional review board policy, respondents were provided information regarding the purpose of the survey (i.e., gaining insights into consumer preferences for tree nuts) and given the opportunity to decline participation if

Table 1. Demographics of the U.S. population and of a group of respondents to a web-based survey of nutrition knowledge, pecan preferences, and pecan purchase behavior. The survey was conducted 24–28 Oct. 2013. Respondents were potential U.S. pecan consumers aged 18 years or older.

Attribute	Respondents		U.S. population (%) ^z
	(no.)	(%)	
Age			
Under 20 years of age	22	2.2	26.6
20–34 years of age	326	32.3	20.5
35–54 years of age	386	38.3	27.4
55–64 years of age	173	17.2	12.1
65 years of age or older	102	10.1	13.4
Annual household income			
Less than \$24,999	213	21.1	24.1
\$25,000–\$49,999	276	27.4	24.2
\$50,000–\$99,999	375	37.2	30.0
\$100,000–\$149,999	95	9.4	12.5
\$150,000 or more	50	5.0	9.2
Census region of residence ^y			
Midwest	261	25.9	17.8
Northeast	179	17.7	21.5
South	341	33.8	37.2
West	228	22.6	23.4
Gender			
Male	321	31.8	49.2
Female	688	68.2	50.8
Marital status			
Single	241	23.9	32.4
Married	586	58.1	48.4
Divorced, widowed, or separated	158	15.7	19.2
Other ^x	24	2.4	-
Race			
American Indian or Alaska Native	11	1.1	0.7
Asian	60	6.0	4.8
Black or African American	75	7.4	12.2
Hispanic or Latino	47	4.7	16.6
White or Caucasian	796	78.9	63.2
Other	20	2.0	2.4

^zU.S. Census Bureau (2013).

^yU.S. Census Bureau (2014).

^xCategory not used by U.S. Census Bureau.

they were not interested in the topic. As a result of this policy, it is possible, and even likely, that survey participants had some affinity for tree nuts, pecans, or both. Since tree nut consumers are a subset of the U.S. population, it is not surprising that demographic features differed between the sample and the U.S. population.

Similarly, since the survey protocol required all participants to be at least 18 years of age, there was some disparity between the sample frequency for age and age frequencies for the general population. It is valuable to explore the information gained from this survey because these respondents may be representative of pecan consumers or those interested in pecans, and inferences to the general population

should be made with awareness of the limitations of the survey methodology used here. Further research should be conducted to validate and extend the findings presented here.

Almost three-quarters (74.0%) of survey respondents reported they consume pecans on a regular basis. Chi-square tests of proportion were used to explore differences between these respondents who consume pecans on a regular basis and those who do not (Tables 2 and 3). Results suggest pecan consumers are more likely to be older: among respondents 55 years of age or older, a higher proportion consume pecans than those who do not ($P < 0.05$). A higher proportion of African Americans and Hispanics consume pecans than those who do not

Table 2. Differences in demographic attributes between survey respondents who consume pecans on a regular basis and those respondents who do not consume pecans on a regular basis. Respondents were potential U.S. pecan consumers aged 18 years or older who participated in a web-based survey of nutrition knowledge, pecan preferences, and pecan purchase behavior. The survey was conducted 24–28 Oct. 2013 ($n = 1009$).

Attribute	Does not consume pecans (%)	Consumes pecans (%)	Total ^a	Chi-square <i>P</i>
Age				
Under 20 years of age	45.5	54.6	100.1	0.0082
20–34 years of age	31.0	69.0	100.0	
35–54 years of age	24.6	75.4	100.0	
55–64 years of age	21.4	78.6	100.0	
65 years of age or older	18.6	81.4	100.0	
Annual household income				
Less than \$24,999	31.9	68.1	100.0	0.0297
\$25,000–\$49,999	24.3	75.7	100.0	
\$50,000–\$99,999	22.9	77.1	100.0	
\$100,000–\$149,999	33.7	66.3	100.0	
\$150,000 or more	18.0	82.0	100.0	
Census region of residence ^b				
Midwest	25.3	74.7	100.0	0.0015
Northeast	36.3	63.7	100.0	
South	20.5	79.5	100.0	
West	26.8	73.3	100.1	
Marital status				
Single	31.5	68.5	100.0	0.1474
Married	24.1	75.9	100.0	
Divorced, widowed, or separated	25.3	74.7	100.0	
Other	20.8	79.2	100.0	
Race				
American Indian or Alaska Native	36.4	63.6	100.0	0.0245
Asian	33.3	66.7	100.0	
Black or African American	13.3	86.7	100.0	
Hispanic or Latino	21.3	78.7	100.0	
White or Caucasian	26.3	73.7	100.0	
Other	45.0	55.0	100.0	
Gender				
Male	27.4	72.6	100.0	0.4736
Female	25.3	74.7	100.0	

^aDue to rounding, may not total 100%.

^bU.S. Census Bureau (2014).

($P < 0.05$). Pecans also appear to be more widely consumed in the southern United States (as defined by the “south” U.S. Census region) than other regions of the United States: a higher proportion of southern U.S. residents consume pecans than southern U.S. residents who do not ($P < 0.05$). This finding is logical given that regional eating patterns exist (Nayga, 1995) and given the prevalence of pecan production in southern U.S. states. These respondents could be more familiar with the uses for and taste of pecans, as well as have increased access to pecans (e.g., backyard trees).

PECAN NUTRITION KNOWLEDGE.

Respondents’ knowledge of general nutrition concepts varied (Table 4). In general, respondents’ tree nut nutrition knowledge level appeared similar to that of respondents in a previous U.S. survey of food consumers (Pawlak et al., 2009), with the majority of respondents being able to correctly identify the nutritional properties and concepts of tree nuts such as almonds, cashews (*Anacardium occidentale*), hazelnuts, pecans, pistachios, and walnuts (Table 5). Although 78% of respondents in a recent study “correctly answered a question regarding which nut was the richest source of omega-3

fatty acids” (Pawlak et al., 2009), the majority of respondents in this study could not identify the relative antioxidant values of food categories and specific tree nut types. Only slightly more than half (58.6%) of respondents in another recent study knew that pecans contain antioxidants (Lombardini et al., 2008), indicating that food consumers may be unaware of the antioxidant properties of pecans. These findings suggest tree nut nutritional knowledge may vary depending on the nutritional compound in question. Additional education about the antioxidant properties of tree nuts, including pecans, relative to other “healthy” food choices may be needed to successfully market tree nuts using an antioxidant-based health claim.

Because nutrition knowledge level can influence perception of healthful foods (e.g., Pounis et al., 2011), the demographic factors influencing this knowledge are of interest to food industry stakeholders seeking to market healthful food products. Each respondent’s answers to the tree nut nutrition knowledge questions posed in Table 5 were used to calculate a tree nut nutrition knowledge score (KS). In the case of the general nutrition KS, each respondent’s score was calculated as the correct percent responses to the 11 true/false and multiple choice general nutrition knowledge questions, while in the case of the tree nut nutrition KS, each respondent’s score was calculated as the percent correct responses to the 11 true/false tree nut nutrition knowledge questions [ranging from 0% to 100% (e.g., Hoogenboom et al., 2009)]. Respondents varied in their tree nut nutrition KS based on several demographic factors (Table 6). Respondents who earn less than \$25,000 annually had a lower mean KS than respondents earning between \$100,000 and \$150,000 annually ($P < 0.05$). Although this study did not examine formal education level, education level may be related to income and thus to tree nut nutrition knowledge. Moreover, educational attainment can influence food consumers’ decisions to buy heart-healthy menu items (Sharma et al., 2011); this decision may be in part based on nutrition knowledge.

Respondents who consider their diet healthy or very healthy had a higher mean KS than those who consider their diet unhealthy, very unhealthy, or do

Table 3. Differences in demographic attributes between survey respondents who consume pecans on a regular basis and those respondents who do not consume pecans on a regular basis. Respondents were potential U.S. pecan consumers aged 18 years or older who participated in a web-based survey of nutrition knowledge, pecan preferences, and pecan purchase behavior. The survey was conducted 24–28 Oct. 2013 ($n = 1009$).

Attribute	Do not consume pecans (%) ^z	Consume pecans (%) ^z	Chi-square <i>P</i>
Age			
Under 20 years of age	3.8	1.6	0.01
20–34 years of age	38.6	30.1	
35–54 years of age	36.3	39.0	
55–64 years of age	14.1	18.2	
65 years of age or older	7.3	11.1	
	100.1	100.0	
Annual household income			
Less than \$24,999	26.0	19.4	0.03
\$25,000–\$49,999	25.6	28.0	
\$50,000–\$99,999	32.8	38.7	
\$100,000–\$149,999	12.2	8.4	
\$150,000 or more	3.4	5.5	
	100.0	100.0	
Census region of residence ^y			
Midwest	25.2	26.1	0.00
Northeast	24.8	15.3	
South	26.7	36.3	
West	23.3	22.4	
	100.0	100.1	
Gender			
Male	33.6	31.1	0.47
Female	66.4	68.8	
	100.0	99.9	
Marital status			
Single	29.0	22.1	0.15
Married	53.8	59.6	
Divorced, widowed, or separated	15.3	15.8	
Other	1.9	2.5	
	100.0	100.0	
Race			
American Indian or Alaska Native	1.5	0.9	0.02
Asian	7.6	5.4	
Black or African American	3.8	8.7	
Hispanic or Latino	3.8	5.0	
White or Caucasian	79.8	78.6	
Other	3.4	1.5	
	99.9	100.1	

^zDue to rounding, may not total 100%.

^yU.S. Census Bureau (2014).

not know the healthfulness of their diet ($P < 0.05$). Similarly, those who read nutrition facts panels regularly had a higher mean KS than those who do not ($P < 0.05$). These results are intuitive since food consumers who are concerned about their own health and consider their diet healthy may invest in learning more about the healthfulness of specific foods. Similar to previous research in Ireland (Lalor et al.,

2011), women had a higher mean KS than men ($P < 0.05$). Married respondents had a higher mean KS than single respondents ($P < 0.05$).

TREE NUT AND PECAN PURCHASES AND PREFERENCES. The majority of respondents consume pecans at least once per year, while more than one-third of respondents consume pecans once per month or more frequently (Fig. 1). In a similar, smaller study of

food consumers, respondents also most frequently consumed pecans four to six times per year (Lombardini et al., 2008). Total pecan consumption could be increased if consumers can be enticed to consume pecans more frequently throughout the year (e.g., if marketing efforts that encourage consumption year-round are successful).

Most respondents purchase pecans in a grocery store (Fig. 2), suggesting that pecan promotions targeting grocery consumers may be effective at increasing domestic consumption. Point-of-purchase displays, in-store coupons, and other in-store promotions may help convince nonconsumers to try a food product or increase product purchases by current consumers (Glanz and Yaroch, 2004). The results of this study differ from those of previous research, which found that farmers' markets and other direct-from-producer outlets were used with greater frequency by consumers (Lombardini et al., 2008). This disparity may be due in part to the previous study's more limited focus on only Texas consumers who were participants in a Master Gardener program. Because Texas is a large pecan-producing state, Texas consumers would have increased access to locally grown pecans using these outlets. The results of our study may be more representative of the shopping outlet preferences of U.S. pecan consumers as a whole.

Pecans are most commonly purchased as a raw baking ingredient (Fig. 3). This finding is supported by previous research, which found that 88.4% of Texas consumers use pecans as an ingredient (Lombardini et al., 2008). Pecans are most often purchased as a minimally processed product (e.g., shelled or in pieces), although 26.4% of respondents purchase value-added pecans (Fig. 4). Additional value-added pecan product options may represent potential domestic market expansion opportunities (e.g., value-added tree nut consumers may substitute other value-added tree nut products for a value-added pecan product if comparable options are available).

Similar to Nayga et al. (1999), who found that taste influences the consumption of grains, fruits, and vegetables, taste was identified as an important or very important reason

Table 4. Knowledge of general nutrition concepts possessed by respondents to a web-based survey of nutrition knowledge, pecan preferences, and pecan purchase behavior. The survey was conducted 24–28 Oct. 2013. Respondents were potential U.S. pecan consumers aged 18 years or older ($n = 1009$).

General nutrition knowledge question	Correct answer	Respondents answering correctly	
		(no.)	(%)
Correctly identified the most recent graphic developed by the USDA to provide dietary guidance.	USDA's My Plate	577	57.2
<i>Please indicate whether the following statements are true or false.</i>			
All red meat is high in saturated fat.	False	671	66.5
Protein is not stored in the body for later use like fat, so it needs to be consumed every day.	True	767	76.0
Substitution of polyunsaturated fat for some saturated fat is recommended to lower the risk of developing heart disease.	True	713	70.7
Milk is a good supplier of calcium for all age groups.	True	925	91.7
Meat and eggs are good sources of zinc.	True	654	64.8
Vitamin supplementation is recommended for all physically active people.	False	349	34.6
Vitamins are a good source of energy.	False	373	37.0
Consuming salt daily is an essential part of a healthy diet.	False	456	45.2
Fresh, frozen, and canned vegetables generally all have similar nutrient values.	True	354	35.1
Carbohydrates are not as easily and rapidly digested as protein and fat.	False	456	45.2
<i>Please rank the following foods in terms of their antioxidant content (1 being the highest in antioxidant content).</i>			
1. Berries and berry products	#1	587	58.2
2. Nuts and seeds	#2	304	30.1
3. Fruit and fruit juices	#3	253	25.1
4. Fish and seafood	#4	431	42.7
All four foods ranked correctly:	N/A	111	11.0

Table 5. Knowledge of tree nut nutrition concepts possessed by respondents to a web-based survey of nutrition knowledge, pecan preferences, and pecan purchase behavior. The survey was conducted 24–28 Oct. 2013. Respondents were potential U.S. pecan consumers aged 18 years or older ($n = 1009$).

Tree nut nutrition knowledge question	Correct answer	Respondents answering correctly	
		(no.)	(%)
<i>Please indicate whether these statements regarding tree nuts are true or false.</i>			
Tree nuts are high in calories.	True	515	51.0
Tree nuts are high in fat.	True	554	54.9
Tree nuts are high in dietary fiber.	True	893	88.5
Tree nuts are high in salt.	False	870	86.2
Tree nuts are high in cholesterol.	False	748	74.1
Eating tree nuts may help to lower one's risk of developing heart disease.	True	885	87.7
Eating tree nuts may help to lower one's risk of developing diabetes.	True	768	76.1
Eating tree nuts will cause weight gain.	False	762	75.5
It is possible that eating tree nuts can help prevent some cancers.	True	803	79.6
Eating tree nuts may help combat age-related brain dysfunctions.	True	833	82.6
From a nutritional standpoint, all tree nuts provide relatively the same amount of nutritional benefits.	False	335	33.2
<i>Please rank the following nuts in terms of their antioxidant content (1 being highest in antioxidant content).</i>			
1. Pecans	#1	85	8.4
2. Walnuts	#2	251	24.9
3. Hazelnuts	#3	198	19.6
4. Pistachios	#4	162	16.1
5. Almonds	#5	57	5.7
6. Cashews	#6	320	31.7
All six tree nuts ranked correctly:	N/A	2	0.2

Table 6. Differences in mean tree nut nutrition knowledge score by demographic characteristics of survey respondents to a web-based survey of nutrition knowledge, pecan preferences, and pecan purchase behavior. The survey was conducted 24–28 Oct. 2013. Respondents were potential U.S. pecan consumers aged 18 years or older ($n = 1009$).

Attribute	Mean tree nut nutrition knowledge score ^z	$P > t $ or F
Age		
Under 20 years of age	66.9	0.06
20–34 years of age	70.8	
35–54 years of age	71.3	
55–64 years of age	73.8	
65 years of age or older	74.2	
Annual household income		
Less than \$25,000	69.4*	0.03
\$25,000–\$49,999	71.1	
\$50,000–\$99,999	72.6	
\$100,000–\$149,999	75.0*	
\$150,000 or more	72.9	
Census region of residence ^y		
Midwest	71.1	0.38
Northeast	72.7	
South	71.1	
West	72.9	
Considers diet healthy or very healthy		
No	70.0	0.00
Yes	73.8	
Consumes pecans		
No	70.2	0.07
Yes	72.3	
Family history of heart disease, cancer, high blood pressure, or diabetes		
No	70.5	0.05
Yes	72.5	
Gender		
Female	72.6	0.02
Male	70.1	
Marital status		
Single	68.0	0.00
Married	73.3	
Divorced, widowed, or separated	72.6	
Other	68.2	
Race		
American Indian or Alaska Native	71.1	0.49
Asian	72.9	
Black or African American	68.2	
Hispanic or Latino	71.4	
White or Caucasian	72.1	
Other	71.4	
Regularly reads nutrition facts panel		
No	67.9	0.00
Yes	74.5	

^zCalculated as % of true/false questions reported in Table 5 answered correctly by respondent.

^yU.S. Census Bureau (2014).

*indicates statistically significantly different means ($P < 0.05$) using Duncan's test.

for consuming tree nuts by 89% of survey respondents in this study (Table 7). Nutritional and health aspects were also important tree nut consumption drivers to 77% and 69% of respondents, respectively. This finding supports the work of

Pawlak et al. (2009), who found that North Carolinian Special Supplemental Nutrition Program for Women, Infants, and Children participants agreed that nuts should be consumed because they are healthful.

More than one-fifth (22.4%) of respondents do not make a conscious effort to consume or purchase tree nuts (Table 8). These respondents—in addition to the 4.4% of respondents who do not currently consume tree nuts but are not allergic to them—also represent a potential new domestic market segment for the pecan industry. Previous research suggests pecan purchasers often buy pecans during the holiday season (Lombardini et al., 2008). Consumers who only eat tree nuts during the holidays (22.4% of respondents to this survey) may be influenced to expand their nut consumption to other times of the year.

Conclusions

This study used an online panel survey of 1009 respondents to explore the demographics of pecan consumers, gauge their current tree nut nutrition knowledge, and examine the preferences surrounding their tree nut and pecan purchases. Respondents who do not consume pecans on a regular basis were most frequently married, Caucasian, female, between 20 and 34 years of age, earn between \$50,000 and \$99,999 annually, and reside in the southern United States. In general, respondents could be further educated about nutrition and specifically about the nutritional benefits of pecans. Respondents most frequently purchase pecans from a grocery store, buy them shelled as a raw ingredient for baking/cooking, and consume pecans four to six times per year. Although the majority of respondents consume pecans on a regular basis (74%), less than consistent purchases throughout the year suggest these respondents may increase their per capita pecan consumption if increases in consumption throughout the year are attained.

This study examined the demand side of the domestic pecan market in an attempt to identify preferences and purchasing habits that may be used to develop additional domestic marketing strategies. This study should be considered exploratory in nature and additional research is needed to confirm its findings. Moreover, it is important to note that at high prices, marketing strategies aimed at increasing domestic demand changes may realize limited success because consumers may substitute another tree nut for pecans when prices are high

Fig. 1. Pecan consumption frequency reported by respondents to a web-based survey of potential U.S. pecan consumers ($n = 1009$).

Fig. 2. Primary shopping outlets used by respondents to a web-based survey of potential U.S. pecan consumers who regularly purchase pecans ($n = 747$).

Fig. 3. Most common use of pecans purchased by respondents to a web-based survey of potential U.S. pecan consumers who consume pecans on a regular basis ($n = 747$).

Fig. 4. Percent of respondents to a web-based survey of potential U.S. pecan consumers purchasing specific pecan products ($n = 747$).

(e.g., walnuts for baking, almonds or pistachios for snacking). Further research using scanner data and other quantitative demand metrics would be valuable to validate these findings as they relate to U.S. consumers as a whole. Although food choices are complex and nutrition information cannot be the only tool used to promote healthy eating decisions (Vaandrager and Koelen, 1997), a food product's nutritional characteristics and the way these characteristics are presented (i.e., label claim) may influence purchase decisions (e.g., Kim et al., 2012; Muth et al., 2013; Visschers and Siegrist, 2010). Additional research is needed to better understand what nutritional components of pecans are most valued by consumers and how the type of marketing used to promote these components influences consumers' preferences for pecans.

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Table 7. Drivers of tree nut consumption reported by respondents to a web-based survey of nutrition knowledge, pecan preferences, and pecan purchase behavior. The survey was conducted 24–28 Oct. 2013. Respondents were potential U.S. pecan consumers aged 18 years or older ($n = 1009$).

	Very unimportant (%)	Unimportant (%)	Neutral (%)	Important (%)	Very important (%)	Respondents (no.)
They taste good.	6	1	4	25	64	1,008
They are a nutritious food.	7	3	14	40	37	1,007
They have specific health benefits I am interested in.	6	5	26	33	29	1,007
They are a good value.	6	4	18	38	33	1,009
They give me the energy I need.	7	6	27	35	26	1,005
My doctor advises me to consume nuts.	15	11	41	19	14	1,005

Table 8. Primary conditions under which respondents purchase or consume tree nuts. Respondents were potential U.S. pecan consumers aged 18 years or older who participated in a web-based survey of nutrition knowledge, pecan preferences, and pecan purchase behavior. The survey was conducted 24–28 Oct. 2013 ($n = 1009$).

Condition statement	Respondents (%)
I consume nuts as a part of my regular diet and make a conscious decision to eat foods that contain nuts, at least in part because of my belief that they provide important health benefits.	39.1
I tend to only consume nuts during specific times of the year (such as during the holidays or when they are in season or on sale).	22.4
I consume nuts as a part of my regular diet, but generally do not make a conscious decision to purchase them. For example, I consume them in breakfast cereals or restaurant meals, but my decision to purchase the food is not related to its nut content.	22.4
I consume nuts with other foods as a part of my regular diet and make a conscious decision to eat foods that contain nuts.	11.8
I do not consume tree nuts.	4.4

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