PROCESSING AND PRODUCTS

Willingness to pay for whole turkey attributes during Thanksgiving holiday shopping in the United States

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ABSTRACT Although whole turkeys served at Thanksgiving are the ubiquitous kickoffs to the US winter holiday season, much remains unknown about shopping behaviors for holiday food items. Given the once-a-year purchase of the whole turkey for most households, collecting data about demand and preferences necessitated the collection of data during the week before Thanksgiving, while turkey shopping was at the forefront of consumers' minds. Despite a self-reported confidence in cooking turkeys, many respondents indicated they thawed frozen meat using improper methods. Ninety-five percent of respondents indicated that they consumed meat; 89% of respondents who consumed meat or had someone in the household who did, indicated they had purchased turkey products. Positive willingness to pay (**WTP**) was found for all attributes of whole turkeys studied: free range, fed a vegetarian diet, hormone use not permitted, and antibiotic use not permitted. Mean estimated WTP for free range ranged from $0.37/lb for industry verified free range to $0.74/lb for USDA verified free range; although those 2 estimates were not statistically different from each other, they were both statistically different from zero. The statistically significant estimated mean WTP for hormone use not permitted ranged from $0.85/lb for industry verification to $1.35 for USDA verification but were again not statistically different from each other. Mean WTP estimates, which were statistically significant but not different from one another for antibiotic use not permitted, ranged from $0.62/lb for industry certification to $0.72 for retailer certified. Turkeys certified to be fed a vegetarian diet had a mean WTP estimate of $0.39/lb for retailer verification to $0.60/lb for USDA verification; those mean WTP estimates were not statistically different from each other but were each statistically different from zero. Social desirability bias, which can be defined as the relative over-reporting of one's own goodness, was detected with respect to self-reported holiday eating and healthfulness statements. Relationships were found between social desirability bias, gender, and age for holiday eating statements using a seemingly unrelated regression.

Key words: consumer demand, health consciousness, social desirability bias, turkey, willingness-to-pay

2020 Poultry Science 99:2798–2810
https://doi.org/10.1016/j.psj.2019.12.047

INTRODUCTION

Whole turkey is a staple component of holiday celebrations in the United States. Although consumers purchase a variety of further processed turkey products throughout the year, the consumption patterns of turkey show increases during the last quarter every year, consistent with the American holidays of Thanksgiving, Christmas, and New Year's Day when whole turkeys are primarily purchased (USDA, 2019). Preparation of whole turkey is considered difficult for some consumers as illustrated by the numerous articles with tips on whole turkey cooking, in addition to several hotlines sponsored by industry stakeholders, such as Butterball, the National Turkey Federation, and the USDA that stressed home chefs can turn to (Chicago Tribune, 2018). Despite these complications, whole turkeys are considered the centerpiece dish in holiday dinners, suggesting that regardless of difficulty, nonprofessionals will still prepare a whole turkey for holiday occasions (Chicago Tribune, 2018).

In an effort to make themselves look better, human inclination may be to answer potentially socially sensitive questions in a way that deviates from the respondent's true behavior towards behavior which is considered socially desirable (Fisher, 1993). This

Received September 30, 2019.
Accepted December 6, 2019.

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behavior is referred to in the literature as social desirability bias (**SDB**) (Fisher, 1993). Owing to changes in food consumption during the holidays and related social pressures, the impact of SDB when evaluating statements related to holiday eating should be considered. Eating decisions during the winter holidays are different from decisions made throughout the year for a variety of socioeconomic reasons (Olynk Widmar et al., 2016). Pope et al. (2014) found an increase in "unhealthy" food purchased during the holiday season (November 14–January 1), which remains elevated during the postholiday season (January 2–March 12), but it has been shown that consumers are still concerned with their health during this time (Olynk Widmar et al., 2016).

Several researchers have evaluated American shopper preferences from product pricing to labeling claims that relate to production practices and perceived environmental sustainability aspects of livestock and food production practices (Tonsor et al., 2009; Olynk et al., 2010; Briggeman and Lusk, 2011). Although the impact, in terms of willingness to pay (**WTP**), on claims about pharmaceutical use, animal nutrition, and environmental handling has been studied for other animal products, such work regarding turkey is sparse. These findings in other products may not be relevant for turkey; even among products with the same core ingredients such as ice cream and yogurt, differences were found in consumer WTP for production attributes (Olynk and Ortega, 2013). A lack of differences between consumer WTP for attributes of ham and ham lunch meat (McKendree et al., 2013) generated questions about the differences across product types and species of origin. Therefore, it should not be expected that previous work on demand for attributes of other meats, and even other poultry, is directly applicable to turkey. The objectives of this work were to estimate consumer WTP for whole turkey attributes certified by USDA, retailer, or industry. Given the timing/nature of the holiday turkey purchase, this analysis also sought to evaluate potential links between self-reported holiday health-related behaviors, SDB surrounding holiday eating, and consumer WTP for turkey production labeling attributes.

MATERIALS AND METHODS

The survey instrument was administered during November 12–19, 2018, using Qualtrics, an online survey tool, to accumulate demographic information, holiday food consumption and behavior, and whole turkey WTP of US respondents. Owing to the holiday-relevant nature of many of the questions and the prominence of whole turkeys during the US Thanksgiving holiday, the timing of this survey administration was paramount. The survey was timed to close just before Thanksgiving Day in 2018 (November 22, 2018) and specifically targeted to collect data while respondents were considering purchasing whole turkeys. Five hundred sixty-five[1] random respondents participated in a WTP choice experiment focusing on WTP for whole turkey attributes. A company that hosts a large opt-in panel database, Lightspeed GMI, was used to obtain survey respondents. Respondents were required to be 18 yr of age or older to participate. Using quotas, the full sample was targeted to be representative of the US population in terms of gender, income, education, and geographical region of residence (U.S. Census Bureau 2016). Regions of residence were defined as in the Census Bureau Regions and Divisions.[2] The survey instrument was designed to collect information regarding general meat consumption preferences, specialty labeling, holiday food consumption and behavior, and WTP for whole turkey attributes.

Frequencies were calculated for categorical variables, and means were calculated for the continuous variables. The test of proportions was conducted to determine the statistical representativeness of the survey respondents by comparing percentages of demographic groups from the sample with the targeted population, the US Census.

Household Food Shopping and Consumption Preferences

To understand respondents' shopping and food consumption behavior, respondents were asked if they were the primary shopper for their household, how much money they spent on food, as well as the types of food their household purchased and consumed. Considering the main objective of this research to understand preferences for whole turkey, understanding respondents' preferences for, and ability to prepare, meat products in general was an important component of this data collection effort. Respondents answered questions regarding their meat preferences including physical preferences as well as labeling preferences, knowledge regarding antibiotics and withdrawal periods, and meat thawing methods. Depending on the question, respondents were asked about turkey products or whole turkey. The verbiage used in the text and tables matches the survey instrument. Whole turkey is most frequently consumed during Thanksgiving and other holidays in the United States. Therefore, specific questions surrounding the occasions where turkey products are

[1]The respondents randomly selected to answer these questions about whole turkeys were part of a larger data collection that resulted in 1,695 responses.

[2]Regions were defined, according to the U.S. Census Bureau, as follows: Northeast includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, and Pennsylvania; Midwest includes Indiana, Illinois, Michigan, Ohio, Wisconsin, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota; South includes Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arkansas, Louisiana, Oklahoma, and Texas; and the West includes Arizona, Colorado, Idaho, New Mexico, Montana, Utah, Nevada, Wyoming, Alaska, California, Hawaii, Oregon, and Washington.

consumed and holiday eating habits were also included in the survey instrument.

Measuring SDB in Self-Reporting Holiday Behaviors

Respondents were asked to indicate on a scale from 1 (it describes you very well) to 5 (this statement does not describe you at all) their level of agreement that 8 holiday healthfulness statements described them. The 8 statements were randomly presented to respondents. Statements used were the same as studied by Widmar et al. (2016) to collect data on holiday health behaviors from November 17 to 19, 2014, and included the following: *I anticipate gaining weight during the holidays, I will gain more weight during the holiday season than during other times of the year, I make a New Year's resolution to lose weight, I will maintain my workout schedule during the holiday season, I will be vigilant about my weight during the holiday season, I watch what I eat during the holiday season, I will consume more desserts during the holiday season than at other times of the year, and I will consume more alcohol during the holiday season than at other times of the year.*

Owing to the possibility of SDB, after indicating their level of agreement regarding themselves, all respondents were also asked to choose from the same scale how the average American would rate themselves regarding the same set of holiday healthfulness-related statements. The 8 holiday healthfulness statements were again randomized for each respondent. The differences between how respondents rated themselves and how they rated the average American were calculated, and an index of those values was created. The notion of using self-reported agreement vs. the same respondent's ratings for the average American as an attempt to measure SDB follows Olynk et al. (2010), which used such measures when assessing statements about livestock rearing/animal welfare, and Widmar et al. (2016), which applied the index to holiday healthfulness. Depending on the specific statement, either a negative or a positive difference between the respondent's own rating and the rating of the average American indicated the potential presence of SDB. For example, respondents would be overstating their own goodness if the difference between self and average American ratings was positive for the statement *I anticipate gaining weight during the holidays* and negative for the statement *I watch what I eat during the holiday season.*

A seemingly unrelated regression (**SUR**) was used to further analyze the relationship between SDB and demographics. Eight models in total were estimated, each with the presence of SDB indicated by a number for one of the 8 holiday healthfulness statements as the dependent variable. Depending on the specific question, either a negative or a positive difference would indicate SDB. For the dependent variables of the seemingly unrelated regression equations, respondents who showed evidence of SDB had a score, as determined by the difference between their self-reported score and their score for the average American, from either −2 to −4 or 2 to 4. Those who did not show evidence of SDB had a score of zero; those with a difference of 1 or −1 were given a score of 0 to allow for some natural variation from the average American. To aid in the interpretability of the SUR results, for the statements for which a negative difference indicated SDB, the absolute value was taken. This resulted in a positive coefficient indicating an increase in SDB and a negative coefficient indicating a decrease in SDB for all the statements. If the disturbance terms of the included equations are correlated, the SUR estimator differs from the ordinary least squares estimator and efficiency is increased (Zellner, 1962). If the disturbances are not correlated, the SUR collapses to the standard ordinary least squares (Zellner, 1962). All models included the same demographic variables as independent variables, as well as the presence of SDB as a dummy variable for all other statements with the exception of the statement that served as the dependent variable. The demographics included as independent variables were as follows: male, age 18 to 24, age 25 to 34, age 35 to 44, age 45 to 54, age 55 to 64, frequent social media user, and a constant. Being male and a frequent social media user were included as dummy variables, and the age group of 65 and older was exluded to avoid multicollinearity. The Breusch–Pagan test was conducted to determine if the individual equations within the SUR models were correlated (Breusch and Pagan, 1980).

Willingness to Pay for Whole Turkey Attributes

Respondents participated in a WTP experiment where they were asked to choose between 2 whole-turkey purchasing scenarios that they could face in a retail store where they typically shop or the option of *I do not choose to purchase either option A or B.* Respondents were informed that the 2 products presented in each scenario had the same characteristics in terms of color, brand, and flavor, with the exception of the varying attributes presented in each scenario. Respondents were given information explaining each of the 5 attributes in the choice experiment (available in Appendix A) before answering any choice questions. Attributes included the following: 3 levels of price per pound ($0.97, $1.56, and $2.15); 2 levels for free range (yes, no); 2 levels for fed a vegetarian diet (yes, no); 2 levels for hormone use (not permitted, permitted); 2 levels for antibiotic use (not permitted, permitted); and 3 levels for certifier (USDA, industry, and retailer). Hormone use in poultry is not allowed (USDA, 2011). However, hormone use claims in poultry can be confusing for consumers. Given the general marketing and regulatory environment, it is not generally clear to consumers what is or is not required or allowable. The intention of the hypothetical choice experiment, rather than an experiment using real products, for example, was to allow the presentation of

hypothetical products. Thus, it is not presumed that consumers know what is or is not required and/or allowable, but rather consumers are asked to respond to the labels presented as they would in a shopping context. Thus, it is assumed that shoppers are responding to the information presented to them as a usual shopping scenario. Regarding hormones, respondents were presented with the text "not permitted means the animal was raised on an operation claiming to never (under any circumstances) administer hormones to animals; Permitted indicates that no claims regarding use of hormones are being made." In addition, respondents were shown the cheap talk script as proposed by Lusk (2003) to attempt to mitigate or minimize hypothetical bias.

The SAS OPTEX program was used to determine the specific combination of attribute levels seen by respondents in the choice experiment, which results in a main effect plus two-way interaction experimental design (Lusk and Norwood, 2005). Maximizing D-efficiency was used as the measure for design choice. The D-efficiency for the chosen model was 75.3486 and included 33 choice scenarios (questions). To avoid survey fatigue, which has been shown to decrease the quality of responses (Galesic and Bosnjak, 2009), the 33 choice scenarios were randomly assigned to 3 blocks of 8 choice scenarios and 1 block of 9 choice scenarios, for a total of 4 blocks. Respondents were then randomly assigned to participate in one of the 4 WTP blocks.

Choice experiments are based on random utility theory. The probability that respondent n chooses alternative i, which represents maximizing utility (U) with deterministic component V_{nit}, if $U_{nit} > U_{njt}\ \forall j \neq i$ as outlined by Train (2009) is represented by

$$P_{nit} = Prob\left(V_{nit} + \varepsilon_{nit} > V_{njt} + \varepsilon_{njt}; \forall_j \in C,\ \forall_j \neq i\right) \tag{1}$$

Given the underlying distribution of the error term, equation (1) can be condensed through algebraic manipulation

$$P_{nit} = \frac{\exp(V_{nit})}{\sum_j \exp(V_{njt})} \tag{2}$$

The random utility of a selection is defined as

$$V_{it} = \beta_1 \text{Price}_{it} + \beta_2 USDA\_FreeRange_{it} + \beta_3 Retailer\_FreeRange_{it} + \beta_4 Industry\_FreeRange_{it} + \beta_5 USDA\_VegDiet_{it} + \beta_6 Retailer\_VegDiet_{it} + \beta_7 Industry\_VegDiet_{it} + \beta_8 USDA\_HormoneUse_{it} + \beta_9 Retailer\_HormoneUse_{it} + \beta_{10} Industry\_HormoneUse_{it} + \beta_{11} USDA\_AntibioticUse_{it} + \beta_{12} Retailer\_AntibioticUse_{it} + \beta_{13} \text{Industry}\_AntibioticUse_{it} + \beta_{14} Optout_{it} \tag{3}$$

where *Price* is the price a consumer is willing to pay for a whole turkey, and *Optout* is a constant, which represents the respondent's disutility from having to walk away from the purchase of a whole turkey; *USDA_FreeRange*, *Retailer_FreeRange,* and *Industry_FreeRange* are the effect-coded interaction terms between the certification entities and *FreeRange* (where *FreeRange* indicates the animal was free range); *USDA_VegDiet, Retailer_VegDiet,* and *Industry_VegDiet* are the effect-coded interaction terms between the certification entities and *VegDiet* (where *VegDiet* indicates the animals were fed a vegetarian diet); *USDA_HormoneUse, Retailer_HormoneUse,* and *Industry_HormoneUse* are the effect-coded interaction terms between the certification entities and *HormoneUse* (where *HormoneUse* indicates hormone use was not permitted); and *USDA_AntibioticUse, Retailer_AntibioticUse,* and *Industry_AntibioticUse* are the effect-coded interaction terms between the certification entities and *AntibioticUse* (where *AntibioticUse* indicates antibiotic use was not permitted). Willingness to pay is calculated by dividing the marginal utility of an attribute by the marginal utility of the cost, for example, the WTP for USDA-verified free range whole turkey can be calculated as follows:

$$WTP = -2\frac{\beta_2}{\beta_1} \tag{4}$$

The -2 in Equation 4 accounts for the effects coding of the various levels of the attributes. The disutility in terms of dollars of walking away from the purchase of a whole turkey (*Optout*) is calculated as:

$$WTP = -\frac{\beta_{14}}{\beta_1} \tag{5}$$

The Krinsky and Robb method of parametric bootstrapping was used to calculate 95% confidence intervals to account for the variability in the estimations (Krinsky and Robb 1986; Olynk and Ortega 2013). Respondent WTP for the different attributes within the model was compared by examining overlapping confidence intervals for statistically significant differences (Schenker and Gentleman, 2001).

RESULTS

The demographics of the survey respondents closely matched that of the US Census (U.S. Census Bureau 2016) with a few exceptions (Table 1). There were statistically lower percentages of respondents aged 18 to 24 years (9%), who did not graduate from high school

Table 1. Respondent demographics and statistical comparison of targeted categories to the U.S census (n = 565).

Demographic variable	Percentage of respondents	US Census[1]
Gender		
Male	45%	49%
Age		
18–24	9%[+]	13%
25–34	18%	18%
35–44	16%	16%
45–54	19%	17%
55–64	17%	17%
65+	21%	19%
Income		
$0–$24,999	23%	22%
$25,000–$49,999	28%[+]	23%
$50,000–$74,999	18%	17%
$75,000–$99,999	14%	12%
$100,000 and higher	17%[+]	26%
Education		
Did not graduate from high school	3%[+]	13%
Graduated from high school, did not attend college	29%	28%
Attended college, no degree earned	23%	21%
Attended college, Associate's or Bachelor's degree earned	31%[+]	27%
Attended college, Graduate or Professional degree earned	14%	12%
Region		
Northeast	18%	18%
South	37%[+]	21%
Midwest	23%[+]	38%
West	22%	24%
Household composition	Mean	
Number of adults	1.91	-
Number of children	0.51	-

[+]Percentage of respondents is statistically different than the percentage of the U.S. Census.
[1](U S. Census Bureau, 2016).

(3%), with incomes of $100,000 or higher (17%) and from the Midwest (23%) when compared with the US Census. A higher percentage of respondents had an income of $25,000 to $49,999 (28%), attended college and earned an Associate's or Bachelor's degree (31%), and were from the South (37%) when compared with the target levels established from the US Census. To gauge social media interactions, respondents were asked to indicate the frequency of social media participation. Eighty-one percent of respondents participated in a social media platform including Facebook, Twitter, Instagram, Snapchat, Pinterest, LinkedIn, Tumblr, Reddit, and/or YouTube at least often or very often. Eighty-one percent of respondents self-reported they were the primary shopper for food in their household. On average, respondents spent $130 per week on total food consumption including at home, on groceries, in restaurants, on takeout, and so on.

All respondents were asked if they were worried about the use of antibiotics in animals harvested for human consumption. Seventy-one percent of respondents indicated they were worried. Twenty-four percent of respondents indicated that they knew what a withdrawal period was in relation to antibiotics and vaccines. Seventy-seven percent of respondents who indicated they knew what a withdrawal period was (n = 138) were concerned about the use of antibiotics in animals harvested for human consumption. Conversely, a statistically significantly smaller percentage, 69% of respondents who indicated they did not know what a withdrawal period was (n = 427), were concerned about antibiotic use on animals harvested for human consumption. Respondents were then provided with the definition of a withdrawal period (A withdrawal period is the time required after the administration of an antibiotic, vaccine, or other drug to an animal to ensure that the drug residues are low enough in the marketable animal products to be below a predetermined maximum residue limit making it safe for human consumption.) Next, they were asked how they felt about the use of antibiotics, vaccines, or other drugs in animals used for food after reading the definition. The most frequent selection was the option *about the same,* 51% (Table 2). On a scale from 1 (much better) to 7 (much worse) the mean response was 3.927. The mean response for those who indicated they were worried about the use of antibiotics in the previous question was 4.012. Conversely, the mean response for those who indicated they were not worried about the use of antibiotics was statistically smaller 3.721, indicating they were less worried.

Ninety-five percent of respondents reported that they consumed meat[3]. Two percent of respondents did not consume meat but had someone in the household who did, whereas the remaining 3% did not consume meat and had no one in the household who did either.

[3]The results in this paragraph are not presented in a table.

Table 2. Respondents' general meat preferences and self-reported handling behavior.

Feelings regarding the use of antibiotics, vaccines, or other drugs on animals used for food after being given the definition of withdrawal period (n = 565)

Much better	Moderately better	Slightly better	About the same	Slightly worse	Moderately worse	Much worse	Mean response	Standard deviation
5%	9%	13%	51%	13%	4%	6%	3.927	1.328

How respondents who consume meat or have someone in the household who consumes meat thaw meat (Multiple selections permitted) (n = 550)

Method	Percentage of Respondents
In microwave	19%[a]
Submerged in cold water	23%[a]
Submerged in hot water	13%[c]
Left out on the counter	37%[d]
In the refrigerator	65%[e]
I do not thaw frozen meat	2%[b]
I don't know	2%[b]
Other	0%[f]

Ranking of importance of meat quality attributes, percentage of respondents who consumed meat (n = 538)[1]

	Rank from 1 (most important) to 5 (least important)							
Attribute	1	2	3	4	5	Mean	Standard Deviation	Mean Rank
Texture	7%	16%	32%	25%	16%	3.28[a]	1.444	3
Color	10%	13%	18%	30%	26%	3.504[b]	1.292	4
Tenderness	20%	34%	21%	15%	7%	2.526[c]	1.180	2
Flavor	46%	23%	12%	9%	5%	2.004[d]	1.213	1
Shelf Life	14%	9%	13%	18%	42%	3.682[e]	1.468	5

[a-f] Matching letters indicate the percentage of respondents were not statistically different at the <.05 level.
[1] All attributes were statistically different at the $P < .05$ level, as determined by *t*-tests.

Respondents who had consumed meat or had someone in their household who consumed meat were asked additional meat consumption–related questions. Seventy-eight percent of respondents who indicated they or someone in their household consumed meat (n = 550) primarily purchased fresh meat, whereas 21% primarily purchased frozen meat. Seven percent indicated they raised, and 11% indicated they hunted for, at least some of the meat they consumed. Of the respondents who indicated they raised or hunted for at least some of the food they consumed (n = 97), 30% indicated they hunted turkeys and 19% raised turkeys. Of the total respondents (n = 565), 9% indicated they either raised or hunted turkeys.

Respondents who consumed meat or had someone in their household who consumed meat were asked what methods they use to thaw meat, and multiple selections were allowed (Table 2). A higher percentage of respondents thawed meat in the refrigerator (65%) or left out on the counter (37%) than the other provided options. The microwave was selected by 19% of respondents and was not statistically different from the percentage of respondents who selected submerged in cold water (23%). Of the respondents who indicated they consumed meat (n = 538), 58% indicated they preferred red meat (beef, pork, and lamb), whereas 41% indicated they preferred white meat (poultry, fish). Respondents who consumed meat were asked to rank the following meat attributes: texture, color, tenderness, flavor, and shelf life (Table 2). The mean ranks were statistically different across the attributes. Flavor had the highest mean ranking followed by tenderness, texture, color, and shelf life.

Reported Consumption of Turkey Products

Eighty-nine percent of respondents who consumed meat or had someone in the household who consumed meat (n = 550) indicated they had purchased turkey products. Of the respondents who indicated they purchased turkey products (n = 490), 61% indicated they purchased whole turkey and 44% indicated they purchased turkey breasts in an average year. Respondents who indicated purchasing turkey products were asked to select from a list the product claims on turkey they had purchased before (Table 3). Multiple selections were allowed, and high percentages of respondents indicated they had purchased turkey products with the claims no antibiotics used (41%), no hormones administered (37%), organic (31%), and free range (30%).

When asked about whole frozen turkey, 36% of respondents who consumed meat indicated they had a preference for name brand, 15% indicated they had a preference for store brand, and 49% indicated they had no preference (n = 550). Of the 201 respondents who indicated they had brand preferences for whole turkey, 77% indicated they preferred Butterball, 8% preferred Jennie-O, 11% preferred Honeysuckle, and 4% did not prefer any of the listed brands. Respondents were also asked to indicate on a scale from 1 (not at all important) to 7 (extremely important) the level of importance they placed on brand and price when purchasing a whole turkey. The mean response for brand was 4.873, and the mean response for price was 5.677. The mean response for price was statistically higher, indicating respondents cared more about price than brand when purchasing a whole turkey. Respondents usually consumed

Table 3. Respondents' turkey-specific and general, holiday eating and cooking behavior.

Respondents who had indicated purchasing Turkey products who had purchased Turkey meats with the following claims on them (multiple selections permitted) (n = 490)	
Product claim	Percentage of respondents
Organic	31%
Free range	30%
No antibiotics used	41%
No hormones administered	37%
Fed a vegetarian diet	14%
I have never purchased items with claims	16%
I don't know	29%
Occasions respondents usually consume turkey (n = 565)	
Occasion	Percentage of respondents
Thanksgiving	87%
Christmas	35%
Easter	10%
Other religious holiday	4%
Family meal aside from holidays	31%
None of the above	7%

	Scale of importance								
	1 (not at all important)	2	3	4	5	6	7 (extremely important	Mean	Standard Deviation
Brand from not at all important to important n = 490	7%	5%	7%	21%	18%	19%	23%	4.873[1]	1.771
Price from not at all important to important n = 490	3%	2%	3%	11%	18%	29%	36%	5.677	1.435
Level of comfort cooking a whole turkey from not comfortable to comfortable n = 550	7%	5%	4%	10%	14%	19%	43%	5.451	1.857
Self-rating of eating habits during the winter holiday season from healthy to unhealthy n = 565	10%	12%	17%	31%	19%	6%	4%	3.734	1.510

[1]The mean response for price was statistically higher than the mean response for brand.

turkey for Thanksgiving (87%), Christmas (35%), and family meals aside from holidays (31%) (Table 3). Respondents were asked to indicate on a scale from 1 (not comfortable) to 7 (comfortable) their level of comfort with cooking a whole turkey; 43% of respondents selected comfortable, and the mean response was 5.451 (Table 3).

Reporting of Holiday Eating Behavior and Preferences for Whole Turkeys

Respondents were asked to indicate on a scale from 1 (healthy) to 7(unhealthy) their eating habits during the winter holiday season (Table 3). A score of 4 was selected by 31% of respondents, and the mean response was 3.734. The difference between the score the respondent gave themselves on a scale from 1 (it describes you very well) to 5 (this statement does not describe you at all) regarding 8 holiday healthfulness statements and the score they assigned the average American were calculated (Figure 1). For the statement *I anticipate gaining weight during the holidays*, 55% of respondents had a positive score, indicating the potential presence of SDB. For the statements *I will gain more weight during the holiday season than during other times of the year, I make New Year's resolutions to lose weight, I will consume more desserts during the holiday season than at other times of the year, and I will consume more alcohol during the holiday season than at other times of the year*, 54, 60, 48, and 64%, respectively, had a positive score. For the statements *I will maintain my workout schedule during the holiday season, I will be vigilant about my weight during the holiday season, and I watch what I eat during the holiday season*, 43, 36, and 38% of respondents had a negative score, indicating the potential presence of SDB, respectively.

The equations included in the SUR were correlated as demonstrated by the Breusch–Pagan test of independent equations, which had a P-value of <0.001. Correlations are available in Appendix B. Exhibiting SDB for other statements surrounding holiday eating decreased the SDB score for the statement serving as the dependent variable in the SUR with a few exceptions (Table 4). For example, exhibiting bias for *anticipates gaining weight during the holiday season* decreased the SDB score for *maintaining a workout schedule*. Similarly, exhibiting SDB for *being vigilant about weight during the holiday season* and *watching what they eat during the holiday season* decreased the SDB score for *makes a New Year's resolution to lose weight*. Being male decreased the SDB score for *will be vigilant about weight during the holiday season* and *will drink more alcohol during the holiday season*. The SDB score for *will drink more alcohol during the holiday season* decreased for the age groups 25 to 34 yr, 35 to 44 yr, and 45 to 54 yr. Being

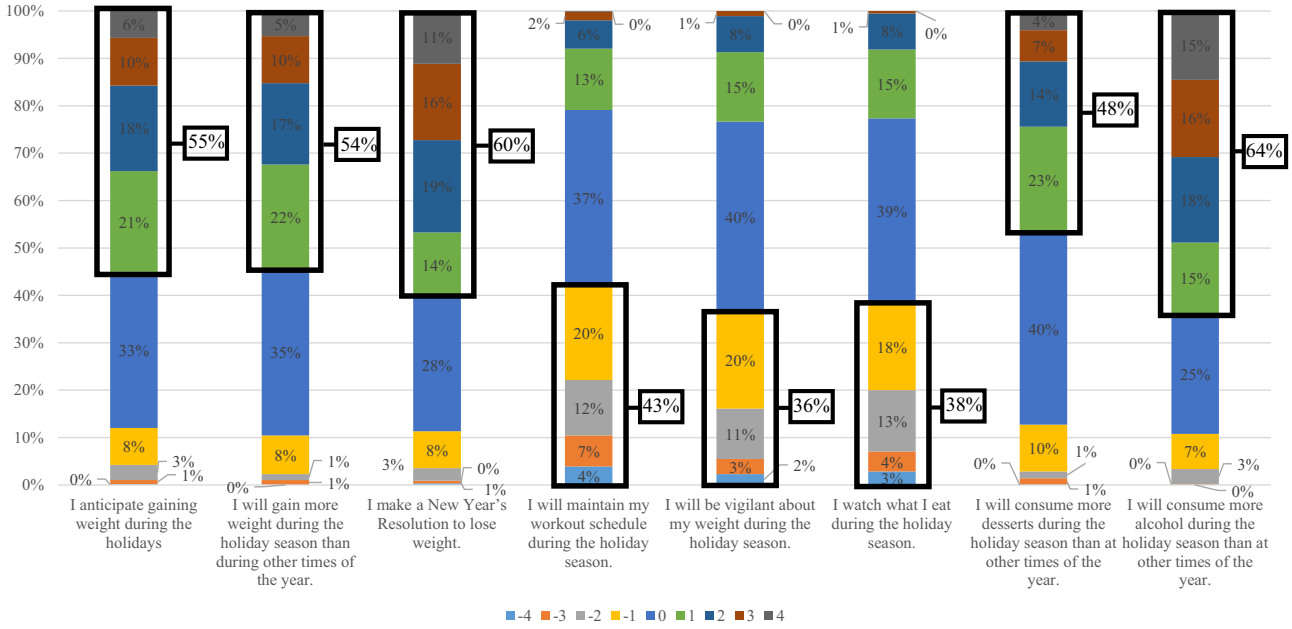

Figure 1. Distribution of social desirability bias Holiday eating questions. Note: Social desirability bias was calculated as the difference in the score on the Likert-scale the respondent indicated for their level of belief and the score they indicated for what they thought others believed for each question. Depending on the question, social desirability bias is indicated by having a lower score or a higher score than what others believed. Evidence of social desirability bias indicated by boxes (n = 565).

aged 45 to 54 or 55 to 64 yr increased the SDB score for *will gain weight during the holidays*. Being a frequent social media user decreased the SDB score for *makes a New Year's resolution to lose weight* but increased the SDB score for *will drink more alcohol during the holiday season*.

Respondents had a positive WTP for the following attributes of whole turkey studied: free range, fed a vegetarian diet, hormone use not permitted, and antibiotic use not permitted, regardless of the certifying agency (Table 5). Respondents were willing to pay a statistically higher amount for USDA-certified hormone use not permitted whole turkey than for the other USDA–certified attributes. For retailer-certified attributes, respondents were willing to pay a statistically higher amount for hormone use not permitted whole turkey than for retailer-certified fed a vegetarian diet whole turkey. When comparing across certifiers, respondents were not willing to pay a statistically different amount for the same attribute certified by USDA, retailer, or industry. For example, there is not a statistically significant difference in the WTP for USDA-certified free range, retailer-certified free range, and industry-certified free range. Respondents experienced a disutility of $4.42 from walking away from a whole-turkey buying opportunity.

To better understand the relationship between respondent WTP for whole turkey attributes and demographics, correlations were evaluated between WTP, demographics, and shopping behaviors. Raising or hunting turkeys was negatively correlated with the WTP for USDA-certified free range whole turkey (−0.0861, $P = 0.0409$). Having purchased name brand turkey (0.0844, $P = 0.0450$), no antibiotics used turkey (0.0877, $P = 0.0372$), and no hormones administered turkey (0.1063, $P = 0.0115$) in the past was positively correlated with WTP for USDA-certified free range whole turkey. Having purchased no hormones administered turkey (0.0863, $P = 0.0404$) and vegetarian fed turkey in the past (0.0878, $P = 0.0369$) were both positively correlated with WTP for industry-certified free range whole turkey. The presence of SDB for any of the following food-related holiday statements: *I anticipate gaining weight during the holidays, I will gain more weight during the holiday season than during other times of the year, I will be vigilant about my weight during the holiday season, and I watch what I eat during the holiday season* was determined for each individual to begin to explain WTP for whole turkey. The presence of SDB for food-related questions was negatively correlated with USDA-certified antibiotic use not permitted (−0.0904, $P = 0.0318$), and retailer-certified antibiotic use not permitted (−0.0828, $P = 0.0491$). Having purchased antibiotic free turkey (−0.1111, $P = 0.0082$) and no hormones administered turkey in the past (−0.0971, $P = 0.021$) were both negatively correlated with the WTP for walking away from a whole-turkey buying opportunity.

DISCUSSION

The sample analyzed in this study closely mirrored the US population, with the greatest differences occurring in the education level of respondents; online surveys tend to be overeducated (Szolnoki et al., 2013). The benefits of online surveys are well accepted, including short completion time, affordable implementation (Louviere et al., 2000; Gao and Schroeder, 2009), and the ability

Table 4. Presence of social desirability bias (SDB) seemingly unrelated regression results (n = 565).

	Anticipates gaining weight SDB model	Anticipates gaining more weight during the holidays SDB model	Makes a New Year's resolution to lose weight SDB model	Maintains workout schedule SDB	Will be vigilant about weight SDB model	Watches what they eat SDB	Will consume more dessert SDB model	Will drink more alcohol SDB model
	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)
Anticipates gaining weight SDB		0.645*** (0.031)	0.204*** (0.056)	−0.143*** (0.043)	−0.019 (0.034)	0.115*** (0.036)	0.153*** (0.042)	0.106* (0.059)
Anticipates gaining more weight during the holidays SDB	0.723*** (0.034)		0.205*** (0.060)	−0.037 (0.043)	−0.001 (0.034)	0.132*** (0.038)	0.315*** (0.043)	0.094 (0.062)
Makes a New Year's resolution to lose weight SDB	0.109*** (0.030)	0.098*** (0.028)		0.251*** (0.031)	−0.086*** (0.024)	−0.135*** (0.026)	0.039 (0.032)	0.421*** (0.041)
Maintains workout schedule SDB	−0.136*** (0.041)	−0.031 (0.039)	0.447*** (0.054)		0.381*** (0.029)	0.192*** (0.034)	0.145*** (0.042)	−0.040 (0.058)
Will be vigilant about weight SDB	−0.030 (0.052)	−0.002 (0.049)	−0.250*** (0.071)	0.619*** (0.048)		0.602*** (0.039)	−0.06 (0.054)	0.114 (0.074)
Watches what they eat SDB	0.153*** (0.048)	0.157*** (0.045)	−0.336*** (0.066)	0.269*** (0.047)	0.520*** (0.033)		0.106** (0.050)	0.016 (0.069)
Will consume more dessert SDB	0.144*** (0.039)	0.264*** (0.036)	0.068 (0.055)	0.143*** (0.041)	−0.034 (0.033)	0.075* (0.035)		0.197*** (0.057)
Will drink more alcohol SDB	0.053* (0.029)	0.042 (0.028)	0.393*** (0.039)	−0.021 (0.030)	0.037 (0.024)	0.006 (0.023)	0.104*** (0.030)	
Male	0.032 (0.083)	0.022 (0.078)	−0.037 (0.113)	0.173 (0.084)	−0.134** (0.066)	0.027 (0.071)	0.036 (0.085)	−0.354** (0.116)
Age 18–24	0.028 (0.169)	0.178 (0.159)	−0.149 (0.231)	0.054 (0.173)	0.017 (0.136)	−0.005 (0.144)	−0.024 (0.174)	−0.283 (0.239)
Age 25–34	0.063 (0.139)	0.129 (0.132)	0.045 (0.190)	0.159 (0.143)	0.036 (0.112)	−0.014 (0.146)	0.017 (0.144)	−0.751*** (0.194)
Age 35–44	0.047 (0.142)	0.131 (0.134)	−0.129 (0.194)	0.056 (0.146)	0.075 (0.114)	0.140 (0.144)	0.106 (0.147)	−0.631** (0.199)
Age 45–54	−0.198 (0.129)	0.225* (0.122)	0.068 (0.177)	0.073 (0.133)	−0.038 (0.104)	−0.015 (0.146)	0.071 (0.133)	−0.381** (0.182)
Age 55–64	−0.167 (0.131)	0.242* (0.124)	−0.239 (0.179)	0.100 (0.135)	0.014 (0.106)	0.175 (0.146)	0.200 (0.135)	−0.198 (0.186)
Frequent social media user	0.107 (0.112)	−0.025 (0.106)	−0.312** (0.152)	0.113 (0.115)	−0.061 (0.090)	0.010 (0.097)	−0.128 (0.115)	0.273* (0.158)
Constant	−0.078 (0.131)	−0.270** (0.124)	0.685*** (0.174)	−0.272** (0.135)	0.116 (0.105)	−0.027 (0.166)	−0.062 (0.136)	0.850*** (0.179)

*Significance at <0.05 level, **significance at <0.01 level, and ***significance at <0.001 level.

Table 5. Random parameters logit model and whole turkey willingness-to-pay estimates (n = 565).

Attributes	Coefficient (SE)	Standard deviation (SE)	WTP [95% confidence interval]
USDA certified Free Range	0.539*** (0.086)	0.920*** (0.116)	$0.74 [0.50,0.98]
USDA certified fed a vegetarian diet	0.439*** (0.087)	0.873*** (0.110)	$0.60 [0.370, 0.88]
USDA certified Hormone use not permitted	0.983*** (0.111)	0.692*** (0.136)	$1.35 [1.05,1.70]
USDA certified Antibiotic use not permitted	0.503*** (0.090)	0.725*** (0.093)	$0.69 [0.44,0.93]
Retailer certified Free Range	0.461*** (0.090)	0.266* (0.154)	$0.64 [0.37,0.90]
Retailer certified fed a vegetarian diet	0.281*** (0.084)	0.424*** (0.100)	$0.39 [0.17,0.63]
Retailer certified Hormone use not permitted	0.752*** (0.086)	0.097 (0.144)	$1.04 [0.80,1.32]
Retailer certified Antibiotic use not permitted	0.525*** (0.087)	0.560*** (0.095)	$0.72 [0.50,0.95]
Industry certified Free Range	0.269*** (0.091)	0.103 (0.197)	$0.37 [0.14,0.62]
Industry certified fed a vegetarian diet	0.338*** (0.089)	0.596*** (0.151)	$0.47 [0.23,0.74]
Industry certified Hormone use not permitted	0.621*** (0.092)	0.007 (0.135)	$0.85 [0.62,1.11]
Industry certified Antibiotic use not permitted	0.448*** (0.086)	0.196 (0.169)	$0.62 [0.37,0.87]
Opt-out	−6.428*** (0.399)	4.632*** (0.448)	−$4.42 [−5.04,− 3.90]
Price	−1.453*** (0.111)		

*Significance at <0.05 level, and ***significance at <0.001 level.

to collect data at specific points in time, such as the holiday season targeted for this analysis. The most unique benefit of this particular data collection was the ability to survey respondents immediately before the holiday season regarding holiday consumption, which was especially important, given the spotlight on whole turkey preferences.

Most respondents were worried about the use of antibiotics for food animals. Withdrawal periods are determined by the Food and Drug Administration for pharmaceuticals and are necessary to ensure any potential residues within animal tissues are eliminated or reduced to acceptable levels (FDA, 2018). Respondents who indicated they knew what a withdrawal period was were still concerned about antibiotic use but at a lower rate than those who did not indicate knowledge. After being given the definition of a withdrawal period, roughly half of respondents felt the same about the use of antibiotics, vaccines, and other drugs. Respondents who were worried before being given the definition still had a higher level of concern than those who were not worried before being given the definition, indicating that informing respondents did not drastically change levels of concern.

Reported food shopping behavior was similar to that in previous studies that used nationally representative household samples. McKendree et al. (2013) found that on average, respondents spent $132.77 on food, which is similar to the $130 per week on total food found in this study. In this study, 95% of respondents indicated they ate meat, which aligns with the 2018 Gallup poll, which found that 94% of respondents were not vegetarian and 95% of respondents were not vegan (Reinhart, 2018). Eleven percent of respondents indicated they hunted for food, which was lower than the 14% found in a nationally representative survey by Byrd et al. (2015). Part of this discrepancy may be attributed to differences in the wording of statements; this survey instrument specifically asked if respondents hunted for food, whereas Byrd et al. (2015) simply asked if the respondent hunted.

Although respondents primarily purchased fresh meat, it is unknown if some of that meat was later frozen. Twenty-one percent purchased frozen meat, which indicates that knowledge of proper thawing techniques is of importance. The three FDA-recommended ways to thaw frozen meat are by using a refrigerator, cold water, and a microwave. Any other method can lead to an increased risk of foodborne illness once the meat enters the temperature zone of 40 to 140 °F because this is the ideal range for rapid bacterial growth. Perishable foods should never be left on the counter to thaw, submerged in hot water, or left for more than 2 h at room temperature (USDA-FSIS, 2013). The most used method reported by respondents was in the refrigerator (65%) and on the counter (37%). The third and fourth most frequently selected methods were cold water (23%) and the microwave (19%), indicating that most consumers are aware of the best ways to thaw meat, but many are still leaving their meat out on the counter, which is a nonsafe thawing technique. Less than 20 yr ago, it was still unclear whether it was safe to thaw meat at room temperature. The USDA had no restrictions regarding how food should be thawed; however, the FDA recommended that food be thawed in refrigeration or in flowing water (Snyder, 1999). Considering most of the respondents to this survey are older than 20 yr, previous lack of coherent and uniform information regarding proper thawing techniques may be the reason why a significant number of participants thaw their meat on the counter at room temperature and possibly taught their children the same.

Since 1990, beef, chicken, and pork have been the highest consumed meat products in the United States, with an average per capita annual consumption of 63.0, 56.3, and 49.9 lb. respectively (USDA, 2019). Turkey and seafood have a substantially smaller portion of the market share with per capita consumption of only 13.5 lb and 15.2 lb, respectively (USDA, 2019). However, over time, the consumption trends of turkey and pork have remained consistent, whereas beef consumption has shown a gradual decline and chicken consumption

has seen a steady increase (USDA, 2019). Although consumption differs in magnitude, the meat quality demands of the consumer are the same across species with flavor and mouthfeel (tenderness and texture) being extremely important when consuming products, and visual evaluation (color/discoloration) being the most important quality attribute at the point of sale.

Traditionally, whole turkey is consumed for the Thanksgiving holiday, which was reflected by the 87% of respondents who indicated they consumed turkey for Thanksgiving. This number is consistent with the claim by the National Turkey Federation that 88% of Americans eat turkey on Thanksgiving (University of Illinois Extension, 2019). Respondents indicated that price was more important than brand when purchasing a whole turkey. Price is commonly an important attribute for food products. Bir et al. (2019) found that price was more important than brand for consumers when purchasing fluid dairy milk. The American Farm Bureau (2018) found that the cost of the Thanksgiving Day dinner in 2018 was at its lowest since 2010. The cost for the dinner was $48.90 for 10 people, and the affordability of turkey owing to high supply was credited for the lower price. Although turkey retail prices were the lowest in 2018 since 2014 (American Farm Bureau, 2018), people are still concerned about price. Despite what the holiday turkey cooking helplines (Chicago Tribune, 2018) might imply, 48% of respondents were comfortable with cooking a whole turkey. However, the relationship between comfort of cooking a whole turkey and the satisfaction of holiday guests is unknown.

Despite changes in consumption surrounding the holidays that often include unhealthy options (Pope et al., 2014; Olynk Widmar et al., 2016), respondents were close to neutral regarding their self-rating of eating habits during the winter holiday season from healthy to unhealthy. When considering instances of SDB and holiday eating statements, instances of SDB occurred more frequently with statements such as *I anticipate gaining weight* and *I will gain more weight during the holiday season* when compared with other weight related activities such as working out and simply watching what one eats. Widmar et al. (2016) included the same holiday eating and healthfulness statements in their US survey during roughly the same period during the holiday season. Instances of SDB were remarkably similar, with differences in percentages of respondents exhibiting SDB between the 2 studies of 3% or less, with the exception of 2 statements. For the statements *I anticipate gaining weight during the holidays* and *I will gain more weight during the holiday season than during other times of the year,* the differences were 7 and 8%, respectively, with the Widmar et al. (2016) study having higher rates of SDB.

Respondents were internally consistent while exhibiting bias within the SDB models. If the respondent exhibited bias for actions that would prevent weight gain, such as watching what they ate, their SDB score for making a New Year's resolution to lose weight decreased. This would indicate that at some level, respondents may have realized that if they truly were taking actions to prevent weight gain, weight loss would not be necessary. However, most instances of SDB for one statement increased the SDB score for other statements, which indicates a general pattern of SDB exhibition between holiday eating statements. Being male decreased the SDB score for the statements *makes a New Year's resolution to lose weight* and *will drink more alcohol during the holidays*. Although other statements included eating and weight-related behaviors, only *making a New Year's resolution to lose weight* differed in terms of gender. In a study of alcohol-related attitudes among college students, Kirmani and Suman (2010) found that men expected alcohol use could lead to positive outcomes, whereas women expected alcohol use could lead to negative outcomes. Perhaps, differences in the perception of alcohol lead to a decrease in SDB for men when asked about holiday alcohol consumption. In general, incidences of SDB decreased with age; it is possible that older respondents did not feel the same social pressures. It is also possible that those in the extreme age categories may truly behave in ways that deviate from the average, having noted that younger respondents did not have decreased incidences of SDB, and further research is needed to evaluate how older respondents may view themselves. Being a frequent social media user decreased the SDB score for *making a New Year's resolution* but increased the SDB score for the statement *will drink more alcohol during the holidays*. DiGrazia et al. (2013) found that social media data were less likely to be affected by SDB than voting data gathered by polling. However, more research is needed to make strong conclusions regarding the relationship between SDB and social media use in different contexts. It may be of interest for future research to consider including a similar set of question regarding nonholiday food consumption and exercise. The literature indicates that people's habits differ during the holiday season, but such a direct comparison, including a comparison of incidences of SDB, could help further establish consumption and exercise patterns.

There were no statistically different mean WTP estimates for production attributes across certifying agencies. Olynk et al. (2010) found that respondents were willing to pay more for USDA-verified pasture access, antibiotic use, and individual crates/stalls when compared with other verifiers for fluid dairy milk and pork chops. Studying ribeye steak attributes including traceability and food safety, country of origin labeling, and tenderness, Loureiro and Umberger (2007) found that respondents had preferences based on the certifying entity. However, similar to the findings in this study, Olynk and Ortega (2013) found that for the attributes antibiotic free and pasture access, respondents had a positive WTP for retail, industry, and USDA verification in ice cream and yogurt. Within the certifiers USDA and retailer, respondents were willing to pay more for not allowing hormone use. Hormone use in poultry is not allowed (USDA, 2011). However, poultry

can be labeled with claims of no hormone use as long as a disclosure that "Federal regulations do not permit the use of hormones in poultry" is included (USDA, 2011). Hormone use is permitted in beef, and researchers have demonstrated a preference for hormone-free beef for some US consumers and European consumers (Tonsor, 2005; Abidoye et al., 2011). These findings demonstrate that consumers prefer hormone-free turkey and that continued prohibition of its use would align with consumer preferences. Correlations between having purchased name brand, no hormone administered, antibiotic-free turkeys, and WTP for USDA-certified free range whole turkey were found. Similarly, correlations were found between having purchased no hormone administered, fed a vegetarian diet turkeys, and WTP for industry-certified free range whole turkey. These relationships indicate that consumers are considering a variety of specialty production practices when purchasing a whole turkey and that previous specialty production practice purchases impact WTP. Although regulations in place dictate the safe use of antibiotics in meat, the general media continuously includes the avoidance of antibiotics in meat in health and fitness segments (Kelly, 2012; Carroll, 2015). The presence of SDB for food-related statements was negatively related to USDA and retailer antibiotic use permitted.

CONCLUSIONS

Although much ado surrounds the preparation of holiday turkey, respondents were neutral in terms of their confidence in cooking a whole turkey. Despite this confidence, many respondents indicated they thawed frozen meat using improper methods. There remains a need to educate US residents about safe food preparation. Positive WTP was found for all attributes studied: free range, fed a vegetarian diet, hormone use not permitted, and antibiotic use not permitted. Furthermore, statistically significant differences in WTP for the 3 certifying entities (USDA, retailer, and industry) within attributes were not found. Further research is needed to analyze why differences in certifiers are found for some food products and not others.

Interestingly, SDB surrounding healthful holiday eating is extremely consistent across time. Incidences of SDB matched almost exactly the findings of Widmar et al. (2016). This study expanded the work and found relationships between SDB, gender, and age for holiday eating statements using a SUR. Interestingly, in general, incidences of SDB decreased with age. It is possible that the pressure to express the "socially correct" answer dampens as people age. There were few differences between gender and SDB prevalence. Men had less incidences of SDB regarding alcohol consumption and New Year's resolutions. More research would be needed to determine if these findings expand to other topics beyond the holidays.

Conflict of Interest Statement: The authors declare no conflict of interest.

SUPPLEMENTARY DATA

Supplementary data associated with this article can be found in the online version at https://doi.org/10.1016/j.psj.2019.12.047

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