PERISHABLE FOOD DATE LABEL BEST PRACTICES AND CONSUMER WILLINGNESS TO REDUCE FOOD WASTE

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Abstract: Food waste is a prominent food policy issue that is caused by many factors, with food expiration date labeling on perishable food items as a contributory factor. Perishable food items may have more than one expiration date label, causing ambiguity among consumers. The most common food expiration date labels are *Best If Used By*, *Use By*, and *Sell By*. The primary objective of this research is to determine which food expiration date labels reduce consumer ambiguity about perishable labels and to quantify consumer willingness to reduce food waste. Data were collected via an online survey distributed by Qualtrics to accomplish the research objective. The survey resulted in a nationally representative sample of adults over 18 years of age. 1,050 participant responses were collected with a 93.1% response rate. A series of chi-square tests were performed to determine if the survey results for the perishable labels differed among the demographic variables of gender, age, race, region, education level, marital status, income level, and primary shopper status. Consumer utility was estimated as a function of large package percent loss (waste), small package percent price increase, package size, product, other product, age, race, region, education level, marital status, income level, primary shopper status, and self-identified food waste importance to determine if consumers receive more utility by reducing food waste. This research followed the traditional framework of willingness to pay (WTP) to quantify consumer willingness to reduce food waste. This research revealed the *Best If Used By* and *Use By* perishable labels are interpreted more ambiguously than the *Sell By* perishable label, and consumers are willing to reduce food waste to obtain a higher level of utility. From these results, it may be necessary to determine a universal label date to lessen consumer ambiguity on label date terminology and offer smaller package sizes in grocery stores to help aid in food waste reduction.

Key Words: Food Waste, Food Policy, *Best If Used By*, *Use By*, *Sell By*, Consumer Willingness

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CHAPTER I

INTRODUCTION

Problem Statement

Food waste is the difference between the amount of food produced and the sum of all food used in food or non-food production, including oils, clothing, and energy (Bellemare et al., 2017). Approximately 31% of the total food supply, from farm to fork, is wasted in the U.S. Consumers contribute 21% of the total food waste while agricultural producers contribute the remaining 10% (Wilson et al., 2017). Wilson et al. (2017) also noted the cost of food waste amounts to $160 billion annually. At the same time, 14.3% of U.S. households are food insecure (Coleman-Jensen et al., 2014). Along with other factors, consumer lack of understanding about food perishability labels contributes to food waste. For example, one food product could have more than one expiration date printed on it, leading to inconsistent labeling and consumer confusion. Studies demonstrate that the closer a food product is to its flexible expiration date, the less consumers find the product acceptable and safe to consume (Wilson et al., 2017, Wansink and Wright 2006, Newsome et al., 2014). Food that may still be safe to consume ends up being thrown away.

In 2009, the Food and Agriculture Organization (FAO) predicted global food production must increase by 70% to meet demand by 2050 (FAO 2009). Today, however, the FAO is determined to reduce food loss and waste with their new “Target-Measure-Act” system. If food loss and waste can be reduced by 50%, there would be sufficient food availability to feed the

population in 2050 (World Resources Institute, 2019).

Along with the FAO's new system, clearing up expiration label confusion among consumers can also aid in food loss and waste reduction (Netburn, 2019). The most common labels are *Best If Used By*, *Use By*, and *Sell By*. Two common misconceptions about these labels are they indicate the safety of a food product and are regulated by the federal government (McGinty, 2019). Manufacturers determine the expiration labels, but the USDA sets "standards" for terminology definition (USDA, 2019). The labels do not indicate the overall safety of a food item and are used for marketing reasons and quality assurance (Wilson et al., 2017). McGinty (2019) found that 37% of consumers discard food when it is near the labeled expiration date. As a product approaches or passes its expiration date, consumers are more concerned with the freshness and healthfulness of the item rather than the potential food safety risks associated with consuming the item (Wansink and Wright, 2006). Therefore, consumers rely too heavily on unregulated expiration labels as opposed to physically examining the food product. Stated in a recent news article by McGinty (2019), "consumers should learn to trust their senses."

Objectives

The primary objective of this research is to determine which food expiration date labels reduce consumer ambiguity about perishable labels and to quantify consumer willingness to reduce food waste.

The specific objectives of this research are to:

1. Determine differences with respect to label interpretation among demographic variables: gender, age, race, region, education level, marital status, income level, and primary shopper status,
    a. Hypothesis: Do the demographic variables interpret labels differently?

$$H_0: Label\ Interpretation\ does\ not\ differ\ among\ the\ demographic\ variables$$

$$H_A: Label\ Interpretation\ does\ differ\ among\ the\ demographic\ variables$$

2. Determine differences for food acceptability by sight or smell versus label date by category (fruit, vegetables, salads/greens, liquid dairy, solid dairy, meat, and bakery items) among demographic variables,
    a. Hypothesis: Does sight or smell versus label date usage differ among the demographic variables?

$$H_0: Sight\ or\ Smell\ versus\ Label\ Date\ Usage\ does\ not\ differ\ among\ the\ demographic\ variables$$

$$H_A: Sight\ or\ Smell\ versus\ Label\ Date\ Usage\ does\ differ\ among\ the\ demographic\ variables$$

3. Determine differences with respect to eating past the label date and self-ascribed food waste importance among demographic variables, and
    a. Hypothesis: Do the demographic variables view eating past the label date and the issue of food waste differently?

$$H_0: Eating\ Past\ the\ Label\ Date\ and\ Self-Ascribed\ Food\ Waste\ Importance$$

$$are\ not\ viewed\ differently\ among\ the\ demographic\ variables$$

$$H_A: Eating\ Past\ the\ Label\ Date\ and\ Self-Ascribed\ Food\ Waste\ Importance$$

$$are\ viewed\ differently\ among\ the\ demographic\ variables$$

4. Estimate consumer utility as a function of large package percent loss (waste), small package percent price increase, package size, product, other product, age, race, region, education level, marital status, income level, primary shopper status, and self-identified food waste importance to determine if consumers receive more utility by reducing food waste.

a. Hypothesis: Do consumers receive more utility by reducing food waste?

$$H_0: Consumers\ do\ not\ receive\ more\ utility\ by\ reducing\ food\ waste;$$

$$Willingness\ to\ Reduce\ Food\ Waste = 0$$

$$H_A: Consumers\ do\ receive\ more\ utility\ by\ reducing\ food\ waste;$$

$$Willingness\ to\ Reduce\ Food\ Waste \geq 0$$

CHAPTER II

LITERATURE REVIEW

2.1. Food Waste

Currently, food waste is a prominent food policy issue, as evidenced by federal and non-government research funding directed towards reducing food waste (Bellemare et al., 2017, Ellison et al., 2019). Jedermann et al. (2014) state that the amount of food waste is too substantial given the increasing population. Food waste is caused by many factors, with food expiration date labeling on perishable food items as a contributory factor. Perishable food items may have more than one expiration date label, causing ambiguity among consumers of when the food item is unsafe to use. In 2016, the Food Date Labeling Act was proposed. The Act's objective was to standardize expiration date labeling on perishable food items (Thomson, 2017). Although a seemingly straightforward objective, the process of standardizing expiration date labels is complicated. As a result, perishable food items still display ambiguous labels.

Food waste is an issue at the consumer, processing, shipping, and retail levels of the food supply chain. At the consumer level, an estimated 68% of food wasted is still edible (Landry and Smith, 2019). At the other levels, the retail level in particular, full-service delis, fresh baked goods, premium meats, and fresh produce bring business to grocery stores. However, all of the products sold at grocery delis are perishable and difficult to manage due to different weights, lack of specific Universal Product Codes for different product variations, and different forms of sale. Managers could check expiration dates more frequently, and discounts could be offered on food

items close to expiration. However, the closer a food item is to its expiration date, the less consumers want the food item. As a result, the perishable items spoil and are wasted (Tsiros and Heilman, 2005, Wilson et al., 2017, Wansink and Wright, 2006).

2.2. Expiration Dates and Shelf-Life

The expiration dates found on the perishable food items are typically *Best if Used By*, *Use By*, and *Sell By*. Expiration dates ostensibly enhance food safety. However, the labels are used more for marketing reasons and quality assurance (Wilson et al., 2017). The *Best If Used By*, *Use By*, and *Sell By* expiration date labels are not purchase or safety dates (USDA, 2019). The labels are there either to indicate best flavor or peak quality of a product or how long a product should be displayed in a grocery store (USDA, 2019). In addition, when a perishable item passes its expiration date, consumers are more likely concerned with the freshness and healthfulness of the item rather than the potential food safety risks associated with consuming the item (Wansink and Wright, 2006).

The expiration dates mentioned above are often perceived as similar to the concept of 'shelf-life', when in fact item expiration dates and shelf-life are entirely different concepts. The shelf life is the time frame a product can be stored at a specific temperature until it is unsuitable for purchase, cooking use, or consumption and is thrown away (Jedermann et al., 2014). Expiration dates should signal the shelf life of a product, but they may be misunderstood. The expiration dates only suggest the quality of a food product and are uncorrelated with the safety of the food product (Jedermann et al., 2014, Wilson et al., 2017). This misunderstanding results in food items being thrown away, most likely without being examined to determine the product's edibility.

2.3. Consumer Choice Theory

Mentioned above, consumers' desire for a food item decreases as the item comes to its

expiration date. This exemplifies the concept of consumer choice theory which is a combination of the positive and normative theories. A positive theory attempts to explain how the world works in a value-free way. In short, this theory expresses what is. A normative theory provides a value-based view about what the world ought to be like. In short, this theory expresses what ought to be (Thaler, 1980). According to Thaler (1980), consumer choice prediction errors arise when dependence is placed only on the normative theory, causing inaccurate decision and behavior predictions of the consumer. Following the normative theory, consumers should act in a specific, predictable way (e.g., should understand food expiration dates). However, consumers rarely work this way; hence, the positive theory of consumer behavior.

Lancaster (1966) introduced a new, non-traditional perspective to consumer choice theory. Traditional consumer choice theory ignores intrinsic properties of goods and simply states that goods enable consumers to maximize utility. Lancaster (1966) argued that all goods are not created equal and that the good itself doesn't give consumers utility. Rather, the good contains certain characteristics that give consumers utility. Relating this perspective to an example with food expiration dates, a consumer chooses between two loaves of bread with identical attributes. The only difference is the expiration date: one loaf is said to expire tomorrow while the other is said to expire a week from tomorrow. The consumer decides to choose the loaf with the longer predicted expiration date because the consumer feels as if it is safer and there is more time to consume the product. Therefore, while the loaf of bread (good) gives the consumer some level of utility, it is the expiration date (characteristic) that gives the consumer a greater level of utility.

Risk preference also influences consumer behavior. A consumer can either be risk-tolerant, risk-neutral, or risk-averse. The more risk-tolerant a consumer is, the more likely the consumer is going to exhibit risky behavior and vice versa (Lusk and Coble, 2005). Therefore, a consumer with a more risk-averse preference may be less likely to purchase or keep a food item past the expiration date compared to a more risk-tolerant consumer.

CHAPTER III

METHODOLOGY

3.1. Conceptual Framework

A choice experiment is a popular tool used to gain insight on consumer choices. One type of choice experiment is the contingent valuation (CV) method which utilizes survey questions to gain insight on consumers' preferences for public goods (Mitchell and Carson, 1989). When conducting a CV study, there are approximately seven steps to follow (Boyle 2017, 87).

Step one states the indirect utility function as the theoretical model.

$$v(p, q^0, m) = Max_x[u(x, q^0): p'x \leq m] \rightarrow v(p, q^0, m) = u[x_i^*(p, q^0, m), q^0] \quad (3.1)$$

The indirect utility function is derived from the theoretical utility maximization framework.

$$\max_x u(x, q^0) \quad (3.2)$$

$subject\ to\ u' > 0, u'' < 0, p'x \leq m, where$

$x = x_1, x_2, \dots, x_m\ for\ private\ goods,$

$p = p_1, p_2, \dots, p_m\ for\ prices,$

$q^0 = q_1^0, q_2^0, \dots, q_n^0\ for\ public\ goods, and$

$m = the\ consumer's\ budget$

From this, using contingent valuation, a consumer's indirect utility is:

$$u(x, q^0) = v_{x(i)} + \mathcal{E}_{x(k)q^0}, where \quad (3.3)$$

$v_{x(i)}$ *is the revealed utility of good* x_i, *and*

$\mathcal{E}_{x(k)q^0}$ *is a stochastic component that is not revealed*

Step two identifies the primary decision maker. Step three determines a data collection method. Step four determines an appropriate sample size. Step five and step six focus on the survey design by determining the type of questions, the question detail, and if pictures will be used. Step seven, the final step, includes demographic questions such as gender and age (Boyle 2017, 87).

3.2. Data

Data were collected via an online survey. The survey, distributed by Qualtrics, resulted in a nationally representative sample of adults over 18 years of age. Responses totaled 1,050 participants with a 93.1% response rate. The survey consisted of eight question sections which are summarized in Table 3.1: demographics, periphery, label importance, label understanding, discarding, product choice, at-home, and food waste awareness.

Table 3.1. Survey Section Descriptions

Section	Description
Periphery	Questions regarding the household primary grocery shopper
Label Importance	Questions regarding the respondents' view on label dates
Label Understanding	Questions regarding the respondents' understanding on label dates
Discarding	Questions regarding the respondents' usage of label dates when discarding food
Product Choice	Questions regarding the respondents' most consumed item
At-Home	Questions regarding the respondents' possible usage of a product labeled to expire in three days
Food Waste Awareness	Questions regarding the respondents' view on the issue of food waste

A summary of the survey respondent demographics can be found in Table 3.2. The complete survey can be found in Appendix A.

Table 3.2. Summary Statistics of Survey Participant Demographics (n = 978)

Variable	Percent		
Gender			
Male	48.62%		
Female	51.10%		
Other	0.29%		
Age			
Mean	Standard Deviation	Minimum	Maximum
46.473	16.425	18	88
Age Category			
18-24	8.84%		
25-34	20.75%		
35-44	19.12%		
45-54	16.91%		
55-64	16.14%		
65-74	15.27%		
75-84	2.59%		
85-94	0.29%		
Race			
American Indian or Alaska Native	1.62%		
Asian	5.43%		
Black or African American	12.76%		
Hispanic or Latino	17.14%		
Native Hawaiian or Pacific Islander	0.38%		
Other	2.10%		
White	60.57%		
Region			
Midwest	21.95%		
Northeast	19.66%		
South	38.93%		
West	19.47%		
Education Level			
Less than a High School Degree	4.86%		
High School Degree or Equivalent	26.19%		
Some College, No Degree	21.24%		
Associate's Degree	8.95%		
Bachelor's Degree	21.33%		
Master's Degree	12.48%		
Doctorate Degree	2.10%		

Table 3.2 (continued). Summary Statistics of Survey Participant Demographics (n = 978)

Variable	Percent
Education Level	
Professional Degree	2.86%
Marital Status	
Single (Never Married)	31.01%
Married	55.34%
Divorced	10.11%
Widowed	2.86%
Prefer Not to Say	0.67%
Income Level	
Under $15,000	9.90%
$15,000-$24,999	8.10%
$25,000-$34,999	10.67%
$35,000-$49,999	11.33%
$50,000-$74,999	19.05%
$75,000-$99,999	14.00%
$100,000-$149,999	15.05%
$150,000-$199,999	5.90%
$200,000+	6.00%
Primary Shopper Status	
ALL the Grocery Shopping	54.43%
MOST of the Grocery Shopping	27.93%
SOME of the Grocery Shopping	15.44%
RARELY do the Grocery Shopping	2.19%

The *Periphery* section asked respondents to identify the household primary grocery shopper, primary grocery shopper grocery store visits on a weekly or monthly basis, respondent grocery store visits on a weekly or monthly basis (if the respondent was not the household primary grocery shopper), monthly outside meal consumption, monthly grocery shopping decisions percentage, and monthly income spent on groceries.

The *Label Importance* section asked how closely respondents pay attention to the label date, label date importance when purchasing fruits, vegetables, salads and greens, liquid dairy, solid dairy, fresh meat, and bakery goods, who sets the expiration date, and expiration dates seen on food products.

The *Label Understanding* section asked respondents interpretation questions on the *Best If Used By*, *Use By*, and *Sell By* expiration date labels. The discard category asked how frequent respondents eat food past the label date, "*sight or smell*" versus "*label date*" usage when discarding perishable items, and the most thrown away item.

The *Product Choice* section asked respondents which item they consume most often: strawberries, grapes, baby carrots, or packaged salad mix. There was an 'I do not consume any of these items' option for the respondents to choose if the respondents did not like or eat the products listed. Strawberries, baby carrots, grapes, and packaged salad mix were the products chosen for this section because they come in packages with a label date printed on the packaging in the grocery store. Respondents were given six randomized choice sets to answer that varied by product attributes. If respondents chose 'I do not consume any of these items', they were given the packaged salad mix choice sets.

Each product had a total of twelve choice sets, and of these, respondents were randomly presented six of the twelve choice sets to select. Each question had a large package option, a small package option, and a none of these option. The large package option had various possible loss (waste) attributes of 25%, 33%, or 50% loss associated with the large package, while the price per pound and price per package stayed consistent for each choice set. The small package had various possible price increase attributes of 0%, 10%, 25%, or 50% price increase per pound with no loss associated with the small package. For example, one possible combination of large and small package options faced by a respondent are included in Figure 3.1. Figure 3.1 indicates the large package size is two pounds of baby carrots which could result in a 33% waste of the product. The price per unit is $1.00 per pound of $2.00 per package. The small package is one pound (half the size) of baby carrots with no chance of waste, but the price is $1.25 per pound, which is a 25% increase relative to the large package price per pound.

Figure 3.1. Example Survey Respondent Choice Set: Product = Baby Carrots, Large Package Size = 2 pounds, Large Package Price = $1.00/pound or $2.00/package, Large Package Possible Waste = 33%, Small Package Size = 1 pound, Small Package Price = $1.25/pound or $1.25/package

The *At-Home* section presented the respondents with a hypothetical situation and asked them to agree or disagree with each option listed. The hypothetical situation was, given that half of the product chosen will spoil in three days, they would: throw the unused portion away, plan a meal using either 25%, 50%, 75%, or 100% of the remaining product, donate the remaining product amount to a food pantry via drop-off which would require 30 minutes, and/or donate all of the remaining product amount to a food pantry via at-home pick-up which would require two hours.

Lastly, the *Food Waste Awareness* section asked respondents if the issue of food waste is important to them, if the issue of food waste is important to the average person, and if the respondents make an effort to not waste food at home and when eating out by buying smaller portions, using the entire package, saving unused food for leftovers, and/or giving unused food to persons in need.

3.3. Methods

A series of chi-square tests were used to accomplish the first, second, and third objectives. For the first objective, chi-square tests on the perishable labels (*Best if Used By*, *Use By*, and *Sell By*) and demographic variables were performed. For the second objective, chi-square tests on how respondents used "*Sight/Smell*" versus "*Label Date*" to determine when to discard perishable items across various demographic variables were performed. Lastly, chi-square tests on participant response to eating past the label date and self-ascribed importance of food waste across various demographic variables were performed to address the third objective.

$$\chi^2 = \frac{(observed - expected)^2}{expected} \tag{3.4}$$

The fourth objective is to estimate consumer utility via the well cited economic modeling procedure of logistic regression, which takes the form of the following logistic function.

$$\Pr(x_i) = \frac{e^{V_{x_i}}}{\sum_j e^{V_{x_j}}}, i \neq j \tag{3.5}$$

More specifically, the general form of the model that was estimated is defined as:

$$\begin{aligned}\Pr(Utility) = f(&Large\ Package\ Percent\ Loss\ (Waste),\\ &Small\ Package\ Percent\ Price\ Increase, Package\ Size, Product,\\ &Other\ Product, Age, Race, Region, Education\ Level, Marital\ Status,\\ &Income\ Level, Primary\ Shopper\ Status,\\ &Self - Identified\ Food\ Waste\ Importance)\end{aligned} \tag{3.6}$$

To determine if consumers receive more utility by reducing food waste, consumer willingness to reduce food waste needs to be estimated. Traditional studies estimate willingness to pay (WTP) by taking the ratio of the product attribute and price coefficients.

$$Willingness\ to\ Pay = -\frac{\theta_i}{\beta_p} \quad (3.7)$$

Following this framework, consumer willingness to reduce food waste was determined from the ratio of the small package and large package percent loss (waste) coefficients, and the ratio of the large package and small package percent price increase coefficients.

$$Willingness\ to\ Reduce\ Food\ Waste = -\frac{Small\ Package\ Coefficient}{Large\ Package\ Percent\ Loss\ (Waste)} \quad (3.8)$$

$$Willingness\ to\ Reduce\ Food\ Waste = -\frac{Large\ Package\ Coefficient}{Small\ Package\ Percent\ Price\ Increase} \quad (3.9)$$

Independent Variable Descriptions

Product Attributes – survey respondents were asked to consider a purchase in a typical grocery store setting. The product chosen was one of four options: strawberries, baby carrots, grapes, or packaged salad mix. The respondents' preference selection of the four options or 'none of these' designated the product within the survey. If 'none of these' was selected, the respondent was designated package salad mix for the product choice set. Respondents were provided six choice sets, which were a random presentation of two product package sizes, large and small, with a defined *Best if Used By* date of two weeks from the date of the survey. The large package included a defined amount of possible waste of 25%, 33%, or 50%. The amount of waste was indicated to be possible since the setting is the grocery store. However, this is not known with certainty. The large package price remained constant across all possible choice sets. The small

package had no possible waste, but the price per unit presented was 0%, 10%, 25%, or 50% higher than the large package per unit price.

There were twelve total possible combinations of choice sets based on these product attribute parameters which can be found in Table 3.3. Each respondent was presented with six choice sets, which were randomly determined via the Qualtrics survey software and where each choice set would occur approximately equally across all responses.

Table 3.3. Total Possible Choice Sets Combinations Based on the Product Attribute Parameters

Small Package Percent Price Increase	Large Package Percent Loss (Waste)		
	25%	33%	50%
0%	Combination 1	Combination 2	Combination 3
25%	Combination 4	Combination 5	Combination 6
33%	Combination 7	Combination 8	Combination 9
50%	Combination 10	Combination 11	Combination 12

Specifically, the independent variables of the consumer utility model are defined as:

Product Attributes

Package Percent Loss (Waste): Either a 25%, 33%, or 50% possible loss associated with the large package size of each product. The price per pound and overall price of the large package stayed constant (no price change) for each large product while the percent loss changed (increased). The small package had 0% possible loss.

Package Percent Price Change (Increase): Either a 0%, 10%, 25%, or 50% price increase on the small package size of each product relative to the large package price. The price per pound and overall price of the small package changed (increased) for each small product while there was no percent loss.

Package Size: Large or small. For strawberries, baby carrots, and grapes, the large package was a two pound package, and the small package was a one pound package. Two pound and one pound

were the common package sizes in the grocery store for strawberries, baby carrots, and grapes. For the packaged salad mix, the large package was a one pound package, and the small package was a half-pound package. One pound and half-pound were the common package sizes in the grocery store for packaged salad mix.

Product: Strawberries, baby carrots, grapes, or packaged salad mix. There was 'I do not consume any of these items' option. If this option was chosen, the respondents were given the packaged salad mix choice sets. Strawberries, baby carrots, grapes, and packaged salad mix come in packages with a label date printed on the packaging in the grocery store.

Other Product: An additional variable was included to distinguish between respondents that selected packaged salad mix from those that selected 'I do not consume any of these items'.

Respondent Demographics

Age: Age of the respondent (converted to age group categories).

Age Group Categories: 18-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, 85-94

Race: Race of the respondent.

Race Categories: American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Pacific Islander, White, Other

Region: Region of the United States where the respondent resides.

Region Categories: Midwest, Northeast, South, West

Education Level: Education level (highest obtained) of the respondent.

Education Level Categories: Less than a High School Diploma, High School Degree or Equivalent, Some College No Degree, Associate's Degree, Bachelor's Degree, Master's Degree, Doctorate Degree, Professional Degree

Marital Status: Marital status of the respondent.

Marital Status Categories: Single (Never Married), Married, Divorced, Widowed, Prefer Not to Say

Income Level: Income level of the respondent (asked in defined income ranges).

Income Level Ranges: Under $15,000, $15,000-$24,999, $25,000-$34,999, $35,000-$49,999, $50,000-$74,999, $75,000-$99,999, $100,000-$149,999, $150,000-$199,999, $200,000+

Primary Shopper Status: Self-identified by the respondent as the primary shopper status of the respondent.

Food Waste Importance: Self-identified question asking if food waste was important to the respondent.

CHAPTER IV

RESULTS

A series of chi-square tests were used to accomplish the first, second, and third objectives in R Studio. The hypothesis for the first objective was:

$$H_0: Label\ Interpretation\ does\ not\ differ\ among\ the\ demographic\ variables$$

$$H_A: Label\ Interpretation\ does\ differ\ among\ the\ demographic\ variables$$

The hypothesis for the second objective was:

$$H_0: Sight\ or\ Smell\ versus\ Label\ Date\ Usage\ does\ not\ differ\ among\ the\ demographic\ variables$$

$$H_A: Sight\ or\ Smell\ versus\ Label\ Date\ Usage\ does\ differ\ among\ the\ demographic\ variables$$

The hypothesis for the third objective was:

$$H_0: Eating\ Past\ the\ Label\ Date\ and\ Self-Ascribed\ Food\ Waste\ Importance\ are\ not\ viewed\ differently\ among\ the\ demographic\ variables$$

$$H_A: Eating\ Past\ the\ Label\ Date\ and\ Self-Ascribed\ Food\ Waste\ Importance\ are\ viewed\ differently\ among\ the\ demographic\ variables$$

Same and Different were used to indicate if there were differences among the demographic variables. If the p-value of the chi-square test was less than or equal to 5% ($p \leq 0.05$), Different

was assigned, and there were differences among the demographic variables. If the p-value of the chi-square test was greater than 5% ($p > 0.05$), Same was assigned, and there were not differences among the demographic variables.

For the fourth objective, the consumer utility model was estimated as a conditional (fixed-effects) logistic regression in STATA. To determine if consumers receive more utility by reducing food waste, consumer willingness to reduce food waste was estimated. The hypothesis for the fourth objective was:

$$H_0: Consumers\ do\ not\ receive\ more\ utility\ by\ reducing\ food\ waste;$$

$$Willingness\ to\ Reduce\ Food\ Waste = 0$$

$$H_A: Consumers\ do\ receive\ more\ utility\ by\ reducing\ food\ waste;$$

$$Willingness\ to\ Reduce\ Food\ Waste \geq 0$$

4.1 Label Interpretation Results

The first objective was to determine if label interpretations differed among the demographic variables. The respondents were given four questions to interpret for each label date. The questions asked for the *Best if Used By* and *Use By* label dates focused on when to consume a product. For example, the *Best if Used By* and *Use By* label date means a product must be eaten on or before the label date (Must); a product should not be eaten after the label date (Should Not); a product has the best flavor quality if eaten on or before the label date (Best Flavor/Quality); and the label is not a safety date (Not Safe). The questions asked for the *Sell By* label date focused on when to purchase a product. For example, the *Sell By* label date means a product must be purchased on or before the label date (Must); a product should not be purchased after the label date (Should Not); the label tells the store how long to display the product

(Display); and the label is not a safety date (Not Safe). The results for this objective are summarized in Tables 4.1, 4.2, and 4.3.

In Tables 4.1, 4.2, and 4.3, Same and Different indicate how the label dates were interpreted among the demographic variables. For example, in table 4.1, Must, Should Not, and Not Safe were interpreted differently but the Best Flavor/Quality was interpreted the same among different genders. The *Best if Used By* and *Use By* labels were interpreted more differently than the *Sell By* label. Therefore, the demographic variables view the *Best If Used By* and *Use By* labels as more ambiguous and the *Sell By* label as more consistent.

Table 4.1. Chi-Squared Test Outcome Label Interpretation by Demographic Category for "*Best If Used By*" Label Wording

	Must	Should Not	Best Flavor/Quality	Not Safe
Gender	Different	Different	**Same**	Different
Age	Different	Different	Different	Different
Race	Different	**Same**	**Same**	**Same**
Region	**Same**	**Same**	**Same**	Different
Education Level	Different	Different	Different	Different
Marital Status	Different	Different	**Same**	**Same**
Income Level	Different	Different	**Same**	Different
Primary Shopper Status	**Same**	Different	**Same**	**Same**

Same: 13, Different: 19

Table 4.2. Chi-Squared Test Outcome Label Interpretation by Demographic Category for "*Used By*" Label Wording

	Must	Should Not	Best Flavor/Quality	Not Safe
Gender	Different	**Same**	**Same**	**Same**
Age	Different	Different	**Same**	Different
Race	Different	**Same**	**Same**	**Same**
Region	**Same**	**Same**	**Same**	**Same**
Education Level	Different	Different	**Same**	Different
Marital Status	**Same**	**Same**	**Same**	**Same**
Income Level	Different	Different	Different	Different
Primary Shopper Status	Different	Different	**Same**	**Same**

Same: 18, Different: 14

Table 4.3. Chi-Squared Test Outcome Label Interpretation by Demographic Category for "*Sell By*" Label Wording

	Must	Should Not	Display	Not Safe
Gender	**Same**	**Same**	**Same**	**Same**
Age	**Same**	**Same**	Different	**Same**
Race	**Same**	**Same**	**Same**	**Same**
Region	**Same**	**Same**	**Same**	**Same**
Education Level	Different	**Same**	**Same**	Different
Marital Status	**Same**	**Same**	**Same**	**Same**
Income Level	Different	**Same**	**Same**	**Same**
Primary Shopper Status	**Same**	**Same**	**Same**	**Same**

Same: 28, Different: 4

The provided responses for the label interpretation questions were Definitely True, Probably True, Neither True nor False, Probably False, Definitely False. The results were distributed almost equally with probably true and probably false being the top two responses for the *Best if Used By* Must and Should Not questions. For the *Best if Used By* Flavor Quality question, Definitely True and Probably True were the majority of the responses, and Probably True was the majority response for the *Best if Used By* Safety question. These results are summarized in Figures 4.1 through 4.4.

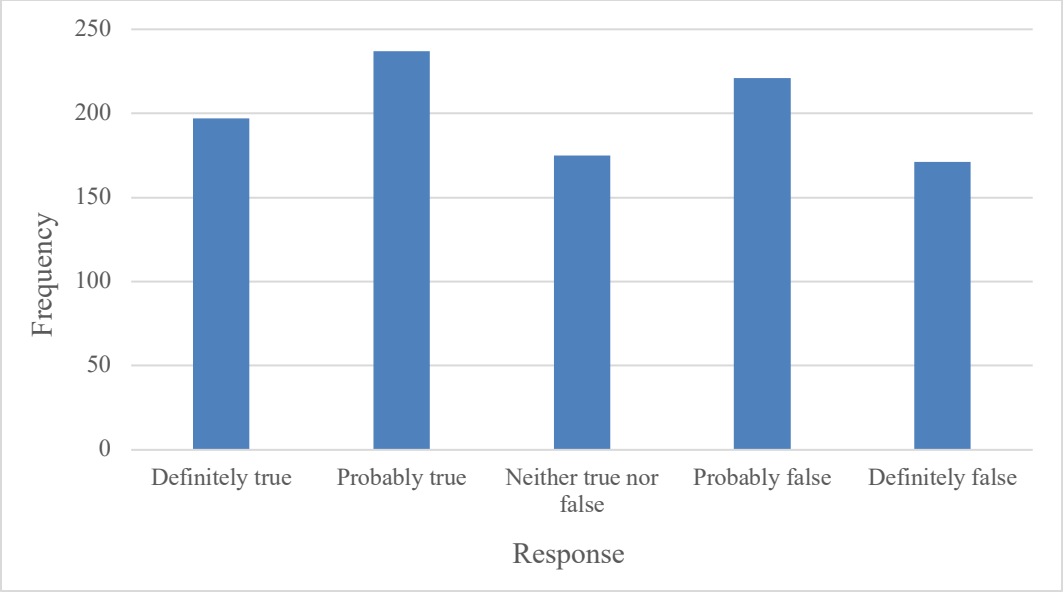

Figure 4.1. Participant Response to *"Best if Used By"* Label Indicating the Product *"Must be eaten on or before <date>"*

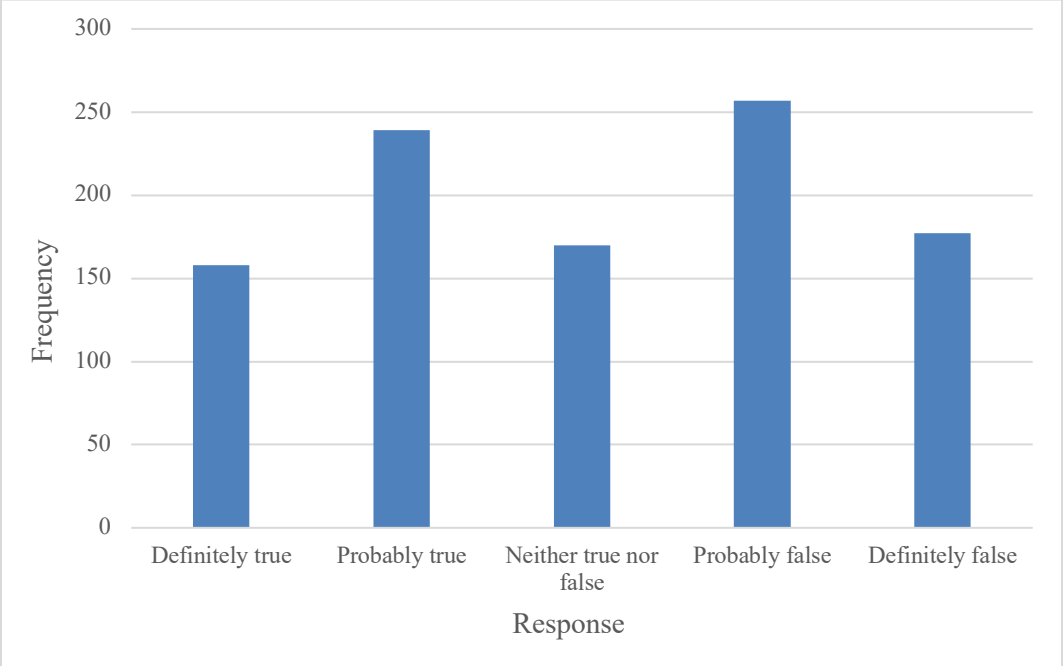

Figure 4.2. Participant Response to *"Best if Used By"* Label Indicating the Product *"Should Not be eaten after <date>"*

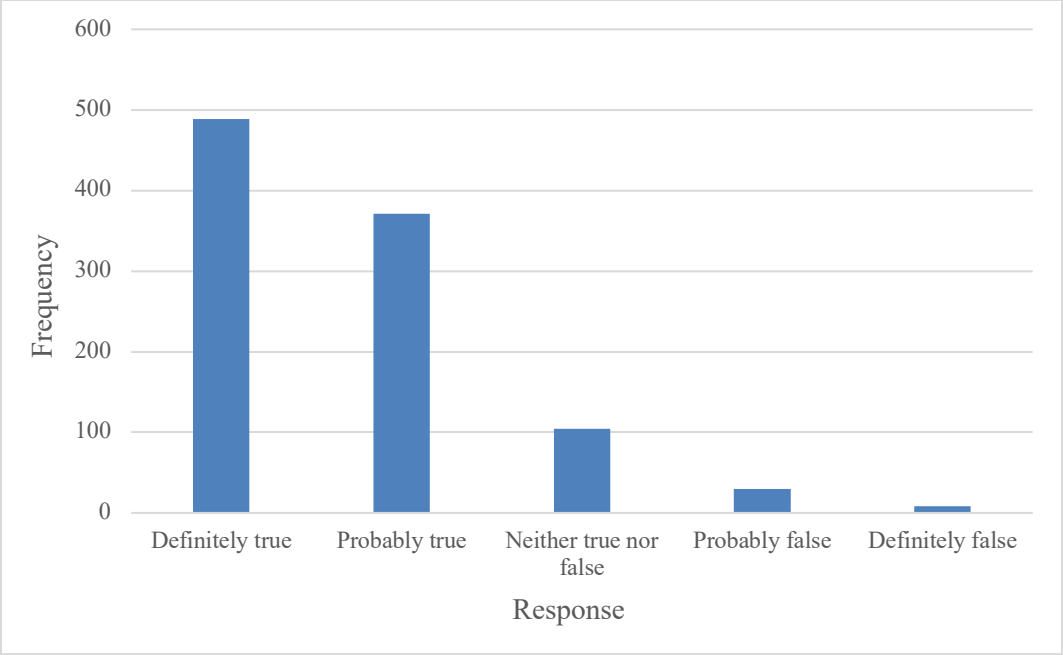

Figure 4.3. Participant Response to *"Best if Used By"* Label Indicating the Product *"will be of best flavor or quality on or before <date>"*

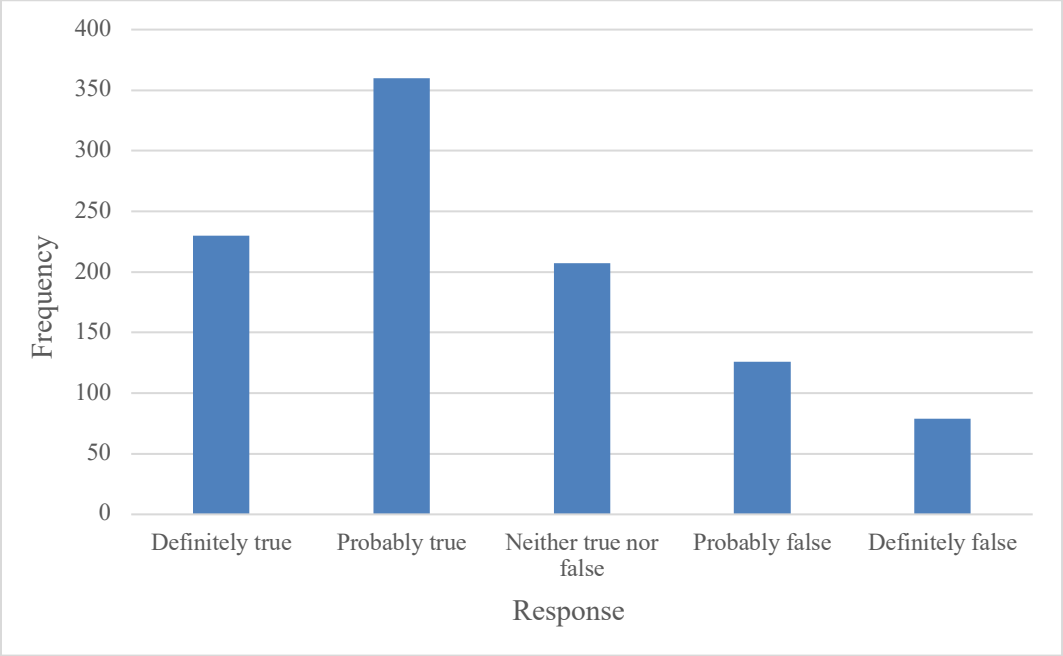

Figure 4.4. Participant Response to *"Best if Used By"* Label Indicating the Label Date is Not a Safety Date.

For the *Use By* label wording Must, Should Not, and Best Flavor/Quality questions, Definitely True and Probably True were the two main responses. For the *Use By* Not Safe question, the results were distributed fairly uniformly with Probably True garnering the top response. These results are summarized in Figures 4.5 through 4.8.

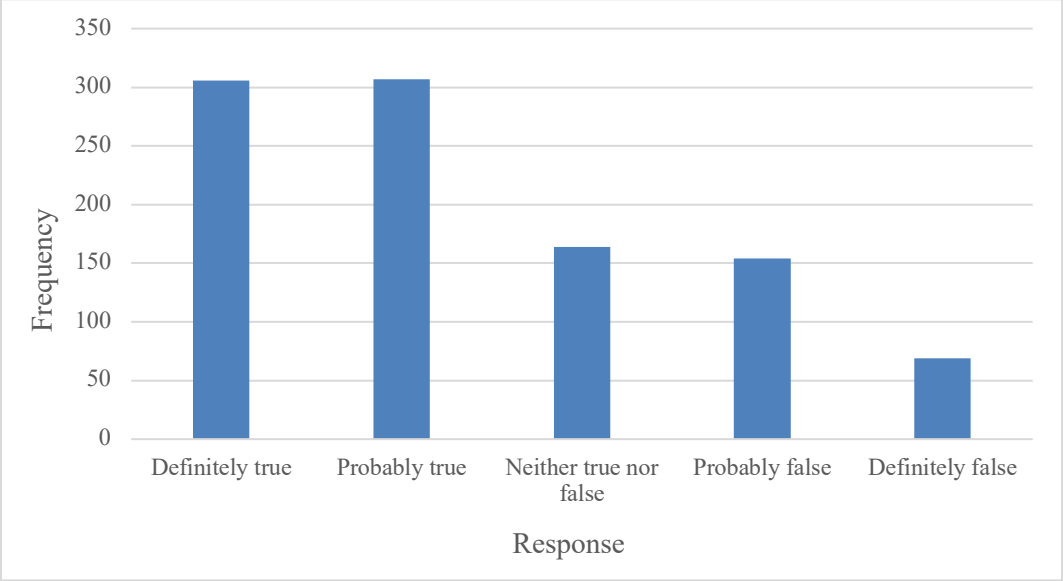

Figure 4.5. Participant Response to *"Use By"* Label Indicating the Product *"Must be eaten on or before <date>"*

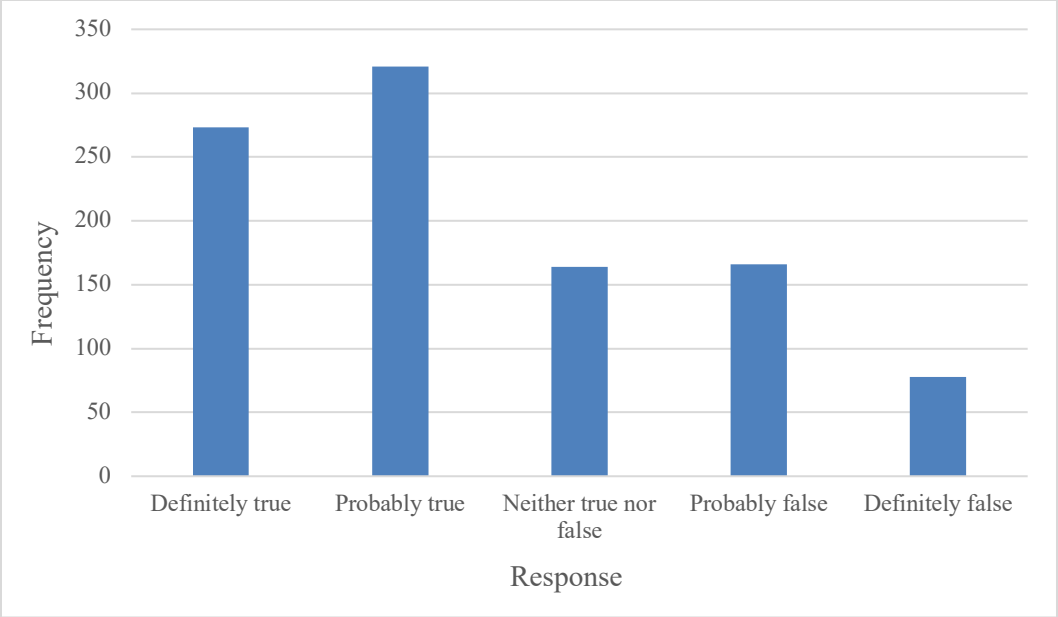

Figure 4.6. Participant Response to *"Use By"* Label Indicating the Product *"Should Not be eaten after <date>"*

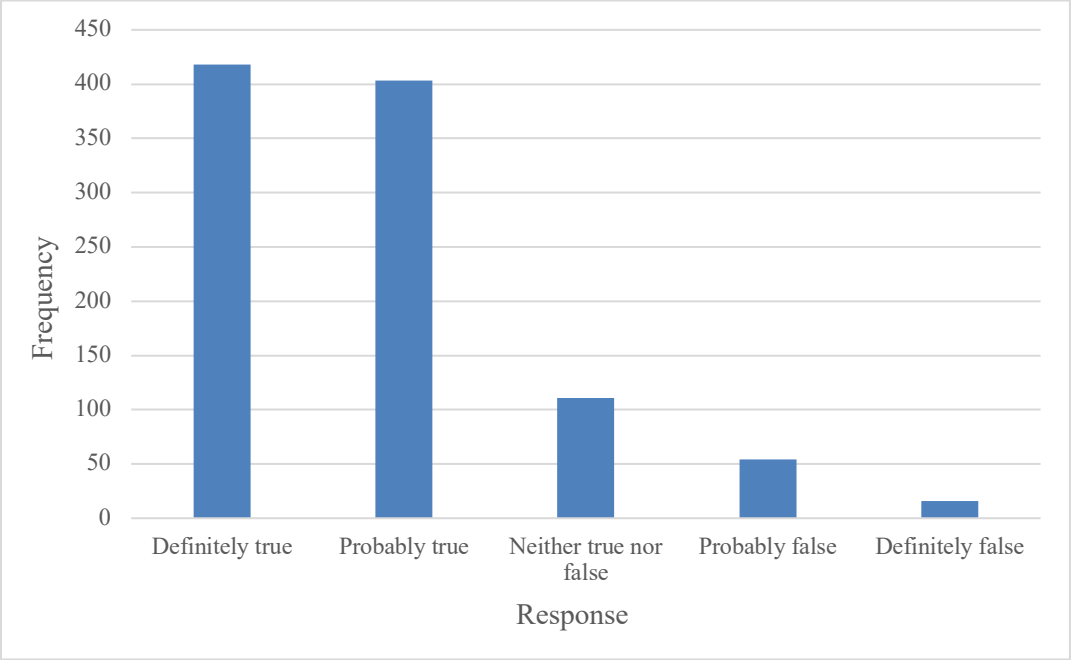

Figure 4.7. Participant Response to *"Use By"* Label Indicating the Product *"will be of best flavor or quality on or before <date>"*

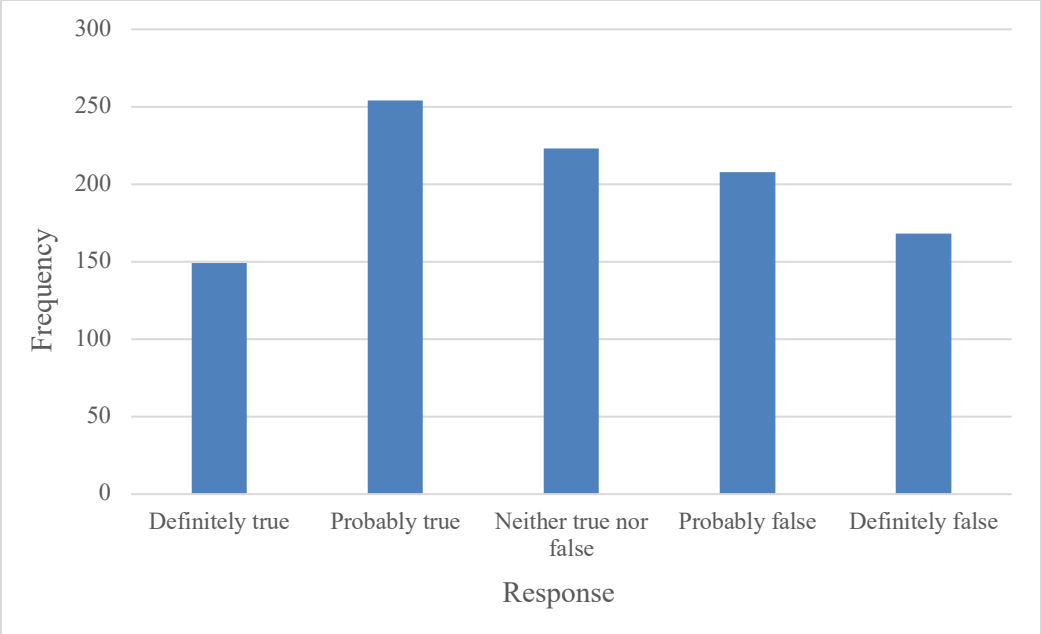

Figure 4.8. Participant Response to *"Use By"* Label Indicating the Label Date is Not a Safety Date.

The two main responses for the *Sell By* Must, Should Not, and Display questions were Definitely True and Probably True. Probably True was the top response for the *Sell By* Not Safe question, while the remaining responses were distributed uniformly. These results are summarized in Figures 4.9 through 4.12.

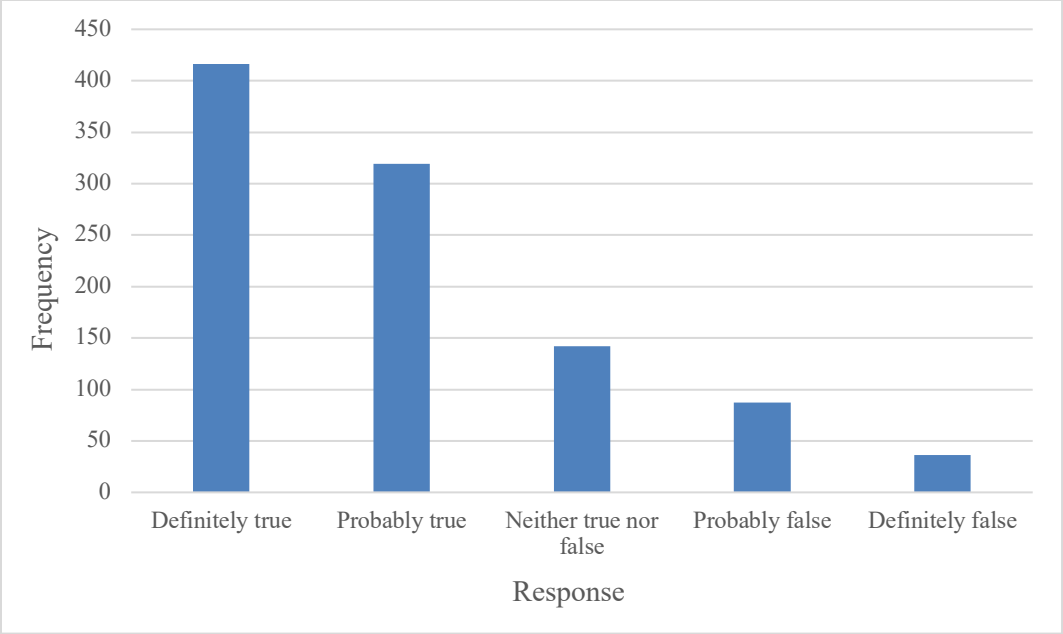

Figure 4.9. Participant Response to *"Sell By"* Label Indicating the Product *"Must be purchased on or before <date>"*

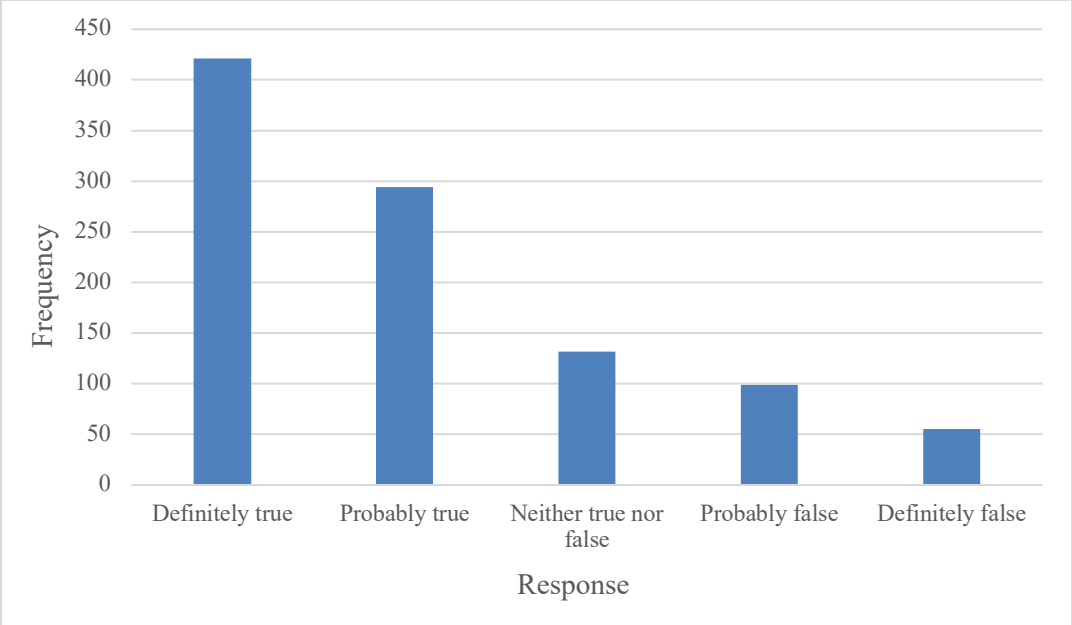

Figure 4.10. Participant Response to *"Sell By"* Label Indicating the Product *"Should Not be purchased after <date>"*

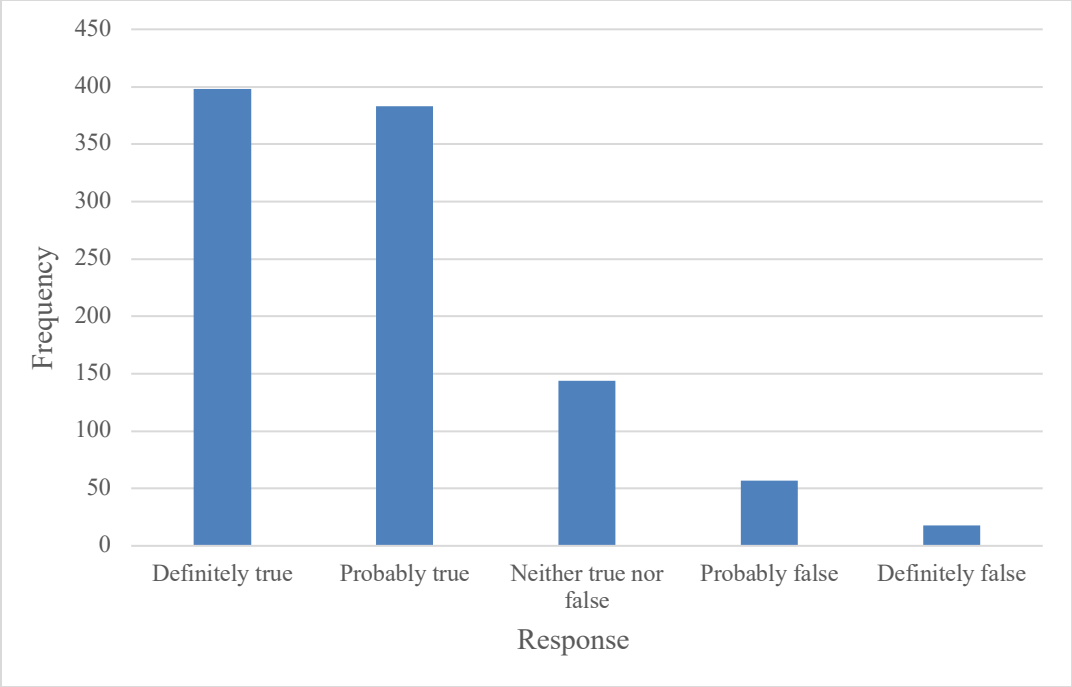

Figure 4.11. Participant Response to *"Sell By"* Label Indicating Display Length of the Product for *"Inventory Management"*

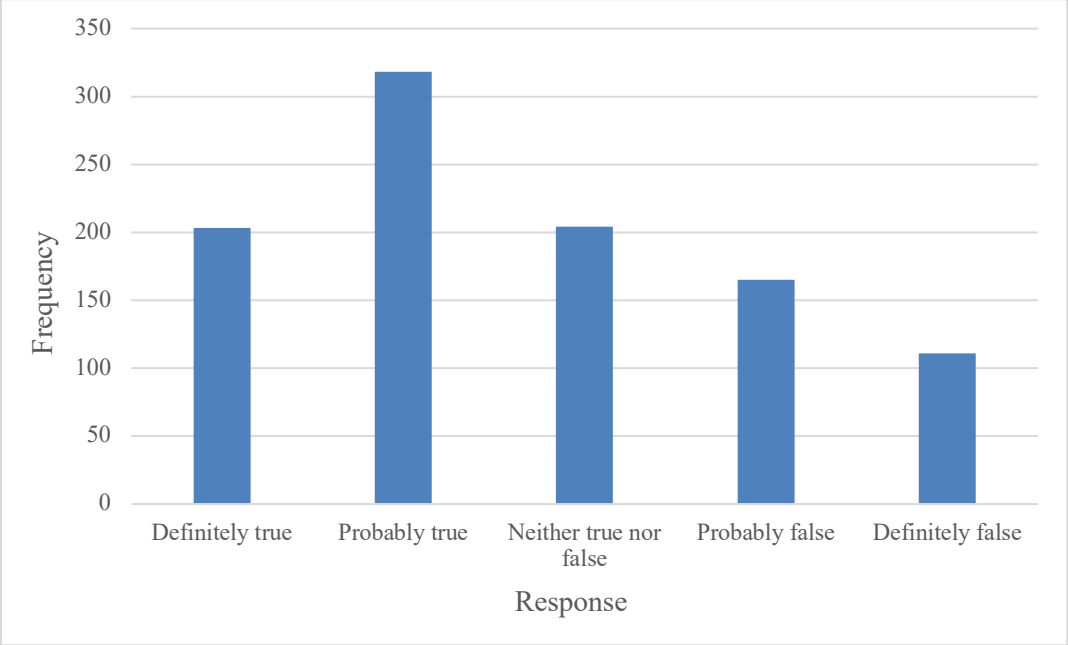

Figure 4.12. Participant Response to *"Sell By"* Label Indicating the Label Date is Not a Safety Date.

4.2. Sight or Smell versus Label Date Usage Results

The second objective was to determine if the survey respondent's use of sight or smell versus the defined label date differed among the demographic variables. The question was posed on a zero to ten scale with zero indicating *only* sight or smell and ten indicating *only* label date was used to determine whether to discard the product. The scale was consolidated for the chi-squared test with 0 to 3 indicating sight or smell, 4 to 6 indicating neutral (indifferent between sight or small and label date), and 7 to 10 indicating primarily label date when determining whether to discard a product. The results are summarized in Table 4.4.

Similar to Tables 4.1, 4.2, and 4.3, Same and Different were used to indicate if the use of sight/smell versus label date for the perishable items differed among the demographic variables. The majority of the results leaned toward being interpreted the same. Bakery items were mostly interpreted differently while salad and solid dairy items were mostly interpreted the same among the demographic variables.

Table 4.4. Chi-Squared Test Outcome of Sight or Smell versus Label Date by Demographic Category

	Fruit	Vegetables	Salad	Liq. Dairy	Sol. Dairy	Meat	Bakery
Gender	**Same**	**Same**	**Same**	**Same**	**Same**	Different	**Same**
Age	Different	**Same**	**Same**	Different	Different	**Same**	Different
Race	**Same**	**Same**	**Same**	Different	Different	**Same**	Different
Region	**Same**	Different	**Same**	**Same**	**Same**	**Same**	**Same**
Education Level	Different	Different	Different	Different	**Same**	Different	Different
Marital Status	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**
Income Level	Different	**Same**	**Same**	**Same**	**Same**	**Same**	**Same**
Primary Shop. Stat.	**Same**	Different	**Same**	**Same**	**Same**	Different	Different
Same: 37, Different: 19							

The second objective was also to determine if the use of sight or smell versus label date varied among the different perishable items. The results for fruit, vegetables, and salad leaned

more towards sight/smell usage. The liquid dairy results leaned more towards label date usage. Solid dairy and meat results were distributed evenly with label date usage as the top response. Lastly for bakery items, the results were distributed evenly, and the top response was a combination of sight/smell and label date usage. Therefore, results that were lower numerically mainly used sight/smell; results for the middle value used a combination of sight/smell and label date; and results that were higher numerically mainly used the label date. These results are summarized in Figures 4.13 through 4.19.

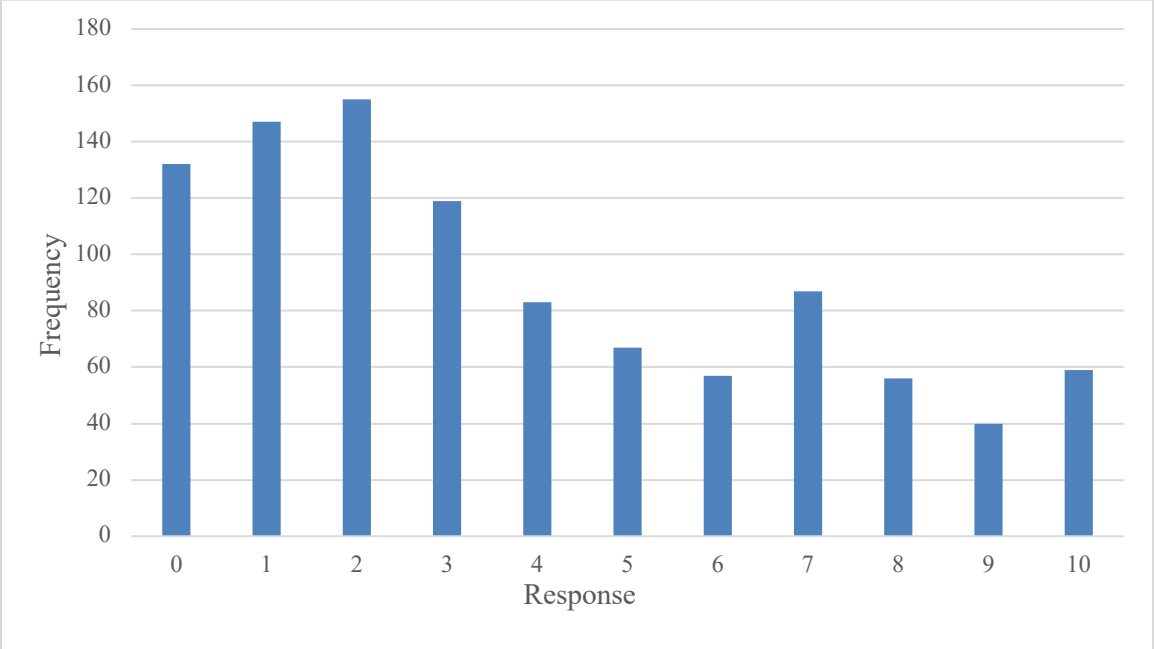

Figure 4.13. Participant Use of Sight or Smell versus Label Date When Considering Discarding Fruits (0 = Only Sight or Smell; 10 = Only Label Date).

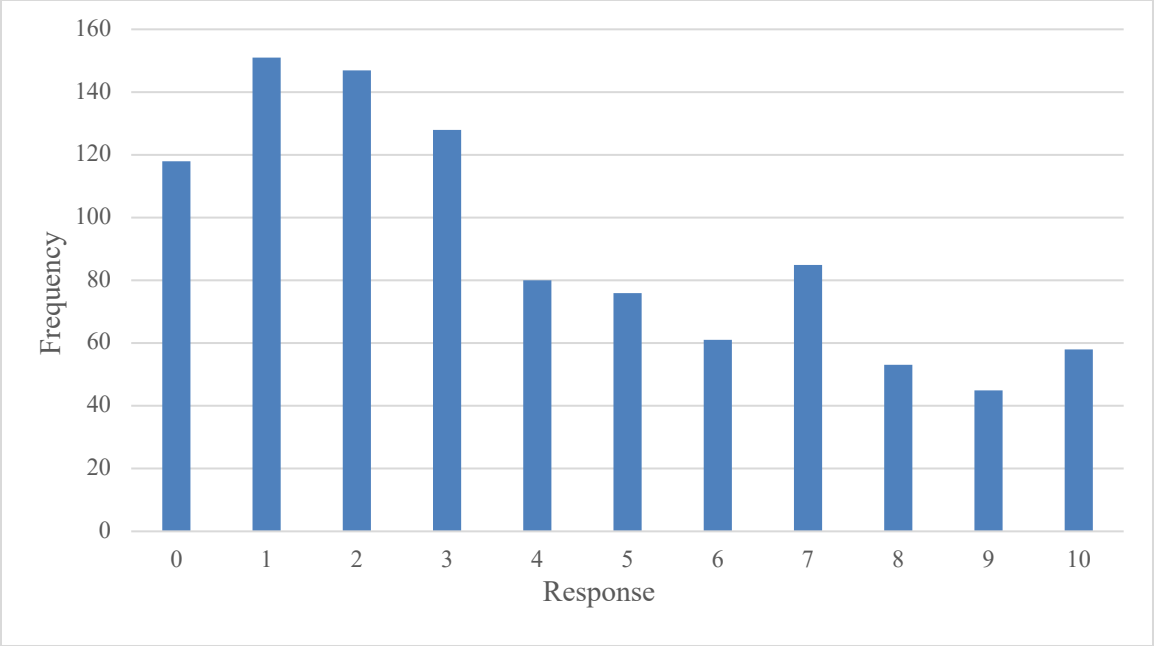

Figure 4.14. Participant Use of Sight or Smell versus Label Date When Considering Discarding Vegetables (0 = Only Sight or Smell; 10 = Only Label Date).

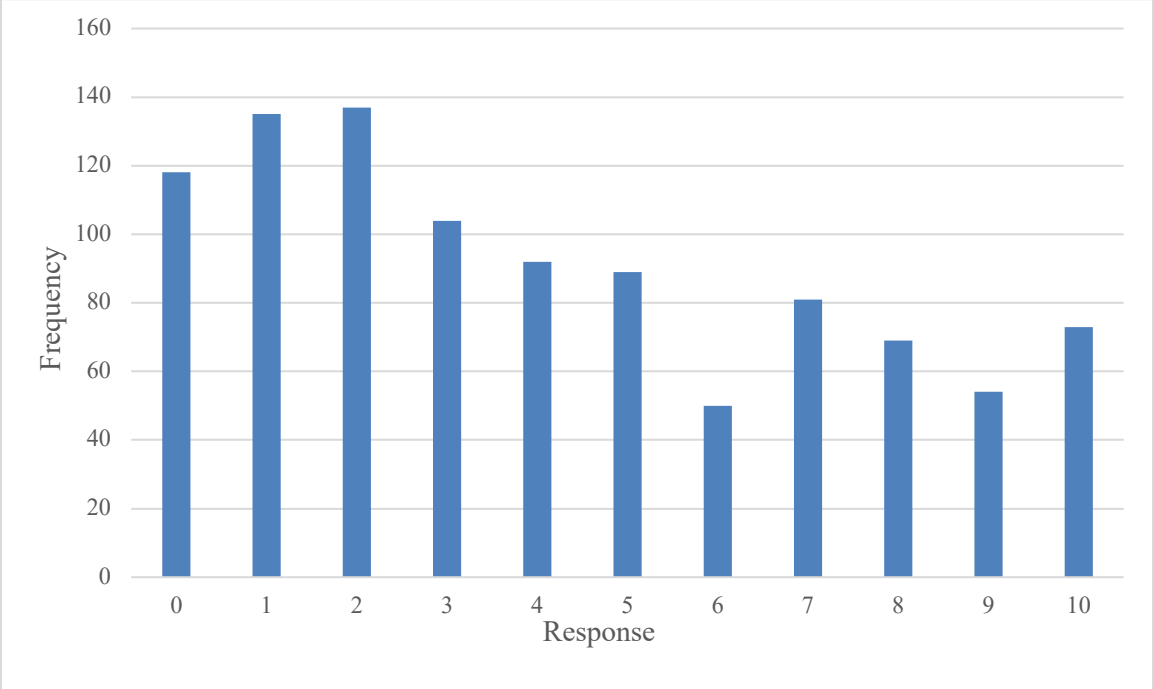

Figure 4.15. Participant Use of Sight or Smell versus Label Date When Considering Discarding Salad and Greens (0 = Only Sight or Smell; 10 = Only Label Date).

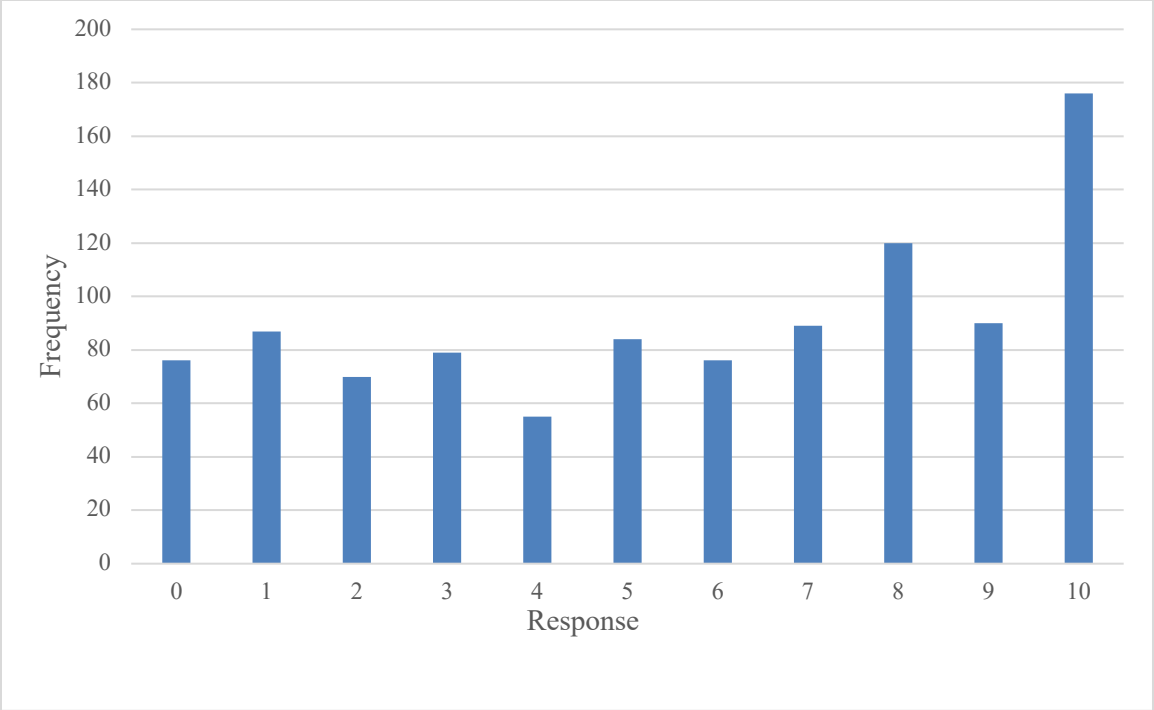

Figure 4.16. Participant Use of Sight or Smell versus Label Date When Considering Discarding Liquid Dairy (0 = Only Sight or Smell; 10 = Only Label Date).

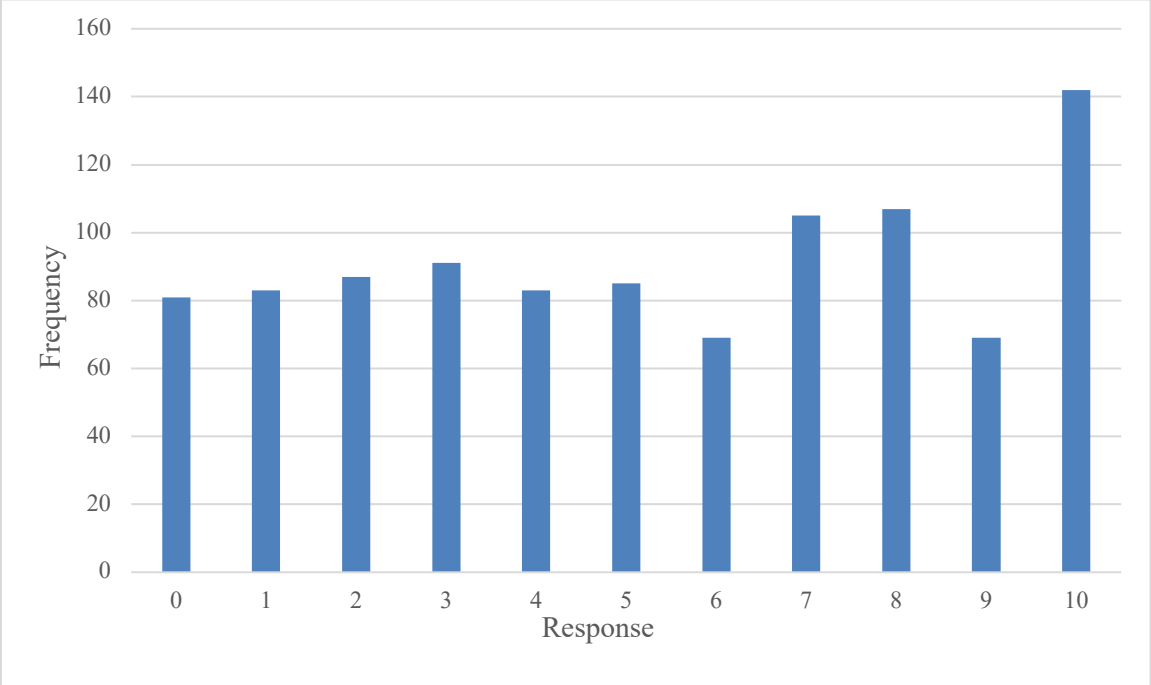

Figure 4.17. Participant Use of Sight or Smell versus Label Date When Considering Discarding Solid Dairy (0 = Only Sight or Smell; 10 = Only Label Date).

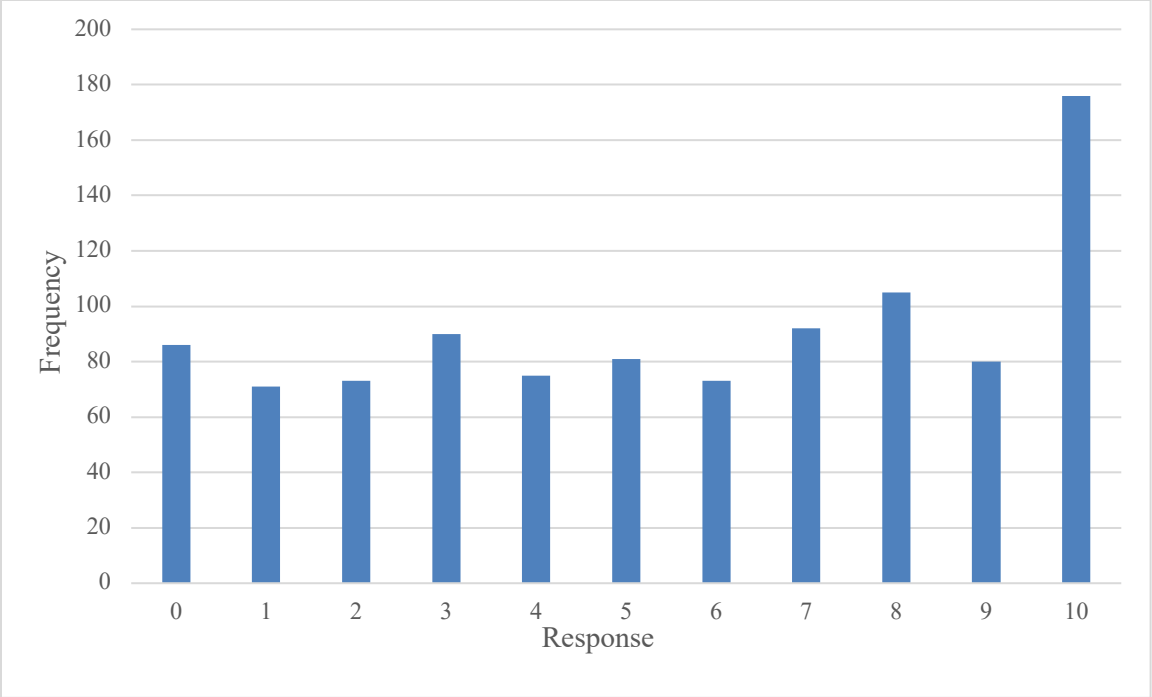

Figure 4.18. Participant Use of Sight or Smell versus Label Date When Considering Discarding Fresh Meat (0 = Only Sight or Smell; 10 = Only Label Date).

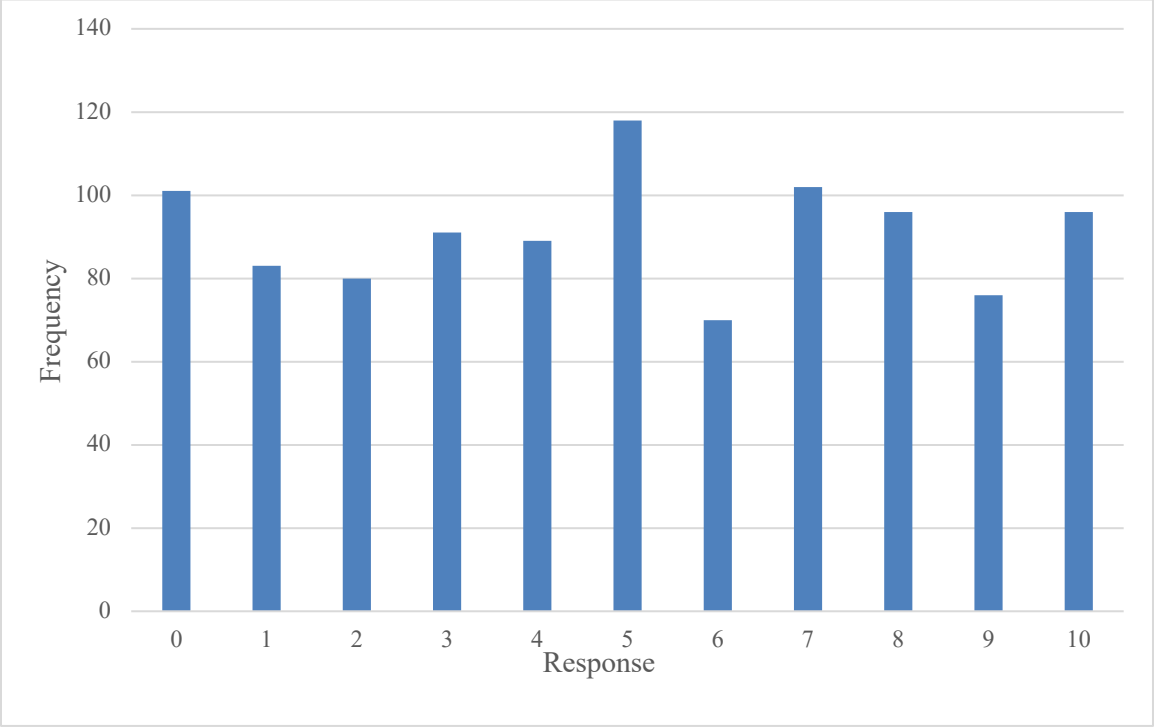

Figure 4.19. Participant Use of Sight or Smell versus Label Date When Considering Discarding Bakery Items (0 = Only Sight or Smell; 10 = Only Label Date).

4.3. Eating Past the Label Date and Food Waste Importance Results

The third objective was to determine if eating past the label date and issue of food waste differed among the demographic variables. These results are summarized in Table 4.5.

Table 4.5. Chi-Squared Test Outcome of "East Past Label Date" and "Food Waste Importance" by Demographic Category

	Eat Past Label Date	Food Waste Importance
Gender	Different	**Same**
Age	Different	Different
Race	**Same**	**Same**
Region	**Same**	**Same**
Education Level	Different	**Same**
Marital Status	Not Applicable	**Same**
Income Level	Different	**Same**
Primary Shopper Status	Different	**Same**

Same: 9, Different: 6

Following the layout of the previous tables, Same and Different were used to distinguish the chi-square test outcomes. Eating Past the Label Date was interpreted differently among the majority of the demographic categories. The chi-square test for the 'Marital Status' demographic category came out inconclusive. Age was the only demographic variable that resulted in the issue of food waste being viewed differently.

The provided responses for the "Eating Past the Label Date" question were Frequently, Often, Sometimes, Rarely, and Never with sometimes being the top response to the question. The provided responses for the issue of food waste were Strongly Agree, Agree, Somewhat Agree, Neither Agree nor Disagree, Somewhat Disagree, Disagree, and Strongly Disagree. Strongly Agree and Agree were the two main responses followed by Somewhat Agree and Neither Agree nor Disagree. These results are summarized in Figures 4.20 and 4.21.

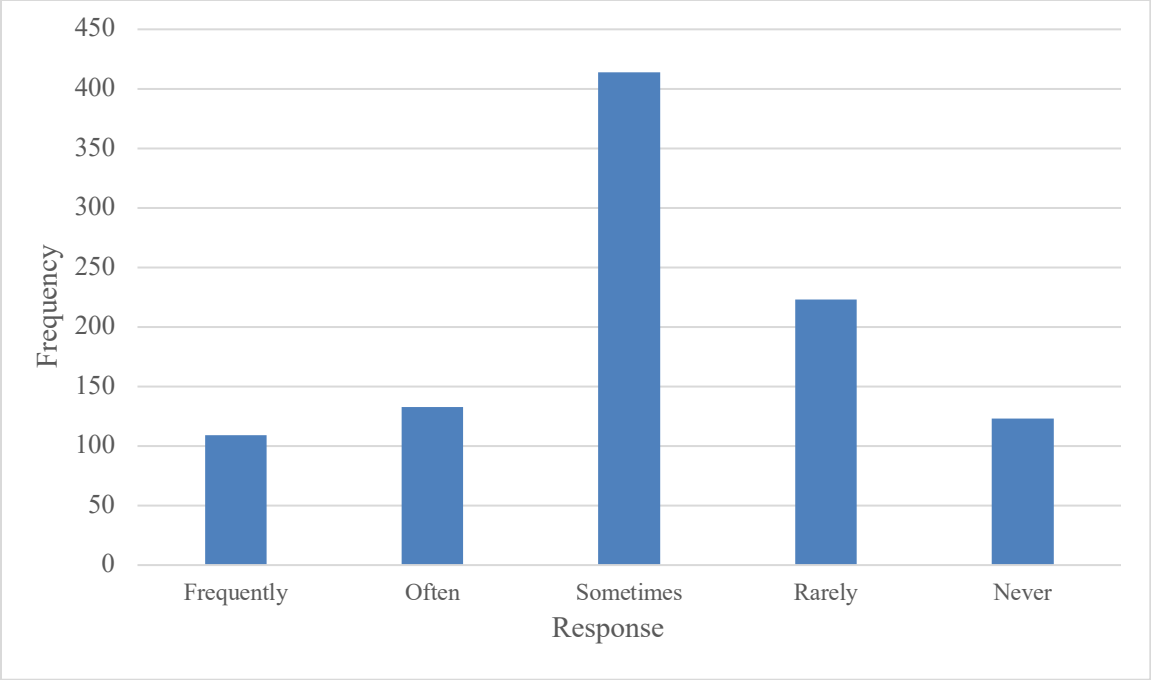

Figure 4.20. Participant Response for Eating Food Past the Defined Label Date.

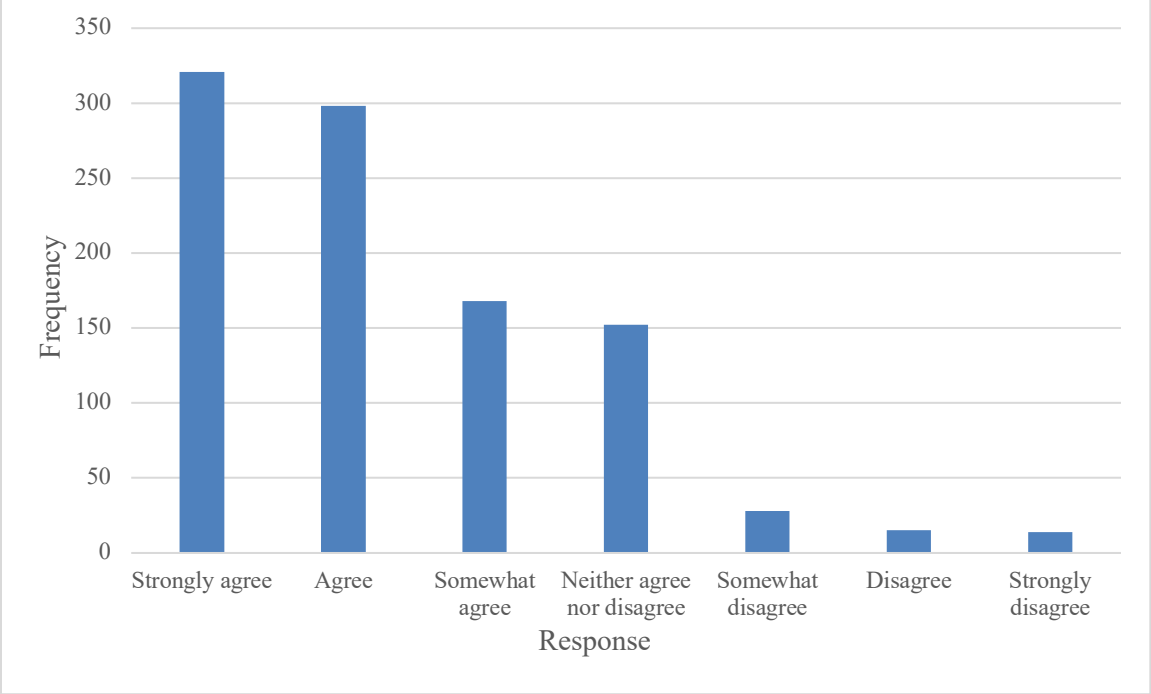

Figure 4.21. Participant Response to the *"Food Waste Is Important to You"* Survey Question

4.4. Consumer Utility and Willingness to Reduce Food Waste Results

The fourth and final objective was to estimate consumer utility as a function of Large Package Percent Loss (Waste), Small Package Percent Price Increase, Package Size, Product, Other Product, Age, Race, Region, Education Level, Marital Status, Income Level, Primary Shopper Status, and Self-Identified Food Waste Importance. The results without and with respondent demographics are presented in Tables 4.6 and 4.7.

Table 4.6. Conditional (Fixed-Effects) Logit Results Excluding Respondent Demographics (n = 978)

Variable	Estimate	Standard Error	z-Value	P>z
*Large Package Percent Loss (Waste)****	-0.011	0.0027	-4.20	0
*Small Package Percent Price Increase****	-0.011	0.0014	-8.09	0
Package Size				
Large***	1.528	0.1242	12.30	0
Small***	1.919	0.0841	22.82	0
Product				
Strawberries**	0.262	0.1186	2.21	0.027
Baby Carrots**	0.414	0.1749	2.37	0.018
Grapes	0.043	0.1114	0.39	0.697
Packaged Salad Mix	default			
Other Product				
Other Product***	-1.361	0.1512	-9.00	0
Packaged Salad Mix	default			

Note: **Significant at P ≤ 0.05 (5%)
***Significant at P ≤ 0.01(1%)

Table 4.7. Conditional (Fixed-Effects) Logit Results Including Respondent Demographics (n = 978)

Variable	Estimate	Standard Error	z Value	P>z
*Large Package Percent Loss (Waste)****	-0.011	0.0027	-3.97	0
*Small Package Percent Price Increase****	-0.012	0.0014	-8.13	0
Package Size				
Large	12.929	882.1035	0.01	0.988
Small	13.351	882.1035	0.02	0.988
Product				
Strawberries	0.208	0.1275	1.63	0.103
Baby Carrots***	0.550	0.1918	2.87	0.004
Grapes	0.018	0.1189	0.15	0.882
Package Salad Mix	default			
Other Product				
Other Product***	-1.287	0.1657	-7.76	0
Packaged Salad Mix	default			
Age Category				
18-24	-12.777	882.1047	-0.01	0.988
25-34	-12.588	882.1047	-0.01	0.989
35-44	-12.867	882.1047	-0.01	0.988
45-54	-12.933	882.1047	-0.01	0.988
55-64	-13.320	882.1047	-0.02	0.988
65-74	-13.386	882.1047	-0.02	0.988
75-84	-13.473	882.1048	-0.02	0.988
85-94	-14.209	882.1050	-0.02	0.987
Race				
American Indian or Alaska Native	0.668	0.4822	1.39	0.166
Asian	-0.274	0.2042	-1.34	0.18
Black or African American**	-0.356	0.1564	-2.28	0.023
Hispanic or Latino***	-0.610	0.1315	-4.64	0
Native Hawaiian or Pacific Islander	-0.626	0.6426	-0.97	0.33
Other**	-0.612	0.2803	-2.18	0.029
White	default			
Region				
Midwest	0.052	0.1432	0.36	0.716
Northeast	-0.161	0.1482	-1.09	0.276
South	0.181	0.1321	1.37	0.17
West	default			

Note: *Significant at P≤ 0.10(10%)
**Significant at P≤ 0.05(5%)
***Significant at P≤ 0.01(1%)

Table 4.7 (continued). Conditional (Fixed-Effects) Logit Results Including Respondent Demographics (n = 978)

Variable	Estimate	Standard Error	z Value	P>z
Education Level				
Less than a High School Degree	-0.356	0.2204	-1.61	0.107
High School Degree or Equivalent	-0.091	0.1437	-0.63	0.528
Associate's Degree***	-0.682	0.1735	-3.93	0
Bachelor's Degree*	-0.250	0.1516	-1.65	0.099
Master's Degree*	-0.329	0.1852	-1.78	0.075
Doctorate Degree**	-0.636	0.3203	-1.99	0.047
Professional Degree*	-0.517	0.2873	-1.8	0.072
Some College, No Degree	default			
Marital Status				
Single (Never Married)*	0.444	0.2486	1.79	0.074
Married	0.366	0.2367	1.55	0.122
Divorced*	0.446	0.2656	1.68	0.093
Prefer Not to Say	-0.514	0.5173	-0.99	0.32
Widowed	default			
Income Level				
$15,000-$24,999	-0.160	0.1878	-0.85	0.393
$25,000-$34,999***	0.532	0.1924	2.76	0.006
$35,000-$49,999***	0.528	0.1951	2.71	0.007
$50,000-$74,999***	0.472	0.1710	2.76	0.006
$75,000-$99,999***	0.673	0.1960	3.43	0.001
$100,000-$149,999***	0.733	0.2010	3.65	0
$150,000-$199,999***	1.211	0.3047	3.97	0
$200,000+	0.044	0.2279	0.19	0.848
Under $15,000	default			
Primary Shopper Status				
ALL the Grocery Shopping***	0.488	0.1262	3.87	0
MOST of the Grocery Shopping***	0.354	0.1366	2.59	0.01
RARELY do the Grocery Shopping	0.040	0.3037	0.13	0.895
SOME of the Grocery Shopping	default			
Self-Identified Food Waste Importance				
Strongly Agree***	1.014	0.3859	2.63	0.009
Agree**	0.882	0.3867	2.28	0.022
Somewhat Agree	0.587	0.3884	1.51	0.131
Neither Agree nor Disagree	0.463	0.3987	1.16	0.246
Somewhat Disagree*	1.082	0.5553	1.95	0.051
Disagree	0.978	0.6534	1.5	0.134
Strongly Disagree	default			

Note: *Significant at P≤ 0.10(10%)
**Significant at P≤ 0.05(5%)
***Significant at P≤ 0.01(1%)

From Table 4.7, which controls for respondent factors, large package percent loss and small package percent price increase are both negative and significant at the 1% level. This indicates that as the large package percent loss and small package price increased, consumer utility decreased. The price outcome follows consumer theory, and the percent waste outcome indicates consumers receive greater utility when food waste is decreased. The estimates associated with package size, large and small, were both positive, and the small package estimate was more positive. Therefore, respondents received greater utility from choosing the smaller package compared to the larger package. Strawberries, baby carrots, and grapes all increase utility relative to the base product packaged salad mix. Respondents that did not select one of the four products – defined as "Other Product" – received less utility relative to packaged salad mix.

For each demographic category, respondents received some level of utility for choosing a product. The 'Under $15,000' income level, 'I do SOME of the Grocery Shopping' primary shopper option, White race, West region, 'Some College, No Degree' education level, Widowed marital status, and 'Strongly Disagree' option for food waste importance were omitted as default dummy variable groups.

To determine if consumers receive more utility by reducing food waste, consumer willingness to reduce food waste was estimated by taking the ratio of the small package and large package percent loss (waste) coefficients, and the ratio of the large package and small package percent price increase coefficients (using equations 3.8 and 3.9). The small package, large package percent loss (waste), large package, and small package percent price increase coefficients used can be found in Table 4.6.

$$Willigness\ to\ Reduce\ Food\ Waste = -\frac{1.919}{-0.011} = 174.455$$

$$Willingness\ to\ Reduce\ Food\ Waste = -\frac{1.528}{-0.011} = 138.909$$

When consumers choose the small package and give up the large package loss, their utility increases by 74.455%. When consumers choose the large package and give up the small package price increase, their utility increases by 38.909%. This indicates that consumers increase their utility more from purchasing a small package when large package loss increases relative to purchasing a large package when small package price increases. Therefore, consumers are willing to reduce food waste to obtain a higher level of utility.

A chi-squared test was performed on the large and small package variables to determine if they were statistically different from each other. The hypothesis was:

$$H_0: Large\ Package = Small\ Package$$

$$H_A: Large\ Package \neq Small\ Package$$

The chi-square results were:

$$\chi^2 = 15.98, Degrees\ of\ Freedom = 1$$

$$p - value = 0.0001$$

The chi-square test indicates that consumer utility derived from the small package relative to the large package is statistically greater at the 0.0001% significance level which is smaller than the 10%, 5%, 1% significance levels. Therefore, we conclude that respondents receive a higher level of utility by choosing the small package, and the small package is statistically different from the large package.

CHAPTER V

SUMMARY AND IMPLICATIONS

The first objective, second objective, and third objective were to determine if label interpretation, sight/smell versus label date usage, eating past the label date, and the issue of food waste differed among the demographic variables of gender, age, race, region, education level, marital status, income level, and primary shopper status. A series of chi-square tests were performed to accomplish these objectives. The *Best if Used By* and *Use By* labels were interpreted differently across the demographic categories, thus could be perceived as a more ambiguous label, while the *Sell By* label was interpreted more consistently among the demographic variables. The sight/smell versus label date usage were interpreted almost evenly, with more of the results being interpreted the same. Bakery items were interpreted differently while salad and solid dairy items were interpreted the same among the demographic variables. The majority of the demographic variables interpreted eating past the label date differently while age was the only demographic variable that interpreted the issue of food waste differently. Some of the responses were uniformly distributed, but the majority of the questions had one or two dominant responses.

Based on these results, it may be necessary to use one style of label dating terminology that offers consistency across the board. The labels in place result in much confusion and ambiguity for shoppers. The *Best If Used By* label was the most ambiguous interpreted label, and the *Sell By* label was the most consistent interpreted label. The *Use By* label fell in the middle and was not interpreted as ambiguous as the *Best If Used By* label and was not interpreted as consistent as the *Sell By* label. Therefore, these results should be taken into consideration by

manufacturers, who determine the expiration labels, to determine if a universal label date is a possible solution to lessen consumer ambiguity on label dating terminology.

The fourth objective was to estimate consumer utility as a function of large package percent loss (waste), small package percent price increase, package size, product, other product, age, race, region, education level, marital status, income level, primary shopper status, and self-identified food waste importance. The large package percent loss (waste) and small package percent price increase estimates were both negative and significant at the 1% level. As the level of waste on the large package and the price increased on the small package, consumer utility decreased, indicating that consumers receive less utility when food waste is increased.

To determine if consumers receive more utility by reducing food waste, consumer willingness to reduce food waste was estimated, which followed the framework of the traditional willingness to pay (WTP) calculation. The ratio of the small package and large package percent loss (waste) coefficients resulted in a willingness of 174.455, which is a 74.455% increase of consumer utility. The ratio of the large package and small package percent price increase coefficients resulted in a willingness of 138.909, which is a 38.909% increase of consumer utility. Consumers receive more utility by choosing the small package and giving up the large package loss relative to choosing the large package and giving up the small package price increase. Therefore, consumers are willing to reduce food waste to obtain a higher level of utility.

The estimates for the large package and small package variables were positive with the small package variable estimate being more positive. A chi-square test was performed on the large and small package variables to determine if the two package sizes were statistically different from each other. The results of the chi-square test produced a chi-square (χ^2) value of 15.98 with one degree of freedom and a p-value of 0.0001, which indicates that consumer utility derived from the small package relative to the large package is statistically greater at the 0.0001%

significance level. Thus, it is concluded that respondents receive a higher level of utility by choosing the smaller package which is statistically different from the larger package.

When the issue of food wasted is incorporated into the decision process for shoppers, smaller packages were preferred over larger packages. Based on this result, it may be necessary for packaging companies to explore the possibility of offering smaller package sizes in grocery stores by reducing the package size of food products. As an example, strawberries, baby carrots, and grapes could come in one pound and half-pound packages as opposed to two pound and one pound packages. Packaged salad mix could only be offered in half-pound packages. This could help consumers better estimate the amount of food they would legitimately use and need when grocery shopping.

Food waste is caused by many factors. Determining a universal label date to lessen consumer ambiguity on label date terminology and offering smaller package sizes in grocery stores could be two possible solutions to help aid in food waste reduction.

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APPENDICES

APPENDIX A

IRB Approval and Qualtrics Survey

Oklahoma State University Institutional Review Board

Date: 9/10/2019

Application Number: AG-19-43

Proposal Title: Perishable Food Date Label Best Practices and Consumer Willingness to Reduce Food Waste

Principal Investigator: JOHN MICHAEL M RILEY, PhD

Co-Investigator(s): Bailey Norwood, Katlin Ramy

Faculty Adviser:

Project Coordinator:

Research Assistant(s):

Processed as: Exempt

Exempt Category:

Status Recommended by Reviewer(s): Approved

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which continuing review is not required. As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or irb@okstate.edu.

Sincerely,
Oklahoma State University IRB

Consent

Background Information
You are invited to be in a research study about the use of perishable food expiration date labeling and consumer willingness to reduce food waste. We ask that you read this form and ask any questions you may have before agreeing to be in the study. Your participation is entirely voluntary.

This study is being conducted by: Katlin Ramy, graduate student in the Department of Agricultural Economics at Oklahoma State University, under the direction of Dr. John Michael Riley, Agricultural Economics, Oklahoma State University.

Procedures
If you agree to be in this study, we would ask you to do the following things: Participate in and complete an online survey about the use of perishable food expiration date labeling and consumer willingness to reduce food waste.

Participation in the study involves the following time commitment: Approximately 20 minutes.

Risks and Benefits of being in the Study
The study involves the following foreseeable risks: There are no known risks associated with this project, which are greater than those ordinarily encountered in daily life.

The benefits to participation are: There are no direct benefits to you. More broadly, this study may help the researchers understand more about the use of perishable food expiration date labeling and consumer willingness to reduce food waste. Additionally, your participation may help shape food policy decisions with respect to food labeling and the reduction of food waste.

Compensation

You will receive [To be defined by Qualtrics] as compensation for your participation. You will receive payment [To be defined by Qualtrics]. To be eligible to receive the compensation, you need to complete the survey.

Confidentiality

The information your give in the study will be stored anonymously. This means that your name will not be collected or linked to the data in any way. Only the researchers will know that you have participated in the study. While it is unlikely to occur, the researchers will be able to remove your data once your participation is complete.

The research team works to ensure confidentiality to the degree permitted by technology. It is possible, although unlikely, that unauthorized individuals could gain access to your responses because you are responding online. However, your participation in this online survey involves risks similar to a person's everyday use of the internet.

It is unlikely, but possible, that others responsible for research oversight may require us to share the information you give us from the study to ensure that the research was conducted safely and appropriately. We will only share your information if law or policy requires us to do so.

Voluntary Nature of the Study

Your participation in this research is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this project at any time. The alternative is to not participate. You can stop and exit the survey at any time.

Contacts and Questions

The Institutional Review Board (IRB) for the protection of human research participants at Oklahoma State University has reviewed and approved this study. If you have questions about the research study itself, please contact the Principal Investigator at (405) 744-6163 or john.m.riley@okstate.edu. If you have questions about your rights as a research volunteer or would simply like to speak with someone other than the research team about concerns regarding this study, please contact the IRB at (405) 744-3377 or irb@okstate.edu. All reports or correspondence will be kept confidential.

Statement of Consent

I have read the above information. I have had the opportunity to ask questions and have my questions answered. I consent to participate in the study.

To save a copy of this form for your records: Riley-Ramy IRB Survey Consent Form.pdf

If you agree to participate in this research, please click "I Agree" to complete the attached survey.

- o I Agree
- o I DO NOT Agree

Demographics

What is your gender?

- o Male
- o Female
- o Other (please specify) [ ]
- o Prefer not to say

What year were you born? (yyyy - e.g. 1994)

[ ]

What is your ethnicity?

- White
- Black or African American
- American Indian or Alaska Native Asian
- Native Hawaiian or Pacific Islander
- Hispanic or Latino
- Other

What is your marital status?

- Single (never married)
- Married
- Divorced
- Widowed
- Prefer not to say

What is your zip code?

In which region of the US do you reside?

- Northeast
- Midwest
- South
- West
- I do not live in the US

What is the highest degree or level of school you have completed?

- Less than a high school diploma
- High school degree or equivalent
- Some college, no degree
- Associate's degree (e.g. AA, AS)
- Bachelor's degree (e.g. BA, BS)
- Master's degree (e.g. MA, MS, MEd)
- Doctorate (e.g. PhD, EdD)
- Professional degree (e.g. DDS, MD)
- Other

What is your current employment status? Please check all that apply.

- ☐ Employed full-time (40+ hours a week)
- ☐ Employed part-time (less than 40 hours a week)
- ☐ Unemployed (currently looking for work)
- ☐ Unemployed (not currently looking for work)
- ☐ Student part-time
- ☐ Student full-time
- ☐ Retired
- ☐ Self-employed
- ☐ Unable to work

How many total children (under 18) live in your household?

What is your household income?

- o Under $15,000
- o $15,000-$24,999
- o $25,000-$34,999
- o $35,000-$49,999
- o $50,000-$74,999
- o $75,000-$99,999
- o $100,000-$149,999
- o $150,000-$199,999
- o $200,000+

How much does your household typically spend on groceries each month?

Amount ($)

0	100	200	300	400	500

Periphery Questions

In a typical month, indicate the percentage of grocery shopping decisions you make for your household?

% of decisions

0 10 20 30 40 50 60 70 80 90 100

Who is the primary grocery shopper in your household?

- o I do ALL of the grocery shopping
- o I do MOST of the grocery shopping
- o I do SOME of the grocery shopping
- o I RARELY do the grocery shopping

Typically, how many times does the primary shopper in your household visit the grocery store?

- o less than one time per month
- o one time per month
- o every two weeks
- o once per week
- o twice per week
- o three to four times per week
- o everyday

Typically, how many times do you visit the grocery store?

- o less than one time per month
- o one time per month
- o every two weeks
- o once per week
- o twice per week
- o three to four times per week
- o everyday

In a typical month, how many times do you consume meals outside of the home?

- o 1-3
- o 4-6
- o 7-9
- o 10-12
- o 12-18

- 18 or more

What percentage of your typical household monthly income do you spend on groceries?

% of income

0 10 20 30 40 50 60

Label Importance

How closely do you pay attention to the label date when buying food?

- Never
- Rarely
- Occasionally
- Frequently
- Always

How important is the label date when purchasing the following food items?

	Not at all important	Slightly important	Moderately important	Very important	Extremely important	Not applicable
Fruits	○	○	○	○	○	○
Vegetables	○	○	○	○	○	○
Salad & Greens	○	○	○	○	○	○
Liquid Dairy (eg, Milk)	○	○	○	○	○	○
Solid Dairy (eg, cheese)	○	○	○	○	○	○
Fresh Meat	○	○	○	○	○	○
Bakery Goods	○	○	○	○	○	○

Rate the typical occurrence of food products you throw away.

	Never	Rarely	Sometimes	Often	Always
Fruits	○	○	○	○	○
Vegetables	○	○	○	○	○
Salad & Greens	○	○	○	○	○
Liquid Dairy (eg, Milk)	○	○	○	○	○
Solid Dairy (eg, cheese)	○	○	○	○	○
Fresh Meat	○	○	○	○	○
Bakery Goods	○	○	○	○	○

Who sets the expiration date for products at the grocery store?

- o Retailer
- o Company that produces the product
- o Company that packages the product
- o The farmer
- o The government
- o I do not know

Which of these expiration date labels have you seen on food products? Please check all that apply.

- ☐ Best By
- ☐ Hazardous After
- ☐ Sell By
- ☐ Use By
- ☐ Use or Freeze By
- ☐ Eat or Discard By
- ☐ Never Spoils
- ☐ Best If Used By

In your own words, explain what a food label date attempts to convey to the buyer.

Label Understanding

"Best If Used By April 12, 2020" means that the product MUST be eaten on or before April 12, 2020.

- o Definitely true
- o Probably true
- o Neither true nor false
- o Probably false
- o Definitely false

"Best If Used By April 12, 2020" means that the product SHOULD NOT be eaten after April 12, 2020.

- o Definitely true
- o Probably true
- o Neither true nor false
- o Probably false
- o Definitely false

"Best If Used By April 12, 2020" date indicates a product will be of best flavor or quality on or before April 12, 2020.

- o Definitely true
- o Probably true
- o Neither true nor false
- o Probably false
- o Definitely false

"Best If Used By" is not a purchase or safety date.

- o Definitely true
- o Probably true
- o Neither true nor false
- o Probably false
- o Definitely false

"Use By April 12, 2020" means that the product MUST be eaten on or before April 12, 2020.

- o Definitely true
- o Probably true
- o Neither true nor false
- o Probably false

- Definitely false

"Use By April 12, 2020" means that the product SHOULD NOT be eaten after April 12, 2020.

- Definitely true
- Probably true
- Neither true nor false
- Probably false
- Definitely false

"Use By April 12, 2020" indicates April 12, 2020 is the last day recommended for the use of the product while peak quality.

- Definitely true
- Probably true
- Neither true nor false
- Probably false
- Definitely false

"Use By" is not a safety date except for infant formula.

- Definitely true
- Probably true
- Neither true nor false
- Probably false
- Definitely false

"Sell By April 12, 2020" means that the product MUST be purchased on or before April 12, 2020.

- Definitely true
- Probably true
- Neither true nor false
- Probably false
- Definitely false

"Sell By April 12, 2020" means that the product SHOULD NOT be purchased after April 12, 2020.

- Definitely true

- Probably true
- Neither true nor false
- Probably false
- Definitely false

"Sell By" tells the store how long to display the product for sale for inventory management.

- Definitely true
- Probably true
- Neither true nor false
- Probably false
- Definitely false

"Sell By" is not a safety date.

- Definitely true
- Probably true
- Neither true nor false
- Probably false
- Definitely false

Discard

Do you ever eat food past the label date?

- Frequently
- Often
- Sometimes
- Rarely
- Never

Indicate how the proportion of your decision to discard an item stems from sight/smell versus label dates for the following food categories.

	Sight/Smell Only									Date Only
	0	1	2	3	4	5	6	7	8	9	10
Fruits											
Vegetables (excl greens)											
Salads & Greens											
Liquid Dairy (eg, milk)											
Solid Dairy (eg, cheese)											
Fresh Meat											
Bakery Items											

Of all the food products in your residence, which specific item do you typically discard most often?

Product Choice

Which of the following items do you consume most often?

- o Strawberries
- o Grapes
- o Baby Carrots
- o Packaged Salad Mix
- o I do not consume any of these items

STRBRY-Pics

For the next few questions, please assume that ${q://QID42/ChoiceGroup/SelectedChoices} are on your shopping list. Also, in these questions the "best if used by" date indicates when a product will be of best flavor or quality. It is not a purchase or safety date.

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
25% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $1.50/pound or $1.50/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
33% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $1.50/pound or $1.50/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
50% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $1.50/pound or $1.50/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
25% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $1.65/pound or $1.65/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
33% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $1.65/pound or $1.65/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
50% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $1.65/pound or $1.65/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
25% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $1.88/pound or $1.88/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
33% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $1.88/pound or $1.88/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
50% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $1.88/pound or $1.88/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
25% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $2.25/pound or $2.25/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
33% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $2.25/pound or $2.25/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of strawberries
50% chance you will not eat all the strawberries
Price: $1.50/pound or $3.00/package

1 pound package of strawberries
0% chance you will not eat all the strawberries
Price: $2.25/pound or $2.25/package

I DO NOT PREFER THESE OPTIONS

BCAR-Pics

For the next few questions, please assume that ${q://QID42/ChoiceGroup/SelectedChoices} are on your shopping list. Also, in these questions the "best if used by" date indicates when a product will be of best flavor or quality. It is not a purchase or safety date.

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
25% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.00/pound or $1.00/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
33% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.00/pound or $1.00/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
50% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.00/pound or $1.00/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
25% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.10/pound or $1.10/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
33% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.10/pound or $1.10/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
50% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.10/pound or $1.10/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
25% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.25/pound or $1.25/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
33% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.25/pound or $1.25/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
50% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.25/pound or $1.25/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
25% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.50/pound or $1.50/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
33% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.50/pound or $1.50/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of baby carrots
50% chance you will not eat all the baby carrots
Price: $1.00/pound or $2.00/package

1 pound package of baby carrots
0% chance you will not eat all the baby carrots
Price: $1.50/pound or $1.50/package

I DO NOT PREFER THESE OPTIONS

GRP-Pics

For the next few questions, please assume that ${q://QID42/ChoiceGroup/SelectedChoices} are on your shopping list. Also, in these questions the "best if used by" date indicates when a product will be of best flavor or quality. It is not a purchase or safety date.

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
25% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.00/pound or $1.00/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
33% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.00/pound or $1.00/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
50% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.00/pound or $1.00/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
25% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.10/pound or $1.10/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
33% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.10/pound or $1.10/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
50% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.10/pound or $1.10/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
25% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.25/pound or $1.25/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
33% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.25/pound or $1.25/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
50% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.25/pound or $1.25/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
25% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.50/pound or $1.50/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
33% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.50/pound or $1.50/package

I DO NOT PREFER THESE OPTIONS

Regarding ${q://QID42/ChoiceGroup/SelectedChoices}, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

2 pound package of grapes
50% chance you will not eat all the grapes
Price: $1.00/pound or $2.00/package

1 pound package of grapes
0% chance you will not eat all the grapes
Price: $1.50/pound or $1.50/package

I DO NOT PREFER THESE OPTIONS

SAL-Pics

For the next few questions, please assume that Packaged Salad Mix is on your shopping list. Also, in these questions the "best if used by" date indicates when a product will be of best flavor or quality. It is not a purchase or safety date.

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
25% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $3.50/pound or $1.75/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
33% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $3.50/pound or $1.75/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
50% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $3.50/pound or $1.75/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
25% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $3.85/pound or $1.93/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
33% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $3.85/pound or $1.93/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
50% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $3.85/pound or $1.93/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
25% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $4.38/pound or $2.19/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
33% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $4.38/pound or $2.19/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
50% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $4.38/pound or $2.19/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
25% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $5.25/pound or $2.63/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
33% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $5.25/pound or $2.63/package

I DO NOT PREFER THESE OPTIONS

Regarding Packaged Salad Mix, whose "best if used by" date is April 22, 2020, given the following product attributes, which would you choose?

1 pound package of salad mix
50% chance you will not eat all the salad mix
Price: $3.50/pound or $3.50/package

1/2 pound package of salad mix
0% chance you will not eat all the salad mix
Price: $5.25/pound or $2.63/package

I DO NOT PREFER THESE OPTIONS

At Home Intro

For these next few questions, please assume that you have already purchased ${q://QID42/ChoiceGroup/SelectedChoices}. You have eaten half of the ${q://QID42/ChoiceGroup/SelectedChoices} and you expect the remaining amount to spoil in 3 days.

Additionally, assume that your community has a food pantry (food bank) that allows unused food to be dropped off. They also offer an at home pick-up that can be scheduled. Drop-off requires 30 minutes of your time (travel to and from the food pantry). Pick-up requires you to be available within a two hour window (similar to scheduling a home repair).

At Home [A]

Given that half of the ${q://QID42/ChoiceGroup/SelectedChoices} will spoil in 3 days, I would:

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Throw the unused portion away	○	○	○	○	○	○	○
Plan a meal to use 25% of the remaining ${q://QID42/ChoiceGroup/SelectedChoices}	○	○	○	○	○	○	○
Plan a meal to use 50% of the remaining ${q://QID42/ChoiceGroup/SelectedChoices}	○	○	○	○	○	○	○
Plan a meal to use 75% of the remaining ${q://QID42/ChoiceGroup/SelectedChoices}	○	○	○	○	○	○	○
Plan a meal to use 100% of the remaining ${q://QID42/ChoiceGroup/SelectedChoices}	○	○	○	○	○	○	○
Donate all of the remaining amount to the food pantry via drop off (30-minute time commitment)	○	○	○	○	○	○	○
Donate all of the remaining amount to the food pantry via at home pick-up (2-hour time commitment)	○	○	○	○	○	○	○

For these next few questions, please assume that you have already purchased a fresh food item. You have eaten half of the item and you expect the remaining amount to spoil in 3 days.

Additionally, assume that your community has a food pantry (food bank) that allows unused food to be dropped off. They also offer an at home pick-up that can be scheduled. Drop-off requires 30 minutes of your time (travel to and from the food pantry). Pick-up requires you to be available within a two hour window (similar to scheduling a home repair).

Given that half of the fresh food item will spoil in 3 days, I would:

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Throw the unused portion away	○	○	○	○	○	○	○
Plan a meal to use 25% of the remaining Packaged Salad Mix	○	○	○	○	○	○	○
Plan a meal to use 50% of the remaining Packaged Salad Mix	○	○	○	○	○	○	○
Plan a meal to use 75% of the remaining Packaged Salad Mix	○	○	○	○	○	○	○
Plan a meal to use 100% of the remaining Packaged Salad Mix	○	○	○	○	○	○	○
Donate all of the remaining amount to the food pantry via drop off (30-minute time commitment)	○	○	○	○	○	○	○
Donate all of the remaining amount to the food pantry via at home pick-up (2-hour time commitment)	○	○	○	○	○	○	○

Food Waste Awareness

The issue of food waste is important to me.

- o Strongly agree
- o Agree
- o Somewhat agree
- o Neither agree nor disagree
- o Somewhat disagree
- o Disagree
- o Strongly disagree

The issue of food waste is important to person.

- o Strongly agree
- o Agree
- o Somewhat agree
- o Neither agree nor disagree
- o Somewhat disagree
- o Disagree
- o Strongly disagree

I make an effort to not waste food at home and when eating out...

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
... by buying smaller portions (at home and/or away)	○	○	○	○	○	○	○
... by using the entire package/meal	○	○	○	○	○	○	○
...saving unused food for leftovers	○	○	○	○	○	○	○
... giving unused food to persons in need	○	○	○	○	○	○	○

VITA

Katlin Ramy

Candidate for the Degree of

Master of Science

Thesis: PERISHABLE FOOD DATE LABEL BEST PRACTICES AND CONSUMER WILLINGNESS TO REDUCE FOOD WASTE

Major Field: Agricultural Economics

Biographical:

Education:

Completed the requirements for the Master of Science in Agricultural Economics at Oklahoma State University, Stillwater, Oklahoma in May, 2020.

Completed the requirements for the Bachelor of Science in Agribusiness at Oklahoma State University, Stillwater, Oklahoma in 2018.

Experience:

Graduate Research and Teaching Assistant, Oklahoma State University, Department of Agricultural Economics, Stillwater, OK. August 2018-May 2020.