

# Dinner and a Date: the Misguiding Nature of Expiration Dates and Their Influence on Consumer Food Waste Behavior

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## **Abstract**

Food waste is largely considered one of the greatest paradoxes of today: while millions of people in the world starve, we waste an astonishing amount of the food we produce. One factor that produces a substantial amount of food waste is the consumer misinterpretation of food date labels, which are inconsistent, confusing, and misunderstood. This study is a comprehensive overview of the history of food dates in the United States, the failures of the current system, an analysis of current consumer perceptions of food dates, and concrete recommendations for needed actions to solve this food date labeling crisis.

## **Introduction**

Food waste is a global issue that is taking a toll on the economy, the environment, and social equity. One aspect of food waste that has been largely ignored in academic research is the negative influence of expiration dates. Expiration dates, which for the purpose of this paper is an all-encompassing term including but not limited to sell-by, use-by, and best before dates, are ambiguous in their differences. This ambiguity leads to confusion among consumers, retailers, and lawmakers, as dates are often incorrectly perceived as “discard-by” dates. Currently, there is a gap in relevant research about how influential expiration dates are on consumer food waste behavior.

This study aims to fill the existing research gap by analyzing survey results in order to understand the role of expiration dates and how they may lead to wasteful consumer behavior. Additionally, this study provides a comprehensive overview of past and current roles the government has taken in regards to expiration dates and

makes suggestions on types of legislation that must be presented in order to clarify the meanings of expiration dates. By restructuring the current guidelines, or lack thereof, for expiration dates, a significant amount of food waste in United States can be deterred.

According to Hall, Guo, Dore, & Chow (2009), food loss per capita in America has continuously increased over the past decades by 50%. While addressing the issue of expiration dates may not solve the food waste crisis, it will help substantially. And at this point, anything and everything must be done.

## Food Waste

Food waste has countless negative impacts on the environment and countless causes influence how much food waste comes out of the system. Some of the primary drivers of food waste are often considered to be our need for perfect produce (Aubrey, 2015a; Aubrey, 2015b; Godoy, 2015), our ever-expanding portion sizes (Bloom, 2011; Husted, 2012), and the growing disconnect between the farm and our plates (Bloom, 2011; Patel, 2012). The collective impact of these troubles sends us an extremely clear message: “all that food we’re allowing to rot is creating billions of tons of greenhouse gases and costing us precious water and land” (Barclay, 2013, para. 3). A recent report from the Food and Agriculture Organization of the United Nations (2013) put the crisis into further focus by reporting that in 2007, the global volume of food waste was estimated to be at 1.6 *gigatonnes*. Clearly, food waste is an important environmental concern that must be looked into further.

One of the more complicated impacts of food waste to quantify is the amount of resources used to produce food that is simply wasted. According to Davis (2014), “the production and distribution of food uses 80% of the freshwater, 50% of the land, and 10% of the energy currently consumed by the U.S. each year” (8). This is of course for all food, not only food that is eventually sent to the landfill unused, but considering that most statistics for American food waste land around 40%, that is a lot of resources being used to simply cultivate matter to fill a landfill. Hall, Guo,

Dore, & Chow (2009) estimate that 25% of freshwater in the United States goes into the production of wasted food. It is also projected, in a separate study done by the McKinsey Global Institute (2011), that by reducing food waste by a mere 30%, the United States could repurpose around 100 million acres of farmland.

Even more damage is done when this wasted food hits the landfill. When food waste is left to rot in a landfill, it produces methane. In Jonathan Bloom's (2011) book titled *American Wasteland* he writes, "methane has been found to trap heat far more effectively than carbon dioxide" (16), and "landfills are the second leading source of human-related methane emissions in the United States" (16). Food waste is also the main culprit in groundwater pollution through leachate. Although newer landfills are designed with a liner that mostly keeps leachate from reaching the groundwater, older landfills continue to seep toxic ooze into our water supply (Bloom, 2011). The newer landfills, which often become faulty and end up eventually seeping leachate, unfortunately do not provide a solution to trap or reduce methane emissions (Bloom, 2011); no matter how you look at it, food waste is an issue that needs to be dealt with for the sake of the environment, public health, and supply chain efficiency.

The global problem of food waste cannot be boiled down to a single issue: it is an interconnected matter with no common source or solution. Unfortunately, this makes food waste difficult to tackle on a large scale, so sizeable, collective action is rarely taken on a national scale. Recently, structural changes have been made to deal with food waste, with legislation banning food waste in large institutions being passed in countries like France (Chrisafis, 2015) and states like Massachusetts (Kaplan, 2014). These separate legislations function similarly, with the end goal of diverting unused food to charities, animal feed, or compost instead of disposing it in landfills.

Legislation like the MassDEP Commercial Food Waste Disposal Ban, which took effect on October 1, 2014, tackles one aspect of the food waste problem, but food waste does not stem from one single issue ("Commercial," 2015). Fortunately, food waste topics can be easily divided into the following sectors:

primary producers, food processors, retailers, and consumers. Consumers create the largest percentage of waste (Overgaard, 2015), largely stemming from the fact that it is extremely difficult to substantially change consumer behavior.

Expiration dates, a contributor to food waste that encompasses all food sectors, will require a complete overhaul of the current system for true change to occur. This change must occur top-down, like the MassDEP Commercial Food Waste Disposal Ban, because there are many ill-defined actors involved in the process of food labeling and dating.

## **Expiration Dates**

Even though dates are a single difficulty in the greater scheme of food waste, it is essential action be taken on a national scale because the problem must be addressed on all levels. Uniformity, or the lack thereof, is a critical issue that begs resolution when redesigning the dating system. In this section we will discuss the historical rise of food dating in America and the complications with the dating system we have today.

An important distinction to make before continuing is the difference between open and closed dating schemes. Open dates, which are where our focus lies, are dates intended for consumer or store use. These dates are always a calendar date and encompass our definition of an expiration date. According to the USDA, open dates are not a safety date (United States Department of Agriculture, 2015) – although we will find they are often interpreted as such. Closed dates, on the other hand, are packing dates and numbers not interpretable to the consumer, and are meant to be solely used by the manufacturer. Closed dates will not be further discussed in this study, as they should have no impact on consumer behavior.

## **History of Food Dating**

America's complicated food dating system began after the 1940s when families began to move off their farms and into the

cities and suburbs. For better or worse, once people's lives began to separate from their food source, they began to understand less and less about their food, where it came from, or how the food system worked. This process accelerated through the 1970s as Americans moved towards packaged and processed foods, and "by the 1970s, consumer concern surrounding the freshness of food crystallized" (Natural Resources Defense Council & Harvard Food Law and Policy Clinic, 2013). According to a report published in 1979 titled "Open Shelf-life Dating of Food,"

Consumers are concerned over whether or not the food they purchase is fresh. A U.S. Department of Agriculture (USDA) consumer survey in 1971 showed that 20 percent had complaints about food product freshness; a Nielson survey in 1973 turned up 50 percent with such complaints. A 1978 survey further supported this concern by noting that of all the problems on the minds of consumers when they shop for food, making sure that food in supermarkets is fresh heads the list. (Office of Technology Assessment, 1979, pg. 1).

In the 1970s, some supermarkets had voluntarily adopted open dating systems (Natural Resources Defense Council & Harvard Food Law and Policy Clinic, 2013). At the time, 89 percent of consumers expressed in a nationwide survey of 250,000 shoppers that they were in a favor of a dating system, as some consumers were concerned that their food was becoming stale sooner than expected and had no idea how old the food was they were purchasing (Comptroller General of the United States, 1975).

By 1973, ten states and two local governments had adopted laws regulating open dating for certain food products; by 1975, the General Accounting Office advocated a uniform date labeling system to Congress (Comptroller General of the United States, 1975). However, though the aforementioned 1979 report "Open Shelf-life Dating of Food" listed many benefits of an open-dating system such as increased consumer confidence and better

product handling by retailers, the report admitted, “there is little or no benefit derived from open dating in terms of improved microbiological safety of foods” (Office of Technology Assessment, 1979, pg. 5). Unfortunately, the lack of connection of dates to hard microbiological science has persisted, and the government even until now hardly ever oversees the dates stamped onto food by the manufacturer.

In a particularly extraordinary period in the 80s, Congress actually made an attempt to regulate the open dating system through legislation, but the National Association of Food Chains testified before Congress that federal regulations would only lead to additional costs and that the food industry was already spending millions on labeling (Natural Resources Defense Council & Harvard Food Law and Policy Clinic, 2013). Congresswoman Nita Lowey (D-NY) has continued to fight for regulation since then, introducing the Food Freshness Disclosure Act in 1999, and reintroducing similar bills in 2001, 2003, 2005, 2007, and 2009 (Natural Resources Defense Council & Harvard Food Law and Policy Clinic, 2013). According to the Natural Resources Defense Council & Harvard Food Law and Policy Clinic (2013), “the bills proposed to amend the Food, Drug, and Cosmetic Act by adding the requirement of applying uniform freshness dates on food. Uniformity would be achieved by requiring that all freshness dates be preceded by the phrase ‘best if used by’” (p. 7). Although this legislation is not comprehensive enough, it would be a step in the right direction for a more uniform and regulated dating system.

### **Date Regulation Today**

Currently, a gaping hole in date labeling legislation still exists across the United States, creating a major problem for consumers who are unable to rely on the message expiration dates send. According to the Natural Resources Defense Council & Harvard Food Law and Policy Clinic (2013):

Inconsistency exists on multiple levels, including *whether* manufacturers affix a date label in the first

place, how they choose which label category to apply, internal inconsistency *within* each label category due to the lack of formal legal definitions, and variability surrounding *how* the date used on a product is determined. (pg. 8)

Phil Lambert, who is informally known as the Supermarket Guru, adds to this discussion by saying “consumers are totally confused by sell-by and use-by dates, which is why one of the things we’ve pushed for a number of years is to just have a use-by date” (Bloom, 2011, pg. 163).

While the Supermarket Guru is correct to argue for a simplified dating system, simply reducing the current system to one use-by date will not solve the confusion, especially since federal laws do not consistently address expiration dates (Natural Resources Defense Council & Harvard Food Law and Policy Clinic, 2013). Although Congress has the authority to oversee date labels because of the Commerce Clause (U.S. Const. art. I, § 8), the USDA does not advocate for a uniform food dating system in the United States (United States Department of Agriculture, 2015). While two agencies, the Food and Drug Administration and the U.S. Department of Agriculture, generally take care of food labeling, no agency has been given explicit authority to regulate labels since there is no comprehensive labeling legislation.

While the FDA and the USDA both partially oversee labels, they only have the power to regulate certain foods. They share oversight for eggs and produce, but the regulation for the remaining food classes is quite distinct. The Natural Resources Defense Council & Harvard Food Law and Policy Clinic (2013) explain that under the Food, Drug, and Cosmetic Act of 1983, the Nutritional Labeling and Education Act of 1990, the Fair Packaging and Labeling Act of 1966, the Infant Formula Act of 1980, and the Food Safety Modernization Act of 2011, the FDA has the authority to regulate all foods except for meat, poultry, and fish. They continue by attributing the regulation of meat and poultry to the USDA, citing the Poultry Products Inspection Act of 1957, the Federal Meat Inspection Act of 1906, the Perishable Agricultural

Commodities Act of 1930, and the Agricultural Marketing Act of 1946 (Natural Resources Defense Council & Harvard Food Law and Policy Clinic, 2013). Because both the FDA and the USDA have the power to regulate misbranding or misleading labels, they in theory should have the power to regulate the current dating system – which is highly misleading to consumers.

Instead of regulating date labeling on food products, the federal government offers several voluntary guidelines. One voluntary guideline is provided by the National Institute of Standards and Technology. Their 2015 NIST Handbook has a section titled “Uniform Open Dating Regulation,” and while their model allows foods to be sold after their expiration date given that the food is of good quality, it does not tackle the idea that consumers might not be interested in buying expired food when the difference between and the nature of expirations dates are still unclear (National Institute of Standards and Technology, 2015). Another voluntary guideline is the FDA Food Code, which is often voluntarily adopted by states because of its certification by food safety experts (Natural Resources Defense Council & Harvard Food Law and Policy Clinic, 2013). Unfortunately, like the NIST Handbook, the FDA Food Code is weak in many areas; while the code does suggest labeling requirements for shellfish, ready-to-eat foods, and reduced oxygen packaged foods, the code does not attempt to improve the clarity of food dates for consumers (United States Public Health Service & Food and Drug Administration, 2013).

In light of lacking federal regulation, some states have taken it upon themselves to regulate food dating internally. This is problematic not only because state laws are not as static as federal laws, but also because different dating schemes across states are a major inconvenience for interstate commerce. For example, in 2012 Georgia passed legislation that made all expiration dates (Pull-By, Best-By, Best Before, Use-by, and Sell-by) synonymous (Natural Resources Defense Council & Harvard Food Law and Policy Clinic, 2013), preventing the sale of products after the sell-by, use-by, and best before dates alike. This legislation differs greatly from other states, especially when considering that nine states, including New



York, do not require date labels at all (Natural Resources Defense Council & Harvard Food Law and Policy Clinic, 2013). To complicate things further, date labeling can also be controlled at a local level when states fail to provide any recommendations. For example, according to the Natural Resources Defense Council & Harvard Food Law and Policy Clinic (2013), Baltimore does not allow the sale of perishable food that is past its expiration date, whereas the state of Maryland has no similar regulation. This variance from city to city only leads to greater consumer confusion.

Expiration dates need to be more clearly defined; we are so disconnected from our food that we no longer are able to tell when food is good to eat because many consumers misinterpret dates. In Van Garde & Woodburn's (1987) study "Food discard practices of householders" participants were asked to determine whether or not specific packaged foods were safe to eat. Their results show that many people do not understand what information is relevant when figuring out the microbial safety of foods, leading to more food waste than is necessary (Van Garde & Woodburn, 1987). In the following sections we will examine the survey data and results, which will allow us to further identify and analyze the failures of the current dating scheme.

## **Methods**

In order to advance our understanding of the role expiration dates play in consumer behavior, I collected data using paper surveys (IRB Number 6152). The surveys were passed out in public and semi-public facilities, like the Norman Public Library and the Sooner Mall. When deciding whom to give surveys to, I purposefully targeted middle-aged participants because they are more likely to have concrete shopping habits compared to younger or older shoppers who may be in the stages of adjusting to living independently.

Though the survey in its entirety is included in the Appendix, the selection of the questions warrants further explanation. Questions were limited in order to confine the survey to one page, front and back, in order to not intimidate possible

participants. Also, questions were almost entirely qualitative in nature. This is not only because self-reported quantitative statistics such as how much money is spent on food that is merely thrown away per month are likely to be severely underestimated, but also because the goal of this research was to discover the role expiration dates play when consumers decide to throw away food, which by its nature requires little quantitative data. When consumers were given the choice to write in a number, such as in questions 3 and 14, and they provided a range, the largest number in the range was chosen. This was done to provide a consistent method among the results, but also to somewhat counter the trend of underestimation.

## Findings

The first and most obvious finding provided by the survey is how little of a role food plays in many consumers' lives. This is exemplified in Figure 1 and Figure 2, which show how many times a month respondents go grocery shopping and the importance the role of sustainable food plays in their everyday decisions, respectively. Additionally, though the data is not graphically represented, the amount respondents reportedly ate at restaurants was extremely unexpected, with a couple of responses stating they ate at a restaurant an average of seven times a week.

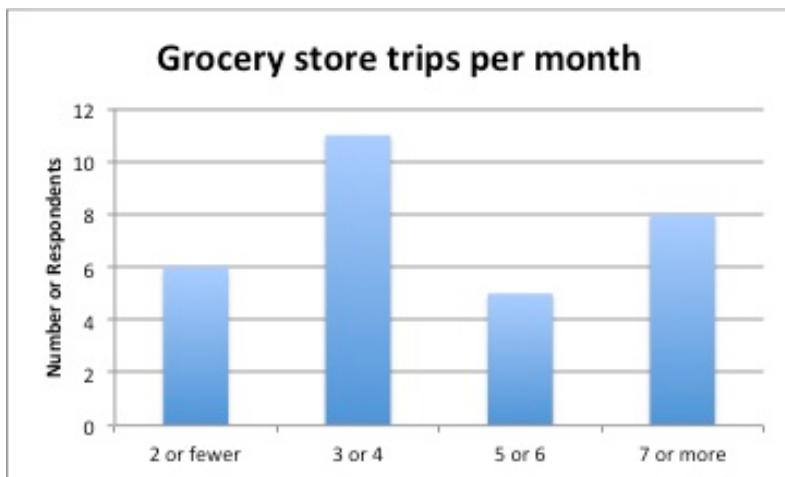


Figure 1. While most respondents reported to go grocery shopping about once a week, a surprising number also reported to go grocery shopping as little as twice a month.

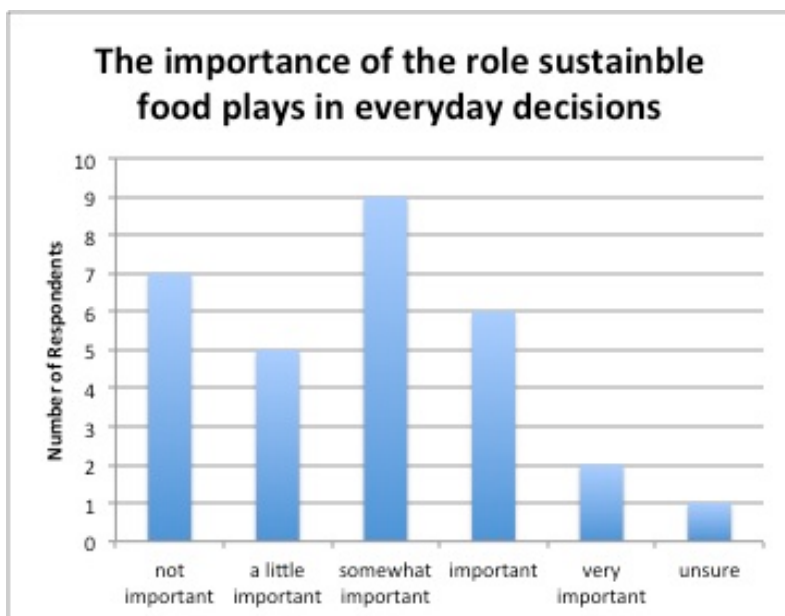


Figure 2. A majority of respondents did not consider sustainable food to be an important factor in their decisions regarding food.

Perhaps the most significant results the survey showed are that a majority of respondents are highly confident in their ability to

distinguish between different expiration dates, yet not a single respondent correctly identified the legal differences, or lack thereof, of the dates. The number of people who claimed to know the difference in the dating system versus those who admitted to not knowing is graphed below in Figure 3. One respondent, who openly admitted to not understanding the difference in the dates, wrote, “not sure, it is very confusing to figure out the sell-by, use-by and best before dates,” while another responded with “sadly, no. I could make some guesses, but I have a hunch they’d be incorrect.”

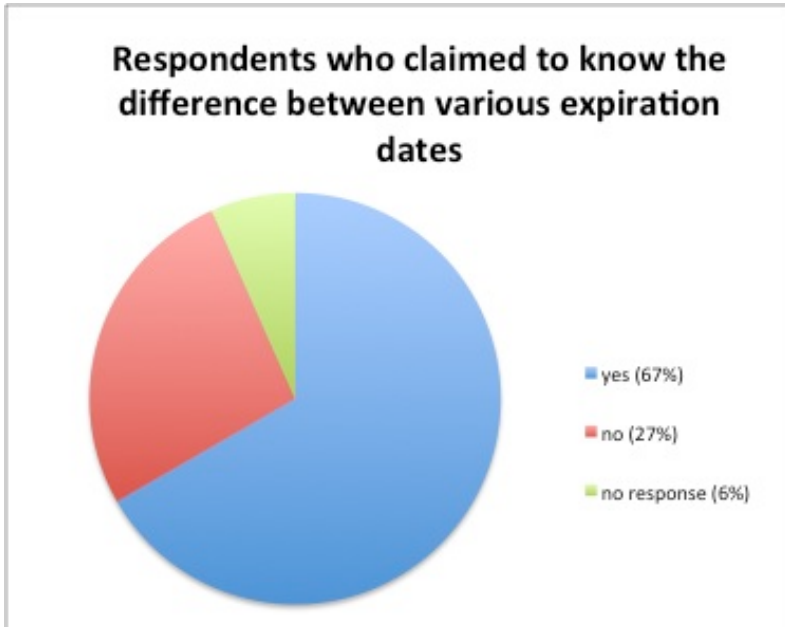


Figure 3. Two-thirds of respondents claimed to know the difference between expiration dates, but not one of them correctly identified the differences.

Despite the fact that consumers have a complete misunderstanding of food date labels, Figure 4 illustrates that many of them rely on the dates to make decisions when deciding to purchase or consume a product. In a similar vein, Figure 5 shows that one-third of consumers trust dates so much they will throw away food simply because it is past the expiration date, and will not further examine it before making that decision. While the people who reported to check the food further than the date before throwing away often did so by looking, smelling, and tasting the

food, not one respondent reported to consider the storage history of the food, which is the most important factor in terms of microbial safety.



Figure 4. This graph shows that nearly all respondents at least sometimes check the dates on packaged food before purchasing or consuming it.

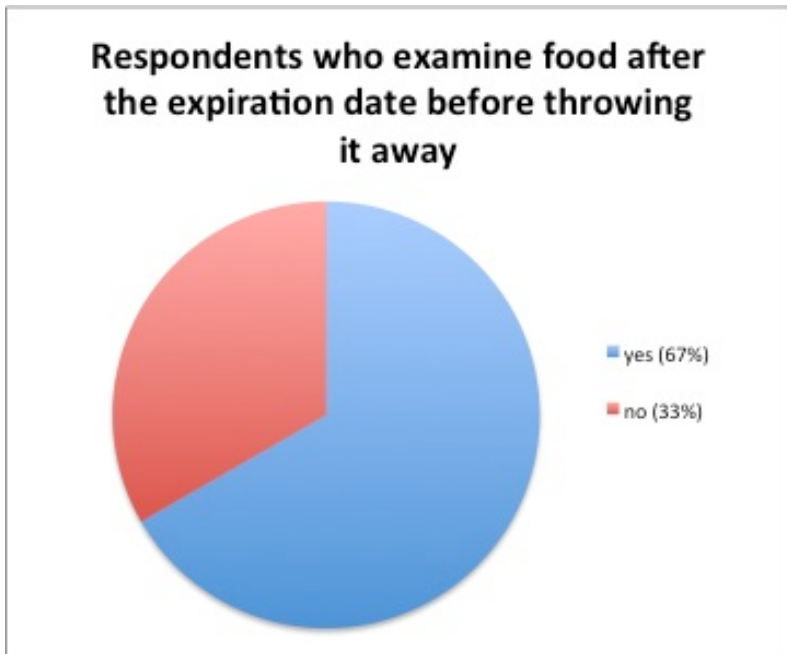


Figure 5. This pie chart illustrates how one-third of respondents fail to examine their food further than the date before deciding to throw it away.

In Figure 6 we explore this relationship between the perception of food date validity and its effect on food waste further by comparing three five-number summaries with each other. The results of this graph indicate that people who perceive food dates to be a good indicator of food quality or food safety self-report higher food waste levels than those who are skeptical of the soundness of food date labels.

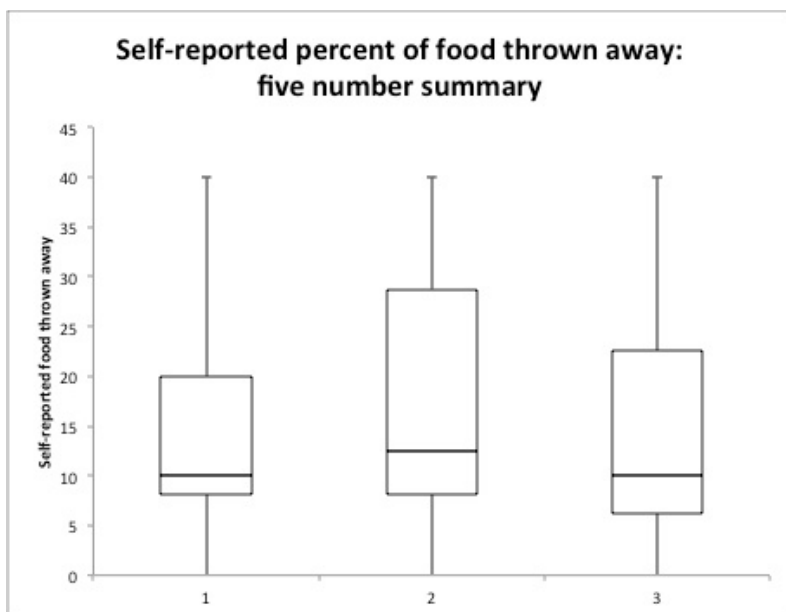


Figure 6. In this figure, the first category represents the overall summary of self-reported food thrown away. The second category represents the summary of self-reported food thrown away for respondents who somewhat or strongly believe that food dates are a good indicator of food safety. Similarly, the third category represents the summary of self-reported food thrown away for respondents who somewhat or strongly believe that food dates are a good indicator of food quality. As we can see, particularly for those who believe dates correctly reflect food safety, the self-reported food waste levels are higher for those who take food date labels more seriously.

Figure 7 and 8 are both highly optimistic. Respondents were asked how likely they would be to buy food past its sell-by date at a discounted price. As Figure 7 displays, a majority of respondents reported that they would be very or somewhat likely to buy the expired food. And Figure 8, in a similarly positive note, shows that food waste is a topic of concern for consumers.



Figure 7. This graph shows that if expired, but still clearly edible, food is sold at a discounted price, a majority of consumers would be likely to buy it.



Figure 8. This graph shows that reducing food waste is on the minds of consumers.



## Analysis

The results of our survey indicate that consumers value the message, albeit confusing, expiration dates send. Unfortunately, our trust is being placed in meaningless terms with no legal definitions. According to the Natural Resources Defense Council & Harvard Food Law and Policy Clinic (2013), a loose interpretation of expiration dates is as follows:

1. "Production" or "pack" date: the date the food was manufactured or put in its final packaging.
2. "Sell by" date: information for retailers when controlling stock. This date leaves plenty of shelf life for the consumer to safely consume the food after the date has past.
3. "Best if used by" or "best before" date: an estimate of the date when the food will no longer be at its top quality, but still safe to eat.
4. "Use by" date: similar to the "best before" and "best if used by" dates, it is a manufacturer's estimate for when the product is no longer at its peak quality.
5. "Freeze by" date: simply a reminder that the product's quality can be preserved if it is frozen.
6. "Enjoy by" date: currently no standard interpretation for this date.

However, these interpretations can vary from manufacturer to manufacturer, and even from product to product. The report "Current State of Food Product Open Dates in the U.S." – which was prepared by the FDA in 2003 – found that the use of open dates by manufacturers varied widely due to the lack of a nation-wide standard (Food and Drug Administration, 2003). The Food and Drug Administration (2003) writes that "each company has its own

definition of the end of shelf life, with some accepting a predetermined degree of change and others finding that no change in quality is acceptable" (p. 3-2). Additionally, many manufacturers admit to severely underestimating expiration dates in order to protect the integrity and quality of their products, but also to maximize profits at the expense of the consumer (Food and Drug Administration, 2003). If even manufacturers cannot agree on consistent definitions, consumers have no way of differentiating between the diverse meanings; yet they still interpret expiration dates as law, leading to an exorbitant amount of unnecessary food waste.

Even though dates are meant to be a slack indicator of quality, our results show that many consumers are under the impression that these dates are correlated with safety. One respondent reported that she did not throw away foods "unless they became harmful for health due to expiration dates," while another wrote that "it is a habit to discard food that is expired according to the label." These findings are consistent with a report from the National Advisory Committee on Microbiological Criteria for Foods (2004), which also showed that most people believe consuming food past its expiration date poses health risks. This unnecessary reliance on dates causes consumers to ignore more relevant factors, such as storage history, when deciding whether or not food is edible, as Figure 5 shows.

Retailers aren't any better when it comes to waste from dates. According to Bloom (2011), some stores have become so overzealous about dates and what message a displayed product past its sell-by date would send to consumers that they will throw out products before the expiration date even approaches. This is the case particularly with baby formula, which is regulated much more strictly than other products, and cannot be sold when it has 60 days left until its use-by date (Bloom, 2011). And manufacturers are just as misinformed as retailers: in Aubrey's (2015a) story for *NPR*, she explains that some manufacturers end up dumping food that still has two weeks left until its sell-by date because it would be too close to the expiration date for grocery stores to accept the order by the time it arrived. This is not only an economic loss for the

manufacturer, but it also contributes to methane emissions, resource use, and climate change.

Figure 6 demonstrates that a relationship between the perceived trustworthiness of food date labels and the reported amount of food waste does exist. If consumers believe food date labels accurately reflect the safety of foods, they are more likely to waste food. A report by WRAP (2011), states, "date labels are reported as being one of the most important pieces of information that consumers look for on food packaging." Both educating consumers about the true nature of food dates and comprehensively changing food date legislation can rectify this.

Figure 7, which graphed the likelihood of consumers to buy expired products at a discounted price, was strangely optimistic compared to our other findings. However, the findings are consistent with existing literature, and programs to sell expired products at a reduced cost could be put into place in the U.S. easily by implementing strategies used in Denmark. Maia Lindstrøm Sejersen, the spokeswoman for Danish supermarket chain Dansk Supermarked, argues that selling expired food at a cheap price is good business because "any grocer would rather sell something than throw it away" (Overgaard, 2015). Danish consumers now pride themselves on saving money on these reduced items, and selling these items has inspired Dansk Supermarked to improve their food waste reduction efforts even further.

## Conclusions

The United States is in dire need of a new food dating system in order to promote clear communication between producers, manufacturers, retailers, and consumers. These recommendations, resulting from an analysis of the food waste problem, the history of food dating in the United States, and the findings from the survey on the influence of expiration dates on consumer food waste behavior, requires that the United States establish a nationally consistent dating system. Under a new system, I recommend the following:

1. The open dating system must truly only be for consumers; therefore, sell-by dates should not be visible past the retail level. Sell-by dates, which are guidelines for grocery stores and are of no use to the consumer, are easily misunderstood to be safety dates. Changing sell-by dates to a closed dating system will reduce consumer confusion.
2. According to the Natural Resources Defense Council & Harvard Food Law and Policy Clinic (2013), food date “language should be standardized, unambiguous, and should clearly delineate between safety-based and quality-based dates” (p. 24). This study supports this recommendation and would even argue it must be taken a step further. The new national policy should replace all remaining open dates (best if used by, best before, use-by, freeze by, packed on, and enjoy by) with one simple phrase: “Best quality assured before MM/DD/YY.” The uniform language, where every word is clear and serves a purpose, would communicate that dates are meant as an indicator of quality much better than the current system does.
3. To further reduce food waste, dates on non-perishable food products, like canned food and dried grains, should be removed entirely. Foods like these rarely have a noticeable deterioration in quality except for when the packaging is damaged. If manufacturers are at first uncomfortable with the concept of not dating food, they could have the option to use the phrase “Best quality assured within XX days of opening.”
4. The dates selected for the “best quality assured before” label must be based on hard science and cannot be underestimated so that the manufacturer benefits at the expense of consumers. Aside from baby formula, there is no federal regulation for what date manufacturers decide to put on packaging (Bloom, 2011; Natural Resources Defense Council & Harvard Food Law and Policy Clinic, 2013). If the methods used

to determine “Best quality assured before” dates were transparent, it would hold manufactures accountable for selecting dates that more accurately predict the quality of the food.

These recommendations are more comprehensive than any previous American legislation and should diminish food waste by reducing, or even eliminating, consumer confusion.

In order for a new dating system to replace the current one and for food waste to be reduced, many actors including the food industry, the federal government, state governments, and consumers must work together. Recommendations for these select actors are as follows:

1. The food industry must move sell-by dates to the closed dating system and begin selling expired products at a discount. Changing sell-by dates to the closed dating system would make it incomprehensible to consumers; therefore, consumers would not have a reason to be confused by them. The food industry in the United States should also make it status quo to sell food that is past or near its peak quality date. As this analysis shows, consumers are receptive to this practice, and retailers only benefit from the extra income from food that would otherwise just be thrown away.
2. The federal government should pass legislation that would establish a clear and uniform dating system, like the system afore recommended. This legislation should also coordinate the roles of the FDA and USDA – as their roles are currently ill defined and their authority sometimes overlaps.
3. Until comprehensive federal legislation is passed, state governments should work to fill the gaps in federal regulation. Some primary, concrete steps they may take are making sell-by dates invisible to the consumer and repealing overzealous laws that promote diverse dating schemes between states.

4. Consumers should educate themselves and those around them about the true meaning of current food date labels. Understanding that the current food date system is not trustworthy would be a major step in reducing food waste. Additionally, consumers should take steps to become more connected with their food, which will lead to them placing more value on food as well as gaining a deeper understanding as to when food is still safe to eat.

Although it is, of course, ideal that these recommendations for actors are all worked towards, the easiest step forward is for consumers to educate themselves on the actual meaning of food date labels. The awareness alone would help combat additional food waste while the remaining actors works towards substantial policy changes.

While ending food date label confusion will not solve the global crisis of food waste, it is a critical and logical step in downsizing the problem. This study demonstrates that the current confusing nature of food dates does influence the amount of food that consumers waste, and it is imperative that the current system is improved upon in order to reduce consumer misperception. Many aspects contribute to the overall problem of food waste, so no course of action is inherently more important than another. Tackling the lack of clarity in the United States' food dating system is a concrete plan of action and should be an issue that everyone can agree requires attention.

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## Appendix

### 1. On average, how many times a month do you go grocery shopping?

2 or fewer  
7 or more

3 to 4 times, or roughly once a week

5 or 6



2. Where do you regularly shop for groceries in the Norman area? You may list more than one.

3. On average, how many times a week do you eat out? \_\_\_\_\_

4. How important is the role of eating sustainable, organic, fair-trade, or GMO-free food in your everyday decisions regarding food?

(not important) 1            2            3            4            5 (very important)  
Not sure

5. How important is the role of reducing food waste in your everyday decisions regarding food?

(not important) 1            2            3            4            5 (very important)  
Not sure

6. The dates on food packaging are a good indicator of when food is no longer safe to eat. This statement is:

Very true            Somewhat true            Neutral            Somewhat untrue  
Very untrue

7. The dates on food packaging are a good indicator of when a food's quality is no longer at its best. This statement is:

Very true            Somewhat true            Neutral            Somewhat untrue  
Very untrue

8. I check the date on packaged foods when deciding whether or not to buy the product.

Always            Almost always            Sometimes            Almost never  
Never            Not sure

9. I check the date on packaged foods before consuming them.

Always            Almost always            Sometimes            Almost never  
Never            Not sure

10. Do you know the difference between sell-by, use-by, and best before dates? If yes, please explain the differences.

11. If a food you enjoy was past its sell-by date, but still clearly edible, how likely would you be to buy the product at a discounted price?

Very likely   Somewhat likely   Indifferent   Unlikely   Very unlikely  
Not sure

12. When you find a product you have purchased that is past its use-by date, what do you normally do?

13. When you have food that is not dated by the USDA (i.e. homemade meals, restaurant leftovers, fresh fruits and vegetables, etc.), how do you decide when to eat or when to throw out the food?

14. What percentage of purchased food do you normally end up throwing away?  
\_\_\_\_\_ %

15. What foods do you find yourself throwing away most often, regardless of the look, smell, or taste, by the date on the package?

16. Why are you throwing away food?

17. What could you do in your household to eliminate food waste?

18. What is your age?

Under 18   18-25   26-35   36-50   51-70  
71+

19. What is your highest level of education?

High school   Professional Degree   Undergraduate Degree  
Graduate Degree or equivalent  
Other \_\_\_\_\_

20. How do you rank your annual household income?

Less than \$40,000   \$40,001-\$60,000   \$60,001-\$80,000   \$80,001-  
\$100,000   \$100,000+

21. How many people are in your household? \_\_\_\_\_