



Academy of Nutrition
and Dietetics
Foundation

THE STATE OF AMERICA'S WASTED FOOD & OPPORTUNITIES TO MAKE A DIFFERENCE

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FOREWORD

From the farm through the production and distribution process to the grocery store to the home – wherever there is food, there is unfortunately food waste. In a world of finite resources and growing populations, wasting food is a luxury no one can afford. As nutrition and dietetics professionals, we are uniquely qualified to assist farmers, food companies, governments, communities, institutions, stores, restaurants, families and individuals to reduce the amount of food that is wasted each year. As Academy members, we have no higher duty than to help everyone create and maintain their nutritional health. This includes wise production strategies and a commitment to conservation that minimizes wasted food. I hope you'll find this report informative and an inspiration to engage deeply in this cause, in which so many Academy members are leaders.

Dr. Evelyn F. Crayton, RDN, LDN, FAND
Academy President, 2015-2016

INTRODUCTION

Over one third of all food produced in America goes uneaten each year, with the majority of it ending up in our landfills.¹ To put this in perspective, this is the equivalent of throwing 320,000 jumbo jets worth of food directly into the landfill each year.² Reducing, reusing, and recycling wasted food and creating an infrastructure that supports these actions across the food supply chain can assist with feeding the estimated 49 million Americans who are food insecure,³ reduce agricultural pressures on the environment, and increase business efficiencies for those producing and selling food. This report highlights where wasted food can potentially occur throughout the food supply chain, the environmental and economic impact of wasted food, and opportunity areas for registered dietitian nutritionists (RDNs) to help reduce wasted food within a total infrastructure that has both a business and consumer facing perspective. The Academy of Nutrition and Dietetics is committed to advancing the practice of nutrition and dietetics, and has funded this report to highlight opportunities around improving our current levels of wasted food.



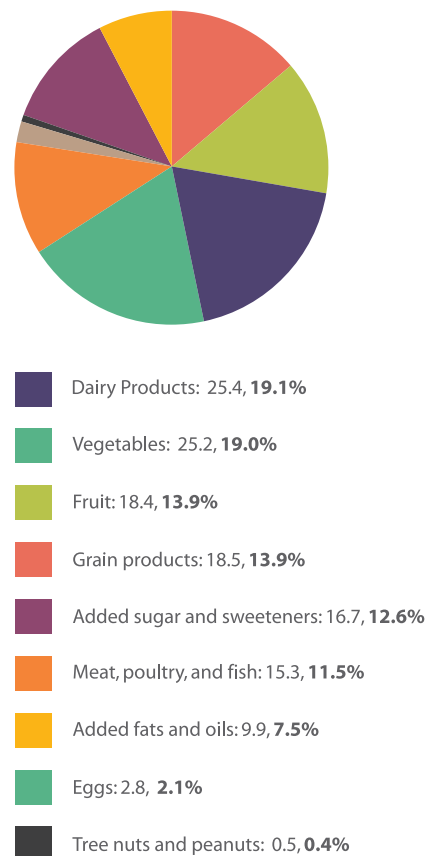
Wasted food: Defined

The Food and Agriculture Organization (FAO) of the United Nations and the US Department of Agriculture (USDA) differentiate between food loss and food waste. They define food loss as “the edible amount of food, postharvest, that is available for human consumption but is not consumed for any reason. It includes cooking loss and natural shrinkage (for example, moisture loss); loss from mold, pests, or inadequate climate control.”⁴ Food waste is identified as a segment of food loss. The FAO definition of food waste is “Food which is fit for consumption being discarded, usually at retail and consumer levels.”⁵ The USDA defines food waste similarly: “Food waste is a component of food loss and occurs when an edible item goes unconsumed, as in food discarded by retailers due to color or appearance and plate waste by consumers.”⁴ Many experts and organizations also highlight that over consuming calories is also a form of food waste, which can also lead to chronic disease.⁵ For the purpose of this report, we will refer to food waste by the more consumer-friendly term—wasted food. According to The National Resource Defense Council (2012), approximately 40% of all food produced in the United States goes to waste.^{1, 6, 7} Wasted food has been an ongoing global issue. Reduction of food loss was included in the FAO mandate when it was established in 1945.⁵ However, the extent of wasted food is much greater now than it ever has been in the past. The average American throws away 50% more food today than in 1970.⁷ In 2010, Americans threw away 133 billion pounds of food with an estimated net worth of over \$130 billion.^{1, 7} To bring these statistics to a more relatable level, the average

American tosses around 300 pounds of food each year.¹ The USDA estimates that the amount of wasted food in 2010 translated into 141 trillion lost calories, which equates to over 1,200 calories wasted per person everyday.⁸ Figure 1 shows the USDA food loss estimates in pounds in 2010. The top contributor categories are dairy products (25.4 billion pounds), vegetables (25.2 billion pounds), grains (18.5 billion pounds), and fruit (18.4 billion pounds).⁸

Figure 1.

Estimated total amount of food loss in the United States by food group, 2010



ERS – USDA Economic Research Service Economic Information Bulletin Number 121 February 2014 <http://www.ers.usda.gov/media/1282296/eib121.pdf>



FROM FOOD TO FORK— WHERE DOES WASTED FOOD OCCUR IN AMERICA?

Wasted food can occur along the entire food supply chain, from farms, processors, distributors, wholesalers, retailers, restaurants/foodservice establishments, and consumers – and everywhere in between. Identifying where wasted food occurs along the food supply chain is necessary to develop effective strategies to increase efficiencies. In developing countries, most wasted food occurs prior to reaching the market. This is due to inefficient processes and equipment in harvesting, transporting, and storing food.⁹ However, in developed countries such as the United States, most wasted food is accumulated after reaching the market—at the retail, consumer, and household levels.⁹ There are a wide variety of reasons waste happens in the latter half of the food supply chain in developed countries, and one examples will be highlighted in the following sections.

Production, Harvest, and Transportation

Wasted food begins where our food supply chain begins -- farming. There are a variety of reasons beyond a farmer's control that food can be lost while farming, including pests, insects, birds, diseases, and weather fluctuations.⁸ Other reasons include labor shortages, food safety issues, and discarding aesthetically unappealing (ugly) produce that both consumers and retailers alike are hesitant to purchase.¹ It is difficult to predict demand of products, so over-planting or over preparing can result in high supplies and low demands, affecting both profit and food loss.¹ According to the FAO, the largest category for food loss in the production phase is fruits and vegetables. They estimate that 20% of fruit and vegetable loss occurs during production.⁹



Harvesting and transportation can also contribute to food loss.¹ Techniques used to harvest and transport goods can cause bruising and damage to crops and produce making them unsellable to retailers. Improper storage such as lack of refrigeration, moisture control, or pest control can also result in food being lost. Animal and plant products such as milk, meat, eggs, fruit, vegetables, and fish are susceptible to food loss for a variety of reasons, ranging from disease, breakage, spoilage, and death during growth and transportation.¹⁰

Processing and Packaging

Continuing down the food supply chain, the next stop is for food to be processed and packaged. Similar to harvesting, processing facilities assess crops for appearance, size, color, weight, and blemish levels, a process known as culling. Anecdotal estimates indicate that culling can remove 10%-40% of a product before it reaches the retail sector.¹ Food loss also occurs during cleaning, grinding, packaging, cooking, and cutting.⁵

Grain products make up the majority of the food loss during the processing and packaging step due to the aforementioned process of culling, followed by seafood and meat.¹ Animal products undergo food losses during processing, as livestock must be trimmed during slaughter. Some of the byproduct is inedible for human consumption, but may have alternative uses. Seafood can be spilled or damaged during canning/smoking, which contributes to food loss.¹⁰ Imported products often times have to wait at ports for days before they are tested and admitted into the United States, which dramatically decreases the shelf life on perishable goods.¹¹

Retailers and Food Service

Once food is finished with harvesting, transportation, and processing, it is ready to be sold in the retail and food service sectors. In-store food losses in the United States totaled an estimated 43 billion pounds in 2008, equivalent to 10% of the total food supply at the retail level.¹² The USDA estimates that supermarkets lose \$15 billion annually in unsold fruits and vegetables alone.¹³ Retailers discard food due to overstocking, improper stock rotation, quality that does not meet the retailer's specifications and additional trimming of edible parts, such as for precut produce.¹²

The primary areas of wasted food in the retail level comes from perishable foods including baked goods, fruits, vegetables, meat, seafood, and prepared food items.¹ Causes of wasted food in the retail sector include high consumer expectations of cosmetically perfect food, excessive pack sizes, confusion surrounding "best by" and "sell by" dates, damaged goods, and unpopular or seasonal items. The greatest amount of wasted food in the retail sector comes from fruits and vegetables, making up 12% of all food discarded.⁹

Food service establishments, including restaurants, fast food, caterers, hospitals, sports stadiums, and schools also contribute to wasted food. The USDA estimated that 86 billion pounds of food were lost in 2008 in food service operations.¹² Wasted food generated by universities alone is estimated to be over 1 billion pounds per year.¹⁴ Some reasons that wasted food occurs in these settings include kitchen loss during preparation, consumer plate waste, and larger meal portion sizes leading to increased plate waste.¹⁵

Consumers

While food waste happens along the entire food supply chain, consumers tip the scales as the leading contributors of wasted food in developed countries - throwing away an estimated 15%-25% of all food purchased.¹⁶ There are many contributing factors, including purchasing too much food, confusion over spoilage dates (best by, use by, sell by, etc.), lack of knowledge when preparing foods, confusion over when food is ripe, seasonal factors, uneaten leftovers, and throwing away food that is still safe to eat.⁸ The primary food groups consumers waste are seafood (33%), fruits and vegetables (28%), grains (27%), and milk (17%).⁹ Wasted food is the single largest component of our landfills, with the greatest contribution coming from the consumer level.¹⁷





THE HIDDEN COSTS OF WASTED FOOD

Wasted food has implications beyond what meets the eye. Trashing food, regardless of the reason, has economic, environmental, and social implications. Globally, wasted food in 2007 occupied a space of almost 1.4 billion hectares, which equals about 28% of the world's land area.¹⁸ If land used to grow food that isn't eaten were a country, it would be the second largest country in the world behind Russia.¹⁸ No matter where waste occurs, it presents an opportunity for us to feed hungry people, save money, and reduce our environmental impact.

Water impact

While this report is focused on wasted food, fresh water usage is also an important component to consider. Agriculture is the largest user of fresh water, guzzling up around 70% of all fresh water used.¹⁹ This water is used to grow our crops, and to care for and feed the animals we eat.¹⁹ When food is wasted we are also wasting the water and other natural resources used to grow, harvest, and raise food. Estimates show that more than one quarter of fresh water use is accounted for by wasted food.²⁰ Increasing the efficiency of the food supply chain can help to reduce our water footprint, which can be especially important for agricultural areas prone to drought, such as Southern California.⁹

Using local tap water versus bottled water has a variety of economic and environmental benefits as well. Bottled water is on average 300 times more expensive than tap water and it contributes to America's use of over 50 billion plastic bottles yearly.²¹ Many of the major brands of bottled water are simply bottled tap water.²² Making water fountains easy to access, attractive, and cup or bottle friendly are ways to encourage consumption of tap water while saving money and the environment.

Climate/ Global Greenhouse Gas Impact

Food that is harvested or raised only to end up in the landfill is a major contributor to environmental degradation. Growing food that is never eaten contributes to an unnecessary usage of agricultural inputs, which, along with methane and carbon



dioxide emissions from decomposing food, have significant impacts on global climate change.²⁰ These inputs include, but are not limited to, fresh water, fertilizers, pesticides, and fossil fuels for growing crops and raising animals, and fueling farming equipment. According to the United Nations Environmental Programme (UNEP), agriculture contributes 10%-35% of all global greenhouse gas emissions, the majority of that attributed by animal agriculture.²³

Decomposing food that's tossed into landfills also directly contributes to climate change. When this food rots it releases methane – a greenhouse gas at least 25 times more powerful than carbon dioxide.¹⁷ Currently food in landfills contributes to 23% of all methane emissions in the United States.²⁴ Data shows that only 3% of food is actually composted,²⁴ which is why diverting food from entering the landfill not only saves money, but helps prevent the creation of global greenhouse gas emissions.

Economic impact

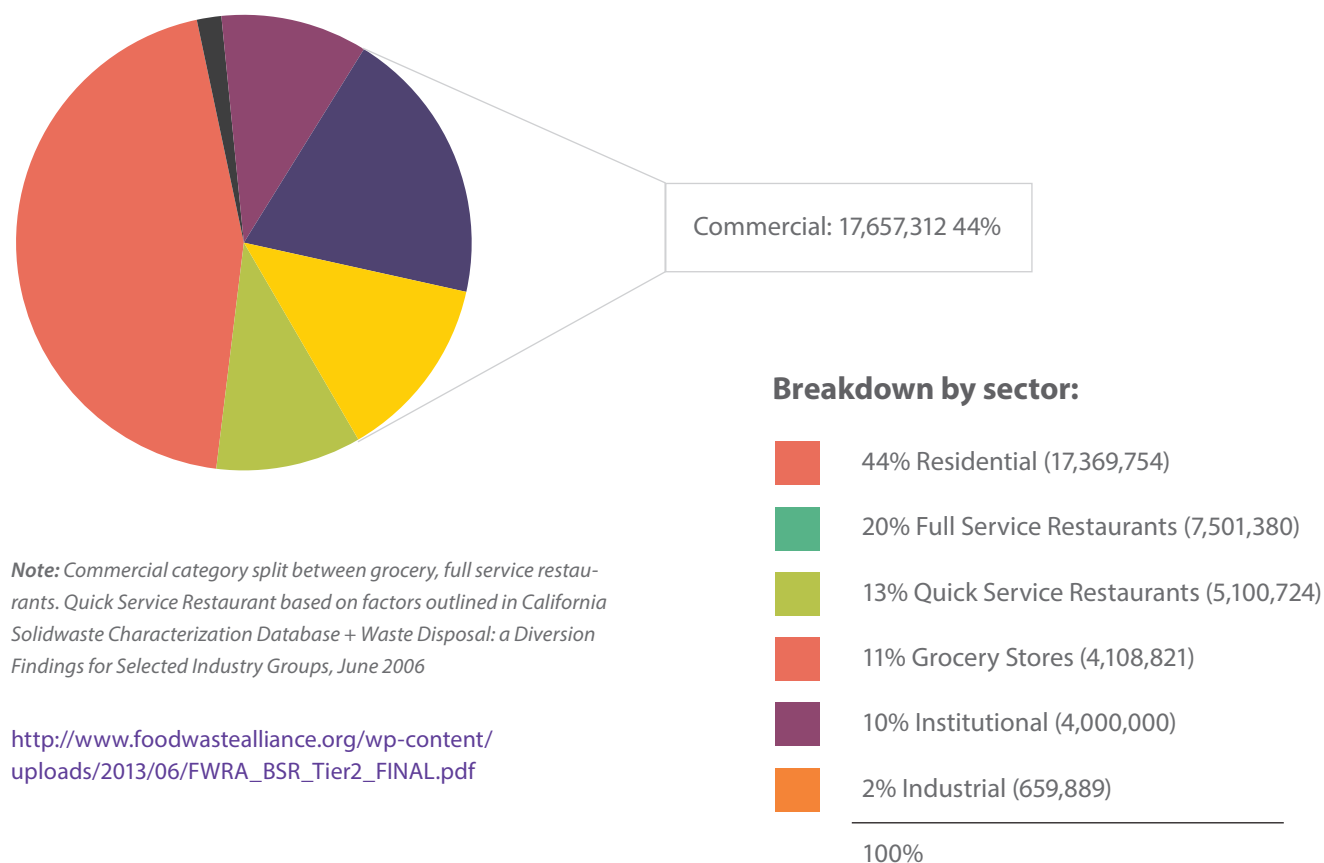
Wasted food is not only detrimental to the environment but also costs consumers, businesses, and taxpayers substantial amounts of money. On the consumer level, an American family of four throws out an average \$1,484 worth of edible food a year.²⁵ It is estimated that all of the food wasted yearly costs \$750 million per year in disposal fees and uses 4% of the total US oil consumption.²⁶ Nationally, the costs associated with the disposal of food exceeds one billion dollars in local tax funds annually.²⁷ Figure 2 shows the US wasted food disposal estimates for each sector, with residential comprising of 44% of all wasted food.²⁴

Figure 2. Wasted food data: A breakdown by each sector (www.BSR.org).

Category breakdown based on BSR Estimate of (Food Waste Disposal)

Total = 39.7 million tons

US-Food Waste Disposal Data- breakdown by sector

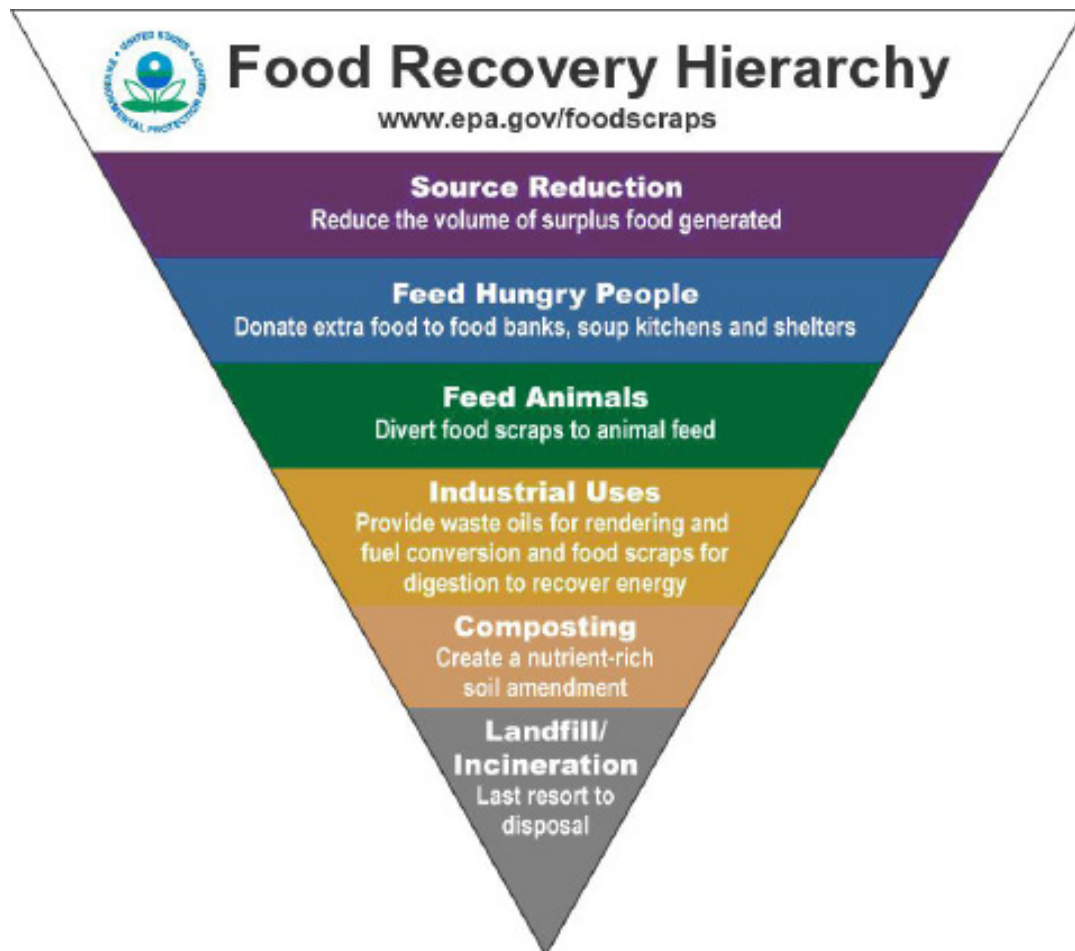


EFFORTS TO REDUCE WASTE ALONG THE FOOD SUPPLY CHAIN

The USDA and the Environmental Protection Agency (EPA) created an easy to follow Food Recovery Hierarchy ranking the most to least preferred methods to prevent and divert wasted food (Figure 3).²⁸ The preferred method is source recovery, or purchasing food more accurately to minimize unnecessary excess. If food is leftover and has been kept in safe storage conditions, the next best option is to donate it to a food pantry or food bank. If the food is not suitable for human consumption, many local farmers are willing to pick up the scraps to feed to their livestock – saving money while reducing wasted food. If the food is not suitable for livestock consumption, donating wasted food scraps and oils to companies who can convert it into usable energy is the next best option. Next on the hierarchy is composting. Composting diverts wasted food from landfill and uses it to enrich soil. Composting also helps reduce methane emissions from landfill. Last on the list is the landfill. Throwing away food contributes to both economic and environmental losses.²

All along the food supply chain there are programs and resources to help reduce wasted food and its associated impacts. While not all wasted food is edible, much of it can be recovered and repurposed. Following are examples of current efforts occurring to reduce waste along the food supply chain.

Figure 3. US Environmental Protection Agency Food Recovery Hierarchy



<http://www.epa.gov/sustainable-management-food/food-recovery-hierarchy>

Reducing wasted food and our environmental food footprints should be a top priority for all American consumers and businesses. All along the FSC there are programs and resources to help reduce wasted food and its associated impacts. While not all wasted food is edible, much of it can be recovered and repurposed. Below are examples of current efforts occurring to reduce waste along the FSC.

Production, harvest and transportation



Reducing wasted food is a top priority for key players along the food supply chain. Improving efficiencies during production, harvest, and transportation can save both money and help reduce the environmental footprint of food production. Examples include improved storage facilities, creating energy from food scraps, and putting aesthetically imperfect produce to good use. The following paragraphs will highlight examples of improvements that help reduce wasted food.

In August 2015, the USDA expanded the Farm Storage Facility Loan program to provide producers of milk, cheese, butter, yogurt, meat, eggs, seafood, and maple sap low-cost loans for on-farm storage facilities. Since 2000, the Farm Storage Facility Loan program has disbursed \$2 billion in loans to

farmers, facilitating the purchase of storage capacity sufficient for approximately 1 billion bushels of grain.²⁹ The USDA also assists with on-site waste reduction support for farmers, which can help increase profits and decrease food waste.²⁹

The Innovation Center for U.S. Dairy, is promoting the use of anaerobic digesters, which converts manure and food scraps (compost) into useable energy in the form of electricity.³⁰ This helps reduce the environmental impact of animal agriculture, while extracting valuable nutrients (phosphorus, potassium, and nitrogen) used to re-fertilize crops. The USDA is also promoting the expanded usage of anaerobic digesters for energy production.³¹ A 2014 USDA report states that if the number of digesters in the United States were maximized, they would create enough energy to power more than 3 million homes annually.³¹

Fresh fruits and vegetables often go unpicked and un-harvested while on the farm. This happens for a variety of reasons, including defects such as bruises, scratches, or odd shapes. Often times, aesthetically imperfect produce can be used in juices, jams, and other products in which produce is not required to be visually appealing.³² Farmers can also donate this imperfect produce to their local food banks and food pantries. This allows the food to be utilized, and the farmers are able to write the donation off on their taxes – a benefit for all involved.^{1,6,10,25}

Processing and Packaging

Fruit and vegetable trimmings and other edible by-products of processing, such as broccoli stalks, lemon peels, and animal fat can be diverted for use as ingredients. These by-products can be used in other foods for human consumption, in nonfood products such as cosmetics, or for animal feed.¹ For example, fresh banana peels can be used to feed livestock when mixed with other ingredients. Banana peels can be incorporated at levels of 15%-30% percent in the diet without affecting taste or performance.³³ Other examples of fruits and vegetables trimmings that can be used are pineapple juice waste, corncobs, orange peels, cabbage leaves, and carrot tops. These byproducts can be turned into a value added item to create oil blends and dietary fibers for food consumption.²⁹ Using food by-products can help divert food from entering the landfill and creating harmful greenhouse gasses.

Innovations in food processing and packaging are also being used to help reduce waste. The USDA is conducting research on technologies that would expand the shelf life of produce, such as fruit and vegetable powders that inhibit spoilage, and the development of packaging that extends the shelf-life of perishable foods.²⁹ Improved packaging, such as Modified Atmosphere Packaging, substitutes the atmosphere inside a package with a protective gas mix, typically a combination of oxygen, carbon dioxide, and nitrogen. Using this packaging ensures a longer shelf life, reduced economic losses, higher quality products, little need for chemical preservatives, and slow microbial growth.^{34, 35}

Retailers & Food Service

A great deal of effort is being directed at reducing wasted food at the retail and food service sectors.³⁶⁻³⁹ Wal-Mart, the nation's largest retail chain, has created a pilot program to reduce the amount of wasted eggs in America. It is estimated that 1 in every 10 dozen eggs is thrown away, or 5 billion eggs per year. That is enough eggs to make an omelet the size of Manhattan.⁴⁰ Previously, if an egg in a carton was cracked, the entire carton was thrown away. Now, a substitution is made of a new egg with the same specifications. This project proves that sustainability can be a win-win for businesses as well, as this egg program can potentially reduce production costs for Wal-mart by \$50 million a year.⁴¹

The media has recently dubbed the aforementioned visually unappealing produce as "ugly" fruits and vegetables. Many companies have seen opportunity in these so-called ugly foods and are taking advantage of their discounted prices. For example, Bon Appétit, a food service management company, has started a campaign called "Imperfectly Delicious Produce".³² In this campaign, they keep edible and flavorful but cosmetically imperfect produce from going to waste. They do this by working with farmers to identify produce that can be rescued, working with distributors to set up the systems for purchasing and transporting the produce, and chefs to find creative ways to incorporate the produce into menus. Chefs are creating novel ways to incorporate this aesthetically imperfect produce it into soups, smoothies, and baked items.³²

The EPA and USDA have recently joined with the private sector and charitable organizations to set the nation's first food waste reduction goals. This is the first-ever national commitment to help reduce food waste, which aims to reduce wasted food by 50% over the next 15 years.⁴² "Let's feed people, not landfills. By reducing wasted food in landfills, we cut harmful methane emissions that fuel climate change, conserve our natural resources, and protect our planet for future generations" said EPA Administrator Gina McCarthy.⁴³

In 2013, the EPA and USDA launched a "U.S. Food Waste Challenge", creating a platform for businesses and food service operations to reduce their environmental footprint through sustainable business practices, including purchasing less, donating extra food, and composting.⁴⁴ By the end of 2014, the U.S. Food Waste Challenge had over

4,000 active participants, well surpassing its initial goal of reaching 1,000 participants by 2020.⁴³ Quantifying the types of food and how much food is being wasted in food service operations can be beneficial when trying to reduce waste. Software developed specifically for this purpose pinpoints opportunities to reduce wasted food and significantly cut costs. Lean Path is an example of software that helps food service facilities, retailers, and restaurants accurately track waste and determine areas for improvement.⁴⁵ This software is able to track wasted food by utilizing employees to quickly measure (via scale) all food prior to discarding it. Businesses are able to see what is being wasted, when it happened, and to help identify solutions to prevent it from happening in the future. Software like Lean Path can help business owners identify trends and ultimately save money.⁴⁵ (www.leanpath.com)



Barbara Hartman, MS, RD, LD

Chief of Nutrition and Food Service
Martinsburg VA Medical Center

Barbara Hartman, MS, RD, LD, is the Chief of Nutrition and Food Service at the Martinsburg VA Medical Center where she and her staff are implementing a comprehensive Green Kitchen project. The project includes increasing the service of sustainable foods and beverages, improving waste management practices, and improving the conservation of energy and water. In 2009 they turned to technology to track and reduce their institution's food waste. Food waste has been decreased, wholesome left overs are donated to a non-profit agency, and any unavoidable waste is then composted for the VA Medical Center's on-site gardens creating nutrient rich soil "healing grounds" and diverting waste from the landfill. Barbara conservatively estimates that they save \$40,000 to \$50,000 a year in food waste. In 2010 these efforts were awarded a national VA Sustainability Award and a GreenGov Presidential award.

Food that has been mislabeled, bruised, or overproduced might not be sold at full price, but many retailers have found creative ways to avoid wasting it. Bargain shelves in retail establishments are used to sell food that is nearing the end of its life or is slightly less attractive. The produce is especially attractive to customers on a tight budget. Some stores such as Grocery Outlet, Big Lots, and Aldi's have made a business out of these products, purchasing food that is unsellable in typical retail stores and selling it at closeout prices.⁴⁶

Getting children to consume more nutrient-dense foods while reducing wasted food is a challenge across the nation. A national campaign known as "Smarter Lunchrooms" has a goal of creating sustainable, research-based lunchrooms that guide smarter choices.⁴⁷ Some of their recommendations include pre-slicing fruit or giving healthier options attractive names. Sliced fruit is shown to be more appealing to children than whole fruit because it is easier and tidier to eat. Studies show up to a 71% increase in fruit sales when pre-sliced.⁴⁸ Giving attractive names to foods such as "X-ray vision" carrots is shown to increase consumption by 16%.⁴⁹ Scheduling recess before lunch can also help to reduce plate waste by up to 30%.⁴⁷ Composting food that is not eaten in schools is another Smarter Lunchroom suggestion. These simple examples of scalable, low-cost environmental changes can promote healthy eating and decrease waste.



Donna S. Martin, EdS, RDN, LD, SNS, FAND
Director School Nutrition Program

Donna Martin has been a leader in reducing food waste while simultaneously increasing fruit and vegetable consumption during school meals in Georgia. As the Director of the School Nutrition Program, Donna has implemented a variety of tactics that has cut back on waste, while simultaneously increasing the variety and quality of food served. Below are Donna's top recommendations:

Choice: Children love having choice when it comes to food. Having more options allows kids to pick foods they enjoy eating – therefore decreasing the amount of tossed food. Everyday she features at least 5 fruits and vegetables, and the leftovers are incorporated into meals for the following day.

Time: With school becoming more stretched for time, often times lunch times are the first to get cut. Donna says kids need at least 15-20 minutes after they are served to eat their food. Healthy foods also take longer to eat (think salads versus pizza), so cutting lunch times leads to healthier choices.

Buying Local: Donna has dramatically increased the amount of local produced served in the lunch line, up to 70% of the menu. This has multiple benefits including; higher quality and tastier food options, decreased travel distance, and connecting kids (and teachers) to the farmers. Kids have proven to love the local foods, and are much more likely to

School and University Food Service, Cont.

eat them. They also have a lower carbon footprint and longer shelf life due to not traveling across the country (or world) to get to her school.

Slice the Produce: Kids are less likely to eat fruit and veggies that are whole. Slicing the produce (apples, cucumbers, oranges, etc.) increases consumption

Traditionally, university dining halls provide trays to carry and collect food. Some schools and universities are going trayless. Overconsumption of food is somewhat reduced, as the customer has to carry each plate or container of food separately, making it difficult to select multiple items at a time. By removing trays from cafeterias, many US colleges have cut the amount of food that students take and waste by 25%-30% percent.²⁵ One study sampled 360 individual diners over a 6-day period and documented a 32% reduction in wasted food and a 27% reduction in dish use when trays were unavailable. The findings suggest that removing trays is a simple way for universities and other dining facilities to reduce their environmental impact and save money.⁵⁰ Research indicates that students in a buffet style setting with trays tend to take more food than they need and that going trayless requires patrons to make their choices more carefully. In a study by Thiagarajah and Getty, they showed a significant reduction in per person plate waste when comparing a tray system with a trayless system in a university

dining hall.⁵¹ Additionally, some universities have created educational campaigns to raise students' awareness of wasted food and how they can help reduce their footprint. One study showed educational messaging decreased wasted food by 15% over a 6- week period.¹⁴

Donating Excess Food

In 2013, over 49.1 million children, seniors, and adults were living in food insecure households, meaning at some point, they did not have access to a stable food source.³ With so many Americans lacking access to adequate amounts of food, preventing wasted food and diverting unused food to those in need could significantly improve food security in the United States. Despite federal law that permits the tax deduction of the costs of producing, packaging, and delivering products to anti-hunger organizations, only 7% of eligible food is being donated to social services, and 38% of retail outlets do not donate anything.³⁷ Concerns about the risks of donating excess food can be a barrier for many retailers quoting that they are fearful of unintended liabilities that could come from donating food that ends up harming a recipient.⁵² However, On October 1, 1996, President Clinton signed The Bill Emerson Act (The Good Samaritan Act), which protects businesses from liability when food is donated to a non-profit organization in good faith that may later cause harm to the recipient.⁵³ While this law is a protective barrier, many retailers are still hesitant or unaware that this law exists. Dan Glickman, the former Secretary of Agriculture at the USDA, is quoted saying "I can't tell you how shocking it is that there are 31 million food insecure people

in the richest, most abundant nation on earth... a nation that throws out over a quarter of its food.”

⁵² Donating excess food can help to reduce costs by avoiding tipping fees (the amount charged to accept garbage at a disposal site) associated with waste removal, which adds up quickly.²⁷



Janice Giddens, MS, RDN, LD
Nutrition and Wellness Program Manager

Food banks play a major role in decreasing food waste in our system, and increasing the amount of healthy food that is distributed to people who are struggling with household food security. According to Feeding America, the national network of food banks, its partners “diverted over 2 billion pounds of safe, edible food that might otherwise have gone to waste, to Americans facing hunger” last year. (1)

Janice Giddens, MS, RDN, LD is the Nutrition and Wellness Program Manager at The Atlanta Community Food Bank. This food bank is a member of the Feeding America network. In fiscal year 2014 – 2015, the Food Bank distributed 61.7 million pounds of food and grocery products (enough for 51 million meals) to more than 755,000 people in its service area. The Food Bank’s nutrition and wellness managers work with internal staff, as well as partner agencies and clients, to minimize food waste and increase the amount of healthy food that is distributed to communities in need. Janice mentions “A source of confusion that Food Bank dietitians address is product “best by” and “use by”

dates on food packages. Many of the products the Food Bank receives from retail partners are near or past the dates stamped on the packages, but this doesn’t necessarily mean the products are unsafe for consumption.” Food Bank dietitians across the country work to provide educational resources to help partner agencies understand these labels so that food makes it to people instead of a dumpster.

Figure 4. Current Product Packaging Terminology in the United States

There is much confusion over product packaging terminology, and rightfully so. Misinterpreting the dates can lead to consumers to throwing away safe, edible food. The definitions below can help consumers navigate product-packaging terms. For more detailed information on specific items and how long they last past their packaging date, please visit www.stilltasty.com.

- Use By Date, Best By, Best Before – These terms are generally found on shelf stable products such as condiments. These dates are placed on the package by the manufacturer to indicate how long the product will remain at its best quality if unopened. The USDA points out that it is still safe to eat beyond this point as long as the product has been properly stored.
- Sell By – These dates are mostly found on perishable items such as meat, seafood, and milk. This date is when the retailer must sell a product by. Products are still safe to eat a few days after this date, as long as they are properly stored within safe temperature zones.

- Expiration Date – The only product legally requiring this date is infant formula and some baby food. Use these products before the expiration date.

Repurposing Wasted Food

There are a several not-for-profit businesses that operate on capturing food that is destined for the landfill and turning it into nutritious meals for low-income clients. L.A. Kitchen, D.C. Central Kitchen, and Campus Kitchens are examples of innovative organizations dedicated to all operate on this model. These non-profits partner with local farmers, distributors, and retailers to secure produce that is unfit for sale for reasons such as over ripeness, excess quantity, or imperfect shapes and conditions. With this heavily discounted food, they are able to create healthy, inexpensive meals for the most vulnerable populations. Find out more at www.campuskitchens.org, www.lakitchen.org, www.dccentralkitchen.org.



Janell Walker, MPH, RD, LDN

Director of Nutrition & Community Outreach

Janell Walker is the Director of Nutrition & Community Outreach for DC Central Kitchen – for more than 25 years, DC Central Kitchen (DCK) has been fighting food waste by recovering leftover food and converting it into meals for our hungry and at-risk neighbors. To date, they have procured hundreds of thousands of pounds of misshapen or blemished produce from local farms, much of which would have otherwise gone to waste. Their approach to recycling food is helping to combat waste while providing nutritious meals to those in need.

Janell is also involved with a variety of other projects with DCK including a Healthy Corner Store initiative, which is a renowned solution to fighting food deserts. Currently they are working with 67 corner stores in the DC area to increase the availability of fresh produce in areas with few nutritious options. They also realize that naturally there will be some waste with this program, so they collect the “unsellable” produce and repurpose it into meals again. Janell states “if we have a surplus of over ripe bananas, we make banana bread!” “Too many strawberries? We make jam!”. DCK is striving to alleviate hunger by provide nutritious meals to vulnerable populations - all while recycling food and preventing waste.

Opportunities with Consumers

Education is key strategy to raise awareness and motivate behavior change. Sometimes wasted food occurs due to confusion about terms used on food packages such as “use by,” “sell by,” “best by,” etc. Including an explanation of these terms in consumer nutrition education by RDNs can be useful. Some of those terms and their definitions are included in Figure 4.

Many cities have taken steps to combat wasted food and reduce unnecessary food being added to landfills. While composting is low on the EPA’s Food Recovery Hierarchy, it is still a much better option than throwing food into the trash, which creates excess greenhouse gasses and cannot be turned into valuable fertilizer for making healthy soils. Cities like New York, Boston, Seattle, Portland, and San Francisco have all passed legislation mandating composting and provide curbside service to residents and businesses. Portland issued a report highlighting a 38% drop in residential trash and that 78% of citizens are composting 1 year after the composting program began.⁵⁴ While not all cities have curbside composting programs, there are groups advocating for more cities to join the cause.





Alice Henneman
Nutrition Educator for the University of
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Alice Henneman is a Nutrition Educator for the University of Nebraska-Lincoln Extension, and she teaches clients regularly on how to reduce their footprint by reducing wasted food. For more information visit their website at <https://food.unl.edu/fnh>.

Alice states, “Preventing food waste saves money and resources. Resources used to produce uneaten food include: fertilizer, cropland, fresh water consumption and energy consumption. These are five simple things I recommend consumers do my online articles and social media. ”

1. Shop the refrigerator before going to the store. Use food at home before buying more. Designate one meal weekly as a “use-it-up” meal.
2. Move older food products to the front of the fridge/cupboard/freezer and just purchased ones to the back. This makes it more likely foods will be consumed before they go bad.
3. Take restaurant leftovers home and refrigerate within two hours of being served. Eat within three to four days or freeze.
4. Check the garbage can. If the same foods are constantly being tossed: Eat them sooner, buy less of them, incorporate them into more recipes or freeze them.

5. If you have several foods that might go to waste at the same time, try adding them to such adaptable recipes as salads, soups, pasta and casseroles.
6. Compost scraps, excess food, and peels – this helps create nutrient rich soil and prevents food from rotting in landfills, which creates greenhouse gasses



Figure 5: Wasted Food Resources: Websites and Smart Phone Apps

These websites and apps below are just some of the many great resources available to help reduce and recover wasted food. A quick Internet search can lead you to many other organizations doing great work in this arena.

- United States Department of Agriculture (USDA) Center for Nutrition Policy and Promotion (CNPP) has developed a new infographic, “Let’s Talk Trash”, to inform American consumers about food loss and waste. CNPP is raising awareness about how individuals and families can reduce food loss and waste, in support of larger USDA efforts. www.choosemyplate.gov/lets-talk-trash.
- Waste No Food is a website that was started by a 12th grader, with a mission to reduce food waste. This website works by creating an online marketplace where food pantries and shelters can locate excess food from farms, restaurants, and grocery stores that may otherwise end up in the landfill. www.wastenofood.org
- Ample Harvest is a website that allows anyone to help donate extra food from their pantry or garden. They have a mission of connecting individuals with food banks and food pantries. www.ampleharvest.org
- Food Cowboy is an application that allows trucks filled with food that has been rejected but are still safe to find a better home than the landfill. Truck drivers are able to quickly report what they have, and find a charity or compost site in their local vicinity that can accept the product. www.foodcowboy.com
- Love Food Hate Waste and Green Egg Shopper are two phone apps that use modern technology to help shoppers reduce their carbon footprint by reducing food waste. It helps shoppers become more efficient in their shopping and storing tactics, and helps to incorporate leftovers into meals for the next day. www.lovefoodhatewaste.com

There are many simple actions that consumers can take to reduce wasted food, and many resources available to support those efforts (Figure 5). RDNs are encouraged to incorporate these and other strategies into their nutrition education programs and guidance for clients. Many RDNs are already leading wasted food reduction efforts in the workplace and with consumers. A wealth of information is also available from the Academy and its Foundation for members to learn more about wasted food, food insecurity, and environmental impact of the food system. Please visit the Academy Foundation's website at www.eatrightfoundation.org/foundation/futureoffood/.

Global Efforts to Reduce Food Waste

Food waste is a global issue, and many countries are beginning to take action to help reduce the amount of wasted food they produce. Countries such as France are passing laws that make it illegal for retailers to throw away food. This law mandates that all unsold but edible food should be donated to charities for immediate distribution to the poor. Food that is unsafe to eat is to be donated to farms for agricultural purposes.⁵⁵

Thanks to successful campaigns, many countries around the world are well on their way to turn the tide and begin decreasing wasted food. Think.Eat. Save is a campaign developed between the United Nations Environment Programme (UNEP) and FAO with a mission to empower widespread global, regional, and national actions surrounding reducing wasted food.⁴⁵ Love Food Hate Waste is a United Kingdom based non-profit organization that aims to raise awareness about wasted food and provides actionable changes to make a difference.⁵⁶ LFHW has

a website, phone app, and resources of consumers and businesses to help reduce wasted food across the food supply chain. To do this, they work collaboratively with community organizations, chefs, UK Governments, businesses, and local authorities.

Turning the Tide of Wasted Food – How RDNs Can Help Make a Difference

As Americans, we are throwing away an alarmingly high amount of food. Collectively, we are discarding around 30%-40% of all food we grow, produce, package, and purchase.^{1,2,5,10,20,26} As highlighted in this report, there are a multitude of reasons as to why waste occurs, but also a number of solutions we can enact to help reduce it. Our global population is growing and resources are becoming more scarce.²⁰ Many RDNs are already taking bold initiatives to reduce their practice area's wasted food footprint. Whether it's reducing the amount of food purchased, donating excess food to feed hungry people, composting scraps, or teaching clients how to be more mindful with their shopping habits – it all makes a difference. There is an immense need to shift our culture's mindset towards one of conservation, especially American consumers, as we produce the largest amount of wasted food. The good news is that reducing wasted food makes sense - economically, environmentally, and socially. Making any change towards a reduction of wasted food is a commendable step in the right direction. This paper highlights some of the many ways we can help reduce the amount of food we waste, and these changes will help to make profound and lasting impact for our generation and generations to come.

References

1. Gunders D. Wasted: How America is losing up to 40 percent of its food from farm to fork to landfill. Natural Resources Defense Council website. <http://www.nrdc.org/food/files/wasted-food-ip.pdf>. Published August 2012. Accessed August 12 2015.
2. Kearney AT. Save the planet, feed the planet. https://www.atkearney.com/documents/10192/471472/EAXII_2_Save_the_Planet_Feed_the_Planet.pdf/3537625f-024b-4197-b54f-0a85aef53019. Accessed August 21, 2015.
3. Feeding America. Hunger and poverty facts. <http://www.feedingamerica.org/hunger-in-america/impact-of-hunger/hunger-and-poverty/hunger-and-poverty-fact-sheet.html>. Accessed July 21, 2015.
4. US Department of Agriculture, Economic Research Service. Loss-adjusted food availability documentation. [http://www.ers.usda.gov/data-products/food-availability-\(per-capita\)-data-system/loss-adjusted-food-availability-documentation.aspx](http://www.ers.usda.gov/data-products/food-availability-(per-capita)-data-system/loss-adjusted-food-availability-documentation.aspx). Updated October 13, 2015. Accessed July 21, 2015.
5. Parfitt J, Barthel M, Macnaughton S. Food waste within food supply chains: quantification and potential for change to 2050. *Philos Trans R Soc Lond B Biol Sci*. 2010;365(1554):3065-3081.
6. Kummu M, De Moel H, Porkka M, Siebert S, Varis O, Ward P. Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use. *Sci Total Environ*. 2012;438:477-489.
7. Consultative Group for International Agricultural Research (CGIAR). Food emissions. <http://ccaafs.cgiar.org/bigfacts/#theme=food-emissions>. Accessed July 21, 2015.
8. Buzby JC, Farah-Wells H, Hyman J. The estimated amount, value, and calories of postharvest food losses at the retail and consumer levels in the United States. US Department of Agriculture website. <http://www.ers.usda.gov/media/1282296/eib121.pdf>. Published February 2014. Accessed December 8, 2015.
9. Gustavsson J, Cederberg C, Sonesson U, van Otterdijk R, Meybeck A. Global food losses and food waste. Food and Agriculture Organization of the United Nations website. <http://www.fao.org/docrep/014/mb060e/mb060e.pdf>. Published 2011. Accessed July 7, 2015.
10. Lipinski B, Hanson C, Lomax J, et al. Reducing food loss and waste. World Resources Institute website. http://www.wri.org/sites/default/files/reducing_food_loss_and_waste.pdf. Published June 2013. Accessed July 2, 2015.
11. The Economist. Watching fruit rot. <http://www.economist.com/news/united-states/21641262-if-dockworkers-union-blocks-west-coast-ports-shippers-will-find-others-watching-fruit>. Published January 31, 2015. Accessed August 14, 2015.
12. Buzby JC, Hyman J, Stewart H, Wells HF. The value of retail- and consumer-level fruit and vegetable losses in the United States. *J Consumer Aff*. 2011;45(3):492-515.
13. The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States. USDA. <http://www.ers.usda.gov/media/1282296/eib121.pdf>. 2014. Accessed July 13, 2015.
14. Whitehair KJ, Shanklin CW, Brannon LA. Written messages improve edible food waste behaviors in a

- university dining facility. *J Acad Nutr Diet*. 2013;113(1):63-69.
15. Ofei KT, Holst M, Rasmussen H, Mikkelsen BE. Effect of meal portion size choice on plate waste generation among patients with different nutritional status. An investigation using Dietary Intake Monitoring System (DIMS). *Appetite*. 2015;91:157-164.
 16. Papargyropoulou E, Lozano R, Steinberger JK, Wright N, bin Ujang Z. The food waste hierarchy as a framework for the management of food surplus and food waste. *J Cleaner Prod*. 2014;76:106-115.
 17. US Environmental Protection Agency. Municipal Solid Waste in The United States, Facts and Figures. http://www3.epa.gov/epawaste/nonhaz/municipal/pubs/2012_msw_fs.pdf. Accessed July 24, 2015.
 18. Food and Agriculture Organization of the United Nations. Food wastage footprint: impacts on natural resources: summary report. <http://www.fao.org/docrep/018/i3347e/i3347e.pdf>. 2011. Published 2013. Accessed August 1, 2015.
 19. Lundqvist J, De Fraiture C, Molden D. Saving water: from field to fork: curbing losses and wastage in the food chain. Stockholm International Water Institute website. <http://www.siwi.org/publications/saving-water-from-field-to-fork-curbing-losses-and-wastage-in-the-food-chain/>. 2008. Accessed July 21, 2015.
 20. Hall KD, Guo J, Dore M, Chow CC. The progressive increase of food waste in America and its environmental impact. *PloS one*. 2009;4(11):e7940.
 21. Fishman C. Message in a Bottle. Fast Company. Available at: <http://www.fastcompany.com/59971/message-bottle>. 2007. Accessed December 24, 2015.
 22. Bottled Water Facts - Ban the Bottle. Available at: <https://www.banthebottle.net/bottled-water-facts/>. Published 2015. Accessed December 24, 2015.
 23. United Nations Environmental Programme (UNEP) Global Environmental Alert Service (GEAS). Growing Greenhouse Gas Emissions due to Meat Production. http://www.unep.org/pdf/unep-geas_oct_2012.pdf. Published in October, 2012. Accessed August 21, 2015.
 24. Environmental Protection Agency (EPA) Office of Resources Conservation and Recovery. Municipal Solid Waste Generation, Recycling, and Disposal in the United States. http://www.epa.gov/osw/nonhaz/municipal/pubs/msw_2010_data_tables.pdf. 2010. Accessed July 12, 2015.
 25. National Geographic, Feed the Future. Third of Food Is Lost or Wasted: What Can Be Done. <http://news.nationalgeographic.com/news/2014/10/141013-food-waste-national-security-environment-science-ngfood/>. 2014. Accessed July 24, 2015.
 26. Food Waste Reduction Alliance (FWRA). Best Practices and Emerging Solutions Toolkit. http://www.foodwastealliance.org/wp-content/uploads/2014/04/FWRA_Toolkit_FINAL_0415141.pdf. 2014. Published 2014. Accessed June 20, 2015.
 27. Environmental Protection Agency (EPA). Waste Not, Want Not - Feeding the Hungry and Reducing Waste. http://www.epa.gov/wastes/conserve/pubs/wast_not.pdf. 2006. Published 2006. Accessed July 24, 2015.
 28. Environmental Protection Agency (EPA). The Food Recovery Hierarchy. <http://www.epa.gov/foodrecovery/>. Updated 2014. Accessed June 20, 2015.
 29. United States Department of Agriculture (USDA). Selected New and Ongoing USDA Food Loss and

- Waste Reduction Activities. http://www.usda.gov/oce/foodwaste/usda_commitments.html. Accessed December 14, 2015.
30. Innovation Center for U.S. Dairy. Sustainability Commitment. <http://www.usdairy.com/sustainability/industry-commitment/about>. 2014. Accessed August 20, 2015.
 31. United States Department of Agriculture, Environmental Protection Agency. Biogas Opportunities Road Map. http://www.usda.gov/oce/reports/energy/Biogas_Opportunities_Roadmap_8-1-14.pdf. 2014. Published 2014. Accessed August 20, 2015.
 32. Bon Appétit. Imperfectly Delicious Produce. <http://www.bamco.com/timeline/imperfectly-delicious-produce/>. 2014. August 4, 2015.
 33. Wadhwa M, Bakshi M. Utilization of fruit and vegetable wastes as livestock feed and as substrates for generation of other value-added products. RAP Publication. 2013.
 34. The Guardian. Tackling the food waste challenge with technology. <http://www.theguardian.com/sustainable-business/tackling-food-waste-technology-refrigeration-packaging>. 2014. Published 2014. Accessed August 3, 2015.
 35. Zagory D. What Modified Atmosphere Packing Can and Can't Do for You. In: University. http://www.nsf.org/newsroom_pdf/articles_whatmap.pdf. Published March 2010. Accessed October 20, 2015.
 36. Phillips C, Hoenigman R, Higbee B, Reed T. Understanding the sustainability of retail food recovery. PLoS One. 2013;8:e75530.
 37. Lebersorger S, Schneider F. Food loss rates at the food retail, influencing factors and reasons as a basis for waste prevention measures. Waste management. 2014;34:1911-1919.
 38. Giuseppe A, Mario E, Cinzia M. Economic benefits from food recovery at the retail stage: an application to Italian food chains. Waste management. 2014. 34:1306-1316.
 39. Neff RA, Spiker ML, Truant PL. Wasted Food: U.S. Consumers' Reported Awareness, Attitudes, and Behaviors. PLoS One. 2015;10:e0127881.
 40. Wal-Mart. The Secret Life of Eggs. <https://www.youtube.com/watch?v=jtVhhPQSKXg>. Published March 6, 2014. Accessed December 12, 2015.
 41. Wunder A. How to Save a Million Eggs a Day, and Other Retail Tales. <http://www.GreenBiz.com>. Published 2011. Accessed November 12, 2015.
 42. Think Progress. The U.S. Government Wants To Cut Food Waste In Half. <http://thinkprogress.org/climate/2015/09/17/3702620/usda-epa-food-waste-goals/>. 2015. Accessed December 12, 2015.
 43. United States Department of Agriculture. USDA and EPA Join with Private Sector, Charitable Organizations to Set Nation's First Food Waste Reduction Goals. <http://www.usda.gov/wps/portal/usda/usdamediafb?contentid=2015/09/0257.xml&printable=true&contentidonly=true>. 2015. Accessed December 12, 2015.
 44. Environmental Protection Agency. Food Recovery Challenge. <http://www.epa.gov/smm/foodrecovery/>. 2014. Accessed August 3, 2015.
 45. Lean Path Software. Lean Path Website. www.leanpath.com/. 2014. Accessed August 20, 2015.
 46. Grocery Outlet website. How we do it. www.groceryoutlet.com. 2014. Accessed June 20, 2015.
 47. Smarter Lunchrooms Website. About us. <http://smarterlunchrooms.org/>. 2015. Accessed August 3, 2015.

48. Wansink B, Just DR, Hanks AS, et al. Pre-sliced fruit in school cafeterias: children's selection and intake. *Am J Prev Med.* 2013;44:477-480.
49. Wansink B, Just DR, Payne CR, et al. Attractive names sustain increased vegetable intake in schools. *Preventive medicine.* 2012;55:330-332.
50. Kim K, Morawski S. Quantifying the Impact of Going Trayless in a University Dining Hall. *Journal of Hunger & Environmental Nutrition.* 2012;7:482-486.
51. Thiagarajah K, Getty VM. Impact on plate waste of switching from a tray to a trayless delivery system in a university dining hall and employee response to the switch. *J Acad Nutr Diet.* 2013;113:141-145.
52. Cohen, J. Ten Years of Leftovers with Many Hungry Still Left Over: A Decade of Donations under the Bill Emerson Good Samaritan Act. *Seattle Journal for Social Science.* Published November 2006. Accessed August 10, 2015.
53. Feeding America. Protecting our Partners, The Bill Emerson Act. <http://www.feedingamerica.org/ways-to-give/give-food/become-a-product-partner/protecting-our-food-partners.html>. 2014. Accessed August 12, 2015.
54. The City of Portland. Bureau of Planning and Sustainability. New Curbside Collection Service - One Year Report. <https://www.portlandoregon.gov/bps/article/423510>. 2012. Accessed July 13, 2015.
55. The Atlantic. Should it be Illegal for Supermarkets to Waste Food?. <http://www.theatlantic.com/international/archive/2015/05/law-france-supermarkets-food-waste/394481/>. 2015. Accessed December 12, 2015.
56. Love Food Hate Waste. About Us. <http://www.lovefoodhatewaste.com/content/about-us-2>. 2014. Accessed July 12, 2015.