Feature: Food Choices & Health June 02, 2014 | PRINT | PDF | EMAIL

Food Loss—Questions About the Amount and Causes Still Remain

by **Jean C. Buzby**, **Hodan Farah Wells**, and Jaspreet Aulakh

Food loss and its food waste subcomponent are increasingly in the spotlight both in the United States and around the world. This attention reflects concern about the resources wasted in the production and disposal of uneaten food, the negative side effects associated with food loss (such as pollution created during food production), and the growing pressures on the global food supply.

Amber Waves

Search Amber Waves Go

Amber Waves Home

All Articles

About Amber Waves

Share or Save This Article

ERS defines food loss as the amount of food available for human consumption—after removing bones, pits, peels, and other nonedible parts—that is not consumed for any reason. It includes moisture loss and cooking shrinkage; loss from mold, pests, or inadequate climate control; and food waste. Food waste is a subcomponent of food loss, and examples include edible food discarded by retailers due to color or appearance and plate waste thrown away by consumers. While ERS researchers have estimated the amount of food loss that occurs in U.S. grocery stores, restaurants, and homes, the waste portion of this loss has not been calculated because of data limitations.

Highlights:

- ERS estimates that 31 percent, or 133 billion pounds, of food available for consumption at the retail and consumer levels in the United States in 2010 went uneaten.
- Two-thirds of this 133-billion-pound loss occurred in homes, restaurants, and other away-from-home eating places, and one-third occurred in grocery stores and other food retailers.
- Potential strategies to reduce food loss include improvements in food packaging, more efficient inventory management in grocery stores and restaurants, and having consumer education campaigns.

The United Nation's Food and Agriculture Organization (FAO) estimates that one-third of global food production is either wasted or goes uneaten. In the United States, an estimated 31 percent of the food available for consumption at the retail and consumer levels went uneaten. Had farm-to-retail level losses been included, this estimate for the United States would be higher.

Some loss is inevitable because food is inherently perishable, and spoiled or deteriorated food must be discarded to ensure the safety and wholesomeness of the food supply. Legal liability and strict food safety rules can inhibit the recovery of uneaten food from homes, restaurants, and other eating establishments to be redistributed to hungry people. Costs to reduce food loss or to safely collect, store, and transport wholesome, uneaten food to food banks can also be prohibitive.

Substantial reductions in food loss within a country would likely require a mixture of public and private-sector approaches. Despite the increased attention from policymakers and the media to food waste in the past decade, questions still remain about the amount and causes of loss and waste along specific parts of the farm-to-fork chain, as well as what portion of food loss can be prevented, recovered for human consumption, or recycled for another economic use, such as burning it for energy.

Why is there food loss?

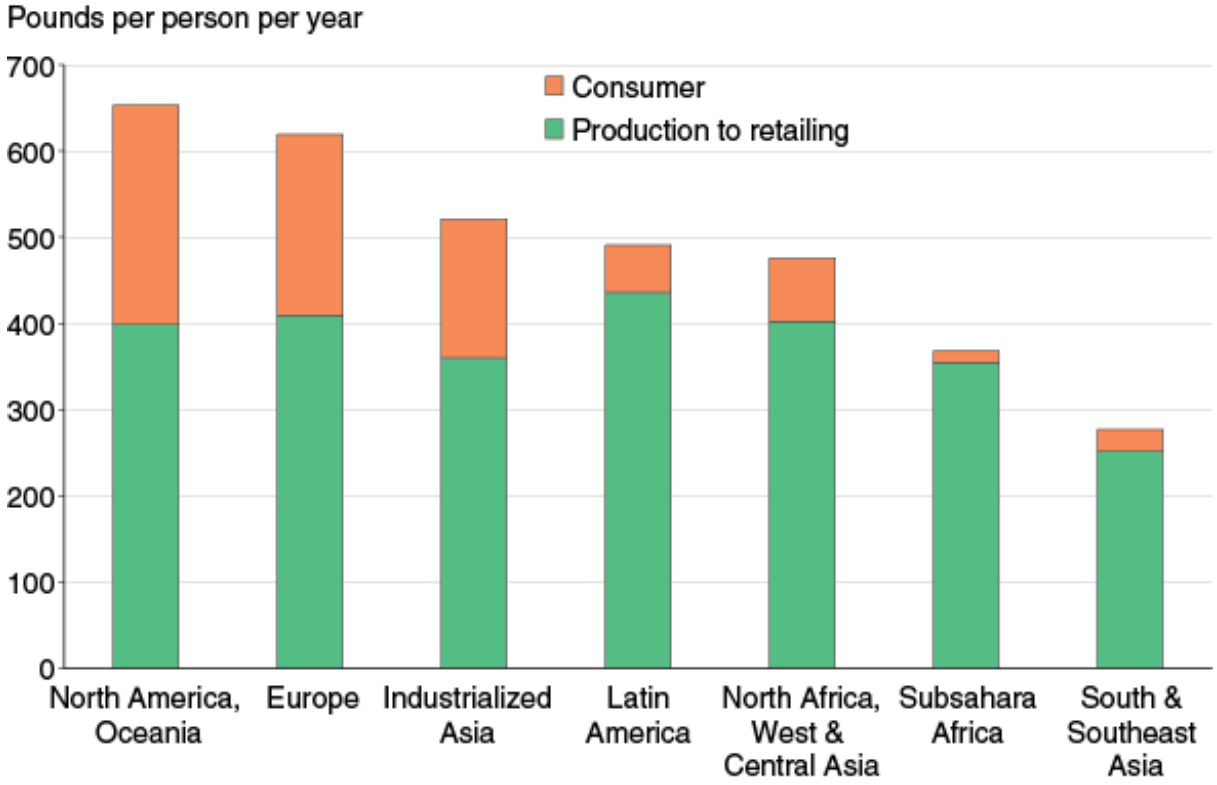
Food loss occurs for many reasons, with some types of loss—such as spoilage—occurring at every stage of the production and supply chain. Between the farm gate and retail stages, food loss can arise from problems during drying, milling, transporting, or processing that expose food to damage by insects, rodents, birds, molds, and bacteria. At the retail level, equipment malfunction (such as faulty cold

storage), over-ordering, and culling of blemished produce can result in food loss. Consumers also contribute to food loss when they cook more than they need and choose to throw out the extras.

The limited data available suggest that food loss tends to occur at different parts of the farm-to-fork food chain when comparing across developed and less-developed countries. In less developed countries, food loss mostly occurs closer to the farm and retail segments with relatively little wasted by the consumer. These countries tend to have relatively inadequate storage (particularly cold storage), transportation networks, and access to markets making it challenging to keep food edible and wholesome until it is consumed. Access to loss-reducing technologies, such as sophisticated packaging films that allow fresh produce to breathe, and adoption of food management practices, such as computerized inventory tracking, are less common in developing countries. Less developed countries may also rely on sun-drying of grains, which increases the risks of pest infestation and damage from unfavorable weather.

In developed countries like the United States, a relatively larger share of food loss occurs at the consumer end of the spectrum. Food accounts for a relatively smaller share of household incomes, and consumers typically demand a wide variety of high-quality, cosmetically appealing, and convenient foods. As a result, blemished, misshapen, or wrong-sized foods are often discarded to meet minimum quality standards. Also, oversized portions and the distaste for certain foods among abundant food choices may help contribute to greater plate waste. Additionally, consumers are often confused over “use-by” and “best before” dates, leading to the discard of edible food.

In less developed regions, relatively less food loss and waste occurs at the consumer level than at earlier stages of the food chain



Source: Food and Agriculture Organization 2011 report by Gustavsson et.al., figure 2. Converted by USDA Economic Research Service authors from kilograms to pounds and bars rearranged.

How much food loss is there and where does it occur?

Although researchers have a general idea about the different reasons for food loss in developed versus less developed countries and within the United States, data on the breakdown of total food loss for a given food commodity and country by the different causal reasons are lacking. For example, although there are estimates of fresh spinach loss at the retail and consumer levels in the United States, national estimates at the farm level do not exist. It is also not known how much of the spinach loss at the consumer level occurs in the home versus away from home, such as in restaurants or schools, or the breakdown of loss from the different causes at any given

stage (e.g., cooking shrinkage, spoilage, and plate waste).

ERS estimates of food loss are based mainly on inference. ERS develops supply and use balance sheets for over 200 individual commodities. In the Loss-Adjusted Food Availability (LAFA) data series, ERS takes the balance sheets for individual commodities, removes the inedible share (such as peach pits and asparagus stalks), and applies food loss assumptions at the retail and consumer levels to estimate food consumption and loss in the United States. Food loss at the consumer level includes losses in homes and in restaurants, schools, sports stadiums, and other away-from-home eating places. The underlying assumptions are from an array of sources, including grocery store supplier shipment and sales data and national food consumption surveys. The LAFA series is considered a work in progress because ERS continues to refine the underlying loss assumptions and estimates.

In 2010, ERS estimates that a total of 31 percent, or 133 billion pounds, of the 430 billion pounds of the available food supply at the retail and consumer levels went uneaten, with an estimated retail value of $162 billion. This translates into 141 trillion calories (kcal) of food available in the U.S. food supply but not consumed in 2010. Expressed on a per capita basis, food loss at the retail and consumer levels in 2010 totaled 1.18 pounds of food per person per day, with a retail value of $1.43.

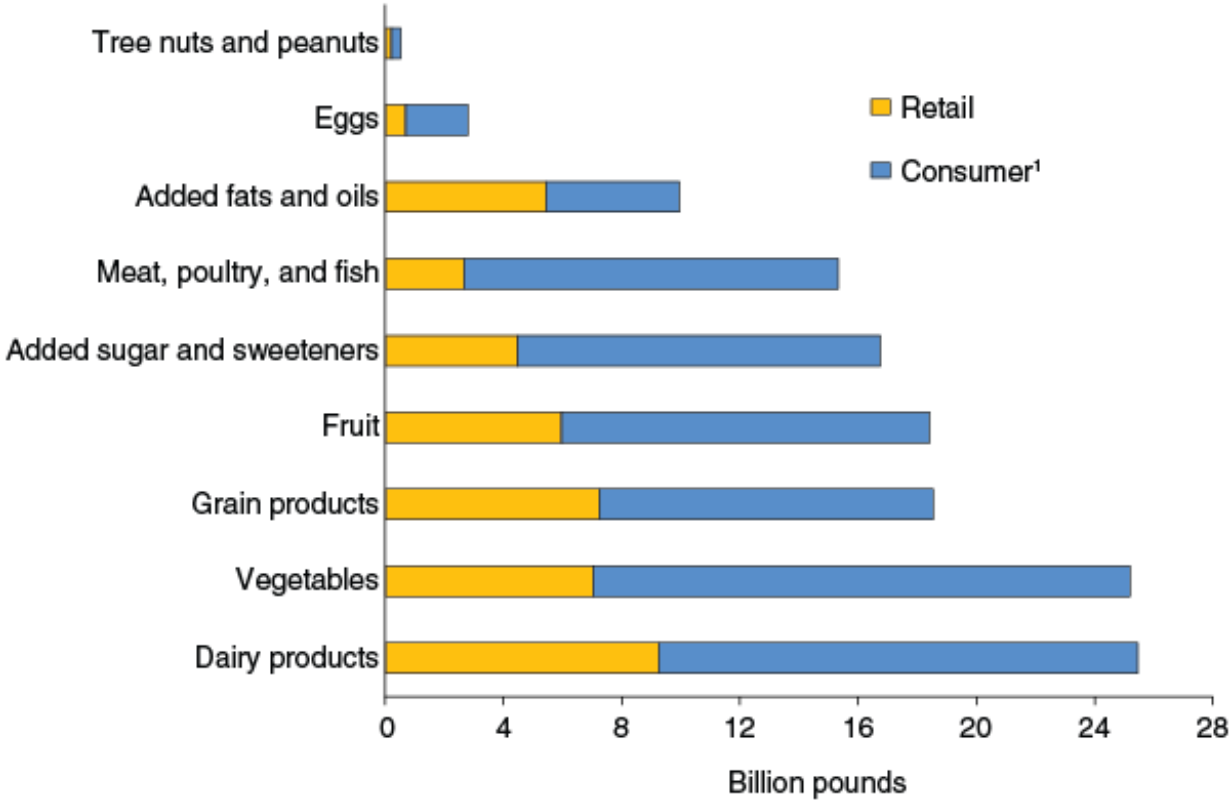
Estimated food loss in the United States at the retail and consumer levels, 2010

Measure	Retail food supply	Total losses	Per capita losses	
	Annual (billions)		*Annual*	*Daily*
Amount (pounds)	430	133	429	1.18
Value (U.S. dollars)	554	162	522	1.43
Calories (kcal)	429,161	141,212	455,890	1,249

Note: Totals may not add due to rounding.
Source: USDA, Economic Research Service Loss-Adjusted Food Availability data, 2010.

The breakdown of U.S. food loss between the retail and consumer levels depends on the food group. For example, 28 percent of loss in the vegetables group in 2010 occurred at grocery stores and other retailers and 72 percent occurred in homes and away-from-home eating places. For grain products, 39 percent of loss occurred at retail and 61 percent at the consumer level. Added fats and oils was the only food group where a larger portion of loss occurred at the retail level than at the consumer level. In terms of pounds of food loss, dairy products had the largest loss at the retail level, while vegetables had the greatest loss at the consumer level.

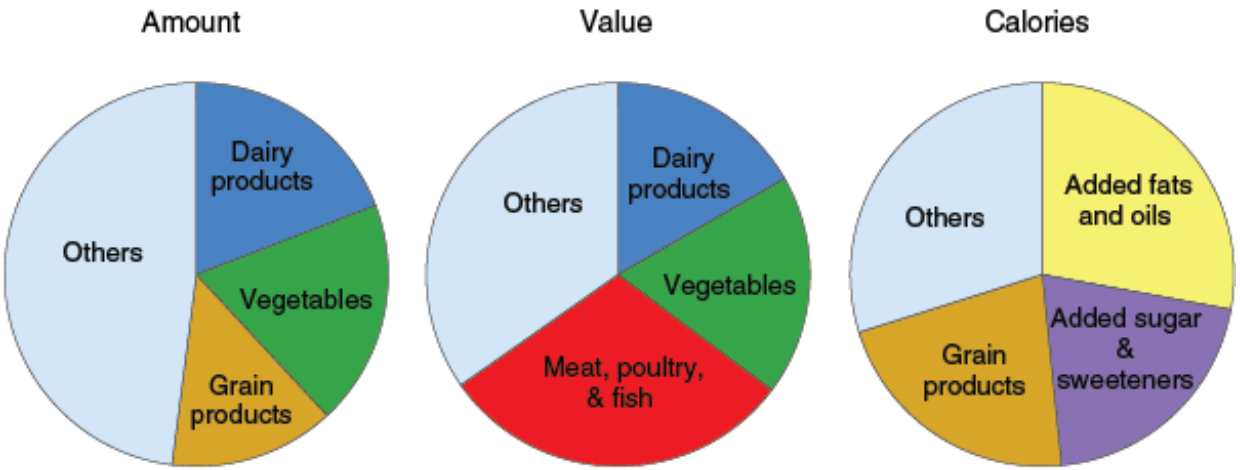
Quantity lossess at the consumer level are larger than retail level losses for all food categories, except added fats and oils



¹Includes loss in the home and in away-from-home locations. Includes cooking shrinkage and uneaten food.
Source: USDA, Economic Research Service Loss-Adjusted Food Availability data, 2010.

In the United States, the food groups with the highest share of food loss vary with the type of measurement. Three food groups (dairy products, vegetables, and grain products) made up almost half of the food loss at the retail and consumer levels in terms of weight. On a total value basis, the meat, poultry, and fish group comprises almost a third (30 percent) of the total (versus 12 percent by weight) because foods in this group tend to cost more per pound than many other foods. Vegetables and dairy products come in second and third in terms of share of total value. The top three food groups in terms of shares of total calories uneaten are noticeably different—shares for added fats and oils, added sugars and sweeteners, and grains are much higher in terms of calories, reflecting these foods' caloric density per pound.

The top three U.S. food groups in terms of annual food loss at the retail and consumer levels vary depending on if measured by amount, value, or calories



Source: USDA, Economic Research Service Loss-Adjusted Food Availability data, 2010.

On a per capita basis at the consumer level, ERS estimates that 290 pounds of food went uneaten in 2010 at a value of $371. This translates into 789 calories per capita per day. The estimate of 290 pounds per capita at the consumer level in the United States in 2010 suggests that consumer level food loss in the United States is higher than in other parts of the world. In general, food waste tends to be higher in developed countries—a 2011 study conducted for FAO found that per capita food waste by consumers in North America and Europe was 209-254 pounds per year compared to 13-24 pounds per year in Sub-Saharan Africa and South/Southeast Asia.

What are the potential strategies to reduce food loss and waste?

There are two separate challenges in reducing food loss and its environmental and other impacts: (1) how to reduce the amount of uneaten food in the first place (prevention), and (2) what to do with uneaten food once it is generated (disposal). If the uneaten food is wholesome, it could potentially be recovered for human consumption or diverted to animal feed if it makes economic sense to do so. Or, uneaten food can be diverted or recycled for another economic use, such as burning it for energy or mixing it with yard waste to make compost. As the first challenge to reduce the amount of uneaten food is met more fully, the second becomes less of an issue.

However, there are limits to how much food loss the United States or any other country could realistically prevent, recover for human consumption, or divert to another economic use. Factors such as the perishable nature of most foods and food safety, storage, and temperature considerations limit how much food loss can be prevented or reduced. Also, logistical challenges of getting wholesome food to the hungry exist, such as the dispersion of uneaten food among millions of households, food plants, and foodservice locations, and the time and expense needed to deliver food to a new destination, such as to a food bank. Consumers' tastes, preferences, and food habits also play a role, such as when people throw out milk leftover at the bottom of a bowl of cereal. Economic factors, such as the costs to recover and redirect uneaten food to another use, may only provide limited incentives to reduce food loss. Food firms will adopt a loss-reducing practice if it is economically justifiable, that is, if the benefits outweigh the costs.

Substantial reductions in food loss within a country will likely require a mixture of public and private-sector approaches. In less developed countries, some strategies to reduce food loss may be simple, low-tech, and relatively inexpensive, such as using triple-layered storage bags for cowpeas in rural Africa instead of double-layered bags. Other strategies are more costly, such as public-sector investment in better and more roads to get crops and other foods to markets. Private-sector investment could include developing access to credit for farmers and small businesses to allow them to purchase improved storage options, and trucks to transport food to markets.

In developed countries, there are many potential strategies to reduce food loss. Examples include the adoption of technological improvements in food packaging, more efficient food inventory management in retail stores and restaurants, increased redistribution of edible food to people through food bank networks, and consumer education campaigns to reduce food waste. The United States Department of Agriculture's (USDA) Agricultural Research Service (ARS) has designed new packaging that reduces moisture loss and doubles the storage life of small fruits. ARS has also developed an ozone-based treatment that growers of organic grapes can use after harvest to inhibit the growth of the microbe that causes gray mold in grapes.

In the past decade, worldwide efforts to improve data collection on food loss have been growing, along with a growth of initiatives to reduce food loss and waste. In 2007, the Waste & Resources Action Programme in the United Kingdom launched its Love Food Hate Waste consumer education campaign to share practical ways to reduce food waste. Five years into the effort, the campaign sponsors reported that household food and drink waste was reduced by 15 percent. Technical innovations, such as modified atmosphere packaging for produce, and a range of behaviors on the part of consumers, such as buying appropriate amounts and making the most of leftovers, contributed to reduced waste. Spain, France, and Japan are also involved in efforts to reduce food waste. Japan has a multifaceted policy that encourages food manufacturers, retailers, and restaurants to recycle more food waste for feed, fertilizer, and energy while meeting strict guidelines, including those for feed safety.

In June 2013, USDA and the U.S. Environmental Protection Agency (EPA) launched the U.S. Food Waste Challenge, calling on U.S. producer groups, processors, manufacturers, retailers, local municipalities, and other government agencies to reduce food loss and waste; to recover wholesome food for human consumption; and to recycle discards to other uses including animal feed, composting, and energy generation. The goal of the Challenge is to lead a fundamental shift in how Americans think about and manage food and food waste. Participants in the Challenge include major food companies, smaller private firms, universities and colleges, sports teams, entertainment resorts, and other businesses.

In addition to spearheading the Challenge, USDA initiated a range of activities to reduce, recover, and recycle food waste in its programs and operations. By the end of 2013, USDA had issued new guidance streamlining procedures for donating misbranded, wholesome meat and poultry products; initiated a study on plate waste in the school meal program; and began piloting a program to compost meat samples from USDA's inspection testing.

ERS has efforts underway to improve its estimates of the food available for consumption and food loss, such as obtaining updated estimates of food loss for fresh fruit, vegetables, meat, poultry, and seafood in retail stores. More refined estimates and greater awareness of the amount of food loss—and where the loss occurs—might help spur changes in government policies, food handling practices and technologies, consumer habits, and other actions that reduce food waste and conserve resources.

This article is drawn from...

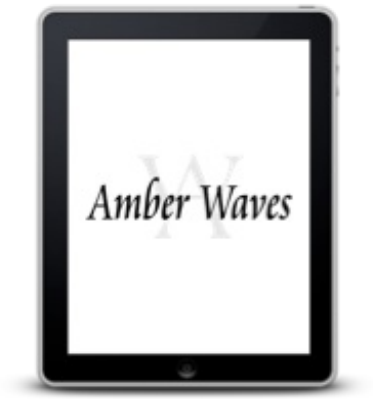
The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States, by Jean Buzby, Hodan Farah Wells, and Jeffrey Hyman, USDA, Economic Research Service, February 2014

Food Availability (Per Capita) Data System, by Jeanine Bentley, USDA, Economic Research Service, October 2015

You may also be interested in...

Global Food Losses and Food Waste: Extent, Causes and Prevention, by Jenny Gustavsson, Christel Cederberg, Ulf Sonesson, Robert van Otterdijk, and Alexandre Meybeck, Food and Agriculture Organization (FAO) of the United Nations: Rome, 2011

"Household Food and Drink Waste in the United Kingdom 2012." Waste & Resources Action Programme (WRAP), by Tom Quested, Robert Ingle, and Andrew Parry, Oxon, United Kingdom, November 2013



Amber Waves on Your Tablet

On the go? Stay connected with our *Amber Waves* app for tablets. Subscribe to the monthly magazine on **iTunes** or **Google Play**.