Overview of Food Loss in the United States

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Economic Research Service (USDA/ERS)
Special thanks to Hodan Wells, Jeffrey Hyman, and Jeanine Bentley

“The Last Food Mile Conference: Food Loss and Food Waste in the U.S. Supply Chain”
Outline

- Definition
- Background
  - Loss-Adjusted Food Availability data series
- Food loss estimates
- Previous initiatives to improve LAFA
  —series is considered preliminary
- Summary
ERS Definition of Food Loss

*Food loss* represents the edible amount of food, postharvest, that is available for human consumption but is not consumed for any reason.

Food loss includes:
- cooking loss and natural shrinkage (e.g., moisture loss)
- loss from mold, pests, or inadequate climate control
- food waste (e.g., food left on plate)
What are the Considerations and Incentives Concerning Food Loss?

In the farm-to-fork chain, each player is maximizing returns. The food production and marketing system is generally efficient. Some amount of loss may be economically justifiable.

Individual tastes and preferences also come into play for consumers.

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.

There are often tradeoffs between technologies that reduce loss and the advantages of reducing loss.

Given the number of calories and overweight people in the United States, it would be detrimental for everyone to eat all the food that they are served or buy.
How much could be reduced?

- There are tradeoffs and limits to how much food loss the United States could realistically prevent, recover for human consumption, or divert to another economic use (e.g., energy creation, composting).

- 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 food-services locations, and the time and expense needed to deliver food to a new destination, such as to a food bank.

- Economic factors may only provide limited incentives to reduce food loss.

- Advances in food packaging, handling, and tracking technologies, show promise in reducing food loss. For example, special plastic films—which allow produce to breathe—continue to be developed and improved.
USDA Economic Research Service’s
Food Availability Data System (FADS)

Supply
- Beginning stocks
- Annual production
- Imports

Equals

Use
- Exports
- Farm, industrial, and other non-food uses (e.g., feed, seed)
- Ending stocks

Equals

TOTAL SUPPLY

DOMESTIC AVAILABILITY

Divided By

U.S. population

PER CAPITA AVAILABILITY (popular proxy for consumption)

Series 1:
Food Availability Data (230 foods)
Provides estimates of:
- Quantities/year

Series 2:
Loss-Adjusted Food Availability Data (215 foods)
(preliminary series)
Provides estimates of:
- Loss-adjusted quantities/year
- Loss-adjusted calories/day
- Loss-adjusted servings/day
- Amount of food loss at the retail and customer levels

Series 3:
Nutrient Availability Data
(From USDA’s Center for Nutrition Policy and Promotion)
Provides estimates of:
- Nutrients and other components of the U.S. food supply (calories, protein, fats, 10 vitamins, 9 minerals)
- Nutrients from major food groups

Source: USDA, Economic Research Service
Background: Loss-Adjusted Food Availability

- For each commodity in the Food Availability Data System (FADS), where the Food Availability (FA) data spreadsheet ends is where the Loss-Adjusted Food Availability spreadsheet begins.

- Like the FA estimates, the LAFA Estimates serve as popular proxies for actual consumption for over 200 commodities (e.g., fresh spinach, beef, and eggs) in the United States.

- Per capita estimates are provided for individual commodities and food groups and where appropriate, in total.

- Estimates are useful for studying food consumption trends.
LAFA Series Adjusts FA Series for 3 Types of Losses

1) Loss at the primary level
   (e.g., farm weight to retail weight)
2) Loss at the retail level
3) Loss at the consumer level:
   (a) Non-edible share
   (b) Cooking loss and uneaten food
### Fresh carrots example of the different types of loss adjustments in the ERS Loss-Adjusted Food Availability data (per capita)

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<th>Primary weight</th>
<th>Loss from primary to retail weight</th>
<th>Retail weight</th>
<th>Loss from retail/institutional to consumer level</th>
<th>Consumer weight</th>
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<th>Total loss</th>
<th>Per capita availability adjusted for loss</th>
<th>Calories per cup-equivalent</th>
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Note: Loss estimates from retail/institutional to consumer level for fresh fruit, vegetables, meat, poultry, and seafood have been updated. See http://www.ers.usda.gov/publications/eib44/. Also, loss estimates at the consumer level have been updated. See http://www.ers.usda.gov/Publications/TB1927/. This table uses aggregate food availability data, adjusts for losses, and converts the remaining supply into daily per capita calories and Food Pattern Equivalents. The basic availability estimate is made at a primary distribution level, which is dictated for each commodity by the structure of the marketing system and data availability. Calories per cup-equivalent and grams per cup-equivalent were obtained from USDA's Nutrient Database for Standard Reference Release, http://ndb.nal.usda.gov/ndb/foods/list. Food Pattern Equivalents multiplied by calories per cup-equivalent. Grams per day divided by grams per cup-equivalent.

Source: USDA/Economic Research Service. Data last updated Feb. 1, 2012. Note: The loss factors presented here are first estimates and are intended to serve as a starting point for additional research and discussion. We welcome suggestions to expand on and improve our loss estimates. Contact Jean Buzby at j buzby@ers.usda.gov or Jeanine Bentley at j bentley@ers.usda.gov.
VEGETABLE EXAMPLE: Broccoli Loss Along the Farm-to-Fork Chain

Farm to Retail
- Damage from pests after harvest
- Damage from equipment malfunction
- Inadequate temperature and moisture control

Retail
- Excessive trimming
- Inadequate temperature and moisture control
- Culling edible broccoli for appearance (e.g., unappealing color)

Consumer
- Biological aging
- Moisture loss leading to limp, unappealing texture
- Dislike of taste by some consumers
- Plate waste

Un eaten Food
MEAT EXAMPLE: Beef Loss Along the Farm-to-Fork Chain

Farm to Retail
- Damage from packaging failure
- Cold storage malfunction
- Spillage
- Rejection of meat for food safety reasons (e.g., pathogen contamination)

Retail
- Packaging failure
- Culling for unappealing color changes
- Overstocking ground beef due to difficulty predicting consumer demand
- Spillage

Consumer
- Inadequate storage
- Spillage
- Overpreparing (e.g., cooking too many hamburgers at a BBQ)
- Recalls for food safety concerns
- Plate waste
- Confusion about use-by or sell-by dates

Uneaten Food
## Estimated Percent Food Loss in the United States, 2010

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* Totals may not add due to rounding and the structure of the data series.

## Estimated Total Food Loss in the United States, 2010

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<th>Commodity</th>
<th>Retail</th>
<th>Level</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy products</td>
<td>9.3</td>
<td>16.2</td>
<td>25.4</td>
</tr>
<tr>
<td>Vegetables</td>
<td>7.0</td>
<td>18.2</td>
<td>25.2</td>
</tr>
<tr>
<td>Grain products</td>
<td>7.2</td>
<td>11.3</td>
<td>18.5</td>
</tr>
<tr>
<td>Fruit</td>
<td>6.0</td>
<td>12.5</td>
<td>18.4</td>
</tr>
<tr>
<td>Added sugar and sweeteners</td>
<td>4.5</td>
<td>12.3</td>
<td>16.7</td>
</tr>
<tr>
<td>Meat, poultry, and fish</td>
<td>2.7</td>
<td>12.7</td>
<td>15.3</td>
</tr>
<tr>
<td>Added fats and oils</td>
<td>5.4</td>
<td>4.5</td>
<td>9.9</td>
</tr>
<tr>
<td>Eggs</td>
<td>0.7</td>
<td>2.1</td>
<td>2.8</td>
</tr>
<tr>
<td>Tree nuts and peanuts</td>
<td>0.2</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td>43.0</td>
<td>89.9</td>
<td>132.9</td>
</tr>
</tbody>
</table>

*Billion pounds*

*Totals may not add due to rounding.*

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

1\ Includes loss in the home and in away-from-home locations. Includes cooking shrinkage and uneaten food.
According to the LAFA data series (2010):

- 31% or 133 billion pounds of the available food supply were lost at the retail and consumer levels.
  - Retail-level losses tally 10% (42.9 billion pounds)
  - Consumer level losses total 21% (83.1 billion pounds)
- Estimated total value of food loss was $161.6 billion.
- Top three groups: meat, poultry and fish (30%), vegetables (19%), and dairy products (17%)
- Venkat (2011) used the LAFA data and estimated that avoidable food waste for 134 foods produced life-cycle gas emissions > 133 million metric tonnes of CO$_2$ annually or 2% of national emissions and costs $198 billion.
Survey of Food Losses in the United States at the Retail and Consumer Levels, 2010

<table>
<thead>
<tr>
<th>Measure</th>
<th>Total Losses (in Billions)</th>
<th>Per Capita Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount (Pounds)</td>
<td>133</td>
<td>429</td>
</tr>
<tr>
<td>Value (U.S. dollars)</td>
<td>$162</td>
<td>$522</td>
</tr>
<tr>
<td>Calories (kcal)</td>
<td>141,212</td>
<td>455,890</td>
</tr>
</tbody>
</table>

*a Totals may not add due to rounding.


“The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States” (Buzby, Wells, and Hyman, Feb. 2014)
The top three food groups in terms of annual food loss vary depending on if measured by amount, value, or calories.

**Amount**
- Dairy products
- Vegetables
- Grain products
- Others

**Value**
- Meat, poultry, & fish
- Dairy products
- Vegetables
- Others

**Calories**
- Grain products
- Added fats and oils
- Added sugar and sweeteners
- Others

Source: USDA, Economic Research Service Loss-Adjusted Food Availability data.
Individual foods with the highest percent losses differ from foods with the most food loss

U.S. Vegetable Loss in 2010

<table>
<thead>
<tr>
<th>Food</th>
<th>Retail and Consumer Level Loss</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Million pounds</td>
<td>Million dollars</td>
<td>Percent loss</td>
</tr>
<tr>
<td>Top 3 Foods by Percent Loss</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fresh mustard greens</td>
<td>76</td>
<td>$104</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>Fresh pumpkin</td>
<td>908</td>
<td>$163</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>Fresh turnip greens</td>
<td>71</td>
<td>$71</td>
<td>63</td>
<td></td>
</tr>
<tr>
<td>Top 3 Foods by Pounds and Dollars</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canned tomatoes</td>
<td>2,916</td>
<td>$3,749</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Fresh tomatoes</td>
<td>1,058</td>
<td>$2,918</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Fresh onions</td>
<td>2,809</td>
<td>$2,350</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

The views expressed are the author’s and should not attributed to the Economic Research Service or USDA.
Initiatives

1. Losses at the primary level—farm to retail weight
University of Minnesota's Food Industry Center (TFIC) Pennsylvania State University and the International Life Sciences Institute (ILSI)

2. Losses at the retail level

3. Losses at the consumer level
LAFA Challenges and Potential Opportunities for Improvement (1)

• Data limitations prevent estimating total food loss across all commodities at the farm level and at the farm to retail levels.

• Some retail level loss estimates need updating and documenting:
  – Added fats and oils
  – Added sugars and sweeteners
  – Fluid milk and dairy products
  – Grain products
  – Processed fruits and vegetables (e.g., canned, frozen, dried, and juice)
  – Eggs, peanuts and tree nuts

• Some consumer level loss estimates need revisiting, for example:
  – Dry edible beans and dry edible peas and lentils
  – Select fruits and vegetables (e.g., fresh grapefruit, dried pears, fresh okra), particularly fruit juices
  – Select beverage milks
  – Select grains
  – Select sugar and sweeteners
  – Select added fats and oils
LAFA Challenges and Potential Opportunities for Improvement (2)

• Food loss estimates (i.e., conversion factors) for individual foods and levels are for the entire data series range (1970-2012), with few exceptions.
• Food donations at the retail level or transfers to thrift shops suggest food may be eaten and therefore should not be counted as food loss.
• Structure of the series (e.g., where inedible share is removed) could be revisited.
• The consumer level in the LAFA series could potentially be split into home and away from home, if data are available.
• Consumer level losses could be subdivided further (e.g., separate column for cooking loss, plate waste, etc.) if data were available.
Summary

1) Quantities of food loss at the consumer level in the US are larger than at the retail level for all food groups except added fats and oils.
2) The ranking of food loss varies depending on if measured by amount, value, or calories.
3) Individual foods with the highest percent losses differ from foods with the most food loss.
4) Measuring food loss is challenging and data intensive.
FOOD WILL WIN THE WAR
You came here seeking Freedom
You must now help to preserve it
WHEAT is needed for the allies
Waste nothing

1. buy it with thought
2. cook it with care
3. use less wheat & meat
4. buy local foods
5. serve just enough
6. use what is left

don't waste it

UNITED STATES FOOD ADMINISTRATION
Further Information


ERS Food Availability (Per Capita) Data System

Loss Adjusted Food Availability Documentation
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