

# Overview of Food Loss in the United States

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*Special thanks to Hodan Wells, Jeffrey Hyman, and Jeanine Bentley*

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# 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.



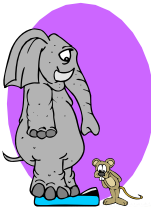
Individual tastes and preferences also come into play for consumers.



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?

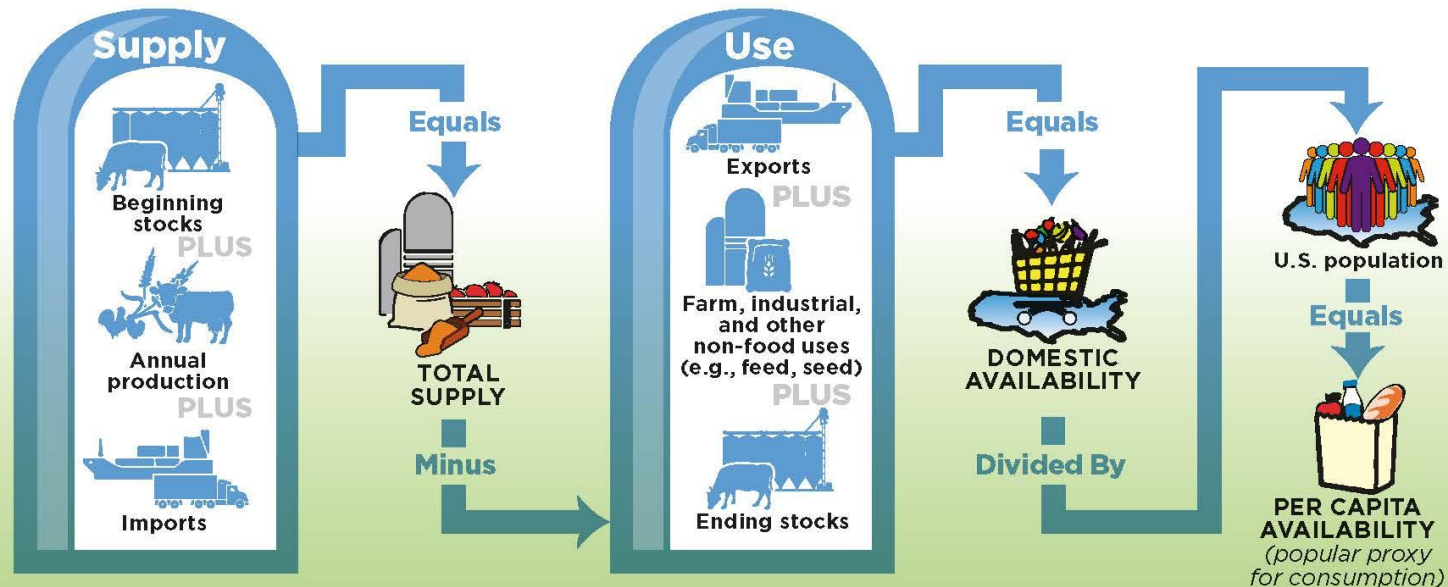


- There are tradeoffs and limits to how much food loss the United States could realistically prevent, recover for human consumption, or divert to another economic use (e.g., energy creation, composting).
- Factors such as the perishable nature of most foods and food safety, storage, and temperature considerations 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)



**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

# 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)

Year	Primary weight <sup>2</sup>	Loss from primary to retail weight	Retail weight	Loss from retail/institutional to consumer level	Consumer weight	Loss at consumer level		Total loss, all levels	Per capita availability adjusted for loss			Calories per cup-equivalent	Grams per cup-equivalent	Calories available daily	Food Pattern Equivalents available daily
						Nonedible share	Other (cooking loss and uneaten food)		Percent	Lbs/year	Oz/day				
	Lbs/year	Percent	Lbs/year	Percent	Lbs/year	Percent	Percent	Percent	Lbs/year	Oz/day	G/day	Number	Grams	Number	Cups
1990	8.29	3.0	8.04	5.1	7.63	11.0	34.0	49	4.20	0.18	5.21	52.0	128.0	2.1	0.041
1991	7.71	3.0	7.48	5.1	7.10	11.0	34.0	49	3.90	0.17	4.85	52.0	128.0	2.0	0.038
1992	8.29	3.0	8.04	5.1	7.63	11.0	34.0	49	4.20	0.18	5.21	52.0	128.0	2.1	0.041
1993	10.85	3.0	10.52	5.1	9.98	11.0	34.0	49	5.49	0.24	6.82	52.0	128.0	2.8	0.053
1994	12.68	3.0	12.30	5.1	11.66	11.0	34.0	49	6.42	0.28	7.97	52.0	128.0	3.2	0.062
1995	11.19	3.0	10.86	5.1	10.30	11.0	34.0	49	5.66	0.25	7.04	52.0	128.0	2.9	0.055
1996	12.37	3.0	12.00	5.1	11.38	11.0	34.0	49	6.26	0.27	7.78	52.0	128.0	3.2	0.061
1997	14.11	3.0	13.69	5.1	12.99	11.0	34.0	49	7.14	0.31	8.88	52.0	128.0	3.6	0.069
1998	9.53	3.0	9.24	5.1	8.77	11.0	34.0	49	4.82	0.21	5.99	52.0	128.0	2.4	0.047
1999	9.25	3.0	8.98	5.1	8.51	11.0	34.0	49	4.68	0.21	5.82	52.0	128.0	2.4	0.045
2000	9.20	3.0	8.93	5.1	8.47	11.0	34.0	49	4.66	0.20	5.79	52.0	128.0	2.4	0.045
2001	9.38	3.0	9.10	5.1	8.63	11.0	34.0	49	4.75	0.21	5.90	52.0	128.0	2.4	0.046
2002	8.42	3.0	8.16	5.1	7.75	11.0	34.0	49	4.26	0.19	5.29	52.0	128.0	2.2	0.041
2003	8.78	3.0	8.52	5.1	8.08	11.0	34.0	49	4.44	0.19	5.52	52.0	128.0	2.2	0.043
2004	8.72	3.0	8.46	5.1	8.02	11.0	34.0	49	4.41	0.19	5.48	52.0	128.0	2.2	0.043
2005	8.66	3.0	8.40	5.1	7.97	11.0	34.0	49	4.39	0.19	5.45	52.0	128.0	2.2	0.043
2006	8.11	3.0	7.86	5.1	7.46	11.0	34.0	49	4.10	0.18	5.10	52.0	128.0	2.1	0.040
2007	8.05	3.0	7.81	5.1	7.41	11.0	34.0	49	4.07	0.18	5.06	52.0	128.0	2.1	0.040
2008	8.07	3.0	7.82	5.1	7.42	11.0	34.0	49	4.08	0.18	5.07	52.0	128.0	2.1	0.040
2009	7.39	3.0	7.16	5.1	6.80	11.0	34.0	49	3.74	0.16	4.65	52.0	128.0	1.9	0.036
2010	7.61	3.0	7.38	5.1	7.00	11.0	34.0	49	3.85	0.17	4.79	52.0	128.0	1.9	0.037

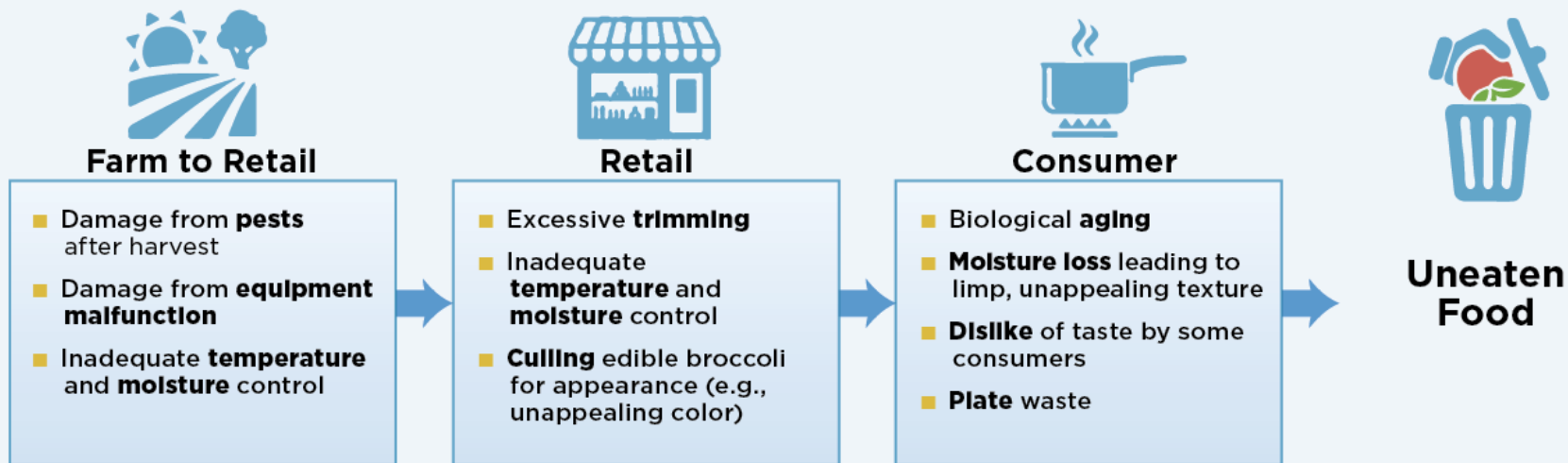
Note: Loss estimates from retail/institutional to consumer level for fresh fruit, vegetables, meat, poultry, and seafood have been updated. See <http://www.ers.usda.gov/publications/eib44/>. Also, loss estimates at the consumer level have been updated. See <http://www.ers.usda.gov/Publications/TB1927/>. <sup>1</sup>This table uses aggregate food availability data, adjusts for losses, and converts the remaining supply into daily per capita calories and Food Pattern Equivalents. <sup>2</sup>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. <sup>3</sup>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>. <sup>4</sup>Food Pattern Equivalents multiplied by calories per cup-equivalent. <sup>5</sup>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 we welcome suggestions to expand on and improve our loss estimates. Contact Jean Buzby at [jbuzby@ers.usda.gov](mailto:jbuzby@ers.usda.gov) or Jeanine Bentley at [jbentley@ers.usda.gov](mailto:jbentley@ers.usda.gov)





## VEGETABLE EXAMPLE: Broccoli Loss Along the Farm-to-Fork Chain





## 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

Commodity	Losses from Food Supply*		
	Retail	Consumer	Total
	<i>Percent</i>		
Grain products	12	19	31
Fruit	9	19	29
Vegetables	8	22	30
Dairy products	11	20	31
Meat, poultry, and fish	5	22	26
Eggs	7	21	28
Tree nuts and peanuts	6	9	15
Added sugar and sweeteners	11	30	41
Added fats and oils	21	17	38
<b>Total</b>	<b>10</b>	<b>21</b>	<b>31</b>

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

Source: USDA/ERS, June 11, 2013.



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

Commodity	Losses from Food Supply*		
	Retail	Level	Total
	<i>Billion pounds</i>		
Dairy products	9.3	16.2	25.4
Vegetables	7.0	18.2	25.2
Grain products	7.2	11.3	18.5
Fruit	6.0	12.5	18.4
Added sugar and sweeteners	4.5	12.3	16.7
Meat, poultry, and fish	2.7	12.7	15.3
Added fats and oils	5.4	4.5	9.9
Eggs	0.7	2.1	2.8
Tree nuts and peanuts	0.2	0.3	0.5
<b>Total</b>	<b>43.0</b>	<b>89.9</b>	<b>132.9</b>

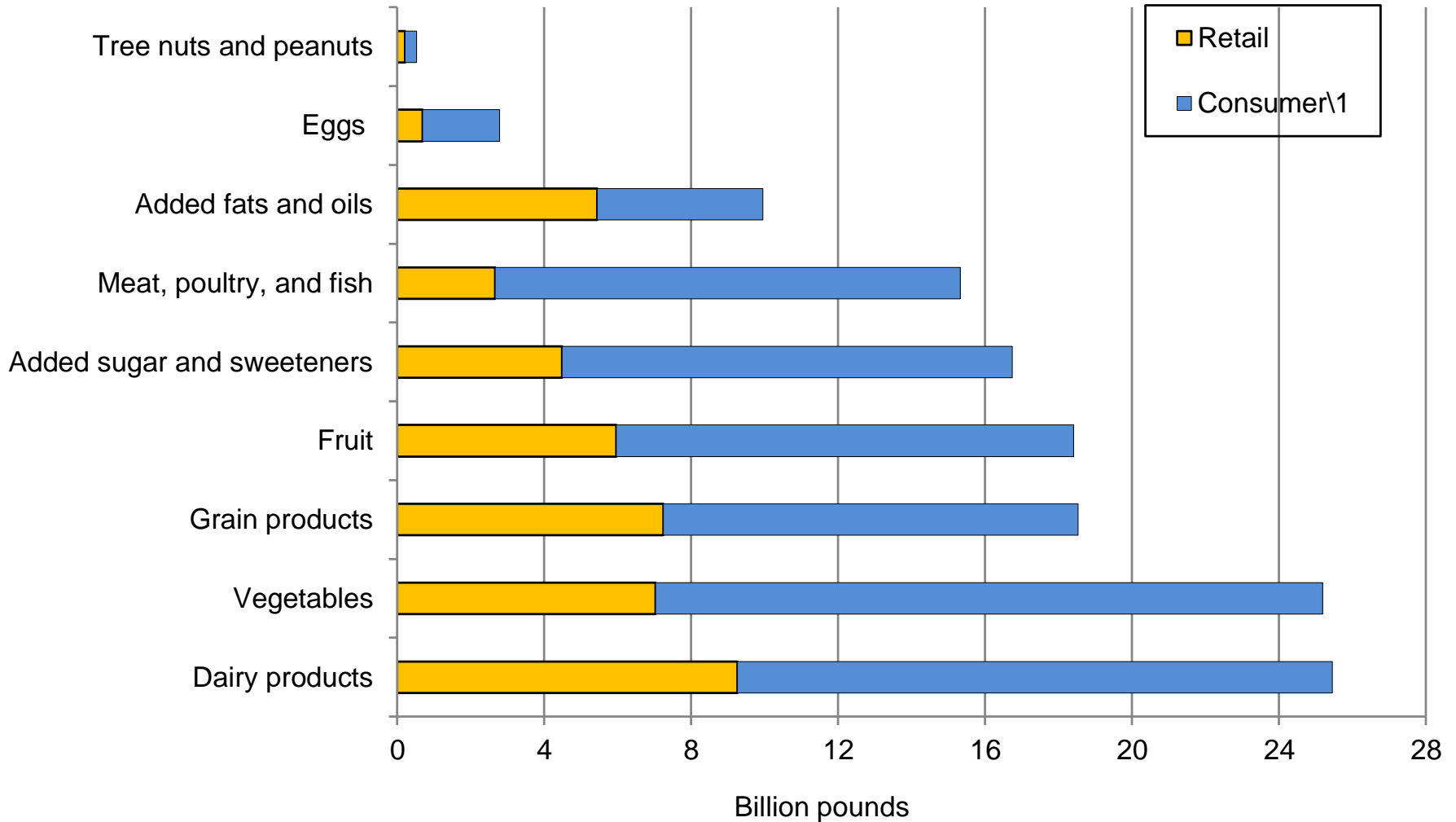
\*Totals may not add due to rounding.

Source: USDA, Economic Research Service.





# 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.





# US Food Loss Estimates

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<sub>2</sub> annually or 2% of national emissions and costs \$198 billion.





**“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)**

**Estimated Food Loss in the United States at the Retail and Consumer Levels, 2010**

Measure	Total Losses		Per Capita Losses	
	<i>Annual (in Billions)</i>	<i>Annual</i>	<i>Daily</i>	
Amount (Pounds)	133	429	1.18	
Value (U.S. dollars)	\$162	\$522	\$1.43	
Calories (kcal)	141,212	455,890	1,249	

<sup>a</sup> Totals may not add due to rounding.

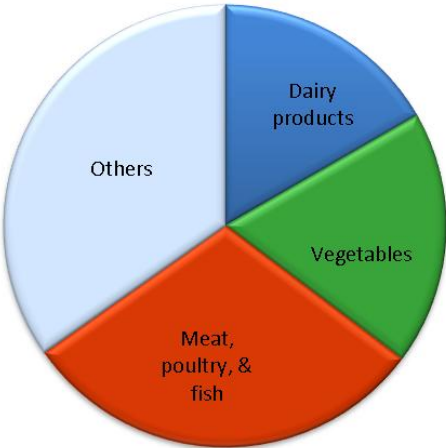
Source: USDA, Economic Research Service Loss-Adjusted Food Availability Data.



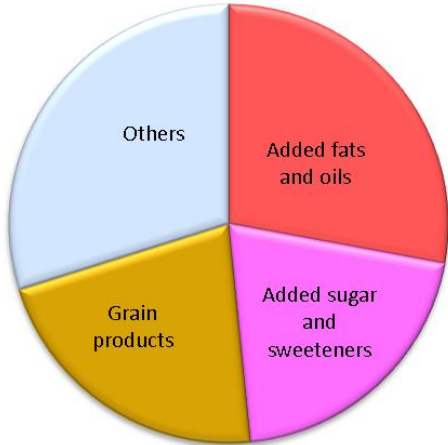
# The top three food groups in terms of annual food loss vary depending on if measured by amount, value, or calories



**Amount**



**Value**



**Calories**

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

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





# 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***

Buzby, Wells, Axtman, and Mickey. (2009)

“Supermarket Loss Estimates for Fresh Fruit, Vegetables, Meat, Poultry, and Seafood and Their Use in the ERS Loss-Adjusted Food Availability Data.



## ***3. Losses at the consumer level***

Muth, Karns, Nielsen, Buzby, and Wells (2011)

“Consumer-Level Food Loss Estimates and Their Use in the ERS Loss-Adjusted Food Availability Data.”



# LAFAs 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



# LAFAs 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 LAFAs 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

- 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*

U.S. FOOD ADMINISTRATION



## 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



UNITED STATES FOOD ADMINISTRATION



don't waste food  
while others starve!

UNITED STATES FOOD ADMINISTRATION

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# Further Information

- Buzby, Jean C., Hodan Farah Wells, and Jeanine Bentley. "ERS's Food Loss Data Help Inform the Food Waste Discussion." Economic Research Service, U.S. Department of Agriculture, *Amber Waves* (June 3, 2013) <http://www.ers.usda.gov/amber-waves/2013-june/ers-food-loss-data-help-inform-the-food-waste-discussion.aspx>
- Buzby, Jean C. and Jeffrey Hyman. "Total and Per Capita Value of Food Loss in the United States." *Food Policy*, 37(2012):561–570. <http://www.sciencedirect.com/science/article/pii/S0306919212000693>
- Buzby, Jean C., Jeffrey Hyman, Hayden Stewart, and Hodan F. Wells. "The Value of Retail- and Consumer-Level Fruit and Vegetable Losses in the United States." *The Journal of Consumer Affairs*, 45,3(Fall 2011):492-515. <http://onlinelibrary.wiley.com/doi/10.1111/j.1745-6606.2011.01214.x/full>
- Buzby, Jean C., Hodan Farah Wells, Bruce Axtman, and Jana Mickey. "Supermarket Loss Estimates for Fresh Fruit, Vegetables, Meat, Poultry, and Seafood and Their Use in the ERS Loss-Adjusted Food Availability Data." Economic Research Service, U.S. Department of Agriculture, EIB-44, March 2009. [www.ers.usda.gov/Publications/EIB44/](http://www.ers.usda.gov/Publications/EIB44/)
- Hodges, R.J., J.C. Buzby, and B. Bennett. "Postharvest Losses and Waste in Developed and Less Developed Countries: Opportunities to Improve Resource Use." *Journal of Agricultural Sciences*, Vol. 149, Supplement S1((November 2010)::37-45. doi: 10.1017/S0021859610000936. <http://www.bis.gov.uk/assets/foresight/docs/food-and-farming/science/11-561-sr15-postharvest-losses-and-waste.pdf> [Note: In table 1 "tonnes" is not a U.S. short or long ton. (The appropriate conversion factor for this kind of "tonne" is: 1 tonne = 2204.62262 pounds).
- Muth, Mary K., Shawn A. Karns, Samara J. Nielsen, Jean C. Buzby, and Hodan Farah Wells. "Consumer-Level Food Loss Estimates and Their Use in the ERS Loss-Adjusted Food Availability Data." Economic Research Service, U.S. Department of Agriculture, Technical Bulletin No. (TB-1927) 123 pp, January 2011. <http://www.ers.usda.gov/Publications/TB1927/>



## ERS Food Availability (Per Capita) Data System

[http://www.ers.usda.gov/data-products/food-availability-\(per-capita\)-data-system.aspx](http://www.ers.usda.gov/data-products/food-availability-(per-capita)-data-system.aspx)

## 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)



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