

Using Contemporary Archaeology and Applied Anthropology to Understand Food Loss in the American Food System

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OBJECTIVES

The goals of the USDA Food Loss Project were to quantify food losses at major stages of the food marketing system: harvesting, processing, storage; retail distribution; foodservice; and households. This information is being used to: (1) provide new estimates of food losses that reflect current market conditions and technologies (2) estimate the dollar value of these losses as a measure of the economic impact of food loss and (3) evaluate the environmental and social impact of food loss in the United States. These estimates will provide detailed and up-to-date measures of food loss to improve reliability of U.S. food consumption and nutrient data, construct means for reducing loss in the American food system or facilitate food recovery and gleaning efforts.

APPROACH

The project documented and quantified food losses throughout the U.S. food production and marketing system using a combination of primary data collection with contemporary archaeology techniques, interviews with commodity and industry experts as well as with lower level management, site visits, and secondary data sources. We measured losses in weight, value, and as a percentage of available food supplies. For fruits and vegetables existing farm-to-retail conversion factors were reviewed and updated based on primary data and commodity groups, and industry experts. Retail, household and foodservice losses were calculated using hand-sorted refuse data and quantitative measure of food purchased and used. The results of this study provide a unique combination of approaches incorporating traditional and innovative agricultural measures, traditional and innovative industry measures and contemporary archaeology and applied anthropology.

Keywords:

Food-Marketing-System; Food-Loss; Food-Waste; Contemporary-Archaeology; Food-Recovery; Consumption; Consumption-Survey; Applied –Anthropology

FOOD LOSS STUDY HIGHLIGHTS

Household Food Loss

□ **American households throw out 1.28 pounds of food a day** in their refuse. Annually that is 467.2 lbs/year. This does not include food loss that goes down the garbage disposal, into compost piles, as food to family pets etc.

The 1.28 pounds per household per day consists of the following foods:

Grain	20% (.26 lbs./household/day)
Meat	11% (.14 lbs./household/day)
Fruit	16% (.21 lbs./household/day)
Vegetables	27% (.35 lbs./household/day)
Fats	2% (.03 lbs./household/day)
Liquid	5% (.07 lbs./household/day)
Slop	4% (.05 lbs./household/day)
Other	13% (.17 lbs./household/day)

(Reference 3)

Hispanic households have lower food loss rates (approximately 25% less) than non-Hispanics and lower income households have lower food loss rates than higher income households. The data also show that Hispanic households consume more fresh fruits and vegetables compared to non-Hispanic households. The amount of fresh fruit and vegetable consumption among Hispanic households has been decreasing over the last 20 years as they adopt food patterns of eating more prepared foods and eating out (Reference 1)

□ **Packaged edible food losses (foods that had not been taken out of their original packaging and were not out of date) constitute 14% of all household food loss.** That would be about .18 lbs/household/day of food that could be donated to food banks or consumed. A breakdown of packaged edible foods includes dry packaged good (34%), canned (19%), meat (18%), condiments (12%), dairy (8%), frozen foods (3%), pastry (3%) and candy (3%). Packaged edible condiments consist mainly of small single serving packages of ketchup, mustard, mayonnaise and relish (Reference 3).

Percent (proportion) of Food Coming into the House that is Lost by Food Type

Food Type	Percent (proportion) Lost
Meat	12.8% (.128)
Grains	16.1% (.161)
Fruit	23.9% (.239)
Vegetables	25.5% (.255)

(Reference 5)

□ **On a percentage basis the amount of food loss at the household level is approximately 14%.** This includes only meat, grains, fruits and vegetables (Reference 5).

□ **Food loss costs a family of four at least \$589.76 annually (Reference 7).**

□ **The annual cost of food waste in American households is \$43,052,480,000.**

Broken down by food type:

Meat	\$14,042,280,000
Grains	\$10,193,720,000
Fruit	\$ 9,638,920,000
Vegetables	\$ 9,177,560,000

(Reference 7)

Commercial Retail Food Loss

Commercial retail food loss varies dramatically depending on the type of business and the type of food. The following are important highlights.

□ **Food Loss as a Percentage of Total Food Used by Commercial Food Store**

Convenience Stores	26.33%
Fast Food Restaurants	9.55%
Full Service Restaurants	3.11%
Supermarkets	0.76%

(Reference 6)

□ **Commercial Food Losses by Food and Store Type**

	Fast Food		Convenience		Full Service		Supermarket		Total
	Lbs ¹	(%) ²	Lbs.	(%)	Lbs.	(%)	Lbs.	(%)	Lbs. (%)
Grain (15.05)	97.95	(25.0)	12.68	(30.1)	65.37	(9.5)	11.00	(9.24)	187
Meat (3.16)	140.28	(11.9)	10.64	(18.6)	13.36	(1.5)	1.12	(0.04)	165.4
Fruit (1.53)	32.02	(79.0)	0.86	(10.2)	21.51	(37.6)	38.04	(0.64)	92.42
Vegetables (2.67)	125.81	(9.3)	22.29	(24.4)	34.69	(2.9)	65.94	(0.99)	248.73
Total	418.42	(9.6)	52.72	(26.3)	138.19	(3.1)	120.79	(0.76)	

¹ in pounds per store per day

² percent of food lost based on the amount of food coming into the store

Percent of Commercial Food Lost by Store and Food Type

(References 2 and 6)

The overall loss rate for these commercial retail food stores is 5.63%. This is misleading since other food types were not included and since there are such dramatic difference in food type losses depending on the type of business. The percent for each store and food type should be used.

□ **Convenience stores have the highest percentage of food loss at 26.3%.** This is due to the fact that they “attempt to keep cooked fresh food ready at all times” and periodically throw out cooked food. **Fast Food Restaurants have the second largest overall percent of food loss (9.6%).** Full Service restaurants food losses are

much lower at 3.1%. Small “mom and pop” restaurants had the lowest loss percentages. Supermarkets have very low loss rates due “mark downs” to sell food going out of date and to donations to local food banks and farmers (Reference 6)

Fast Food Restaurant losses vary greatly depending on the size of the chain. **The large fast food chains have much lower loss rate (5%-7%) compared to small local chains where loss rate can be as high as 50%.** The higher rate of loss is due a lack of management, training and oversight. (Reference 6)

□ **One reason for increased food loss in Fast Food Restaurants is the application of “Just-in-Time Delivery” to the industry.** With the advent of this system and the use of regional warehouses (as opposed to local suppliers) the new stores were built with smaller storage facilities (particularly cold and freezer storage). Consumer demand is highly variable and not easily predicted yet manager orders have to be in a day or two before food deliveries. Managers do not want to run out of stock for their customers and hence food deliveries tend to be greater than the storage space available. These types of food losses are particularly costly since they consist of expensive and highly perishable frozen foods such as meat (Reference 6).

□ National Projections Food Lost per Day by Food and Store Type (in pounds)

	Meat	Grain	Vegetables	Fruit	Total
Full Service Restaurant	4,881,062	23,882,864	12,673,957	7,858,657	49,296,540
Fast Food Restaurant	30,128,497	21,037,113	27,020,717	6,877,063	85,063,390
Supermarket	77,796	764,071	4,580,258	2,642,296	8,064,421
Convenience Store	1,157,260	1,379,140	2,424,372	93,538	5,054,310
Total	36,244,615	47,063,188	46,699,304	17,471,554	147,478,661

(Reference 9)

□ **Commercial retail food establishments throw out 54 billion pounds or 27 million tons of food annually (Reference 9).**

Farm

Three major farming groups were studied; citrus, apples and fresh vegetables. Farm food loss varies greatly depending on the type of crop and the durability of the crop. Crop losses occur mainly through “Walk Bys”, weather, deterioration, neglect and processing.

Deterioration during transportation or storage in the fresh vegetable and citrus industry are negligible. In the apple industry, which takes great efforts to store, preserve and find uses for their product, experience losses of about 6% from deterioration.

□ With the advent of “Higher Value” products (prepared salads, broccoli flowers, pre-sliced carrots, etc) some increased losses have been created in the food chain before it

reaches the consumer. **“Higher Value” processing has increased losses in the 3%-10% range (Reference 7).**

□ Overall percent of farm food losses by food type are as follows:

	Citrus ¹	Leaf Lettuce	Head Lettuce	Broccoli	Cauliflower	Celery	Carrots	Apples
Field Losses	6%	6%	4%	11%	10%	10%	1%	5%
Harvesting	4%	<1%	<1%	<1%	<1%	<1%	<1%	0.5%
Storage	2%	0.5%	0.25%	*	*	*	*	6%
Processing	7%	9%	16%	3%	3%	1%	1%	1%
Shipping	1%	1%	*	*	*	*	*	<1%
Neglect	15%	*	*	*	*	*	*	*
Total	29%	17.5%	23.25%	19%	15%	15%	3%	12.5%

¹ Predominately oranges

* Negligible

(Reference 7)

□ **Overall farm food losses are approximately 29% in the Citrus industry, 18% in the vegetable industry and 12% in the apple industry (Reference 7).**

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