USDA

EPA United States Environmental Protection Agency

UNIVERSITY OF ARKANSAS

Guide to Conducting Student Food Waste Audits

A Resource for Schools



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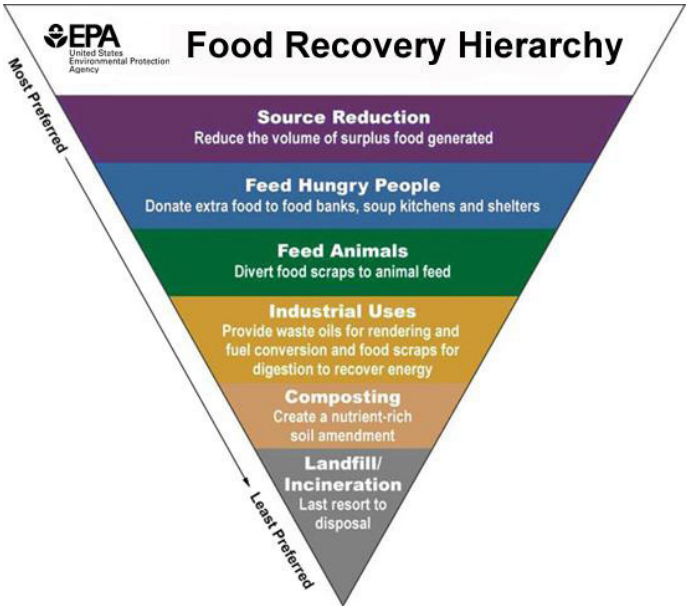
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Background

On September 16, 2015, the U.S. Department of Agriculture (USDA) and U.S. Environmental Protection Agency (EPA) announced the United States' first-ever national food waste reduction goal, calling for a 50-percent reduction by 2030 (USDA News Release No. 0257.15). Food loss and waste is generated from farm to fork, including in schools and households (Buzby and Guthrie and Buzby et al.). This student food waste audit guide is intended to help educate students about the amount of food they waste in their school cafeterias and to encourage them to reduce waste and eat more of the nutritious foods provided through USDA's school meals programs or brought from home.

To begin, students must first understand the scope of the problem. How much food or beverage items do they waste (for the rest of the document, beverages are included as "food")? Which types of foods are being wasted most? Why are students not eating particular food items? Doing a student food waste audit in your school cafeteria will help answer all of those questions. After studying the audit data, students and schools can develop and implement food-waste reduction strategies that make the most sense for their particular situation. A follow-up food waste audit after the strategy has been fully implemented can reveal how successful a particular strategy or strategies were in reducing food waste. We encourage students to organize multiple food waste audits in a school year to engage each other in finding creative ways to make sure nutritious food ends up in hungry bellies and not into the trash can.

At the end of this guide, we provide a list of food-waste reduction strategies. Most of the strategies focus on preventing waste. Preventing food waste is not only the best way to make sure children eat healthy meals, but it is also the best way to reduce the damaging environmental impacts food waste has on our world (U.S. Environmental Protection Agency). Below you will see strategies for dealing with food waste.



Why conduct a student food waste audit?

1. Student food waste audits are a quick way to learn which kinds of foods go uneaten by students in a school cafeteria. The data gained from an audit can help schools develop specific strategies to reduce wasted food. Most importantly, the audits identify why the students are throwing certain foods away, which can help schools develop strategies to encourage students to eat their nutritious meals.

2. Activities performed during an audit including project planning, data collection, data analysis, and conducting interviews, can be incorporated into math and science curriculum or used towards community service hours.

3. After an audit, schools will have a better idea of how and where to reduce food waste. Reducing food waste can help schools save money by reducing the cost of garbage collection. Reducing food waste also reduces the stress we put on natural resources through production of uneaten food, while helping reduce greenhouse gas pollution (U.S. Environmental Protection Agency).



Photo by Melissa Terry, University of Arkansas

Food Waste – A National Problem



31% of food at the consumer & retail level goes uneaten
(Buzby et al.)



Only 24% of people say they are very knowledgeable about reducing food waste
(John Hopkins Bloomberg School of Public Health)



Food waste is the single largest component of waste sent for disposal, much of which ends up in landfills, where it generates methane, a powerful greenhouse gas
(U.S. Environmental Protection Agency)

Planning your audit

1. Reach out to the school district's nutrition director or school cafeteria director. Make it clear that the main goal of the audit is to help find ways to encourage students to eat their nutritious meals and not throw them away.

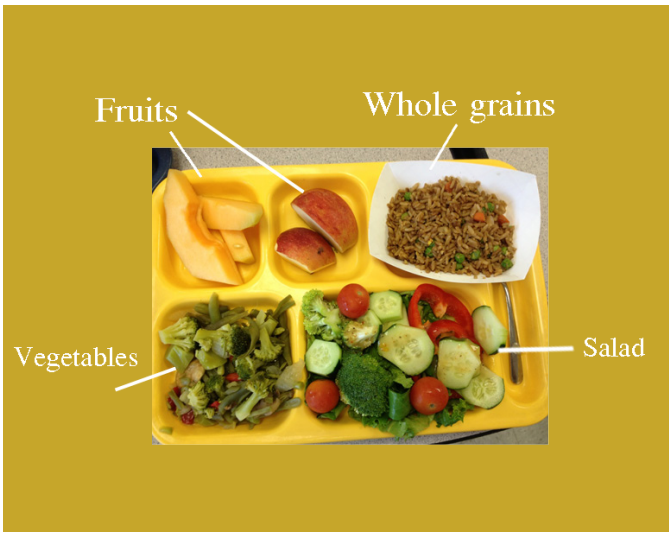
2. Put together a technical advisory team to help plan and implement the audit. Ideally, the team should include a school administrator, nutrition staff representative, one or two teachers, and a Parent Teacher Organization member. Involving teachers is important if the audit will be linked to curriculum benchmarks, such as basic math and measurement.

3. Work with the team to recruit student volunteers such as a green team, student council, or Reserve Officer's Training Corps class. A minimum of four volunteers plus a team leader is recommended. Ideally, have 4 volunteers for every 100 students eating in the cafeteria. There should be 1 separate audit station for every 200 students.



Photo by Melissa Terry, University of Arkansas

An audit station usually consists of two tables. One table is where students drop off their trays and get interviewed by volunteers in order to get answers on why they did not finish the food items left on their tray. The second table is used for separating food items from trays into buckets after an interview. The buckets will eventually be weighed and recorded (see sample setup on page 8).



4. Arrive before lunch service on a day that will have the same menu as the planned audit day. Take photos of each item being served. Determine which items are going to be collected and weighed. For example, if green beans are being served as a side dish, a bucket could be designated for green beans on the audit day. If there is more than one vegetable being served, it may be easier to have one "vegetable" bucket. Additionally, having a bucket for unopened items can be useful to see how much leftover food you could potentially donate.

Planning your audit (continued)

5. On a day before the audit, arrive early before the lunch begins to identify where students usually enter, where they throw away their trash, and where they exit the cafeteria. This gives the team a good idea of traffic flow before, during, and at the end of lunch.

6. Identify a good spot to set up tables for the audit station. Again, 2 or more audit stations may be required depending on how many students are present during a particular lunch period.

7. Decide how to direct students to the audit station. Put extra signs in the places where students normally throw away trash with arrows directing them to the audit station.

8. Meet with cafeteria and custodial staff to discuss the purpose of the audit and plan for how it will proceed. Coordinate with them on how the trash will be emptied throughout the audit.



Photo by Melissa Terry, University of Arkansas



Photo by Stephen Sturdivant, U.S. Environmental Protection Agency

9. Decide which categories/food items will be collected, weighed, and analyzed for the audit. The number of categories will vary from school to school. An audit in an elementary school may require 5 buckets, whereas a high school may require 12 or more buckets because there may be more food choices. The more categories there are, the more useful the results will be. For example, it is a good idea to have one bucket for each entree option available that day (i.e., burgers vs. burrito). Make sure all food is accounted for in the respective categories so students won't end up with an item without an assigned bucket.

10. Place pictures and names of the food items you want to collect on each bucket.

Items needed

- ☐ Two tables per audit station. One table for students to drop off their trays and get interviewed and one table to place the food buckets (see sample setup on page 8).

- ☐ Minimum of two large trash cans on wheels for emptying the food buckets into after they are weighed. A typical school cafeteria should already have these available.



Photo by Melissa Terry, University of Arkansas

- ☐ Small trash bags to line the buckets (optional). Lining the buckets make emptying out the buckets easier as food won't get stuck to the sides.

- ☐ Buckets! Five-gallon buckets at a local home improvement store sell for around 3 dollars each. Grocery store bakeries or restaurants may also be willing to donate their extra buckets. Five to 12 buckets should be sufficient for an audit station.

- ☐ Scales. Hand-held luggage scales and bathroom scales are two options. Hand-held scales with the display on top and wide handles can be purchased for as little as 8 dollars. Keep in mind that a 5-gallon bucket full of food can weigh up to 20 pounds and a half-full bucket of liquid can weigh up to 25 pounds.



Photo by Stephen Sturdivant, U.S. Environmental Protection Agency

- ☐ Good signage that directs students to food waste audit stations.

- ☐ Interview clipboards and pens.

- ☐ Weight log sheet and interview sheets (see appendix for examples).

- ☐ Gloves for handling food.

- ☐ Printed bucket labels or food photos taped to the buckets. Food waste buckets need to be clearly labeled.

- ☐ Clothes and/or paper towels for spills and cleanup.

Instructions for interviewers

1. When students walk up with their trays, say "Hello, we are taking a survey, and we would like to ask for your input. I'm going to ask you about the food items left on your tray and record what you thought about them." Look at their tray and mark down which food items they left unfinished (drink containers too). Make sure to write down the same name that is on the label on one of the collection buckets. If unsure, ask the audit team leader.

2. Mark each unfinished food item down on the log sheet (one item per line) (see appendix for sample log sheets). For each item, ask the student "Can you tell us why you didn't finish your [name of food]?" and write down what they say. Only give one reason per item – his or her main reason. Try to get an answer that can help staff fix the problem. Answers like "didn't like it" or "tasted gross" are not helpful answers. Instead, ask a more specific question like "What about the taste didn't you like?" in order to get a more detailed answer such as "I didn't like it because it was too cold."

3. Thank the students and ask them to leave their tray on the table. If there are many students lining up to be interviewed, please be brief with each student in order to get a response from as many students as possible. After each interview is complete, have them leave their tray on the table.

4. If there are no other students to interview at the time, ask the student if they have any ideas on how to reduce waste and write their suggestions down on the log sheet.

The Art of the Interview



Photo by U.S. Department of Agriculture

Example 1
Interviewer: Why didn't you finish your chicken lo mein?
Student: I didn't like it.
Interviewer: What about it didn't you like?
Student: It was kind of cold.
Write down "cold" for "chicken lo mein."

Example 2
Interviewer: Why didn't you finish your carrots?
Student: I knew I wasn't going to like it.
Interviewer: What about them don't you like?
Student: Really, it was my only choice.
Write down "no other choice" for "carrots."

Example 3
Interviewer: Why didn't you finish your cookie?
Student: I was too full.
Write down "full" for "cookie."

Instructions for food separators

1. Food trays should not be taken directly from students. The interviewers must talk to the students first. If a student tries to hand a tray directly to the food separator volunteer, ask the student to please take it to one of the interviewer volunteers first.

2. After an interviewer is done talking with a student, take the lunch tray. Carefully put the leftover food into the corresponding bucket. If unsure about which bucket to place an item, ask the team leader right away.

3. Stack the empty trays off to the side. Trays will be counted later to record the total number of participants in the audit.

4. All non-food trash must stay out of the food buckets and be placed directly into the trash can on wheels.

5. If a food bucket or trash can is getting close to full, let the team leader know. Once the liquid buckets gets half full, let the team leader know. Liquid buckets can be difficult to handle even when half full.



Photo by Melissa Terry, University of Arkansas

Day of audit

- [ ] Set up the audit stations and restrict student access to all trash cans (set up signs that redirect them to the audit station). Be sure to also restrict student access to the audit station trash cans so only volunteers can use them. This ensures that all food waste is accounted for and that the data will be accurate (see sample setup on page 8).
- [ ] Remind the cleaning crew about the audit and tell them where the trash cans will be.
- [ ] Weigh an empty bucket and record its weight on the log sheet to subtract the weight later.
- [ ] Bring the student volunteers to the stations before lunch starts and walk them through what they will be doing. Ensure they are familiar with their roles.
- [ ] During the assessment, check on the interviewers to make sure they are writing down useful reasons for why students didn't finish their specific food items. Check that the food separators are putting items in the right buckets.



Photo by Melissa Terry, University of Arkansas

- [ ] Have cloths or towels ready to wipe off surfaces and clean up spills.
- [ ] Once a bucket is getting close to full, weigh it and record the weight and type of food on the log sheet. Do not let liquid buckets get full! Weigh them when they are half full. After recording weights, empty buckets into large trash can on wheels.
- [ ] When one trash can feels heavy, have another one on wheels ready to be used next.
- [ ] Some students may not throw their food away until the bell rings in which case there will be a rush of students at the end. If, near the end, volunteers are unoccupied, have them walk up to students sitting at tables and ask if they are finished. If they are, then ask them to take their tray to the survey table. Do not interview them until you get to the actual survey table.
- [ ] At the end of the audit, count trays, weigh the buckets, and record everything.
- [ ] Thank students and staff!

Sample cafeteria setup for audit

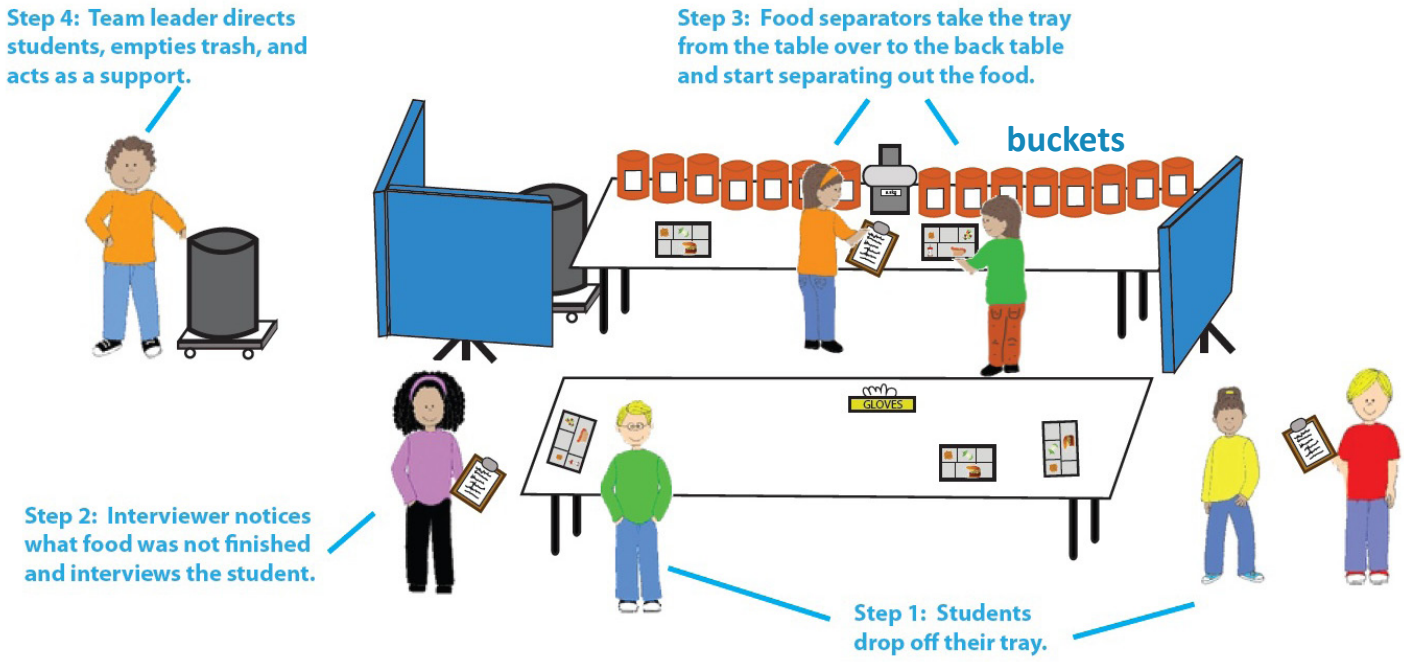


Diagram by Stephen Sturdivant, U.S. Environmental Protection Agency

Data collection

Remember that the main goal of a student food waste audit is to learn why students are not eating certain food items and to make changes so that they eat more of what's on their tray. Students finishing their nutritious meals will in turn reduce food waste and save the school money by reducing trash-collection costs. Most importantly, well-nourished students are better able to concentrate in class and can grow into healthy adults. After implementing food-waste reduction strategies, a follow-up audit or audits should be organized on days that have the same or a similar menu as the first audit so the data can compare the same food items.

Here are some examples of data collected from actual school food waste audits.



Photo by Melissa Terry, University of Arkansas

Student volunteer totaling weights by food type.

Category	Weight (lbs)
compost	36.3
liquid	24.9
stir fry	12.15
burrito	11.15
salad	8.5
hoagie	3.05
bun sandwich	4.3
pizza	2.55
cold sandwich	1
chicken	0.5
TOTAL	104.4

Sample data from an actual audit



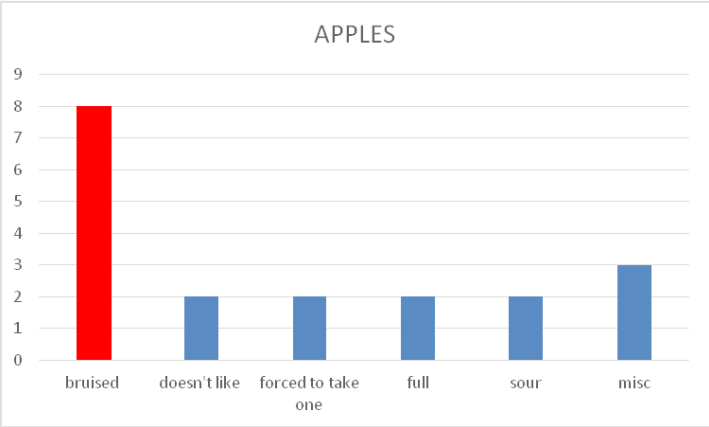
Sample pie chart from an actual audit

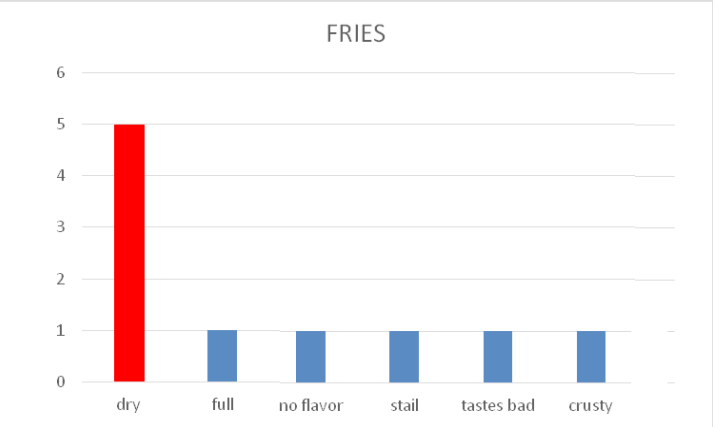
Chart by Stephen Sturdivant, U.S. Environmental Protection Agency

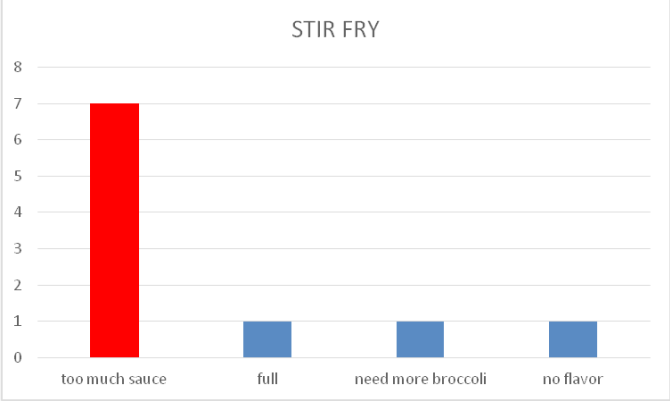
Data collection (continued)

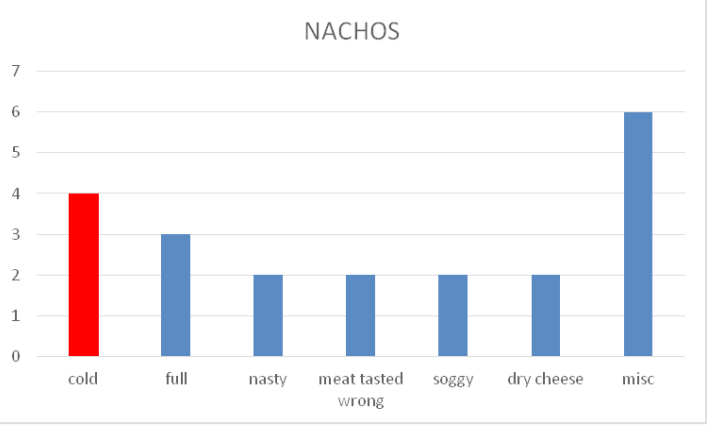
The answers given by students for why they didn't finish certain food items is crucial in helping cafeteria staff make simple changes to the menu or their preparation methods so that students eat more of the food served.

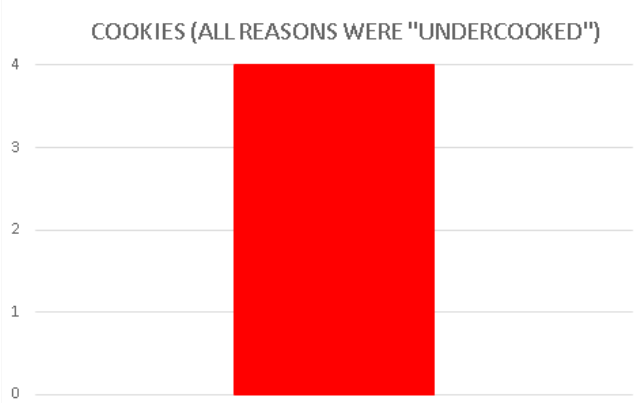
Here are some examples of the data collected from the interviews. How would you deal with the problem of uneaten apples?

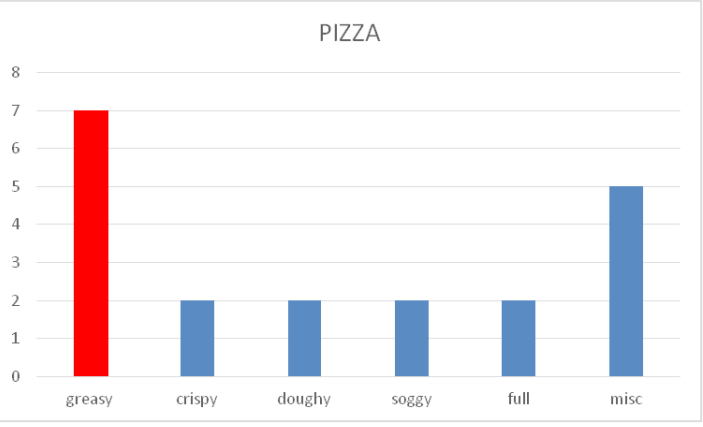












Charts by Stephen Sturdivant, U.S. Environmental Protection Agency

Food waste prevention ideas

1. Recess before lunch. In one study by the Smarter Lunchrooms Movement, schools that scheduled recess before lunch reduced food waste by 40 percent. In addition, students ate 54 percent more fruits and vegetables (Brigham Young University).

2. Extend lunch from 20 to 30 minutes. In one study by the Harvard School of Public Health, schools that gave students more time to eat had 13 percent less entrée waste, 12 percent less vegetable waste, and 10 percent less milk waste (Harvard School of Public Health).



Photo by U.S. Department of Agriculture

3. Give food items creative names. In 1928, canned spinach was children's third favorite food behind ice cream and turkey because of Popeye. Students' taste expectations are increased when food items are associated with something exciting. In one study by the Smarter Lunchrooms Movement, schools that called their carrots "X-Ray Vision Carrots" doubled their consumption (Cornell University Food and Brand Lab).

4. Slicing fruits. In one study by the Smarter Lunchrooms Movement, slicing apples resulted in a 73-percent increase in the number of students who ate more than half of their apple. The average cost of an apple slicer is $127 and it took a cafeteria worker 3 to 4 seconds to slice one apple with the equipment. To keep apple slices from browning, give them a lemon water bath (Cornell University Food and Brand Lab).

5. Use USDA's Offer versus Serve (OVS) provision. OVS is a concept that applies to menu planning and meal service, and allows students to decline some of the food offered in a reimbursable lunch or breakfast. The goals of OVS are to reduce food waste and to permit students to choose the foods they want to eat. USDA's Offer versus Serve Guidance includes a section about identifying reimbursable meals when using OVS. Please note that under OVS, students are still required to take a half cup serving of fruit and/or vegetable" (USDA Food and Nutrition Service).

Food waste prevention ideas (continued)

6. **Involve students.** If your school conducts taste tests, one form of student engagement is to have them create graphs of the survey results, which can then be displayed in the lunch room. If your school does not conduct taste tests, consider working with your District Nutrtion Director to coordinate a "Harvest of the Month" taste test featuring seasonal produce and/or a new dish.

7. **Introduce salad bars into the cafeteria.** Salad bars may help reduce plate waste by increasing fruit and vegetable consumption. Salad bars are a wonderful opportunity to showcase fresh, local foods. When planning a salad bar, schools should ensure portion sizes are consistent with the meal pattern requirements for each grade group (USDA Food and Nutrition Service).



Photo by Let's Move Salad Bars to Schools

8. **Create share tables.** Share tables are tables or stations where children may return whole food or beverage items that they choose not to consume, if in compliance with local and State health and safety codes. These food and beverage items are then available to other children who may want additional servings. Non-perishable and complete food items left on the share table may also be stored for another meal service, allowing food service staff to "recycle" food items for a later time (USDA Food and Nutrition Service).

9. **Saving food items.** Students who may not have time to finish their meal during the designated lunch period may save certain meal components for later in the day. For food safety reasons, this practice should be limited to food items that do not require cooling or heating, such as whole pieces of fruit. This practice helps to ensure students receive the full nutritional benefits of all food components offered during the traditional meal service (USDA Food and Nutrition Service).

10. **Donate surplus food.** Where it is not feasible to reuse leftovers, surplus food may be donated to a non-profit organization, such as a community food bank, homeless shelter, or other nonprofit charitable organizations (USDA Food and Nutrition Service).

Additional Resources

Brigham Young University and Cornell University. December 2014. "Lunch, Recess and Nutrition: Responding to Time Incentives in the Cafeteria." **http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2536103**

Buzby, Jean C., Hodan F. Wells, and Jeffrey Hyman. "The Estimated Amount, Value, and Calories of Postharvest Food Losses at the Retail and Consumer Levels in the United States." EIB-121, U.S. Department of Agriculture, Economic Research Service, February 2014. **https://www.ers.usda.gov/webdocs/publications/eib121/43680_eib121.pdf**

Buzby, Jean C. and Joanne Guthrie. "Plate Waste in School Nutrition Programs." Final Report to Congress, U.S. Department of Agriculture, Economic Research Service, E-FAN-02-009, March 2002. **https://naldc.nal.usda.gov/download/48204/PDF**

Cornell University Food and Brand Lab. "Attractive names sustain increased vegetable intake in schools" **http://foodpsychology.cornell.edu/outreach/whatname.html**

Cornell University Food and Brand Lab. "Pre-Sliced Fruit in School Cafeterias: Children's Selection and Intake" **http://foodpsychology.cornell.edu/outreach/slice.html**

Harvard School of Public Health and Project Bread – "Amount of Time to Eat Lunch Is Associated with Children's Selection and Consumption of School Meal Entrée, Fruits, Vegetables, and Milk" **www.andjrnl.org/article/S2212-2672(15)01248-4/pdf**

John Hopkins Bloomberg School of Public Health – "Wasted Food: U.S. Consumers' Reported Awareness, Attitudes, and Behaviors" **http://journals.plos.org/plosone/article/authors?id=10.1371%2Fjournal.pone.0127881**

USDA Food and Nutrition Service – "Clarification of the Policy on Food Consumption Outside of Foodservice Area" **https://www.fns.usda.gov/sites/default/files/SP41-2014os.pdf**

USDA Food and Nutrition Service – "Guidance on the Food Donation Program in Child Nutrition Programs" **https://www.usda.gov/oce/foodwaste/FNS_Guidance.pdf**

USDA Food and Nutrition Service – "Offer Versus Serve – Guidance For the National School Lunch Program and the School Breakfast Program." **https://www.fns.usda.gov/sites/default/files/cn/SP41_2015a.pdf**

Additional Resources (continued)

USDA Food and Nutrition Service – "Salad Bars in the National School Lunch Program" **https://www.fns.usda.gov/sites/default/files/SP31-2013os.pdf**

USDA Food and Nutrition Service – "The Use of Share Tables in Child Nutrition Programs" **www.fns.usda.gov/sites/default/files/cn/SP41_CACFP13_SFSP15_2016os.pdf**

USDA News Release No. 0257.15 (September 16, 2015) – "USDA and EPA Join with Private Sector, Charitable Organizations to Set Nation's First Food Waste Reduction Goals" **www.usda.gov/wps/portal/usda/usdahome?contentid=2015/09/0257.xml&navid=NEWS_RELEASE&navtype=RT&parentnav=LATEST_RELEASES&edeployment_action=retrievecontent**

U.S. Environmental Protection Agency – "Sustainable Management of Food Basics" **https://www.epa.gov/sustainable-management-food/sustainable-management-food-basics**

About the authors

Melissa Terry – Master of Public Administration Graduate Student in the University of Arkansas' Political Science Department of the Fulbright College of Arts and Sciences, specializing in Food Policy applied research and asset-based community development.

Stephen Sturdivant – Environmental engineer at the U.S. Environmental Protection Agency's Region 6 office under the Sustainable Materials Management Program.

Jimmy Nguyen – Works for the USDA Food and Nutrition Service External and Governmental Affairs, whose mission is to be the creative force that builds alliances to feed our communities. Jimmy is also an agency lead on food waste reduction efforts.



Photo by Melissa Terry, University of Arkansas

Example interview & log sheets

Student Interview Sheet

Location:

Date/lunch period:

Type of Food (one item per line)	**Loss Reason** ("didn't like it" is not enough detail)	**Optional** (if time permits)**: ideas to reduce food waste**

Food Separator Weight Log

Weight of empty bucket: _____

Number of trays: _____

	Food Type	Weight (Include weight of bucket)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
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