



FOOD WASTE IN RURAL SCHOOLS

IOWA WASTE REDUCTION CENTER
UNIVERSITY OF NORTHERN IOWA
<https://iwrc.uni.edu/food-waste>

From the desk of Jennifer Trent

I have had the pleasure of interacting with students, teachers, volunteers, and administrators of many great schools and districts across Iowa. I've felt welcomed by many, but more importantly, I've loved the questions and comments of students at every single cafeteria waste audit I've done. Their interest in food waste has kept my job fun, promising, and interesting! Also, I'd like to thank the countless people associated with K-12 schools and districts throughout Iowa for their interest in preventing and reducing food waste through donation, composting, reduction, and all the strategies we've recommended over the years to reduce the amount of food headed to the landfill. And to the K-12 schools and districts that have implemented our recommendations, my hat is off to you! Thank you for all your hard work, time, and diligence to make a difference!

As our work continues and we forge ahead to make a difference by preventing and reducing food waste, I look forward to our partnerships within the education and academic communities across Iowa and the nation!

Sincerely,
Jennifer Trent

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A study looking at
food waste generated
by students in K-12
schools in rural* Iowa

** Schools located in communities with
populations of 10,000 or less.*

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FOOD

Food is the star of our parties, backyard barbeques, and family dinners. We all need food to survive.

We all enjoy delicious food when celebrating life's events with our loved ones. Many of us tend to gardens as we grow our own food that will make it to our tables. Food is oftentimes the way in which we feel satisfied, even happy. Why do we so easily throw it away knowing it will end up in our landfills, completely wasted? The natural resources it takes to produce food are squandered when food ends up America's landfills. From fresh water used to irrigate fields, gas and oil to plant and transport food, to the deforestation and habitat destruction caused by clearing land to produce food, wasted food equals wasted natural resources. Food that ends up in the landfill also generates methane, a potent greenhouse gas that contributes to global climate change. Costs associated with food waste equals \$165 billion per year that burdens the U.S. economy according to the Natural Resources Defense Council. Feeding America reports that 37 million Americans are food insecure while 72 billion pounds of food ends up in America's landfills.

Wasted food can be put to better uses such as feeding hungry people and animals, creating energy through anaerobic digestion and creating compost, which improves soil structure and water holding capacity while increasing available nutrients when added to soils. But the best option, is to prevent food waste altogether.

Not only is food waste an issue nationally; according to the 2017 Iowa Statewide Waste Characterization Study contracted by the Iowa Department of Natural Resources, food waste in landfills



Wasted food equals wasted natural resources



across the state grew to 20%, up from 13.3% in 2011 and 10.6% in 2005. Additionally, in 2017 food waste was the number one disposed material across all sectors (municipal solid waste, residential, and industrial, commercial, & institutional). From 1998 to 2017, food waste in Iowa's landfills increased nearly 47% while population in Iowa increased by just 9%.

For these reasons, the Iowa Waste Reduction Center (IWRC) decided to tackle food waste through direct, on-site assistance helping food waste generators prevent and reduce the amount of food headed to the landfill. These services grew to include not just food waste generators, but also those with the capacity to alleviate environmental, economic, and societal strains associated with food waste including haulers, municipal yard waste composting operations, anaerobic digestion facilities, and landfills. Fighting food waste has become a core pillar of service at the IWRC and assistance has been diverse; reaching many types of businesses, organizations, and institutions. However, the IWRC's number one food waste clients have been K-12 schools and districts.

The IWRC has conducted 44 cafeteria waste audits across 21 Iowa school districts over the last 5 years to help reduce the amount of food waste in Iowa's landfills, however not every school or district opted to conduct cafeteria waste sorts. Out of the schools and districts mentioned above, 28 schools in 15 districts had cafeteria waste sorts conducted that include either breakfast, lunch or both of which 22 schools in 11 districts sorted both breakfast AND lunch waste. Cafeteria waste audits can include waste sorts when requested but always include analyses of food management practices, a search for local options to divert food waste from the landfill, and a final customized report for each K-12 school/district that signs up for assistance. The IWRC also assists each K-12 school/district that is interested in implementing recommended strategies such as composting, setting up share tables, or training staff to track and analyze pre-consumer kitchen waste. Funding for this service over the years has been provided by both Rural Development of the United States Department of Agriculture (USDA) and the IWRC at zero cost to K-12 schools/districts.



SERVICES PROVIDED

Each K-12 school that requests assistance can choose from an array of on-site services provided by the IWRC.

Services include the following:

- Conduct analyses of food management practices from ordering to kitchen prep to disposal with customized recommendations to both prevent and reduce food waste
- Provide training to measure, track, and analyze pre-consumer kitchen waste and post-consumer food waste
- Perform a search of the local area to identify diversion opportunities including donation, composting, and anaerobic digestion facilities
- Organize and conduct waste sorts to measure post-consumer food waste from students' trays
- Calculate greenhouse gas emissions generated in the landfill from the schools/districts food waste
- Calculate disposal costs associated with food waste
- Provide regulatory information regarding requirements associated with donation and composting
- Provide training and technical assistance to set up and properly maintain an active composting project
- Prepare and share a customized written report detailing on-site assistance visit and recommendations to prevent and reduce food waste
- Support K-12 schools through implementation of recommended strategies

CAFETERIA WASTE SORTS - METHODOLOGY

The service offered by the IWRC that K-12 schools are most interested in are cafeteria waste sorts to measure food waste generated by students following breakfast and/or lunch. The IWRC conducts waste sorts to measure food waste, recyclables, trash, cold-lunch waste, edible foods that can be donated, and opened unfinished beverages. These measurements can help K-12 schools set prevention and reduction goals while implementing strategies recommended by the IWRC. As of April, 2020 44 schools within 21 districts across Iowa have been provided with these services.

Initially, the IWRC conducted post-consumer waste sorts at K-12 school cafeterias by dumping a full garbage bag onto a tarp following breakfast and/or lunch and then hand sorting through the waste and measuring each category. Students disposed everything from their trays into one garbage bag. First, all trash was sorted and removed which included emptied milk cartons (milk remaining in cartons was dumped into the garbage bag) and any other items that weren't recyclable. Next, recyclable items were removed and weighed. Finally, once all trash and recyclables were removed, all that remained was food and beverage waste, which was also weighed and recorded.

This was done for a single garbage bag at each K-12 school and data for each category was then multiplied by the number of garbage bags disposed during the waste sort.

This method was utilized because it required fewer staff and less time than actually measuring all waste disposed from K-12 cafeterias during breakfast and/or lunch. Though this method was very time efficient and required fewer staff, overall accuracy and student interactions were lacking. Separating food waste from opened unfinished beverage waste was also not possible with this method. Moreover, this method required a large space and tarp to sort waste on, leading to potentially unsanitary conditions. For these reasons, this method of conducting waste sorts was replaced in 2016 with a more precise method that encourages student participation.

The method the IWRC has been using since 2016 requires students to sort the waste on their trays into corresponding labelled bins. Although this method is more accurate, it requires more people to help guide students through the process to dispose items from their trays into correct bins. In addition to improved accuracy, students are also more engaged and become more aware of

The IWRC conducts waste sorts to measure food waste, recyclables, trash, cold-lunch waste, edible foods that can be donated, and opened unfinished beverages.

the amounts of food and beverage waste being disposed when they participate in the sorting process. Finally, this preferred method allows the IWRC to easily add categories to the waste sort including the following:

- **Food waste and compostable items** – paper boats and condiment cups, napkins, and post-consumer food waste (partially consumed)
- **Pre-consumer kitchen waste** – prep trimmings and peelings, expired/moldy foods that need to be disposed and unfinished foods that didn't make it to any students' tray
- **Trash** – milk cartons and items not recyclable such as flimsy plastics and chip bags
- **Recyclable items** – water bottles, fruit cups, juice cups, metal cans
- **Opened, unfinished beverages** – juice and milk
- **Unopened, uneaten, whole foods and beverages from students' trays that can be donated** – apples, bananas, milk, juice, yogurt, and prepackaged shelf stable foods
- **Cold-lunch waste**

If K-12 schools want to conduct a waste sort on their own, costs are minimal including a scale (luggage or fish scales work best and are inexpensive), garbage bags and cans, labels for each category, and tracking sheets. Otherwise, K-12 schools can just calculate food and beverage waste per student based on the IWRC's findings mentioned below.



CUSTOMIZED REPORT



Once the waste sort is completed, the IWRC prepares a customized report for every participating school/district. The IWRC analyzes waste sort results and conducts a local search to identify options to divert food waste from the landfill. This includes anaerobic digestion and composting facilities as well as local shelters, food banks, and soup kitchens that accept edible food to feed the community's food insecure population. The IWRC also calculates greenhouse gases generated in the local landfill from the school's food waste as well as disposal costs associated with cafeteria waste. Furthermore, the report includes regulatory information regarding liability protection when donating food, policies for setting up a share-table, and composting on-site. Finally, the report contains strategies K-12 schools can implement to prevent and reduce food waste. The IWRC will continue to provide direct assistance to every school that requests additional help to implement recommendations. While each report delves into donation and composting, the following list displays additional recommendations that could easily be implemented at virtually zero/low cost:

Set up a share-table where unopened, whole, uneaten foods can be donated by students



Analyze the most common foods being thrown away and find a solution to prevent these items from ending up in the trash. For example, a recipe not well received by students can be changed to entice students to eat.



Serve left-over foods from the previous day as an extra option.



Repurpose food items into new recipes. For example, stale bread can be turned into croutons or burgers can be turned into chili or soup.



Order less food more often so it's easier to manage.



Inventory foods frequently and move older foods to the front to be used first.



Always check food deliveries for freshness and store foods at the proper temperatures to extend shelf-life. For example, cucumbers should be stored at 50-55 degrees Fahrenheit while tomatoes can be stored up to 70 degrees Fahrenheit.



Schedule recess before lunch to increase appetites and calmness.



Allow students to help plan the menu and give menu items jazzy names.



Extend meal times to at least 25 minutes so students have ample time to finish eating.



Get students involved in setting a goal to reduce and prevent food waste. Once a week have "Zero Food Waste Day" where students are encouraged to eat everything they've selected for lunch. Keep track of progress in reducing food waste by displaying graphs and/or charts in the lunchroom that showcase accomplishments every week in reducing food waste.



Compost food waste

STUDENT IMPACT

The IWRC has conducted 44 cafeteria waste audits across 21 Iowa school districts to help reduce the amount of food waste in Iowa's landfills, however not every school or district opted to conduct cafeteria waste sorts. Out of these schools and districts, 28 schools in 15 districts had cafeteria waste sorts conducted that include either breakfast, lunch or both. However, 22 schools in 11 districts sorted both breakfast AND lunch waste.

In total, 8,898 students at 28 schools in 15 districts across Iowa participated in cafeteria waste sorts by sorting waste from their own trays. However, some schools / districts were only interested in sorting lunch waste and did not include breakfast waste. For the sake of this document, data has only been provided in the table below for 22 schools in 11 districts where both breakfast AND lunch waste were sorted. Either way, student participation has proven effective in creating awareness about the issues of food waste as well as the mass quantities tossed by students and their peers.

Some K-12 schools allowed students to volunteer to help their peers sort waste from trays following meals which provided the opportunity to discuss food waste, issues that surround tossing it in the landfill, as well as strategies that can easily be implemented at the school. Many times, it was the student who spearheaded contact with the IWRC regarding a waste audit and/or assistance with implementation of strategies. The following photos provide a snapshot of students that volunteered and helped with waste sorts.



Comments received by students include:

“Can I help you weigh those bags?”

“Can I have one of those cookies set aside?”



Melcher-Dallas Community School District students help their peers sort waste from their trays.

Davis County Community School District student volunteers help peers



Left - Students from Nevada High School organize a waste sort.
Right - Central Community School District in Elkader students stand where the new composting site is now located.



“I always thought food in the garbage was gross, but this smells just like milk shakes and tacos.”

“Are we saving the turtles?”

“Can you come back every day so we can keep doing this?”



RESULTS OF WASTE AUDITS

Although each K-12 school/district that requests assistance is provided with their own waste sort data, the IWRC also compiles and extrapolates this data to estimate how much food and beverage waste K-12 students throughout Iowa are tossing yearly. The following table displays this data:

Based on the data collected by the IWRC, **58.2 pounds of food and beverage waste is discarded annually by each student, or 0.3 pounds per day during breakfast and lunch.** K-12 schools that don't have the expertise or time to conduct waste sorts can use these estimates to calculate food and beverage waste in their own districts.

In the 2018-2019 school year, there were 517,076 K-12 students across Iowa. The IWRC estimates these K-12 students in Iowa tossed over **150,000 pounds of food and beverage waste every school day during breakfast and lunch.** Moreover, Iowa's K-12 students tossed nearly **30 million pounds of food and beverage waste in 2018-2019** (based on 180 day school year) with the majority of this ending up in the landfill.



When analyzing waste sort data, only K-12 schools where students sorted waste from their own trays during breakfast AND lunch have been reported to maintain consistency in data representation.



Cafeteria Waste Sort Results at K-12 Schools / Districts Across Iowa

Includes Schools and Districts that sorted both Breakfast AND Lunch Waste
2016 - 2020

*School / District	Breakfast		Lunch		Total Daily Organics (lbs.)	Total Yearly Organics lbs. [tons]	Total Meals Served per Day	Daily Organic Waste Generated per Student (lbs.)	Extrapolated Yearly Organic Waste Generated per Student (lbs.)
	Daily Beverage Waste (lbs.)	Daily Food Waste (lbs.)	Daily Beverage Waste (lbs.)	Daily Food Waste (lbs.)					
Elementary School	3.49	4.68	4.44	10.98	23.59	4,246.2 [2]	Total = 61 Breakfast - 22 Lunch - 39	0.4	70
Community School District 2 schools	23.6	6	17.5	41.8	88.9	16,002 [8]	Total = 192 Breakfast - 57 Lunch - 135	0.5	83
Elementary School	25.14	2.4	20.14	35	82.68	14,882.4 [7]	Total = 260 Breakfast - 84 Lunch - 176	0.3	57
Community School District 1 school	13.2	6.6	27.6	42	89.4	16,092 [8]	Total = 329 Breakfast - 96 Lunch - 233	0.3	49
Elementary School	10.8	14.8	29.5	90.9	146	26,280 [13]	Total = 373 Breakfast - 58 Lunch - 315	0.4	71
Community School District 2 schools	23.18	7.2	25.14	69.8	125.32	22,557.6 [11]	Total = 474 Breakfast - 147 Lunch - 327	0.3	48
Community School District 1 school	16	7.4	61.8	111.2	196.4	35,352 [18]	Total = 816 Breakfast - 144 Lunch - 672	0.2	43
Community School District 3 schools	32.67	8.2	52.44	139.2	232.51	41,851.8 [21]	Total = 961 Breakfast - 211 Lunch - 750	0.2	44
Community School District 4 schools	52.2	17.8	58	211.2	339.2	61,056 [31]	Total = 1,055 Breakfast - 274 Lunch - 781	0.3	58
Community School District 3 schools	45.07	25.67	52.76	189.51	313.01	56,341.8 [28]	Total = 1,200 Breakfast - 300 Lunch - 900	0.3	47
Community School District 3 schools	98.8	27.97	138.78	382.44	647.99	116,638.2 [58]	Total = 1,350 Breakfast - 247 Lunch - 1,103	0.6	86
TOTAL: 22 schools in 11 districts	344.15	128.72	488.1	1,324.03	2,285	411,300 [206]	7,071 Breakfast - 1,640 Lunch - 5,431	0.3	58.2

* Based on 180 day school year

* Names of schools/districts are kept confidential

OUTCOMES OF ASSISTANCE

The IWRC has been conducting waste audits at K-12 schools since 2015. One of the most important things the IWRC has learned about schools that implement food waste prevention and/or reduction projects is that they have a champion at the school or district that spearheads the work involved in implementing strategies that make a difference. This is especially true when students are involved in the projects. The IWRC has found without one of these forms of support, food waste initiatives will fall by the wayside.

When the IWRC first started conducting waste audits at K-12 schools in 2015, it was rare to see share tables. Now, five years later, the IWRC regularly sees share tables at K-12 schools. The primary concern with share tables involves health inspectors across Iowa and confusion over policies that must be followed. Each county has a health inspector and many times these are independent contractors hired by the county. Health inspectors have not all been on the same page as to the policies that must be followed

and information conveyed to each K-12 school/district varies. Some health inspectors have told K-12 schools no whole fruit can be re-served to students, while others have said re-serving whole fruits is fine. When the IWRC visits a K-12 school, proper share table policies are always presented to the school's staff/administration. Many K-12 schools are out of compliance but are trying to reduce food and beverage waste and unbeknownst to them, they are re-serving foods that need temperature controls to maintain food safety which requires a variance to be granted from the Iowa Department of Education (DOE) under guidance and direction of the Iowa Department of Inspections and Appeals (regulating authority).

In Iowa, the regulations state that K-12 schools cannot rescue and re-serve temperature controlled

ASSISTANCE SPOTLIGHT



Central Community School District students in Elkader, Iowa were able to apply for and receive an exemption from the Iowa Department of Natural Resources to compost the school's food waste under the guidance of teacher Ann Gritzner. Gritzner provides project based learning opportunities for students to undertake an environmental or sustainable problem or project idea and run with it. The community is especially supportive of students at the local school; composting all the school's food waste

couldn't have been done without reliable donations of corn stalks from a local farmer, a manure spreader that serves to mix food waste and carbon, also from a local farmer, and an agreement with the city that the school's food waste could be composting on the community's yard waste site. In addition, the city provides transportation of the school's food waste and corn stalks to the yard waste site. Both support within the school district and community has been pivotal in the success of the school's food waste initiatives.

foods to students such as milk, yogurt, and cheese without first obtaining a variance from the Iowa Department of Education. The variance requires K-12 schools to outline a procedure to maintain food safety such as providing ice blocks and refrigeration where students place donated food items. Temperatures of food items that need refrigeration to maintain food safety must be recorded after each lunch shift and a share table monitor must inspect all donations for integrity and food safety. When rescuing and re-serving to students, a variance is not necessary for foods that don't need temperature controls to maintain food safety such as pre-packaged shelf stable foods and whole fresh fruit although all whole fresh fruit must be washed prior to re-serving if the peel is edible. Many K-12 schools are unaware of these policies and have implemented share tables. Other K-12 schools interested in implementing a share table reject these policies due to various reasons including lack of staff, time, and equipment. Whatever the reason, the IWRC has seen share tables that are knowingly out of compliance as well as K-12 schools/districts that would like to implement a share table but struggle with internal conflict about the issue and lack of staff and time to adhere to variance policies.

The IWRC has also experienced the vast amount of work that goes

into conducting waste sorts at K-12 schools. A majority of the time, the IWRC conducted these waste sorts, sent a detailed and customized report only to realize the school/district has implemented none of the recommendations. A perfect example is a district in NE Iowa (the IWRC will maintain this district's confidentiality). The IWRC sent four staff to one school within the district and conducted waste sorts during breakfast and lunch



over the course of three days and also attended 3 separate meetings with the district's superintendent, teachers, staff, and community members. Disagreements between the food service director and staff has derailed efforts to implement any strategies at all with the superintendent making a final decision that no share table would be implemented despite the local food pantry being an avid supporter. A local non-profit even offered to purchase and donate refrigeration for share tables so

that a variance could be obtained to rescue temperature controlled foods. The IWRC has witnessed this time and time again; K-12 schools/districts implementing nothing to prevent or reduce food and beverage waste after hours of the IWRC's staff time has been spent conducting cafeteria waste audits on-site.

Many communities have no organics hauler, no local composting operation, and no waste to energy facilities that recycles food waste. This fact coupled with a lack of community support to help local institutions and businesses implement projects that will prevent and reduce food waste derails, or in the least, severely limits any efforts at all. Infrastructure is severely lacking in the vast majority of communities across Iowa. It takes partnerships, community support, administrative support, and local leaders to spearhead initiatives that work to prevent and reduce food waste. Partnerships can also expand local options to divert food waste from the landfill. For example, a local farmer can compost a K-12 schools food waste on their land by utilizing a regulatory exemption to do so with very few easily obtainable requirements; however transportation of the food waste to the farmer is essential and community support and partnerships could help meet this need.

FUTURE CONSIDERATIONS

The IWRC is considering changing the way waste sorts and audits at K-12 school cafeterias are conducted. Since so many K-12 schools implement nothing after free assistance from the IWRC, it is being considered that the IWRC provides each K-12 school/district with a list of services to select from with a requirement to commit to implement at least one recommended strategy that serves to prevent and reduce food waste.

Although K-12 schools/districts have been extremely receptive to assistance, the IWRC also provides assistance to colleges and universities to help measure food and beverage waste as well as implement and troubleshoot pre and post-consumer food waste composting projects. Restaurants, municipalities, jails, nursing homes, medical centers, and food processors have all sought out the IWRC for assistance to help prevent and reduce food waste as well as disposal costs. One thing is certain, the IWRC will continue to work with a variety of clients including K-12 schools/districts across the state to continue the fight against food waste.



If you would like assistance in reducing food waste at your school, contact **Jenny Trent** at

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