Food Waste in Iowa
Recommendations to Position Iowa as a Leader in Reduction and Recovery
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FOREWORD

I have had the opportunity to meet with individuals from many entities throughout Iowa that are interested in, and already taking initiatives, towards addressing the amount of food being wasted. And unfortunately, there is no one answer, policy, or regulation that will solve this complex problem overnight. However, if we start examining the decisions we make as a society and as individuals, we can curb the amount of food we are wasting and reduce its negative impacts.

The following white paper is an unbiased report put together by individuals from many facets of government, business, and non-profit. They all came together to examine the food waste issue, document its impact and when possible, develop comprehensive recommendations that may reduce the economic, environmental, and social impacts specific to our state.

Please note that this paper is a collaboration of efforts and is in no way a direct opinion of any individual member or organization that has taken part in its development. The Iowa Food Waste Stakeholder Group would like to extend a thank you to the Iowa Energy Center at Iowa State University for providing a grant to assist in the development of this paper.

It is my hope and desire that this starts a conversation in our great state regarding the amount of food waste that is generated and disposed of in our landfills. All questions or comments regarding this white paper can be directed to me at daniel.nickey@uni.edu. An electronic copy of this paper can be found at iwrc.uni.edu/iowa-food-waste-group.

Dan Nickey
Associate Director
Iowa Waste Reduction Center
University of Northern Iowa
ABOUT Iowa Food Waste Stakeholder Group

The Iowa Food Waste Stakeholder Group is a collaborative effort of individuals and organizations from varying parts of the food system.

**Mission Statement**

*The Iowa Food Waste Stakeholder Group is dedicated to advancing Iowa’s efforts in reducing food waste generation and utilizing excess food as a valuable resource through supporting program development, education, and advocacy.*

Initially formed in 2015, the group determined a white paper would be developed as a means to introduce where Iowa stands and how we can move our state to become a leader in food waste reduction and diversion efforts. In 2016, funding was granted from the Iowa Energy Center to fund the development of this paper. The stakeholder group also collaborated with the Law School at Drake University. Students conducted research on existing laws and regulations regarding the handling, distribution, and disposal of food waste. Additionally, coordination of the contents was facilitated by Eat Greater Des Moines.

**STAKEHOLDERS**

Aubrey Alvarez, *Eat Greater Des Moines*
Liz Christiansen, *University of Iowa*
Linda Gorkow, *Hawkeye Area Community Action Program*
Demetrios Hadjis, *GreenRU*
Lea Hensel, *Iowa Waste Reduction Center, University of Northern Iowa*
Eric Holthaus, *City of Cedar Rapids*
Dave Jackson, *University of Iowa*
Jen Jordan, *City of Iowa City*
Scott Koepke, *Grow Johnson County*
Laurie Kroym, *University of Iowa Hospitals*

Dan Nickey, *Iowa Waste Reduction Center, University of Northern Iowa*
Jeff Phillips, *Barker Lemar*
Barb Prather, *Iowa Food Bank Association*
Mary Rankin, *Iowa State University*
Adrienne Ricehill, *Iowa Economic Development Authority*
Jenny Trent, *Iowa Waste Reduction Center, University of Northern Iowa*
Margo Underwood, *Underwood Consulting*
Pete Vogel, *Quad Cities Food Rescue Partnership*
Jennifer Zwagerman, *Drake Agricultural Law Center, Drake University Law School*
INTRODUCTION

Food waste reduction and diversion efforts have been in place for many years. Back in 2007, the United States Environmental Protection Agency released the Food Recovery Hierarchy (shown to the right) which has become one of the main standards in determining food recovery strategies.

However, it was with the August 2012 release of the National Resource Defense Council Issue Paper, Wasted: How America is Losing Up to 40 Percent of Its Food from Farm to Fork to Landfill, that awareness, education, and implementation efforts really got a push in the right direction.

The National Resources Defense Council paper highlights a key fact that we must take into account when reducing and recovering food – the entire food system. From growing and harvesting to processing and transportation to distribution and marketing to consuming and disposal. Every step in the system has a role in food waste and along the way, we can make significant impacts on the economic, environmental and social implications we see as a result of throwing away so much food.

It costs the United States economy $218 billion each year growing, processing, transporting, and disposing of food that is never eaten (“Food Waste: ReFED | Rethink Food Waste,” n.d.). Food waste in landfills generates 16% of the country’s methane gas emissions (United States Environmental Protection Agency, 2012). In Iowa alone, it accounts for over 13% of the state’s municipal solid waste stream (Iowa Department of Natural Resources, 2011).

And the social implications pull at the heart strings. When Americans waste food, it creates an unconscionable paradox where we produce a staggering excess of food in this country while failing to ensure that all Americans have access to healthy, edible food. According to Feeding America, 1 in 7 Americans struggles with hunger, 1 in 8 Iowans, and 1 in 5 children.

In order to utilize food as a resource and not a waste, everyone, including individuals, policymakers, and businesses, need to have a better understanding of where food waste comes from and where we can send excess and inedible food. This effort requires businesses, communities, and individuals to review current practices to identify opportunities to reduce food waste. In 2015, the United States Environmental Protection Agency partnered with the United States Department of Agriculture to initiate a national food waste reduction goal – 50% by 2030. Without a comprehensive, national plan, this will be hard to achieve. But here in Iowa, we can take actions now to propel Iowa forward and become a leader in food waste reduction and diversion.

This white paper uses the United States Environmental Protection Agency Food Recovery Hierarchy as a guide towards explaining where we stand now and where we can go in the future. The stakeholder group looked at how much food waste Iowa is generating. What are the hurdles or barriers that exist making it difficult to fix the problem? What are the cost benefits we could see by solving the problem? And most importantly, what are the recommendations that can propel Iowa forward?
Food Waste in Iowa: Recommendations to Position Iowa as a Leader in Reduction and Recovery

SOURCE REDUCTION

Reduce the volume of surplus food generated

Food waste is a significant issue within the residential and private sectors. “Over 40% of the food produced or imported for domestic consumption in the United States is lost, with over 1/4 of household food purchases by weight going to waste” (Sonntag, 2016).

The most economical and effective method to curbing food waste is to reduce it at the source. Within both sectors listed in this section, one solution is imperative: education.

The United States Environmental Protection Agency utilizes a program called Food: Too Good to Waste (FTGTW). This program utilizes community-based social marketing techniques to encourage residents to “shop, store, prep and save” food. Prompts include a meals-in-mind shopping list, a fruit and vegetable storage guide, tips on preparing food efficiently and planning tips to eat leftovers or other foods that need to be used in order to avoid spoilage. In 2014, Iowa City piloted the FTGTW program with 50 households and found that households can reduce food waste, even taking into account the non-edible portions of the peak of summer produce, with simple tips and prompts.

Globally, the Food Loss + Waste (FLW) Standard is a protocol developed on a larger scale to measure food loss and waste and ensures international consistency in the quantification of food loss and tracking of progress (Rowling, 2016). The purpose of the standard is to quantify food loss and waste and also to track progress toward reducing waste while maintaining transparency. The FLW Standard promotes efficient storage, transport, and consumption of food to reduce loss and waste. Everything reported by countries and businesses is made available to the public and can be used to compare successful techniques and fresh ideas to reduce food loss and waste.

As an example, candy giant Nestle utilized the FLW Standard to measure fresh milk loss of the supply chain in Pakistan (Steer, 2016). Nestle found that waste was just 1.4% compared with a national average of more than 15% loss.

Nestle procures milk from over 100,000 farmers and set up refrigerated tanks in villages where the farmers live and also installed cooling systems to be used during transportation of milk to help reduce loss. Nestlé’s strategies to prevent milk loss are successful and replicable. The FLW Standard provides online data about Nestlé’s measurements of milk loss as well as information about strategies that helped Nestle prevent milk loss. Other entities interested in similar strategies to facilitate prevention can acquire the information for the FLW Standard website.
Aside from making changes in production to reduce food waste at the source, relationships can be established between retail food stores and farmers/producers. Excess foods and off-spec foods are perfectly fine for use and are saleable but are often wasted. Especially in the case of off-spec foods, this is primarily because the food does not meet size or visual requirements, not because the food is unsafe for consumption.

In November 2016, Hy-Vee announced all 242 stores would begin to carry "cosmetically-challenged" produce by the end of the year. Items range on availability but are simply off-spec either in size, shape or other defects that in no way affect how the produce tastes (Nickle, 2016).

**COST BENEFITS**

By reducing food waste at the source, everyone from household level individuals to businesses can see a return on investment.

At the household level, the United States Department of Agriculture estimates that the average American wastes approximately 20 pounds of food per person per month. At 2.58 people per household (Lofquist, 2012), that corresponds to a whopping 51.6 pounds of food waste per household per month.

This equates to $28 to $43 per month per household of wasted food. Reducing food waste can save households $336 to $516 per year.

Businesses can see similar financial savings that range throughout production. By implementing source reduction techniques through tracking food waste or changing operations, food waste generators can achieve significant savings. And especially through the production side, these includes a saving of water, energy and other resources.

For example, ConAgra Foods was able to save over 300 tons of pie dough in a single year by reducing the amount of dough trimmed off Marie Calendar potpies. Not only did this reduce food waste at the source, but it also saved the water, energy, flour, and other ingredients that were used to make the pie dough (Stasz, 2016). Similarly, General Mills was able to save nearly 4,000 metric tons of pizza toppings by simply heating the cheese a bit more so the toppings would stick to the pizza better.

**RECOMMENDATIONS**

**Residential**

Within the residential sector, education for residents to reduce edible food waste at home can positively impact personal budgets and organic waste production.

- Incentivize the implementation of the United States Environmental Protection Agency’s “Food: Too Good to Waste” (FTGTW) program in Iowa cities.
Private Sector
Education and policy change are necessary within the private sector to help entities quantify their food waste production and to spur awareness based behavior change.

- Encourage retail food stores to build relationships with farmers and producers to sell excess, off-spec foods
- Implement organics tracking
  - Legislation incentivizing tracking and recording of food loss and waste should include tools and guidelines that support a consistent system of measuring and recording data that will be equally gathered from entity to entity.
- Support local ordinances to increase awareness and education for source reduction
  - Once an entity has a food waste generation baseline, strategies can be implemented to facilitate prevention. Educational campaigns to help prevent food loss and waste need to include simple strategies that are easily implemented and cost effective.
- Develop online clearinghouse with organics tracking data
  - Organics tracking policies should include an online clearinghouse for the data that provides the following information.
    - Food loss and waste measurements reported by each entity
    - Implemented strategies that prevented food waste
    - Implemented strategies that resulted in the diversion of food waste from landfills
  - Keeping data transparent will allow other entities to replicate techniques that prevent food waste.
Given the abundance of healthy edible food currently going to waste, there is a tremendous opportunity to reduce the number of Iowans who experience food insecurity. First, four significant hurdles must be overcome.

<table>
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<th>Availability of food pantries, soup kitchens, and shelters</th>
<th>Prevalence of food deserts in rural and urban settings</th>
<th>Reluctance to donate excess food due to food safety concerns</th>
<th>Lack of resources</th>
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<td>While there are hundreds of food pantries, soup kitchens, and shelters throughout Iowa, there is not equitable distribution throughout the state. Especially in rural areas, the availability of pantries and accessibility to those establishments can be an issue.</td>
<td>Food deserts are regions where large portions of households are low-income, have inadequate access to transportation, and few food retailers providing healthy, affordable groceries. In urban settings, low access is at least 500 people and/or 1/3 of the census tract living &gt;1 mile from a supermarket or grocery store. In a rural setting, this distance is 10 miles. (Dutko, Paula, Michele Ver Ploeg, and Tracey Farrigan, 2012).</td>
<td>Some food establishments are apprehensive to donate leftover food due to food safety liability concerns and fear of litigation. There is a lack of awareness of the Bill Emerson Food Donation Act that protects food donors from food-safety liability when donating food to a non-profit organization.</td>
<td>Donating and receiving organizations lack the resources to get the excess food from the donor to the recipient organization. Appropriate logistics planning, transportation, and staff capacity are lacking on both ends.</td>
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Food rescue is the process of collecting donated food from restaurants, caterers, and other food service providers, and distributing that food to people in need through local social service organizations. One of the most important federal laws regarding food rescue is the Bill Emerson Good Samaritan Food Donation Act. Passed in 1996, the Act protects donors from civil or criminal liability when donating food in good faith. In Iowa, the donation of perishable food is governed by Iowa Code 672.1. Both the donor and recipient of food are required to have reasonably inspected the food to make sure it is fit for human consumption.

However, the current law does not protect donors who donate in good faith to individuals directly, only to donors who donate “to a charitable or nonprofit organization for ultimate free distribution to needy individuals, or to the department of natural resources or a county conservation board for use in a free interpretive educational program”. With the limited options for food donation services in some areas, allowing donors to be protected when directly donating food items in good faith would expand options for getting food to those who need it before it spoils. Requiring a middleman, particularly in more rural areas, can be a major obstacle.
Additionally, 672.1(2) and 671(3) of the code are unclear. Part (2) indicates that donors are only protected if they donate food to an organization for ultimately free distribution. However, part (3) protects nonprofit organizations who provide food for “free or a nominal fee.” So as written, it’s unclear if the same protection extends to donors, who may not ultimately be sure of the end use of the food once donated to the nonprofit organization.

Non-profit organizations within Iowa are working to increase food rescue efforts.

- Feeding America Food Banks, of which there are five serving Iowa, make safe food recovery a priority. Not only are they required to pass American Institute of Baking (AIB) food safety audits every two years, at least one staff member must be a certified Serv Safe Manager. This commitment to food safety is passed along to member organizations by requiring food safety training and annual inspections.
  - For example, the Northeast Iowa Food Bank in Cedar Falls, IA has a robust food rescue program. Food rescue is the fastest growing category of all food donations received. Not only do they rescue from retailers like Hy-Vee, Panera Bread, Walmart, Target, Starbucks, and Aldi’s, they also connect member agencies with Kwik Star Stores to pick up donations daily. Additionally, they recoup product from farmers, ranchers, and farmers markets.
    - For example, they buy 400 gallons of milk from a local dairy and the dairy donates 100 gallons. This milk is made from an excess product that was thrown away in the past. These food recovery efforts have led to over 2.25 million pounds of food being recouped locally.
- Table to Table in Iowa City was founded in 1996. Table to Table collects excess wholesome, edible food from donating retail partners and distributes to social service organizations. Since starting, they have recovered over 15 million pounds of food. That equates to 18 million equivalent meals.
- The Food Rescue Partnership in the Quad Cities is a new non-profit that informs and educates the entire community about food rescue, serves as an advocate for solutions as an official Endorser of the United States Environmental Protection Agency Food Recovery Challenge, fosters and facilitates food rescue partnerships between licensed food establishments and non-profit hunger relief agencies, and conducts a community-wide food rescue recognition program.
- Eat Greater Des Moines is a non-profit organization based in Des Moines. Their role is to make it easier for donating organizations to connect with recipient organizations. Outside of setting up regular food rescue relationships between donors and recipients, they operate the free ChowBank smartphone application. ChowBank allows donors and recipient organizations to connect directly in real time. Donors create an alert outlining their donation specifics (the type of food, quantity, location and if delivery is available) and then push the donation alert to the network of recipient organizations. Recipient organizations receive a notification and have the opportunity to accept if the donation matches their needs. Once a donation is accepted, it disappears from view and the donor and recipient organization are connected to finalize donation details.

**COST BENEFITS**

Food rescue efforts positively impact recipient and donor bottom lines. Increasing food available to social service organizations allows them to divert food budget dollars to other programs.

Only a few states have laws that provide tax credits for food redistribution to state food banks; California, Arizona, Oregon, and Colorado. Iowa has the Farm to Food Donation Tax Credit, a “program that establishes a tax credit for farmers who donate self-produced food commodities to food banks and food
pantries in an amount equaling the lesser of $5,000 or 15% of the value of the commodities during the tax year for which the credit is claimed.” In order for the donors to claim the tax credit, they must obtain a Farm to Food Tax Credit Donation Receipt from the local food organizations (who must be registered with the Iowa Department of Revenue in order to be recognized). However, more can be done to improve the tax incentive of donating edible but not sellable food by expanding to include meat, dairy, and other commodities. Provide an incentive for the farmer to donate but also provide funding to do the necessary processing.

Many Iowa companies are already leading the way with food recovery programs. They recognize the various benefits through internal food rescue efforts. The food recovery program at Principal Financial Group in Des Moines is a great example. Sodexo has been the foodservice partner at Principal since March 2008. They operate three on-site restaurants and provide corporate catering services to the 6,000 plus Des Moines Principal Campus employees and clients. In early 2009, they started rescuing and donating ready-to-eat and non-perishable food items from the on-site cafés. Their food recovery program has led to enhanced staff awareness through the use of waste and food recovery tools and they have improved overall production accuracy and actually reduced food cost by an average of 2.5%.

RECOMMENDATIONS

Expanding food recovery efforts in Iowa can be bolstered through specific efforts.

- Expand scope of Iowa Code 672.1 to clarify and ensure the protection include donors who donate food items “to a charitable or nonprofit organization or to any other person.”
- Reconcile and clarify Iowa Code 672.1(2) and 671(3) to clear up confusion as explained on page 8.
- Expand the scope of protection to allow foods to be donated that are mislabeled in a way that does not affect safety.
  - An exception should be written into the law that allows the donation of mislabeled food when the mislabeling does not have any relevance to food safety.
- Liability protection should be expanded to include those who donate canned or packaged foods that are past the label date for food items where the date does not refer to safety.
  - The current law regarding this area is unclear and can make some donors hesitant to donate. Date labels, with few exceptions, generally have no relation to whether or not a food is safe to consume after the package date. Labels generally refer to freshness, not safety.
- Statewide educational campaign promoting food rescue.
  - Expand awareness of the Bill Emerson Good Samaritan Act and highlight those actively engaged in food rescue to encourage more organizations to start food recovery programs.
- Provide funding to expand access to food donation software applications.
- Expand and simplify tax credit for Iowa donors beyond farmers.
  - While the current tax incentive is a step in the right direction, more can be done to incentivize the donation of edible but not sellable food. Incentives should be expanded to include meat, dairy, and other commodities. Provide an incentive for the farmer to donate but also provide funding to do necessary processing.
FEEDING ANIMALS

Divert food scraps to animal feed

Through history, society has utilized food scraps to feed livestock. This practice allowed a valuable resource that would otherwise be wasted to assist communities in providing needed feed for their livestock. This practice reduced food waste and provided a valuable resource for agriculture. Now livestock is fed valuable commodities that are grown in the form of corn and wheat. The United States Department of Agriculture estimates that 80% of the commodity crops grown in the United States are dedicated to feeding animals. Reducing the amount of commodity crops used to feed livestock allows more food to be used to feed the earth’s human population.

The modernization and industrialization of the agriculture industry hindered the practice of feeding excess food to livestock. The day of the small family farm has progressed to larger corporate farming operations. This progression has dramatically decreased the ability of food scraps to be utilized as food for livestock.

With the concern of bovine spongiform encephalopathy (BSE) or “mad cow disease” has come increased regulations regarding inclusions of animal parts in products feeding livestock. Feed that included animal by-products was determined to be the cause of the spread of BSE in the United Kingdom from 1986 to 1998. This was the worst BSE outbreak infecting 180,000 cattle, and 4.4 million were slaughtered in an attempt to stop the spread. This epidemic demonstrates the importance of ensuring the food scraps being fed to livestock is compatible with the animals receiving the food scraps and how the food scraps are processed.

To reduce the possibility of spreading the disease to humans from the practice of feeding livestock food scraps the following federal rules were enacted.

- The Food and Drug Administration’s Bovine Spongiform Encephalopathy /Ruminant Feed Ban Rule. This rule bans the use of mammalian protein food scraps as a feed to any ruminant (i.e. cattle, sheep, and goat).
- The Swine Health Protection Act of 1982 was passed by Congress to regulate feeding food scraps to swine. It requires all food scraps being fed to swine be heated to 212 degrees Fahrenheit for 30 minutes.

There are certain exemptions in these rules that allow food scraps to be fed to livestock. An individual farmer is allowed to feed food scraps that were generated on-site to his swine. These federal rules are the minimum regulations governing the use of food scraps in livestock feed. Individual states have enacted their own state regulations that go above the federal rules. In Iowa, feeding food scraps to livestock is regulated by Iowa Code 163.26 to 163.28. In all practical terms, these codes do not allow feeding of food scraps to animals except in those specific cases in which individuals may feed food scraps to their swine. The Iowa Department of Agriculture is the primary agency that regulates and enforces these requirements.
Based on United State Department of Agriculture data the graphic on the right depicts states throughout the country’s status regarding feeding garbage/food scraps to livestock. States that do allow garbage/food scraps to be fed to livestock may have their own very specific requirements and stipulations.

It has been established that there is a risk of feeding food waste to animals, however, this risk can be eliminated by limiting the types of food waste in livestock feed and how it is treated. Spent grains from brewery operations and off-specification grains and cereals from industrial operations can be fed to livestock with no risk of spreading disease. For example, MGM casino in Las Vegas sends its buffet waste to a hog farmer who treats the material to then feed to its hogs.

There is also another more intangible hurdle to utilizing food scraps to feed livestock; public perception. Agriculture producers may see adverse reactions from the general public if they realize the products they are consuming were fed with food scraps. Even if the food scraps met all regulatory conditions the general public may not be willing to purchase meat that was fed food scraps. This may result in producers turning away from the utilization of food scraps as a feedstock for their animals. Conversely, another part of the population that favors the sustainability movement may embrace this concept as an environmentally sound way to utilize the earth’s resources.

**COST BENEFITS**

Feeding food scraps to livestock has obvious environmental benefits, but it also has cost saving benefits as well for farmers, consumers, and communities. The most costly expense to livestock farmers is feed. The cost of growing feed for livestock is increasing due to the increased costs of labor, fertilizer and the growing number of severe weather incidents that have resulted in significant crop loss. This increased production cost for feedstock has directly increased the cost of food in America. Utilizing the excess food generated in the United States from commercial, industrial and institutional producers to feed the country’s livestock can reduce the cost of feed for country’s livestock producers.

Businesses that generate food waste can also realize cost saving from directing their food waste to feed animals instead of being disposed of in the landfill. If food waste generators develop relationships with local livestock producers to take their food scraps to replace the farmer's more expensive feed, the generators will be able to potentially decrease their disposal cost of food scraps being directed to landfills. In MGM Casino’s sustainability movement it decreased its food waste by 3,500 tons per year at an average cost savings of $7,000 per month by sending its food scraps to a pig farmer. Even if a business does not realize an economic benefit, most businesses that have implemented food waste diversion projects receive a positive public relationship benefit. If businesses promote their food waste reduction activities, they may see positive feedback from the public. Certain aspects of America society are more willing to spend their dollars at businesses that are socially responsible.
RECOMMENDATIONS

Iowa has one of the largest livestock populations in the United States, however very little of the food scraps that are generated in the state are used to feed this livestock. The protection of human health must be the primary concern of any policy. Feeding food waste to Iowa livestock on a large scale is not practical or responsible for the health of Iowa livestock or citizens. However, feeding food scraps in specific situations can be a safe alternative to feeding Iowa livestock traditional commodities while reducing the amount of food scraps being directed to Iowa landfills. Iowa should look to the past to assist in determining future practices of feeding the state’s livestock.

The following are recommendations that could be implemented that would encourage the use of food scraps to feed Iowa’s livestock.

- Reverse the ban on feeding food scraps to swine.
  - Lifting the ban in Iowa could create an environment that will encourage livestock producers to consider using food scraps as a feedstock instead of traditional commodities. It will also produce a new market for food scraps that would otherwise be disposed of in Iowa’s landfills. In addition, policies could be enacted (e.g. tax credits) for the development of regional processing facilities that would treat the area’s food scraps creating a safe and reliable feedstock. The processing facilities would create economic development in the area in the form of jobs to process and transport the food scraps.

- Create policies to allow small-scale agriculture operations to feed onsite food scraps to onsite livestock.
  - There is a movement of the development of small-scale agriculture operations ranging from organic produce operations to wineries. These types of agriculture operations generate food waste in the form of off-specification produce that could be fed to the facilities livestock.

- Update, streamline, and clearly define Iowa regulations regarding feeding food scraps to Iowa livestock.
  - The Iowa rules that govern food scraps being fed to livestock are administered by multiple state agencies and have not been updated since 1970. It would assist Iowa livestock producers and generators of food scraps if these rules were updated, regulated by only one state agency and have a point of contact that would clearly answer all questions regarding feeding food scraps to Iowa livestock. Rules should also clearly define if food scraps can be fed to Iowa livestock and under what specific situations.
INDUSTRIAL USES

Provide waste oils for rendering and fuel conversion and food scraps for digestion to recovery energy

Anaerobic digestion is by definition “a biological process that produces a gas principally composed of methane and carbon dioxide otherwise known as biogas.” Biogas is produced from organic wastes like livestock manure and food waste making it a renewable energy source with a very small carbon footprint. Multiple types of organic wastes, or feedstock, can be used to create energy through anaerobic digestion.

- Food waste
- Manure
- Paper food packaging
- Cardboard boxes
- Waxy paper
- Other non-recyclable paper

The process of anaerobic digestion, simply defined is utilizing microorganisms to decompose plant and animal materials. In the process, acid forming bacteria convert the biomass (food waste, manure, etc.) into acetic acid while methanogens (not a bacteria but archaea) convert the acetic acid into methane. The methane can then be used to produce electricity or provide heat for buildings. By-products of anaerobic digestion include separated digested solids that can be used for livestock bedding, compost and liquid fertilizer for crop cultivation.

Currently, Iowa has three agricultural anaerobic digesters throughout the state. All of these digesters process agricultural waste such as manure but have the capacity to process food waste as well. Additionally, according to the American Biogas Council, Iowa currently has 53 anaerobic digesters at wastewater treatment plants that are municipally owned and operated. Out of the 53 anaerobic digesters at wastewater treatment plants, only nine accept outside feedstock.

Utilizing Iowa’s anaerobic digestion industry to reduce food waste headed to Iowa landfills is feasible, however, there are challenges that the industry faces in accomplishing this goal. The following are a list of challenges that currently need addressing to make digestion of food waste easier and more cost effective.

- Limited knowledge of digesters
- Limited distribution of digesters in Iowa able to accept food scraps
- Cost of installing and maintaining digesters
- Limited anaerobic digester facilities to take food scraps
- Limited companies to pick up and haul food scraps
- Cost to transport produced biogas to utilities
- Pipelines not located near production sites
- No rebate program
- Costs associated with power purchase agreements
- Current tax deductions for energy production are limited
Educational awareness about anaerobic digestion and the benefits that can be realized by digesting organic waste is first and foremost essential in Iowa to further the industry and work towards overcoming many of the barriers listed above.

The cost of anaerobic digesters is steep. Anaerobic digesters can range from $250,000-2,000,000. Yearly operating costs range from $11,000-51,000 for maintenance and system operator’s wages. Despite initial start-up and maintenance cost, the sustainable management of organic waste through anaerobic digestion has many benefits.

- Reduces electricity costs
- Reduces costs associated with manure application on fields
- Income generated through the sale of electricity
- Reduces fossil fuel use by generating renewable fuel
- Sustainable management practice for waste
- Captures the nutrients used to grow food
- Promotes reduction of greenhouse gas emissions by digesting rather than landfilling organic
- Reduces reliance on imported energy and promotes self-sufficiency

**COST BENEFITS**

A study conducted of the costs and benefits of anaerobic digestion on dairy farms in Oregon and New York found that the benefits received included electricity sales, digested fiber sales, and hot water (Moser, Mattocks, Gettier & Roos, n.d.). This did not include benefits from the value of reduced propane use. This same study showed yearly benefits are about 21% of the costs associated with purchasing and installing the anaerobic digester. An agricultural anaerobic digester in New York realizes yearly benefits at 23% of the cost of purchasing and installing the digester. These anaerobic digesters were both sized for manure management of 1,000 cows each.

A fact sheet developed by the Michigan Department of Agriculture in partnership with the Michigan Department of Environmental Quality, Michigan Milk Producers Association, Michigan Agriculture Environmental Assurance Program and the Michigan Farm Bureau (n.d.) stated that anaerobic digesters managing the manure of 100 lactating cows can generate 200 to 300 kilowatt hours per day of electricity. This is enough energy to power 15 homes. Considering this finding, this suggests the two anaerobic digesters referred to above can generate enough electricity to power 300 homes per year and recover the costs of purchasing and installing the digester in just five years.
RECOMMENDATIONS

According to the United States Environmental Protection Agency, food waste is one of the least recovered materials in the municipal solid waste stream and is one of the most important materials to divert from landfills to mitigate climate change.

Anaerobic digesters located at schools, within communities, at wastewater treatment plants, and on farms can provide a valuable method for managing food waste. The hidden energy generating capacity of food waste is lost when it ends up in a landfill, but anaerobic digestion offers a renewable energy source that can decrease pressure on current energy demands, reduce greenhouse gases, extend landfill life, and provide valuable soil amendments to nourish soils and reduce reliance on traditional fertilizers that contribute to nitrogen and phosphorus pollution of surface waters. The following list provides recommendations to further anaerobic digestion, which will in turn promote sustainable management of food waste in Iowa.

- Expand current renewable energy tax credits to allow anaerobic digester facilities to receive tax credits for more than one form of renewable energy. For example, a biodigester that produces renewable energy but also recovers heat for buildings can only receive a tax credit for one of the renewable energy forms, but not both.
- Extend or remove 30-month window for tax credits
  - Eligible renewable energy facilities, once approved by the Iowa Utilities Board, have a limit of 30 months to become operational. Facilities that are not operational within 30 months lose their renewable energy facility status and become ineligible for the tax credit.
- Expand renewable energy tax credit to include those that produce for on-site consumption. Currently, renewable energy that is produced solely for on-site consumption is exempt from receiving the renewable energy tax credit.
COMPOSTING  
*Create a nutrient-rich soil amendment*

Food waste that is not edible does have value when it is composted. When composted, food waste aerobically breaks down into a rich soil amendment that provides nutrients for soils, kills weed seeds, retains moisture, suppresses plant diseases and parasites and decreases soil erosion. Compost applied to lawns, farm fields, and gardens improve soil structure and make nutrients available to growing plants. In Iowa, regulations dictate that composting food waste on a large scale requires a permit issued by the Iowa Department of Natural Resources, however composting food waste that is generated off-site and weighs less than two tons per week does not require a permit and falls under an exemption called the “Permit-By-Rule.” Although no permit is needed under the “Permit-by-Rule, there are still requirements that must be met. Both types of regulatory requirements can be found under Iowa Administrative Code Chapter 567-105: Organic Materials Composting Facilities. Additionally, composting one’s own food waste on one’s own land is exempted completely from regulatory requirements except for nuisance laws.

As of December 2016, three municipal landfills in Iowa accept food waste in their composting operations. Metro Waste Authority in Des Moines “accepts limited quantities (up to two tons per week) of pre-approved, commercially generated food waste.” The Cedar Rapids/Linn County Solid Waste Agency accepts food waste from retailers and institutions. And Iowa City has a commercial compost facility in place and began a curbside composting program in November 2016.

On a large scale, composting requires heavy, expensive equipment. Landfills and private composting facilities need bucket loaders, screeners, shredders, skid loaders, and windrow turners to keep the composting operation active and to promote the speedy breakdown of material. It is costly and extremely time-consuming but with only three municipal landfills accepting food waste in composting operations throughout the state, it is a definite barrier towards all sectors diverting their food waste from the landfill to composting operations outside of these areas.

The other option aside from the municipal landfills is through hauling services. There are options in Iowa but more haulers to provide organics services to entities interested in food waste composting would divert even more from landfills. Existing policies are supportive but have not guaranteed food waste composting. To move the State of Iowa beyond pockets of success, state-wide education and funding for infrastructure are needed. Success stories within Iowa and in other leading cities can point the way.
COST BENEFITS

In total, compost benefits per ton, compared to landfilling, is approximately $4.00 per ton ("Food Waste: ReFED | Rethink Food Waste," n.d.).

Business benefits grow with infrastructure and customers. Material hauling is costly in the beginning and improves with each customer. Early adopters are typically institutions with mission statements that align with food waste reduction and enjoy promoting the program to local and regional peers. To haulers, a growing customer base expands a company and encourages other entrepreneurs to be involved. Schools, grocery stores, colleges, and hospitals are candidates.

Iowa City provides an example where landfill tipping fees are $43.50 per ton and food waste tipping fees for composting are $24.00 per ton. Selling compost back to businesses and residents for $20.00 per ton normalizes the revenue on a per ton basis with landfilling and adds benefits of recirculating resources, keeping value in the community, and extending the life of the landfill.

RECOMMENDATIONS

Food waste is a resource, and galvanizing resources and interest across Iowa can put Iowa on the map for nationwide leadership in the area of composting. Building on top of previous successes is the way forward and the following recommendations can get Iowa to this point.

- Conduct a study of how existing businesses and landfills could keep food waste out of the landfill.
- Create tax incentives for private businesses to fund food waste composting equipment.
- Increase funding for the Iowa Department of Natural Resources Solid Waste Alternative Project program to fund food waste reduction equipment needs.
- Recommend the state’s largest institutions to compost food waste and document successful strategies.
- Recommend state roadways projects to use compost for erosion control.
LANDFILL/INCINERATION

Last resort to disposal

Landfills are a critical part of the utility infrastructure for communities and industries. They receive a variety of waste materials for long-term management from a diverse group of generation sources (i.e., residential, industrial, institutional, etc.). Landfills work to minimize the environmental impacts generated waste materials have on the environment and work to minimize the cost of disposal, which in turn helps decrease the costs of goods and services.

In 2011, an estimated 121 million tons of food was discarded by consumers and 69 million tons of food intended for human consumption was lost during production, post-harvest, processing, or distribution in North America and Oceania (Australia and surrounding islands) (FAO, 2011). Each year, approximately 52.4 million tons of food is sent to landfills in the United States. ("Food Waste: ReFED | Rethink Food Waste," n.d.). See the addendum for specifics of food waste by type and phase of production.

In Iowa, an estimated 10.3% of the total waste received by landfills consisted of food waste in fiscal year (FY) 2011 (Iowa Department of Natural Resources, 2011). The tonnage that Iowa landfills disposed of in FY 2011 was 2,864,033.83 tons (Iowa Department of Natural Resources, n.d.). Therefore, an estimated 294,995 tons of food waste was disposed of in Iowa landfills in FY 2011. This is an estimated 193 pounds of food waste per person per year (3,046,355 million people in Iowa) (United States Census Bureau, n.d.).

The high moisture content of food waste helps decompose received waste, which in turn helps bio-stabilize the waste, inside the landfills. The decomposition process creates landfill gases that contain methane, a greenhouse gas which is 20-25 times more potent than carbon dioxide at trapping heat in the earth’s atmosphere. Some landfills have an infrastructure designed to help capture landfill gases. However, these systems do not capture all of the generated gasses and are costly to install and maintain. Therefore, many landfills do not have a gas collection system.

In 2015, the Iowa Department of Natural Resources commissioned the Industrial, Commercial and Institutional Food Waste Generator Study, prepared by the Iowa Waste Reduction Center, showing approximately 12,370 Iowa food waste generators (Iowa Waste Reduction Center, 2015). Multiple key findings of the study may impact establishing Iowa reduction thresholds.

- Industrial, Commercial, and Institutional (ICI) food waste generators are scattered across the state with heavier concentrations in more populated areas.
- Less than ¼ of food ICI waste generators surveyed could report how much food waste their facility generate.
Over half (59\%) of food waste generators generated both pre-consumer and post-consumer food waste. As a whole, food waste that was solely unpackaged was nearly even with generators whose food waste is both packaged and unpackaged. Nearly 90\% of food waste generators landfill their food waste.

Five states have implemented state-level food waste disposal bans or recycling laws. Rhode Island, Massachusetts, Connecticut, and Vermont have implemented organic waste bans. California has implemented recycling laws.

Diverting food waste from landfill disposal requires alternative diversion options. To establish diversion goals, identification of current diversion options, location, capacity, fees, distance from major generators, etc. must be known to strategically plan for additional diversion. Generation of packaged food waste is another factor that must be considered as packaged food waste requires pre-disposal processing.

**COST BENEFITS**

Diverting large quantities of food wastes from disposal may have the following financial, operational, and environmental benefits at landfills.

- Decreased landfill gas production
- Decreased leachate production
- Increase in service life of landfill (airspace)

**RECOMMENDATIONS**

Developing an infrastructure that supports the management of the materials being diverted from disposal is a necessary first step. Well established and self-sustaining (not dependent on solid waste disposal fees for program funding) food waste diversion programs can be supported by disposal bans/and or recycling bans but cannot be the catalyst for the creation of the diversion programs.

- Establish disposal diversion programs to provide an alternative to disposal options.
- Establish a food waste disposal diversion goal.
  - Taking into account the United States Department of Agriculture and the Environmental Protection Agency domestic goal to reduce food loss and waste by 50\% by the year 2030, Iowa could establish a statewide goal (i.e., 20\% reduction in disposed food waste by 2020) to help drive the diversion service industry and program development, and lay the groundwork for potential disposal diversion regulations.
- Establish incremental food waste disposal bans that initially target the largest food waste generators and provide an updated listing of identified businesses to landfills.
  - Enforcement regulations would need to be established to provide landfills with the ability to collect fines or fees from haulers delivering food wastes in excess of the threshold from identified generator sources. Landfills do not have the resources to identify industries within their service area that are required to meet the food waste disposal ban
state policies. The state would need to provide a list of the identified businesses within individual service areas to the landfills. If the threshold for the amount of food waste changes, the state would need to provide the landfills with an updated list.

- Develop educational and promotional campaigns targeting identified food waste generators, waste haulers, and landfills to help disseminate disposal ban regulations and to assist with compliance.
WHERE DO WE GO FROM HERE?

There is no shortage of solutions and recommendations for reducing food waste. Heightened awareness is good, but can also lead to thinking it is “someone else’s” issue and problem to solve. This white paper was put together by Iowans from a variety of business, education, government and non-profit sectors for Iowa. The solutions presented take into account the unique challenges and opportunities Iowa faces.

In the battle to reduce food waste, everyone throughout the food system has a role. Nationally, the United States goal to reduce food waste by 50% by 2030 is a touch point for Iowa. In order to meet this goal, appropriate tracking and reporting measures need to be in place. Working at the local level will push Iowa ahead in the race to reduce food waste.

The magnitude of food waste at a national level can make the issue seem overwhelming and impossible, however, breaking the numbers down to make it Iowa specific is a great starting point. Requiring tracking and reporting by entities will make the issues transparent and create space for conversations and solutions.

With Iowa’s strong agriculture roots and focus on feeding the world, ensuring all Iowans are fed is a natural fit. Wasting food and the resources required to produce while 1 in 5 children and 1 in 8 adults go hungry is not acceptable at any level. Expanding on the successes in food recovery efforts in pockets of Iowa can help reduce food wasted while increasing food access for those who need it most. Expanding current Iowa policies to incentivize more food rescue efforts benefits donors, recipient organizations, and Iowa landfills.

The benefits of reducing and divert food waste are multi-faceted. Food waste prevention saves valuable resources, alleviates hunger and can slow the adverse environmental effects related to the release of harmful gasses from landfills in which food waste decays, while simultaneously producing jobs and supporting Iowa’s economy. Iowa has multiple opportunities to increase food waste prevention methods currently being implemented across the state. This white paper has outlined recommendations targeted towards all elements of the food system. Capitalizing on these recommendations listed within this white paper will make Iowa a leader in food waste reduction and diversion.
REFERENCES


Food Waste in Iowa: Recommendations to Position Iowa as a Leader in Reduction and Recovery

ADDENDUM

Food Waste by Type and Phase of Process (Gunders, D. (n.d.))

![Food Consumed Versus Food Loss Chart](chart)

### FRUITS & VEGETABLES
- Production Losses
- Postharvest, Handling, Storage Losses
- Processing and Packaging Losses
- Distribution and Retail Losses
- Consumer Losses

![Fruits & Vegetables Chart](chart)
Food Waste in Iowa: Recommendations to Position Iowa as a Leader in Reduction and Recovery

**GRAIN PRODUCTS**

- Production Losses
- Processing and Packaging Losses
- Consumer Losses
- Postharvest, Handling, Storage Losses
- Distribution and Retail Losses

**SEAFOOD**

- Production Losses
- Processing and Packaging Losses
- Consumer Losses
- Postharvest, Handling, Storage Losses
- Distribution and Retail Losses
Food Waste in Iowa: Recommendations to Position Iowa as a Leader in Reduction and Recovery

**MILK**
- Production Losses
- Processing and Packaging Losses
- Consumer Losses
- Postharvest, Handling, Storage Losses
- Distribution and Retail Losses

**MEAT**
- Production Losses
- Processing and Packaging Losses
- Consumer Losses
- Postharvest, Handling, Storage Losses
- Distribution and Retail Losses
FOR MORE INFORMATION

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