

Oregon Wasted Food Study: Institutional and Commercial Sector Case Studies

Case 2: Food repurposing in a commissary kitchen



This report was prepared for
Oregon Department of Environmental Quality, Ashley Zanolli, Project Lead

Submitted
November 19, 2018

By

Reed Brodersen, MURP
Graduate Research Assistant

Christa McDermott, PhD
Director

Jennifer Stefanick
Research Assistant

Community Environmental Services

Portland State University
P.O. Box 751
Portland, OR 97207-0751

1600 SW 4th Avenue, Suite 128
Portland, OR 97201
503-725-5949
christa@pdx.edu

Table of Contents

- Introduction..... 5**
 - Focus of study 5
 - Business context..... 5

- Methods 5**
 - Study design 5
 - Interviews..... 6
 - Waste assessments 6
 - Recommended practice..... 6

- Results 7**
 - Waste assessments 7
 - Interviews..... 7
 - Sources* 7
 - Causes and barriers* 7
 - Existing prevention strategies* 8
 - Potential prevention strategies*..... 8
 - Recommended practice: 9
 - Tracking and storing meat trim for potential repurposing 9
 - Meat trimming records*..... 9
 - Financial benefits*..... 9
 - Environmental benefits*..... 10
 - Evaluation interview*..... 11

- Analysis and Conclusion..... 12**
 - Key causes and barriers to full food utilization 12
 - High quality standards* 12
 - Lack of flexibility*..... 12
 - Analysis of recommendation*..... 12
 - Limitations*..... 13
 - Conclusions and additional opportunities..... 13

- Appendix..... 15**
 - Waste sort process and data 15
 - Conformance to Food Loss and Waste Reporting Standard 18

Index of Tables and Figures

Figure 1:	Formula used to calculate the percent meat trim of total meat used.	9
Figure 2:	Potential GHG emissions avoided from the repurposing of meat scraps....	10
Figure 3.	Avoided energy consumption from potential meat scrap repurposing.	11
Figure A1.	Example of meat trimmings separated by meat type.....	15
Table A1:	Waste sort categories and definitions.....	16
Table A2.	Waste sort results	17
Table A3.	Meat trim measurement for two-week trial period	17
Figure A2.	Scope of Case Study 2 as relates to the Food Loss and Waste Reporting Standard	18

Introduction

This is a report on the methods and results of one of 15 food service business case studies, as part of the institutional and commercial (IC) sector portion of the Oregon Wasted Food Study. This study is funded by the Oregon Department of Environmental Quality and conducted by Community Environmental Services (CES) at Portland State University.

The research objectives for the IC portion of this study are to:

- Understand components of wasted food in IC sector
- Highlight causes of commercial wasted food and key opportunities for waste prevention
- Test wasted food reduction best practices and quantify their effectiveness
- Promote wasted food reduction best practices for application at commercial food service institutions

Focus of study

This study explored the major types and causes of waste in commissary kitchens. Commissary kitchens provide centralized food preparation for several outlets, such as for food trucks or a food service business with multiple local outlets. This report examines the potential effectiveness, benefits, and challenges of formalized **food repurposing as a strategy for preventing food loss**. Specifically, this study uses wasted food auditing and tracking practices to identify opportunities for repurposing, which in this case, revealed an opportunity to repurpose meat trimmings. Strategies and challenges to implementing this new practice, the financial and environmental benefits of repurposing meat trimmings, and the business case for the repurposing more broadly are discussed.

In this case study, we found that meat trim represented a loss of 8% of turkey and 6.6% beef. **Results suggest that this commissary kitchen could save \$158 per week in food purchasing costs, totaling \$8,204 a year, by repurposing meat trimmings.** Creating new menu items with repurposed foods that were otherwise thrown away has the additional potential of generating revenue, though in this case, the creation of a turkey pot pie menu item would replace an existing menu item, likely being revenue neutral.

Business context

This case study is of a commissary kitchen that serves roughly 10 retail cafe locations across and beyond the Portland area, preparing components for sandwiches, salads, and soups. It is part of a retail chain that is known for its sustainable practices and use of local ingredients. There is a separate commissary kitchen for baked goods that was not included in this study. While the retail chain has more than 200 employees, the commissary kitchen itself has roughly 10.

Methods

Study design

The study was conducted over a six-month period from August 2017 through January 2018. It included: employee interviews, a waste assessment, a wasted food tracking practice, and a cost/benefit and

environmental impact analysis. These allowed us to (1) identify types of wasted food and key causes of waste, (2) develop and implement a best practice for wasted food reduction, and (3) analyze the effectiveness of the practice.

Interviews

A total of three employees were interviewed for this study. These included the kitchen manager, a general cook and a prep cook. Initial interviews were all conducted on the same day in August 2017. The kitchen manager was also interviewed after the selected waste prevention practice was implemented in January 2018.

Employees voluntarily participated in one-on-one interviews, on site but in a private location. Interviews were recorded and took between 15 and 25 minutes each. The interviews were semi-structured. Standard interview questions were asked of each employee with additional questions asked that either responded to employee answers or pertained to their specific role. Two of the three interviews in this case study were conducted in Spanish, with an interpreter assisting the researcher in communicating with the interviewees in real time.

Waste assessments

Researchers sorted all of the business' food scrap waste generated during a 24-hour period of regular business in September 2017. No front-of-house waste was collected or sorted because the commissary kitchen operates independently from the company's retail operations.

This waste assessment had several unique categories to better understand the characteristics of food loss. Three categories of romaine lettuce leaves were collected separately: smaller leaves for salad, bigger leaves for salads or sandwiches and the outermost lettuce leaves that were deemed inedible by the business. In addition, ingredients such as vegetable scraps, peels and cores were separated into their own category, since they could potentially be re-used for soup stock. Lastly, meat trimmings were separated out and sorted by meat type. A complete description of the waste assessment process and photos of it can be found in the Appendix.

Recommended practice

Three best practices were recommended to the restaurant to test: (1) offering a lunch menu with increased Meat repurposing was selected as the focus of this study because it represented a substantial opportunity to capture environmental and cost savings while minimally impacting the business' labor needs and corporate policies. The business was unsure of their interest in and ability to repurpose meat scraps so researchers first suggested meat trim tracking and trim storage practices to quantify the potential benefits of repurposing and test storage practices. While other practices were discussed, such as re-establishing the use of edible lettuce leaves not used for sandwiches in salads, staff felt unable to challenge strong corporate expectations around high product quality.

The process for tracking and storage repurposing was straightforward: prep cooks and sous chefs who trimmed turkey and beef for use in sandwiches and other dishes collected all of the salvageable edible meat after they trimmed the meat (post-cooking). The scraps were weighed to the nearest hundredth of a pound, weights were recorded, and the meat was kept in sealed containers (one for each meat type) and frozen. Each day additional meat scraps were added to the same containers. The practice took place over a two-week period, with collection, storage and weight recordings conducted each day.

Results

Waste assessments

Back-of-house food scraps totaled 84.44 pounds for a 24-hour period. The categories with the most waste were inedible, liquids/oils/greases, prepared foods and meat and fish categories (Table A2). Inedible food parts weighed 48 pounds (or 56.9% of total food scraps) with most of the items identified as vegetable scraps and cores, including kale stalks, lettuce leaves, and herb stems. Prepared foods weighed 9.19 pounds (or 25.25% of edible wasted food) with evidence of mixed deli salad ingredients. Meat and fish weighed 5.27 pounds (or 14.48% of edible wasted food) consisting of in-house roasted turkey and beef ends. Liquids, oil and grease made up a majority of edible wasted food, totaling 15.44 pounds or 42.42%. This category was entirely bacon fat, generated in a substantial amount because of the retail chain's BLT sandwich, a special for that month.

Interviews

Sources

The interviews uncovered three main sources of food loss: meat trim, overproduction or partial batches of foods, and vegetable trim and spoilage waste.

First, two interviewees involved in trimming cooked meats described that the ends of the meat needed to be trimmed as they were too dry or too small for use. Since the meats associated with the trimmed ends were used for routine menu items, these trimmings were produced daily. Staff indicated that there were not set guidelines on how much of the meat to trim but they were expected to meet the company's high quality standards, which meant they were **more willing to over-trim than under-trim**.

Second, staff indicated that, while the technology used for ordering and recipe planning was fairly accurate at estimating correct ingredient volumes, there often was remaining **prepared food left over once the commissary kitchens batches were split into portions for the retail locations**. These "partials" did not always happen, staff said, but when they did, they often were placed on a shelf for employees to take home.

The final major type of wasted food, according to staff interviews, was vegetable trimmings and spoilage. Staff indicated that lettuce trimmings were a substantial part of the waste stream because only the middle leaves of the head were used. The outermost layer of leaves were culled because of **quality and flavor concerns**, the next layers of outer leaves were culled because they did not meet **aesthetic standards** (generally too large for sandwiches), and the inner heart was composted because the leaves were too small for use on sandwiches. Staff did indicate that the lettuce hearts had been used for salads but that they no longer were because of consistency concerns and they had new sources for salad greens, in the form of pre-cut and prepared mixed greens. **Vegetable spoilage** was also a common occurrence, according to some staff.

Causes and barriers

One cause of food loss, indicated by two staff members, was the company's **high quality standards**. Many staff said that everything has to be perfect, which impacted how they trimmed and culled produce and meat.

Staff said that standards had risen over the past few years, leading to changes in policies, for example, and no longer using lettuce hearts in salads.

Another cause of loss was the variability associated with local produce ordering, stemming from **variations in prices, availability, and quality leading to spoilage**. Staff mentioned this was particularly a problem during the summer months when the company ordered a lot of produce from local, smaller farmers. Staff, who were not responsible for the ordering, said they thought management would order extra produce from small farms either to get a better price per pound or to support a farmer with surplus product. These staff said they did not see strong efforts by management to find use for surplus product, and sous chefs themselves had little room to alter their recipes to accommodate this product.

This **lack of flexibility**, both in terms of adherence to recipes and adherence to scheduled menu items and specials, limited staff opportunity for food loss prevention through creative repurposing. Staff mentioned that recipes were to be followed scrupulously, which management echoed as being important for consistency across stores and over time.

Along the same lines, the kitchen had no ability to create menu item specials to accommodate excess product or surplus produce, as **specials are set one or more years in advance**. This meant these items could not be repurposed into other product, as they are in many kitchens. Management indicated that special sales were hard to predict, which meant stores sometimes over-ordered and under-sold specials, leading to additional waste.

Existing prevention strategies

The kitchen already has a suite of existing prevention strategies, many worth highlighting here. First, the commissary kitchen works on a daily **ordering and delivery schedule**, meaning retail locations put orders in the morning of the day before delivery (i.e. 24 hours in advance of delivery). The commissary kitchen produces only what is ordered for the next day, meaning no surplus is necessary. They also benefit from routine deliveries of produce (six days per week) and meats (five days per week), which minimizes spoilage.

The kitchen also benefits from a **strong expectation for the full utilization of a product**, set by the kitchen manager. This means that unless instructed otherwise (e.g., lettuce exteriors/interiors and meat trimmings) staff are expected to utilize all of the edible portion of a vegetable, fruit, or meat product.

Finally, employees are encouraged to consume “partials” (partial portions) through the institutionalized use of the **employee shelf**. All partials are labeled, dated, and set on the shelf for three days during which employees are encouraged to eat them for lunch or take them home for themselves or their families. Some staff did say that they occasionally take the food home, but that they and others do not always want to eat the things they make at work.

Potential prevention strategies

Prevention strategies discussed here include both those drawn directly from interviews with staff and those suggested by researchers and found in literature. One prevention strategy that would work well within existing processes at the business is the **repurposing of meat trimmings or culled lettuce leaves**. Staff mentioned the possibility of using meat trim in soup stocks, which are made in-house. The kitchen manager said this would be difficult, however, because they needed larger quantities of meat for stock making than was produced in trimming in any given day or week. When researchers suggested using meat scraps to supplement fresh ingredients at regular intervals, thus avoiding storing the scraps long enough to deteriorate,

the manager dismissed this idea as not practical. Researchers still recommend this method for frequent repurposing and consider this practice to be both practical and have limited consequences to labor requirements. Lettuce leaves, especially the lettuce hearts, also represent a great opportunity for reuse, if the policy of using them for salads were to be reinstated. This could also become an **opportunity for customer education** about the businesses commitment to valuing food by not wasting it. According to the Food and Agriculture Organization (FAO) about one third of all lettuce leaves go uneaten.¹

The kitchen manager mentioned a potential strategy to reduce wasted food at the retail level and reduce unnecessary orders to his kitchen. Their idea is a system of **food sharing between cafes** that would take over-ordered or soon-to-expire goods from one location and bring them to another location(s) with more steady demand for that product. This system could easily piggyback on the already existing commissary system infrastructure of daily ordering and deliveries.

Recommended practice:

Tracking and storing meat trim for potential repurposing

Meat trimming records

Meat trim was collected for a two-week period in late November and early December, 2017. An overview of these results can be seen in Appendix Table A3. Meat scraps were collected and recorded each day, with turkey trim averaging 2.56 pounds per day, and beef trim averaging 0.55 pounds per day. The amount was variable, ranging from 1.62 to 3.25 pounds per day for turkey and 0.24 to 1.06 pounds per day for beef. In total, 35.89 pounds of turkey trimmings and 7.76 pounds of beef trimmings were collected over the two-week period.

To understand how the trim amount related to production targets, which were also variable, production records were obtained, from which the weights of final products were recorded. Using these production targets, wasted food as a percent of the total product was calculated using the formula in Figure 1. Overall, turkey meat trim accounted for 8.03% of the total turkey meat used, and beef meat trim represented 6.62% of total beef meat used.

$$\left(\frac{\text{meat trim}}{\text{meat trim} + \text{production amount}} \right) \%$$

Figure 1: Formula used to calculate the percent meat trim of total meat used.

Financial benefits

The value of meat scraps was calculated by first estimating the amount of raw meat it took to produce the cooked meat scraps collected. Cooked beef has an estimated 80% yield, using USDA's cooking yield standards for "Beef, chuck eye roast, boneless, separable lean and fat, trimmed to 0% fat, all grades." Cooked

¹ FAO. (2013) *Food waste footprint: Impacts on natural resources*. Food and Agriculture Organization of the United Nations. Retrieved from <http://www.fao.org/docrep/018/i3347e/i3347e.pdf>

turkey has an estimated yield of 83%, using the standards for “Turkey, retail parts, non-enhanced, wing, thigh, meat and skin.”² The kitchen manager provided cost estimates of \$5.25 per pound for beef and \$6.00 per pound for turkey. **Over the two-week period, an estimated \$259.45 of turkey trim was collected, and \$50.93 of beef was collected.**

Environmental benefits

The repurposing of beef and turkey scraps that would have otherwise been disposed to the landfill will reduce greenhouse gas emissions by about 62 MTCO₂E/year (metric tons of carbon dioxide equivalent, 361 operating days). **This is equivalent to the emissions from 13 passenger vehicles driven for one year** (see, Figure 2).

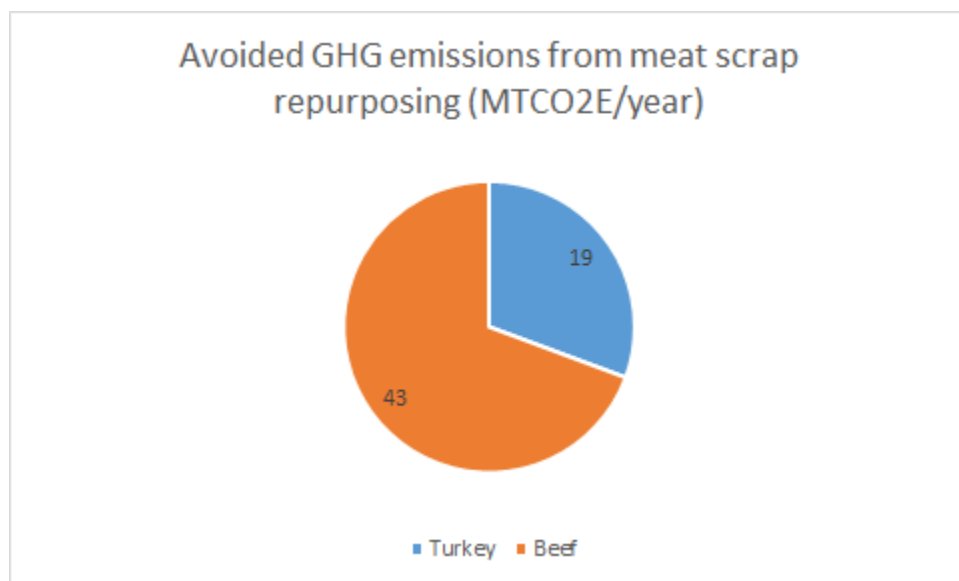


Figure 2: Potential GHG emissions avoided from the repurposing of meat scraps.

² USDA. (2014) USDA Table of Cooking Yields for Meat and Poultry. Retrieved from <https://data.nal.usda.gov/dataset/usda-table-cooking-yields-meat-and-poultry/resource/cc27fb8f-1228-451e-ade7-3cba75c0628c>

Assuming the repurposed menu items were eaten by people, preventing the wasting of beef and turkey scraps through repurposing will result in conserving 263 Million BTU (British thermal unit) annually. This is equivalent to the annual energy use by 4 average households or conserving 44 barrels of oil (see, Figure 3).

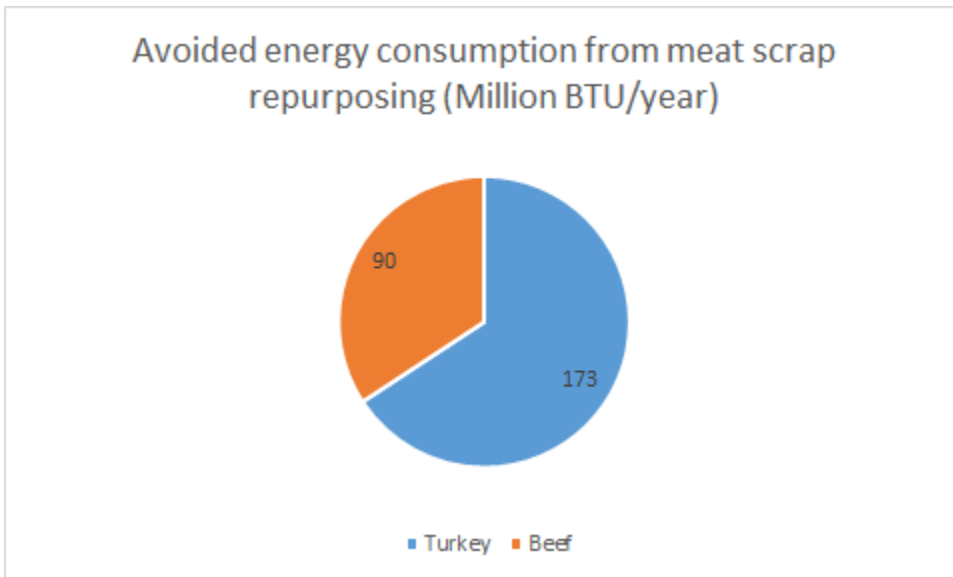


Figure 3: Avoided energy consumption from potential meat scrap repurposing.

Evaluation interview

The kitchen manager shared their post practice insights on the storage processes used, the post-practice meat quality, and the feasibility/benefits of continuing the practices. The kitchen manager said that using the same bin for freezing trim day after day allowed moisture to get in and led to freezer burn, so in the end the product was unable to be used. They said that vacuum sealing the bags would work better, but would lead to more plastic waste and increased labor needs.

The kitchen manager also said that if a better system of storage were used, the scraps could be used to displace the use of fresh meat. Another problem in addition to the storage system was that that the kitchen does not accumulate enough volume to use in a recipe before the scraps lose quality. If the scraps could be used more frequently, they could be utilized while still high-quality. Accordingly, the kitchen manager said that they were considering switching menu items from chicken to turkey pot-pie to **create a way to reusing the turkey scraps consistently**.

Lastly, they said **they were convinced by the financial case the tracking results demonstrated**, convincing them that the repurposing of meat scraps warranted implementation. The testing of this repurposing strategy **changed the conversation about opportunities to more fully utilize meat purchases** in the products for sale. At the time this case study was written, however, this business had not yet implemented changes in response to this information.

Analysis and Conclusion

Key causes and barriers to full food utilization

High quality standards

Edible wasted food generated from trimming practices was encouraged by the company's high quality standards. The waste assessment found 5.27 pounds of edible meat trimmings and 2.03 pounds of edible lettuce hearts in a 24-hour period. Interviews with the general cook and a prep cook affirmed these findings, acknowledging that **high standards made them cautious and led them to over-trim.**

Lack of flexibility

The company's **rigid menu plans** and **inflexible recipes** limit the staffs' ability to repurpose items and utilize soon-to-spoil or surplus ingredients. This was identified in interviews and illustrated in the waste sort, both by the presence of meat trimmings and spoiled vegetables.

Analysis of recommendation

The practice was successful in quantifying the potential cost savings associated with repurposing meat trimmings. **Results suggest that this commissary kitchen could save \$158 per week, totaling \$8,204 a year, by utilizing meat trimmings in the place of raw meat.** The practice itself - collecting, weighing and storing the trimmings - did not represent a significant burden to staff. Furthermore, continuing weighing and recording the prevention practice are only necessary to quantify repurposing potential, and are not necessary to continue once a decision on repurposing is made. Progress could be assessed by **tracking purchasing costs (normalized by sales) and conducting quarterly waste audits to validate shifts in kitchen practices as well as identify new opportunities** to reduce unsold surplus food.

This case study also demonstrates the **benefits of supportive leadership.** The business' kitchen manager, who oversaw the practice's implementation, set strong expectations for staff to complete the practice properly and consistently. Such expectations, **supported with trainings and necessary resources, such as adequate time allocated for employees to complete practices,** are crucial elements for effective waste prevention practices.

The results of the measurement practice were significant enough for the kitchen manager to begin conversations with his supervisors about institutionalizing meat trim repurposing for soup stocks or in a new menu item. This supports other research suggesting that **wasted food measurement and cost/benefit analyses are useful tools to promote changes in policies and practices that reduce food loss by maximizing food utilization in commercial kitchens.**

The test also uncovered difficulties in storing meat trimmings, which suggests either **better storage practices are needed to maintain product quality or stored trimmings should be used more quickly after freezing.** Staff suggested changing storage practices, such as vacuum sealing meat trimmings, would result in increased packaging waste and labor needs. While the net impact of this approach is unknown, it could be tested to determine the actual costs, both labor and environmental.³ It also suggests complimentary

³ Given the relatively high environmental impacts of meat production when compared to packaging, it is likely that the added use of packaging for vacuum sealing would justify the improved utilization (reduced waste) of meat. For a discussion of trade-offs between packaging use and meat product waste, see, <https://www.oregon.gov/deq/FilterDocs/PEF-Packaging-FullReport.pdf>

practices, like **adjusting menus to accommodate edible by-products**, can be important to maximize a business' ability to repurpose edible trimmings or over-production.

Finally, the tracking results also suggest that amount of product trimmed was inconsistent. Daily waste percentages varied between 5.30% and 11.93% for turkey (averaging 8.03% with a standard deviation of 2.21%) and 2.91% and 13.04% for beef (averaging 6.62% with a standard deviation of 2.52%). This **suggests variability in either product quality, roasting practices, or trimming practices that could be avoidable**, leading to more of the meat being used for its intended purpose.

Limitations

The yearly cost savings and environmental benefits were extrapolated from two-weeks' worth of data. Longer term testing is needed to validate costs and benefits. In addition, no actual tests on the viability of the saved meat trimmings were conducted, meaning the quality of these products cannot be assured. Furthermore, the quality of the meat trimmings after storage, as well as their suitability for repurposing, was determined by staff and not researchers. Finally, this case study only looked at meat trimmings that were pre-processed (i.e. bone removed). The repurposing potential for unprocessed meats may be different, as may be the quantity of fresh meat they displace, though their use in soup stocks is common practice.

Conclusions and additional opportunities

This case study demonstrated that the measurement and tracking of edible wasted food with potential for reuse was effective at quantifying opportunities for cost savings and environmental benefits, and is useful to decision-makers as they consider food loss prevention practices.

This case shows the significant opportunity for cost savings that food service institutions can capture through the creative reuse of high-value edible byproducts. **In this case, repurposing meat trimmings would save, on average, over \$8,200 in food costs per year with limited changes to process and minimal impact on labor.** Further analysis suggests repurposing opportunities exists beyond meat trim. By extrapolating edible lettuce waste found in the waste assessment, results suggest the commissary could avoid the purchase of 720 pounds of lettuce a year, worth approximately \$532.80 in purchasing costs alone⁴, by utilizing this lettuce for salad mix.

Complementary actions would make repurposing meat trimmings easily viable, with minimal implications for ingredient quality. Specifically, intentional menu design could expand opportunities for repurposing and institutionalize an outlet for meat scraps as a core ingredient.

To enhance the viability of repurposing practices, the business could **adapt their menu offerings** to allow for using high-value meat and vegetable trimmings on a regular basis. The kitchen manager, for example, suggested that turkey pot pie replace the existing chicken pot pie so that turkey trimmings would have a consistent use. Other **creative repurposing options** could be explored to create value-added products from formally wasted food product. Examples could include pickling vegetables (e.g., kale stems) for use in salads and sandwiches.

⁴ Costs per pound of lettuce were estimated using ReFed's value of wholesale food estimates. See, ReFed, 2016. **A Roadmap to Reduce US Food Waste by 20%: Technical Appendix**. Retrieved from https://www.refed.com/downloads/ReFED_Technical_Appendix.pdf

Furthermore, the business could **modify quality standards** to better accommodate the utilization of ingredients. For example, they could allow for lettuce hearts to be used in their salads as complements to other greens.

Overproduction and leftover partial units could be reduced through a **fine tuning of recipes**, or a tightening of measurements throughout production to ensure that the amount produced matches the number of units ordered.

Finally, the commissary model and its existing processes could be used to **transport soon-to-expire food across locations** for immediate sale, reducing wasted food on the retail end and reducing unnecessary production and labor at the commissary level.

Appendix

Waste sort process and data

Wasted food for the study was set aside by the kitchen manager for the waste assessment and represented a 24-hour period of regular business in September 2017. Researchers sorted commissary kitchen waste only. No front-of-house waste was collected or sorted. 100% of the business' landfill, recycling, and food scrap streams were sorted and weighed.

The sort was conducted off-site by three CES staff. Two folding tables were set up adjacent to one another lengthwise with two large low-rimmed black bins on either table. Bags were dumped into black bins to facilitate sorting the contents of each bag. Numerous yellow bins were placed around the perimeter of the sorting area and labeled with each specific food category. Once all foods were sorted and categorized, photos are taken of each yellow bin. Next, all of the yellow bins were weighed with amounts recorded. In addition, tare weights of yellow bins were recorded. Landfill and recycling streams were also separated into yellow bins during sorting process, weighed and photographed.

This sort had some unique categories to help the researchers better understand the characteristics of the wasted food being generated. Three categories of romaine lettuce leaves were collected separately: smaller leaves that could be used for salad, bigger leaves that could be used for salads or sandwiches, and outer leaves that were deemed inedible. In addition, ingredients such as vegetable scraps, peels, and cores were separated into their own category, since they could potentially be re-used for soup stock. Lastly, meat trimmings were separated out and sorted by meat type (Figure A1).



Figure A1: Example of meat trimmings separated by meat type.

Table A1: Waste sort categories and definitions

Categories		Definitions	Examples
1	Inedible	Items not intended for human consumption (small amounts of edible material associated with the inedible material are permitted to be included)	Egg shells, banana peels, pits/seeds, bones
2	Meat & Fish	Uncooked or cooked meat (with mostly edible components) unmixed with other types of food	Chicken drumstick, salmon fillet
3	Dairy	Solid dairy products unmixed with other food types or in original form	Cheese, yogurt
4	Eggs	Egg products unmixed with other food types or in original form	Fried egg, whole eggs, liquid egg whites
5	Fruits & Vegetables	Solid uncooked or cooked vegetables and fruits (with mostly edible components) unmixed with other types of food	Potatoes, spinach, berries, salad with only vegetables
6	Baked Goods	Baked goods and bread-like products unmixed with other food types or in original form, including pastries	Bread, tortillas, pastries
7	Dry Foods	Cooked or uncooked grains, pastas, legumes, nuts, or cereals unmixed with other food types or in original form	Rice, cereal, pasta
8	Snacks, Condiments, Sauces	Includes confections, processed snacks, condiments, and other miscellaneous items	Condiments, candy, granola bars, sauces, jellies
9	Liquids, Oils, Grease	Items that are liquid, including beverages	Sodas, milk, oil, juice
10	Cooked or Prepared Food	Items that have many food types mixed together as part of cooking or preparation	Lasagna, sandwiches, burritos
11	Unidentifiable	Used only if necessary	

Table A2: Waste sort results

Categories	Weight (lb)
Inedible	48.05
Meat & Fish	5.27
Dairy	0.07
Vegetables/Fruits	2.84
Baked Goods	3.48
Dry Foods (Grains, Pasta, Cereals)	0.10
Snacks, Condiments, Sauces	<.01
Liquids/Oils/Grease	15.44
Cooked/Prepared/Leftovers	9.19
Unidentifiable	<.01
Total food scrap waste	84.44
Total food scrap waste (% of total waste)	56.70%
Edible wasted food	36.39
Edible wasted food (% of total food)	43.10%

Table A3: Meat trim measurement for two-week trial period

	Turkey	Beef
Total meat trim (lb)	35.89	7.76
Average lb/week	17.95	3.88
Average lb/day	2.56	0.55
Min lb/day	1.62	0.24
Max lb/day	3.25	1.06
Standard deviation lb/day	0.60	0.28
Waste as % of total	8.03%	6.62%
Min % of daily total	5.30%	2.91%
Max % of daily total	11.93%	13.04%

Conformance to Food Loss and Waste Reporting Standard

[The Food Loss & Waste Protocol](#)⁵ is a multi-stakeholder partnership, which has developed the global Food Loss and Waste Accounting and Reporting Standard – also known simply as the FLW Standard. Launched in 2013, the Food Loss & Waste Protocol’s mission is to ensure wide adoption of the FLW Standard so companies, governments, cities and others are better informed about food loss and waste and motivated to curb this inefficiency.”

The graphic below describes the scope of Case Study 2, institutional and commercial sector, in the Oregon Wasted Food Study using the FLW Standard.

Food loss + waste protocol

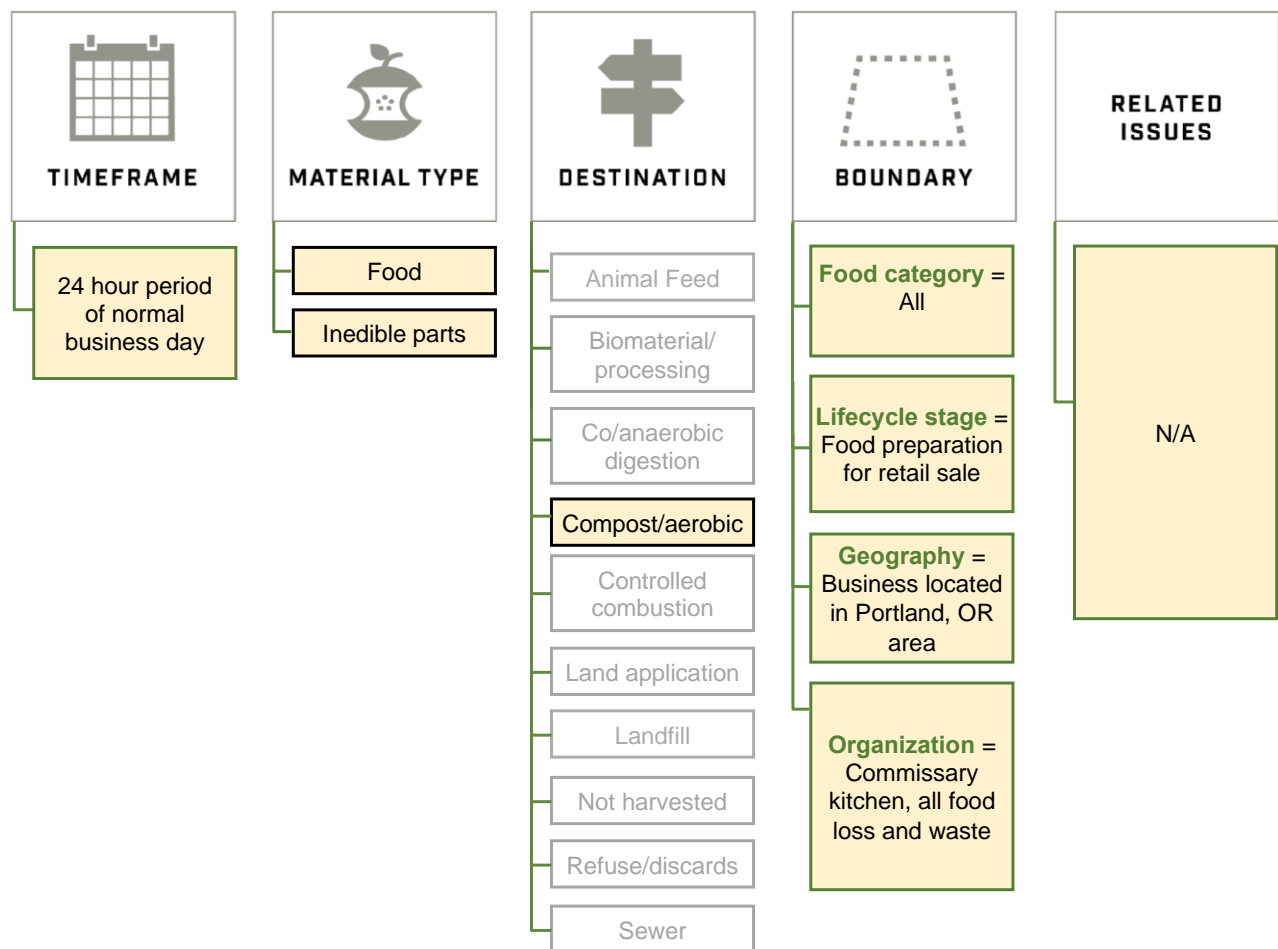


Figure A2: Scope of Case Study 2 as relates to the Food Loss and Waste Reporting Standard

⁵ See, <http://flwprotocol.org>