Oregon Wasted Food Study: Institutional and Commercial Sector Case Studies

Case 10
Knife skills training to reduce edible trim waste in a hotel

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

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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

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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 explores major types and causes of wasted food associated with hotel food service operations. Knife skills training was conducted to reduce back-of-house wasted food and edible trim. A protocol is recommended for tracking trim waste to assess the effectiveness of knife skills training and to provide regular feedback for staff to maintain their skills.

Business context

The business participant in this case study is large hotel in Portland, OR. This hotel is also the subject of Case Study 9, and some of the same data is used across both case studies. The hotel has its own restaurant, which serves breakfast and lunch, its own catering service to support the hotel's large and varied event spaces, and a smaller buffet-style breakfast and lunch buffet for small corporate events in a dedicated corporate events space. Finally, the hotel's food service operation operates a buffet-style staff cafeteria open to all hotel staff.

Methods

Study design

The study was conducted over a seven month period from November 2017 to June 2018. It included employee interviews and waste assessments to (1) identify types of wasted food and key causes of waste, and (2) understand the impact of knife skills training on wasted edible food from routine over-trimming.

Interviews

A total of seven employees were interviewed for this study, including a banquet prep cook, a breakfast prep cook, the purchasing manager, a dishwasher, a buffet server, the cold Banquets manager, and the executive sous chef. The interviews were all conducted in November 2017.

Employees voluntarily participated in one-on-one interviews on site, but in a private location. Interviews were recorded and took between 10 and 20 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.

Waste assessments

Two waste sorts were conducted. The first occurred on-site in January 2018. Food scraps were retrieved from several 25-gallon food scrap compost receptacles that had been staged and marked with signage by an employee indicating where the waste had come from (i.e. back-of-house, front-of-house, employee cafeteria, catering, etc.) and consisted of 24-hour's worth of waste. Areas of waste within the business included buffet and production waste, by-product from prep and spoilage waste. The second waste assessment occurred in July 2018 and focused only on back-of-house food scraps from the banquet preparation areas, because these staff were the only ones included in the knife skills training and communications.

The first waste sort was more comprehensive in part to identify a practice to reduce waste. While not directly comparable to the first sort, the more focused second waste sort allowed researchers to assess changes in back-of-house waste. **Waste sort data combined with interviews with the chef were used to evaluate the knife skills training**.

Recommended practice

This case study looked at the **effectiveness of knife skills training on reducing edible wasted food trim**. Management preferred to address back-of-house wasted food because they had more control over these operations and addressing front-of-house wasted food would involve operations beyond their direct purview.

Knife skills trainings were identified as an important practice to test because the **waste sort uncovered substantial edible food remaining on trimmed vegetable, fruit and fish ingredients.** This was **corroborated with staff interviews**. Together, these findings convinced the business to undertake the training initiative. The knife skills training occurred on May 27, 2018, when the sous chef conducted a 15 minute training with a majority of the banquet production staff, those who prepare food for catering. Managers believed most of the trim waste was coming from this particular part of the business. **The training included verbal instructions regarding proper trimming practices as well as demonstrations** where the sous chef demonstrated proper trimming practices on a variety of commonly prepared vegetables and fruits. **Two subsequent reminders to focus on proper knife techniques** were issued to banquet preparation staff in the week following the initial training. **To test the persistence of the training's effect, researchers conducted a second waste sort** on July 13, 2018, assessing the preparation waste from events 47 days after the original training. Production staff were not informed that the assessment would take place, and only the executive chef, the sous chef and the closing manager (responsible for setting aside production waste at the end of the day) were aware of the assessment.

Results

Waste assessments

Three different sources of wasted food were assessed for the first waste sort: food from the employee cafeteria, front-of-house waste (from catering, the restaurant and business buffet), and back-of-house (e.g. trimmings or unserved, prepared food). The second waste sort only included back-of-house preparation waste from the banquet preparation kitchen area, which was most pertinent to the practice introduced and evaluated. For more information about the hotel's wasted food more generally, please see Case Study 9.

The first waste sort revealed a significant portion of wasted food. Focusing on the back-of-house waste, the first sort found a total of 164.1 pounds of wasted food, mostly **inedible parts** (108.71 pounds or 66.2% of the total) and largely comprised of fruit and vegetable peels, cores, and ends. **Prepared foods** were the highest category of edible wasted food, mainly consisting of potato, mixed vegetable and pasta salads (21.65 pounds or 39.1% of total wasted *edible* foods). **Fruit and vegetables** (16.47 pounds or 29.7% of total wasted *edible* foods) consisted of a large quantity of prepped vegetables that included red peppers, portabella mushrooms, zucchini, onions and cabbage that were all identified as usable quality ingredients for preparing entrees.

The second waste sort identified a significantly lower overall amount of food scraps, 36.59 pounds. The lower total amount of the second sort is largely a result of it being limited to the waste from preparation associated with catering services, while the first waste assessment included back-of-house waste for all of the hotel's food service venues. The percentages of inedible and edible food in the waste stream were nearly the same as in the first sort. 65.0% (23.79 pounds) was inedible and 35% (12.8 pounds) was edible. Of this, 25.14% (9.20 pounds) was edible fruits and vegetables, which was a higher percentage than in the first assessment. **This revealed the weaknesses and strengths of the point-in-time waste sort**. The weakness is that capturing just two points in time is not a sufficient sized nor truly random sample, as it is not a sampling from the wider pool of all available waste collected. This very small sample size is prone to a false negative (Type II error), where a significant difference exists but can't be detected. Additionally, the comparison is based on weight, which is just one characteristic of the waste. The strength of waste assessments is the visual observation and documentation of waste, giving researchers a literal picture of the kinds of waste generated. In this case, the first sort was extremely useful in revealing the large amount of preventable food loss from trimming, something not apparent to staff in interviews. **The second assessment revealed where new skills were effective and where they were not**. It also showed that other issues outside of knife skills training, but related to trimming, such as **mandated cut types, were also a key contributor to food loss.** These findings are detailed below. Photographs from the two waste sorts (see, the Appendix) illustrate how the assessments provided this important information and context.

Interviews

This section of the results will discuss themes discussed in interviews with employees specifically related to edible trim waste, knife skills and cultures and policies related to food waste. This represents only a small portion of what was discussed in these interviews. For a broader look, see Case Study 9. **For the most part, knife skills and poor trimming practices were not central issues raised by employees in conversations around wasted food.**

Contributions to edible wasted food

Two staff members indicated that trim product comprised most of the food waste generated by the institution. One staff member, a banquet prep cook, guessed that vegetable and fruit trim made up 90% of what they composted. **One manager said that knife skills and a general lack of experience/training was a significant cause of waste especially for newer staff**.

Strategies for improving knife skills

Two employees in management roles indicated that knife skills trainings were a part of the onboarding process for new employees, but only if the employee had limited kitchen experience. More experienced hires were not given such training. One employee also mentioned that the lead accountant for the hotel's food service operation would frequently **walk through the kitchen and point out issues with excessive trimming of edible product**.

Culture and policies

One staff member expressed worry about tackling the wasted food issue when they said "if food costs go down, you see labor go away." They thought a more efficient operation could reduce the need for staff, reducing hours and endangering his and others' job security. Management also expressed concerns about labor, though has a different view of its relationship to wasted food. They said that a shortage of labor was consistently a barrier to preventing wasted food.

When asked about policies related to preventing wasted food, staff at all levels indicated **no relevant policies were in place**. Rather, management said, **waste prevention was a continuous and iterative process**, "coaching and checking compost bins regularly."

Knife skills training

A post-practice interview with a chef two months after the knife skills training suggested the training and subsequent conversations with staff appeared to be effective at reducing unnecessary edible wasted food. He expressed concern that the impact of the training would likely diminish over time as people "reverted back to their own ways." He indicated **more "hands-on supervision" would help maintain the kitchen's adherence to proper trimming practices**. This tactic, though, was difficult to accomplish now because of issues with staffing.

Limitations

This study relies on point-in-time waste sorts which did not capture all trim types, like pepper tops, nor track changes over time in more granularity. The evidence presented here, drawn from staff interviews and waste assessments, was incomplete. Without additional data (e.g., measures of actual trim pre- and post-training it is difficult to make a strong conclusion about the efficacy of knife skills trainings. **Future studies should collect more data on a daily or other period basis over an extended period of time to evaluate adherence to proper trimming techniques.**

Conclusion and Future Opportunities

Inedible waste made up most of the back-of-house food waste at the hotel studied. However, edible wasted food comprised a significant portion. **Poorly trimmed fruits and vegetables, as well as those trimmed for aesthetic reasons or because of a specific cut type, made up a majority of the edible fruit and vegetable waste generated.** However, **prepared foods made up an even higher portion of the edible wasted food found, suggesting improved trimming practices can only go so far in reducing edible wasted food.**

Interviews suggested that **problems with understaffing and with staff inexperience hampered the business' ability to pursue waste prevention practices**. In particular, staffing challenges reduced management's ability to supervise, provide feedback for, and train staff.

Knife skills training

Comparing the weights of edible wasted fruit and vegetables across the two waste sorts is not helpful at determining the efficacy of the knife skills trainings deployed in this case study. This is, in part, because the assessments did not parse out the same waste streams and because production amounts varied between days. **Visual inspection of trim showed that excellent knife skills were deployed even 47 days after training**. Figures 3-6 in the appendix show examples of tightly trimmed tomatoes, pineapple, strawberries and cilantro. A manager interviewed after the study complimented these observations, asserting that the training and subsequent reminders had been, up until that point, successful in reinforcing efficient trimming practices.

However, one item found in the second waste sort, squash, still had considerable amounts of edible flesh after preparation. This was likely because the same cut (a diagonal crosscut) was used across both periods of time, which led to the remaining edible product. Together, **these findings suggest that knife skills improvements can only do so much to reduce edible trim waste when structural barriers exist, such as mandated cut types.**

Knife skills training can be an important part of source reduction practices. However, it should be combined with efforts to address accompanying contributors to the generation of edible wasted food, such as required cuts or presentation standards. Additionally, a waste audit helps identify unrecognized types of edible food loss but daily or weekly tracking over time is needed to accurately evaluate changes in practice.

Improving knife skills: a suggested protocol

An improved protocol for measuring knife skills and tracking progress is outlined here and recommended for future use.

Baseline

First, establish a baseline to (1) better understand the magnitude of wasted edible food and its causes and (2) define a starting place from which to track improvements. Use visual assessments, preferably documented with photographs, and volume or weight measurements to record back of house trim waste. This will be easiest if trim waste is specifically set aside throughout the day and measured at the end of kitchen operations, but before trim waste is mixed with other wastes in a compost or landfill bin. Visual assessments, however, may be done periodically throughout the day. Samples, either visual or measured, should be taken with

consistency, but also to ensure representation. For example, conduct visual assessments at different times every other day for two weeks, to ensure each day, as well as different shifts and employees, are sampled.

Weight or volume measurements should record both inedible trim waste and edible, under-utilized product. Ideally, this means separating edible parts (i.e., the fleshy part of a pepper top) of products from inedible parts (i.e., the pepper stem) and recording them separately. If measurements are too time consuming because a business produces a high volume of waste, consider assessing only a sample of trim waste each day. For example, assess only a 10 pound sample of trim waste.

Once baseline records are collected, consider why edible trim waste may be occurring. Is it due to poor or rushed trimming practices? Are required cuts creating wasted edible trim? Could alternative ways of presentation minimize this wasted food? Consider whether knife skills trainings will support waste prevention, other interventions are more appropriate, or some combination of strategies is needed. **Rarely is there a "silver bullet" and usually multiple strategies are needed**.

Practice deployment

During the deployment of a waste prevention practice, i.e., knife skills trainings, new practices for repurposing or changes in expected cutting styles, track progress over time. Use a data collection plan similar to the baseline collection protocol. If weight or volume assessments are not practical, use periodic visual assessments to both track progress and provide opportunities for targeted refreshers with employees.

Post-practice evaluations

After the practice is completed continue to conduct periodic visual assessments and, perhaps less frequently, weight or volume measurements. These may be conducted every week, or every other week, or perhaps once every few months (for maintenance) and should be used to monitor the need for refresher trainings or the implementation of additional practices to improve utilization of ingredients.

Appendix

Waste collection and sorting

Methods

Methods for this sort were typical to other sorts where a series of bins and buckets were used to gather the various categories of waste and weighed accordingly. Tare weights for the bins were recorded and subtracted to derive accurate amounts of wasted foods. No follow-up sort was conducted for this site.

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	

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Waste sort results

Table A1: Waste sorts, weight of food by category, back-of-house waste only, with only a sub-portion of back-of-house waste assessed in the second sort

	First sort (lb)	Second sort (lb)
Inedible	108.7 (66%)	23.79 (65%)
Meat & Fish	2.23 (1.4%)	0.87 (2.4%)
Dairy	0.61 (0.3%)	<.01
Vegetables & Fruits	16.47 (10%)	9.2 (25%)
Baked Goods	<.01	1.73 (4.7%)
Dry Foods (Grains, Pasta, Cereals)	14.43 (8.8%)	<.01
Snacks, Condiments, Sauces	<.01	<.01
Liquids, Oils, Grease	<.01	<.01
Cooked, Prepared, Leftovers	21.65 (13.2%)	1 (2.7%)
Unidentifiable	<.01	<.01
Edible wasted food (lb)	**55.39**	**12.8**
Edible wasted food (% of total food)	**33.75%**	**34.98%**
Total food scrap waste (lb)	164.1	36.59

Waste assessment photographs

First sort

Figure A1: Inedible food waste comprising of fruit and vegetable trimmings.

Figure A2: Edible vegetable and fruit waste including pepper tops, carrots, squash and mushrooms.

Second sort

Figure A3: Inedible food waste, featuring strawberry tops, with tightly trimmed cilantro stems in the background.

Figure A4: Thinly sliced tomato tops.

Figure A5: Squash ends, considered edible wasted food.

Figure A6: Inedible wasted food, namely, pineapple trim.

Conformance to Food Loss and Waste Reporting Standard

The Food Loss & Waste Protocol[1] 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 10 of the institutional and commercial sector assessment of the Oregon Wasted Food Study using the FLW Standard.

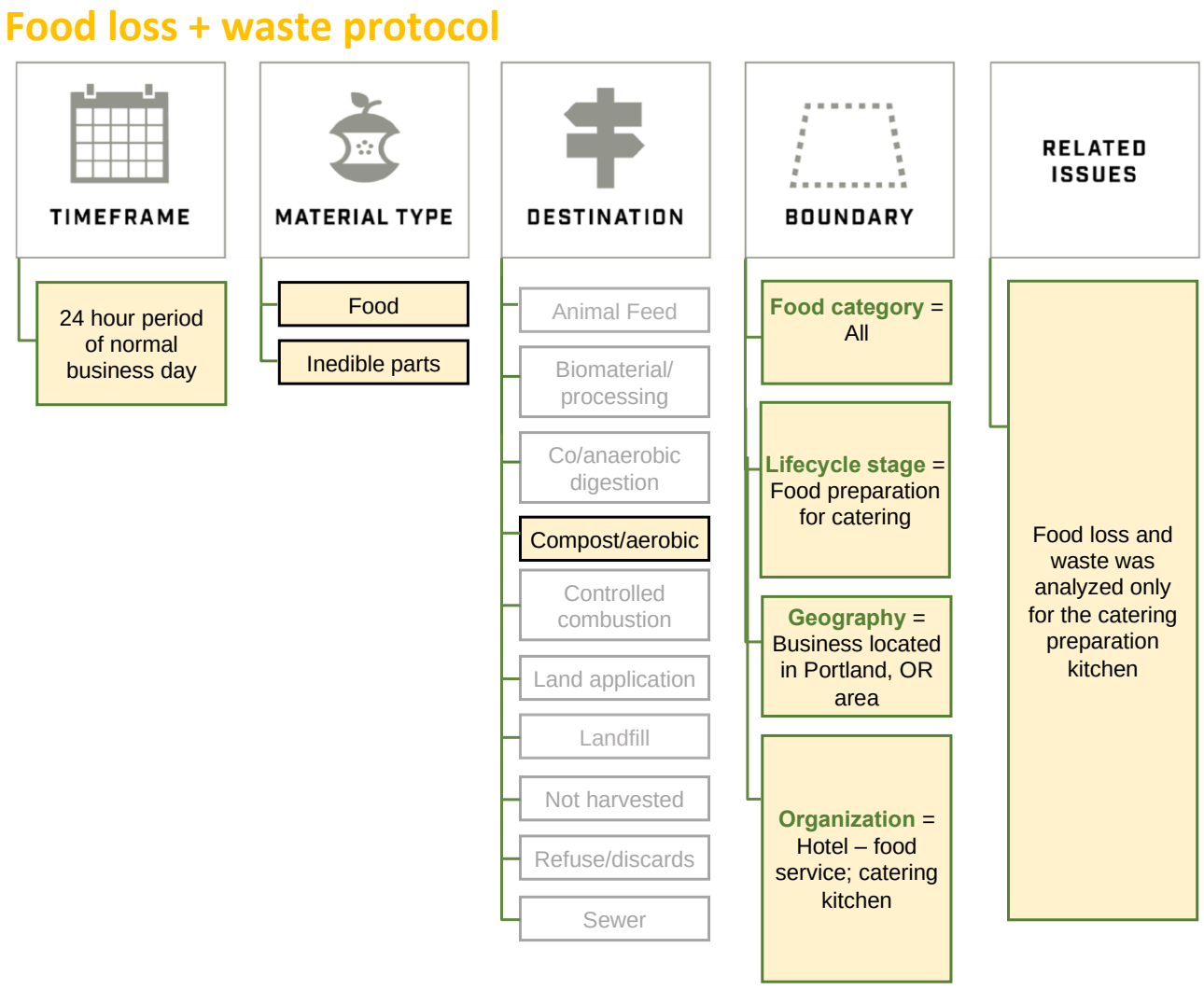

Figure A7: Scope of Case Study 10 as it relates to the Food Loss and Waste Reporting Standard

[1] See, http://flwprotocol.org