



## LOCAL FOOD AND FOOD WASTE

### Runk Dining Hall Waste Audit

Global Sustainability, Fall 2011

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## ABSTRACT

In order to address the problem of excess food waste that eventually accumulates in landfills after it leaves Runk, as part of a group project for a course in Global Sustainability at the University of Virginia, we conducted a food waste audit at one of UVA's smaller dining halls, Runk Dining Hall. This food waste audit provided us with raw data to present to the university and the community in order to encourage students to reduce their amount of food waste and also to promote possibly installing a food composting system in the Runk dining hall. On November 2, 2011 during dinner hours from 5pm-8pm, we set up two large plastic containers next to the return tray line at Runk Dining Hall and collected food scraps left on students' plates before they were sent to the kitchen to be washed. At the end of the audit, the container of food waste from the student's plates weighed 104.2 lbs and the container of food waste from the kitchen weighed 40.5 lbs. 1,067 students were served in this three hour dinner period; an average of 1.56 ounces of food was wasted per person. Since Runk tends to serve less people, we were surprised to find that the total amount of food waste did not differ significantly from that of the other two dining halls. The weight of food waste collected was much larger at Observatory Hill, but Runk's 104.2 pounds and Newcomb's 101.7 pounds were very similar. As part of our educational campaign, posters with found data and thought provoking statements relating to food waste were tacked up around grounds. We put together a short promotional video using footage taken during the audit as well as an interview with Kendall Singleton, UVA Dining's Sustainability Coordinator. We also conducted a survey to analyze why students were wasting food, which led us to two major conclusions: portion size issues and quality of food. Many students also stated they wished to have permanent signage in the dining halls as a reminder not to waste food. In conclusion, our group proposes that this signage be introduced near the tray return as a reminder. We also propose that Runk implement a composting program to help reduce methane emissions in local landfills.

## BODY

### Introduction

In America, food leftovers by weight account for the largest component of the waste stream according to the EPA.<sup>1</sup> "Food leftovers" here refer to both kitchen scraps as well as uneaten food left on individual plates in residences, restaurants and larger eating facilities like factory lunchrooms and cafeterias. A 2004 study by anthropologist Timothy Jones, part of the Bureau of Applied Research in Anthropology at the University of Arizona Tucson, released research information that indicates forty to fifty percent of all food ready for harvest in the United States never gets eaten.<sup>2</sup>

Why is food waste an issue? Plastics in a landfill are a problem because the plastic material takes centuries or never to decompose. Wouldn't food decompose naturally in a landfill? Landfills consist mostly of paper products, yard clippings, plastics and food waste. Metal and glass are among the various materials that usually are separated from landfill waste to get recycled.<sup>3</sup> Landfills isolate trash from groundwater and environmental integration for sanitation purposes. The plastic liner, necessary to create the sufficient water barrier, exponentially slows decomposition, allowing landfills to grow tremendously in size. A compost pile, like the farm at Panorama Pay-Dirt, purposely buries the trash in a way that allows it to decompose quickly. Rotting food in a landfill also releases methane, a GHG (Greenhouse Gas) which contributes to global warming. Methane traps several dozen times more heat in the atmosphere than carbon dioxide. The release of methane from landfills accounts for approximately a third of all methane emissions in the U.S. According to the U.S. Department of Agriculture, just over a quarter of the food in the U.S gets thrown away and taken to landfills every year and the U.S. spends more than \$1 billion every year just to dispose of all its food waste.<sup>4</sup>

The second problem of food waste, also from a sustainability standpoint, relates to the initial statistic that forty to fifty percent of fresh food grown in the United States gets eaten. If Americans could reduce the amount of food wasted less landscape would have to be dedicated to growing crops and cattle. Less energy and resources, like water, would have to be sacrificed in the process as well. Agriculture is constantly looking for ways to become more efficient, but only on the producing end. This leads to tighter living spaces and more antibiotic use for animals and more fertilizer use for crops. If we take two steps back and look at the system of agriculture not just as supply and demand, but a feedback loop with stocks and flows, we could find the right leverage point to decrease the "flow" of food waste, allowing the agriculture system to become more efficient naturally, rather than artificially tipping the profit margins. Though composting is a great start, diverting food waste from landfills to composting farms in order to avoid producing dangerous levels of methane gas, only education and government/policy intervention is going to help reverse the cycle of overproduction on a national level.

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<sup>1</sup> [http://www.endhunger.org/food\\_waste.htm](http://www.endhunger.org/food_waste.htm)

<sup>2</sup> <http://www.foodproductiondaily.com/Supply-Chain/Half-of-US-food-goes-to-waste>

<sup>3</sup> Freudenrich, Ph.D., Craig. "How Landfills Work" 16 October 2000. HowStuffWorks.com. <<http://science.howstuffworks.com/environmental/green-science/landfill.htm>> 07 November 2011.

<sup>4</sup> <http://www.ecowatch.org/pubs/junjul08/whyis.htm>

## Project Definition

As part of a group project for a course in Global Sustainability at the University of Virginia, we conducted a food waste audit at one of UVA's smaller dining halls, Runk Dining Hall. Food waste audits are a common way to collect data to determine trends over time and necessity for intervention to continue on the path to becoming a more sustainable university. In terms of sustainability, UVA Dining has successfully implemented several approaches in the past several years to reduce practices that cause environmental degradation. Recently, UVA Dining had omitted the use of trays which helps conserve water, a successful effort aimed at reducing overall waste. The University of Virginia ceased using trays from dining halls in 2008, which lowered food waste by 25% and reduced washing water by a third. The force behind the trayless initiative stemmed from a food waste audit conducted in 2006 at Observatory Hill Dining Hall. Usually, the university conducts a waste audit annually or every other year in order to track trends. The data collected help the university observe these trends and inform decisions to counteract and reduce waste. Most recently, a composting program involving both the Observatory Hill and Newcomb dining halls has been implemented diverting food waste from local landfills to Panorama Pay-Dirt composting farm in Earlysville, Va. Runk has not joined the composting program because it is a smaller dining facility that generally feeds less students and therefore proposes that it produces less waste than its larger sisters. The facility itself is also smaller in size which means that the kitchen space would have to be restructured to include the necessary area for a pulping machine. Runk, unlike the other dining halls, has never completed a waste audit. This fact, in part, expresses part of the "problem" that we will address with our study. Runk, as a smaller dining facility, wasn't a priority in the waste auditing coordination, so we have a unique opportunity to be part of the group that initiates the research.

In order to address the problem of excess food waste that eventually accumulates in landfills after it leaves Runk, our research group decided to conduct a food waste audit of the dining hall. This food waste audit provided us with raw data to present to the university and the community in order to encourage students to reduce their amount of food waste and also to promote possibly installing a food composting system in the Runk dining hall. We met with our community partner and UVA Dining's sustainability coordinator, Kendall Singleton, to design our food waste audit. The goal of the waste audit is to collect quantitative raw data to describe food waste in the production and consumption areas at Runk Dining Hall. We then contacted Runk's location manager, Jerry Trombley, to help us with the logistics. We conducted our waste audit on November 2, 2011 during Runk's dinner dining hours from 5pm-8pm.

## Description of Waste Audit

On November 2, 2011 we set up two large plastic containers next to the return tray line at Runk Dining Hall to collect the food scraps before they were disposed on the conveyer belt. When the students had finished eating and were returning their used plates to return tray conveyor belt to be washed, we took their plates and separated the solid food waste from liquid drinks and other disposable items such as napkins. We then physically scraped the extra food left on plates into the first container, designated for student food waste. Napkins, non-edible items, and condiment packages were separated and placed in proper garbage or recycling containers. Throughout the process we documented our waste audit with video footage and still camera shots. We hoped to capture the full picture of student's eating habits from start to finish, from the food lines to the return conveyer belt. At the end of the dinner hours we collected the remaining food from the kitchen area and placed it in the second container labeled kitchen waste. Because the industrial scale was currently in use elsewhere, Jerry Trombley weighed each container, separately, for us the next day.

## Interpretation of Data

The container of food waste from the student's plates weighed 104.2 lbs and the container of food waste from the kitchen weighed 40.5 lbs. The student swipe count of the number of diners that ate at Runk Dining hall during our food waste audit hours was 1,067 swipes. Only considering the student waste, the 104.2 pound total, the average amount of food wasted per person was 1.56 ounces. To put that into perspective, that's about the weight of two regular size Reese's Peanut Butter Cups. Weight is different from mass, so the portion of food wasted compared to the full meal is hard to calculate, for example tossing out a dense half-eaten bowl of soup as opposed to three plates of salad.

Because this is the first waste audit conducted at Runk dining hall, interpreting and comparing trends from past years is not applicable, but we can compare per capita food waste between the other two major dining halls on the UVa grounds. The hypothesis is that the average amount of food waste per student for the duration of one meal is not significantly different at Runk than the other dining halls. Another research group gathered data by conducting a similar waste audit at the Observatory Hill dining hall, which feeds mostly first years. During one meal, 172.9 pounds of food waste was collected. The swipe count, not including to-go boxes, was 1,314 students. The average amount of food wasted per student at Observatory Hill was 2.10 ounces of food. The research group that gathered data at the third major dining hall at UVa, Newcomb, reported 101.7 pounds of waste with a swipe count of 665 students. The average amount of food wasted per student at Newcomb was 2.45 ounces of food. In order to compare these data scientifically, more waste audits would have to be conducted to be sure that human error and menu choices are less of a factor. We don't believe that students who dine at Runk are inherently less wasteful than students who dine at other dining facilities on grounds, therefore if more data was collected, we believe that the average amount of food waste per person would not be significantly different across the dining halls.

Since Runk tends to serve less people, we were surprised to find that the total amount of food waste did not differ significantly from that of the other two dining halls. The weight of food waste collected was much larger at Observatory Hill, but Runk's 104.2 pounds and Newcomb's 101.7 pounds were very similar. This may, in part, be due to the fact that the waste audit at Newcomb was conducted during lunch hours (2 ¼ hours) rather than dinner hours (3 hours), but since Newcomb is the closest dining hall to main grounds, students tend to dine there during lunch because of the convenience of the dining hall's location. The length of time dissimilarity doesn't make a significant difference because the last 45 minutes collected food waste at Runk was very slow. At Newcomb the first hour, from 11am-12pm, produced 34 pounds of waste, while the second hour, from 12pm-1:15pm produced 67.7 pounds of waste. Most kids start clearing out to attend afternoon classes after 1:15pm.

## Educational Campaign & Survey Results

The educational component of this project is important because it will hopefully encourage students and other dining hall users change their eating habits to help reduce individual food waste. Our project will help students and other people eating at the dining hall become more aware of how food waste affects the environment. Our research group targeted dining hall users by promoting our campaign in Runk dining hall and near other dining facilities. As part of our educational campaign, posters (See Appendices) with found data and thought provoking statements relating to food waste were tacked up on a bulletin board outside of Runk, and on other cork boards and information sharing walls around campus. Many of these informative boards etc. are located near dining halls which is a convenient launching point to share our findings and

future proposals. We also put together a short promotional video using footage taken during the audit inside the dining hall as well as an interview with Kendall Singleton, UVa Dining's Sustainability Coordinator. We plan to use this video as an educational tool to share with the university by playing the video on the television monitors at Runk, having it on file with UVa Dining so that professors can use it in appropriate lectures, and we also plan on showing a clip of it during our final presentation.

Student surveys were an important part of our data collection because we hoped to pinpoint the reason *why* students leave extra food on their plates. This survey included a short number of easily answered questions about the food served at Runk and the student's eating habits. Hopefully, the student responses can help the Runk kitchen and UVa Dining to understand what causes students to waste food. For example, the menu selection might be too broad or not broad enough or the food might not be well prepared. Portions could also be unnecessarily large, so students are just not physically able to eat all of their food. The top two responses that were included in the survey were that the food taste was under-satisfying and that the student became full before being able to finish the rest of his or her food. Sixty-five percent of responders stated that they left food on their plate due to under-satisfying taste while twenty-eight percent had eyes bigger than their stomach. What is promising is that eighty-eight percent of responders had considered the amount of uneaten food left on their plates. This means that the audience of students our campaign is trying to reach has some interest in the path that uneaten food takes once it is thrown away. In fact, many students proposed suggestions to implement some sort of composting program at the Runk Dining Hall facility as part of the final survey question, which was left as a free comment. Many students considered portion size as a possible reason for food waste. One student wrote that "It's frustrating having a dining hall employee serve you food and having to tell them how much you want, that said, often student's eyes are bigger than their mouths." A student blatantly responded "serve smaller portions" while another student advocated "self serve stations." A handful of students also remarked on the quality of the food, emphasizing that better tasting food would help them leave less of it on their plate. One student remarked "I often leave Runk still hungry because a majority of their food tastes bad." Another wrote "My experience with Runk is that I get a plate thinking that I'll like it, but then I don't." Several students also advocated implementing a composting program. One student wrote "compost the food." Another simply wrote "compost." By far the most common repetitive response was to put up permanent signage reminding students of their food waste. Common responses included: "Put up fact sheets," "Put it on a poster above the plate returns," "Signs in the dining hall, and "Lots of signage displaying this information." Students at UVa love to be a part of positive change, and I think this educational campaign and future campaigns will have a positive effect on both the individual food waste and the movement to include Runk in a composting initiative.

## CONCLUSION

Any amount of food waste, whether at home, a small business, or a large institution that could be re-routed from landfills to a safe composting site both saves the environment from harmful methane GHG and saves money for everybody. For example, the dining hall saves money by using less trash services, the trash trucks have to drive less back and forth to landfills, and the government spends less burying unnecessary food waste within landfills where it has little to no chance of safely decomposing.

Our research suggests that Runk should not be left out of the composting program because it is a smaller facility. The amount of food waste collected at Runk was very similar to the total at Newcomb, another

dining hall on grounds that is part of a composting program. It's understandable that an initial investment needs to be made by the university to incorporate a composting unit at the facility, but the investment will lead to money saved in waste removal in the long run and a small step towards an environmentally friendly planet. Another obstacle to Runk's ability to join the composting program is the space limitation at the facility to fit a pulping machine. What a pulping machine does is de-water and grind the food waste into small, easily compostable scraps. These food scraps are then collected in trucks by a local composting company like Panama Pay-Dirt and taken to a composting farm, where food scraps decompose quickly into rich soil. Without a pulping machine, a compost program like this is simply out of reach. Smaller composting units are designed for workplaces or residences and hold anywhere from 10 to 170 gallons of food waste. Based on our audit experience, 144.7 pounds of total food waste for the duration of one meal filled one and a third 30-40 gallon plastic containers. On the conservative side, we estimated that about 150 pounds of food is about 45 gallons. Over three meals in a day, where breakfast produces less waste, again conservatively we estimated 100 gallons of food is wasted at Runk. An individual composting unit takes a week to two weeks to completely compost the food, which means a unit with the ability to hold a complete composting cycle would need to be 700 to 1400 gallons. Individual composting units are not sold this large. Perhaps pulping machines are sold in a smaller size to accommodate the space limitations at Runk, but the result of our research leads our group to recommend Runk find space or make space to incorporate a pulping machine and join the other dining halls in composting their excess food waste with a company like Panama Pay-Dirt.

The qualitative data survey results also suggest that permanent signage be posted near the tray return of each main dining hall as a reminder to waste less food. This permanent signage may also include facts and reasons why food waste routed to landfills is a problem and information about the problem of overproduction and how wasting less could be a leverage point for positive change in the agricultural system. Other suggestions from the survey as to why students waste food include the quality and taste of the food. Perhaps UVA Dining should send a handful of chefs to cooking classes annually or biannually to help increase the quality of prepared food. Another common suggestion from survey results was more self-serve stations. If students were able to put a small amount of the dish served on their plates to taste it first before accepting a full portion, if the food was not to their taste, the full serving would not have to go to waste.

## FUTURE WORK

Hopefully, the post waste audit educational campaign will have at least planted a seed of thought in the percentage of students the campaign was able to reach. The video will be an important teaching tool for the future, playable on dining hall television monitors. In the future, table tents could be used as a marketing tool to inform students of the negative environmental impacts of food waste that is simply sent to landfills. Further, we propose a continuation of an annual waste audit at Runk to begin to be able to compare trends in food waste. We will provide clear and informative documentation of the waste audit conducted on November 2, 2011 as well as a copy of our final report and other useful information for future waste audit groups. We will determine if our food waste audit was successfully campaigned by the raw data gathered from these future waste audits. Our group proposes that signage be introduced near the tray return as a reminder to waste less food. This permanent signage may also include facts and reasons why food waste routed to landfills is a problem and information about the problem of overproduction and how wasting less could be a leverage point for positive change in the agricultural system. We also promote installing a food compost system in Runk Dining Hall with the support from students, faculty, and other community partners.



## LESSONS LEARNED

We found that during the waste audit, many students were confused as to what was happening. The usual routine, we noticed, was for students to walk up to the return tray line, scrape their food waste, napkins, and plastic cracker packaging into the trash cans and then put their empty dishes on the conveyor belt. A dozen to several dozen times, we were unable to stop students from breaking their routine, so we lost some weight in food waste due to student confusion. In order to clarify that students should not scrape their plates during a waste audit, we recommend the next group make a sign to place in front of the trash cans or on top of the trash cans as a kind-of lid warning students that a waste audit is taking place and they should either scrape their food waste into the collection bin or place their plates on the conveyor belt and let the waste audit group scrape their waste into the correct bin. After several instances, our group caught on to this routine and moved the trashcans behind our audit set-up, but that didn't quite work because students just walked obliviously around us. Finally, we had to place someone on watch duty to take people's plates before they scraped them into the trash cans themselves.

At the beginning of the semester we thought we could set up two waste audits to determine whether or not our educational campaign reduced food waste or changed patterns in students' plate-filling habits. We were unable to complete the second waste audit, but the next group to perform a waste audit at Runk will have access to our data to make comparisons and study trends.

If our group was to do this project again, we would better document the leftover food. The survey, though anonymous, may not have been entirely accurate. People like to think that the best of themselves which is an excellent quality, but sometimes don't realize exactly what they are doing, or subconsciously don't wish to confess to having a part in the growing GHG and world environmental problems. Most people responded to taking 1-2 plates per meal in the survey, but from observation, our group would have reported the mode number of plates as at least two, average 3 per person. If we quickly photographed every plate on the conveyor belt, noted the number of plates per person, and handed out the survey to students after they dined, before collecting the food waste we would have a more accurate set of data. This is especially true because the survey was sent out to a wide range of university students, many of whom rarely eat at Runk. This would not only provide more accurate data for the number of plates per person, but also the amount of food left on each plate. We could also expand our survey to include more questions about why people leave food on their plates and what kind of changes would be acceptable to help reduce food waste. We might also think about info-advertising our found data on the table tents in the dining halls as an additional part of the educational campaign.

Successfully creating change is a result of hard work, a healthy budget for advertising, audience participation, and bureaucratic action. Change requires a movement. Posters, videos, and other advertising need to cause people to talk, and maybe prompt them to research the problems of food waste on their own. Change requires a solid base of people that care enough about a topic to cause the bureaucracy to reconsider the current situation and start real action. If enough people want a composting program implemented at Runk, and enough data is collected to support that decision, it will happen eventually just as the dining halls went tray-less in 2008.

APPENDICES

Educational Campaign Posters

Poster 1

**104.2lbs in 3hrs**  
student food waste during dinner  
at Runk



# 40.5lbs in 3hrs

overproduced food from the kitchen  
after dinner at Runk



This is why they say to “eat everything on your plate and THEN go back for seconds.”



*This sounds so corny, over-used and elementary, but seriously folks,*

**Saving the environment  
starts with YOU!**

**Try filling one plate at a time.**

## Should Runk invest in a composting program?



Here are the reasons a student group at UVA, as part of a Global Sustainability class, thinks "YES!"

Since Runk tends to serve less people, the total amount of food waste is smaller than at the larger cafeterias like O-Hill and Newcomb, but any amount of food waste that could be re-routed from landfills to a safe composting site:

---saves the environment from harmful methane GHG produced by rotting food in landfills.

Methane traps several dozen times more heat in the atmosphere than carbon dioxide. The plastic barriers that isolate trash/food in landfills, necessary for sanitation purposes, exponentially slow decomposition, whereas sending extra food waste to a composting farm fosters clean decomposition.

---saves money for the dining hall by using less trash services, the trash trucks have to drive less to and from landfills.

---saves money for the government burying unnecessary food waste within landfills where it has little to no chance of safely decomposing. This money could be re-routed to provide incentives to start composting programs at schools across the nation.



# 1.56 ounces of food waste per student\*

\*during dinner hours (5pm-8pm) at Runk Dining Hall on November 2, 2011.  
Only includes food left on student's plates, not kitchen waste.



## That's about...

*for you chefs and bakers:*

**3 tablespoons,**

*for you party-goers:*

**the amount of liquid one shot glass can hold,**

*for the classy among us:*

**a crisp Benjamin Franklin worth of Chanel No.5,**

*and for the sweet-tooth:*

**two Reese's Peanut Butter cups.**

# LET'S MAKE IT 0.

# Photographs

Photo 1



Photo 2





## Promotional Video Stills

Image 1 // Kendall Singleton, UVa Dining's Sustainability Coordinator



Image 2





Image 3



## Survey

1. *Where do you live during the school year?*

- (a) On-Grounds- 57%
- (b) Off-Grounds-43%

2. *If you are an undergraduate student please indicate your year of study. If not an undergraduate student, please specify under "other".*

- (a) First year- 17%
- (b) Second year- 30%
- (c) Third year- 25%
- (d) Fourth year- 27%
- (e) Other- 1.0% Response: "grad student"

3. *In a typical week, how many meals do you eat at a University Dining Facility?*

- (a) 0-1 meals- 43%
- (b) 2-7 meals- 29%
- (c) 8-14 meals-27%
- (d) 15-20 meals- 1%

4. *In a typical week, how many meals per week do you eat at Runk Dining Hall?*

- (a) 0-1 meals- 95%
- (b) 2-7 meals- 4%
- (c) 8-14 meals-1%

5. *During a typical meal, how many plates of food do you take to eat?*

- (a) 1-2- 70%
- (b) 3-4-30%
- (c) 5+-0%

6. *After a typical meal, approximately how much uneaten food is left on your plate?*

- (a) none of the plate- 38%
- (b)  $\frac{1}{4}$  of the plate-61%
- (c)  $\frac{1}{2}$  of the plate-1%
- (d)  $\frac{3}{4}$  of the plate-0%
- (e) the whole plate-0%

7. *Have you ever considered the amount of uneaten food waste left on your plate or in the dining hall?*

- (a) Yes- 88%
- (b) No-12%

8. *Why do you typically leave uneaten food on your plate?*

- (a) The meal was not to my taste- 65%
- (b) I got full before I could finish all of the food on my plate- 28%
- (c) Other -7%

9. *On November 2, 2011 a food waste audit was conducted on Runk Dining Hall during the Dinner dining hours. 104.2lbs of uneaten food was recorded as student waste and 40.5 lbs was recorded as kitchen waste. Do you have any suggestions for disseminating this information to the community or reducing the amount of food waste generated in Runk Dining Hall?*

Skipped Question: 73%  
Response Count- 27%

## Charts & Graphs

Chart 1 // Survey Results for question 5

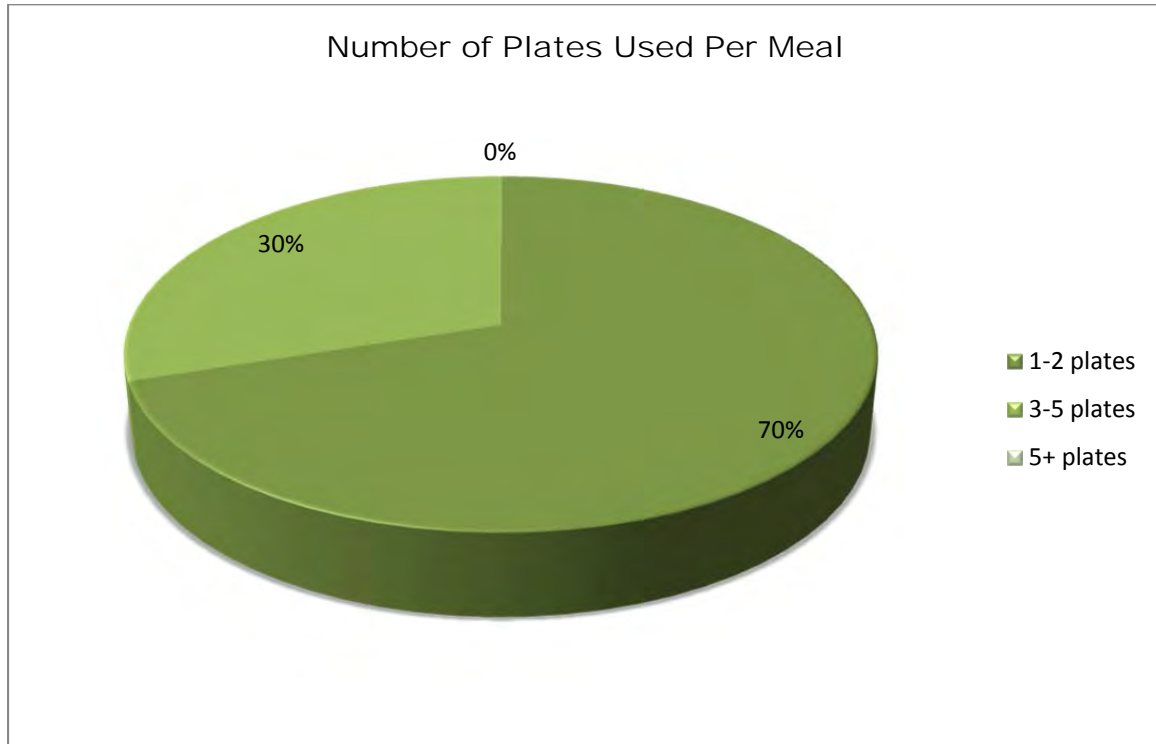


Chart 2 // Survey Results for question 6

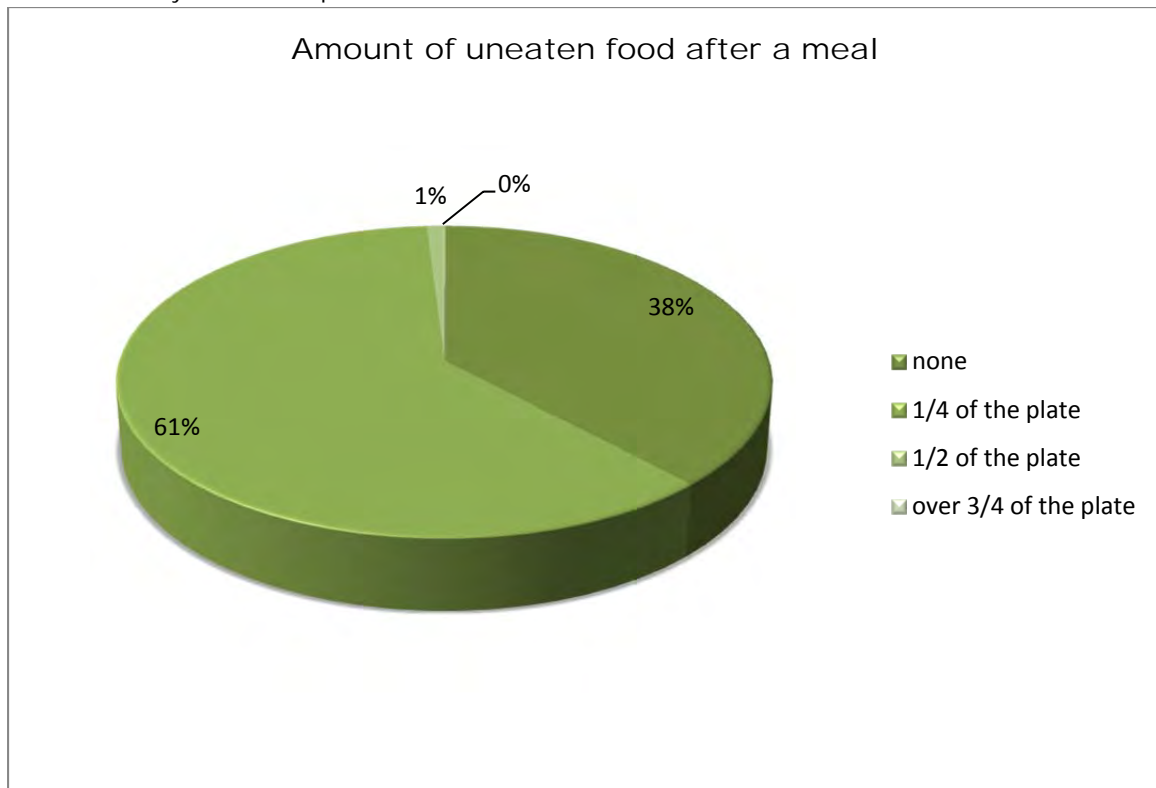
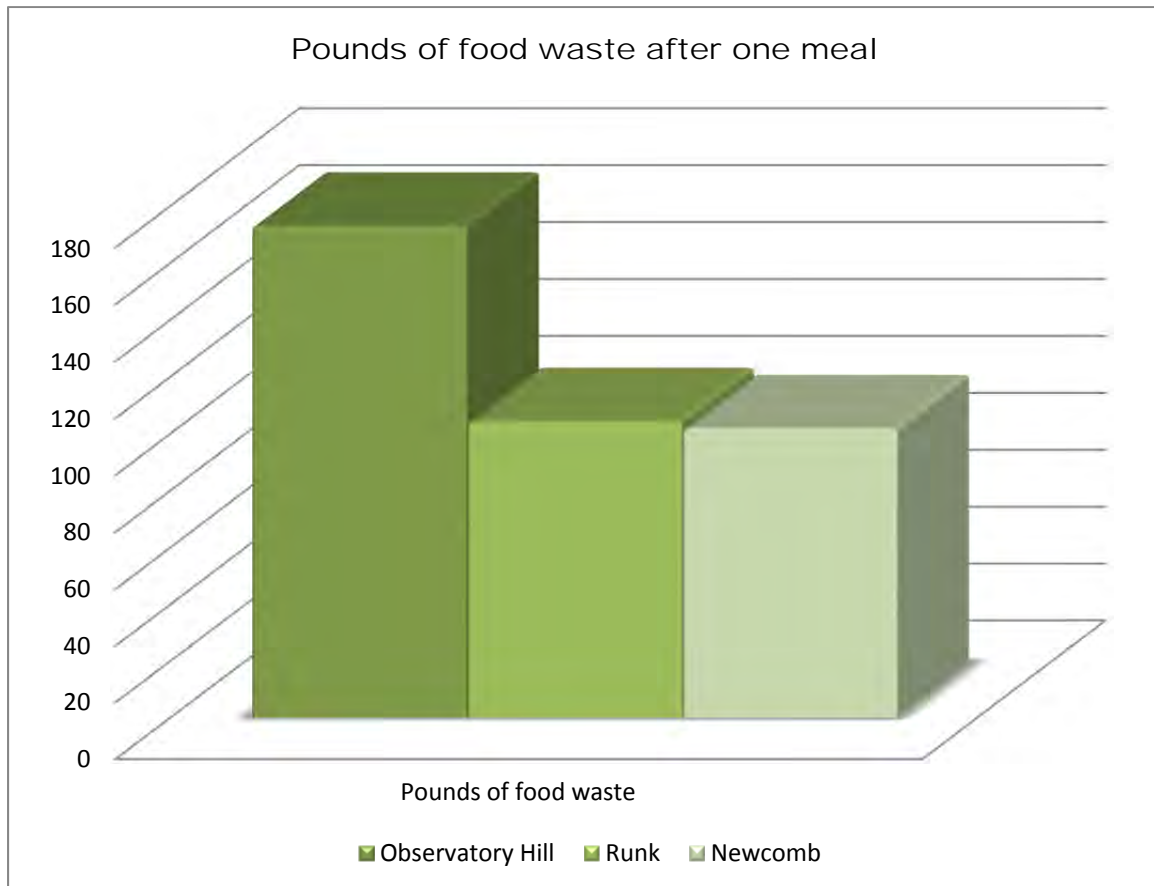


Chart 3 // Survey Results for question 8



Chart 4 // Waste Audit Collection Data



## Materials & Costs

In terms of budget, Hereford Residential College, of which Runk is the associated dining hall for, assisted us with funding for printing our promotional/educational posters and flyers. The total cost of printing the posters was \$24.73. We reduced our costs in other areas by using electronics to film a video documentary of our waste audit and to show it on the television monitors at Runk dining hall.

## Acknowledgements

Thank you to Kendall Singleton, Sustainability Coordinator for UVa Dining, for meeting with us on more than one occasion and leading us in the right direction. Thank you to Jerry Trombley and the kitchen staff at Runk Dining Hall for helping us set up the audit, and to our teaching assistant Jack Cochran for his general awesomeness.

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