Why Do UC Berkeley Students Waste Food at Dining Halls?

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ABSTRACT

Food waste creates many social and environmental problems. Minimizing food waste can increase the availability of nutrients to individuals and improve community health and food security. Reducing food waste can promote environmental sustainability through energy and water conservation. Local efforts in minimizing food waste are believed to be more effective than non-specific, large-scale efforts. I studied why UC Berkeley students did not finish their food at the dining halls by surveying 500 UC Berkeley students. I used Microsoft Excel to store and analyze my data. I examined how dining halls' serving styles, such as buffet or a la carte serving, the use of tray, serving portion and food quality affect students' food wasting behavior. Results showed that a la carte serving and the use of trays helped generate less food waste. Poor food quality and being served too much at buffet dining halls were top reasons why students wasted food. This study is served as a reference for implementing suitable strategies to reduce students' food waste.

KEYWORDS

Cafeteria, plate waste, food quality, a la carte, serving portion

INTRODUCTION

Food waste creates both social and environment problems in the United States (Sobal and Nelson 2003). Kantor et al. (1997) showed that we are wasting half of the food we produced. In 2008, of the 250 million tons of municipal solid waste generated in the US, food scraps comprises 12.7%, which is the third largest portion after paper and yard trimmings (EPA 2008). Besides, The United States Department of Agriculture estimates that recovering 5% of 44 million tons of food waste could feed four millions out of 38 millions undernourished people in the US (USDA 2004). Minimizing food waste can increase the availability of nutrients to individuals, improve community health and food security (Hamm and Bellows 2003).

Reducing food waste can promote environmental sustainability through energy and water conservation (Griffin et al. 2008). Energy is used during food production, distribution, and waste processing. Heller and Keoleian (2000) showed that energy used for food production, excluding transportation and packaging, accounted for 17% of all fossil fuel use in the US. The energy content of food as well as the energy that involved in producing, processing, transporting, marketing and storing food is lost when the food is discarded (Blair and Sobal 2006). Besides, Food waste is directly related to water waste because water is used in food production (UNEP 2008). Food waste also contributes to air pollution, such as methane from decaying food and water pollution from runoff or leaching from landfills (Rathje 1992), which threaten the environment and community health (Griffin et al. 2008).

To prevent food waste from further deteriorating our environment, as well as other social issues, it is important to look for suitable strategies to reduce food waste. There has been a growing practice of recycling used materials since 1990 (EPA 2008), and the recycling of food scrapes is composting. Composting has grown recently as a means of diverting food waste from landfills to composting sites. Even though food wastes can be reused through composting, composting is costly, and requires energy such as transporting food waste to composting sites. While it is impossible to eliminate food waste, there are strategies to minimize food waste. The most efficient way to reduce foodservice and consumer food waste is not to generate it at the first place (Kantor et al. 1997).

As local efforts in minimizing food waste are believed to be more effective than non-specific, large-scale efforts (Griffin, 2008), I have chosen a small-scale, local food system for my study – the UC Berkeley dining hall system. At UC Berkeley, Cal Dining is the major food

operation that operates the only four dining halls on campus: Café 3, Clark Kerr Dining (Clark kerr), Crossroads and Foothill Dining (Foothill). These four dining halls serve about 5580 students per day (Cal dining 2009). Cal Dining has implemented different sustainability practices, including composting organic food waste, providing a wide range of organic food, donating food to a non-profit family shelter, and serving local produce (Cal dining 2009). Yet in 2005, students at these four all-you-can-eat-dining halls discarded about 1.2 tons of unconsumed food after being served (UC Berkeley Sustainability Assessment 2005).

Cal Dining acknowledges the large amount of food waste, and has recently made two major changes in their policies in the hope of reducing food waste: One of the four dining halls, Foothill, switched from buffet to an a la carte serving system beginning in fall 2009, and the other three buffet dining halls stopped providing trays since Spring 2010. An a la carte dining hall means that food is charged per item, which is the direct opposite of a buffet dining hall, which is an al-you-can-eat dining hall. Sarjahani et al. (2009) shows that a la carte serving generates less food scraps than buffet servings. Karstens and Moe (2009) shows that not only 10% food waste was reduced at their school cafeteria by not using trays, but also a reduction in water and electricity usage from washing the trays. Cal Dining estimated that the a la carte system could reduce 10% of food waste that was generated under the buffet style (Daily Californian, 2009). Apart from the dining hall's serving style and the use of tray, there are other factors that drive students not to finish their meals such as dining hall's food quality (Guthrie and Budzy 2002). It is important to find out what these drivers are, so that Cal Dining can change its policies accordingly to reduce food waste, however no studies have been conducted to investigate why students waste food at UC Berkeley's dining halls.

In order to investigate why students do not finish their meal at the dining hall, I collected opinions from students who were frequent diners at the dining halls through surveys. My research question is why diners waste food. I hypothesize that the buffet serving style, and low food quality are main drivers of food wasting behaviors.

METHODS

To investigate why students do not finish their meals, I randomly surveyed 500 students around the dining halls and residential halls during dinner hours from 6pm-9pm, two to three weekdays in every week from February to March, gathering information on students' year in

college, majors and the dining halls they go to most often. I asked students to estimate how much food they usually waste in each meal at the dining hall, and use that as an indicator of the amount of food they usually waste at the dining hall (Appendix).

In order to find out reasons why students do not finish their meals, I asked them to circle all the given reasons, and write down additional reasons that could explain their food wasting behavior. To categorize the food quality at Cal Dining's dining halls, I asked diners to rank the food quality of the dining halls. To see how diners feel about the recent changes, I asked them whether they felt the recent changes help reduce their amount of food scraps. There was space at the end of the survey for students to leave additional comments on my study, and their thoughts on food waste at the dining halls. I used Microsoft Excel to store and analyze my final data.

RESULTS

Of the 500 students surveyed, 490 students completed the entire survey. Among the 490 students, 86 students were regular diners at Cafe3, 93 students were regular diners at Clark Kerr, 104 students were regular diners at Foothill Dining, and 205 students were regular diners at Crossroads.

Food Wasting behavior

210 students (43%) did not finish 30% of the initial amount of food they had in every meal, and 195 students (40%) did not finish 2% of the initial amount (Fig.1).

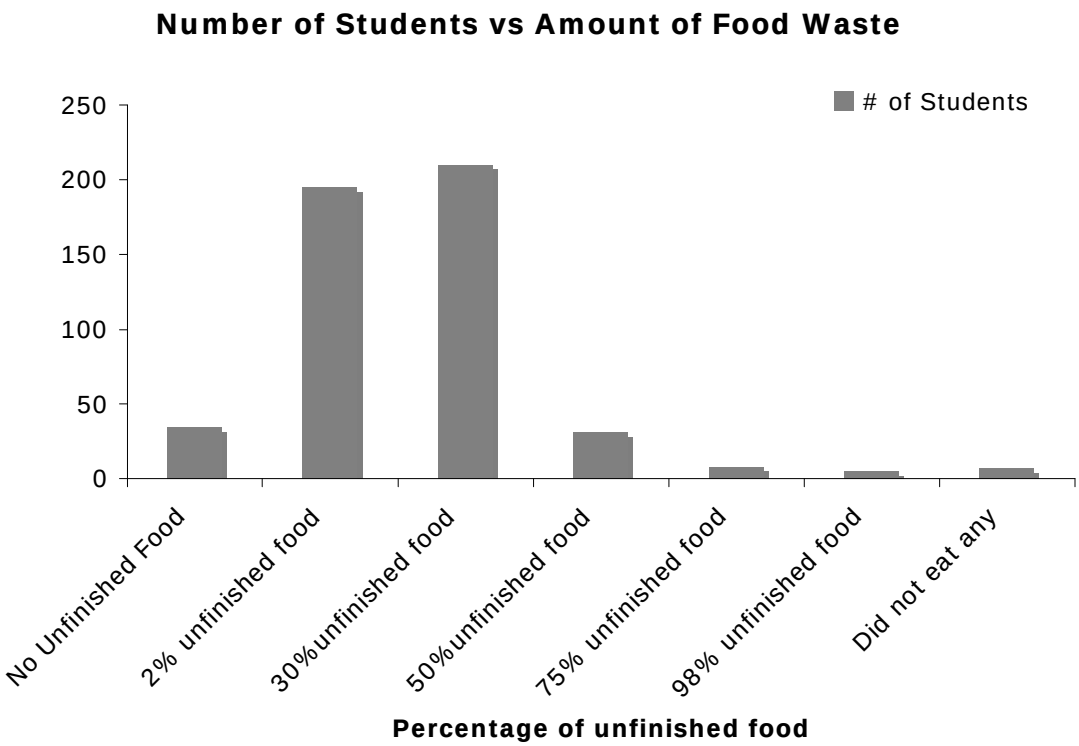

Figure 1. Number of students versus amount of unfinished food in a meal

Reasons for not finishing their meals

50% of students thought that poor food quality explained why they did not finish their food. 28% of the students thought that taking too much food or being served too much were reasons they did not finish their food. Other reasons included that the food was seen as disappointing, students were unaware of the amount taken, and students skipped unhealthy food, and lost their appetite. Some students left additional comments that said the food was salty, oily and not delicious. 2% of the students pointed out they did not waste food other than crumbs or excess sauces.

Food Wasting Trend at Each Dining Hall

The majority of the frequent diners at Crossroads and Café 3 wasted 30% of their meal while the majority of the frequent diners at Clark Kerr and Foothill wasted only 2% of their meal (Fig 2). Besides, Foothill has the most students who finished their entire meal. 16% of students from Foothill dining did not waste food, while only about 5% of students from each of the other dining hall did not waste food. Clark Kerr has the least number of students who cannot finish half of their meal. 5% of students from Clark Kerr dining hall wasted more than half of their

food while about 10% of students from each of the other dining hall wasted more than half of their food.

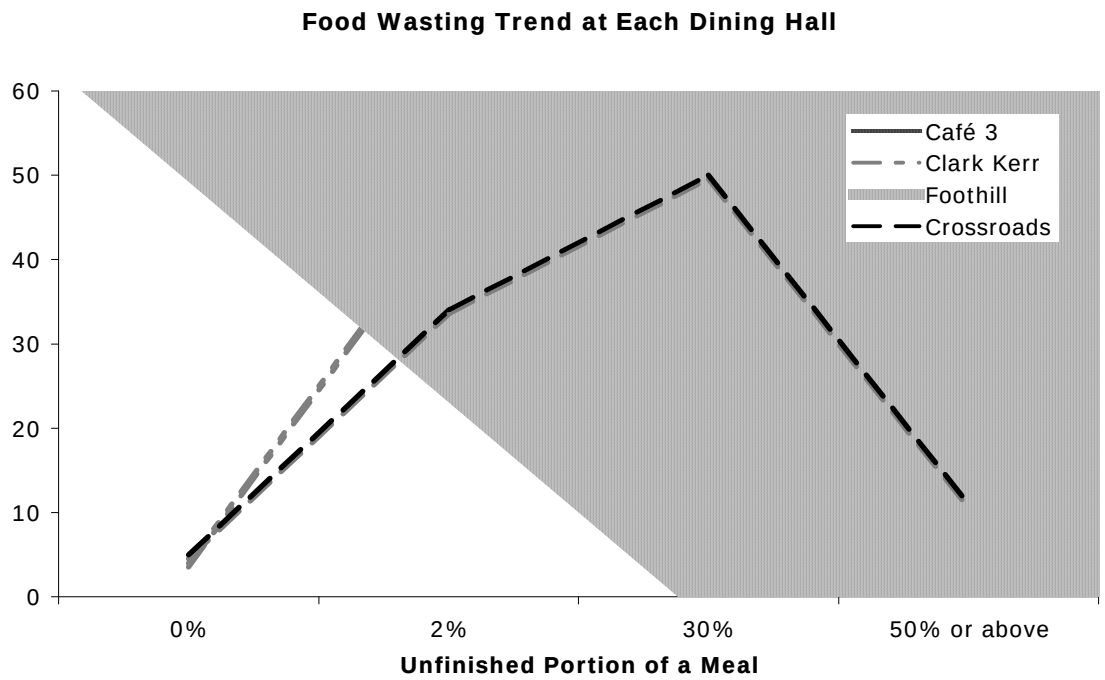

Figure 2. Comparison of students' food wasting trends at each dining halls.

Dining hall's food quality ranking

Clark Kerr dining hall had the most votes on best food quality, followed by Foothill, while Crossroads had the most votes on the worst food quality (Fig 3).

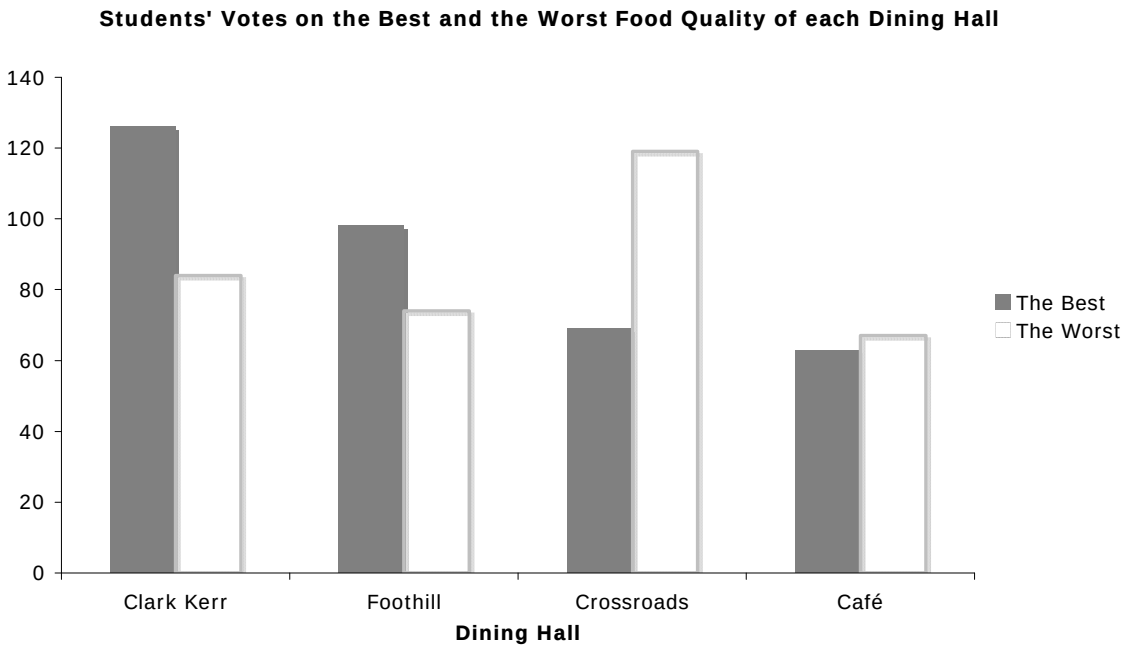

Figure 3. Students' votes on the best and the worst food quality of the dining halls.

Serving Style and the Use of Tray

In response to recent Cal Dining 's policy changes, 63% of the students agreed that a la carte helped reduce food waste and 26% of the students had never been to an a la carte dining hall. Also, 56% of the students felt that without using a tray helped reduce food waste. However, 71% of the students preferred buffet dining to a la carte, and 2% of students wrote an additional comment that it was inconvenient not to have a tray. Students' serving style preferences were independent of the serving style they used most (X^2=51.61, df= 486).

DISCUSSION

My findings justified my hypotheses that poor food quality, being served too much and the buffet serving style were tops reasons that drove student to waste food. My results showed that with better dining hall food quality, students had less plate waste. Also, more students finished their entire meal at an a la carte dining hall. The purpose of conducting this study was to find out why students did not finish their meals at University dining halls. My study confirmed Guthrie and Buzby (2002) that bad food quality and the inability to control the serving portions could

lead to more plate waste. My study also agreed with Sarjahani et al. (2009) that a la carte serving helped reduce plate waste.

Reasons for not finishing meals

Low food quality and being served too much were top reasons why UC Berkeley students could not finish their meals at the dining halls. Improving food quality and allowing students to self-serve could reduce food waste. A study by Guthrie et al. (Guthrie 2002) on reducing plate waste generated by students at an elementary school suggested strategies which, including allowing students to self-serve and improving food quality and appearance, can reduce plate wastes. My study also showed that students at buffet dining halls generated more plate wastes than students at the a la carte dining hall.

Food quality

Better food quality could help reduce food waste. To assess the relationship between food quality and plate waste, I compared the dining halls with highest votes for the best and the worst food quality to the chart that showed the food-wasting trend at each dining hall. Clark Kerr has the most votes on best food quality, and had the least number of students who wasted more than half of their food. However, Crossroads, with the most votes on worst food quality, had the most students who wasted more than 70% of their meal. Some students also pointed out that they intentionally skipped unhealthy food such as food that was too salty or oily. These results confirmed with Guthrie and Budzy (2002) that students would try to finish more food if the food was healthier or more delicious.

Serving Portion

Some students cannot finish their meal because they were served too much, or unable to control their serving portions. Guthrie and Budzy (2002) suggested that allowing students to self-serve themselves could reduce plate waste. Levitsky et al. (2004) pointed out that young adults tended to overeat when they were served with more food. The extra food consumed would become body fat, which would be just another form of food waste stored within our body. Allowing students to serve themselves the amount they needed can reduce plate waste.

Buffet serving

My findings confirmed with Sarjahani et al (2009) that a la carte serving helped reduce food waste. The only dining hall with a la carte serving had the most student who finish their entire

meal. It supported my hypothesis and Cal Dining's estimation that a la carte serving could reduce food waste.

Use of tray

More than half of the students thought that not using a tray could reduce plate waste, agreeing with the study by Hackes et al. (1997) that concluded tray service generated more food waste in a retirement facility. However, the majority of the students liked buffet dining hall more than a la carte dining hall, and about 2% of the students wanted the trays back.

Constraint of the study

Most of my results were based on the data from my survey. While I tried to avoid leading questions on the survey, and did random sampling, there were still biases associated with the survey such as under-coverage and non-response biases. Although my survey research may not completely avoid methodological problems that are inherent in every intrusive behavioral research, hopefully it could enhance the surveyees' awareness of food waste problems and thus contributing to eventual reduction in food waste.

Also, I constructed my survey with mostly questions with categorical answers, so that students could use less time to finish the survey. However, I can only perform minimal statistical analysis on these categorical answers.

Future research and implication

From this study, I found that improving food quality, allowing self-serve services, switching to a la carte servicing, and without using a tray, were ways to minimize plate waste. Cal Dining has made its first step to reduce students' food waste by not providing trays and switching one of the buffet dining halls to a la carte serving. Cal Dining should consider changing the remaining dining halls from buffet to a la carte serving.

Besides, I would suggest Cal Dining to develop studies on improving its food quality, and change the dining hall settings to allow student to self-serve. While there is no official standard to control food tastiness, Cal Dining could provide food samplers and ask for students' opinions when it sets up the menus. Also, since there is no food tastiness standard for universities' dining halls, it gives Cal Dining an opportunity to be the first one to set up a food quality standard that assess food healthiness and tastiness for dining halls at other universities to adopt.

Future research should compare numerical data on food waste tonnage to prove students' food waste at Clark Kerr, with the best food, is lower than that at other dining halls. Future

research can also look into student's awareness on their food wasting behavior. Given growing concerns on growing population, food production, food risk increasing, food prices and their impact to our economy, food waste also impacts our environment and should be reduced.

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REFERENCES

Blair, D., and Sobal, J. 2006 Luxus consumption: Wasting food resources through overeating. Agriculture and Human Values 23: 63-74.

Cal- Dining 2009. < http://caldining.berkeley.edu/community.html> April 12 2009

Daily Californian 2009 <http://www.dailycal.org/article/104405/foothill_dining_commons_to_replace_buffet_with_a_l > Oct 23 2009

EPA US Environmental Protection Agency 2008 Municipal Solid Waste Generation, Recycling and Disposal in the United States Detailed Tables and Figures for 2008 < http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw2008data.pdf>

Griffin, M., Sobal J. 2008. An analysis of a community food waste stream. Agriculture and human values 26:67-81.

Guthrie, J.F., Buzby, J. C., Several Strategies May Lower Plate Waste in School Feeding Programs. *Food Review, 25*(2) 36-42.

Hackes,B.L., Shanklin,C.W., Kim,T., Su,A.Y. Tray Service Generates More Food Waste in Dining Area of a Continuing-Care Retirement Community. *Journal of the American Dietetic Association* 97(8) 879-882

Hamm, M., and A.C. Bellows. 2003. Community food security and nutrition educators. Journal of Nutrition Education and Behavior 35 (1) : 37-43

Kantor, L.S., Lipton K., Manchester A., and Oliveria, V. 1997. Estimating and addressing America's food losses. Food Review 20 (1): 2-12

Karstens, K., Moe, G.L. 2009 Trayless Dining Services and Composting Green the College Cafeteria. Journal of the American Dietetic Association 109:66-69

Levitsky, D.A., Youn,T. The more Food Young Adults Are Served, the More They Overeat. The Journal of Nutrition 134: 2546-2549

Rathje . 1992. The Archaeology of Contemporary Landfills. American antiquity 57:437-447.

Sarjahani, A., Serrano,E.L., Johnson,R., Food and Non-Edible, Compostable Waste in a University Dining Facility. *Journal of Hunger and Environmental Nutrition4(1)* 95-102

Sobal, J., and Nelson, M.K. 2003. Food Waste. In Encylopedia of food and culture, ed. S.H. Katz, 28-29. New York: Charles Schribner's Sons.

UC Berkeley Sustainability Assessment-Food. 2005 < http://sustainability.berkeley.edu/assessment/pdf/CACS_UCB_Assessment_8_Food.pdf> April 10, 2009

UNEP. United Nation Environmental Program. 2008 The Environmental Food Crisis

USDA. United States Department of Agriculture. 2004. Household Food Security in the United State

Heller, M.C., Keoleian, G.A. 2000 Sustainability Indicators for Assessment of the U.S. Food System. Center for Sustainable Systems- University of Michigan Report No. 2000-4

APPENDIX

This survey is for my Environmental Sciences senior research project on left over food disposal at UC Berkeley dining halls. I want to find out why diners have leftover food. This survey is intended gather background information about diners at dining halls, and their opinions on wasting food. Please circle the best-described option.

1. a)What year are you?

1st Year 2nd Year 3rd Year 4th Year 4th Year or above

b) What is your major (or intended major) ? _____

c) Are you are vegetarian? Yes No Others_____

d) Which dining hall do you dine in the most? Cafe3, Clark Kerr, Crossroads, Foothill

e) Which dorm do you live in? Unit 1, Unit 2, Unit3, Foothill, CKC, Others_____

f) How often do you eat in the dining halls?

Every Meal / Once everyday / Once every two days / Less than once every two days

2. a) Which dining hall style do you prefer?

Buffet (all-you-can-eat, eg: Crossroad) À la carte (charge per item, eg: Foothill)

b) Have you been to Foothill Dining Hall after it changed to a la carte?

Yes (go to 2c) No (go to No.3)

c) Do you think the a la carte serving at Foothill helps reduce food waste? Yes / No

3. How often do you throw your unfinished food into the green composting bins?

Everytime / 8-9 out of 10 times / 5-6 out of 10 time / 1-2 times out of 10 times / Never

4 a) How much of the initial amount do you usually throw into the composting bin?

0% / 2% / 30% / 50% / 75% / 98% / 100%

b) Do you usually waste the same amount of food when you eat at home? Yes / No

c) If you were allowed to take-home your unfinished food by paying a reasonable price per pound, would you do so? Yes / No

5 a) Why do you sometimes not finish your food?

Bad food quality / Taking too much food / Others(please specify):_____

If "Taking too much food" is one of your reasons, please go to 5b, if not, please go to 6.

5 b). Why do you think that you take too much food?

Don't want to make an extra trip Food disappointing Unaware of the amount taken

Others(please specify):_____

6. Rank the following dining halls according to the quality of the food, with 4 the most delicious, and 1 the least delicious.

Café 3 ____ Clark Kerr ____ Crossroads ____ Foothill ____

7. How important do you think it is to do the followings? With 5 being the most important and 1 being the least important.

	Least important				Most important
Paper recycling	1	2	3	4	5
Plastic bottle recycling	1	2	3	4	5
Switching off lights that are not needed	1	2	3	4	5
Composting food waste	1	2	3	4	5

8. If there is no composting service at the Dining Halls, how does it affect your food wasting behavior?

Waste less food / Waste more food / No Change.

9. Do you feel that going trayless does help in reducing food waste? Yes / No

Thank you for your participation. If you have any comments regarding on food waste at Cal Dining's dining halls, please leave a comment below. If you would like to be contacted for a follow up interview with me regarding on food waste at Cal Dining's dining halls, please leave your name, email and phone number. Thanks. You may contact me at yutinglam@berkeley.edu

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