

The Average Amount of Solid Food Waste Produced at the Howe Hall Cafeteria and an Investigation of its Causes

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Abstract

This paper will discuss the average amount of food being produced as waste at Dalhousie's Howe Hall cafeteria. Included, is the average amount that each the patrons and kitchen are responsible for. In addition, we investigated the causes of this food waste and recommended ways to reduce it.

Our research involved a mixed-method approach including a literature review, physical waste audit, overall daily food waste weighing, and a survey distributed to cafeteria patrons.

We found that an overwhelming 500 pounds of food waste is produced and sent to the local compost facility on a daily basis. Of this amount, approximately half is contributed by the patrons who eat there and half is contributed by the kitchen. Time restrictions did not allow us to investigate the causes of kitchen waste. However, by means of a 15 question survey, 47% of patrons account poor food quality/taste to food waste.

Upon investigating solutions to helping reduce this waste, our main barrier was indeed the accountability of food taste/quality by cafeteria patrons. Further examination of the surveys, however, revealed many great suggestions including improved patron-management communication and changing the meal plan from all-you-can-eat to pay-as-you-go.

Overall, both students and management showed concern for the amount of food waste being produced at Howe Hall cafeteria. Among other things, this paper recommends further research to determine options for reducing the amount of food waste being contributed by the kitchen.

1. Introduction

Residence services have always played a large role in both the operation of universities and the life and experiences of their students. Each year, new students enter the residences for both housing accommodations and food services. Cafeterias are an integral element of residence life, as they are tasked with the monstrous responsibility of keeping the students and other patrons fed. Most universities in Canada offer one of two common types of meal plans. First, the ‘pay as you go’ system gives patrons the ability to purchase credits that they can use to obtain food. The second, known as the ‘all you can eat’ meal plan, charges patrons up front for a semester of admission to the cafeteria, thus leaving the amount of food that is taken unrestricted, regardless of how much is consumed. When considering that hundreds to thousands of patrons per university utilize such plans, there arises a concern as to how much food is actually eaten, and how much is thrown away. This issue has many significant affects on Dalhousie’s total waste production and overall sustainability. This project evaluated the total amount of solid food waste generated by Howe Hall cafeteria, the portion produced by patrons, and an investigation of patron opinion regarding this waste.

1.1 Project Goal

To prelude the following discussion, it is important to first define our use of the term “food waste”. We classified patron food waste as any portion of uneaten food left on ones tray for disposal.

The goals of this project were both information gathering as well as action oriented. The primary goals of this research was to gain an accurate representation of how much solid food waste is being produced at the Howe Hall cafeteria, the average amount of waste contributed by cafeteria patrons, and an investigation to gain knowledge of the patrons’ attitudes and opinions concerning the causes of this food waste. The collected and interpreted data was used for the creation of an educational poster. In addition, a full version of the final project will be available online for students, faculty, and staff to gain better understanding of food waste at Howe Hall.

This project is valuable to the wider ‘greening the campus’ movement in many ways. Our rationale for choosing such a project stems from the argument that, as a global community, we are reaching the “tipping point” (M’Gonigle, Starke, 12: 2006). Consumption and waste patterns need to be carefully analyzed in order to generate ideas on how to alleviate the pressure humans are putting on the earth’s natural systems, which ultimately support all living things. Waste analyses and the results gathered from this research are important not only because they promote a sustainable campus, but also because they are aimed at “creating precedents” (M’Gonigle, Starke, 9: 2006) which will encourage future students to follow and build upon these results.

The overall objective of the project is to contribute to the greening the campus initiative by focusing on raising awareness pertaining to the amount of food waste generated in the Howe Hall cafeteria. In doing so, it is hoped that cafeteria patrons will waste less food and help reduce the environmental stresses caused on the local environment of the Halifax Regional Municipality (HRM). Understanding food waste patterns in the Howe Hall cafeteria will hopefully be the first step of many towards making Howe Hall cafeteria a sustainable model for the remaining three Dalhousie cafeterias in addition to cafeterias on other university campuses.

1.2 Project Definition

Successfully completing the above goals was a large undertaking and could not have been done without specific guiding questions. Our research questions were:

1. How much solid food waste is being produced at the Howe Hall cafeteria?
2. What portion of this total are cafeteria patrons responsible for?
3. What do cafeteria patrons feel are the influencing factors of food waste?

In answering these questions, we implemented the use of both qualitative and quantitative methods, such as direct measurements and surveys to determine the ideas, attitudes and values of the people responsible for this waste. Following our research, we explored alternatives to reduce the amount of waste produced. A number of people and groups are both directly and indirectly involved with food waste at Howe Hall cafeteria.

Those who are continually and intensely involved with the issue, otherwise known as core actors, would include the managerial staff working for Aramark who make decisions relating to hours of operation, meal plans, and food quantity. In addition, the students, faculty, staff, and other patrons who eat at the facility would also fit this criterion. Supporting actors are less involved with the amount of food waste produced, but have the ability to make significant change. This would include the kitchen staff. Finally, all affiliates of Dalhousie University including students who do not eat at Howe Hall, staff, administration, and campus groups are should-be actors because they “should” have an inherent interest in the amount of food wasted at Howe Hall cafeteria (Wright, 3501, 2006).

In this case, the system of social rules, which regulate the system and the negotiations that go on among actors, consists mostly of social norms (Wright, 3501, 2006). The only regulation is that patrons must pay a set price in order to enter the cafeteria and are free to take much food as they want, regardless of how much they actually eat. The rest of the activity that goes on inside the cafeteria is governed by social norms. There is no limit to the amount of food that can be put on a plate and there is no limit to how many plates one is allowed to fill. There are no repercussions for taking more food than can be consumed in one sitting and leaving it for compost. Within the walls of the cafeteria, it appears to be socially acceptable to waste food.

1.3 Scope

Prescott Allen’s “Egg of Sustainability” emphasizes that in order for whole systems to remain healthy, the environment needs to be considered first and foremost. Social and economic factors must be considered secondary, for neither can exist without the environment (Wright, 3501, 2006). In this case, the Howe Hall cafeteria represents the system. Specific reference is given to the amount of food being produced versus the amount of food being wasted. The production of unneeded food places unnecessary demand on agricultural and industrial processes thus contributing to environmental degradation. Therefore, food waste has indirect consequences that are often overlooked. Furthermore, excess energy is being used in the kitchen to cook food that ends up in compost disposals. Reducing food waste would be economically beneficial because less

food would need to be purchased (from a supply/demand perspective) and less organic material would have to be transported and processed by composting facilities. Determining and suggesting reduction strategies was a step towards sustainability and a model to influence the perceptions of local citizens concerning sustainable practices in general. The intention is for our model to be beneficial to everyone, from the farmers who grow livestock feed, to compost management facilities on contract with HRM and Dalhousie.

The direct scope of this project was Howe Hall Cafeteria, which is serviced by Aramark. Aramark Canada is a food service provider contracted by Dalhousie University to provide on-campus food outlets, both in formal (residence) and informal (coffee shops, etc.) settings. The meal plan offered by Aramark at Dalhousie University is all-you-can-eat, and is implemented in all Dalhousie residence cafeterias. The Howe Hall cafeteria was chosen because it is the largest of the four cafeterias, with approximately 700 full-time residents.

The scope of the waste being researched was restricted to solid food waste, which was left for disposal by the cafeteria patrons and did not include any liquids, except for milk from cereal. However, the scope of the daily overall food waste output included all food waste, including that of the patrons, and other compostable items (ex. Napkins) for the entire day. Lastly, the scope of our survey distribution was limited to those people eating at the Howe Hall cafeteria, otherwise known as cafeteria patrons. See Appendix A for visual aid.

2. Methods

2.1 Waste Audit

2.1.1 Patron Waste

To achieve an accurate representation of the amount of waste produced by cafeteria patrons, eight meals were chosen to represent three full days of cafeteria activity. These three days of the week were chosen at random and were found to be Wednesday, Thursday and Saturday. Based on researcher availability, March 8th, March 14th and March 17th were chosen for solid waste audit days. In total, 2 breakfasts, 2

lunches, 3 dinners and 1 brunch (brunch takes the place of breakfast and lunch on weekends) were audited. All audit dates were completed within a 2-week period previously set out by the research team.

Measurements were taken on a standard household scale. The unit of measurement on the scale was in pounds, and therefore, our data was recorded in pounds. We chose to do a physical waste audit as opposed to a visual waste audit in order to assign an accurate numerical value to the waste. Due to time and cost restraints, using a household scale was the most feasible method for measuring the weight of the waste.

Patron-produced cafeteria waste was temporarily diverted from its regular path into a secondary bin lined with a plastic bag. At approximately 30 minute intervals, a researcher would first record their own weight in pounds, then remove the plastic bag from the container and record their weight combined with the weight of the food waste, also in pounds. Following that, the waste would be dumped into the green cart and the bag would be disposed of, and a new bag would be placed in the secondary bin. Collection bags were replaced for weight accuracy. Results were recorded on a specific table which included columns for bag number, time collected, tare weight, total weight, net weight, total net weight, total number of patrons per meal and notes (see Appendix B). The number of cafeteria patrons present for each meal was obtained from an Aramark staff member who kept count of the number of patrons entering the cafeteria with a hand-held counting device. This process was repeated throughout the meal until all plates had been scraped and food was no longer served (see Appendix C)

Measurements of net food weight were determined by subtracting the initial measurement of individual weight from the total of individual and food waste. The averages for each individual meal, as well as the averages for the total amount of food waste produced per person, were best represented using measures of central tendency. Considering there were no outliers to skew the data the mean, or average, was the most appropriate measure of central tendency to describe our data. Using the median or mode methods would not have been inclusive of all data, and thus, would have produced inaccurate results compared to the mean.

The audit was reliable in that it used pounds as the unit of measurement. Furthermore, the same scale was used throughout the entire waste audit. Aramark staff were informed of the waste audit and were given specific instructions as to how to dispose of the food waste, which increased the validity of the audit. This increases validity by ensuring that we were only measuring patron-produced food waste.

2.1.1.1 Limitations and Delimitations

There were three major limitations and two major delimitations that affected the results of the patron waste audit. Every patron who enters the cafeteria is recorded by a counting system. Although approximately fifteen to twenty staff members contribute to food waste everyday, they are not included in the patron counting system. Thus, more people contributed to the patron food waste than was accounted for. This slightly skewed our overall results. Secondly, as described in the methods section, two very similar garbage disposals were placed side by side to dispose of regular refuse and compostable scraps. Due to their similarities, it was easy for kitchen staff to confuse the two. Thus, some compostable items were disposed of into the regular refuse bin. Like the unaccounted staff members, kitchen error also resulted in slightly skewed data. This leads to our third limitation, which is time. Given the opportunity to undertake more food waste audits, the results would become more accurate and diminish the effects of kitchen error and also increase overall validity.

Delimitations included inedible waste, the use of a household scale and oversight involved in analyzing weekend data. It was decided by the researchers that data collection would be easiest if all waste, including inedible waste, was included in the audit. Due to time limitations, separating inedible waste from edible waste was not a viable option. As a result, the amount of food waste produced per person appeared to be higher. The second delimitation, the use of a household scale, produces less reliable results because it does not have the same accuracy as the digital platform scale used by Facilities Management. The final delimitation stemmed from attempting to analyze the weekend waste audit data. For one, the brunch data could not be included as either breakfast or lunch, and therefore, would have to stand alone because we had only audited one weekend day. Because of time limitations, it was not feasible to complete a second

weekend day audit, and therefore, we decided to only analyze the weekday audit data. Secondly, the weekend dinner data was not included in the overall data analysis. We came to this conclusion in order to have an equal amount of waste measurements per meal: 2 breakfasts, 2 lunches and 2 dinners.

2.1.2 Kitchen Waste

To understand what percentage of patron-generated waste accounts for the total cafeteria waste, the green bins containing the total cafeteria waste (i.e. both kitchen and patron waste), produced over the course of a day, were weighed in pounds. In order to ensure that the waste weighed was only one day's accumulation, Aramark staff were asked to date a green bin with chalk and place that day's waste in the bin and leave it in their usual spot.

With the help of Dalhousie Facilities Management, these daily green bins were collected and brought to the Facilities Management warehouse at 1459 Oxford St. using a truck equipped with a hydraulic lift. At this location, each bin was weighed separately on a digital platform scale. Individual cart weights were recorded in pounds and then added to represent the total cafeteria output for the recorded date. Following measurement, the carts were returned to the loading dock at Howe Hall in time to be collected by Green Waste. This process was repeated for two days at the end of the 2-week study period.

The above procedures for measurement and analysis were appropriate given the amount of waste to be weighed. Without access to industrial sized equipment, the above task could not have been undertaken. These results were imperative to determining the overall amount of food waste produced in the Howe Hall cafeteria and thus increased the reliability of our results.

2.1.2.1 Limitations and Delimitations

We could ensure more reliable results given the opportunity to repeat this procedure multiple times. Therefore, time was our main limitation. The second limitation of primary significance pertains to food production for external purposes. The Howe Hall kitchen does not prepare food exclusively for patrons of that particular

cafeteria location, but is responsible for catering most events held by the university. Therefore, the amount of waste produced in the kitchen does not precisely represent how much byproduct is produced in the preparation and over-preparation of the cafeteria food supply. There were no delimitations for this portion of the audit.

2.2 Student Survey

The second tool used for our research was a survey (see Appendix D). The purpose of the survey was to investigate the opinions and attitudes of cafeteria patrons on food waste issues within the cafeteria. The cafeteria patron survey was administered at the Howe Hall cafeteria over the course of three days, March 8th, March 14th and March 17th, and at three separate meal times: brunch, lunch and dinner. The heterogeneous sample population consisted of individuals who eat at Howe Hall, and are primarily students. Thus, the importance of students as being core actors in the issue of cafeteria waste was acknowledged. A non-probabilistic, purposive sampling technique was used for the survey. In total, 111 surveys were completed for a residence population of 700 in an attempt to make the sample size representative. This sample size allowed for a ninety-five percent confidence level, and a nine percent confidence interval, and can furthermore be considered to be representative of the Howe Hall cafeteria patron population.

The survey itself consisted of both quantitative and qualitative questions. This was appropriate for the purpose of our project because quantitative questions ensured that we would receive answers in regards to specific variables, while the qualitative questions gave cafeteria patrons the opportunity to express their thoughts on cafeteria waste openly. The qualitative questions also enhanced the catalytic validity of the project, where they worked to “empower people by enhancing their ‘self-understanding’” (Palys, 2003: 77). Furthermore, proposing both types of questions increased the reliability and validity of the data. Having one consistent survey containing two different types of questions, closed and open-ended, ensured reliability or the “degree to which repeated observation of a phenomenon...yields similar results” (Palys, 2003: 435). Validity was ensured by creating the questions ourselves and by providing both open and closed-ended questions. This increased our chances of measuring what we actually intended to assess. (Palys, 2003: 438).

The surveys were self-administered at the Howe Hall cafeteria over the course of three days and three meals: brunch, lunch and dinner. At the beginning of each meal, a researcher was stationed at each of the two entrances of the cafeteria. The survey administrator would ask students, as they were either entering or exiting the cafeteria, if they had a moment to fill out a two-page survey. Our roles as environmental science students were not disclosed unless specifically asked. This was done to ensure impartiality upon completion of the surveys. The participants were provided with a pen and given as much time as they liked to complete the survey. Once completed, the participant was thanked and the survey was placed directly into a brown paper envelope for confidentiality purposes. Surveys were administered over the duration of the meal and ended when the cafeteria doors closed.

The 111 surveys were analyzed according to the type of question that was asked: closed-ended or open-ended. The closed-ended questions were analyzed using nominal or categorical measurement techniques. To begin, all surveys were numbered 1-111. For each of the ten closed-ended questions, there was a series of possible letter responses. A coding system was implemented that matched numbers to letters in an ordinal fashion. Using Excel, we determined how often each response appeared in the surveys. This method of analysis was appropriate for the closed-ended data, as it was the most efficient and systematically consistent way of analyzing the results. Furthermore, this method allowed the results to be easily translated into chart and table form. The six open-ended answers were analyzed in a different manner. All of the open-ended responses were compiled into a word document according to the question number. For example, all 111 responses for a specific question were lumped together. Once all of the written responses were recorded, the data was further analyzed using the grounded a posteriori method. As each response was analyzed, common themes such as “poor food quality”, for example, were given a category. Every time a common response appeared in an answer, it was recorded. Responses that were mentioned only once, or that had unique themes, were placed into an “other” category. This was the most efficient and accurate way of analyzing the open-ended data. Translating the data into tables, graphs and charts was made easier through the categorization of answers by common theme. All of the survey

data was analyzed and represented as a distribution of variables, which made the results easy to compare.

2.2.1 Limitations and Delimitations

The main limitation to the survey was time. More surveys could have been administered if we had more time. Another limitation was patron willingness to participate. More surveys could have been filled out if more people were willing to participate. This could have increased reliability and validity. Some delimitations to the survey included the amount of open-ended questions, survey responses and the chosen sample population. There were a total of six open-ended questions on the survey. Some survey participants neglected to fill out the second page of the survey, as it contained most of the open-ended questions and were cumbersome to answer. Furthermore, in analyzing our data, we had not anticipated that some surveys would have inappropriate responses, or have questions that were left completely unanswered. As a result, some of the open-ended questions do not reflect responses from 111 cafeteria patrons, therefore, the closed-ended questions are more representative of the sample of cafeteria patrons surveyed. Our third delimitation pertains to our chosen sample population, which was the 700 students who reside in Howe Hall. We chose this sample population assuming that the majority of Howe Hall cafeteria patrons would be Howe Hall residents. However, we acknowledge the fact that not all cafeteria patrons are Howe Hall residents, or even students for that matter. As a result, our sample size may not be representative of the typical volume of Howe Hall cafeteria patrons.

3. Results

3.1 Food Waste Audit

The average amount of food waste being produced in the Howe Hall cafeteria was calculated to be 500 lbs. Cafeteria patrons' food waste accounted for 257 lbs of the total average, which is over half of the total waste of the cafeteria. The waste audit calculated the average amount of patron food waste produced during breakfast, lunch and dinner,

and the average food waste per meal are presented in Figure 1. The results show that dinner produced the most amount of patron food waste, at an average of 106 lbs.

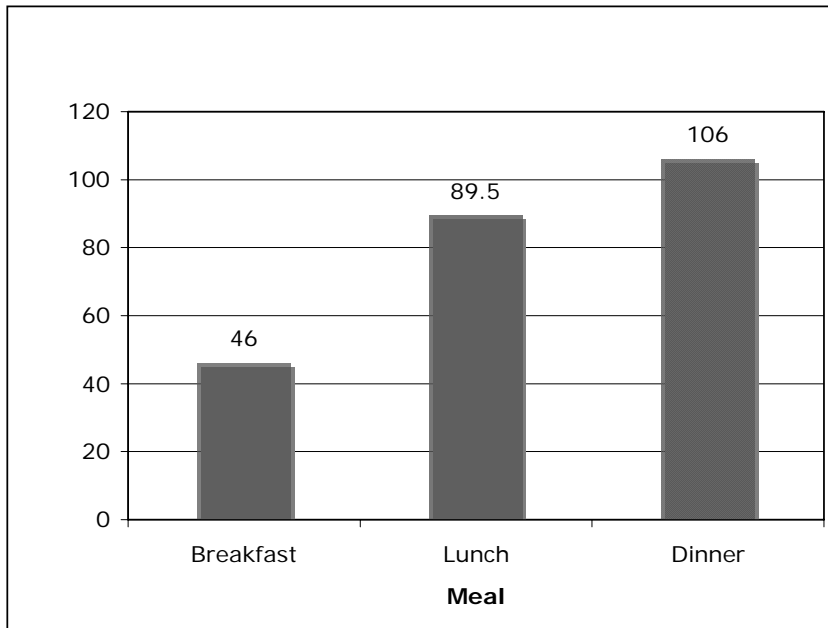


Figure 1. The average amount of patron food waste produced per meal resulting from two randomly selected days of food waste auditing.

Figure 2 shows the average amount of cafeteria patrons eating during each meal and the average amount of waste produced during each meal.

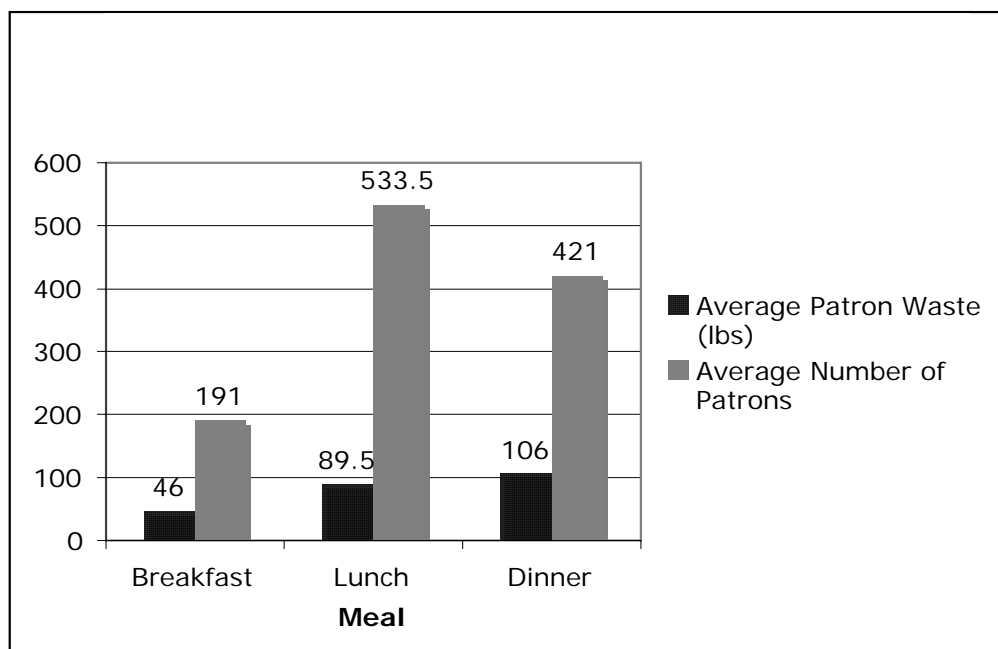


Figure 2. Relationship between the average number of patrons per meal and the average amount of patron food waste per meal. This data was obtained from two randomly selected days of food waste auditing.

Figure 2 demonstrates that although, on average, lunch had the highest amount of patrons at 522.5 attendees, it did not have the highest amount of food waste. Dinner had the second highest amount of patrons, at 421 on average, yet it produced the largest average amount of food waste.

Figure 3 provides the average amount of food waste produced per person eating in the cafeteria. It shows that dinner, on average, produced 0.27 lbs of waste per person. This demonstrates that dinner was found to be the most wasteful meal of the day, followed by breakfast, which has an average amount of waste per person of 0.25 lbs. Lunch, was therefore the least wasteful meal of the day with an average amount of food waste per person of 0.17 lbs, which is 63% less wasteful than breakfast and 68% less wasteful than dinner.

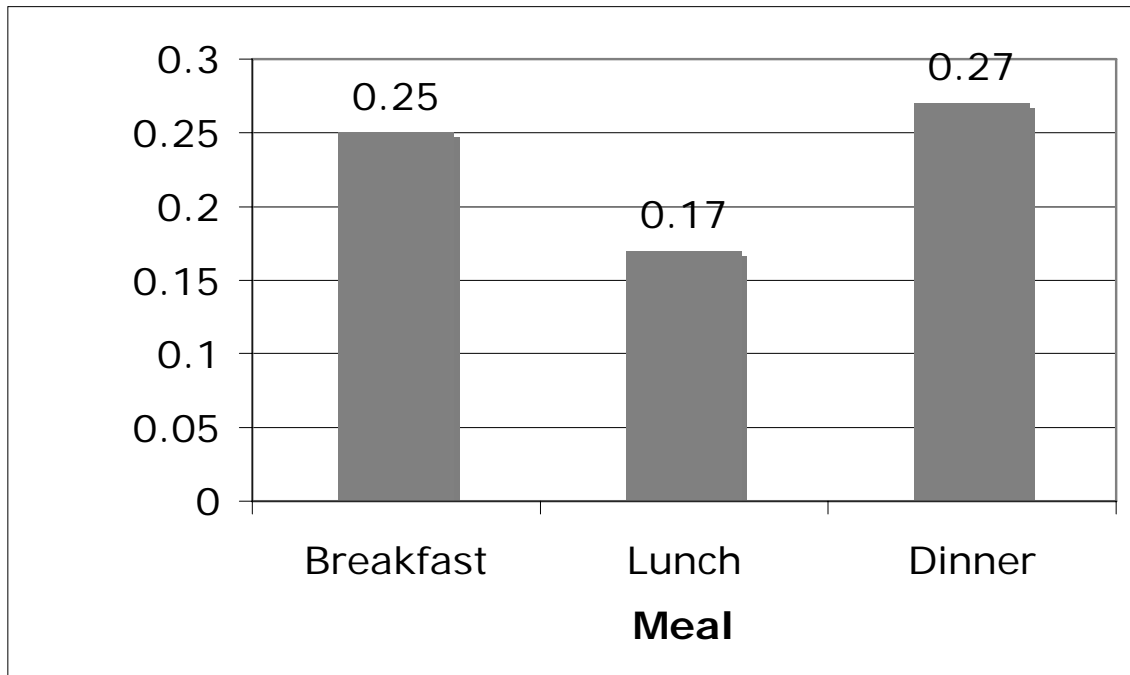


Figure 3. The average amount of food waste produced per patron per meal according to two randomly selected days of auditing.

3.2 Student Survey:

There were 111 surveys completed by Howe Hall cafeteria patrons and Figure 4 depicts the most common patron demographics that were obtained through these surveys. Over 90% of the surveyed patrons are undergraduate students that live in Dalhousie residences with an Aramark meal plan. It can also be seen that 55.4% of students acknowledge to regularly leave $\frac{1}{4}$ of a tray of waste for disposal and 69% are aware of the amount of waste they are leaving for disposal.

The surveys also showed that of the 92% of students that were not completely satisfied with their current plan, 80% of them felt that the reasons they are unsatisfied, in some way, contribute to the amount of food waste generated at Howe Hall cafeteria.

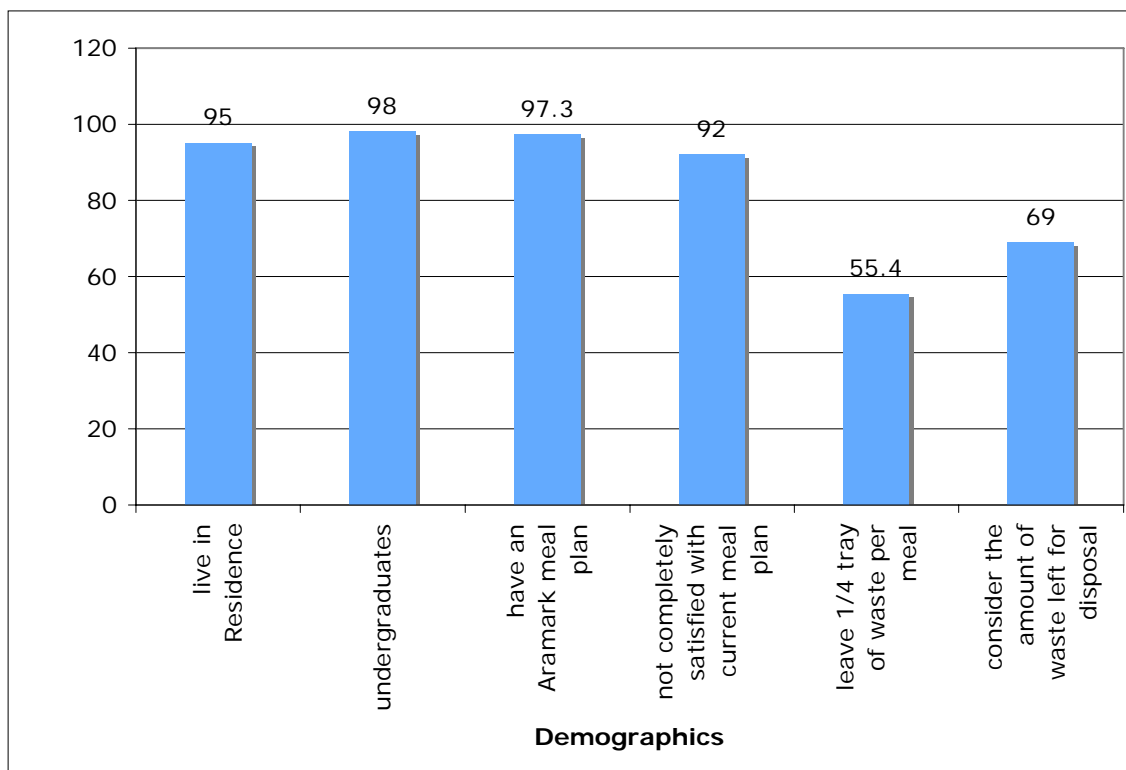


Figure 4. A depiction of the average demographic information gathered from 111 surveys filled out by patrons of Howe Hall cafeteria.

The survey also highlighted the major factors students found to be influencing their food waste and the results are represented in Figure 5. We found that 47% of patrons think the food is of poor quality/taste and 33% feel that their waste simply results from taking too much food. Another 8% of the patrons felt that poor food choice/variety contributed to the amount of food waste they produced. The other 12% of the patrons surveyed felt that either the cafeteria hours of operation, laziness, amount of food prepared by the kitchen or other miscellaneous reasons influenced their food waste in the Howe Hall cafeteria.

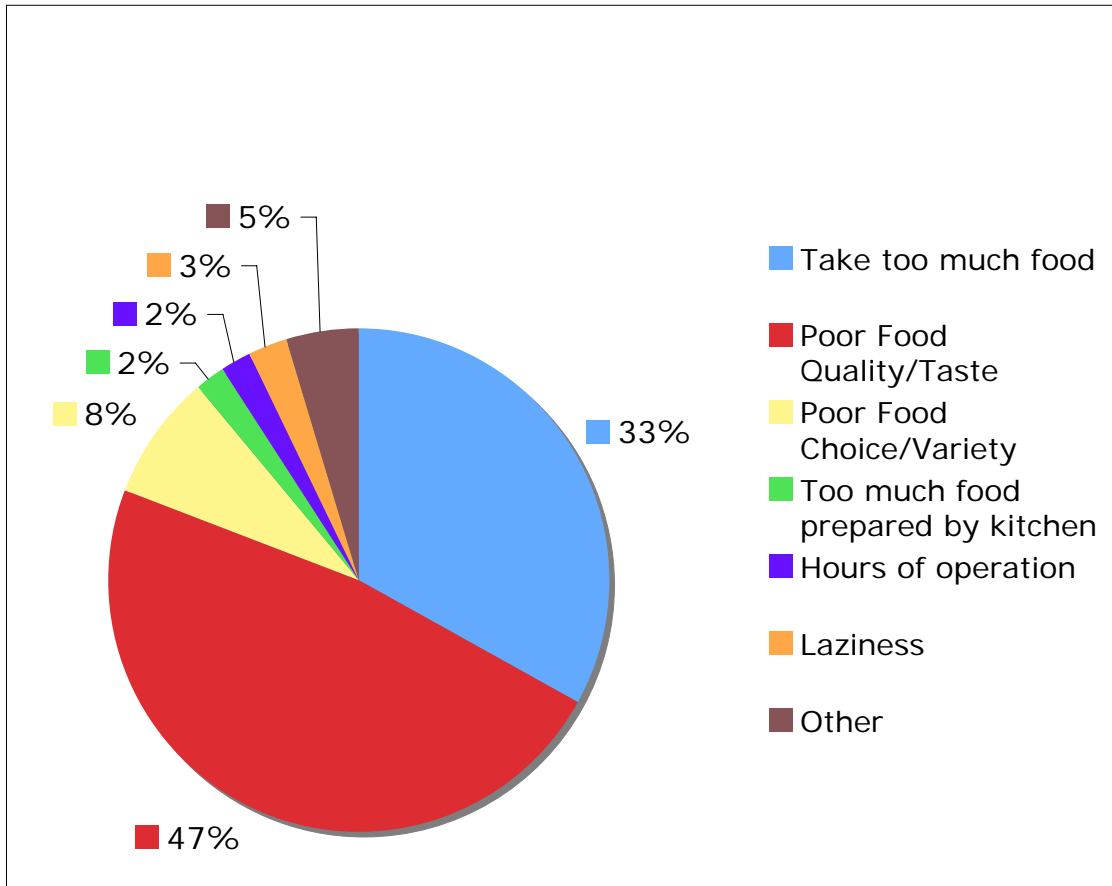


Figure 5. The factors influencing food waste at the Howe Hall cafeteria according to the results of 111 surveys completed by patrons who eat there.

Finally, we extracted the suggestions that cafeteria patrons had for reducing the amount of food waste they produce in the Howe Hall cafeteria (see Figure 6). Of the students surveyed, 38% felt that increasing food quality and taste would be a way to reduce the amount of patron food waste. The second most popular suggestion was a combination of having controlled portion sizes and a change in the type of meal plan provided. Some of the other suggestions included having more food variety, composting the waste, and having advertising and educational initiatives. It was also suggested that increasing communication between management and students, increasing the cafeteria hours of operation and having patrons scrape their own plates would help reduce the amount of food waste produced.

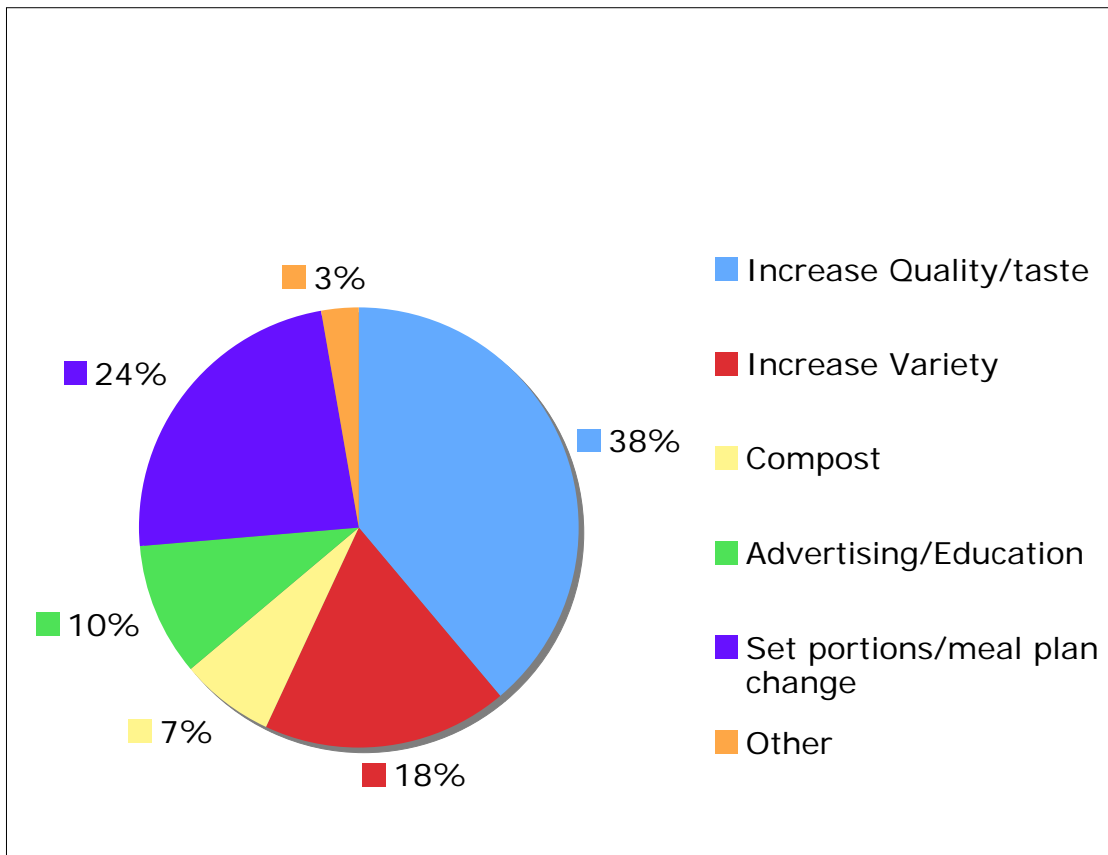


Figure 6. Suggestions for reducing food waste at Howe Hall cafeteria according to surveys completed by 111 patrons.

4. Discussion

4.1 Food Audit

Analyzing the average amount of waste produced at each meal showed that breakfast produced the least amount of waste with an average of 46 lbs, followed by lunch with an average 89.5 lbs, and dinner with an average 106 lbs (see figure 1). Caution needed to be taken when analyzing this data in order to avoid inference that breakfast was the least wasteful meal. This analysis did not incorporate the average total number of patrons present during each meal. Upon including the number of patrons present, the average amount of waste per person was calculated. This made it very clear

which meals were actually the most wasteful (see Figure 3). Based on the average amount of waste per person it was found that dinner was the most wasteful meal, followed by breakfast, then lunch. Interestingly, lunch had the highest attendance rate and was 63% less wasteful than breakfast and 68% less wasteful than dinner.

One reason for lunch having a drastically lower average amount of waste per person could include the fact that lunch consists mainly of staple foods such as sandwiches, salads, and soups. Therefore, patrons are less likely to experiment with foods they have never eaten before and even have input into the creation of their meals at the salad or sandwich stations. This reduces the chance of selecting something they do not like and will not eat.

It can also be inferred that dinner was the most wasteful meal because it has the largest amount of food selection and variation. A large amount of waste was not unexpected because patrons have the option to take unlimited portions of prepared food they are unsure they will enjoy. Based on survey results 47% of patrons feel the food is of poor quality. This increases the chance that food will be unsatisfying and left uneaten. Also, the provisions of the all-you-can-eat meal plan provide unlimited portions and the option to try all available food. Ultimately, this has led to the contribution of overall food waste during dinner.

Although breakfast was nearly as wasteful as dinner, with average food waste per person equaling 0.25 lbs compared to 0.27 lbs, we suspect the reasons are different than those outlined above. Breakfast waste consisted of a large portion of inedible waste, such as grapefruit rinds, which are quite heavy. Also there was a lot of cereal milk, which was included as food waste and this may have contributed to the high level of average waste produced in pounds during breakfast.

A comparison of these findings to a food waste audit performed at St. Francis Xavier's cafeteria shows that Howe Hall produced a much greater average amount of food waste per person per meal. The St. Francis Xavier waste audit averaged the amount of waste from breakfast, lunch and dinner together with the average amount of patrons for each meal and obtained an average amount of waste per person per meal to be 0.12 lb (Malhotra, 2007). Based on the results shown in Figure 3, the Howe Hall cafeteria has an average amount of waste of 0.22 lbs per person per meal:

$$(0.27 \text{ lbs} + 0.25 \text{ lbs} + 0.17 \text{ lbs})/3 = 0.22 \text{ lbs per person per meal}$$

This shows that the Howe Hall cafeteria generates nearly 50% more waste than that of St. Francis Xavier's. Therefore, given that St. Francis Xavier deemed a lesser amount of food waste inappropriate, it is evident that Howe Hall cafeteria produces an unacceptable amount of food waste.

Another significant finding was that the average total amount of waste produced at the Howe Hall cafeteria was 500 lbs and that the portion of waste produced by the kitchen and patrons closely represented a 1:1 ratio.

4. 2 Survey Discussion

Upon analyzing the 111 completed surveys, conclusions were drawn regarding the factors influencing patron food waste and suggestions as to how that waste can be decreased. The initial survey questions determined demographic information that confirmed the homogenous characteristics of our survey participants. According to Figure 4 in the results section, 95.5% live in student residence, 98.2% are working towards their undergraduate degree, and 97.3% have an Aramark meal plan. This information is pertinent in that it ensured that we surveyed our intended population.

One of the most considerable findings from our surveys was that 92.2% of students surveyed are not completely satisfied with their current meal plan and that 80% of these students feel the reasons they are unsatisfied contribute, in some way, to the amount of food waste generated in Howe Hall cafeteria. Upon determining this, the next logical step was to analyze the results with the intention of revealing the reasons behind patron dissatisfaction. Figure 5 exemplifies our findings. Patrons were asked: “[w]hat do you think are the major factors influencing food waste at the Howe Hall cafeteria?” An overwhelming 47% contributed their food waste to poor food quality and taste.

Knowing this, the most logical solution to reducing food waste would be to improve the taste and overall quality; however, this is an unrealistic solution. Food taste is a very subjective variable and thus cannot be improved with a definitive ingredient or cooking utensil. In addition, if taste and quality were improved, it would be likely that after eating the same meals for an 8 month period, the results would still hold food taste and quality accountable for patron waste. Considering this, we focused our attention on

the next largest statistic which attributed 33% of food waste to patrons taking too much food initially. Again, following the next logical step, we analyzed the data to determine reasons behind why students “took too much initially”. We were led to student recommendations that indirectly answered this question and also provided suggestions as to how food waste produced by the patrons of Howe Hall cafeteria can be minimized.

For the reasons outlined above, we have disregarded the statistics suggesting “Increased Quality/Taste” and “Increased Variety” (see Figure 6). Instead, we have redirected our attention to the 24% that suggest a change in meal plan. Currently the cafeteria serves an ‘all you can eat’ meal plan. Survey results suggest that food waste would be reduced if meal portions were pre-set and patrons were required to purchase each meal accordingly. Included in this statistic were suggestions to also increase the hours of operation and allow patrons to re-enter the cafeteria for snacks.

Another noteworthy recommendation was to initiate an advertising campaign to raise awareness about food waste and increase educational outreach. The need for more education and awareness pertaining to food waste was made obvious by the 7% statistic of patrons recommending composting procedures as a reduction strategy. Since composting is already an active practice at Howe Hall cafeteria, and does not actually reduce the amount of waste produced, this suggestion highlights the lack of patron knowledge pertaining to their food waste. An example of an educational poster was created from the project data (see Appendix E).

The final suggestion worth mentioning was to increase communication between Howe Hall patrons and management. Although the suggestion was of relatively low frequency, we see it as a viable solution to decreasing the amount of waste produced. Weekly or monthly meetings or even a residence food committee could better relay what patrons would prefer.

5. Conclusion

Upon the completion of the Howe Hall cafeteria waste audit and the patron surveys, several conclusions have been made based on the results. Furthermore, some of the shortcomings of our research and their implications on our results have been

discussed. Three main conclusions have been drawn from our discussion and are summarized below:

- The contributions to total solid organic waste production is approximately 1:1 between the cafeteria kitchen waste and the uneaten waste coming from the patrons
- The greatest contributing factor to patron food waste, aside from poor taste, was determined to be the ability of students to take as much food as they wanted, but not necessarily needed
- In comparison with improving food quality and taste, as well as overhauling the entire meal plan, one of the most viable strategies to reducing food waste would be student education and open communication with management

Because this project was only a first step out of many potential steps, we have generated recommendations for further research. There are three proposed areas of research that should be investigated:

- A full waste audit needs to be performed on the cafeteria in order to gain an accurate depiction of the extent of solid food waste produced in the meal production processes as well as the disposal of any uneaten prepared food
- A comprehensive comparative study of the 'all you can eat' and 'pay as you go' meal plans should be done in order to assess the social, economic and environmental benefits and drawbacks to both programs. This should be done with the intention of determining the most effective and efficient meal plan
- A follow-up study assessing the amount of patron solid food waste being produced after the implementation of an education program should be undertaken. This will provide information on the effectiveness of a food waste awareness campaign within the residence halls

Ultimately, the reduction of solid food waste on the Dalhousie campus is vital to the greening the campus goal and there are many necessary steps that still need to be taken. Ideally, this preliminary study of solid food waste within the Howe Hall cafeteria will offer a foundation and starting point for the future studies. Solid food waste involves many actors, and if everyone plays their roles, a lot more than just food will be saved.

6. Acknowledgments

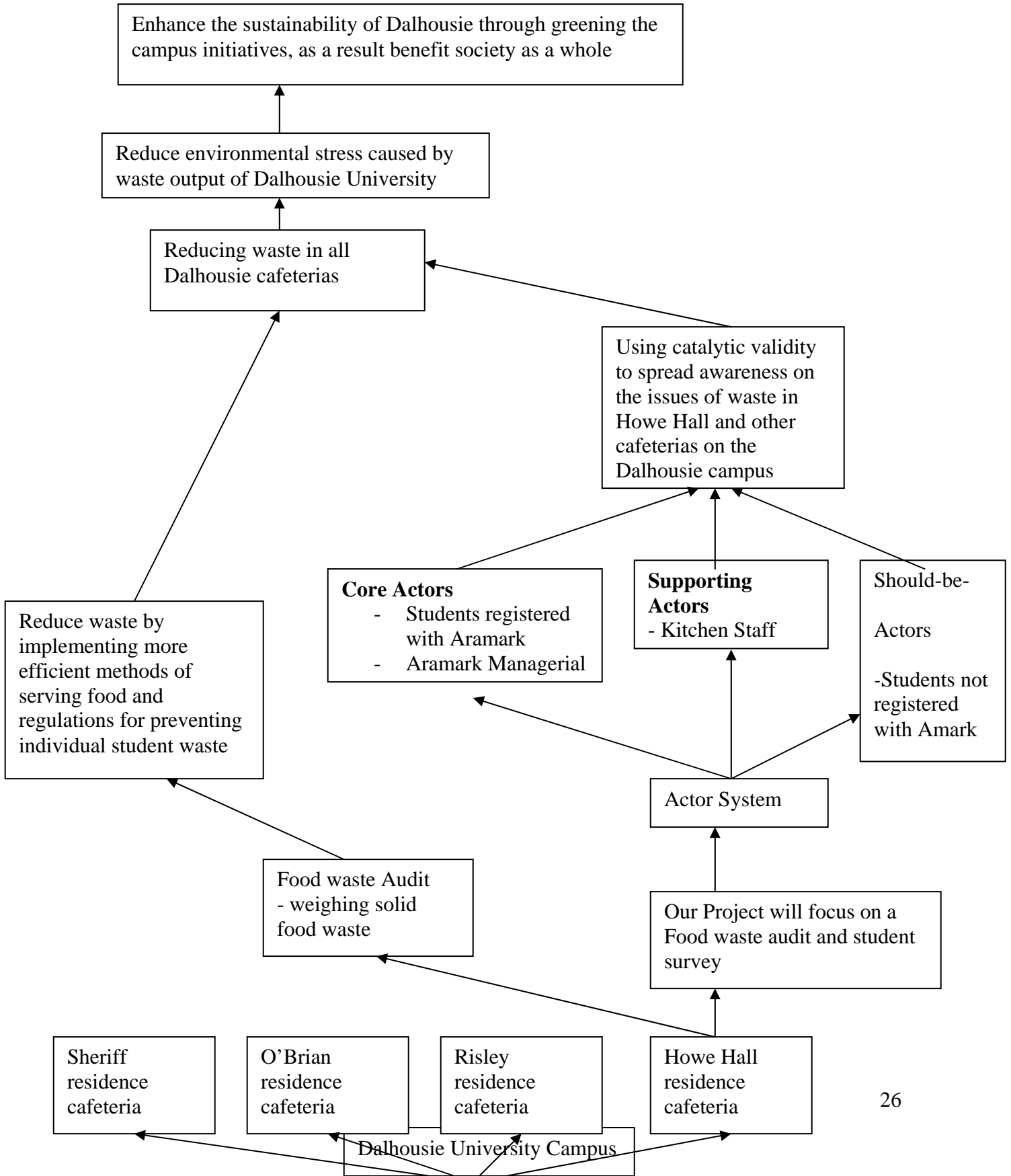
The researchers associated with this project would like to thank Dr. Tarah Wright for her guidance offered throughout the duration of the project. We would also like to thank Mr. Derrick Hines who is the food service director for Aramark on Dalhousie campus and Mr. Mahesh Lakshmanan, the in-house manager for the Howe Hall Cafeteria. Without Mr. Hines and Mr. Lakshmanan's kind and generous support, this project would never have been possible. We would also like to extend our thanks to the cafeteria staff that worked to help us with the collection of our data during the waste audits. In addition, we would like to thank Michael Murphy from Dalhousie Facilities Management, as weighing the overall cafeteria waste would not have been possible without his help.

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Appendix A – Visual Conception of Scope

Reducing waste from Dalhousie food services



Appendix B – Waste Audit Data Sheet

| Bag Number | Time | Weight of Individual Pounds | Weight of Indiv. + Bag Pounds | Net Weight Pounds | Notes (if any) |
|------------|------|-----------------------------|-------------------------------|-------------------|----------------|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Date:

Meal:

Researchers:

Appendix C – Waste Audit Data

Date: March 8th, 2007
Meghan and Jessica

Meal: Breakfast

Researchers:

| Bag Number | Time Collected | Tare Weight Individual Only (lbs) | Total Weight Individual+Bag (lbs) | Net Weight Waste Only (lbs) | Notes (if any) |
|------------------------------|----------------|-----------------------------------|-----------------------------------|-----------------------------|---|
| 1 | 9:15 am | 145 | 165 | 20 | |
| 2 | 9:52 am | 149 | 140 | 9 | -started at 7:55 -scale only goes to 200 -there was 117 people -a lot of food is not really waste because it's skin of grapefruit, etc. but it is still weighted -staff are allowed one meal per shift however this is not counted |
| Total Net Waste (lbs): 29 | | | | | |
| Total Number of Patrons: 204 | | | | | |

Date: March 8th, 2007

Meal: Lunch

Researchers: Mischa and Greg

| Bag Number | Time Collected | Tare Weight Individual Only (lbs) | Total Weight Individual+Bag (lbs) | Net Weight Waste Only (lbs) | Notes (if any) |
|---------------------------------------|----------------|-----------------------------------|-----------------------------------|-----------------------------|----------------|
| 1 | 11:25 am | 210 | 231 | 21 | |
| 2 | 12:15 pm | 210 | 228 | 18 | |
| 3 | 1:05 pm | 210 | 236 | 26 | |
| 4 | 1:30 pm | 170 | 196 | 26 | |
| 5 | 2:00 pm | 170 | 181 | 11 | |
| Total Net Waste (lbs): 102 | | | | | |
| Total Number of Patrons: at 4:00: 759 | | | | | |

Date: March 8th, 2007
and Sarah

Meal: Dinner

Researchers: Aelita

| Bag Number | Time Collected | Tare Weight Individual Only (lbs) | Total Weight Individual+Bag (lbs) | Net Weight Waste Only (lbs) | Notes (if any) |
|------------------------------|----------------|------------------------------------|-----------------------------------|-----------------------------|----------------|
| 1 | 4:20 pm | 199 | 229 | 30 | |
| 2 | 5:30 pm | 140 | 160 | 20 | |
| 3 | 5:45 pm | 144 | 161 | 17 | |
| 4 | 6:15 pm | 157 | 173 | 16 | |
| 5 | 6:45 pm | 144 | 165 | 26 | |
| 6 | 7:15 pm | 157 | 186 | 29 | |
| Total Net Waste (lbs): 138 | | | | | |
| Total Number of Patrons: 448 | | | | | |

Date: March 10th, 2007
and Aelita

Meal: Brunch

Researchers: Greg

| Bag Number | Time Collected | Tare Weight Individual Only (lbs) | Total Weight Individual+Bag (lbs) | Net Weight Waste Only (lbs) | Notes (if any) |
|------------------------------|----------------|-----------------------------------|-----------------------------------|-----------------------------|----------------|
| 1 | 11:55 am | 210 | 223 | 13 | |
| 2 | 12:45 pm | 141 | 161 | 20 | |
| 3 | 1:25 pm | 141 | 160 | 19 | |
| 4 | 2:10 pm | 141 | 156 | 15 | |
| 5 | 2:35 pm | 141 | 162 | 21 | |
| Total Net Waste (lbs): 88 | | | | | |
| Total Number of Patrons: 361 | | | | | |

Date: March 10th, 2007
and Jason

Meal: Dinner

Researchers: Mischa

| Bag Number | Time Collected | Tare Weight Individual Only | Total Weight Individual+Bag | Net Weight Waste Only | Notes (if any) |
|------------------------------|----------------|-----------------------------|-----------------------------|-----------------------|--------------------|
| 1 | 5:33 pm | 168 | 187 | 19 | - first dinner bag |
| 2 | 6:00 pm | 170 | 185 | 15 | |
| 3 | 6:30 pm | 168 | 185 | 17 | |
| 4 | 6:55 pm | 170 | 187 | 17 | |
| 5 | 7:05 pm | 170 | 187 | 6 | |
| Total Net Waste (lbs): 74 | | | | | |
| Total Number of Patrons: 354 | | | | | |

Date: March 14th, 2007

Meal: Breakfast

Researchers: Jason

| Bag Number | Time Collected | Tare Weight Individual Only (lbs) | Total Weight Individual+Bag (lbs) | Net Weight Waste Only (lbs) | Notes (if any) |
|------------------------------|----------------|-----------------------------------|-----------------------------------|-----------------------------|--|
| 1 | 9:25 am | 168 | 182 | 14 | |
| 2 | 10:15 am | 168 | 185 | 17 | |
| 3 | 12:00 pm | 168 | 183 | 15 | - continental and remainder of breakfast was mostly grapefruit peels and yogurt. |
| Total Net Waste (lbs): 46 | | | | | |
| Total Number of Patrons: 178 | | | | | |

Date: March 14th, 2007

Meal: Lunch

Researchers:

Jason

| Bag Number | Time Collected | Tare Weight Individual Only(lbs) | Total Weight Individual+Bag (lbs) | Net Weight Waste Only (lbs) | Notes (if any) |
|------------------------------|----------------|----------------------------------|-----------------------------------|-----------------------------|----------------|
| 1 | 12:15 pm | 168 | 336 | 17 | |
| 2 | 1:05 pm | 168 | 187 | 19 | |
| 3 | 1:30 pm | 168 | 187 | 19 | |
| 4 | 2:10 pm | 168 | 190 | 22 | |
| Total Net Waste (lbs): 22 | | | | | |
| Total Number of Patrons: 220 | | | | | |

Date: March 14th, 2007
and Greg

Meal: Dinner

Researchers: Jessica

| Bag Number | Time Collected | Tare Weight Individual Only | Total Weight Individual+Bag | Net Weight Waste Only | Notes (if any) |
|------------------------------|----------------|-----------------------------|-----------------------------|-----------------------|--|
| 1 | 4:00 pm | 210 | 256 | 46 | - had to lay waste on a tray because it was too heavy for a bag |
| 2 | 5:25 pm | 145 | 161 | 16 | - noticed bits of food in garbage |
| 3 | 5:45 pm | 210 | 231 | 21 | |
| 4 | 6:15 pm | 145 | 160 | 15 | - someone didn't know what was going on and putting food waste in the garbage - got some of it out, hard to tell how much went into the garbage |
| 5 | 6:45 pm | 210 | 233 | 23 | |
| 6 | 7:16 pm | 145 | 170 | 25 | |
| Total Net Waste (lbs): 146 | | | | | |
| Total Number of Patrons: 430 | | | | | |

Appendix D – Cafeteria Patron Survey

Survey: Food Waste in Howe Hall's Cafeteria

A group of students currently enrolled at Dalhousie University created this survey to compile information from cafeteria patrons regarding their views with respect to the food in Howe Hall cafeteria.

General Information

1. During the school year, where do you live?
 - a) Dalhousie Residence
 - b) Off-campus housing
 - c) Other: _____

2. If you are a student, please indicate your year of study. If you are not a student please skip to question 4.
 - a) First year undergrad
 - b) Second year undergrad
 - c) Third year undergrad
 - d) Fourth year undergrad
 - e) Grad Student
 - f) Other: _____

3. What is your current or intended major? _____

Food Information

4. Are you currently registered with an Aramark Meal Plan
 - a) Yes
 - b) No

5. What Aramark Meal plan are you currently registered for?
 - a) 10 meals per week
 - b) 14 meals per week
 - c) 19 meals per week
 - d) other

6. On average, how many meals a week do you eat at Howe Hall?
 - a) 0-1
 - b) 2-6
 - c) 7-13
 - d) 14-19

7. Please indicate the approximate amount of uneaten food left on your tray during an average meal.
 - a) None of the tray
 - b) 1/4 of tray
 - c) 1/2 of tray
 - d) 3/4 of tray
 - e) whole tray

8. If you leave uneaten food on your tray, do you ever consider the amount you leave for disposal?
 - a) Yes
 - b) No

Please Explain:

9. What do you think are the major factors influencing food waste at the Howe Hall cafeteria?
10. Do you have suggestions for reducing the amount of food waste generated in the Howe Hall cafeteria?
11. How would you go about implementing programs to reduce food waste in the Howe Hall cafeteria?
12. Are you satisfied with your current meal plan arrangement?
- a) completely unsatisfied
 - b) somewhat unsatisfied
 - c) somewhat satisfied
 - d) completely satisfied
13. If you are not completely satisfied, in what areas would you suggest improvement? (Circle all that apply)
- a) Food Taste
 - b) Nutritional Value
 - c) Freshness
 - d) Food Sustainability – local, organic, seasonal
 - e) Waste efficiency
 - f) Speed efficiency
 - g) Cafeteria atmosphere
 - h) Atmosphere
 - i) Hours of operation
 - j) Other: _____
14. Do you feel that the areas you checked off in question 13, in some way, contribute to the amount of food waste generated at Howe Hall cafeteria? If so, how?
-
15. Is there anything else you would like to say about food services and/or food waste in the Howe Hall cafeteria?

Appendix E – Educational Poster

**I WANT YOU
TO THINK ABOUT
FOOD WASTE**

**You are the Actor
Play your Role**

**Howe Hall Cafeteria creates 500 lbs of solid food waste
daily, further burdening the HRM's exacerbated Green
Waste Facilities**

Appendix F – Ethics Form

ENVIRONMENTAL PROGRAMMES

FACULTY OF SCIENCE

DALHOUSIE UNIVERSITY

APPLICATION FOR ETHICS REVIEW OF RESEARCH INVOLVING HUMAN PARTICIPANTS

UNDERGRADUATE THESES AND IN NON-THESIS COURSE PROJECTS

GENERAL INFORMATION

1. **Title of Project:** Organic Waste Investigation of the Howe Hall Cafeteria (??)

| | | | |
|--|--|-------------|----------------|
| 2. Faculty Supervisor(s) Tarah Wright tarah.wright@dal.ca | Department Environmental Science | Ext: | e-mail: |
|--|--|-------------|----------------|

| | | | |
|---|--|--|--------------|
| 3. Student Investigator(s) Telephone Number: Jessica Budgell Mischa Couvrette Jason Couse 429-3435 Meghan Hopper Aelita Neimanis Gregory Onions | Department Environmental Studies | e-mail: couse@dal.ca | Local |
|---|--|--|--------------|

4. **Level of Project:**
Non-thesis Course Project Undergraduate Graduate Specify course and number: ENV3502

5. a. **Indicate the anticipated commencement date for this project:** Feb. 26/07

b. **Indicate the anticipated completion date for this project:** March 27/07

SUMMARY OF PROPOSED RESEARCH

1. Purpose and Rationale for Proposed Research

Briefly describe the purpose (objectives) and rationale of the proposed project and include any hypothesis(es)/research questions to be investigated.

The objective of this research is to contribute to the “Greening the Campus” project by identifying ways to reduce environmental stresses caused by the output of solid food waste from Dalhousie food services. This will be done by

- a) Performing a waste audit to determine how much solid food is leaving the Howe Hall cafeteria as waste and to pinpoint its source
- b) surveying students that regularly visit the cafeteria about their values towards food waste and to take suggestions about any other areas that the cafeteria may be contributing to the problem, and how to remedy these issues
- c) exploring alternative possibilities for meal plans and waste management
- d) promoting awareness of waste issues to cafeteria customers and staff

Hypothesis: The amount of solid food waste being disposed of by the Howe Hall cafeteria is unnecessarily large and is a result of the all-you-can-eat meal plan in place and the attitudes and values of cafeteria customers.

Research Question: To what extent is solid food being wasted in the Howe Hall cafeteria?

2. Methodology/Procedures

- a. ***Which of the following procedures will be used? Provide a copy of all materials to be used in this study..***

- Survey(s) or questionnaire(s) (mail-back)
- Survey(s) or questionnaire(s) (in person)
- Computer-administered task(s) or survey(s)]
- Interview(s) (in person)
- Interview(s) (by telephone)
- Focus group(s)
- Audio taping
- Videotaping
- Analysis of secondary data (no involvement with human participants)
- Unobtrusive observations
- Other, specify Direct Measurement: weighing food waste

- b. **Provide a brief, sequential description of the procedures to be used in this study. For studies involving multiple procedures or sessions, the use of a flow chart is recommended.**

Food Audit: **First, we need to find out where the food goes directly from the plates**

- a. Choose a day to audit (1 of 3?) b. weigh bins at the end of each meal using ? scale c. record weight of food in kgs, round up to the nearest tenth.

Student Survey:

- a. Wait at entrance to cafeteria at chosen time during the meal b. random start – introduce ourselves, overview confidentiality, and offer survey to the first person entering the cafeteria c. ask them to fill out the survey (there? During their meal?) d. repeat process with every 5th person for 10 people?

3. Participants Involved in the Study

- a. **Indicate who will be recruited as potential participants in this study.**

Dalhousie Participants: Undergraduate students
 Graduate students
 Faculty and/or staff
 Non-Dal Participants: Children
 Adolescents
 Adults
 Seniors
 Persons in Institutional Settings (e.g. Nursing Homes, Correctional Facilities)
 Other (specify): Any guest who may enter the

cafeteria

- b. **Describe the potential participants in this study including group affiliation, gender, age range and any other special characteristics. If only one gender is to be recruited, provide a justification for this.**

The potential participants of this study are anyone who subscribes to a Dalhousie residence meal plan who eat at the Howe Hall cafeteria on the proposed audit dates, as well as a small number of Aramark staff members. Most individuals using the cafeteria on these days will be Dalhousie students in their first year of study, and upper year students as Residence Assistants (RAs). A large number of this group will fall into the age bracket of 17-22 years. The participants will be chosen at random but should be a roughly accurate representation of male and female populations as well as student and RA populations.

- c. **How many participants are expected to be involved in this study?** 100

4. Recruitment Process and Study Location

- a. **From what source(s) will the potential participants be recruited?**

- Dalhousie University undergraduate and/or graduate classes
- Other Dalhousie sources (specify):
- Local School Boards
- Halifax Community
- Agencies
- Businesses, Industries, Professions
- Health care settings, nursing homes, correctional facilities, etc.
- Other, specify (e.g. mailing lists): Howe Hall cafeteria attendees

b. Identify who will recruit potential participants and describe the recruitment process.

Provide a copy of any materials to be used for recruitment (e.g. posters(s), flyers, advertisement(s), letter(s), telephone and other verbal scripts).

Each member of the project will have an opportunity to recruit participants as they enter the cafeteria. Participants will be approached individually and will be verbally debriefed on the project, confidentiality and survey. Aramark employee participants will be requested to participate at random.

5. Compensation of Participants

Will participants receive compensation (financial or otherwise) for participation? Yes No

If Yes, provide details:

6. Feedback to Participants

Briefly describe the plans for provision of feedback and attach a copy of the feedback letter to be used.

Wherever possible, written feedback should be provided to study participants including a statement of appreciation, details about the purpose and predictions of the study, contact information for the researchers, and the ethics review and clearance statement. Moreover, several educational components such as brochures and posters will be implemented to create catalytic validity. Our project recognizes the benefits of catalytic validity and as an essential outcome will attempt to create “self-knowledge” on the issue of waste. Feedback to participants is of utmost priority to create change in our residence dining halls.

Note: When available, a copy of an executive summary of the study outcomes also should be provided to participants.

POTENTIAL BENEFITS FROM THE STUDY

- 1. Identify and describe any known or anticipated direct benefits to the participants from their involvement in the project.**

This project is catalytically valid because it aims to raise staff and student awareness of food waste and waste management on campus. Those who participate in the surveys will become more conscious of their actions, which in return, may persuade them to waste less.

- 2. *Identify and describe any known or anticipated benefits to society from this study.***

A solid food waste audit of the Howe Hall cafeteria will provide the university and Aramark with concrete data on waste amounts. If the amounts are considered to be high, the university, in co-operation with Aramark, may examine some alternatives to student meal plans and waste management to be applied to all Dalhousie food service providers. Along with the raised awareness of cafeteria staff and customers, these structural changes have the potential to greatly reduce solid food waste generated on Dalhousie campus therefore helping to minimize the environmental stress

POTENTIAL RISKS TO PARTICIPANTS FROM THE STUDY

- 1. For each procedure used in this study, provide a description of any known or anticipated risks/stressors to the participants. Consider physiological, psychological, emotional, social, economic, legal, etc. risks/stressors**

Food Audit:

[x] No known or anticipated risks for study participants (students).

Minimal risk
Potential physiological risks to researchers from inhaling, handling or lifting solid food waste. Psychological risk as a result of the potentially arduous process of completing the audit.

Greater than minimal risk

Student Survey:

No known or anticipated risks for study participants because the proposed survey does not touch on sensitive or deeply personal topics and all participants will remain anonymous. For this reason most participants should feel comfortable answering the survey honestly.

Minimal risk

Greater than minimal risk

2. Describe the procedures or safeguards in place to protect the physical and psychological health of the researchers and participants in light of the risks/stresses identified in Question 1.

Food Audit: Researchers will be fully equipped with safety gear and protection including gloves and masks as well as any other necessary protective apparatus. Researchers performing the audits will do so in groups. This will ensure a safe process as individuals will be available to aid each other in the transportation and the physical weighing of the waste

Surveys: Each survey will begin with a statement that briefly introduces the objective of the survey and as well as an anonymity statement. Participants that wish to receive follow up information from the study will have the option to leave their email address. Any participant that feels uncomfortable or unwilling to complete the survey can terminate their participation at any time.

INFORMED CONSENT PROCESS

Refer to: <http://pre.ethics.gc.ca/english/policystatement/section2.cfm>

1. What process will be used to inform the potential participants about the study details and to obtain their consent for participation?

- Information letter with written consent form; provide a copy
 - Information letter with verbal consent; provide a copy
 - Information/cover letter; provide a copy
 - Other (specify)
-

2. If written consent cannot be obtained from the potential participants, provide a justification.

ANONYMITY OF PARTICIPANTS AND CONFIDENTIALITY OF DATA

1. Explain the procedures to be used to ensure anonymity of participants and confidentiality of data both during the research and in the release of the findings.

Participants will be debriefed on the terms and the conditions of the project and survey before taking part in the survey. They will be provided with the option to leave only their e-mail if they would like personal feedback on the project. The project facilitator will also sign the same sheet ensuring confidentiality of data for research purposes and anonymity. The surveys will be kept with one of the project organizers in a safe place at all times. The e-mail of participants will only be used for project feedback. The findings of the project will be presented anonymously.

2. Describe the procedures for securing written records, questionnaires, video/audio tapes and electronic data, etc.

Written data collected from the procedures will be kept with one project organizer and will only be able to be accessed only through that person. Data transported to an electronic source will only be analyzed from a personal computer or from a personal account.

3. Indicate how long the data will be securely stored, the storage location, and the method to be used for final disposition of the data.

- Paper Records
- Confidential shredding after _____ years
- Data will be retained indefinitely in a secure location

- Data will be retained until completion of specific course.
- Audio/Video Recordings
 - Erasing of audio/video tapes after _____ years
 - Data will be retained indefinitely in a secure location
 - Data will be retained until completion of specific course.
- Electronic Data
 - Erasing of electronic data after _____ years
 - Data will be retained indefinitely in a secure location
 - Data will be retained until completion of specific course.
- Other ___data will not be deleted until final statements and conclusions on the project are made_____

(Provide details on type, retention period and final disposition, if applicable)

Specify storage location: ___project member and personal computer_____

ATTACHMENTS

Please **check** below all appendices that are attached as part of your application package:

- Recruitment Materials:** A copy of any poster(s), flyer(s), advertisement(s), letter(s), telephone or other verbal script(s) used to recruit/gain access to participants.
- Information Letter and Consent Form(s).** Used in studies involving interaction with participants (e.g. interviews, testing, etc.)
- Information/Cover Letter(s).** Used in studies involving surveys or questionnaires.
- Parent Information Letter and Permission Form for studies involving minors.
- Materials:** A copy of all survey(s), questionnaire(s), interview questions, interview themes/sample questions for open-ended interviews, focus group questions, or any standardized tests used to collect data.

SIGNATURES OF RESEARCHERS

| | |
|---|---------------|
| _____ Signature of Student Investigator(s) | _____ Date |
|---|---------------|

| | |
|--------------------------------------|-------|
| _____ | _____ |
| Signature of Student Investigator(s) | Date |
| _____ | _____ |
| Signature of Student Investigator(s) | Date |
| _____ | _____ |
| Signature of Student Investigator(s) | Date |
| _____ | _____ |
| Signature of Student Investigator(s) | Date |
| _____ | _____ |
| Signature of Student Investigator(s) | Date |
| _____ | _____ |
| Signature of Student Investigator(s) | Date |

FOR ENVIRONMENTAL PROGRAMMES USE ONLY:

Ethics proposal been checked for eligibility according to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans

Signature

Date