Towson University

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Kevin Antoszewski
Emily Beckhardt
James Bunty
Margaret Chan
Lauren Davidson
Colin deLeyer
Bridey Gallagher
Scott Healy
Lauren Lehman
Steven S. Miller
Carrie Moore
Edward A. Plato
Kevin Ryan
Owen Sherrod
Meredith Springsteen
Rachael Titone
Tinsae B. Tolossa
Nicole Voelker
Karen Zeiter

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Without the assistance of the following people, this project would have never been possible:

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Dennis Bohlayer, Director, Energy Engineering and Conservation, Facilities Management, Towson University

Alice Chalmers, Executive Director, Future Harvest CASA

Roy Cubbler, Chartwells District Manager, Food Services, Towson University

LeRoy McKee, Energy Coordinator, Facilities Management, Towson University

Jack Nye, Director of Sustainability, Facilities Management, Towson University

Kelsey Roman, Student Assistant, Summer 2011

Tracie Rusnak, Assistant Facilities Support Manager, Towson University

Joe Trovato, Sales Engineer, Insinger Machine Company. Philadelphia, PA

Beth Valle, Marketing Manager, Food Services, Towson University

Ben Watson, Resident Assistant, Towson Run Apartments, Towson University

Dr. Jane Wolfson, Director, Environmental Science and Studies, Towson University

All Survey Participants

We especially want to thank Jack Nye and Roy Cubbler for their enthusiastic responses to our questions.

Forward

The Environmental Science and Studies (ESS) Senior Seminar class is taken by students who are completing their academic major and preparing to graduate. The course consists of a semester-long project. The course objective is for the students to bring to the project the knowledge, skills and abilities they have developed through their academic study and use them to address a specific environmental question or problem that someone in our community would like addressed. This year we were asked by Mr. Jack Nye, Director of Sustainability at Towson University, to assist him as he works to develop a Sustainability Plan for the University. Specifically, he wanted our help looking at the Food Service Operations. Mr. Roy Cubbler, Chartwells District Manager for Food Services at Towson, was willing to work with the class and was interested in their ideas and suggestions.

Food seems like a simple topic until you really start to think about it; many in our community have little understanding of how food finds its way onto a table [or a tray] and the environmental costs incurred as it gets there. Food service provides a service to the University and perceives members of the campus community as its clients; it needs to meet their demands and keep them happy. At the same time, the University is moving towards decreasing its greenhouse gas emissions and increasing the sustainability of its operations; food service operations require lots of energy and consume many resources. Bringing these two sets of demands together led the class to consider sources of foods, environmental impacts of packaging, utensils and the vast amounts of waste that food service generates. Coming up with ways to alter the expectations and behavior of their peers was challenging and educational.

It was particularly interesting to survey the campus and find out what people said was important to them and what they would be willing to change. That provided a basis for many of the suggestions. It is safe to say that the project was a learning experience for all.

The student authors are responsible for this project. They explored the issues and pulled the information together. I provided guidance and help as requested.

Jane L. Wolfson, Ph.D., Director, Environmental Science and Studies Program
Instructor, ENVS 491 Senior Seminar, Fall 2011

Introduction

In 2007, the President of Towson University signed the American College and University Presidents' Climate Commitment (ACUPCC), joining six hundred and seventy four other signers. The main goal of the ACUPCC is for colleges and universities to become models in reducing their emissions of climate changing greenhouse gases, ultimately leading to the climate neutrality of individual campuses. In striving to achieve climate neutrality, colleges and universities become committed to educating their campus communities about sustainability and providing community members with the skills to actively counter climate change. After signing the Climate Commitment, Towson University formally initiated the development of a more environmentally responsible campus culture as required by the ACUPCC.

In an attempt to assist the University in developing a sustainability action plan, we were asked to look at campus food service operations and identify short and long term actions that would enhance the sustainability of campus food operations. The food service facilities at Towson University provide ideal venues for educating our campus community about sustainability and ways to reduce our "food-print" because so many students utilize campus food facilities.

However, for food services to be effective at educating the campus community about sustainability, support from the Towson Administration, Chartwells, the students and the faculty will be needed. Dialogue among these parties is essential to provide a clear pathway to reach carbon neutrality. The Towson Administration needs to set clear standards to which their food services provider, Chartwells, must agree. From there, the students need to be immersed in a campus culture valuing sustainability. Changes need to be implemented at many different levels within the campus community in order to make food service operations, and the whole campus, more sustainable.

Chapter 1: Background

Sustainability of Food Production Systems

Food production methods differ in terms of their environmental impacts and it is important to consider sustainability when making decisions about what foods to purchase. Since we are a large University, it would be beneficial for Towson University and Chartwells to partner with the sustainable farms located near Towson. Working with local farmers would connect the Towson University community to its surrounding community, help demonstrate Towson's commitment to becoming a "green" campus, create learning opportunities for students, and support local businesses.

Sustainably produced food refers to food that is produced in a way that does not deplete the environment in which it is grown over the long term, and that makes the most efficient use of the non-renewable resources required for its production (101st U.S. Congress, 1990). Producing food in this way is beneficial in that it promotes the long-term health of our food production system; resources required for healthy crop yields are not depleted. Conventional agricultural methods rely on monoculture, chemical fertilizers and pesticides that impact the streams and aquatic communities surrounding the farm. The use of these chemicals can lead to loss of natural predators and the development of pesticide resistance among weeds and insect herbivores.

While partnering with local sustainable farms is possible, there are many potential obstacles that Towson could run into if it decided that purchasing only sustainably produced local foods should be a priority on campus. Martinez et al. (2010) identified issues that institutions are likely to face as they push for sustainably grown local food purchases. Among the barriers are capacity constraints on previously identified farmers, lack of a nationally recognized infrastructure making it difficult to find new food sources, and uncertainties with regulations (Martinez et al., 2010). Since food on campus is currently under contract with Chartwells, all purchases by Chartwells for the campus currently need to be in compliance with the 'rules and regulations' of Compass, their parent company. Among those rules is a requirement that all food suppliers need to have minimum liability coverage of one million dollars to ensure that the food coming from their farm is safe for consumption (R. Cubbler, personal communication, Sept. 26, 2011). This coverage can be hard for smaller farms to get. While it is important that sustainably produced foods are served more frequently on campus, the issue of liability insurance could interfere with these efforts.

Towson University would not be the first institution interested in working with local farmers; programs are in place to help ease a transition to local foods. The United States Department of

Agriculture (USDA) created a program called "Know Your Farmer, Know Your Food (KYF2)" (USDA, 2011b) in an attempt to bring regional farmers and consumers together. Connecting growers and consumers strengthens local food production systems; consumers are able to continue to purchase locally grown foods which, in turn, provide local producers with a dependable market. In order to strengthen or even create a connection, KYF2 promotes policies that would directly affect the relationship between local, sustainable farms and the consumers that surround them (USDA, 2011b). KYF2 also attempts to approach the issue of sustainable agriculture from various angles. They are developing better educational materials on sustainable farming techniques and effective marketing tools for farmers, helping consumers learn how to partner with participating farmers, discussing political restrictions on the introduction of sustainably farmed foods into institutions, and delving into economic issues such as how to effectively price these sustainably farmed foods in a way that gives the farmer a secure income but also makes it economically feasible for institutions to partner with the farmers (USDA, 2011b).

One way that KYF2 hopes to promote the effort of institutions to integrate sustainably farmed foods into their food services is by offering grants and incentives (USDA, 2011b). One specific grant that has been successful with many of the institutions working to introduce sustainably and locally farmed foods is the Agriculture and Food Research Initiative (USDA, 2011a). This grant targets institutions of higher learning and focuses on supporting research in many different areas of sustainable agriculture (USDA, 2011a). Specifically, schools looking to receive this grant would conduct research on the benefits of sustainable agriculture, educate their community about the importance of supporting sustainable, local agriculture, and in the long run would hope to forge relationships and create programs that lead to food from local farms supplying that institution (USDA, 2011a). Pursuing a grant such as this could possibly be a way for Towson and Chartwells to begin their move to providing food that is local and has been farmed sustainably. Since Towson University does not have an agriculture program, some other form of research regarding sustainably produced agriculture would be required, but Towson students are interested and there are local farmers who might be willing to cooperate in research projects. The introduction of sustainably produced foods could be used as a medium to educate students about the importance of growing food sustainably. An educational program could be implemented in the dining halls through signage, or a volunteer-run educational program.

Food Transportation

Food Distribution Systems

Most people in the United States do not know, or worry about, how far their food traveled to get to their plate. In fact, as international food trade continues to expand, Americans are consuming more food that is produced outside of the United States than ever before (Pirog and Benjamin, 2003). As an industrialized nation, the United States is heavily reliant on imported and transported food rather than on food from local food production systems (Pirog and Benjamin, 2003). It is estimated that the average American prepared meal contains ingredients from five or more countries outside of the U.S.A. (Pirog and Benjamin, 2003). If we wish to reduce our greenhouse gas emissions and become a more sustainable society, we need to modify our dependence on this food transportation; we need to start relying more on local food systems rather than food transported from around the globe.

The process of food transportation is in itself complex. In the typical food distribution system, food starts with the producer, and then travels to a minimum of one processor, then to distributors, and then to the seller before it gets to the consumer (Wallner et al., 2007). Food miles can be calculated to determine how far food travels from where it is grown before it gets to the consumer (Pirog and Benjamin, 2003). Food miles for any product are determined by finding the Weighted Average Source Distance (WASD), which looks at the distance from the point of production to the final point of sale and takes into consideration the various volumes of material flowing along these different distances (Pirog and Benjamin, 2003). Studies have shown that purchasing food locally can greatly reduce food miles. Pirog and Benjamin (2003) compared the number of food miles associated with products coming from a local farmer in Iowa with food products traveling from conventional sources. When the food came from a local farmer, the food traveled less than 45 miles from its origin to the point of sale (Pirog and Benjamin, 2003). However, when food traveled from conventional sources, it traveled an estimated 1,546 miles from its origin to the final consumer (Pirog and Benjamin, 2003). This difference has a major impact on our environment and food-print.

Local Food Systems

Local food is defined by Chartwells as a product that is grown within a hundred miles of campus (R. Cubbler, personal communication, Sept. 26, 2011). There are many benefits to buying locally, such as reducing transportation costs, helping the local economy, and possible increased freshness of the product. Local farms can be easily found through group websites including: Future Harvest CASA, www.marylandsbest.net and through local food co-ops. These webpages, as well as others, allow for a

search for local products, lists local farms, what they sell and how to contact the owners. Furthermore, the Maryland State Archives provides a list of food products grown in Maryland and the harvest season of those products (Maryland State Archives, 2008).

The distance food travels to reach its final consumer is often underestimated and overlooked, leaving the consumer unaware of the associated environmental impacts of their food choices, such as greenhouse gas emissions. In 1997, fresh produce was found to travel an average of 1,686 miles to the Maryland Terminal Market, located in Jessup, Maryland (Pirog and Benjamin, 2003). This is a very long distance for food to travel and buying food locally could drastically reduce this distance and the greenhouse gas emissions associated with transport.

In a study by Pirog et al. (2001), the diesel fuel for semi-trucks and fuel for other long distance modes of food transportation are shown to be economically and environmentally very costly. Purchasing food locally uses an average of 4 to 17 times less fuel than the conventional national transportation system, and releases 5 to 17 times less carbon dioxide; an average of 280 to 346 thousand gallons of fuel were saved through local procurement (Pirog et al., 2001). Reducing the distance food has to travel is an obvious way to reduce transportation and environmental costs from pollution and save money on fuel (Pirog et al., 2001). Buying locally is overall less costly in several ways; money is saved on fuel and fewer pollutants are released into the atmosphere.

The local economy benefits greatly from the purchase of local food products. Typically, when a produce item is bought in a large grocery store, only about eighteen cents of each dollar goes back to the farmer, the rest goes to the "middlemen," such as the processors and distributers (Local Harvest Inc., 2011). However, when food is purchased locally, the "middleman" is cut out and the farmer makes a greater profit. According to the USDA, producing food locally can replace imports and require food processing activities to become localized, increasing local employment (Martinez et al., 2010). In turn, this can have a positive effect on the local economy (Martinez et al., 2010).

Educational institutions could feature locally grown items and use them as a way to connect students with their community and encourage healthy food choices. USDA claims that local food may be fresher, less processed, and lose fewer nutrients during the short transportation time to the final consumer (Martinez et al., 2010). While buying and featuring locally grown items can be a great educational tool, Gregoire et al. (2005) found that the seasonality, dependability of the market, and pricing were the most significant concerns of Iowa producers marketing to local Iowa Institutions. Gregoire et al. (2005) also found, through a survey of local farmers, that many had not sold to local food operations for a variety of reasons including inability to meet the volume required because of the

relatively low quantities of foods they could provide, inability to locate willing buyers, and pricing differences; the farmers needed a higher return than the buyers were willing to provide and small local farmers need to make higher returns to continue producing. Small-scale farmers need to take on many additional roles in order to sell to institutions. Farmers must be able to market, advertise, store, package, and transport their items to buyers (Martinez et al., 2010). Furthermore, some food products need additional processing, and this infrastructure may not be available locally; for local production to become the standard, the processing of those items that require processing needs to be de-centralized and moved into local communities. Other issues that local farmers and institutions need to consider include a change in ordering methods, contract negotiations, difficulty with long-term meal planning due to farmer supply and delivery issues, seasonality, and finding local growers willing to work with an institution (Martinez et al., 2010). When considering buying locally, institutions should be willing to work with farmers and use seasonally available ingredients as frequently as possible.

Pollution Associated with Food Transportation

The four main methods of transporting food are by air, road, water and rail (Hill, 2008). According to Hill (2008), shipping by air generally consumes the highest amount of energy and produces the most CO_2 while shipping by boat consumes the least amount of energy and produces the least amount of CO_2. Road transport, which is normally carried out by tractor trailer, is the second highest energy consumer and second highest producer of CO_2 (Hill, 2008).

The Sources of Campus Food

Towson University's dining services are provided by Chartwells, which uses Food Buy as its primary food provider (Compass, 2011a). Food Buy is a large company that provides services for airline caterers, restaurant chains, country clubs and many other facilities (Food Buy, 2011). Food Buy provides the option of working with a distribution system that is already in place or setting one up for an individual client (Food Buy, 2011). Food Buy also provides opportunities to employ several sustainable business practices including: compostable disposables, fair trade coffee, cage free eggs, rBGH free milk and dairy, sustainably harvested seafood, reduced hormone usage in beef, pork, and poultry, zero trans fats, and an organic and natural food program with United Natural Foods, Incorporated (UNFI) (Food Buy, 2011).

Chartwells' purchasing decisions are governed by the policies and regulations of their parent company, Compass. One policy set forth by Compass is that purchases be from Compass approved vendors unless there are specific reasons to deviate from this practice. Chartwells has some freedom when they are deciding where to purchase their produce. In some cases they may purchase from

women and minority owned businesses instead of purchasing from Compass approved vendors (R. Cubbler, personal communication, Sept. 26, 2011). Compass claims that in all of their operations in 2009, they spent seventeen million dollars on locally grown products (they define local as within a 150 mile radius) (Compass, 2011b). Compass also has many other programs, similar to UNFI, including: a fair trade coffee and tea program, cage free eggs, flexitarian (reduction in meat in meals) programs, and rBGH free meats and dairy (Compass, 2011b). These programs are, however, part of Compass and it is not clear to what degree they are in operation on Towson's campus through Chartwells. Though Food Buy has a partnership with UNFI, it is unclear how much of the food consumed on campus is organically produced. All of the information provided on the Compass website is very vague and is usually followed by a qualifier of "where available" leaving much unknown about campus specifics. For example, rBGH free milk is available through Food Buy but the milk containers on campus are not labeled as being rBGH free in the all-you-care-to-eat dining facilities and the á la carte facilities serve pre-bottled milk which is also not labeled as rBGH free.

The University itself does not have control over where food served on campus is purchased; it is a contractual responsibility of Chartwells. It may be possible for Towson University to include a change in flexibility of food sourcing when it renegotiates its contract with Chartwells. The University would not want to be responsible for food purchases but it could define more tightly the sources/types of food it would want Chartwells to purchase for campus use. Towson University has made a commitment to become more sustainable and this commitment includes campus food services. With some changes, the programs that are already in effect to purchase organic, local, healthy foods can be implemented and increase the overall sustainability of the University.

The food transportation system upon which all consumers/purchasers of food are dependent reduces the sustainability of any food operation. As a University committed to increasing the sustainability of its campus operations, Towson has the ability to set an example by making those with whom it contracts for food services increase and deploy sustainable food sourcing choices. By thoughtfully choosing the food we eat, where the food comes from, and when we serve certain items, the University's community of students can make a big difference in the world. The only way that this can happen, however, is with Chartwells' and Compass' full support and willingness to work with the University on this initiative.

Current Food Processing Methods

After food is produced, it is processed, at least most of it. As of 2008, The U.S. Department of Labor reports that there are 706,700 food processing employees that produce the hundreds of different

categories of food products (USDOL, 2011). The constant development of new products and increased technological manufacturing methods have led to the current level of production (Diehl, 2002; Smith and Hui, 2004; Tetra Pak, 2011; Wood and Bruhn, 2000). The food industry faces constant pressure from consumers to provide products at a low cost and with a long shelf life. Foods must be processed and packaged in order to make the product as non-perishable as possible, but processing also adds visual appeal and convenience (Smith and Hui, 2004). Most foods are processed prior to distribution and the processing itself, while important, also contributes to the environmental cost of the food. Therefore, purchasing and consuming foods with less environmentally costly processing would enhance Towson University's food service sustainability initiatives.

The main reason for food processing is that foods will eventually decay through natural processes; this 'natural' recycling often involves food spoilage from bacteria (Smith and Hui, 2004). Spoilage bacteria are one-celled microorganisms that make a food unfit or unattractive for human consumption by a putrid smell, minor discoloration, or bad taste (USDA, 2006). If the spoilage bacteria are pathogenic they can cause disease in the consumer of the food and may cause extreme levels of sickness and even death (Smith and Hui, 2004). According to the Centers for Disease Control and Prevention (CDC), spoiled food, food contaminated with microorganisms, leads to food-borne illnesses; annually there are 76 million illnesses and 5,000 deaths in the United States from food contamination (CDC, 2011). Because of the potential risk associated with consumption of spoiled foods, preventing spoilage is a major concern of the food processing industry (Smith and Hui, 2004). Additional reasons for food processing are to improve or maintain nutritional value and to improve taste, texture, and appearance (USDHHS, 2004).

A recurrent theme in discussions focused on making food processing operations more sustainable or less energy and resource intensive is the reuse of water. Recycling water allows a more efficient use of what may have been considered wastewater in the past (Tetra Pak, 2011). Past practices allowed large quantities of water to be wasted and the conservation and reuse of processing water helps minimize its overall consumption (Mardikar and Niranjan, 1995). Waste minimization must start at the raw material stage with efficient cleaning to reduce water use (Hills, 1995).Tetra Pak, an international food processing and packaging company, has innovated new processing unit technology that utilizes "closed cooling water systems," which can cut traditional operation costs by half (Tetra Pak, 2011).

A relatively new, but more controversial method of food processing is irradiation. Irradiation involves exposing the food to radiation that is intended to destroy all potential pathogens and spoilage bacteria (Grandison, 2006). The FDA has deemed the irradiation process safe and effective in decreasing

or eliminating harmful bacteria. It has approved irradiation of meat, poultry, fresh fruits, vegetables, and spices (USDHHS, 2009). Two methods of irradiation are stationary isotope radiation and machine source radiation (i.e. x-ray) (Grandison, 2006). A noted downside of irradiation is that high irradiation doses may cause slight color variations in beef, pork, and poultry (Wood and Bruhn, 2000). In 1988, the World Health Organization (WHO) concluded that high dose irradiation could be safely applied to several different foods to make them more shelf-stable and improve their health benefits (Diehl, 2002). Although organic certification prohibits irradiation, public education about the potential benefits it can offer in effectively reducing food borne illnesses is changing the public perception in its favor (Molins, 2001).

There are thousands of ingredients utilized in making the meals we eat. The Food and Drug Administration (FDA), which is under the United States Department of Human Health and Services (USDHSS), lists 4109 regulated ingredients in a database entitled "Everything Added to Food in the United States" (USDHHS, 2011a). Not every ingredient listed is initially, even conceptually, a food by itself, and may be what is considered a food additive. A food additive is defined by the FDA as any substance used to provide a 'technical effect' in foods (USDHHS, 2010). This technical effect can be used to provide freshness, prevent spoilage, retain moisture, provide texture, and many other enhancements (USDHHS, 2010). Some FDA categories of food additives are: "Preservatives, Sweeteners, Flavors and Spices, Flavor Enhancers, Fat Replacers, Nutrients, Emulsifiers, Stabilizers and Thickeners, Binders, Texturizers, Leavening Agents, Yeast Nutrients, Firming Agents, Enzyme Preparations" (USDHHS, 2010). The Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture (USDA) and the FDA have responsibility for overseeing the safety of these additives (USDHHS, 2008). There is a continuously growing list of materials that are approved as food additives considered "Generally Recognized as Safe" (GRAS) (USDHHS, 2011b). The GRAS list was created under sections 201(s) and 409 of the Federal Food, Drug, and Cosmetic Act (USDHHS, 2011b). There are currently 373 GRAS substances that were scientifically evaluated for their health safety by a select committee of experts with many more pending reviews (USDHHS, 2011a).

Organic food processing requires certain practices like irradiation and food additives to be revised or eliminated from traditional processing because those practices are not in compliance with organic certification standards (Menken, 2005). The USDA's National Organic Program (NOP) regulates the national organic certification program (USDA, 2008). One major part of the NOP's decision in ruling on organic certification is that the ingredients used in the processing are in compliance with the National List of Allowed and Prohibited Substances, which affects non-organic processing as well (Menken, 2005). Many plants practice "split-operations" which produce organic and non-organic products at the

same facility (Menken, 2005). These facilities treat foods carefully in order to prevent contamination of organic and non-organic products (Menken, 2005). Some other specifications required to gain organic certification, according to the NOP, are the elimination of pest management materials or cleaning supplies non-compliant with the National List of Allowed and Prohibited Substances (USCFR, 2000).

Specific food products, like milk, can go through many processing treatments before it arrives on the shelves of a grocery store. Walstra et al. (1999) explain that low pasteurization, high pasteurization, sterilization, ultrahigh temperature heating, separation, homogenization, evaporation, reverse osmosis, and fermentation are all different ways milk can be processed to get rid of any dangerous microorganisms in the milk and increase its shelf life. In 2007, there were over 300 commercial milk bottling plants and approximately 1,600 dairy product processing plants in the United States (Schultz and Huntrods, 2011). These bottling and manufacturing plants contribute to the $75 billion dairy industry in the United States (DePuis, 2000).

There is a way for the milk industry to become more energy efficient during processing. Özbay and Demirer (2007) state that milk processing can use less energy by recycling water, repairing leaks in equipment, fixing problems with packaging, and adding a level control to the separation process to reduce water usage. To increase sustainability, Tetra Pak recently launched a OneStep Ultra High Temperature milk processing unit (Tetra Pak, 2011). The single unit combines heat treatment, separation, and standardization that allows the processing plant to reduce its carbon footprint by 40% and reduce its water use by 60% (Tetra Pak, 2011).

Meat is another food that goes through major processing. The meat processing plants inspect the animal carcasses for diseases before processing and the raw meat is inspected for diseases by the USDA (Unnevehr, 2003). The USDA requires the meat processing plants identify and monitor their operations at critical control points under the 1996 law called Hazard Analysis Critical Control Point (HACCP) (Unnevehr, 2003). There are over 900 federal processing plants in the United States, but approximately only 50 of these plants process 80 percent of the meat consumed (Appleby, 2005). A large number of plants are available nationwide so if the local plants could gear up to deliver to local businesses, this could contribute to reducing transportation associated with meat processing. Locally grown animals could be processed locally for local consumption.

A new cost saving solution combining local food and sustainable practices is mobile meat processing. Mobile processing units (MPU) give small and mid-sized farmers the ability to process 15-20 cattle a day and avoid hauling their livestock by trucks over long distances to slaughter houses and processing facilities (Ostrom, 2009). The first USDA approved MPU was developed in 2002 by local livestock farmers of San Juan County, WA (Ostrom, 2009). The USDA is supportive through their “Know

Your Farmer, Know Your Food" program, and states they encourage small producers to manage their own slaughter units as long as they are in compliance with new safety regulations (USDA, 2010). This is an exciting new example of ingenuity and sustainability driven by local groups of farmers. If our local community of meat producers knew the University was encouraging purchase of locally produced meat it might facilitate development of a similar operation in our region.

Sustainability and Non-Food Purchases

Currently, in most academic institutions, dining facilities occupy a large amount of space and consume a large amount of energy; cooking, serving, heating and cleaning all require energy. In addition, food services depend on more than food products. The most common non- food materials used in dining facilities include plastics, ceramics, Styrofoam and paper. Alternative options and products made from wheat, polylactic acid (PLA) and Calymer™ which could replace plastics, Styrofoam and paper, have been gaining popularity with businesses. All of these products have a unique 'footprint' based on the amount of resources that make up each item's total cost.

Plastics

Plastics are one of the most common materials used traditionally to make non-food items found in University dining facilities. There are seven distinct classifications of plastics; Polyethylene Terephthalate (PET™), High Density Polyethylene, Polyvinyl Chloride (Vinyl or PVC), Low Density Polyethylene, Polypropylene, Polystyrene, and other resins (Garthe, n.d.). This classification system is noted on the bottom of plastic products, a number ranging from 1 to 7 indicates the class of plastic used in that product (World Centric, 2011a). The plastic production process and manufacturing the products from these materials utilizes considerable energy and resources. For example, depending on the particular type of plastic, between five to seven gallons of potable water are used per one pound of plastic created (World Centric, 2011a). Additionally, the different types of plastics use between nine and ten kWh of electricity per one pound of plastic produced (World Centric, 2011a).

Certain types of plastics have been shown to leach potentially harmful chemicals into the products that they are intended to protect. Bisphenol A (or BPA) is the most publicized endocrine disruptor that is found in some plastics, notably water bottles (Gurd, 2007). Its leaching is dependent on temperature; when exposed to a warm liquid BPA leaches out of the container and into the contents fifty-five times faster than at room temperature (Biello, 2008). The actual long-term effects of such endocrine disruptors on human health are still under debate in the scientific community because the critical limit for the amount of BPA that the human body can withstand is unknown (Biello, 2008). It is universally accepted that prolonged exposure to BPA is linked to early maturation, diabetes, and

prostate and breast cancers (Biello, 2008). To avoid leaching of chemicals into beverages, the best options are to buy plastics intended for one-time use, that don't contain BPA (and many are now advertised as such) or use glass or stainless steel water bottles (Gurd, 2007).

These 7 different types of plastics have different recycling capabilities because different recycling facilities are constructed to recycle different types of plastics (World Centric, 2011a). Within the last few decades, there has been a strong initiative to increase the recyclability of the plastic products produced. In the United States there are approximately 1,800 business that reclaim used plastics, with most recycling occurring through residential curbside pick-ups (EPA, 2011f). Currently, the market for recycled plastic is strong and stable, especially in the United States (EPA, 2011f). There are various benefits gained from recycling plastics, including the reduction of need to synthesize new base resins for the manufacture of new product, as well as reducing the need for additional landfill space (Earth 911, 2011). Although plastic can be recycled, the reduction in the amount of plastic dinnerware products that are produced will lead to more sustainable dining facilities.

Styrofoam

Polystyrene, commonly known as Styrofoam, is one of the major resources used in producing disposable dinnerware. Polystyrene products are found most commonly in dining facilities with products that include plates, cups, utensils, take-out boxes and egg cartons. Polystyrene is a "petroleum-based plastic made from the styrene monomer" (Earth Resource Foundation, n.d.). Polystyrene is extracted from oil, making it a non-sustainable resource (All Recycling Facts, 2009).

Large amounts of energy are used during the production process of polystyrene (World Centric, 2011b). In order to manufacture one pound of polystyrene, it takes 11.28 (kWh) of energy and 20.54 gallons of water (World Centric, 2011b). This process also creates 0.113 lbs. of solid waste and 2.51 lbs. of CO_2 emissions (World Centric, 2011b). The production of polystyrene has been noted for some environmental pollutant concerns; the EPA reported and named "the polystyrene manufacturing process as the 5th largest creator of hazardous waste" (Earth Resource Foundation, n.d.).

Although many recycling plants accept polystyrene for recycling, the transportation issues for Styrofoam products often inhibit them from reaching the recycling plant. Since Styrofoam is so lightweight, the cost of transporting this material to a recycling plant (given the large volume per unit of weight) makes the cost greater than the benefits that would be received from recycling the Styrofoam (All Recycling Facts, 2009). Contaminated Styrofoam poses a problem at the recycling plants because it involves additional cleaning and decontaminating before the recycling process can even begin (All Recycling Facts, 2009). The need to decontaminate raises the cost of recycling the Styrofoam, making

the incentive to recycle or accept Styrofoam recycling less economically viable (All Recycling Facts, 2009). The current system causes more resources to be put into recycling the polystyrene than resources produced after recycling.

Paper

Paper products are commonly used in dining services for disposable dinner ware such as plates and napkins because of its high versatility and its renewability as a resource. Different types of coatings can also be used to make paper products stronger or smoother (European Paper & Packaging Industries, 2011).

The production process of paper is resource and energy intensive. About 42% of global wood harvest for "industrial uses" is used to make paper (Green America, 2009). This results in a large amount of deforestation. Making one pound of virgin paperboard requires 5.56 kWh of energy and 9.86 gallons of water (World Centric, 2011c). According to Green America (2009), this large use of resources is expected to increase along with paper production.

Paper is readily recycled and there are many benefits to recycling paper; it saves trees and forests, lowers greenhouse gas emissions associated with the production process, the tree/wood harvest, transportation, etc. To make one pound of 100% recycled paper only 2.31 kWh and 1.58 gallons of water are used instead of the 5.56 kWh and 9.86 gallons of water needed to make 1 pound of virgin paper (World Centric, 2011c). In producing one ton of 100% recycled paper, about 24 trees are saved (Green America, 2009). By producing one ton of 100% recycled paper, greenhouse gas emissions are reduced by 47%, solid waste is reduced by 54%, energy consumption is reduced by 27%, and wood use is reduced by 100% (Green America, 2009). Recycling paper reduces almost all inputs of paper production and reduces the amount of paper waste in landfills.

Sustainable Alternatives to Traditional Dinnerware

Ceramics

Ceramics are defined as nonmetallic minerals like clay heated to high temperatures (UIUC, n.d.). They are one of the most popular materials used in food service areas like dining halls because dinnerware made of ceramic can be washed and reused many times. Ceramics are very durable and therefore can be reused over long periods of time. In fact, the environmental impact of a ceramic plate is equal to that of a biodegradable plate after just fifty uses, and in dining facilities there are probably hundreds if not thousands of uses of an individual item (Broca, 2008).

Calymer

Calymer™ is a light-weight packaging material developed by the Swedish company Ecolean AB that can be used for bottles (Ecolean, 2011b). The material is a hybrid comprised of traditional plastics, specifically polypropylene and polyethylene, and chalk (Ecolean, 2011b). Calymer™ is approximately forty percent chalk by weight, which decreases the weight of the packaging and the amount of petroleum used to produce it (Ecolean, 2011b). When contrasted with typical polyethylene terephthalate (PET or PETE) liter bottles, an Ecolean bottle requires about sixty-six percent less energy and seventy-five percent less water to produce (Ecolean, 2011a).

Wheat

Wheat is on the rise as one of the nontraditional materials being used to make a variety of products typically made by using traditional materials. Wheat is derived from wheat stalks, specifically the remaining plant material after the grain and chaff of the seed have been removed (World Centric, 2011a). Furthermore, the use of only the wheat stalks and not the food grain prevents much of the proteins and allergens associated with wheat from being an issue in the finished products (World Centric, 2011a). Wheat-straw is a good option for use in production because it comes from a sustainable, renewable resource (Wheatware, 2007). Additionally, only a surplus component of the wheat is used for the production of these materials, thus it will not have an effect on the supply of edible wheat products for consumers (Wheatware, 2007). Products made from wheat are strong and heat resistant, as well as being 100% compostable (Wheatware, 2007). There are a variety of products that can be made from wheat-straw which include utensils, trays, and tableware (World Centric, 2011a) as well as cabinetry, ceilings and particle-board (Maryland Grain Producers, 2007).

Wheat-straw is both biodegradable and compostable (World Centric, 2011a). The biodegradability of wheat-straw comes from the fact that it is derived from a plant-based product (World Centric, 2011a). There are different composting rates associated with wheat-straw products, depending upon whether composting is done at a residential or commercial level. In a typical residential situation, wheat-straw products take anywhere from one to four months to fully biodegrade if composted (World Centric, 2011a). In a commercial composting facility, wheat-straw products take anywhere from one to three months to fully biodegrade (World Centric, 2011a

PLA (Polylactic Acid)

Polylactic acid (PLA) is a resin made from corn kernels that is both compostable and biodegradable (Lamb, 2011). The primary component of PLA is corn. The corn is first harvested, soaked and ground (Lamb, 2011). The endosperm of the corn is then separated and enzymes are added to

convert it into dextrose (Lamb, 2011). Bacterial cultures are then added that ferment the dextrose into lactic acid (Lamb, 2011). The lactic acid molecules form polymers, and manufacturers use these polymer pellets to make plastics. The number of uses for PLA is increasing but products that can be made out of PLA as of now include plates, bowls, cups, utensils, and takeout containers.

PLA products can biodegrade within two years in a home composting system and within one year in a commercial composting system (World Centric, 2011a). When the PLA biodegrades, it produces methane, which can be used as fuel, but if not used is a potent greenhouse gas (Lamb, 2011). PLA has a very low melting point of 140°F, which is why it is able to biodegrade in a relatively short time period (Lamb, 2011).

The non-food material and products used in dining services are all important when trying to manage and reduce an institution's environmental impact. The inputs for each product must be evaluated and analyzed to meet the needs of the dining facility and the institution's commitment to the environment. All of the materials described above have strengths and weaknesses, and can be utilized to reduce waste. In order to improve its sustainability, the University must make a commitment to using and purchasing materials that have the smallest environmental impact possible.

Waste: We Do Not Eat It All

The sustainability of the Towson food service operation is determined by how it deals with waste generated from our food as well as the materials brought into it. Different ways of dealing with waste have different impacts.

Landfills

A landfill, not to be confused with a dump, is a secure area of land carefully engineered to store various waste materials (Ejnet, 2011). The goal of a landfill is to manage waste, prevent leaching and environmental contamination, and protect human health (EPA, 2011d). Federal and state regulations strictly govern the location, design, operation, and closure of landfills (Ejnet, 2011). Landfills contain municipal solid wastes, commonly known as trash or garbage (EPA, 2011d). Municipal solid wastes can include a variety of things such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint, and batteries. Most of these materials come from homes, schools, businesses, and hospitals. According to the EPA, in 2009 municipal solid waste consisted of the following categories: paper: 28.2%, food scraps: 14.1%, yard trimmings: 13.7%, plastics: 12.3%, metals: 8.6%, rubber, leather, and textiles: 8.3%, wood: 6.5%, glass: 4.8%, other: 3.5% (EPA, 2011e).

The EPA has stated that in recent years Americans are generating around 250 million tons of municipal solid waste annually (EPA, 2011e). Of this waste 33.8% is recovered and recycled or composted, 11.9% is burned at combustion facilities, and the remaining 54.3% is disposed of in landfills (EPA, 2011e). Other materials besides municipal solid waste found in a landfill may include medical waste, hazardous waste, low level radioactive waste, incinerator ash, industrial solid waste, demolition debris, and other special classes of waste (Ejnet, 2011). As the waste degrades, it degrades the materials securing it. Ultimately, no landfill, no matter how secure, can permanently contain the environmental hazards within it (Zero Waste America, 2011). Landfills will eventually reach capacity at which point there is no more room for waste. In old and new landfills, liners may be permeated by certain materials or crack under stress, tops may allow seepage to occur, and leachate collection pipes may become clogged or break under stress (Zero Waste America, 2011). All these may lead to emissions in the air and leachate entering groundwater. Landfills are by their very nature just temporary solutions to the waste problem.

Composting

Growing concern about landfill space and the harmful effects landfills can have on the environment has led to wide interest in recycling organic material through the process known as composting (EPA, 2011a). Compost is the product resulting from the controlled biological decomposition of organic material (CalRecycle, 2011). The process starts by combining organic waste materials in proper ratios of nutrient rich material and nutrient poor material into piles, rows, or vessels (CalRecycle, 2011). Next, bulking agents are added as necessary to accelerate the breakdown of the materials (CalRecycle, 2011). Lastly, the finished material is allowed to fully stabilize and mature through a curing process (CalRecycle, 2011). Sorted municipal solid wastes, yard trimmings, wood chips, vegetable scraps, paper products, animal carcasses, manures, and wastewater sludge are all types of organic waste that can be composted successfully (EPA, 2011a). On a small scale, such as that of a homeowner, there are many items that should not be composted such as certain types of plants, bones, pet wastes, dairy products, and other materials, all of which can be found listed on the EPA's website. These restrictions do not apply to larger scale operations.

Along with reducing the amount of materials flowing through the waste stream into landfills and preventing pollution that comes out of landfills, compost, the end product from composting, has many other environmental benefits (EPA, 2011b). The main benefit of compost is its potential to improve soil (Bear Path Farm, 2011). Compost has the ability to help regenerate poor quality soils when mixed into them (EPA, 2011b). The composting process encourages the growth of beneficial microorganisms such as bacteria and fungi (Bear Path Farm, 2011). These break down organic matter to create humus.

Humus, when mixed into the soil, increases the nutrient content in soils and helps soils retain moisture (CalRecycle, 2011). Compost has also been shown to suppress plant diseases and pests, reduce or eliminate the need for chemical fertilizers, and promote higher yields of agricultural crops (EPA, 2011b). Compost can remediate already contaminated soils in various ways as well (EPA, 2011b). Compost, by potentially reducing the need for water, fertilizers, and pesticides, also provides economic benefits (EPA, 2011b). It is a low-cost alternative to standard landfill top cover and artificial soil amendments (EPA, 2011b). Composting can extend landfill life by diverting organic materials from landfills and provides a less costly alternative to conventional methods of cleaning contaminated soil (EPA, 2011b).

At Towson University some food waste is currently composted but most of it is disposed of in a landfill. Towson University's waste is taken to Eastern Sanitary Landfill Solid Waste Management Facility in White Marsh, MD which is the only sanitary landfill left in Baltimore County (BC, 2011). In 2008 the landfill was declared to be half full and is projected to be at full capacity in 2039 (BC, 2011). Last year Towson began a composting program. The University has contracted with the Waste Neutral Group who picks up waste to be composted three times per week (TU, 2010). This waste comes from the Newell and Glen dining halls, and the eating facilities in the University Union and West Village Commons (TU, 2010). The program is projected to divert between 190 and 280 tons of organics from the landfill during this academic year (TU, 2010). Hopefully this program will be expanded to further reduce our carbon footprint.

Saving Energy through Recycling

Recycling, as was discussed earlier for some products, saves energy and natural resources over manufacturing from raw materials. Generally, about 10.4 million BTUs (British thermal units) are required to manufacture products from one ton of recyclable products as opposed to 22.4 million BTUs from virgin materials (Hutchinson, 2008). Gathering, transporting, and processing one ton of recyclable materials only consumes roughly 0.9 million BTUs (Hutchinson, 2008). Recycling aluminum consumes 96% less energy than manufacturing from raw materials (Hutchinson, 2008). Plastic recycling is the second most efficient, using 76% less energy than starting with virgin material (Hutchinson, 2008). The third most efficient process is recycling newsprint, consuming 45% less energy (Hutchinson, 2008). Recycling glass falls behind the others but is still more efficient than manufacturing from virgin resources, using 21% less energy (Hutchinson, 2008).

Manufacturing plastic products from recycled plastic is second in efficiency behind only recycled aluminum. Recycling aluminum cans has another advantage over recycling plastic beverage bottles in that recycled cans go through a closed-loop system; recycled cans become new aluminum cans.

Products like PET (polyethylene terephthalate) plastic bottles, made from petroleum, are "down cycled" (Hutchinson, 2008). This means the material loses quality through the recycling process. These plastic bottles are recycled to become fibers for clothes or carpets and aren't recycled further (Hutchinson, 2008). PET bottles can become other PET bottles but the process is more expensive than making bottles from new materials (Hutchinson, 2008).

There are several different recycling/waste disposal programs in which other universities have been participating: composting, cooking oil conversion into biofuel, and on-campus initiatives to reduce waste at the source. Towson University is currently using two of these programs, but the biofuel program is a new option and the current programs can be improved to increase participation. Towson University also has the option to pioneer its own. Our waste cooking oil is processed into biofuel by an external contractor, but it would be nice if we could save additional energy by using our biofuel on campus.

Towson University has a successful recycling program but there is always room for improvement. If recycling is increased on campus, the University will save money in addition to benefiting the environment and the TU community. Students and faculty must work together in order to improve the current program.

Energy Consumption of Glen Dining and Newell Dining

Towson University reports energy use equivalent to emitting an average of 110,871 metric tons of CO_2 per year from 2007 to 2009 (CIER, 2011). Glen Dining alone consumed 1,107,897 kWh of electricity from May 2010 to May 2011 (L. McKee, personal communication, Oct. 4, 2011). Newell Dining consumed 1,121,845 kWh of electricity during that same time period (L. McKee, personal communication, Oct. 4, 2011). The electricity used by each dining hall emitted the equivalent of 764 metric tons and 774 metric tons of CO_2 respectively according to the EPA's Greenhouse Gas Equivalency Calculator (EPA, 2011c). The heavy energy consumption by food services is clear when energy use is calculated on a per gross square foot basis. Newell Dining consumed 24.2 kWh per square foot. Glen Dining used 34.7 kWh per square foot. In contrast, the much larger Glen Towers A, B, C, and D used an average of 1,774,231 kWh of electricity per tower, or, on average 17.8 kWh per square foot (L. McKee, personal communication, Oct. 4, 2011). Each residential Tower, which is approximately 3 times the size of Glen Dining, consumed only 37% more electricity than Glen Dining.

Energy Star

Food service facilities are filled with appliances that, in some instances, run constantly. The energy consumption of food service facilities would be reduced by replacing all old, energy-intensive

appliances with new, energy-star labeled ones. The Energy Star program was started by the EPA in 1992 to help consumers conserve energy, reduce greenhouse gas emissions, and save money (EPA and DOE, 2011). Over time, the program has expanded to include more products and now includes commercial kitchen appliances (EPA and DOE, 2011). In 2010, Americans saved $18 billion on utility bills thanks to the Energy Star program (EPA and DOE, 2011). The reduction in greenhouse gas emissions due to the decrease in energy-use was equivalent to removing 33 million cars from the road (EPA and DOE, 2011).

In order to gain the Energy Star label, a product must meet the standards set by the EPA. These standards, which are subject to change, are based on a set of guidelines also established by the EPA (EPA and DOE, 2011). The specific guidelines as presented in the Energy Star website by the Environmental Protection Agency and Department of Energy are below (all information from EPA and DOE, 2011).

- Product categories must contribute significant energy savings nationwide.
- Qualified products must deliver the features and performance demanded by consumers, in addition to increased energy efficiency.
- If the qualified product costs more than a conventional, less-efficient counterpart, purchasers will recover their investment in increased energy efficiency through utility bill savings, within a reasonable period of time.
- Energy efficiency can be achieved through broadly available, non-proprietary technologies offered by more than one manufacturer.
- Product energy consumption and performance can be measured and verified with testing.
- Labeling would effectively differentiate products and be visible for purchasers.

Food service operations are complex and involve a range of different products and processes, but there are areas which can be changed to make the overall operations more sustainable. Which specific components are to be changed first depends on the willingness of the various stakeholders to accept a need for change.

Chapter 2: Survey

Understanding the attitudes and satisfaction of the campus community towards our current food services operations seemed to be a logical first step prior to making suggestions about any changes to food services. Food service aims to serve the community; by understanding the community's needs and feelings related to food services, we would be in a good position to develop suggestions that would be minimally disruptive and based on a currently perceived need of those served.

Food services at Towson University already have certain environmental policies and multiple opportunities for patrons to behave in an environmentally responsible fashion, but the campus community does not always behave as we hope it would. We hoped that the information obtained through a survey could provide insight into the knowledge, opinions, behavior, habits, expectations, and flexibility of the campus community at Towson University. The information collected did provide valuable insight, which we used to develop our suggestions about how current food services operations might be changed (see Chapter 3: Suggestions).

Methods

A survey instrument was designed for the purpose of investigating the attitudes, beliefs and behaviors of the campus community (see Appendix A). The survey was created by Kelsey Roman, with assistance from Dr. Jane Wolfson. The survey was submitted to the campus Institutional Review Board and approved for use in this project. The survey was intended to explore various components of food services on campus including such issues as 1) student and faculty satisfaction with the current food services, 2) the frequency and time of use of dining facilities, 3) waste and recycling habits, and 4) the community's willingness to purchase (even at a higher cost) more sustainably produced food items. The survey instrument consisted of twenty-two questions including multiple-choice questions, Likert- scale questions, and a free response question. Basic demographic information on participants was also collected.

Being familiar with places of campus gatherings and campus food service facilities, our class developed a list of potential locations that might provide participants for the survey. Specific times and locations were selected to cover most areas of interest and to accommodate the schedules of those who would be soliciting participants. We surveyed in all three of the all-you-care-to-eat dining halls (Glen Dining Hall, Newell Dining Hall, and West Village Commons Dining Hall), 4 of the 10 à la carte service areas (Paws, Susquehanna, Brick Street Café, and the Arts Café), academic buildings (Cook Library, Smith Hall, and the College of Liberal Arts), and places where students gather and spend time (West Village

Commons, Freedom Square and Burdick Gym). Multiple locations were chosen in an attempt to reduce potential bias. The times of surveying in these various locations were also set, occurring between the times of 10:00 AM and 7:00 PM, with most surveys completed between 10:00 AM to 5:00 PM. Data was collected over a two week time span, from September 14th – September 28th, 2011.

Students from our class, working together in teams of two or more, approached members of the campus community, and asked if they would be willing to take the survey. Prior to being given the survey, each potential participant was asked: 1) whether they used food services on campus and 2) whether they were 18 years of age or older. If they did not use campus food services, we thanked them but indicated that we only were interested in hearing from those who ate on campus. If they replied yes to both questions, a consent letter was read to them describing the nature of the survey and who they could contact if they had any questions (see Appendix A). The participant was then given the survey along with a writing implement and asked to fill out the entire survey; participants were also instructed to ask if they had any questions or were confused about any statements in the survey. Upon completion of the survey, the participant was thanked for their time, and the surveys were collected. The data from the completed surveys were entered into a Microsoft Excel spreadsheet and analyzed. There were 363 participants surveyed, and there were approximately 30 additional possible participants who were approached but from whom we did not collect data because they did not eat on campus.

Results

The survey was divided into several sections, each offering questions that provided information about the participant's knowledge, praise of or dissatisfaction with the food services, and other relevant information. The raw data is presented in Appendix C. The first section of the survey was composed of questions regarding demographics, which gave us a better understanding of the participants. Students were the dominant population we surveyed and were responsible for 98% of the survey participants. The majority of the students were freshman (33%) or sophomores (26%) although upper-level students were also represented. Of all the participants that were surveyed, 58% lived off campus and 57% surveyed did not have a meal plan.

We asked how many times a week a participant purchased food from an on-campus dining facility and provided possible responses in five-times-a-week intervals, i.e., 1-5 times a week, 6-10 times a week, etc. The results (see *Figure 1*) indicated that the majority of people surveyed purchased food on campus one to five times per week.

When asked whether quality or quantity of food was more important in their food purchases at a campus dining facility, the majority of people surveyed (89%) said that quality was more important than quantity [total number responding = 358]. A question addressed whether a variety of selections of

food over time or a variety of selections of food at one time was more important to them when selecting a particular food service facility to eat in. The majority of people surveyed (66%) said that a variety of selections at one time was more important than a variety of selections over time [total number responding = 347].

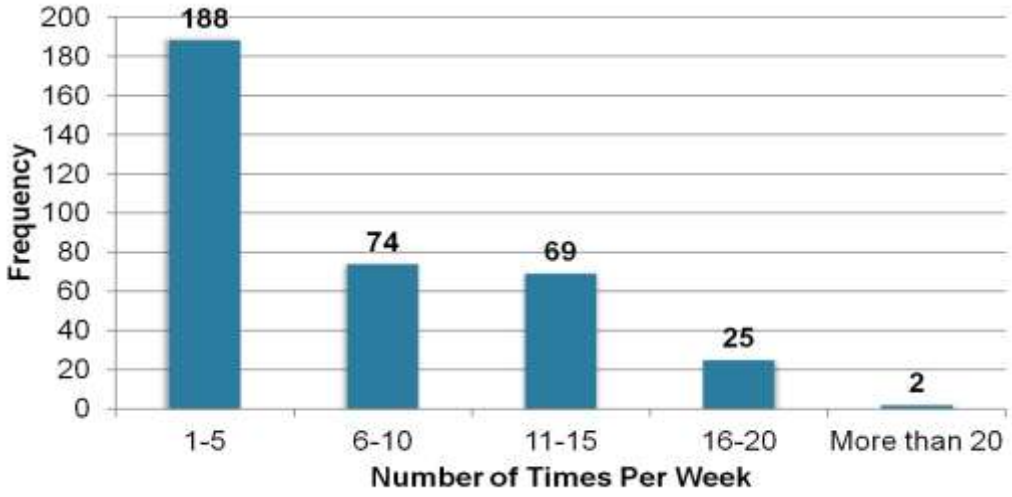

Figure 1: Bar graph showing responses by 358 people regarding their weekly frequency of food purchases on campus

To explore what sources within food services would contribute to the wasting of food, we asked which factors contributed to a participant taking or buying more food than they might be able to eat. The options provided were: 1) number of options available, 2) the food is already paid for in my meal plan, 3) it's hard to decide what I want, 4) curiosity to taste the options, and 5) the size of the portion served. The participants were asked to circle <u>all</u> options that applied. *Figure 2* shows that the reasons

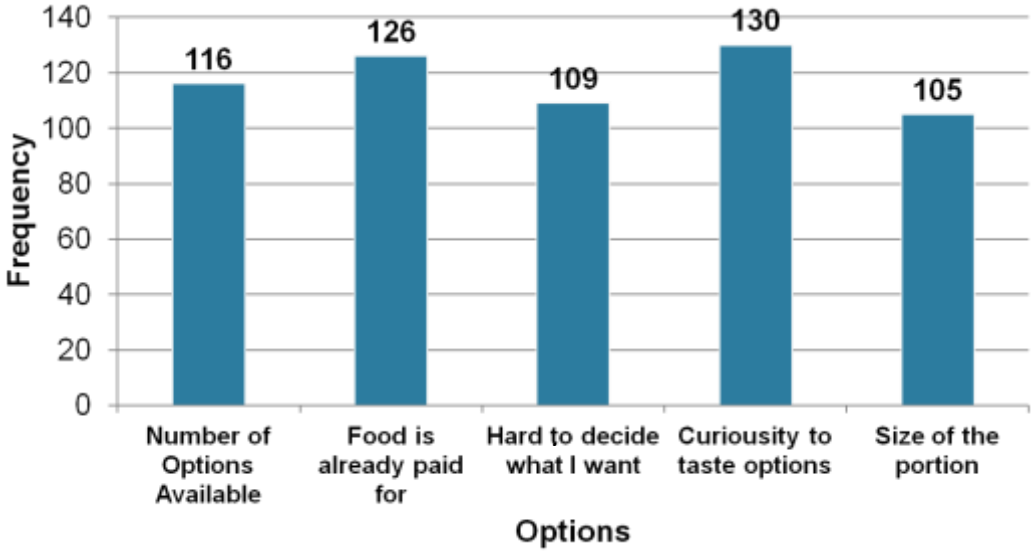

Figure 2: Bar graph showing the responses by 362 people as to why they might take more food than they could eat during a meal. Multiple reasons were allowed.

given for taking more food were fairly evenly distributed among all five factors.

Recycling is encouraged at Towson and the participants were asked to demonstrate their knowledge about which materials could be recycled in food service facilities (composting is only available in four dining facilities). The available options in the questions were paper products, plastic products, Styrofoam products, food waste (compost), and bottles and cans. The results (see *Figure 3*) demonstrated most people knew that paper products, plastic products, bottles and cans can be recycled in the dining facilities, but few people knew about composting and the recycling of Styrofoam in dining facilities.

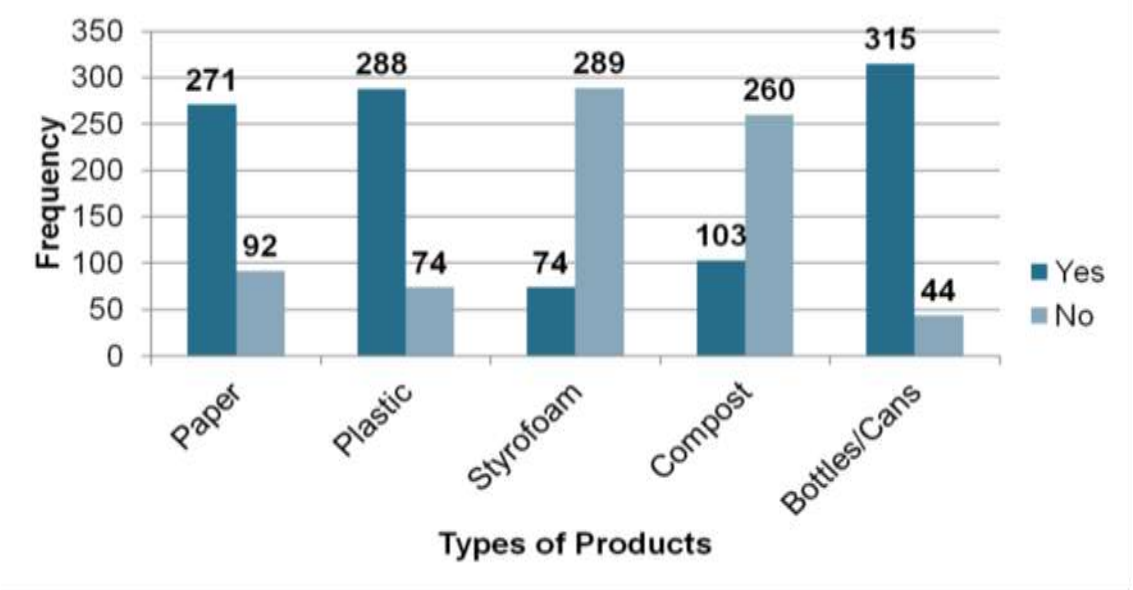

Figure 3: Bar graph showing participants awareness of which materials can be recycled in TU's dining facilities

The question about which materials could be recycled on campus was followed by a question about recycling behaviors at home. The majority of people surveyed said they do recycle at home; 51% said they almost always recycle at home and 30% said they often recycle at home [total number responding = 359]. The next question inquired about the participant's opinion of the convenience of the recycling sites in TU's food service facilities. The majority of people surveyed said the recycling sites in TU's food service facilities are very convenient (14%) or convenient (53%). This was followed by a question probing recycling behavior in campus dining facilities. The majority of people surveyed said they do recycle at Towson's dining facilities; 29% said they almost always recycle at Towson's dining facilities, 44% said they often recycle at Towson's dining facilities and 4% said that they never recycle at Towson's dining facilities [total number responding = 355].

When asked if they leave food waste on their plate almost half, 49%, of the participants rarely or never left food waste. On the other hand, 38% most always or often left food waste on their plate (see *Figure 4*) [total number responding = 355].

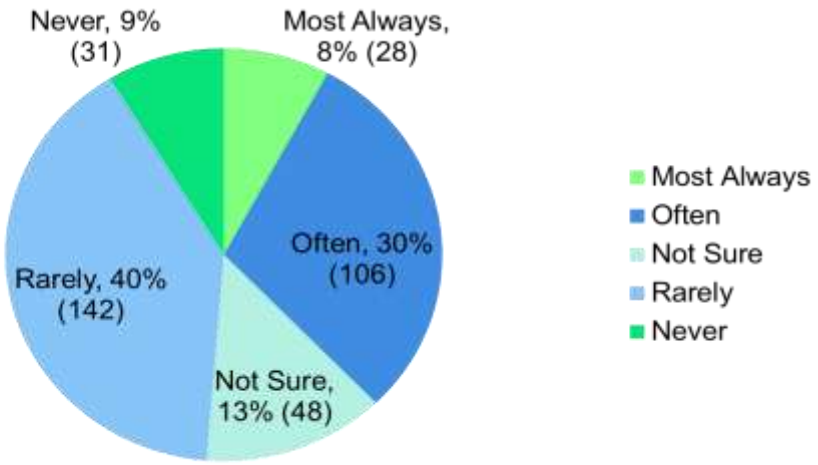

Figure 4: Pie graph showing the frequency in which participants leave food waste on their plate.

The use of trays in dining facilities has received attention as a way to reduce waste and therefore we asked a question about the convenience of Trayless Tuesdays in the all-you-care-to-eat dining facilities. Opinions among those who ate in all you can eat facilities (see *Figure 5*) were fairly evenly distributed between convenient and very convenient (22%), inconvenient and very inconvenient (28%).

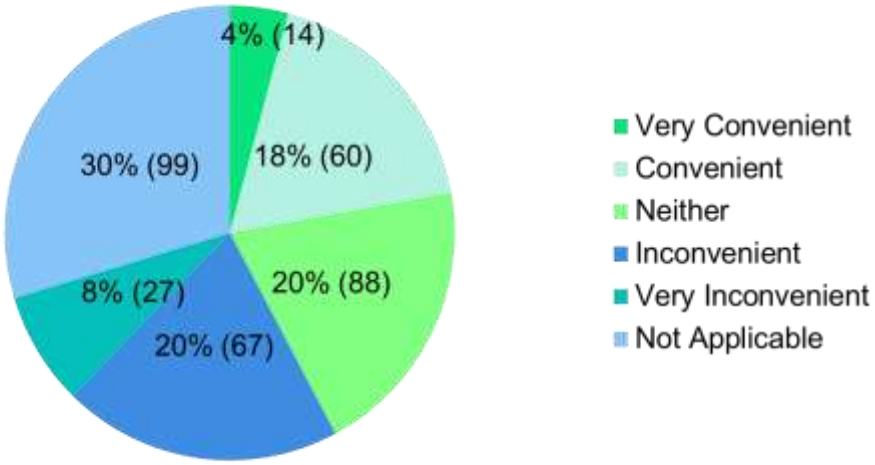

Figure 5: Pie Chart showing the level of convenience for Trayless Tuesdays in the all-you-care-to-eat dining facilities

A series of questions explored participants' responses to the food served and food in general. One set of responses indicated that the number of food options available at Towson's food service facilities was just right (48% of respondents). When asked if they would be okay with a reduction in the number of options for different categories of food [meat, vegetable, etc.] as long as some options

remained, the majority (63%) said they would not be okay with a reduction while the remainder (37%) said they would be okay with it.

The participants indicated they thought the 'quality' of food, in general contributed to their overall well-being. The majority of people thought the quality of food was very important (49%) or important (41%) to their overall health.

A series of questions in the survey focused on participant purchasing habits. When asked whether the environmental footprint of an item affected the participants' purchasing habits (see *Figure 6*), the majority of people surveyed said the environmental footprint of an item did impact in their purchasing habits with 55% saying it was important and 19% saying it was very important. A much smaller number of participants thought the environmental footprint of an item was irrelevant (19%) or totally irrelevant (5%).

When asked whether they would be willing to pay more for sustainably produced food on campus, the majority (63%) of participants said they would be willing to pay more, while the remaining 37% said they would not be willing to pay more. The participants that were willing to pay more for a sustainably produced item were then asked how much more they were willing to pay on a $5.00 item. Of the people surveyed, 27% were willing to pay $0.25 more for a sustainably produced $5.00 item and 26% were willing to pay $0.50 more. When asked whether a slight increase in price or a slight decrease in serving size would have more of an impact on their purchasing habits, the majority (63%) said a slight increase in price would have more of an impact on their purchasing habits.

Not all participants visit the dining facilities at the same time of day and we wanted to know which times were most popular. The next question asked participants when they would visit an all-you-care-to-eat dining facility and gave options of 7am-11am, 11am-3pm, 3pm-7pm and 7pm-11pm. We found that among our participants the largest number of people (N = 148) ate at an "all-you-care-to-eat" dining facility during the dinner time period of 3pm-7pm. The second highest was the lunch time period of 11am-3pm for a total of 118. The reported frequency of times of eating in these facilities is presented in *Figure 9.* However, it should be noted that participants often reported eating at all-you-care-to-eat dining facilities multiples time of the day.

The results of a similar question probing food purchases at any à la carte facility, shown in *Figure 10,* using the same time intervals as presented in *Figure 9*, showed participants purchased food at à la carte facilities most frequently during lunch from 11am-3pm, (N= 159). The second busiest time interval was from 3-7pm, (N= 83). It should be noted that participants could select more than one time interval. The distribution for times at which participants made food purchases at à la carte facilities is very similar to the distribution for the all-you-can-to-eat dining facilities (highest between 11am and 7pm) although people tended to eat at the à la carte facilities in the middle of the day during the 11am-3pm-time slot.

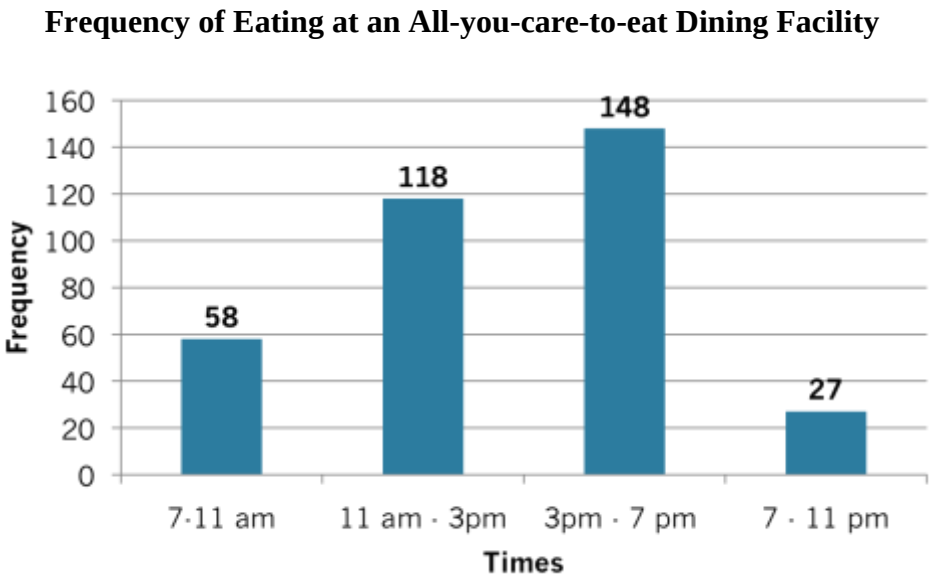

Figure 9: The times at which participants purchased food at "all-you-care-to-eat" dining facilities

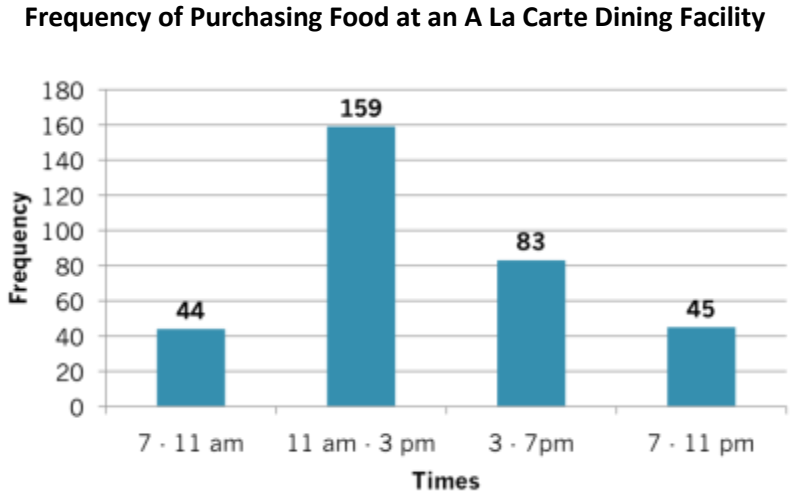

Figure 10: This histogram shows how frequently food is purchased at A La Carte Dining during different time periods

The dining on campus also includes various food franchise operations. When asked when these were most frequently used, using the same time intervals as the previous questions, we saw a different pattern. In addition to the high use during lunchtime, there was also considerable patronage during the morning and late evening time intervals, although the majority of people surveyed ate at franchises in the first half of the day (see *Figure 11*).

Finally, when asked when the participants purchased snacks throughout the day, using the same time intervals, new pattern emerged. The daily pattern of snack purchases is relatively high throughout the day and drops off in the evening (see *Figure 12*).

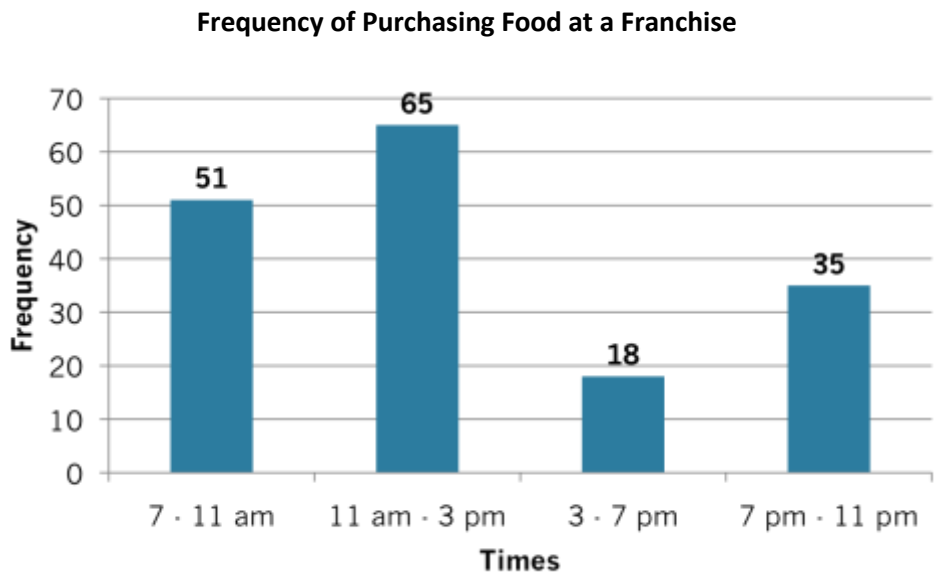

Figure 11: The frequency of food purchasing from franchises during different time periods

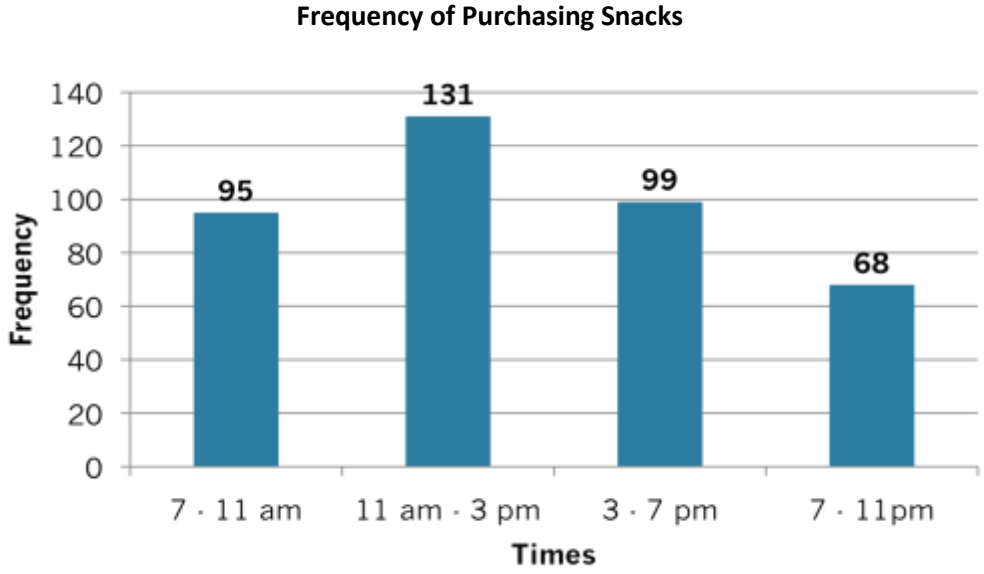

Figure 12: Histogram showing the distribution of when participants bought snacks

After reviewing and analyzing the data, some relationships among responses were noted. For a complete sequence of the analysis of the variables, see *Appendix E*. The first relationship analyzed was the campus community's willingness to pay more for sustainably produced products and how often they recycled at Towson University. An X^2 test at a 5% level of significance, lead to a rejection of the null hypothesis as the observed X^2 (26.45) was greater than the critical X^2 (3.841) meaning that the willingness to pay and recycling habits are not independent variables. The lack of independence of the variables suggests that those participants who are willing to pay more for sustainably produced products

are the same people who report that they recycle most always or often at Towson University. This suggests that we have on campus a community of environmentally responsible individuals.

The second relationship analyzed was the campus community's recycling habits at home versus their recycling habits at Towson University. A X^2 test at a 5% level of significance leads us to reject the null hypothesis as the observed X^2 (7.314) was greater than the critical X^2 (3.841), meaning that the participants' recycling habits at home and at Towson University are not independent. The lack of independence of the variables indicates that the participants' recycling habits at home is an indicator of the participants' recycling habits at Towson University.

The third relationship that was analyzed was number of years students had been at Towson University and their recycling habits at Towson University. After performing a X^2 test, it was shown that the difference in the tested variables was not significant. Therefore, the number of years at Towson University is independent of recycling habits on campus.

The final relationship analyzed was number of years at Towson University and recycling habits at home. The X^2 test again showed that that number of years at Towson University is independent of recycling habits at home.

The final question on the survey was an open-ended question, which allowed the survey participants to offer any opinions or suggestions they wished. Only a portion (79 out of 363 or about 22%) of the participants who took the survey answered the final question. There were common themes among the comments received. What follows is a summary of common themes/ideas we saw in the comments. The entire [and unedited] list of comments is presented in Appendix D.

One of the main areas that participants commented on was ways to recycle and/or reduce waste. Out of the seventy-nine comments received, 14 comments were centered on recycling. Six people voiced a desire to keep recycling programs and to continue and/or expand them (see Appendix D, numbers 4, 14, 19, 24, 34, 36). Six other people expressed the need for more advertisements about the recycling bins on campus, because according to these participants, there was a lack of knowledge about what could be recycled (see Appendix D, numbers 5, 6, 17, 40, 41, 50). Finally, there were two comments encouraging the expansion of the recycling program from Susquehanna to all dining facilities on campus (see Appendix D, numbers 32, 43).

Quite a few participants expressed a desire to reduce the amount of waste that comes from food service facilities at Towson University. Four comments offered that Towson University should use real plates for eating in at Brick Street Café instead of using the traditional disposable products (see Appendix D, numbers 7, 12, 29, 52). Additionally, there was one comment about giving out trays at the door so only one tray is used per person and another that suggested going completely trayless (see Appendix D, numbers 49, 56). There were more comments that expressed the desire to eliminate

Styrofoam and other disposable tableware (see Appendix D, numbers 12, 29). Finally, there was one especially interesting suggestion addressing the desire to reduce waste by allowing meal points to roll over so the individual did not feel like they had to buy as much as possible at the end of each week (see Appendix D, number 45).

Ten out of the seventy-nine comments (about 13%) we received contained specific changes to food options and food sources that participants said they would like to see (see Appendix D, numbers 2, 10, 15, 23, 46, 48, 54, 59, 60, 70). Seven comments were very specific about adding more vegetables, fruit and vegetarian options in the dining facilities (see Appendix D, numbers 20, 22, 41, 54, 59, 71, and 79). Another seven comments expressed wanting more locally grown food or organic options (see Appendix D, numbers 12, 38, 41, 53, 55, 73, 76). Additionally, several comments talked about reducing portion size, especially for meat (see Appendix D, numbers 1, 28, 72, 77, 78).

In spite of the fact that our survey results suggest that lots people are not using food services late in the day, a couple of comments discussed the desire for dining halls to stay open later during the week and during the weekends (see Appendix D, numbers 35, 37, 46, 47). Finally, an interesting suggestion regarding the quality and health importance of food was having a range in pricing for sustainable and conventional products with the ability for students to buy sustainable products at reasonable prices (see Appendix D, number 35).

Other comments included the use a free market system where local venders could come in and sell their products to the students. This comment suggests that the student believes that this would create more of an incentive for students to choose sustainable options (see Appendix D, number 21).

Discussion

The survey explored the campus community's opinions, knowledge, behavioral habits, expectations, and flexibility. The results provide clues about the major challenges food services will face should they try and implement changes, but also provide clues as to how to best proceed.

A portion of the survey explored the campus community's opinions of quality and quantity of food they purchase as well as variety of offerings over time. The survey results suggest that the campus community is more concerned with the quality of the food they purchase than the quantity and that individuals consider quality in their purchasing habits. However, if the participants interpreted the questions as they were intended, the survey results also suggest that variety in choices at one time was more important than a variety of choices over time. This could be an area where students would not be open to change even if a reduction of options could help the campus food services become more sustainable, although this response also could reflect an interest in different types of options, i.e., more organic or local food. The results seemed to suggest that while a majority of the campus community

was satisfied with the number of options offered at dining facilities, there was also a substantial number who believed that there were not enough options. These results along with the specific comments that were offered suggest to us that some component of the campus community was dissatisfied with the number of vegetarian and healthy options.

The survey results seem to indicate that the majority of students considered their environmental footprint as a factor in their purchasing habits. Furthermore, the survey results demonstrate that people are willing to pay more, at least $.25 on a $5.00 product or a 5% increase in price, for products that are sustainably produced. It is important to note that people were willing to pay more for sustainable products, even though cost was still a major factor in their purchasing habits.

The survey explored the campus community's recycling habits in a variety of ways. The results suggest that people who recycled at home also recycled at Towson University, and people who did not recycle at home were less likely to recycle at Towson. Additionally, the results seemed to suggest that those students who recycled either at home or at Towson University also found that the recycling locations at Towson University dining facilities were convenient; those who did not recycle at home or at Towson University did not find these locations convenient. The results also highlight a need to continue to educate the campus community about the extent of recycling at Towson University, as many students knew that paper, plastic, and bottles/cans were recyclable, but were unaware that Styrofoam was also recyclable and that many forms of food waste were being collected for composting. This might reflect the absence in many off campus residential communities of Styrofoam recycling programs or composting programs.

While food service facilities are used frequently, they are not used by all participants at regular periods during the day. The survey results seemed to demonstrate that students who use food services eat on campus at least once a day during the week.

There were a number of interesting discrepancies that appeared in responses to various questions. These could be attributed to some questions not being as clear as intended, which caused confusion for the participant or that participants were answering the survey questions as they believed they were expected to answer. These discrepancies may have impacted the distribution of the data so that more environmentally friendly behaviors were seen in the results than are actually present in the population.

While the statistical analysis of the data may indicate certain relationships, it is important to note that the sample size drawn was very small in reference to the total population we were interested in understanding.

Chapter 3: Suggestions

The goal of this project is to assist Towson University's food service operations to become more sustainable. This required that we explore the costs of doing business as usual and familiarize ourselves with the aspects of the current operation that were having significant impacts on sustainability. Similarly, we wanted to understand the attitudes and behaviors of those who were using the food service facilities; this information was obtained through our survey. With these two different sources of information and with our personal experiences as students, we then set about developing suggestions that were feasible for the food service operations. Some suggestions will be easier to implement than others, but we think they are all possible given support from Towson University and its community. By implementing these suggestions, we not only make steps towards carbon neutrality, but we also provide a foundation for a culture of sustainability on the Towson University campus and our community as a whole.

Educational Programs for Sustainability

In order for the University to accomplish its goal of reducing greenhouse gas emissions and uphold its commitment to the American College and University Presidents' Climate Commitment, the student body at Towson University needs to become more aware of sustainability; what it is and why it matters. In order to do this, we are suggesting three different educational programs that target three different yet equally important audiences. These three audiences are first year students, transfer students, and students living on campus who have meal plans. If implemented, these programs could strengthen students' commitment to living sustainable lives both on and off campus, and would transform Towson University into a campus that not only knows about sustainability but also 'lives it.'

Educational Program for First Year Students

Towson University should implement a mandatory workshop during orientation on sustainability for incoming freshman; this will contribute significantly to the sustainability educational initiatives on campus. It would be pro-active to educate incoming students about the importance of recycling and sorting waste appropriately on the Towson University campus as they begin their journeys in a new environment. As a campus community, we are constantly changing the way we do things. By educating freshman, we are taking the initiative to inform students about campus recycling procedures. By including this session during orientation, the importance of sustainability becomes part of 'what Towson University is all about' for the new students.

During orientation, freshman students should be given a brief survey to explore their typical recycling habits and knowledge of recycling and sustainability. From this, those organizing the activities can determine how much the incoming first year students know about recycling and gauge their current recycling habits. Student volunteers who are knowledgeable about sustainable living can be the presenters for this sustainability workshop, which can be funded by the SGA or other campus organizations involved in first year orientation activities and/or environmental initiatives.

The educational component of the workshop will begin after the survey is completed. Presenters/educators will teach freshman about the general importance of recycling: how it affects the environment, how it affects the university, and how it affects their own wallets. For example, the presenters could talk about how recycling reduces the amount of space needed for landfills. Waste in landfills degrades very slowly and leachate from landfills will, in time, contaminate the environment surrounding them (Zero Waste America, 2011). Landfills also occupy land that could be better used for other things. Recycling, in addition to keeping materials out of landfills, reduces the amount of raw materials needed to make those products that can be made of recycled materials. By recycling items made of plastic, paper, metal and glass, we are reducing the amount of raw materials needed to be extracted from the earth to create new products. Recycling also lowers the amount of waste being transported to landfills, which lowers transportation costs in terms of weight and volume and saves fuel costs and pollution produced during transportation to landfills. Recycling saves the University money by reducing those transportation costs and the tipping fees, which benefits the students and campus community. Recycling allows us to make a positive impact on the environment as an institution. By making recycling a part of their everyday life, students contribute to the global effort to reduce waste and make the planet a cleaner place.

Students will also learn, during the workshop, how recycling works on the Towson campus: 1) where recycling bins are located; 2) what materials are recyclable on the Towson campus in the RecycAll recycling bins; 3) where to recycle specific items such as batteries, ink cartridges, etc.; 4) what is not recyclable and how to avoid purchasing those items; and 5) why it is important to not contaminate recycling bins.

The materials that are currently recyclable on the Towson campus in RecycAll bins are aluminum containers, glass of any color, plastic containers of any number, steel and tin cans, any paper items, and flattened cardboard boxes including pizza and cereal boxes (TU, 2011g). There are also designated locations around campus specifically for recycling electronics, batteries, light bulbs, and printer cartridges (TU, 2011g). Recycling bins need to contain only the accepted recyclable materials without extraneous materials that can contaminate recyclables and make them ineligible for recycling. Educating

new members of the community about the importance of separating waste is crucial in making the recycling program at Towson University effective and efficient.

Towson students will also learn about sustainable habits such as taking rational portion sizes in the dining halls, the significance of choosing purchases with less packaging materials, the benefits of buying locally, and the benefits of reusable containers and utensils. Students need to understand why there is interest in reducing the amount of food being taken and not consumed; no one wants them to go hungry, rather the interest is in reducing food waste, thereby reducing other factors such as transportation costs, preparation costs, energy costs, etc., that are wasted when food is wasted. Benefits of buying locally include lower transportation costs, higher returns for local farmers, and less transportation costs associated with purchasing from closer vendors. By using reusable containers and utensils, students can reduce the amount of packaging going in to the waste stream; benefiting the environment by reducing the amount of non-food waste going in to landfills and even benefit the recycling stream itself, which does require energy.

The specific program about sustainability and recycling could be outlined as follows:

1) Introduction: This section should begin with what sustainability is and why it is so important. It might be helpful to start by defining and discussing sustainability in general. The American College and University President's Climate Commitment and Towson University's acceptance of this commitment should be discussed. Our commitment to becoming carbon neutral to combat climate change should be highlighted. Towson University's commitment to educate its students about climate change and to become an example of a University taking responsibility and reducing carbon emissions should also be stressed.

2) Recycling and Waste Creation: Students should be informed about our current RecycALL Program, including what we recycle on campus and where the recycling containers are located. Students should be presented with a simple list of what common items and materials can be recycled on campus. For example, a form listing plastic, aluminum cans, Styrofoam, paper, etc. should be available for the student to take, and an online version of this information should be made available to all students. In the presentation students should also be shown areas where recycling is available and how to properly recycle items. For example, students need to be specifically told to remove all food or liquid that remains in containers before recycling them.

A post-workshop survey should be given at the end of the recycling orientation workshop, or perhaps a few weeks later. This is to measure the change in attitudes of students who have received information about how to recycle on the Towson Campus, why it is important to recycle, and the effects that the small action of recycling can have on the environment and their future. We expect that the

outcome of this program would be a notable change in a more positive attitude towards recycling and sustainability, and expanded knowledge about how and why to recycle on campus. It would also be helpful to get student feedback on the workshop itself so it could be improved again and again and become more effective.

Educational Program for Transfer Students

Transfer students need to be informed about Towson University's sustainability efforts in order to become part of the cultural change our campus needs. Transfer students may not have come from an institution that has similar sustainability programs. The transfer students need to be introduced to what Towson University expects of them in terms of recycling, waste creation and reduction, and sustainability. Many current Towson University students lack the knowledge about what can be recycled on campus (see Chapter 2: Survey). In order to change students recycling and waste creation habits, we need to educate all students that are new to Towson University.

Towson University requires all transfer students to attend a transfer student program, which consists of a two day orientation to the University (TU, 2001f). In the second part of this program, new students attend meetings and are introduced to campus resources and receive general information about the campus (TU, 2011f). The student orientation assistants can add a short discussion and presentation on sustainability into this information session.

Transfer students may or may not already be aware of sustainability from their prior schools. We can change campus culture by informing new students about what Towson University students do to take action against climate change. In order to do this, the same educational program (proposed for First Year students, see above) would be used during the transfer students' orientation.

The projected outcome of this transfer orientation activity would be that Towson University students would waste less materials and food products, therefore reducing waste going to landfills, and reducing the associated air pollutants involved in waste transport and landfills. Students would understand their individual choices and how those choices either fight or contribute to climate change. Students will also know that Towson University encourages them to make environmentally and economically wise decisions such as recycling. The education about climate change and Towson University's commitment to become more sustainable are very important lessons for our students.

Continuing Education: Partnering with Resident Assistants

A recent study by Moore (2005), reports that collaboration between different departments or services on a college's campus can create an environment where education focused on sustainability can be introduced and be successful. For this reason we suggest that Chartwells and Towson University collaborate with Housing and Residence Life (HRL) on Towson's campus to facilitate the development of

a partnership between the parties that encourages sustainability education within residence halls. Specifically, representatives from Chartwells and representatives from HRL will come together to create an educational program for Resident Assistants to use on their floors in order to reach out and educate Towson students about living sustainably on and off campus.

Through conversations we had with fellow students while surveying, we found that many Towson University students are too often unaware of the recycling program entirely, slightly knowledgeable but do not know the full extent of it, or simply have no concern for sustainability and recycling regardless of their awareness level. In order to remedy these problems, students must be educated fully about the recycling and sustainability initiatives that both Towson University and Chartwells have started. This lack of knowledge and concern for sustainability can be viewed as evidence that there is not yet a culture of sustainability on Towson's campus. By educating students on the subjects of sustainability, the recycling program, and how these issues relate to them as students of the University and future citizens of the world, we could create a culture of sustainability. More than likely, students would begin to care more about their individual impacts and be more willing to follow necessary steps and contribute to the 'greening' of Towson's campus and food services.

Resident Assistants (RAs) employed on Towson University's campus are required to have at least four educational programs on their floor per semester. Often there are general themes that their program must contain. These themes often cover topics such as social justice, personal well-being and health, and responsibility. In the current programming model that Towson HRL employs, RAs have to research all the information for their program and then create and design it themselves. This presents an opportunity for Chartwells and HRL to 'help' the RAs and develop a program about sustainability for them to present to the residents. What we are suggesting is that Chartwells and HRL meet and develop one unified program focused on campus sustainability that all RAs would learn and use in order to ensure that the information Chartwell's wants to be known is what is being taught. This alleviates a burden from the RAs and at the same time delivers information to the residents that is important for them and the campus.

Three topics that they may want to focus on in developing the program are sustainably produced foods in the dining halls, the recycling/composting program, and reducing/reusing initiatives such as Trayless Tuesday and Project Clean Plate or other similar initiatives that might be developed. It is important to develop educational programs with interactive teaching styles that offer something that entices students to come. This would be a good way to introduce more students to the idea of using a reusable water bottle instead of purchasing bottled water. The reusable ones that Chartwells and Towson make available to students could be used as a "giveaway" to encourage students to come to the program. It is well-known on campus that students will come to a program when they know that free

food is involved. This would make for the perfect opportunity for RAs and Chartwells to work together to showcase the sustainable foods that are offered on campus.

RAs deal directly and almost exclusively with students who live on campus, meaning that all students who they come into contact with while working have a meal plan. This is an excellent target audience for a sustainable food services program because they are the ones who are consistently visiting the dining facilities. If this program were to be used in conjunction with the orientation programs that we are suggesting as well, we could expect to see real development and reinforcement of awareness of and caring about sustainability at Towson. The program we are suggesting provides Chartwells with a phenomenal opportunity to communicate more directly with their clients and market themselves as more sustainable.

Implementing these educational programs provides students with information that they deserve to be taught at an institution of higher learning. When the students leave Towson University, they need information about climate change and ways to make sustainable choices. No students should leave Towson University without knowing what "sustainability" is or why it is important; omitting this part of a student's education would be a great disservice to the students, and the communities they will live in later. As an educational institution, it is our duty to inform and encourage students, faculty and alumni to make environmentally sustainable choices. Sustainability and reducing carbon emissions is not just for scientists; global climate change will affect everyone, and our students need to be prepared with information and encouraged to continue sustainable activities in their lives.

Telling and Selling the Sustainability Story

Effective marketing methods should be a component of changing the culture of Towson University's food service operations towards one of increasing sustainability. Students are often unaware of the current policies and the changes taking place on Towson University's campus because of their busy lives and their academic and personal priorities. Faculty members are also unaware of the current policies and the changes taking place on Towson University's campus because of their possible limited exposure to these initiatives. However, through better marketing of campus sustainability initiatives, students and faculty can become more aware of the benefits increasing sustainability has to offer both themselves and the University. In addition to this increased awareness, the more students and faculty know about the reasons behind any changes in procedures, the more likely food services will observe positive user response to the changes in protocol they might implement to achieve more sustainable operations.

Video of Sustainability Efforts

Towson University should use marketing techniques in the form of videos to advertise the change in expected behavior standards on campus. The University Administration is responsible for setting the standards the entire institution must follow and they should decide which programs the videos should address. Additionally, the University is primarily an education facility and as such, educating students about ways to be more sustainable should be one of its main concerns. Marketing techniques have been a very successful method in the past to gain attention to issues and to educate the student body.

A promotional video (or series of videos) could include students or other key figures at Towson University with whom the students can identify; this will make the video more meaningful to the students. The videos could address multiple ideas surrounding sustainability. The University's efforts toward sustainability can be addressed, specifically the recycling programs, refillable water bottles, etc., in a way that draws attention to the issues and is meaningful to the students. In order to make the videos more meaningful to the students, the University could hold a video competition like the one for the Cook Library Video (Cook Library, 2010). Cook Library issued a request for students to create a promotional video, following a clear list of rules, and then they held a contest to pick a winner (Cook Library, 2010). This was a success and the winning video was posted on YouTube (Cook Library, 2010). The video is currently being played in the Union and at many other parts of the campus.

The sustainability video would be especially useful in addressing the RecycALL recycling program and could be especially effective in the dining facilities themselves. Students do not typically read posters that are placed on the walls, but they will watch a video if it is playing while they eat or while they are in line waiting to be served. Not only would they be informed of the changes to the recycling program or other important initiatives, but also students would be more likely to comply with the recycling process. Since there is already a recycling video on the GoGreen website, playing it in public areas more often would be a good way to get the message to the students.

The use of promotional videos would educate the students so that they are aware not only of the issues but are able to make a more informed decision about their actions and the sustainable or non-sustainable ramifications they hold. Video is an effective method to grasp and maintain students' attention. Video provides an avenue for students to actually 'grab' onto the material and retain the message; other venues do not have this ability. The goal of becoming more sustainable is to not only make a change on the campus itself, but to instill these fundamental principles in the students themselves so that they enter the world as more informed citizens who make choices that include consideration for the environment.

Expand the Environmental Conference

Towson University should expand the Annual Environmental Conference to reach more of the student body and be more representative of the efforts of the University to become more sustainable. The Conference provides an opportunity for the University to be able to reach the student body with the information that directly impacts them. This includes the changes that will be made as a result of the University signing the ACUPCC. Since one purpose of the Environmental Conference is to address "the impact of individuals and communities on the environment and actions that individuals and communities can take to positively impact the environment and create a more sustainable world" (TU, 2011c). This venue is perfect for addressing the structural changes to the University brought about as we increase our sustainability.

Improved marketing of the Environmental Conference is critical to reach more students. Most of the sponsors of the Conference are environmentally involved. By expanding the reach of the Conference to include more of the student population, more individuals have access to the environmental information provided by these sponsors and those presenting. One way to expand the audience reached by the program is to make the program mandatory as an orientation requirement each year. To implement this, there might be more than one conference necessary. A more feasible alternative would be to have a well-known person attract attention to the conference. Additionally, offering free, sustainable items can be another good way to attract more students. There is no better central event than the Environmental Conference to immerse the student body into the environmental efforts that the University is pursuing.

Distribute and Sell Reusable Products

Plastic bags are extremely harmful to the environment and their use needs to be eliminated or severely restricted by Towson University. The University can partner with Chartwells and help implement this change. The University could distribute and sell reusable bags, which students can take to on-campus food service facilities if they are purchasing take-out food and be rewarded for this 'environmentally responsible behavior' with a nominal discount on their entire food purchase.

Currently, when students purchase food "to go" they are given a plastic bag to carry their food. This plastic bag ends up in the trashcan because the campus has no plastic bag-recycling capability, which means it will eventually go into a landfill. To make this scenario even worse, some plastic bags won't even make it into the trashcan; rather, they will become litter. There is no economic advantage to the University allowing the use of plastic bags. Since the bags are intended for single use, one student can go through multiple bags in one day. When the whole student body (of over twenty thousand students) is considered, the number of plastic bags being used and discarded during a semester is

staggering. The implementation of a program to solve a problem like this is rather simple. The University should invest in reusable bags. Once they have purchased the reusable bags, they can distribute some, possibly for free, during the school's sustainability days or events, the same way t-shirts and reusable water bottles have been distributed in the past. After the free reusable bag supply is exhausted, the bags can go on sale at the on-campus dining facilities and the University Store. We suggest that the University underwrite some of the price of the bag since use of this bag fits within the University's sustainable education mandate and the University benefits from the lack of plastic bag trash around campus. Programs promoting the use of these bags should be created to highlight the advantages of using the reusable bags as well as the disadvantages of using the traditional plastic bags. These promotions can also accentuate the fact that for students, the reusable bags practically pay for themselves (when the discount on food items is considered). To facilitate transition to this new 'normal' while continuing to demonstrate its commitment to the environment, Towson University could slowly phase out the use of plastic bags all over the entire campus. Eventually, every student and faculty member who needs a bag to carry food will have to purchase the reusable bag. While initially the use of these bags would benefit Chartwells, which will no longer have to purchase plastic bags, over time this program would save the University money. Food service managers would not have to spend part of their budget on plastic bags, which could also result in a decrease in expenses. The mass use of reusable bags will take pressure off of local landfills and reduce on-campus plastic bags litter.

Create Signage Promoting Sustainable Living at On-campus Food Service Facilities

When someone is eating at an on-campus dining facility, they often read the tabletop signs on the tables, which are primarily used to promote things like the PAWS "Eating Challenge" and other on-campus events. The food service facilities could substitute signs that promote sustainability. Food waste generated by the dining facilities is a major problem on-campus and many people do not consider what happens to food waste once they discard it or even think about where it goes after it leaves Towson University. Educating the students and faculty members about their direct, and personal, impact on the environment when they create food waste and don't reuse or recycle would help increase awareness.

The tabletop signs could be different from one food facility to another based on the biggest sustainability problem at each individual facility. Signage could change as the problems change. For example, the Susquehanna eatery has a problem of people putting items in the wrong receptacles (R. Cubbler, personal communication, Sept. 26, 2011). Therefore, signs in this facility should indicate which type of container should be used for food waste, the general trash and the recyclables.

In other food service places with different problems, the signs could list recyclable items or general facts and statistics on energy, food and water waste savings associated with responsible behaviors or the costs associated with the on-campus dining facilities and how these impact the environment. Chartwells could utilize graphic-design students to aid in the creation and design of these signs. These signs would have multiple benefits including creating a more educated and knowledgeable student body while simultaneously reducing food waste and increasing recycling.

Better Promotion of Recycling Methods

One recent initiative at Towson University is collecting organic waste for composting; this requires that leftover food waste be separated from recycling and trash. At the Susquehanna dining facility, students are encouraged to separate their trash into bins specific for food waste, recycling, trash, and liquid waste. This is a major sustainability initiative for Towson's dining services because it allows recycling and food waste materials to be reused and/or composted, thus diverting that amount of waste from the solid waste stream. It is critical, however, that the food waste containers not be contaminated with trash or recyclables contaminated with food waste. Large signs above the different types of receptacles would improve recycling/disposal habits.

Marketing techniques that might improve this program include utilizing consistent signs for the containers to make it clear where each type of waste should be deposited. Displaying the images and pictures of each item a student may dispose of on the containers themselves would enable students to quickly recognize the correct receptacle. Another way of applying marketing strategies to make the waste separation process easier for students would be to create different shaped waste container openings to represent different types of waste. For example, recycling receptacles could be in the shape of a triangle, a trash receptacle would be a square, food waste could be in a circle, and liquid waste could be in the shape of a hexagon. Many students seem to be unaware of the new waste separation system and do not fully participate (R. Cubbler, personal communication, Sept. 26, 2011). However, through effective marketing of the program, student participation will improve, and in time it will be clear that the culture at Towson includes sustainable food services practices.

Improving the convenience of recycling and food waste separation will increase the willingness and ease with which students change their habits. Of the students and faculty surveyed, 79% stated it was convenient to recycle at TU, and also stated they recycle always or often while on campus (see Chapter 2: Survey). Easy-to-recognize labels on bins will encourage even more students to use recycling/trash/compost bins properly. The less thought that must be put into deciding which bin an item must be placed, the more effective the recycling programs in the dining halls will be. Students have busy schedules and they are often preoccupied with various issues; the less time and thinking the

recycling process requires, even if it is a matter of seconds, the more students will be inclined to recycle. Large pictures displayed on signs where recycling and trash bins are placed would allow for easy recognition of the proper receptacle. Placing recycling bins at the same exact location as trash receptacles or even physically attaching the bins, would make recycling that much more convenient. Spacing the bins just a few steps apart is enough to deter a busy student from properly recycling or even worse, contaminating the recyclables.

Social Marketing to Advertise Food Sustainability Programs

The objective of social marketing is to achieve a behavioral goal in an effort to better society (Kotler and Zaltman, 1971). In the case of Towson University's goal to increase the sustainability of its food service operations, the behavioral goal is to increase participation of the campus community in the food services sustainability programs on campus. Effective marketing of the initiatives, created as part of these efforts, will bring the University closer to enhancing the sustainability of food services while simultaneously changing the culture of the campus.

Several different media for marketing are available for Towson University's use in order to raise awareness and instigate a cultural change on campus. Some methods that may be used include newspaper ads and articles in the student paper, the Towerlight, Daily Digest listings, Facebook, Twitter, other social media websites, physical signs, billboards, posters placed in key areas on campus, and Towson University's Go Green website. Each chosen method will reach a different student group. Therefore, a combination of several methods is needed to reach the broadest possible audience.

Events on Campus

In order for students to properly participate in new food sustainability initiatives at TU, it is crucial that they know why sustainability is important in the first place. This is where the Education Programs come into place, such as Freshman Orientation workshops, Resident Assistant (RA) sustainability programs, and Transfer student information sessions. Once the student body is aware of the negative environmental impacts that result from choosing food produced in an unsustainable manner, it is the hope that a cultural change will begin to take place.

The marketing of food services sustainability could also take place during on-campus events and through the creation of incentive programs. An incentive program could include a competition to decrease waste or increase recycling yields from year to year. There could be a reward put in place for the school as a whole if there is a substantial increase in recycling or reduction in waste. In order to compare the amount of waste produced from year to year, the statistics would be represented per capita to take into account the growth that occurs in the total student body each year. Recycling competitions are a great way to get the student body involved and several institutions including Suffolk

University in Massachusetts and Saint Joseph's University in Pennsylvania have had success using this approach. Suffolk University uses a simple and unique reward system where students who are seen recycling are given a coupon to an on-campus venue or event (Suffolk University, 2007). This type of system provides an intermediate step between promoting education and successful implementation of policy. These rewards would eventually be phased out as the rate of education of recycling policy is improved on campus.

On-campus events could draw attention to the need for sustainability, as well as spread awareness of the practices already implemented. Events would be a fun way to involve students in the new sustainable practices on campus. These could be events that are already held like the Annual Environmental Conference, new events on-campus, or even Tigerfest. The Environmental Conference is a great venue for reaching students who already care about the environment, but incorporating sustainability into events such as Tigerfest would reach those students who may not have been as interested or participated in sustainability before. Sustainability themed games could be held at Tigerfest as well as information booths.

A sustainability awareness week specifically held in the dining facilities each semester could help to educate students and faculty members of Towson's commitment to sustainability. This week could consist of increased access to sustainably produced food choices served throughout the week. A reduction in meat options, specifically beef, would increase the sustainability of the food served. Serving certified organic food choices or expanding the vegetarian options during this proposed sustainability week would also give students and faculty the opportunity to broaden their sustainability horizons.

By exposing students and faculty to the pre-existing sustainability efforts and the changes to the sustainability efforts of the dining services by the methods suggested above, the culture of Towson University will eventually change as knowledge and acceptance of these practices grows. It is then that the true impact of the sustainability efforts of the food services and Towson University as a whole will be felt. In order to achieve this, the students and faculty must have increase knowledge, which will lead them to make better choices. Not only will these actions benefit Towson University, but they also will have a lasting impact on the surrounding community.

Creating a Menu for Sustainability

The way food is grown has a large impact on the environment. Since food affects everyone, improving the food production systems so that more sustainable methods are used more widely is vital to decreasing this impact. While the University itself has no control over the production systems, we can change our purchasing habits to support food that is produced more sustainably. Everyone on

campus eats and by providing more sustainable food options, the University can help improve the economic viability of sustainable production systems.

Increasing Organic Purchasing on Campus

In recent years, Americans have become more aware of the benefits of eating organically grown foods including a lower pesticide exposure and higher nutrient concentration than seen in conventionally grown products (Benbrook et al., 2008). In 2010 alone, the organic food industry grew almost 8% while total food sales in the United States only grew 1% (OTA, 2011). However, this trend toward increased consumption of organic food is not being reflected in Towson University's food service facilities.

The University could encourage Chartwells to purchase from vendors that supply organic products and request that Chartwells implement a "buying 100% organic when available" policy. The progress towards buying 100% organic can be gradual, with Chartwells increasing the number of organic products bought every year so that they have time to develop relationships with distributors. However, because organic products can be grown worldwide and transported into the country, these products are not always the most sustainable. Local products should be used in place of organic products which may have to travel long distances to be used on campus. The travel miles associated with shipping add to the carbon footprint of organic products and make them a less sustainable option. An easy protocol to follow is that the selection of products should be: local organic vs. long distance organic, choose local; organic vs. conventional from similar distances, chose organic; sustainable vs. conventional, choose sustainable.

If organically produced products are served at food service facilities, these foods should be accompanied by educational information so that student knowledge about organic foods would also increase. Considering that farming practices for organically grown products are often more sustainable than traditional practices, buying and using local organic products is usually better for the environment (Benbrook et al., 2008). Students may buy more organic products off campus even if there is a cost differential, if students knew the benefits of purchasing and consuming local organic products.

Local Food and Farmers Markets on Campus

Farmers markets should be brought to Towson University to provide local food to our community and help make our campus more sustainable. Chartwells states that they purchase local foods while in season and so this purchasing method should be emphasized on Towson University's campus (TU, 2011d). Utilizing our campus garden and local farmers markets within Towson University's food services could be a great way for the campus as a whole to become more energy efficient and

sustainable. One way to promote local food would be to invite local farmers markets to campus near the West Village Commons dining facility once a month. University of Maryland Baltimore County (UMBC) is a school that has brought Chartwells and local farmers markets together on their campus (Students for Environmental Awareness, 2010). The Students for Environmental Awareness at UMBC started the farmer market program in the fall of 2010 (Students for Environmental Awareness, 2010). A similar program would be a way to help Towson University connect with the local community while also saving on transportation costs for fresh produce; it would benefit the students and TU would be viewed more favorably by the local farming community.

Produce grown within the United States is usually shipped an average of one thousand five hundred miles before reaching its final consumer (Local Harvest Inc., 2011). Obtaining food locally reduces our carbon footprint, helps our local community, and educates TU students about sustainable food procurement. This could be a big step for Chartwells to reduce transportation costs of certain menu items each year. It is also a great way for students to learn about the community garden on campus and local farmers markets in the Towson area and what they have to offer to the campus and the community.

Recombinant Bovine Growth Hormone

Recombinant Bovine Growth Hormone (rBGH) is currently used in many dairy cows in the United States (OCA, 2005). According to The Organic Consumer's Association (OCA) the use of rBGH in dairy cows tends to lead to chronic mastitis, an infection of the animal's mammary glands (OCA, 2005). These infections, as well as the antibiotics used to treat them, can have adverse effects on the health of humans that consume them and can contribute to resistance to antibiotics. For these health reasons, milk and dairy products served on campus should be rBGH free in the interest of the health of the consumers. Chartwells currently has an rBGH free program in place, but many of the milk and yogurt containers are not labeled as being rBGH free. By making sure that these products are rBGH free, it will ensure that students can make more informed food choices.

Reduced Meat Consumption

Production of meat products places a large strain on the environment. Reducing the amount of meat consumed on campus by reducing the number of meat options available on campus would help to effectively reduce our carbon footprint. According to some reports, reducing the amount of meat served can have a greater impact on sustainability than buying locally (Pirog et al., 2001). To produce meat products, plants must be grown, harvested, transported, and fed to the livestock; this process is highly inefficient. Reducing the number of meat options available per meal, coupled with a push of

flexitarianism, cutting out meat one or two days per week, could decrease the rate at which meat is consumed on campus.

Vegetarianism/Flexitarianism

In each dining facility there is at least one vegetarian entrée available. There are also substitutes offered for meat products but they are often soy alternatives. Though soy provides necessary protein, over half of the soybeans grown are genetically modified (GM) (GMO-Compass, 2008). There is still concern among the public about possible health risks associated with consuming GM foods; these concerns have not been ruled out by scientific studies. Substitutions should be readily available and ingredient lists should be posted. It is occasionally unclear as to whether a rice dish is made with beef or chicken stock, or with what stocks particular soups are made. As stated above, pushing the flexitarian concept can increase the overall sustainability of the campus. Increasing the overall quality of vegetarian meals and making them more readily available would assist the campus in its move towards increased sustainability.

Fair Trade Products

Chartwells currently serves fair trade coffee on campus which is valuable and appreciated by those for whom this is important. Fair trade certified refers to the fact that all workers involved in the production of the product are paid a fair living wage (FTI, 2011). For those that do not drink coffee, however, no fair trade products are available. In order for a product to be fair trade certified, both the producers and traders have to be fair trade certified (FTI, 2011). Offering fair trade tea would provide options at dining facilities for those who do not drink coffee. There are also products like fair trade chocolate and bananas which could be used in dining facilities.

The University can encourage Chartwells to investigate vendors that sell fair trade products so that these products could be available on campus. Fair trade helps to alleviate poverty in areas all around the globe and encourages awareness of global problems (FTI, 2011). It could promote students to think more about the products that they buy and what goes into making them. Though not necessarily more sustainable, they encourage the same mindset that sustainably produced foods encourage. By actively engaging in food choices, consumers can make better decisions about what to buy and what to eat.

On Campus Garden

The environmental costs of bringing food to campus are very high. Because the food must be shipped from central hubs all across the country, it has to be transported in large trucks that are not

energy efficient. Therefore, food transportation to campus emits a lot of pollution. An on-campus garden can alleviate some of the costs associated with shipping food onto campus.

The Towson University Urban Farm (TUUF) has already started a small garden on campus. The University can promote this effort and work with TUUF to expand it. TUUF sold some of their harvest at the first Towson University farmer's market (TUUF, 2011); this event could be repeated. The University can also encourage Chartwells to buy and use produce from the garden in the dining facilities to save on transportation costs. Chartwells could work with TUUF and the University to choose which vegetables and fruits they would try to grow so that Chartwells could use a majority of the produce in the dining facilities.

The on-campus garden would promote an awareness of how food can be grown sustainably. It will also allow Chartwells and the University to reduce some of their greenhouse gas emissions by avoiding an increasing number idling trucks polluting the environment while delivering food to campus.

Changing the Requirements for Food Service Providers

The University's commitment to sustainability needs to be a component of all contracts the University negotiates. The food service organization that the University develops a contract with to provide food to the University community needs to be included within that framework. Food procurement decisions by the food service industry are responsible for the largest component of environmental impact of the entire food service industry (Baldwin, 2010). Therefore, a critical step in making our dining services sustainable can be found within the contract that we develop with Chartwells, our food service provider. Contract negations with Chartwells need to focus on providing a more sustainable service on campus. If the University looked towards its 'triple bottom line,' a framework that evaluates options in terms of their economic, environmental and social impact, we could enhance our sustainability and our stature. While Chartwells follows the regulations provided by Compass, its parent group, and is restricted in what it can do, Towson can join with other institutions that signed onto the ACUPCC and push Compass to provide more options that enhance institutional sustainability.

As a University, we should purchase as many products as feasible from local and organic farmers. Chartwells' Schools sector has already begun to incorporate buying from local producers into their business plan (Compass, 2007). As demonstrated by other schools, Chartwells, a subset of Compass Group, has the capacity to purchase from local farmers; it is up to Towson to include language in the contract making clear that this is a University priority. Locally grown foods can help decrease the distance food has to travel to be bought by consumers. Since the local products travel less distance, the final price of the items tend to be less expensive than similar products found at local supermarkets. Not

only will purchasing from local farmers be a sustainable environmental initiative; it will provide a boost in the local economy. In Rhode Island, a Chartwells pilot program was initiated to buy locally grown produce, and after six months of implementing and monitoring the program, over $9,000 had gone back into the local economy (Compass, 2007).

Food services at schools around the country are becoming more sustainable which demonstrates, that while challenging, it can be accomplished. University of Colorado at Boulder, voted "Best Sustainable Campus" by Sierra Magazine, offers a variety of local, organic and natural choices in their dining facilities (University of Colorado, 2011). Chartwells offers a program called Terrave, which is a vegetarian and vegan based concept (Chartwells, 2011). Incorporating this brand of Chartwells dining into Towson University facilities would greatly increase our sustainability.

Campus sustainability would be increased if all franchises that are part of Towson food services were required to support our sustainability efforts. This would require removal of franchises that do not support our commitment to sustainability such as Chick-fil-A. Chick-fil-A uses packaging products that cannot be recycled, which makes them a major contributor to the waste in dining halls. There are alternative dining franchises more in line with Towson's goal of sustainability. Subway is an ideal corporation for Towson to contract with because of the company's renewed commitment to environmental responsibility (PR Newswire Association LLC, 2011). An example of a sustainable and local food business that Towson University could bring on campus is Atwater's Café. Atwater's is a Baltimore based purveyor and creator of seasonally local and organic foods (Atwater's, 2011). By increasing the sustainability of the food being purchased by food service facilities and removing sources of unrecyclable materials, Towson University's food services and the campus would increase its sustainability.

Sustainable Meal Plan

Chartwells currently offers some items that support sustainable eating including cage-free eggs, rGBH-free milk, sustainably harvested seafood, and hormone-free pork, but that is only a small proportion of the products that Chartwells serves on a daily basis. Because Americans in general are becoming more aware of how and where their food is prepared, a 'sustainable' meal plan for students may be a valuable option.

The results of our survey of campus attitudes and behaviors indicate that 63% of respondents said that they would be willing to pay more for sustainably produced food products (See Chapter 2: Survey). This suggests that the University, along with Chartwells, could work to create a meal plan that may be more expensive than the current plans, but that has a strong emphasis on sustainably produced products. The meal plan could focus on local foods along with produce grown without use of pesticides

or herbicides, and hormone free dairy and meats. Schools such as Yale University and Northwestern University have implemented a meal plan that contains a majority of sustainably produced products (Northeastern University, 2011). The sustainable meal plan at Towson University could be a stepping stone to incorporating a majority of sustainable products into the traditional meal plans. It would give the University and Chartwells time to ascertain the level of interest among the student body.

The sustainable meal plan may entice the students that buy it to care more about their food and the impact that it can have on the environment. It could also help the local economy because many of the sustainably produced products could come from nearby farms. It could also encourage more environmentally responsible students to come to Towson University; if they care about the environment and live on campus, they will want to buy a meal plan that offers sustainable products.

We Consume More Than Food

By signing the ACUPCC, Towson University agreed to make efforts to become more sustainable. One of the easier changes that could be made, which would have exponential effects on our sustainability efforts, is to change current purchasing patterns making an exerted effort to select products made from materials with a low environmental footprint. Commonly purchased products often have their own benefits including being cheap and easy to obtain. However, there are high environmental costs associated with them like high fuel costs for the creation of the project or the costs of recycling or disposing of the product. Materials that come with a high environmental cost transfer that cost to the purchaser and end user of the product. By reviewing the traditional materials used and then eliminating or changing some materials to more sustainable ones, Towson University can make a serious impact on our goal to be more sustainable.

Reusable Bottles: Completely Phase Out Non-Reusable Plastic Water Bottles

Towson University should initiate and enforce a 'cease of sale of plastic non-reusable water bottles' in dining services and on-campus, including the bookstore. The 'cease of sale of non-reusable water bottles' would address the amount of waste and recycled products that need to be carried away from the University and avoid costs of transport to the University. While plastics are recyclable, the creation of plastics impacts our environmental footprint because of the high inputs and costs associated with their creation.

While the sale of non-reusable plastic water bottles would be the optimal goal, it needs to be phased out carefully to avoid upsetting a large number of students. In order to change the assumption that non-reusable plastic water bottles are a normal part to life, there are steps that can be taken to change the mindset of the students. However, these changes need to be mandated at the University

level in order to be effective. The movement towards no non-reusable plastic water bottles being sold on campus requires some preliminary and complementary steps.

First, more refillable water bottle stations need to be installed around campus. This will allow for an available alternative to the consumption of water from purchased non-reusable plastic water bottles for people on campus. By having abundant refillable water bottle stations, the convenience and free cost of refilling their bottles will be more appealing to the students. Possible ways to get reusable water bottles to the community would be to give them out during orientation or to give them away at environmental events.

The sale of bottled water in non-reusable plastic bottles has many implications in the University's quest to become more sustainable. The production of non-reusable plastic water bottles uses a large supply of oil and there are costs for transporting the bottles (Sustainable Table, 2009). Furthermore, while the goal of recycling is to give plastics a hope of second purpose, many plastic products do not even get recycled but are rather incinerated (Sustainable Table, 2009). To reduce their footprint, Towson University should implement a 'cease sale of non-reusable water bottles' as soon as possible.

Eliminating Styrofoam products

Producing Styrofoam uses a large amount of resources, creates a large amount of pollution and is an important source of hazardous waste. The EPA reported and named polystyrene manufacturing as the 5th largest creator of hazardous waste (Earth Resource Foundation, n.d.). Styrofoam products are also very expensive to recycle whereas recycling of other 'disposables,' i.e., plastics and paper, is very efficient. The recycling process of Styrofoam is very inefficient and it is very expensive to transport Styrofoam to a recycling center due to its lightweight nature (the large volume per unit of weight) of the product (All Recycling Facts, 2009). There also seems to be no use of Styrofoam produces for which alternatives are not readily available. This suggests that it could be easily eliminated in terms of substitute availability. All Styrofoam products could be replaced with products that are less energy intensive to produce and more efficient to recycle. Paper products are a good alternative to Styrofoam. Paper production uses a smaller amount of resources than Styrofoam production (World Centric, 2011c). Paper is readily and energy efficiently recyclable (World Centric, 2011c). Most products made from Styrofoam (cups, plates, bowls, etc.) can usually be made from paper and there is no reason not to make this switch.

Switching from Styrofoam products to an alternative would decrease the amount of energy and resources used in production of products coming to campus. By eliminating Styrofoam products, Towson University would decrease the amount of emissions from transportation to and from the University;

more paper could be transported in a smaller amount of space compared to Styrofoam. The elimination of Styrofoam would decrease the University's carbon footprint and make the campus more sustainable.

Currently, many students are unaware that Styrofoam is recyclable (see Chapter 2: Survey) and therefore it usually gets thrown in the trash which increases the University's waste volume. Reducing Styrofoam on campus will result in less energy and resources used in production and recycling, less emissions, and less waste overall. We would be focusing on recycling materials that are beneficial to recycle, i.e., paper, metals, plastics, glass, etc., and not be collecting a material which really has no further use or can be used only very inefficiently.

Aluminum Cans Instead of Plastic Bottles

To make Towson University more sustainable, aluminum cans should be used instead of plastic bottles wherever possible. Recycling aluminum is more efficient than recycling plastic. Creating cans from recycled aluminum is over 90% more efficient than creating them from raw material (Hutchinson, 2008). While creating plastic from recycled plastic is only 76% more efficient than starting with raw material (Hutchinson, 2008). Also, PET plastic bottles (the bottles used for water or carbonated beverages) are down cycled, meaning they lose quality upon recycling (Hutchinson, 2008). These bottles can be used to make bottles again but the process is more expensive than starting with raw material (Hutchinson, 2008). Implementing this change would help Chartwells and Towson become more sustainable because more materials used by food services could be recycled more efficiently.

Making Recycling More Efficient on Campus

Recycling is one of the easiest things that an individual can do to reduce their carbon footprint, yet it seems hard to get Towson students to recycle on campus. After analyzing the survey and doing some research on recycling we have some suggestions, which would dramatically improve the recycling efficiency on campus in the dining facilities.

Increase the Rate of Recycling

In order to encourage good recycling habits and make the process more convenient for students, more recycling bin locations are needed. Recycling is an effective means to move towards sustainability because most new materials (Styrofoam is an exception) manufactured from recycled material uses less energy compared to manufacturing from virgin materials. On average, it takes about 10.4 million BTU (British Thermal Units) to manufacture a product from recycled products as opposed to 22.4 million BTU from virgin materials (Hutchinson, 2008). Another consideration is that gathering, transporting, and processing recyclable materials only consume roughly 0.9 million BTU, therefore even with this additional cost, recycling is environmentally responsible (Hutchinson, 2008). Making aluminum

products from recycled aluminum consumes 96% less energy than manufacturing from raw materials and sets a standard for efficiency among recycled materials (Hutchinson, 2008). Plastic bottle recycling is the second most efficient with recycled plastic using 76% less energy than starting with virgin material (Hutchinson, 2008). Third most efficient is recycled newsprint, which consumes 45% less energy producing paper from recycled stock than working with raw materials (Hutchinson, 2008). Glass products, produced from recycled glass, falls behind the others but are still more efficient than manufacturing from virgin resources; it uses 21% less energy (Hutchinson, 2008).

Recycling Bin Labeling that is Easy to Recognize

The challenge then is to how to improve our campus recycling efficiency. One way we think we could improve recycling efficiency is to have one consistent , uniform system for all recycling bin labeling and color-coding in the dining facilities and on campus. Our goal is to make the system 'automatic' so that students don't have to think about where to put an item. Along with this, it is important to make sure that a recycling bin accompanies every trashcan. There are some trash receptacles that do not have recycling bins next to them. While there may be recycling bins in the same room, students in a hurry may not notice them. Often recycling bins and trash bins are next to one another but they are the same color and have similar labeling (even though the words on the different containers might differ). In order to prevent confusion, it is important that there is a consistent scheme for the color coding on campus. Students in a hurry will most likely pick the closest bin and throw everything into it. Adding more recycling bins and changing their design would be simple. Every trashcan would be accompanied by a recycling bin so that students who were in a hurry would not throw the wrong materials into the wrong receptacle. The recycling bins could be blue or green while the trashcans could be black. Each bin would be labeled in colors that stand out (like white font on black or white font on blue) with a clear font that stood out. Under the main label in smaller lettering could be a list or description of what kinds of products go in that particular bin. This is even more important if we hope to include a 'compostable' option in all facilities in the future. This would make the lives of "lazy" or "rushed" students easier while encouraging them to recycle more. It would also ensure that more products would get recycled or put into the trash appropriately.

While these changes will have a cost associated with them, the cost of not having trash and recycling receptacles easily accessible and clearly labeled is also substantial. Every time someone throws a piece of non-recyclable material into the recycling the whole bin must be sorted otherwise it cannot be included in the recycling pick up at Towson (R. Cubbler, personal communication, 2011). Similarly if students were more aware and not put off by the "difficulty" of choosing which bin to throw their waste into, they would not throw recyclable items into the trashcans. This would insure every

piece of recyclable material was processed properly. Students on campus value sustainability (see Chapter 2: Survey).

Table Top Signs

The development of table top signs produced by Chartwells that would outline what should go in the trash and what would go into the recycling (and compost once that is fully implemented) could also be used to increase recycling. These signs would be placed on the tables in the dining facilities. Sometimes students do not know which products can be recycled and which cannot. Students may get confused by the design of food container or the material it's made out of and assume it is non-recyclable. People may be driven by habit and may not think to change their habits until they see what they are doing wrong. The table top signs could help break some of these habits. People like to read while they eat and a significant number of people would see them and read about how to change their behavior. This would increase the efficiency of the recycling programs by enabling student to make more informed decisions while disposing of their waste. Chartwells could also use these table top signs to market how sustainable they are and get students excited about eating at the dining facilities.

Chick-Fil-A and Frito-Lay Packaging Need to Become Recyclable

One suggestion for improving recycling and reducing waste would be to substitute the Chick-Fil-A sandwich bags and Frito-Lay bags for bags that are recyclable; another option is to remove these two food items from campus. Packaging containers used by these two franchise operations cannot be recycled on campus (J. Nye, Personal communication, 2011). There are ways to address this problem. Chartwells could conduct a series of surveys to determine what student preferences for alternatives to Chick-Fil-A and Frito-Lay were. Once these more sustainable preferences were determined, the school and Chartwells could pick the best one or two. Another option would be for Chartwells and Compass to use their goodwill and purchasing power to urge a change in the packaging materials used by these companies.

Reducing Waste in Dining Facilities

Increase the Use of Compostable Utensils, Plates, Cups, and Bottles

The introduction of compostable or biodegradable utensils, plates, cups, and bottles could provide a great deal of environmental and economic benefits to campus and food service operations. In most of Towson's all-you-care-to-eat dining facilities the utensils, cups, and plates are made to be washed and reused. In contrast, in the a-la-carte dining facilities the utensils are plastic, the plates are mostly Styrofoam, and the cups may be paper or plastic. Most of this disposable dishware is thrown away and added to the waste stream. Replacing all the disposables with compostables will greatly

reduce the waste stream going to landfills or being incinerated and conserve non-renewable resources that are used in the production of the disposable products. Such a change would also increase the incentive and ease of composting food waste; food waste and its container could go into the same bin. An additional benefit comes after the biodegradable dishware actually breaks down and the benefits of compost are reaped.

Composting

Towson University currently contracts with the Waste Neutral Group to collect and haul all of the organic food waste from campus food services to a separate location for composting. If the composting were to take place on campus, the University could reduce the transportation costs of hauling the compost away. Right now the University only receives forty pounds of compost for every ton of waste collected (TU, 2010). The University currently generates between 190 and 280 tons of organic waste annually (TU, 2011b). If the University were to compost on campus, it would be able to use all of the composted material produced for landscaping, the on campus garden, and sell any extra to the local community to make a profit.

In order to implement this, the University can look into Earth Tubs, which has been used with success by universities with limited space like Northland College (Northland College, 2011). Earth Tubs are large containers that are self-contained and constructed to compost automatically (Earth Tub, 2011). The Earth Tubs must only be mixed two times a week in order to ensure that all of the compost breaks down at the same rate and are insulated to protect against odor (Earth Tub, 2011). The Earth Tubs should be able to handle the volume of organic waste that TU produces.

Extending the Life of Vegetable Oil

At University of Maryland, cooking oil is micro filtered after use, reused, and then converted into biodiesel fuel (UMD, 2010a; UMD, 2010b). This extends the life of the vegetable oil and has reduced UMD's use of cooking oils by 50% (UMD, 2010b). Towson University can take this idea a step farther by using biodiesel vehicles in its fleet and use the converted vegetable oil as fuel. In Towson University: Green Fleet Forward, Rachel Brauer et al. (2009) claimed that biodiesel fuel is the best alternative fuel choice for TU in the current fuel market because it burns cleaner than petroleum based fuels. Although some diesel vehicles may have to be slightly modified to operate on biodiesel fuel, the benefits outweigh the cost of switching to biodiesel (Brauer et al., 2009). Towson University could reduce its waste while reducing its carbon footprint by consuming its own post-processed biodiesel to fuel our vehicle fleet.

Ways We Can Save Energy

Concern about the environment and global warming is leading people to reduce their energy consumption which, in turn, helps reduce their carbon footprint. As part of our support and commitment to the American College and University Presidents' Climate Commitment, Towson University is changing many aspects of the campus to become more sustainable and reduce our energy consumption over time (Dautremont-Smith et al., 2009). In this section, we focus on reducing the energy consumed by our food service operations.

Reducing Energy Usage in Dining Facilities

Towson University has pledged to become carbon neutral by the year 2050. As a way to make a positive difference in the environment and work towards our goal of becoming carbon neutral, it is essential that Towson University make the changes that are available to us now. One change the University could make would be to reduce the energy used by the equipment in dining facilities.

Big consumers of energy in the dining facilities are appliances such as the refrigerators, freezers, ovens, and stoves. These appliances may be running most of the day, even if they are not necessarily being used at the time. Appliances that are outdated consume high amounts of energy and create a bigger carbon footprint compared to newer energy-efficient appliances. In accordance with Towson University's commitment to sustainability, it is important that we purchase and use highly energy efficient appliances as replacements are needed.

The amount of energy consumed in the dining halls could be reduced in various ways. The best way to cut back on energy consumption would be to replace all of the old appliances with Energy Star appliances. Using Energy Star appliances would dramatically reduce the energy consumption in the campus dining facilities. Energy Star appliances saved Americans $18 billion in utility bills in 2010 and the amount of energy saved was equivalent to taking 33 million cars off the roads (EPA and DOE, 2011). Another way energy consumption could be lessened would be to only have certain appliances on during peak hours or just when they are being used. Depending on the situation, using a timer on the appliance could be a simple way to decrease the energy consumption. Energy consumption could also be reduced by replacing all of the lights in the dining facilities with high efficiency LED fixtures. These LED lights consume 70% less energy than the current fixtures (TU, 2011e). Although this is done in select areas around campus, it is important for all of the fixtures to be replaced in the dining facilities since these facilities are open so many hours during the day (TU, 2011e).

Turning certain equipment on during peak hours or only when it is needed would also help to conserve energy. This can be implemented by finding out when certain equipment (like the toasters) are used the most and then turning them off when they have minimal or no usage. This is important

because pieces of equipment like the toasters are used mainly in the mornings and then are rarely used in the afternoons or evenings. Keeping these machines running all day is a huge waste of energy. Changing this would help Chartwells and the University conserve energy, making them more sustainable and it would also save more on energy bills.

Reducing the energy consumption in the dining facilities would be another step Towson University could take to work towards their goal of reducing their carbon footprint. Decreasing the energy usage in the dining facilities would also help decrease the electricity bill TU has to pay every month (EPA and DOE, 2011). Since they wouldn't have to pay as much, this would leave TU with more money to spend on new sustainability initiatives. Our mission of sustainability could make us a role model or a leader in the community, or possibly even on a national level. This could help us become more recognized for our accomplishments and may interest more students in attending Towson University. However, if energy consumption does not decrease, it will make it harder for Towson University to reach our goal of becoming carbon neutral by 2050.

Energy/Water used for Trays

Going trayless does more than just save food from being wasted; it also saves energy and water. Using the 68,182 diners/month attendance estimate for TU all-you-care-to-eat dining facilities (R. Cubbler, personal communication, Nov 3, 2011), and assuming that each person uses one tray at each meal, major water and energy savings would be reaped if TU were to go trayless. Using a best case scenario in which TU uses high efficiency tray washing machines appropriate for an operation of our size, energy and water consumption data for the monthly usage can be estimated – (we are using the TRAC 878 produced by Insinger Machine Company as our prototype model (Trovato, personal communication, Nov. 4, 2011)). Using the TRAC 878 tray washer at minimum safe temperatures, energy use associated with cleaning the trays can be estimated at 3106 kwH/month during fall/spring semester months at TU. Based on the U.S. Energy Information Administration's average kWh cost for Maryland of $0.1231, this equates to $382 per month spent on cleaning trays (EIA, 2011). These estimations are based on three brand new, efficiently designed TRAC 878 tray washer machines running at total of 77.65 continuous hours.

Even if the efficient TRAC 878's were to be installed in TU's dining facilities, tray use involves considerable water usage. Operating at full capacity, the TRAC 878 consumes 197 gallons/hour (Trovato, personal communication, Nov. 4, 2011). Using the TRAC 878, one of the most efficient tray washers available, would consume an estimated 15,297 gallons of water a month based on our generation of dirty trays. Without including the economic and environmental costs of the cleaning products used in washing the trays, Aramark estimates that each tray requires one third to one half

gallon of water to clean using the average tray washer (Aramark, 2008). Using such estimates, 68,182 trays would require 22,727 gallons – 34,091 gallons of water per month (Aramark, 2008). Water bill estimates require access to TU's utility billing information, but water is an extremely precious resource for which any reduction in use is important.

Eliminate Self-Serve Stations

All of the all-you-care-to-eat dining facilities offer a variety of dining options that are available at the same time. The foods are set up in stations. Some of these stations include an employee who prepares and/or serves you the food you wish to eat, however, many have platters of food left for students to serve themselves. In the absence of a server and no regulation of portion size, it is easy to pile too much food onto a plate; this food will be discarded if the person becomes full or dislikes the dish. Because there are so many different choice options during any one visit, this may be done for multiple food items. This can generate a large and unnecessary amount of food waste. It is also a waste of resources, water, and energy in the production of food that did not need to be made. A solution to this would be to eliminate self-serving stations or to place employees at these stations to serve appropriate portions of the food. This will reduce solid food waste as well as conserve resources, energy, and water. The costs of the aforementioned items will also be saved in the process although it will cause an increased need for staff.

Reduction in the Number of Open Facilities

Towson University provides a broad range of dining venues on campus. In total, there are sixteen venues consisting of eleven à-la-carte locations, three all-you-care-to-eat dining facilities, and two convenience stores (TU, 2011a). Some of these facilities are scattered throughout campus while others are in fairly close proximity to each other. These food service facilities by their very existence are consuming extensive amounts of energy and are emitting high amounts of greenhouse gases on a daily basis. However, we could greatly reduce our carbon footprint if we reduced the number of food service facilities on campus, or at least cut back their hours of operation.

On campus, more energy is consumed by buildings containing food facilities than by buildings that do not contain a food facility (J. Nye, personal communication, Sept. 7, 2011). For example, the electricity used by Newell Dining emitted the equivalent of 764 metric tons of CO_2 from May 2010 to May 2011 (EPA, 2011g). The energy consumed is due to using lots of hot water, the heating or cooling of the facility, use of freezers, by lighting, cooking and general food preparation. There are also times when the big dining facilities are open, yet there may not be many customers there during that time. For example, only 27 of the 351 respondents (only about 7.7%) to our survey said they eat in the all you can eat dining facilities between 7 pm and 11 pm (see Chapter 2: Survey). This suggests that closing a

facility during those low use time periods might be a way to become more energy efficient as a campus; there is no reason to keep a food facility 'ready to serve' when there is little demand and another nearby facility is open.

A survey focusing on the favorite venues of the students and faculty on campus could be used to determine which food service facilities could be opened fewer hours or perhaps completely closed. The venues that are determined to be the least used and the least popular could be the ones to get closed down or their hours reduced. Another way to select which food service facility gets shut down would be to close a facility that is in close proximity to another food service facility. This would help minimize the travel inconvenience to the students and faculty looking to purchase food. Also, if shutting one of the facilities down is not an option, we could limit the hours of operation so only smaller and less expensive to keep open facilities are open during less frequently used time periods. It seems unnecessary for so many dining facilities to be open outside of peak hours. Since 7:30 am and 11:00 pm are not peak hours, more dining facilities should be closed during this time (TU, 2011a). Even if these facilities opened a little later and closed a little earlier than their current hours of operation, this would make a positive difference in reducing our carbon footprint.

If Towson University were to reduce the number of food service facilities or reduce the hours these facilities are open, it would have a positive impact on sustainability of the campus. There would be a dramatic decrease in the amount of energy consumed and the amount of greenhouse gases that are released. By consuming less energy, this will save TU a substantial amount of money on energy costs by not having to pay to keep as many food service facilities open. This will also help Towson University come closer to reaching our goal of being a sustainable campus.

There are many changes that Towson University has already made that improve our sustainability. However, it is important to have goals addressing how we can continue to improve and become better. With a set of common goals, we will be able to greatly reduce our carbon footprint while saving a substantial amount of money. That is why it is important to focus on the food service facilities which consume such high amounts of energy.

To Tray or Not to Tray

One of the main factors that increases the amount of food wasted in dining facilities is the use of trays. In a nationwide study which included 25 institutions there was considerably less food waste generated on days that were trayless (Aramark, 2008). Going trayless reduces waste, conserves natural resources, reduces polluting detergents, and reduces water use. This no tray approach conserves energy by eliminating the need to heat water for tray washing. Not washing these trays saves one third to one

half gallon of water per tray (Aramark, 2008); in light of the almost 70,000 trays used monthly (R. Cubbler, personal communication, Nov. 3, 2011), this is a substantial amount of saved water. Environmentally, trayless dining decreases the need of landfills, incinerators, and wastewater treatment facilities. Implementation of trayless dining can be used for education and awareness about environmental issues. It encourages students to participate in a "green" initiative that has both a personal and community impact (Aramark, 2008). Reducing food waste will help the campus and food services become more sustainable. By signing the ACUPCC, Towson University agreed to reduce our environmental footprint and to eventually reach climate neutrality; this agreement applies to all divisions within Towson University, including dining services. In order to take a major step in achieving this goal, the dining services must address the amount of waste produced.

Tray Tax

In order to make the switch to trayless easier for students and dining services, there are a few intermediate steps that can be taken. The first step is to increase the number of trayless days from just Tuesdays to more days throughout the week. Increasing the number of trayless days enables students to become more comfortable with not using a tray. The second step might be to implement a tax program associated with using a tray. This could be similar to the tax on plastic bags implemented in Washington D.C. In January 2010, Washington D.C. instituted a five cent tax on every plastic shopping bag supplied by a store, and since its institution, the plastic bags used in D.C. have dropped from twenty-two million to around three million during a one month time span (Merchant, 2010). Additionally, the plastic bag tax serves its purpose in reducing waste, but it has also generated $150,000 in revenue for Washington D.C. (Merchant, 2010). The success of the D.C. bag tax can be used as a model for a tray tax at TU. Students will not want to pay more for using a tray and thus they will achieve the desired result of using fewer trays. By implementing these intermediary steps, the University can make a smooth transition from the dominant protocol of using trays to not using trays.

Incentives

If the decision is made to slowly phase in going trayless, the use of incentives could help eliminate the use of trays on Towson University's campus. Students who skip taking a tray can receive a raffle ticket for a chance to win a free meal. A similar program for a slightly different goal, reducing food waste, is proving successful at University of Maryland Baltimore County (UMBC). At UMBC's all-you-care-to-eat dining facility on campus, True Grits, they have a program designed to help reduce food waste by providing an incentive for returning cleaned plates after their meal (UMBC, 2011). This program involves giving out raffle tickets to the consumers who eat all the food on their plates, so the customers overall tend to not take more than they can eat in one sitting (UMBC, 2011). Towson can use

UMBC's idea as a model. Incentives are a great way to get students to change the eating habits they are currently accustomed to in their daily lives.

Potential Impact of Trayless in All-You-Care-To-Eat Dining

A reduction of 25-30% of food waste generation was estimated in a study comparing a trayless operation to one in which trays were used (Aramark, 2008). Estimates were based on 1.2-1.8 ounces of food waste being reduced per person per trayless meal (Aramark, 2008). Roy Cubbler estimates the monthly dining attendance of the Towson University all-you-care-to-eat facilities, which include Glen Marketplace, Newell Dining Hall, and West Village Commons Dining Hall, is 68,182 meals served (R. Cubbler, personal communication, Nov. 3, 2011). Converting this attendance to trayless would result in 2.6- 3.8 tons less food waste being generated at TU during a typical month. Not only is the reduction of waste ideal for sustainability reasons, but it reduces the costs associated with taking waste to a landfill, transporting, and tipping fees. If TU were to go trayless, the reduction of 2.6 tons – 3.8 tons waste would result in savings of $206-304 in monthly tipping fees based on current tipping fees of $80/ton (MDE, 2009), not to mention the costs of buying, storing and preparing the food.

Setting a New Standard for First Year Students and Faculty

A trayless policy in the dining facilities could be implemented more smoothly by making sure that incoming first year and transfer students are educated about the waste produced by using trays and the reason they are being/have been eliminated (Aramark, 2008). In addition, the removal of trays would not be shocking or even apparent to most students if the trays were never available in the first place; this suggests that it is critical that this be implemented whenever a new facility opens. 'Trayless' needs to become the 'standard' situation. Of course, it is important to keep trays readily available for people who are disabled and cannot use the facility without one. Educating staff about the availability of trays for those who require one is important (Aramark, 2008). Managers have discovered that a prime source of resistance comes from their own dining and kitchen staffs, especially long time employees (Aramark, 2008). Because trays have always have been a part of the operation, changing to trayless is an adjustment for staff as well as clientele. The gradual transition to trayless dining has to be met with a positive reaction from students. There needs to be awareness and educational efforts leading up to the launch. Rather than quietly removing the trays from the dining facilities, leave the trays there with signs explaining the water usage and food waste savings that would result from the implementation of trayless dining. Trayless dining also discourages students from overeating. Even though students can still get as much food as they want, not having trays means students are now unable to take as much food during one trip as they were before. This means that less food ends up wasted.

Other Trayless Universities

There are many other universities that have implemented a no tray policy and have been very successful. Central Michigan University was particularly successful. During the fall 2008 semester, Central Michigan University went completely trayless in their Residential Restaurants and was able to reduce their waste by 33% (Central Michigan University, 2011). Central Michigan University saw how much water, chemicals, food, and energy was being wasted by using trays, and so they decided to completely remove trays from their dining facilities (Central Michigan University, 2011).

Institutions such as Williams College in western Massachusetts estimate that the college is saving 14,000 gallons of water annually since eliminating trays (Foderaro, 2009). Similarly, the Rochester Institute of Technology, which completely stopped using trays in the summer of 2008 describes the benefits they have seen as "remarkable" (Foderaro, 2009). Rochester Institute of Technology has seen a drop in food waste, estimating that the school has saved over 10 percent on food spending (Foderaro, 2009). There is reason to assume that Towson would see similar benefits.

At Roanoke College, dining services completed a trial run of going trayless to see how many students would not use the trays (Leir, 2010). Students expressed their frustration because the trays were hidden (Leir, 2010). Some students felt as though they did not have a choice and did not appreciate being forced to act in a certain way (Leir, 2010). The students went as far as leaving their dishes on the dining tables (Leir, 2010). One issue that was brought up in the study is that certain students need to be allowed to use trays; trays must be available for use by disabled persons (Leir, 2010). Students complained about not wanting to make 2-3 trips from the dining service areas to their tables and how messy the tables would become if trays were no longer available (Leir, 2010). Education, communication, and support from the administration are imperative in easing the cultural shift of going trayless. It is important to design a program that will address many of these needs and still serve the primary goal.

The Costs of Trays

One negative externality associated with using trays is the greenhouse gases (GHGs) emitted through their use because their use is associated with food waste. GHGs are produced from producing and shipping food products, but food waste itself also contributes high level of GHGs (NWF, 2009). Food waste that ends up in the landfill succumbs to bacterial breakdown under anaerobic conditions, which produces methane, a very potent greenhouse gas (Freudenrich, 2011). CO_2 is greatly publicized for its contribution to global warming, but methane is twenty-one times more efficient at trapping solar radiation, warming the atmosphere, and contributing to global warming than CO_2 (EPA, 2010).

If Trays are Phased Out

A completely trayless protocol in all dining facilities at Towson University would significantly reduce the amount of waste needed to be removed from these facilities. Our survey indicated that 38% of 355 students and faculty (that answered this question) almost always or often left food on their plates (See Chapter 2: Survey). While they have not attributed this waste to the use of trays, our survey results do show that there are students and faculty who admit to leaving waste on their plates and other studies have associated trays with production of excess food waste (Central Michigan University, 2011). By producing less waste, there are fewer emissions from vehicles carrying the waste away from the University. The energy going into preparing the wasted food would be avoided, as would costs associated with getting those wasted foods grown and shipped to campus. Additionally, the reduction in waste will reduce the environmental footprint of dining services and help achieve the carbon neutrality required by the ACUPCC.

While the switch to no trays will probably evoke grumbling from the students, eventually it will become part of the culture of Towson; it will become second nature for students to get food without the need of a tray. It is important that the University stands with Chartwells as it implements a no tray policy; food services cannot make a change that large without full support from the University.

Conclusion

Our project, which focused on trying to make Towson University's food services more sustainable, was overwhelming from the onset. With a focus on the carbon neutrality goal set by the American Colleges and Universities Presidents' Climate Commitment, we started to gather information about food service operations. Through group efforts, we analyzed the life cycle of our food from farm to table. The intermediate steps of processing, packaging, transporting, and waste management became some of the most important aspects of what we needed to understand in order to determine the best ways to move towards sustainability. Each of us within the class had to become experts on some component of this process and also had to educate everyone else on the elements of their findings.

The purpose of this project has been to initiate a campus-wide discussion on ways to further efforts of Towson University and our campus Chartwells operation to increase the sustainability of food services as we continue to work towards making all campus operations more sustainable. In order to understand the campus community's feelings towards food services, we conducted an on-campus survey, which allowed us to gather our peers' opinions about food services; what do people do already, what do they know, what are they willing to change. From our survey results and further research of other universities' successes, we devised a series of suggestions that we know can be implemented at our school, Towson University.

Food service operations can become more sustainable if we: (1) provide information to new students during orientation about food services and their role in increasing its sustainability, (2) increase the awareness of campus sustainability initiatives on campus through promotional events and marketing, (3) introduce reusable bags thereby avoiding the waste and expense of unnecessary plastic, (4) replace outdated appliances with more energy efficient ones , (5) reduce and eventually remove all trays from campus dining facilities thereby reducing waste, (6) increase the use of compostable disposables, (7) eliminate Styrofoam, (8) raise the number of refillable water bottle stations and decrease the sale of single use water bottles. We hope the information provided about the positive changes that can be made in our food services will be a starting point in the improvement and awareness of sustainability in all operations at Towson University.

A range of benefits will result from implementation of our suggestions; not only will this increase the sustainability of food services, but simultaneously they will decrease spending and operational inefficiencies. Increasing sustainability of food services will involve a cultural paradigm shift and all components of the campus will need to embrace this change to make it happen.

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Appendix A: Survey Instrument and Accompanying Consent Letter

[Note: the numbers in color near each option/answer represent the way that item/answer is represented on the 'raw' data report found in Appendix C.]

_1_Faculty/Staff _2_Student I am entering my 1,2,3,…. year at Towson
Live _1_On-campus Live_2_Off-campus Meal Plan _3_Yes _4_No

1. In general, how many times a week do you purchase food from an on-campus dining facility?

___**1**__1-5; __**2**___ 6-10; ___**3**__11-15; ___**4**__16-20; ___**5**___more than 20

2. In general, which is more important in your food purchases at a campus dining facility?
   a. Quality **1**
   b. Quantity **2**

3. Which is more important in selecting the food service facility on campus that you eat at?

   a. Variety of selections at one time **1** vs. b. Variety in offerings over time **2**

4. Which of the following contribute(s) to taking more food than you might be able to eat? (Circle all that apply). **[1=answer selected/ 0=answer not circled]**
   a. Number of options available
   b. The food is already paid for in my meal plan
   c. It is hard to decide what I want
   d. Curiosity to taste the options
   e. The size of the portion served

5. Which of the following are recycled at Towson's food service facilities? (Circle all that apply). **[1=answer selected/ 0=answer not circled]**
   a. Paper products
   b. Plastic products
   c. Styrofoam products
   d. Food waste (compost)
   e. Bottles and cans

Circle the most accurate response	Most always	Often	Not sure	Rarely	Never
6. I recycle at home	1	2	3	4	5
7. I recycle at Towson's food service facilities	1	2	3	4	5
8. I leave food waste on my plate	1	2	3	4	5

[number selected recorded]

Circle the most accurate response	Very Convenient	Convenient	Neither	Inconvenient	Very Inconvenient	Not applicable
9. Trayless Tuesdays in the all-you-care-to-eat dining facilities are	1	2	3	4	5	6
10. In general, the recycling sites in TU's food service facilities are	1	2	3	4	5	--

[number selected recorded]

11. How do you feel about the number of food options available at Towson's food service facilities?

Way too many	More than enough	Just right	Not enough	Way too few
1	2	3	4	5

[number selected recorded]

12. How important do you consider the 'quality' of what you eat to your overall well-being?

Very Important	Important	Neither	Not important	Very unimportant
1	2	3	4	5

[number selected recorded]

13. How would you feel if there was a reduction in number of options in each category of food (meat, vegetable, side) as long as a choice remained?

a. It would be okay with me 1

b. It would not be okay with me **2**

Check the most accurate response [code in the box]	Very Important	Important	Neither	Irrelevant	Totally Irrelevant
14. In my general purchasing habits, the "environmental footprint" of an item, i.e. made from sustainably harvested or recycled products is	**1**	**2**	**3**	**4**	**5**
15. In my general purchasing habits, I consider the cost of food products to be	**1**	**2**	**3**	**4**	**5**

16. Would you be willing to pay more for sustainably produced food choices on campus (locally grown tomatoes, free range chicken, grass-fed beef, etc.)? [Circle one]

a. Yes **1** or No **2**

b. If yes, how much more would you be willing to pay for a $5.00 item? [Please check]

_**1** __5 cents; _**2**__10 cents; __**3**_25 cents; __**4**_50 cents; __**5**__more than 50 cents

17. In general, which of the following changes would have more of an impact on your food purchasing habits? [circle one]

a. A slight increase in price **1** OR b. A slight decrease in serving size **2**

Please indicate [X] all that apply	7-11 am	11 am-3 pm	3–7 pm	7-11 pm
18. Typically, I purchase food from an all-you-care-to-eat dining facility	**1**	**2**	**3**	**4**
19. Typically, I purchase food from à la carte (non-franchised)	**1**	**2**	**3**	**4**
20. Typically I purchase food from an on-campus franchise	**1**	**2**	**3**	**4**
21. Typically, I purchase snacks (coffee, chips, sodas, etc.)	**1**	**2**	**3**	**4**

22. Do you have any suggestions as to how our campus food services could become more 'sustainable' in its operation, i.e., reduce its environmental 'footprint' while maintaining its ability to serve its clientele?

Letter of Consent

September 2011

Dear Participant:

As a part of our Environmental Science and Studies Senior Seminar course, we are working with TU food services trying to assist them in becoming more 'sustainable' in their operation. As part of this project we are trying to determine people's attitudes about and use of campus food services.

If you are age 18 or older, we are hoping you will help us by completing a brief survey.

All of your answers will be completely anonymous. You may stop answering at any time.

If you have any questions about the project you can contact our professor, Dr. Jane Wolfson, at 410-704-4920 or the Chairperson of Towson University's Institutional Review Board for the Protection of Human Participants, Dr. Gartland at 410-704-2236.

We greatly appreciate your assistance with our project.

Appendix B: Summary of Survey Data

Demographic Questions

Number of faculty vs. students that participated in survey

Faculty/staff	Student
6	369

Years at Towson

Years	Frequency
Year 1	84
Year 2	65
Year 3	62
Year 4	42

Living On-campus vs. Off–campus

On-campus	Off-campus
133	187

People with Meal Plan vs. People without Meal Plan

Meal Plan	No Meal Plan
40	53

Question One: Frequency of food purchases from an on-campus dining facility

Purchases per Week	People
1-5	188
6-10	74
11-15	69
16-20	25
More than 20	2

Question Two: Importance of quality of food vs. quantity of food.

Quality	Quantity
318	40

Question Three: Importance of variety of food at one time vs. variety of food over time.

At one time	Over time
230	117

Question Four: Contributing factors to taking more food than you might be able to eat

Categories	Yes	No
Numb. of options	162	201
Paid by meal plan	126	237
Hard to decide	109	253
Taste options	130	232
Size of food	105	258

Question Five: Recycle at Towson University

Category	Yes	No
Paper	271	92
Plastic	288	74
Styrofoam	74	289
Food waste (compost)	103	260
Bottles and cans	315	44

Question Six: Recycle at home

Category	Response
Most always	163
Often	98
Not sure	16
Rarely	46
Never	36

Question Seven: Recycle at Towson's food services

Category	Response
Most always	102
Often	156
Not sure	45
Rarely	36
Never	16

Question Eight: Leave food waste on plate

Category	Response
Most always	28
Often	106
Not sure	48
Rarely	142
Never	31

Question Nine: Convenience of Trayless Tuesday in all-you-care-to-eat dining facilities

Category	Response
Very Convenient	14
Convenient	60
Neither	88
Inconvenient	67
Very Inconvenient	27
Not applicable	99

Question Ten: Convenience of Recycling sites in TU's food service facilities

Category	Response
Very Convenient	50
Convenient	182
Neither	75
Inconvenient	31
Very Inconvenient	7

Question Eleven: The number of food options available at Towson

Category	Response
Way too many	6
More than enough	59
Just right	167
Not enough	108
Way too few	17

Question Twelve: Importance of "quality" of what you eat to your overall well being

Category	Response
Very Important	175
Important	146
Neither	17
Not Important	13
Very unimportant	8

Question Thirteen: Reduction of options in each category of food (meat, vegetable, side)

Would be Ok	Would not be Ok
131	224

Question Fourteen: In general purchasing habits, the "environmental footprint" of an item made from sustainably harvested or recycled

Category	Response
Very Important	50
Important	143
Neither	104
Irrelevant	48
Totally irrelevant	13

Question Fifteen: In my general purchasing habits, I consider the cost of a food product

Category	Response
Very Important	108
Important	180
Neither	44
Irrelevant	22
Totally irrelevant	4

Question Sixteen (part a): Willing to pay more for sustainably produced food

Yes	No
224	133

Question Sixteen (part b): If yes, How much more? (On a $5.00 item)

Money	Response
5 cents	26
10 cents	40
25 cents	63
50 cents	60
More than 50 cents	45

Question Seventeen: Changes that would have more of an impact on your food purchasing habits

A slight increase in price	**A slight decrease in serving size**
231	106

Question Eighteen: Dining times at an all-you-care-to-eat dining facility

Time	**Response**
7:00 to 11:00 am	26
11:00 to 3:00 pm	52
3:00 to 7:00 pm	78
7:00 to 11:00 pm	10

Question Nineteen: Dining times at an a la carte dining facility

Time	**Response**
7:00 to 11:00 am	27
11:00 to 3:00 pm	120
3:00 to 7:00 pm	46
7:00 to 11:00 pm	29

Question Twenty: Dining times at on campus franchises

Time	**Response**
7:00 to 11:00 am	20
11:00 to 3:00 pm	107
3:00 to 7:00 pm	56
7:00 to 11:00 pm	14

Question Twenty-One: Dining times of snacks.

Time	**Response**
7:00 to 11:00 am	48
11:00 to 3:00 pm	68
3:00 to 7:00 pm	37
7:00 to 11:00 pm	37

Appendix C: Raw data from survey-answer codes presented in Appendix A

Sur. #	Stud/ Fac	Year	Live	Meal Plan	1	2	3	4a	4b	4c	4d	4e	5a	5b	5c	5d	5e	6
1	2	2	1	3	2	1	1	1	1	1	1	1	0	1	0	1	1	3
2	2	1	1	3	3	1	1	1	1	0	0	0	1	1	0	0	1	2
3	2	1	0	3	4	1	1	1	1	1	0	0	1	1	0	0	1	2
4	2	1	1	3	3	1	1	1	0	1	0	1	1	1	0	0	1	1
5	2	1	1	3	3	1	2	0	0	1	0	0	1	1	0	0	1	1
6	2	1	2	1	1	1	2	0	0	0	1	0	1	1	0	0	1	1
7	2	1	1	3	3	2	1	0	1	0	0	0	1	1	0	0	1	2
8	2	0	1	3	2	1	2	0	0	0	0	1	0	1	0	0	1	1
9	2	1	2	3	1	1	1	1	0	0	0	0	1	1	0	0	1	5
10	2	1	1	3	3	1	2	0	0	0	1	0	1	0	0	0	1	2
11	2	3	2	3	4	1	2	0	0	1	0	0	1	1	0	1	1	1
12	2	1	1	3	3	1	1	1	1	0	1	0	1	1	1	1	1	1
13	2	1	1	3	2	1	1	1	0	0	1	1	1	1	0	0	1	2
14	2	3	3	1	1	0	1	0	1	0	0	0	0	1	0	1	0	2
15	2	3	2	2	1	1	1	0	0	0	1	0	1	1	0	0	1	1
16	2	1	2	4	1	1	1	1	1	0	0	1	0	1	0	1	1	2
17	2	5	2	4	1	1	1	1	0	0	0	1	0	0	0	0	1	1
18	2	3	2	4	1	1	1	1	0	1	0	0	0	1	0	0	1	1
19	2	3	0	4	1	1	1	0	0	0	1	0	1	1	0	0	1	4
20	2	3	2	4	1	1	1	0	0	0	1	0	1	1	0	0	1	1
21	2	3	0	4	1	1	1	0	1	1	0	1	1	0	1	0	0	1
22	2	2	2	4	1	1	1	0	0	1	1	0	0	1	0	0	1	1
23	2	5	2	4	1	1	2	0	0	0	1	0	1	1	0	0	1	1
24	2	3	2	4	1	2	1	1	0	0	0	0	1	1	0	0	1	5
25	2	4	0	4	1	1	1	0	0	0	0	1	1	1	0	0	1	1
26	2	4	2	4	1	1	1	1	0	0	0	0	1	1	0	0	1	2
27	2	3	2	4	1	1	1	1	0	0	0	1	0	1	0	0	1	1
28	2	2	2	4	1	1	1	1	0	0	0	1	1	1	0	0	1	2
29	2	4	2	4	1	1	1	0	0	0	0	1	1	1	1	0	1	2
30	2	2	2	4	1	2	1	0	0	1	0	1	0	0	0	1	2	4
31	2	4	2	4	1	1	2	1	0	0	0	1	1	1	0	0	1	5
32	2	2	2	4	1	1	0	0	0	0	0	1	1	1	0	0	1	1
33	2	4	2	4	2	4	1	1	1	1	0	1	0	0	1	1	0	0
34	2	3	2	4	1	1	1	0	0	0	1	0	1	1	0	0	1	2
35	2	0	2	0	1	1	2	1	0	0	0	0	1	1	0	0	1	1
36	2	0	2	4	2	1	1	1	0	0	0	0	1	1	0	0	1	2
37	2	0	2	0	1	1	2	1	1	0	0	0	1	1	1	1	1	1
38	2	0	2	4	1	1	2	1	0	0	0	0	0	1	0	0	0	2
39	2	0	0	0	1	1	2	1	0	1	0	1	1	1	0	0	1	2
40	2	3	2	4	1	1	1	1	0	1	0	0	1	1	1	1	1	4
41	2	4	2	4	1	1	1	0	0	0	0	1	0	0	0	0	1	2
42	2	2	2	4	1	2	2	0	0	0	1	0	1	1	1	0	1	2
43	2	0	2	1	1	1	1	0	0	0	0	1	1	1	1	1	1	2
44	2	3	2	4	1	1	1	0	0	1	0	0	0	1	0	0	1	1
45	2	0	1	0	1	1	1	0	0	0	0	1	0	1	0	0	1	1
46	2	0	0	0	1	1	1	0	0	1	0	0	1	1	1	1	1	5
47	2	3	2	4	1	1	2	1	0	0	0	0	1	1	0	1	1	5
48	2	0	2	4	1	1	1	1	1	1	1	1	1	1	0	0	1	1
49	2	4	2	4	1	1	1	0	0	0	0	1	1	1	0	0	1	1
50	2	2	1	3	3	1	2	1	1	1	1	1	1	1	1	1	1	1
51	2	3	2	4	1	1	1	0	1	0	0	0	0	0	0	0	1	1
52	2	1	2	3	3	1	1	1	0	0	1	0	0	1	1	0	1	1
53	2	3	2	4	1	1	2	1	0	0	0	1	1	1	0	0	1	1
54	2	2	2	4	1	1	2	1	1	0	0	1	1	0	0	0	1	2
55	2	1	0	0	1	1	2	0	1	0	0	0	0	0	0	0	1	2
56	2	2	2	2	1	1	2	0	0	0	1	1	1	1	0	0	1	2

Sur #	7	8	9	10	11	12	13	14	15	16a	16b	17	18	19	20	21	Site
1	2	4	2	2	2	2	2	2	2	1	2	1	3	4	3	4	Paws
2	2	2	2	2	3	2	1	2	3	1	2	1	3	3	4	2	Paws
3	2	4	4	2	4	1	2	5	2	2	0	2	6	12	12	1	Paws
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173	2	2	4	3	3	1	1	3	1	1	3	1	3	2	2	0	Brick Street
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187	1	4	5	2	3	2	2	2	2	2	0	1	0	0	6	0	Burdick
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193	4	1	4	3	3	1	1	3	2	2	3	1	2	3	3	4	Burdick
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196	2	3	2	2	4	2	2	2	2	1	3	1	11	2	4	2	Susq
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218	2	5	2	5	3	0	0	0	0	0	0	0	0	0	0	0	Paws
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252	2	2	2	4	1	1	2	0	0	0	1	0	1	1	0	0	1	1
253	2	3	1	3	4	1	1	0	0	1	0	0	1	1	0	1	1	2
254	2	1	2	4	2	2	2	1	0	0	0	0	1	1	1	1	1	1
255	2	4	1	3	4	1	2	0	1	0	0	0	1	1	0	1	1	1
256	2	4	2	4	1	1	1	1	0	0	0	0	1	1	0	0	1	1
257	2	0	2	4	2	1	1	1	0	0	0	0	0	0	0	0	1	3
258	1	0	2	4	1	1	1	0	0	1	0	1	1	0	0	1	1	2
259	2	2	2	4	1	1	1	1	1	0	1	0	1	1	0	0	1	1
260	1	0	2	4	0	0	1	1	0	0	0	0	1	1	0	1	1	2
261	2	3	2	4	1	1	1	1	0	0	0	0	1	1	0	0	1	1
262	2	1	1	3	3	1	1	1	1	0	0	0	1	1	1	0	1	1
263	2	1	1	3	2	1	1	1	1	0	0	1	1	1	1	0	0	2
264	2	1	0	1	2	1	2	1	1	0	1	0	1	1	0	0	1	2
265	2	1	1	1	2	1	1	0	1	0	0	0	1	0	0	0	0	4
266	2	3	1	3	3	1	2	0	1	0	0	0	0	0	0	0	1	1
267	2	3	1	3	1	1	1	1	1	0	1	0	1	1	1	1	1	5
268	2	2	2	3	1	1	1	0	1	1	1	0	1	1	0	0	1	2
269	2	1	1	3	3	1	1	1	0	0	0	0	1	1	0	1	1	4
270	2	1	1	3	3	1	1	0	0	0	1	0	0	0	0	1	0	4
271	2	2	0	3	2	1	2	0	1	0	1	1	1	1	1	1	1	2
272	2	3	1	3	1	2	1	1	1	0	1	0	1	1	0	0	1	5
273	2	1	1	3	2	1	2	0	0	0	1	0	0	0	0	0	1	1
274	2	1	1	3	3	1	2	0	0	0	1	0	1	1	0	0	1	1
275	2	1	1	3	3	1	2	0	0	1	0	0	1	1	1	0	1	4
276	2	1	1	3	2	1	2	1	0	0	1	0	1	1	0	1	1	2
277	2	1	1	3	2	1	1	0	1	1	1	0	1	1	0	0	1	1
278	2	1	1	3	4	1	1	1	0	1	1	0	0	1	0	0	1	1
279	2	3	1	3	2	1	2	0	1	1	1	0	1	1	0	1	1	2
280	2	1	1	3	3	1	1	1	1	1	0	0	1	1	1	0	1	4
281	2	2	1	3	3	1	1	1	0	0	0	0	0	0	0	0	1	2
282	2	1	1	3	2	1	2	1	1	0	1	0	1	1	0	0	1	2
283	2	1	1	3	4	1	1	0	0	1	0	1	1	1	0	0	1	5
284	2	1	1	3	2	1	0	0	0	0	0	0	0	0	0	0	0	4
285	2	1	1	3	3	1	1	0	1	0	1	0	1	1	0	0	1	1
286	2	0	1	3	1	2	1	0	0	0	1	0	0	0	0	0	1	5
287	0	0	2	4	1	1	1	1	0	0	0	0	0	0	0	1	0	5
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289	2	1	2	0	2	1	1,2	1	0	1	0	0	0	0	0	0	0	4
290	2	1	2	3	2	1	2	1	0	1	0	0	1	1	1	1	1	4
291	2	1	2	4	1	2	1	1	0	1	1	0	0	0	0	0	0	4
292	2	3	1	0	3	1	1	1	0	0	1	0	1	1	1	1	1	2

234	1	4	3	1	4	1	1	1	2	1	4	1	3	3	3	7	Burdick
235	2	4	3	2	4	1	1	2	2	1	5	1	6	4	0	0	Brick Street
236	4	2	3	2	4	1	1	2	2	1	3	1	2	2	3	1	Glen
237	1	3	3	4	4	2	2	2	1	1	3	1	8	2	3	0	Glen
238	1	4	6	2	2	4	1	3	2	1	2	2	0	2	2	2	Liberal Arts
239	2	4	6	0	3	3	1	3	2	1	1	2	0	2	2	15	Liberal Arts
240	2	3	4	3	2	3	2	3	2	2	0	1	8	6	6	7	Liberal Arts
241	2	4	4	2	2	3	1	1	2	1	2	2	6	6	6	15	Liberal Arts
242	2	2	4	3	3	4	2	4	1	2	0	0	2	0	0	6	Liberal Arts
243	2	4	3	2	1	2	1	1	2	1	3	2	1	2	2	7	Liberal Arts
244	2	4	3	2	2	2	1	1	3	1	3	2	6	2	2	4	CFA
245	2	3	6	2	2	4	1	3	3	1	2	2	6	2	2	7	CFA
246	1	4	6	2	2	4	1	2	2	1	1	2	0	2	2	6	CFA
247	3	2	6	4	2	4	1	3	1	2	0	1	13	6	6	15	CFA
248	2	3	4	2	3	4	2	2	2	1	1	1	6	0	2	6	CFA
249	2	2	4	3	3	4	2	4	1	2	0	0	2	0	2	6	CFA
250	1	4	3	2	2	3	1	2	2	1	3	0	6	6	6	6	CFA
251	4	2	5	4	4	4	2	4	1	2	0	0	13	8	8	15	CFA
252	1	5	3	2	1	2	1	1	3	1	4	2	0	0	0	6	CFA
253	2	3	1	3	2	3	1	4	1	2	0	1	13	6	6	6	CFA
254	1	4	6	2	2	4	1	2	2	1	1	2	0	2	2	6	CFA
255	2	5	6	2	2	2	1	2	2	1	2	2	13	6	8	13	CFA
256	1	3	2	2	2	2	1	2	3	1	3	1	3	2	1	2	Newell
257	2	5	2	2	3	3	1	3	2	2	0	1	3	3	4	4	Newell
258	1	4	5	2	2	2	1	2	2	2	0	1	3	0	0	0	Newell
259	2	4	3	2	3	1	1	2	2	1	5	1	1	2	1	2	Newell
260	2	5	4	2	2	1	2	2	2	1	1	1	0	0	0	0	Newell
261	1	4	3	2	4	2	1	2	2	1	3	2	3	1	1	1	Newell
262	2	1	5	2	4	1	2	5	5	2	0	1	1	0	2	4	Newell
263	3	2	4	2	3	2	1	5	5	1	2	1	10	12	2	2	Newell
264	3	4	3	2	3	2	2	2	2	2	2	1	6	0	2	3	Newell
265	4	4	4	3	3	2	2	2	3	2	0	0	6	0	2	0	Newell
266	4	1	2	2	4	2	2	1	4	1	5	1	1	1	6	0	Newell
267	2	1	5	2	4	2	2	2	2	1	3	1	3	2	2	2	Newell
268	3	2	3	3	4	1	1	3	2	1	5	1	2	0	0	4	Newell
269	2	2	4	2	4	1	2	3	2	2	0	1	3	3	4	4	Newell
270	2	4	4	2	3	1	2	2	2	1	3	1	11	1	4	3	Newell
271	2	2	4	2	3	1	1	4	1	2	0	2	13	0	4	5	Newell
272	1	5	5	2	3	2	2	2	4	2	0	1	3	1	2	4	Newell
273	2	4	3	2	4	1	1	4	2	1	4	1	3	4	15	0	Newell
274	2	2	3	1	3	2	2	2	1	2	0	1	2	3	6	3	Newell
275	4	4	4	2	3	1	2	4	2	1	4	2	6	3	6	3	Newell
276	2	4	4	2	3	2	1	4	4	2	0	1	7	3	7	4	Newell
277	2	2	3	3	4	2	2	2	1	1	3	1	6	0	0	0	Newell
278	2	2	6	2	3	1	2	3	2	1	2	1	6	4	13	13	Newell
279	2	4	4	3	3	1	2	3	2	1	2	1	3	14	14	13	Newell
280	1	2	3	1	3	2	2	3	2	2	0	2	8	4	0	0	Newell
281	1	2	1	1	4	2	2	4	1	2	0	1	3	4	3	4	Newell
282	3	3	4	2	3	2	2	2	1	2	0	1	11	3	11	2	Newell
283	2	2	5	4	4	1	2	4	2	2	0	1	1	2	8	3	Newell
284	3	4	3	3	3	2	0	3	2	1	4	0	3	2	0	3	Newell
285	1	2	6	2	3	2	2	3	2	1	5	2	6	4	15	4	Newell
286	5	5	2	2	3	1	2	5	3	2	0	1	1	0	0	4	Newell
287	5	5	3	3	3	2	2	3	3	2	0	2	0	2	3	0	Univ village
288	2	3	2	2	3	1	1	2	2	1	4	1	3	2	2	2	Univ village
289	5	2	5	5	3	1	2	3	2	2	0	0	7	7	0	0	Univ village
290	2	4	6	0	4	2	2	2	2	1	1	0	7	4	0	4	Univ village
291	3	4	6	0	3	1	1	2	1	2	0	1	3	0	0	0	Univ village
292	2	3	6	3	3	1	1	2	1	2	0	1	14	0	0	0	West village

293	2	2	1	0	3	1	1	0	0	1	0	0	0	0	0	0	0	3
294	2	2	1	3	3	1	1	1	1	0	1	0	1	1	0	0	0	2
295	2	0	0	0	1	1	2	0	0	0	0	1	1	1	0	0	1	2
296	2	0	2	0	1	1	1	0	0	1	1	1	1	1	0	0	0	5
297	2	2	2	3	1	2	1	0	0	1	1	0	1	1	0	0	1	1
298	2	0	0	0	1	1	1	1	1	0	1	1	1	1	0	0	1	2
299	0	0	2	4	1	1	1	1	0	0	0	1	0	0	0	0	0	2
300	2	3	2	3	2	1	2	0	0	0	0	1	1	1	1	0	1	2
301	2	1	1	3	4	1	1	1	1	1	1	0	1	1	0	0	1	4
302	2	4	2	4	1	1	0	0	0	0	1	0	0	1	0	0	1	1
303	2	0	2	4	1	1	1	0	0	0	0	1	1	1	0	0	1	1
304	2	1	1	3	3	1	2	1	1	0	0	0	0	1	0	0	0	1
305	2	2	2	4	1	1	1	0	1	0	1	0	1	1	1	0	1	4
306	0	0	0	0	4	2	1	0	1	0	0	0	0	0	0	0	1	3
307	2	1	1	3	2	1	2	0	1	0	0	0	1	1	0	1	1	3
308	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0	1	2
309	2	1	1	3	2	2	1	0	1	0	0	0	1	1	0	1	1	3
310	2	1	1	3	3	2	1	0	0	0	0	0	1	1	0	0	1	3
311	2	0	0	0	2	2	1	0	1	0	1	0	0	1	1	1	1	1
312	2	0	1	3	3	1	1	0	1	0	0	0	1	1	0	1	1	3
313	2	1	1	3	3	1	2	1	1	1	0	0	1	1	1	0	1	2
314	2	1	1	3	3	1	1	0	1	0	0	0	1	1	0	1	1	3
315	2	1	1	3	2	1	2	0	1	0	1	0	1	1	0	1	1	3
316	2	4	2	4	2	1	2	0	0	0	0	0	0	1	0	1	1	4
317	2	2	2	4	1	1	1	1	1	1	0	0	0	0	0	0	1	5
318	2	1	1	3	2	1	1	1	1	1	0	0	1	1	0	1	1	2
319	2	3	1	3	3	1	2	1	1	0	0	0	1	1	0	0	1	5
320	2	4	2	4	1	1	2	0	1	0	0	0	0	0	0	1	0	5
321	2	0	1	0	4	1	0	1	1	0	1	0	0	1	0	0	1	2
322	2	0	1	0	3	2	1	0	0	1	0	0	1	1	1	1	1	2
323	2	1	1	3	2	2	2	1	0	0	0	0	1	0	0	1	1	1
324	2	1	1	0	2	1	1	0	0	1	0	0	1	1	0	0	1	1
325	2	1	1	3	3	2	1	1	0	0	0	0	1	1	1	1	1	2
326	2	0	1	3	3	1	1	0	0	1	0	0	1	1	0	0	1	5
327	2	0	0	0	3	1	1	0	0	1	0	0	1	1	0	0	1	1
328	2	1	1	0	3	1	1	1	0	1	0	0	1	1	0	0	1	1
329	2	1	1	3	3	1	1	0	0	1	0	0	1	1	0	0	1	3
330	2	0	1	0	2	1	2	1	1	0	0	0	1	1	0	1	1	5
331	2	0	1	0	3	1	2	0	0	1	1	0	1	1	0	1	1	4
332	2	1	1	0	3	1	2	1	0	0	1	0	1	1	0	1	1	1
333	2	0	1	3	2	1	2	1	0	0	1	0	1	1	0	1	0	1
334	2	1	1	0	2	1	1	0	1	0	0	0	1	1	1	0	1	1
335	2	0	2	0	1	1	1	0	0	0	1	0	1	1	0	0	1	1
336	2	2	1	3	2	1	1	0	0	0	1	1	1	0	0	0	1	5
337	2	1	1	3	2	1	2	0	1	0	1	0	1	1	0	1	0	1
338	2	1	1	0	2	1	2	0	1	0	0	0	1	1	0	1	0	2
339	2	1	1	3	2	1	1	0	1	0	0	0	1	1	0	1	1	1
340	2	0	1	0	3	1	2	1	1	1	0	0	1	1	0	0	1	1
341	2	3	1	0	2	1	1	1	0	0	0	0	1	1	1	1	1	1
342	2	1	1	1	3	1	1	1	1	1	1	0	0	1	0	0	1	1
343	2	0	1	1	3	1	1	0	0	0	1	1	0	1	0	0	1	1
344	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
345	2	0	1	0	4	1	1	1	1	0	0	0	1	1	0	0	1	1
346	2	1	1	3	4	1	1	1	1	1	0	1	1	1	0	0	1	5
347	2	0	1	0	3	1	1	1	1	1	0	1	1	1	0	1	1	1
348	2	2	1	3	3	1	2	1	0	1	1	0	1	1	0	0	1	4
349	2	2	1	3	3	1	2	0	1	0	1	1	1	1	0	0	1	1
350	2	3	1	0	3	1	1	0	0	0	1	0	1	1	0	0	1	1
351	2	4	1	3	2	1	1	0	0	0	1	0	1	1	0	0	1	1

293	3	4	3	3	3	2	2	4	4	2	0	0	12	3	3	0	WVC
294	2	2	4	2	3	2	1	2	2	1	4	0	14	0	1	0	WVC
295	2	4	2	2	3	2	1	3	2	1	3	1	0	2	2	2	Univ village
296	3	2	4	3	4	2	1	4	1	2	0	1	3	3	3	2	
297	2	1	3	3	5	1	2	5	1	1	3	1	3	2	3	1	
298	1	4	3	1	4	1	2	1	1	1	3	1	2	2	2	2	
299	5	1	5	4	4	2	1	3	3	2	0	2	0	0	0	0	WVC
300	2	4	4	0	2	1	1	2	2	1	3	1	3	2	0	0	WVC
301	3	3	3	3	2	2	2	3	2	2	0	1	5	3	2	4	WVC
302	1	4	2	2	2	5	1	1	1	1	4	1	0	2	0	1	WVC
303	3	4	4	4	3	2	1	2	1	1	1	2	3	1	0	0	WVC
304	3	2	2	3	4	3	2	2	2	2	3	2	5	4	1	2	Susq
305	2	4	4	2	3	2	2	3	3	1	3	1	0	0	2	5	Susq
306	2	3	0	4	5	2	2	3	4	2	0	2	8	0	0	14	WVC
307	2	5	6	2	4	1	2	2	4	1	3	0	2	0	2	0	WVC
308	2	4	6	4	5	1	2	1	2	1	5	0	0	2	2	5	Susq
309	2	3	5	3	5	1	2	3	3	1	5	1	6	0	0	0	WVC
310	3	4	6	4	4	2	2	3	4	1	5	2	8	0	3	7	WVC
311	2	2	4	3	5	1	2	4	3	2	0	1	8	2	6	13	Susq
312	2	4	6	3	5	2	2	2	4	1	5	2	6	0	0	0	Susq
313	2	4	6	3	4	1	2	1	2	2	0	2	5	3	3	6	WVC
314	4	4	5	3	5	2	2	3	3	2	0	2	6	3	6	8	WVC
315	2	3	3	4	4	2	2	3	4	1	5	2	8	2	0	0	WVC
316	2	4	6	2	3	1	2	2	1	1	4	2	0	0	2	5	Susq
317	4	1	5	4	4	3	2	4	4	2	0	2	0	0	6	8	Susq
318	3	2	6	3	4	1	2	2	4	1	5	2	8	2	3	0	Susq
319	4	2	4	4	4	2	2	4	2	1	4	2	11	2	0	4	Susq
320	5	1	5	5	5	5	2	5	1	2	0	1	3	1	2	4	WVC
321	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	WVC(Cfire drill)
322	2	2	5	1	3	1	2	4	1	2	0	2	3	4	13	1	WVC
323	2	4	4	2	3	2	2	3	2	2	0	1	6	0	0	0	WVC
324	2	2	2	1	3	1	2	4	4	2	0	2	3	4	2	14	WVC
325	3	3	2	2	2	2	2	1	1	2	0	2	1	2	2	1	WVC
326	5	2	4	0	4	1	2	3	3	2	0	0	6	0	0	0	WVC
327	4	4	6	3	4	5	2	3	3	2	0	1	13	0	0	0	WVC
328	5	5	3	3	3	2	2	3	2	2	0	0	6	0	2	3	WVC
329	3	4	6	1	5	2	2	4	1	0	0	1	6	0	2	15	WVC
330	4	3	3	2	3	2	2	3	3	2	0	1	3	3	3	4	WVC
331	3	3	3	3	4	1	2	3	3	2	0	1	0	15	0	3	WVC
332	4	2	4	2	4	3	1	2	2	2	0	2	1	7	7	2	WVC
333	1	2	4	2	4	2	2	2	3	1	2	2	3	12	3	2	WVC
334	1	2	3	1	4	1	2	2	2	1	2	1	3	2	1	2	WVC
335	2	1	5	2	4	2	2	2	1	2	0	1	0	6	0	0	Susq
336	2	2	3	2	4	1	1	4	1	2	0	2	15	15	15	15	Susq
337	2	2	6	3	2	1	2	3	3	2	0	1	6	2	15	1	Susq
338	1	3	6	2	3	2	2	3	3	2	0	1	3	4	15	5	Susq
339	2	3	3	2	3	1	2	5	5	2	0	1	2	3	0	13	Susq
340	2	4	3	2	4	1	2	5	3	1	2	1	3	2	2	2	Susq
341	0	0	2	2	2	2	0	4	1	2	0	1	11	0	0	0	WVC
342	2	4	3	2	3	2	2	4	1	2	0	1	6	0	4	0	WVC
343	2	2	2	3	3	2	2	2	3	2	0	1	2	4	1	0	WVC
344	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
345	1	2	4	3	3	1	2	2	5	1	2	1	15	7	7	6	WVC
346	4	1	4	3	4	1	2	4	2	2	0	1	3	4	7	15	WVC
347	4	2	6	2	4	2	2	4	2	2	0	1	3	7	0	15	WVC
348	1	4	5	3	4	2	2	3	2	1	3	2	3	13	13	0	WVC
349	2	2	5	2	3	1	2	4	3	2	0	1	8	3	6	0	WVC
350	3	4	3	2	3	1	2	2	1	1	3	2	2	7	7	7	WVC
351	2	3	4	4	3	2	2	2	1	1	4	1	6	6	6	6	WVC

352	2	4	2	2	1	1	1	0	0	0	1	1	0	0	0	0	1	4
353	2	2	1	1	2	1	1	0	1	0	0	0	0	0	0	0	0	4
354	2	3	0	0	1	1	1	0	0	0	1	0	0	0	0	0	1	1
355	2	3	2	2	1	1	1	0	0	1	0	1	1	1	0	0	1	2
356	2	2	1	1	2	1	1	1	1	0	0	1	1	1	0	0	1	1
357	2	2	1	2	4	1	2	0	0	0	0	0	1	1	1	1	1	1
358	2	0	2	0	1	2	1	0	1	1	0	1	1	1	0	0	1	4
359	2	4	2	2	1	1	1	0	1	0	1	0	0	1	0	0	1	1
360	2	0	2	0	1	1	1	0	0	0	0	1	1	1	0	1	1	1
361	2	4	2	2	1	1	1	0	0	0	0	1	1	1	0	0	1	1
362	2	2	1	2	2	1	1	0	1	0	0	1	1	1	0	0	1	1
363	2	3	2	1	1	1	1	1	1	0	0	1	1	1	0	0	0	1

352	1	2	6	0	4	1	2	2	1	1	4	2	0	2	2	1	Beach
353	4	2	4	4	3	2	1	4	1	1	2	1	1	15	0	3	Beach
354	1	4	6	2	3	1	2	1	1	1	5	1	0	0	0	0	Beach
355	0	0	6	3	4	2	2	2	1	1	4	1	2	1	0	1	Beach
356	2	2	2	2	3	1	2	4	2	1	3	1	4	2	3	2	Beach
357	1	5	3	2	1	1	1	1	4	1	5	1	6	4	0	4	Beach
358	3	4	4	2	4	2	2	3	1	2	0	2	0	2	2	0	Beach
359	1	2	1	1	2	2	1	3	2	1	3	1	4	3	3	3	Liberal Arts
360	1	3	2	2	3	1	1	2	2	1	5	1	2	2	2	3	Liberal Arts
361	1	1	6	2	2	1	1	1	2	1	4	1	2	2	2	2	Liberal Arts
362	1	2	6	3	3	2	2	2	2	1	5	2	0	13	13	13	Liberal Arts
363	1	2	3	2	3	1	1	3	2	1	3	1	0	2	2	3	Liberal Arts

Appendix D: Unedited Comments from Survey **(Note: These are unedited and were taken directly from the survey responses to the best of our reading ability)**

The question asked was "Do you have any suggestions as to how our campus food services could become more 'sustainable' in its operation, i.e., reduce its environmental 'footprint' while maintaining its ability to serve its clientele?"

1. Less serving size
2. The food restaurants such as paws and the dining halls should remain open till a later hours past 7 pm. The portion sizes could be smaller and the options could be healthier.
3. If they were to offer more sustainable food it should be across the board-don't give the people the option or they will take the bigger cheaper portions.
4. Recycle, reduce, and reuse
5. Make it more clear which cans are recycling and which are for trash. I often see people just toss in their trash without paying attention to whether it is a recycling can or not.
6. Promote the recycling.
7. Real plates for eat-in at brick street, p-tux, etc.
8. More option.
9. Is there any sustainable practice going on? I would not think so based on food available. I have no suggestions, because it's hard to feed masses of people, expensive organic foods for a low cost to the school students.
10. Quality over quantity.
11. More simple options that cost less-food that is a staple in a lot of people's diet.
12. No styrofoam's, options of reusable plates of silverware instead of disposable products, locally grown/raised products.
13. Not sure how it is ran to begin with.
14. Keep recycling.
15. Lower the prices. Improve the quality of food.
16. Non that I can think off.
17. To advertise recycling options by all bins because not everyone knows what can be recycled.
18. Use more paper products.
19. Buy local, Compost, Use ALT, energy sources.
20. More vegetation options.
21. If campus used a free market system where local venders could come in the incentive to be sustainable would be higher, there would be greater competition which would push the companies to get better for the clients.
22. Offer more vegetarian options.
23. The quality should increase.
24. Compost, Less styrfoams.
25. I just want tastier food.
26. Lowering prices by a lot.
27. Be more connected to the vegetable garden on campus.
28. Cut down on the amount of choices people have when eating meat.
29. How about not using plastic fork, spoons, etc..?
30. Price lowered and quantity increased.
31. Utilize urban farms, green house on roof tops.
32. More recycle like in the University Union at all locations.
33. Try to waste less food.
34. Recycle.
35. Extend dining hours, give food options for all kinds of students, prices should be in range.
36. Composting is a great idea and more recycling.
37. The hours of operation need to be longer and open on weekends.
38. Use containers/cautions made from recycled materials. Buy products from/work in business with the Towson Farmers Market.
39. More recycling bins.
40. More advertising about it.

41. Make recycling situations obvious, more locally grown foods and options for us vegetarians. Use food from TU veggie gardens.
42. No more recycling “Nazis” at susquana. Use different things to eat off.
43. Have the different types of recycling/waste bins. Similar to those in Susquana right now.
44. I don’t know.
45. Some way to roll-over meals so that I don’t have to buy so much extra food or lose the meals.
46. Food facilities should stay open later, lower prices, help make food healthier and improve quality of food.
47. Food needs to stay open later.
48. Make healthier food choices.
49. Give trays at the door so you only use one tray per person. I see people finish one helping send a tray through and grab another.
50. More identifiable recycling containers,
51. Environmentally safe food at cheaper prices.
52. The different facilities use on abundance of paper and plastic. Their should be a different way to serve the food.
53. More locally grown produce and meats.
54. It would be nice to incorporate more input in terms of diverse dining choices. Vegetarian options are extremely limited and poor quality. This fact alone forces me to bring food from home, or make unhealthy choices. Plus more meatless soups.
55. Local, free range, organic, natural. Features foods from businesses in Towson. It is close and promotes local spending.
56. Go completely trayless, forces people to get less food and cut down on their water and electricity.
57. Recycling in dorms a lot.
58. Have a larger variety of food.
59. Not making many fatty cookies, and other food items, put more fresh fruits, make more vegetable choices which can help us to not gain weight. This option is healthy
60. Focus on macro nutrients-carbs, protein, fat. Teach students why a portion size is, list healthier choices.
61. Use recyclable plates and silverware.
62. Add on campus chipotle!!!!
63. Can’t think of anything
64. “What! Neither?” on question #17
65. “None” on question #17
66. “I want a dam tray for all-you can eat” on question #9, “WAH” for question #22
67. “no idea”
68. “Just do it-you won’t!”
69. “no, its good”
70. “more healthy”
71. “more veggies and fresh fruit”
72. “Portion size is crazy (particularly in buffet type places)”
73. “Use locally grown vegetables”
74. “More effective/prompt service in food lines and less pre-wrapped/packaged options”
75. “Do we have compostable silverware” “Recycled content/sust. Paper products”
76. “local organic food options!”
77. “Decrease portions! We don’t need a million fries w/our chicken or shrimp”
78. “smaller serving sizes”
79. “1 day a week – no meat, spread awareness of footprint of meat”

Appendix E: Statistical Analysis

Willingness to Pay More for Sustainable Products and How Often They Recycle

H_o: Willingness to pay [WTP] for more sustainable products and how often they recycle are independent.
H_1: Willingness to pay for more sustainable products and how often they recycle are not independent.

df = (2-1)(2-1) = 1 Observed X^2 = 26.45 p = 2.70

Expected	WTP	Not WTP
Most always or often recycle at Towson University	163.03	91.97
Rarely or never recycle at Towson University	31.97	18.03

At a 5% level of significance, we reject the null hypothesis; therefore willingness to pay more for sustainable products and recycling often are not independent.

Recycle at Home and Recycle at Towson University

H_o: Recycle at home and recycle at Towson University are independent.
H_1: Recycle at home and recycle at Towson University are not independent.

df = (2-1)(2-1) = 1 Observed X^2 = 7.314 p = 0.0068 df = 1

Expected	Most always/often at Towson University	Rarely/never at Towson University
Most always/often at Home	192.951	34.349
Rarely/never at Home	65.349	11.651

At a 5% level of significance, we reject the null hypothesis; therefore recycling at home and recycling at Towson University are dependent.

Years at Towson University and Recycle at Towson University

H_o: Years at Towson University and Recycling at Towson University are independent.
H_1: Years at Towson University and Recycling at Towson University are not independent.
df = (2-1)(4-1) = 3

Observed X^2 = 4.86 p = 0.182 df = 3

Expected	Year 1	Year 2	Year 3	Year 4
Most always/often recycle at Home	53.962	46.491	45.660	29.887
Rarely/never recycle at Home	11.038	9.509	9.340	6.113

At a 5% level of significance, we do not reject the null: therefore, years at Towson University and recycling at Towson University are independent.

Years at Towson University and Recycling at Home

H_o: Years at Towson University and recycling at home are independent.
H_1: Years at Towson University and recycling at home are not independent.

df = 3 X^2 = 1.15 p = 0.76 df = 3

Expected	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Most always/often recycle at Towson University	57.502	47.047	44.060	25.391
Rarely/never recycle at Towson University	19.498	15.953	14.940	8.609

At a 5% level of significance, we do not reject the null; therefore, years at Towson University and recycling at home are independent.