

## **Food Systems and Security at the University of Richmond**

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#### **Introduction**

The University of Richmond's new Strategic Plan states that one of the main values of the University is to maintain "careful stewardship of institutional and environmental resources" and sets forth its goal to be a "leader in innovative practices that sustain our environmental, human, and financial resources" (Crutcher 2017). These statements signal a new chapter in the environmental-consciousness of the institution to formally incorporate sustainability commitments into the University's overall framework.

In the past fifteen years, the University has signed multiple national and global sustainability commitments, such as the 2003 Talloires Declaration, the 2007 American College and University President's Climate Commitment, and the 2015 American Campuses Act on Climate Pledge (OFSb 2017). These commitments set ambitious climate action goals and address the responsibility of colleges and universities not only to cultivate a culture of environmental stewardship on campus but also to transform their conventional operational systems into sustainable systems. The University of Richmond's 2017 Sustainability Report highlights the steps the University has taken to achieve these goals and identifies areas in need of improvement. The report adopts the Sustainability Tracking, Assessment & Rating System (STARS), which is a transparent, self-reporting framework used by hundreds of colleges and universities worldwide to measure their sustainability performance (AASHE 2017). In 2016, the University earned a Silver STARS rating, demonstrating the considerable efforts made by the University to integrate sustainability into its campus-wide practices (OFSa 2017). Even so, there remains much room for improvement. One area of campus that scored low in the Sustainability Report was Dining Services (1.13/7.00), which we determined was an important operational function of the University to demonstrate leadership in its environmental resources. Given the challenges of maintaining a sustainable food system in the context of climate change and prompted by Dining's low score in the 2017 Sustainability Report, this project seeks to determine the current state of food security among students at the University as well as to analyze the larger context in which our food system is embedded.

This paper begins with a literature review of food systems, food security, the alternative food movement, the role of higher education to lead society in sustainable practices, and local and place-based frameworks. Then, after describing the methods and results for this project, we discuss the overall state of the University's food security and ways to improve the food system at the University of Richmond.

## Literature Review

### *Food Systems*

A food system refers to the linkages of activities and actors that bring food from the farm, to the table, to the trash. While each food system varies, they all share some of the same characteristics: production, processing, packaging, storing, wholesaling, retailing, trading, transporting, consumption, and disposal (Brown *et al.* 2015). In general, however, all food systems fall into two main categories: labor-intensive and capital-intensive. In labor-intensive food systems, farmers eat the food grown on their land with minimal processing. This type of food system is common throughout much of the developing world where access to technology and markets are limited. In contrast, capital-intensive food systems are characterized by long distances separating producers and consumers and therefore rely heavily on technological and energy inputs (Brown *et al.* 2015). The United States' conventional food system illustrates this latter model and has had a two fold impact on American society. On one hand, food has become cheaper, more plentiful, and easier to access for the majority of the population. Nevertheless, this system has also led to many environmental and social justice problems, such as environmental degradation, labor exploitation, and disparities in food security across race and socioeconomic demographics (Hoppe 2014).

### *Consolidation and Centralization*

Under the conventional system, supermarkets have become the major drivers of the modern food system (Dunning *et al.* 2015). Spurred by the entrance of Wal-Mart into the market 30 years ago, supermarkets began to buy out smaller firms as they realized the economic benefits of consolidation and centralization: economies of scale, infrastructure, control over management logistics, tracking technologies, and bargaining power. Still, supermarkets needed an effective distribution system to bridge the gap between production and retail and also connect procurement, transportation, inventory, and sale of commoditized products (2015). In response, these supermarkets created an extensive network of warehouses across the country known as regional distribution centers (RDCs). These warehouses now house most of the United States' food. However, RDCs prefer to buy food only from large-scale growers that specialize in specific products in order to maximize volume discounts and transportation savings (2015). Additionally, buying in bulk from a small network of vendors cuts down on transaction costs and allows RDCs to enforce quality and safety standards as demanded by retailers.

This shift in power dynamics from the producer to the retailer has had important implications for the entire system. Consolidation and centralization have decreased the number of entry points for independently owned and operated grocery stores that cannot compete with giant corporations while also excluding small-scale farmers from the market (Hoppe 2014). This has led to substantial disparities in the way food is produced in the US. For instance, while small-scale farmers make up just fewer than 90% of the total number of producers in the US, they only contribute 24.2% to the total amount of US production. In contrast, large-scale and non-family farms make up 4.2% of producers but produce over 52% of the US's food (USDA Economic Research Service 2015). Similarly, the top four supermarket firms (Wal-Mart, Kroger, Albertsons, and Safeway) dominate about 42-51% of the market with Wal-Mart's share alone estimated to be about 23% to 33% (James *et al.* 2012). And, since 90% of the food consumed in the US is bought from supermarkets, a majority of Americans rely on food produced and sold by a small percentage of corporations who dominate the conventional food system (Hoppe 2014).

### *Vulnerabilities of the Conventional Food System*

The potential precariousness of America's food system stems from the environmental pressures and vulnerabilities within the existing conventional system. As a part of the capital-intensive food system, agriculture in the United States relies on intensive inputs in order to remain productive (Brown *et al.* 2015).

Fertilizers and fossil fuels are two of the main inputs driving this system. The heavy use of synthetic fertilizers throughout the US has caused significant water quality issues through the leaching of nutrients after rain events. Fossil fuels are used at every step of the system to power machines that till the ground, sow the seeds, harvest the yield, transport the goods, and process the food. Animal products have an especially heavy environmental footprint. According to the IPCC, agriculture contributes approximately 14% to total greenhouse gas emissions, mainly originating from methane fermentation during animal digestion (IPCC 2014). Lastly, due to the demand for large-volumes of the same food commodities, monoculture has become a common practice among growers. Although monoculture increases revenue profitability for farmers, it introduces vulnerabilities into the system by enabling parasites to specialize on one specific host and increases vulnerability to crop-failure.

Finally, anthropogenic climate change threatens to destabilize the food system. Agricultural production is governed by climate conditions so that changes in the climate have major repercussions on production yield (Brown *et al.* 2015). Although scientists cannot calculate with absolute certainty how a warming planet will specifically impact the food system, several outcomes are predictable. Brown *et al.* (2015) argue that increasing greenhouse gases in the atmosphere will cause temperatures to rise and also alter the timing and intensity of precipitation events. These changing climatic conditions will have a wide range of potential impacts on localities. In some cases, rising temperatures will actually exhibit a positive effect on food systems. Higher temperatures mean more land at higher latitudes can be cultivated, resulting in increased yields in some regions (Brown *et al.* 2015). In addition, climate change has lengthened the global growing season by 10-20 days on average over the 20<sup>th</sup> century (Brown *et al.* 2015). Longer growing seasons can increase yields and allow for double-cropping. Warmer temperatures also increase rates of decomposition and may lead to greater soil-nutrient availability.

Nevertheless, the negative implications of climate change on agricultural production far outweigh the positives. Higher temperatures will reduce crop yields in some regions, especially in the tropics where plants already approach temperature thresholds. Higher temperatures also means higher rates of moisture losses from soils, which can exacerbate drought conditions and limiting growth in water limited regions (Brown *et al.* 2015). And as winters become milder, pests and diseases will spread into new areas. More intense rain events will erode and alter the physical structure and depth of soils as well as reduce organic matter concentrations (Brown *et al.* 2015). Finally, future agriculture will require even more energy inputs to compensate for higher temperatures and extreme weather events, resulting in the use of more fossil fuels and a positive feedback loop. The environmental footprint of the conventional food system along with its vulnerability to climate change has raised concerns by policymakers about the future of food security in the United States. The next section addresses the issue of food security on college campuses.

### *Food Security*

According to the USDA, food security exists “when all people at all times have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAOb 2012, 57). This definition encompasses four components of food security: *availability*—if food exists in a certain area; *accessibility*—whether food can be obtained; *utilization*—if the food can be consumed so that an individual can obtain the proper nutrients he or she requires; and *stability*—the absence of any significant fluctuations in any of these components. Note that food production is distinct from food security, and high national or regional agricultural yields do not guarantee food security. For example, the United States produces an annual average of over 3,600 Calories per-capita per day (FAOc 2014), yet 14.3% of the U.S. population is currently food insecure (Coleman-Jensen *et al.* 2014). In addition, 2 billion people currently receive insufficient nutrition (Brown *et al.* 2015).

Emerging interest in the research of food systems has encouraged colleges to examine the state of food security on their campuses (Booth & Anderson 2016). A study conducted at California State University Sacramento found 69.2% of students skipped meals and 22% of those students did it on a regular basis (Hanna 2014). In contrast, a study at The University of Northern British Columbia found a low percentage of food insecurity on campus at 3% but only 19% of students were satisfied with quality of food and only 15% thought the cost was reasonable (Booth & Anderson 2016). A larger majority of students, 63%, in Ontario thought the food was expensive and quality was poor, stating there was a prevalence of unhealthy choices and lack of dietary sensitive foods (Canadian Federation of Students- Ontario 2012). These studies demonstrate conventional food systems have led to disparities in availability, access, and utilization on college campuses in North America.

### *Alternative Food System*

Alternative food systems, like the local food movement, have developed in response to these issues. One of the main goals of alternative food systems is to rescale food systems to localities in order to cycle benefits back to the community by supporting regional economies, providing fresher and higher quality food, promoting good public relations, making safer food available, and offering the ability to purchase smaller quantities (Strohbehn and Gregoire 2004). By decentralizing the sources of production in a food system, local food may build community resiliency and strengthen food security (Dunning *et al.* 2015). Local food systems emphasize purchasing and consuming food close to where it was grown and processed (Hinrichs 2015). Local food frameworks have the biggest impact on greenhouse gas emissions from food miles and stimulating local economies as well as strengthening relationships between provider and purchaser (Hinrichs 2015).

A place-based food system is another alternative system that provides a historical, geographical, and regional socio-economic approach to food. While place-based systems do not always decrease greenhouse emissions from food miles, they can still have positive impacts on how communities use the land by encouraging community members to grow crops in places where they naturally occur (Hinrichs 2015). Using these food systems on college campuses can have similar benefits by securing more diverse, healthier, and socially acceptable foods as well as educating students on sustainable practices and hopefully influencing the continuance of these sustainable practices. Incorporating new food systems opens educational avenues such as practical skills in growing food, leading to a student base better equipped for food insecure times (Lacharite 2016). These programs offer the opportunity to learn about food security and the interdependence of humans and the environment. Food projects are also known to increase the connection between various disciplines making it an interdisciplinary study (Lacharite, 2016). This engages students from all majors and allows a whole system approach where students can be involved in food production, economics, utilization, policy, etc. (Lacharite 2016).

Implementing food projects requires organization, communication, and a solid foundation. Many groups have noted the need to “create space” for projects to begin and persist (Feenstra 2002). Feenstra (2002) notes four types of space; social, political, intellectual, and economic, all crucial for a meaningful change to the food system. Social space includes places such as gardens or farmers markets, which allow for communities to come together to plan, listen, problem-solve, and compromise on food issues (Feenstra 2002). For example on 93% of college campuses in the US, students can volunteer, take classes, conduct research, and secure employment related to food (Lacharite 2016). Some campuses have even scheduled gatherings to encourage a social atmosphere such as farm workdays, pizza gatherings, and lectures (Lacharite 2016). Although Feenstra (2002) finds the formation of social space difficult due to initial network building, it is imperative for members to be patient and persistent. Political space is important because not only does it give the community a voice and input in policy changes but also works to organize the community around a goal and common understanding (Feenstra 2002). Intellectual space relies on a strong central group or person who can visualize the big picture and explain it to many people of various

disciplines (Feenstra 2002). This space draws the connections between food production and consumption and the relationship between biological and social sciences in the food system. Lastly, economic space is essential because any policy decision requires funding in order to succeed. Leaders are needed to help with funding, writing grants, and maintaining these opportunities (Feenstra 2002). Ball State University (BSU) released a paper describing the steps to creating these spaces in a timeline project called “greening the campus”. BSU created political space with a green committee, intellectual space and social space with a greening conference and including administrators and faculty to further initiatives (Koester *et al.* 2006). BSU also created economic space by allowing students and administration to work on financial funding together (Koester *et al.* 2006).

### *Responsibility of Universities and Colleges*

Colleges and universities offer a rich field of study to investigate the conventional food system, food security, and the implementation of campus-scale alternative food projects. Throughout the United States, food is an integral part of the university’s characteristics and often an influential marketing tool to attract prospective students. As a result, universities purchase, consume, and also waste large quantities of food, making them significant actors in the overall food system. Moreover, universities respond to the demands of their student body and thus can facilitate institutional changes more easily than institutions at the city, state, or national scale. Lastly, and most importantly, universities are powerful institutions in American society. Not only do they directly influence the political economy of the country through their decision-making, but also they play an integral role in cultivating young people to become active and informed citizens who will one take up leadership positions in the public and private sectors of the US. Therefore, higher education should be viewed as a public good rather than a private benefit (Boyer 1996). This viewpoint echoes leaders in higher education throughout the nation who call for universities to cease being what Boyer (1996 p. 26) calls “islands of affluence, self-importance, and horticultural beauty in seas of squalor, violence and despair.” Engaging with the food system of a university and challenging the disparity of food security on and off campus may also create a platform for other social justice issues. As undergraduate students of the University of Richmond, we chose to study these topics of food systems and food security in the context of our university.

### **Methods**

We distributed a 23 question survey (see appendix B) covering topics such as demographics, food choice and access on campus, food awareness, and interest in food projects. The survey was active for 24 days from March 22nd - April 14th during the 2017 spring semester. We generated contact lists for administrative coordinators of each major, professors of first year seminars (FYS) and sophomore scholar in residence programs (SSIR), and presidents of student clubs. We chose these contact lists to include as many students as possible from all years and interests. In total 32% of administrative coordinators, 47% of FYS and SSIR professors, and 33% of club presidents distributed the survey to students. Tables 1, 2, and 3 in appendix A show which departments, FYS classes, SSIR classes, and clubs the surveys were distributed to. The absence of a central node for email distribution makes it difficult and time consuming to distribute surveys to students on campus.

In addition, we conducted 5 semi-structured ethnographic interviews with university dining services staff in purchasing and residential dining, staff from Cavalier Produce (University’s vendor for produce), and the CEO of Seasonal Roots (local community supported agriculture company) to learn more about the University’s food system. Finally, we used the Sustainability Tracking, Assessment and Rating System (STARS) online database to analyze data from other colleges’ and universities’ dining services to compare the sustainability of University of Richmond’s food system.

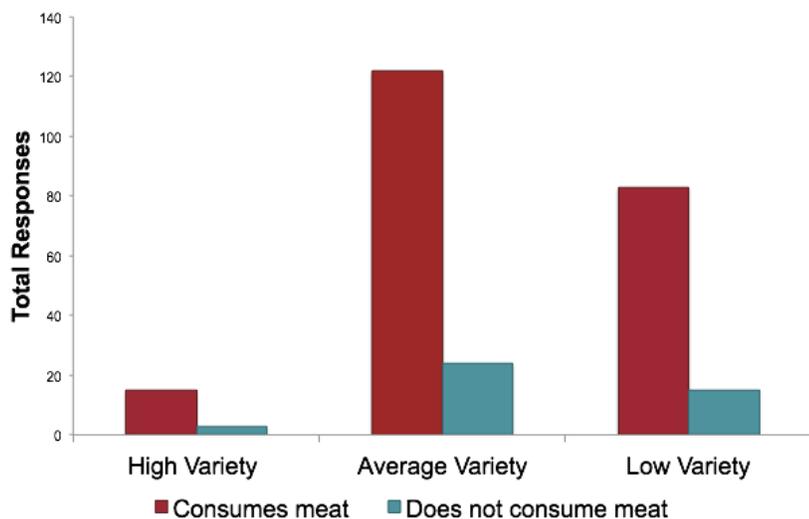
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## Results

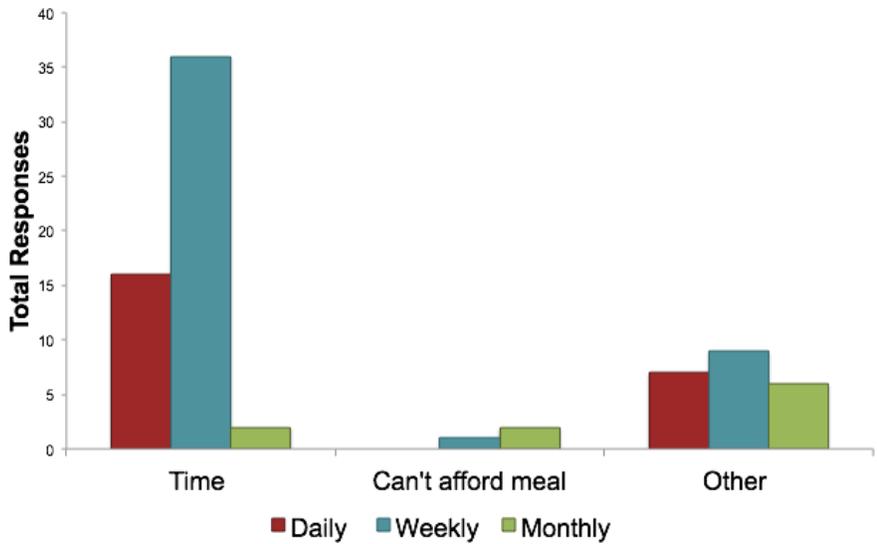
We received 305 responses from our survey, 68 percent of respondents identified as female, 31 percent identified as male, and 1 percent identified as other. Thirty-eight percent of respondents graduate in 2020 followed by 27 percent in 2019, 20 percent in 2018, and 15 percent in 2017.

### *Food choice and access on campus*

Students were more likely to have a meal plan with Heilman dining swipes (92%) compared to a meal plan with no Heilman dining swipes (3%). We asked respondents if they eat meat and 84 percent answered yes; 14 percent answered no and 1 percent chose not to answer. When asked to describe the variety of fruits and vegetables on campus 133 out of 235 meat-eaters and 24 out of 42 non-meat eaters responded there is an average variety (Figure 1). When asked to select the best statement to describe food on campus 49 percent of meat-eaters responded there is enough of the food they want and 41 responded enough but not the food they want. A smaller portion of non-meaters (19%) responded there is enough of the food they want whereas 64 percent responded there is enough food but not of the kind they want. Students who use the Heilman dining center were asked how often they finish their plate and 63 percent responded often, 32 percent responded sometimes, 11 percent responded never, and 1 percent chose not to answer. Students were also asked how often they intentionally skip meals and 26 percent responded yes compared to 73 percent who responded no. These responses were cross-referenced with two other questions asking students why do they intentionally skip meals and how often do they skip a meal for this reason (Figure 2). Not having enough time (56) was the main reason why students intentionally skipped meals, 36 on a weekly basis, 17 on a daily basis, and two on a monthly basis (Figure 2). Twenty-two students answered they skipped meals for other reasons, nine on a weekly basis, seven on a daily basis, and six on a monthly basis (figure 2). Three students responded they couldn’t afford the meal, one on a weekly basis and two on a monthly basis (figure 2)



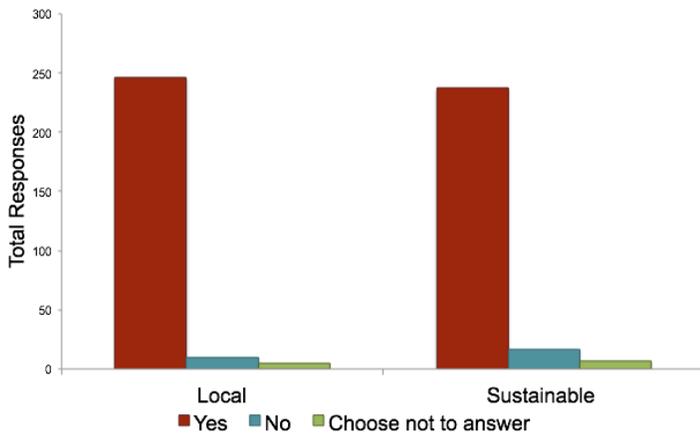
**Figure 1:** Students (meat eaters and non meat eaters) were asked to describe the variety of fruits and vegetables available on campus



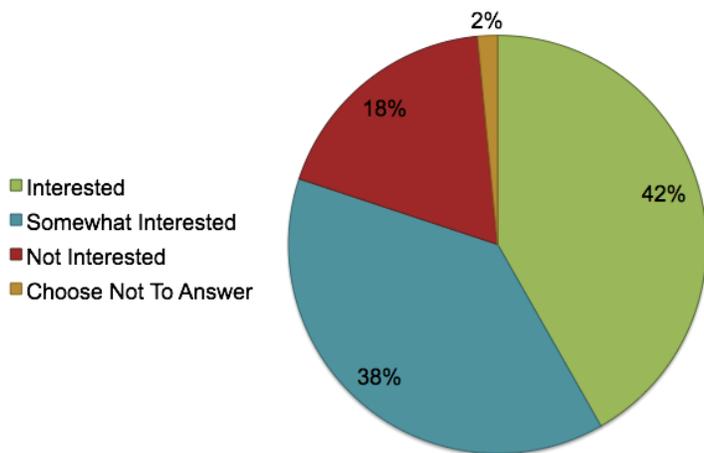
**Figure 2:** Represents why students intentionally skip meals and how often they skip meals due to time, budget, and other reasons. Just over a quarter of students said they intentionally skip meals.

*Food awareness and interest in food projects*

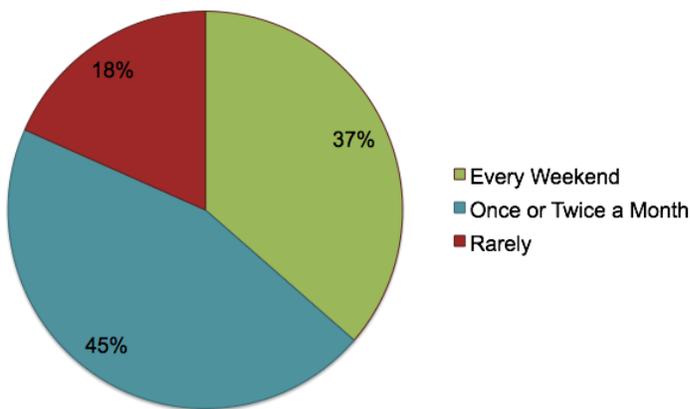
We asked students to what extent they were concerned about the environmental impacts of their food choice and 50 percent responded somewhat concerned followed by 28 percent never concerned, 21 percent very concerned, and 1 percent chose not to answer. A large majority of students want the University to source more food from local farmers (94%) and sustainable food programs (90%) (Figure 3). Forty-two percent of respondents are interested in farming or gardening on campus followed by 38 percent somewhat interested, and 18 percent not interested (Figure 4). Forty-five percent of students indicated they would buy from an on campus farmers market once or twice a month followed by 37 percent every weekend and 18 percent rarely (Figure 5).



**Figure 3:** We asked students if they thought the University should source more food from local farmers and sustainable food producers.



**Figure 4:** We asked students how interested they were in participating in a food project such as a garden.



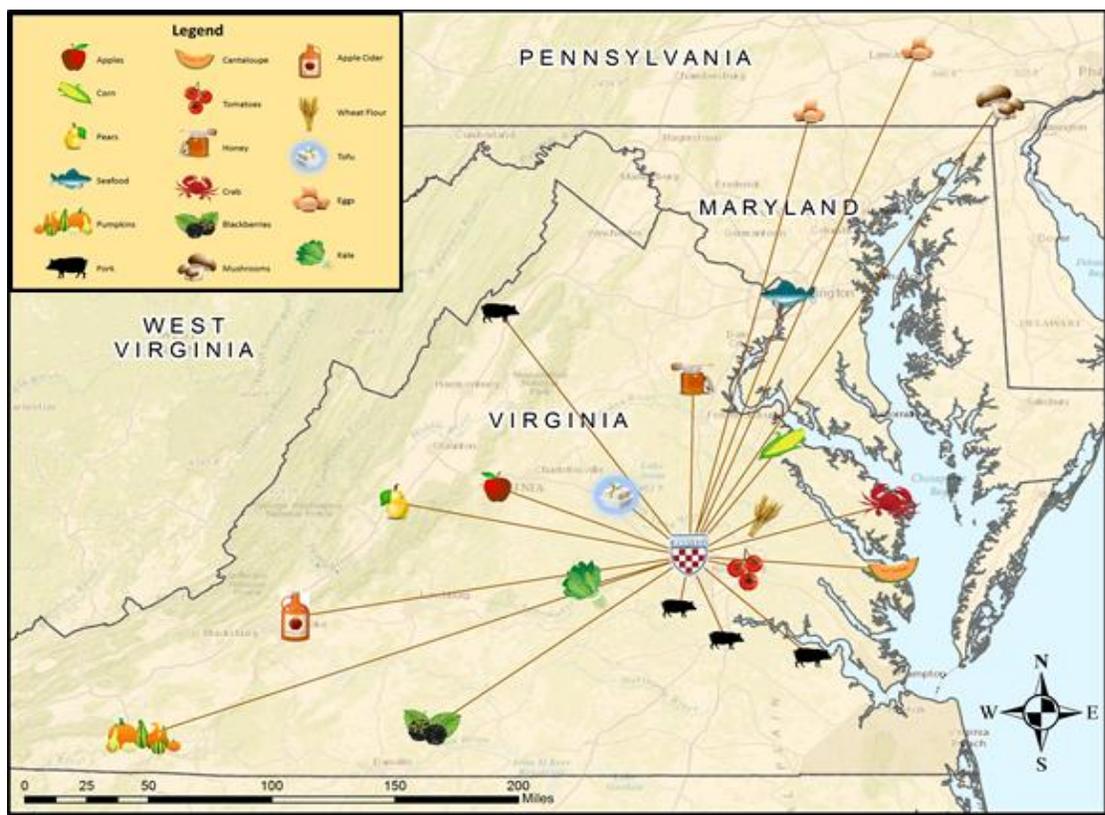
**Figure 6:** We asked students how often would they purchase produce from a farmers market that came to campus every weekend.

### **STARS Data**

Through our research of the University’s STARS data for Dining Services we were able to understand the measurements determining Dining Services’ low score on the Sustainability Report, identify the locations where the University sources local food, and compare the University of Richmond’s Dining Services scores with other universities and colleges in the region. The ‘Food and Dining’ STARS subcategory exists to recognize and assess institutions that support sustainable food systems. This subcategory contains two different parts for which institutions can earn points.

Part 1, called Food and Beverage Purchasing, measures the percentage of third-party verified and/or both local and community-based food the University purchases. ‘Third party verified’ refers to producers who have obtained one or more certifications proving their product has been produced by ecologically sound, fair, and/or humane practices according to recognized sustainability standards. The ‘local and community-based’ category is designed to recognize campus gardens, farms, and small local producers that may not have the resources necessary to pursue third party sustainability. ‘Local’ is defined by STARS criteria as food that has been grown, raised, caught, processed, or distributed by a community-based producer within a 250-mile radius of consumption (Figure 1). Products from intensive livestock

operations (e.g. CAFO facilities), large producers (\$5 million or more in annual sales), and geographically dispersed products are excluded from this category (AASHE 2017).



**Figure 7.** Map of Dining Services local food vendors. Shows various products purchased by the University within a 250-mile radius.

Universities can earn a maximum of 4 points for this credit when 75% or more of total food and beverage expenditure comes from products that qualify under either of these classifications. For example, an institution with 18.75% of total food and beverage expenditures qualifying as third party verified and/or both local and community-based would earn 1 point (1/4 of the points available). The University of Richmond procures 3.23% of total food and beverage expenditures from sources that are third party verified and/or both local and community-based (Table 1). This figure is derived from the summation of the percentages in the column labeled “Percentage of total food and beverage purchases that are local & community-based and/or third party verified”. As a result, it earned 0.13 points out of 4 points for this category.

Table 1. Percentage of University’s food and beverage purchases according to category. Rows have been highlighted to show categories with highest percentage of ‘local and community-based’ and ‘third-party verified’ purchases. Note that while the University spends only 3% and 3.6% of total food and beverage expenditure on ‘Produce’ and ‘Fish/Seafood’ respectively, 27.8% of total Produce expenditure comes from local and community based producers (see Figure 7 map) and 48.8% of total Fish/Seafood expenditure is third party verified.

Product Category	Total percentage of food and beverage expenditures allocated to each category	Percentage of category purchases that are local & community-based (250mi)	Percentage of category purchases that are third party verified	Percentage of total food and beverage purchases that are local & community-based and/or third party verified	Percentage of category purchases that are conventionally produced
Dairy	15.8%	0.0%	0.0%	0.0%	100.0%
Beverages	4.0%	1.1%	0.1%	0.0%	98.8%
Meat	18.2%	2.4%	0.0%	0.4%	97.6%
Poultry	15.9%	0.0%	0.0%	0.0%	100.0%
Eggs	2.9%	0.3%	0.0%	0.0%	99.7%
Produce	3.0%	27.8%	0.0%	0.8%	72.2%
Grocery	32.6%	0.2%	0.0%	0.1%	99.8%
Tea/Coffee	0.7%	0.0%	0.0%	0.0%	100.0%
Fish/Seafood	3.6%	2.5%	48.8%	1.8%	48.7%
Baked goods	3.3%			0.0%	100.0%
				<b>Total= 3.23%</b>	<b>Total= 54.10%</b>

Part 2, called Low Impact Dining, measures two different features. The first feature, worth 2 points, identifies the percentage of total dining services food purchases comprised of conventionally produced animal products. Conventionally produced animal products include meat, poultry, fish/seafood, eggs, and dairy products that are not third party verified to meet recognized sustainability standards or else both local and community-based. In order to earn the maximum 2 points, the institution must purchase non-conventional animal products. To earn 1 point, the institution must purchase 15% of its food from conventional animal products. No points are earned for purchasing percentages exceeding 30%. The University of Richmond purchases 54.10% of its total food and beverage purchases from animal products produced conventionally and therefore earns no points for this feature. The second feature, worth 1 point, identifies institutions that provide and label diverse, complete-protein vegan options at all meals. The University of Richmond earned the full point for this feature.

As a result of the points earned for 'Food and Beverages Purchasing' (0.13/4.00) and 'Low Impact Dining' (1.00/3.00), the University earned 1.13 points out of 7 possible total points.

### Comparison to Other Schools

In order to compare the University of Richmond's STARS Dining scores with other educational institutions in the region, we used the STARS definition of 'local' to identify a total of 34 college and universities within a 250-mile radius of the University of Richmond. Out of these schools, 30 had published data on their school's Dining Service on the STARS database and thus were chosen for this study. The 250-mile radius was used to allow for significant overlap in the 'local' radii of other schools in order to assure similar agricultural capacities to source food locally. Table 2 lists the Food and Beverages points earned by these 30 schools with the University of Richmond highlighted in red. With respect to the Low Impact Dining scores, we used the same pool of 34 universities but selected only 27 schools that had published data for this category (Table 3).

Table 2. Food and Beverages scores for 30 colleges and universities within a 250-mile radius of the University of Richmond.

Table 3. Low impact dining scores for 27 colleges and universities within a 250-mile radius of the University of Richmond.

Colleges and Universities	Food and Beverages Purchasing Points (out of 4 possible points)
Carnegie Mellon University	2.51
Villanova University	2.09
University of Pennsylvania	1.98
Chatham University	1.86
Guilford College	1.68
Virginia Common Wealth University	1.20
Goucher College	1.15
Lafayette College	1.00
Pennsylvania State University	0.97
Princeton University	0.84
Bucknell University	0.77
Virginia Tech	0.68
Haverford College	0.68
University of North Carolina, Wilmington	0.67
Gettysburg College	0.66
Appalachian State University	0.54
Lehigh University	0.53
Muhlenburg College	0.53
University of North Carolina, Greensboro	0.50
Old Dominion University	0.42
George Washington University	0.39
University of Virginia	0.28
George Mason University	0.26
Elon University	0.16
College of William and Mary	0.16
American University	0.15
Dickinson College	0.14
University of Richmond	0.13
Wake Forest University	0.10
University of North Carolina, Pembroke	0.10

Colleges and Universities	Low Impact Dining Points (out of 3 possible points)
Gettysburg College	3.00
University of Pennsylvania	2.50
Virginia Tech	2.50
Dickinson College	2.35
Princeton University	2.13
Lafayette College	2.07
University of North Carolina, Greensboro	2.05
American University	1.83
George Mason University	1.83
University of Virginia	1.80
Wake Forest University	1.78
Chatham University	1.73
Villanova University	1.73
Haverford College	1.60
Elon University	1.36
Guilford College	1.33
Bucknell University	1.07
University of Richmond	1.00
University of North Carolina, Pembroke	1.00
Lehigh University	1.00
Muhlenburg College	1.00
Appalachian State University	1.00
University of North Carolina, Wilmington	1.00
Pennsylvania State University	1.00
Goucher College	1.00
Carnegie Mellon University	1.00
George Washington University	1.00



Consistency is also a major challenge for local procurement. Staff from both Cavalier and the University's Dining Services noted the difficulty of building a planned menu around inconsistent product due to issues with weather, pests, disease, profits, laborers, etc. Another issue Dining Services faces with local food is price. In order to serve 28,000 meals a week with a limited budget, Dining Services must balance quality with price in food procurement. Cavalier recognizes this challenge and while it attempts to purchase food from mixed sources, small local producers cannot compete with the quality and low prices offered by conventional food production. Lastly, the US Department of Agriculture has very specific guidelines on what the type of vendors Cavalier can use. For instance, Cavalier can only purchase produce from vendors that are GAP (Good Agriculture Practice) or GHP (Good Handling Practices) certified. These certifications verify that the fruits and vegetables are produced, packed, handled, and stored as safely as possible to minimize risk of microbial food safety hazards (USDA Agricultural Marketing Service 2017). Food safety has become an important issue in the food industry and federal regulations require Cavalier to be able to trace its products from producer to consumer. This system ensures that Cavalier can accurately identify its products if there is a recall. Since this data is not available to the public, I contacted Cavalier staff to provide me with information about two of the University's most consumed produce items: bananas and apples.

### *Tracking University Bananas and Apples*

#### Bananas

The vast majority of global banana production originates in Central and South America. In total, these countries produced about 77% of the world's bananas in 2012 (FAOa 2014). In that same year, the United States imported almost a third of all bananas traded internationally (2014). Cavalier Produce, along with the vast majority of distributors across the country, purchases its bananas from these same suppliers. Through conversations with Cavalier staff, we learned how bananas are transported from South America to the US. Bananas are picked while still green, packaged in the field, and shipped in huge vessels to the United States. They are then bought and sold several times over by different distributors across the country. In order to ripen the fruit, they are processed in specially designed ripening rooms where they are exposed to a controlled atmosphere containing ethylene gas. Once ripened, Cavalier will then purchase bananas from these regional distribution centers (RDCs) and sell them to the University.

#### Apples

Not only are apples one of Virginia's most lucrative agricultural products, generating about \$235 million in revenue, but also they are the 6<sup>th</sup> largest apple producing state in the country (VDACSa 2013). Virginia's apple harvest begins in July and extends through early November. While this season encompasses less than half of the academic school year, distributors can extend the shelf life of apples up to 12 months through controlled atmosphere (CA) technology. Depending on the specific variety, apples can last in CA storage for 5-12 months. Using this technology, institutions located in temperate regions like the University can obtain "fresh" apples throughout the year. However, Cavalier mentioned that they begin to purchase freshly grown apples from Ranier Fruit Company in Washington State in February.

## Discussion

The responses to our survey provide us with new and important data about student food choice, food awareness, and interest in food projects. With 92 percent of our respondents having meal plans with Heilman dining swipes we suggest most students have access to food on campus. The majority (49%) of students who eat meat indicate having availability to enough food they want but a large portion (41%) of meat-eaters also indicated having availability to enough food but not what they want. We see the opposite trend with responses from vegetarians indicating availability of food they want is an area for improvement. Twenty-six percent of respondents indicated they intentionally skip meals, a much lower number compared to the findings in Hana (2014) where 69.2 percent of respondents indicated intentionally skipping meals. Students at the University of Richmond skip meals most often due to time constraints and a much lower portion skip meals due to budget constraints. Students have access and moderate availability to food but do not or cannot utilize it. Time constraints can be due to many reasons such as time management or working while in school and we suggest asking students why they are too busy to eat so we can understand the root of the problem.

The majority (71%) of students indicate being concerned about the environmental impacts of their food choices and want to see more local and sustainable food options on campus. The presence of awareness and interest in alternative food systems suggest we have the potential to implement these practices on campus. In addition, our results indicate a large portion of students are interested in actively participating in a garden or buying from a farmers market at least once a month. The majority of students who responded to the survey are currently freshmen and sophomores and will have a chance to help create and carry out food projects and further research before they graduate. Expanding garden space and organizing a farmers market on campus are ambitious goals and will undoubtedly need much attention and work from the University but the interest observed from the survey suggests student support exists.

### *Local Food Procurement and Space-Making*

There are many important benefits to supporting local food systems. Not only does purchasing local food empower local economies, encourage environmentally-friendly and humane farming methods, and work to eliminate labor exploitation, but also local food serves as a platform for relationship-building and community engagement (AASHE 2017). As a prestigious institution in American society, the University of Richmond has a responsibility, as stated in the Strategic Plan, to be a “leader in innovative practices that sustain our environmental, human, and financial resources” (Crutcher 2017). However, as the STARS data indicate, the University of Richmond lags behind in local food procurement compared to other schools in the region. With only 3.23% of total food and beverage expenditure coming from local sources and 54.10% of animal product purchases coming from conventional animal production, the University must improve in this area to back up the innovative environmental and human leadership rhetoric used in the 2017 Strategic Plan.

Given the challenges we identified in conversations with Cavalier Produce and Dining Services, what ways can the University champion a sustainable food system and increase local food procurement as a result? In order to implement and maintain a successful alternative food movement on campus, we identified the need to establish spaces for students, faculty, and administration. Indeed, the University of Richmond strives to create space for all interests, and students have the option to join over 100 different types of clubs, experience internships, conduct research, etc. These opportunities present the chance for students to actively work on current issues. We looked at how the University provides space for food projects through the four main spaces; social, political, intellectual, and economic space outlined in Feenstra (2002). We then suggest how these spaces could be expanded or enhanced to reach a wider range of students in all disciplines.

Our campus provides social space for environmental work through groups such as the food recovery network, GreenUR, and Greeks Going Green, and an Earth Lodge living learning community for students. Additionally, the University has a community garden on campus. These spaces provide the chance for students, faculty, and staff to develop relationships, openly communicate, and converse about food related topics. We recommend organizing more educational and social activities associated with these groups such as open discussions about food systems and security or food related movie nights. We also suggest expanding the garden space on campus allowing more people to participate in growing food. The Gambles Mill Corridor presents great potential for garden expansion because the garden we currently have is located there and with the trail being a common walking/biking path students could plant fruit trees for people to pick from. The temporary gravel parking lot, and various rooftop spaces such as the Heilman Dining Hall, Maryland hall, Puryear Hall, and Richmond Hall are potential spots but more research needs to be done on the weight bearing and accessibility restrictions for rooftop gardens.

The Office for Sustainability, RCSGA, WCGA, Spider CARE, and GreenUR all provide political space for faculty, staff, and students to exercise policy work. Even though food policy hasn't been at the top of the list for all these groups motivated students could easily approach these spaces with ideas. The activities and opportunities provided within these groups should be more transparent and accessible to students on campus. Getting the message out to the student body increases the potential for participation. We also suggest the creation of a cross campus food committee and guidelines for sustainable purchasing.

Intellectual space on campus is provided through the Geography and the Environment major, Environmental Studies major, Sociology Major, and Global Environmental Speaker Series. Students enjoy taking classes that focus on examining food systems and security or cover the topic in a lecture or two. Students also have the opportunity to conduct research or internships related to food issues while working with faculty or off campus organizations. The intellectual space on campus has a strong foundation and would benefit from a sustainability themed first-year experience, or active learning opportunities for classes or students seeking an independent study.

Lastly, economic space on campus is created through the Office for Sustainability, Richmond Guarantee, and potentially sustainability themed First Year Experience within the Quality Enhancement Plan. Funding for food related projects is readily available through these avenues but as of yet the student body has underutilized these on-campus resources. The best way to improve economic space is to encourage collaboration between many sectors (schools, staff, administration, students, etc.) on campus bringing together a strong support system from many viewpoints.

### *Transparency*

The University of Richmond purchases food from a multitude of vendors that supply Dining Services with a wide assortment of different products: produce, meat, dairy, tablecloths, napkins, etc. However, many of these vendors procure their products from their own network of vendors. Cavalier Produce, for example, relies on a wide variety of conventional, non-conventional, local, and non-local producers to supply its food inventory. Similarly, Performance Food Group, the university's prime vendor, supplies about 80% of the university's annual food expenditure and food service related supplies (Dining Services 2014). Performance Food operates in a capital-intensive food system to provide products to the University through a complex network of farms, processing plants, transportation services, and distribution centers that span state and national boundaries. This massive inventory creates an opaque food system that makes it difficult for institutions like the University of Richmond to know important specifications about its food such as where it was produced, how it was produced, how it has been processed, and if the laborers were treated fairly. Since transparency is a key component to the sustainability of any food system, these questions represent one area in need of growth for the University (AASHE 2017). We propose that the University create an information system that makes food system information accessible to the public. Increased

transparency would serve to heighten the awareness of the student body as to the environmental footprint of the University's food system and hopefully provide a platform for sustainable behavioral changes.

### *Sustainable Food Purchasing Agreement*

In order for a vendor to supply the University with food, they must first enter into a contract with Dining Services that outlines the goods and services they will provide, along with all the information on how those goods and services will be provided. These contracts offer a great opportunity for universities to establish clear sustainability standards on the products they purchase. Currently, the University of Richmond's contract for a prime vendor, which is now Performance Foods, contains a "Sustainability Strategies" section that states: "The University of Richmond is committed to environmental sustainability by encouraging faculty, staff and students to purchase products and services that minimize waste, contain a high-recycled content, use responsible production methods, and demonstrate a maximum biodegradability, reparability, energy efficiency, non-toxicity and recyclability" (Dining Services 2014). These strategies are a good start but do not outline specifics. These contracts could be designed to include specific metrics for local food or non-conventional animal products procurement.

### *Climate Change*

Many of the actors we spoke with did not indicate climate change to be a significant problem in the future and did not allude to any adaptive management plan to address it. When asked about the impact climate change might have on agriculture, staff from Cavalier Produce indicated that while climate change may have an impact on productivity, it is no different from other weather related-challenges farmers have faced in the past. Staff from Seasonal Roots responded similarly, stating that farmers were unconcerned with climate change. This lack of concern may be a result of the gradual intensification of climate change, which may pass unnoticed by those concerned with day-to-day weather conditions. This disconnection from looming climatic impacts on food productivity is echoed in the literature. Niles *et al.* (2013) surveyed growers in California to understand their perceptions of climate change and found that they were more concerned with how environmental regulations might hurt their business. This appears to be a trend among farmers, who seem to be confident in their ability to adapt to adverse weather conditions. However, the combination of the climate change literature's prediction of more extreme weather events and farmers' apparent lack of concern indicates a potential vulnerable point in the overall food system that needs to be addressed by future planning efforts.

Indeed, although small-scale farmers are unconcerned with the potential impacts of climate change, it remains the biggest threat to eliminate them from the food system altogether (Morton 2007). Extreme weather events will continue to damage crop yields as temperatures rise and precipitation becomes more infrequent and intense (Brown *et al.* 2015). While large-scale producers within the conventional system have the resource capacity to absorb losses brought on by crop failures, many small-scale farmers cannot recover in the same way and this vulnerability may force them to drop out of the market. The introduction of new pests and diseases will make food safety a bigger challenge in the food system. In order to meet these new challenges, regulators might require farmers to obtain more third-party certifications such as GAP or GHP in order to increase food industry standards. However, as mentioned above, many local and community-based farmers cannot afford these certifications and therefore might leave the market altogether if they cannot sell their uncertified products. Lastly, producers might need more expensive technologies to buffer their products from the negative impacts of climate change, which also might prove too expensive for small-scale producers. These vulnerabilities emphasize the responsibility of institutions like the University of Richmond to support local food systems in order to invest in the benefits that local food provide as well as to increase resiliency in the face of climate change.

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**Appendix A: Survey Distribution**

**Table 1: Represents the distribution of surveys by major**

Major(s)	Distributed Survey
Accounting, Finance	No
American Studies, Film studies	No
Department of Sociology and Anthropology	Yes
Languages, Literatures, and Cultures	No
Classical Studies, Philosophy	Yes
Art History	No
Art	No
Studio Art	No
Biochemistry & Molecular biology	No
Department of Biology	Yes
Economics	No
International Business	Yes
Management	No
Marketing	No
Chemistry	No
Department of psychology, cognitive science	No
Computer Science, Mathematics	No
Department of theatre and dance	No
Department of English	No
Environmental Studies, Geography, International Studies, WGSS	Yes
Department of History	Yes
Interdisciplinary Studies	No
Journalism	Yes
LALIS	Yes
PPEL, Leadership Studies, Classical Studies and Philosophy	Yes
Music	No
Physics	No
Political science	Yes
PPEL	No
Religious studies	No
Rhetoric and Communication studies	No

Table 2: Represents the distribution of survey to FYS and SSIR classes.

Type	Class	Distirbuted Survey
FYS	Working	No
FYS	From Holy to Hooking up	No
FYS	Morality and global econ crisis	No
FYS	Summons to Conscience	No
FYS	Education and Citizenship	Yes
FYS	What Does Sound Say	Yes
FYS	What is time	Yes
FYS	Telling History	No
FYS	Entrepenurial Innovation	No
FYS	Taking it to the streets	Yes
FYS	Wining and Dining	Yes
FYS	Puzzles and Paradoxes	Yes
FYS	Civic Journalism and Social Justice	No
FYS	Framing the U.S. Constitution	Yes
FYS	Knowing in the face of advesrity	Yes
FYS	A life in letters	No
FYS	Engaging contempary art	Yes
FYS	Healthcare policy and politics	No
FYS	The rhetorical lives of maps	No
FYS	City of Petersburg	No
FYS	The double life of paris	No
FYS	films by decade of the 20th century	No
FYS	Representing of civil rights in richmond, crime in america	Yes
FYS	Self-fullfilmet/denial, western thought	No

FYS	Belief and doubt in literature	No
FYS	Contemplative traditions in art	No
FYS	Touching the past	Yes
FYS	The search for the self	Yes
FYS	Nature of Mathematics	No
FYS	Human Trafficking	Yes
FYS	Noble beasts	No
FYS	Democracy in education	No
FYS	Transatlantic lit crossings	No
FYS	Expansion of Europe and Asia in Africa	No
FYS	Documenting 1960s America	Yes
FYS	Drama matters/staging your life	Yes
FYS	War rhetoric	Yes
FYS	friendship, collaboration, conviviality	No
FYS	Rio: Brazil, Samba, Carnival	No
FYS	Why do we build	Yes
FYS	capitalism and its discontents	Yes
FYS	from witches to wrath	Yes
FYS	students, scholars, scientiae	Yes
SSIR	Arts in action	Yes
SSIR	Crusades and holy wars	No
SSIR	disaster, memory, and pop culture	No
SSIR	Geography of the James River	Yes
SSIR	global health, medical humanities, human rights	Yes
SSIR	great war, modernity, memory	Yes
SSIR	A life worth living	Yes
SSIR	Longevity and happiness	No

SSIR	Out of the sea	Yes
SSIR	producing opera	No
SSIR	reading to live	No
SSIR	salsa meets jazz	No
SSIR	the system	No
SSIR	travel for discovery	Yes

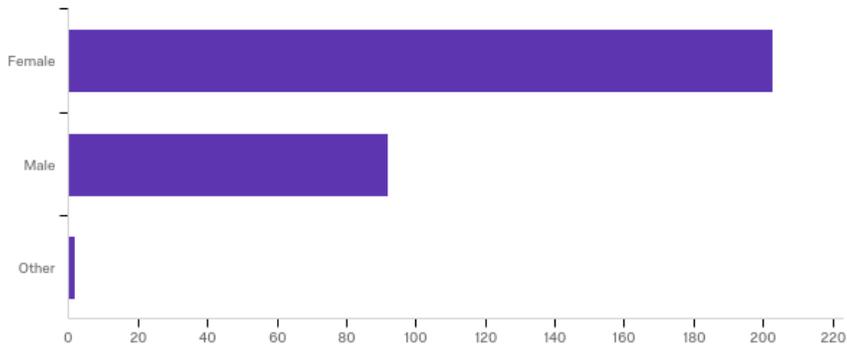
Table 3: Represents the distribution of surveys to clubs

Club	Distributed Survey
Accounting Society	No
Alpha Chi Sigma/climbing club	No
Alpha Kappa Alpha	Yes
Alpha Kappa Psi	No
Alpha Phi Alpha	Yes
Alpha Phi Omega	Yes
Alpha Psi Omega	No
Alpha Sigma Kappa	Yes
American Marketing Association	Yes
Arab Club	No
BARK	No
BSA	Yes
Bollywood	Yes
Chinese Students and Scholars Association	No
Circle K International	No
College Republicans	Yes
CARE	Yes
Delt Delta Delta	No
Delta Epsilon Mu	Yes
Delta Gamma	No
Delta Sigma Pi	Yes
Delta Sigma Theta/WILL	Yes
Entrepreneurship club	No
Film Guild	No
Forum Magazine	No
Kappa Alpha Order	No
Kappa Alpha Theta	Yes
Kappa Delta	No
Kappa Kappa Gamma	Yes
International Club	No
Korean American Student Association	No
Lambda Chi	Yes
League of Legends	No
Mortar Board	No
Pi-Sigma Alpha	No
Sigma Delta Pi	yes

American Chemical Society	No
ASBMB	Yes
ACM	Yes
Golden Key	No
Marketing Analysis and Trading club	No
Asian Echo	No
Ngoma	No
Off the cuff	No
FIJI	No
Pi Beta Phi	No
Sigma Chi	Yes
Sigma Phi Epsilon	No
Theta Chi	No
Multicultural Student Solidarity network	Yes
Spanish and Latino Student Alliance	Yes
SCOPE	Yes
West Indian Lynk	Yes
College Democrats	No
Track & Field	No
crew	No
D-squad	No
Equestrian	No
Ice Hockey	No
Mens basketball	No
Mens Lacrosse	No
Mens Rugby	No
Mens soccer	No
Mens ultimate frisbee	No
Quidditch CLub	No
SpinnURS dance team	Yes
Womens basketball	No
Women's Lacrosse	No
Womens Soccer	No
Women's Ultimate Frisbee	No
UR games	No
UR smash	No

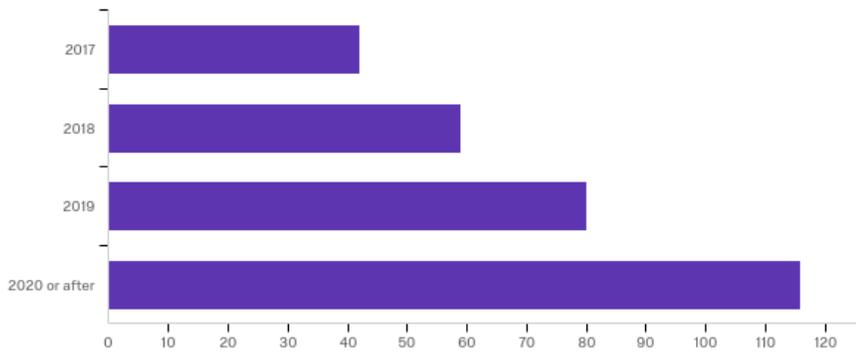
## Appendix B: Food Security Survey

### Q1 - Gender



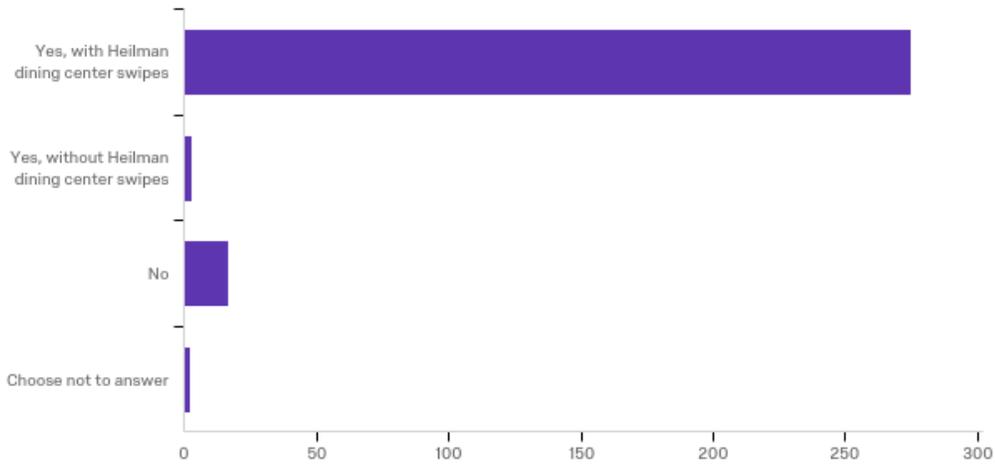
#	Answer	%	Count
1	Female	68.35%	203
2	Male	30.98%	92
3	Other	0.67%	2
	Total	100%	297

**Q2 - What is your expected graduation year?**



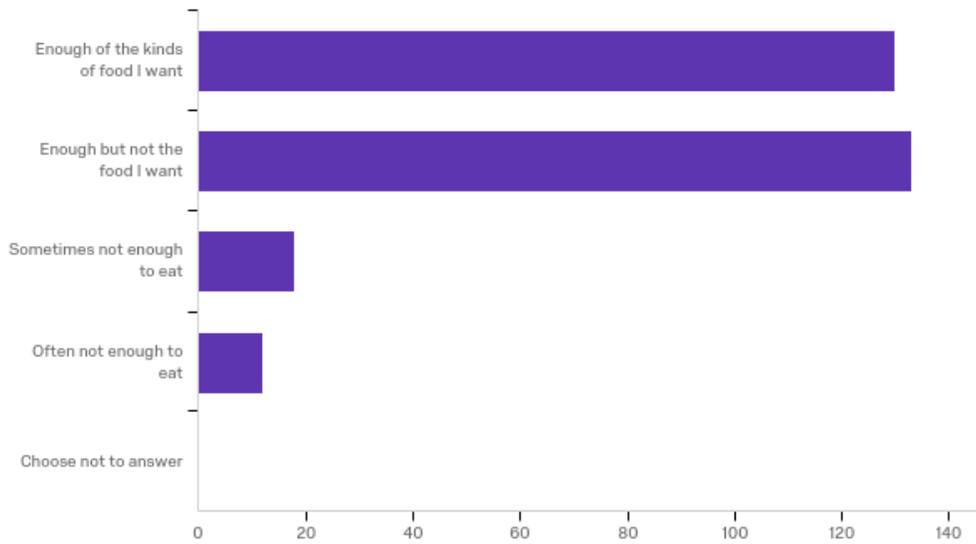
#	Answer	%	Count
1	2017	14.14%	42
2	2018	19.87%	59
3	2019	26.94%	80
4	2020 or after	39.06%	116
	Total	100%	297

**Q3 - Do you have a meal plan?**



#	Answer	%	Count
1	Yes, with Heilman dining center swipes	92.59%	275
2	Yes, without Heilman dining center swipes	1.01%	3
3	No	5.72%	17
4	Choose not to answer	0.67%	2
	Total	100%	297

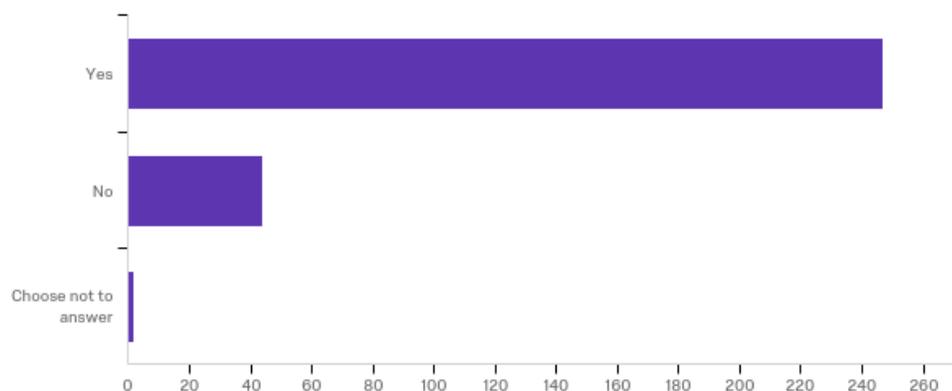
**Q4 - Which of these statements best describe the food available on campus?**



#	Question	Yes	No	Choose not to answer
3	Sometimes not enough to eat	6.07% 15	6.82% 3	0.00% 0
4	Often not enough to eat	3.24% 8	9.09% 4	0.00% 0
1	Enough of the kinds of food I want	49.39% 122	18.18% 8	0.00% 0
2	Enough but not the food I want	41.30% 102	65.91% 29	100.00% 2

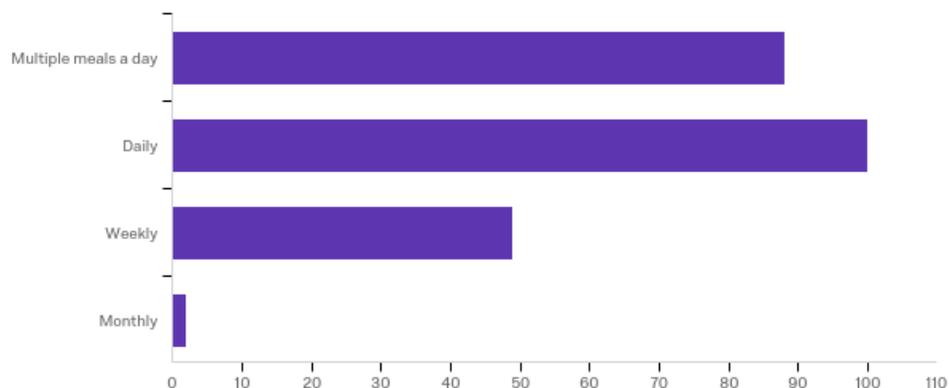
5	Choose not to answer	0.00%	0	0.00%	0	0.00%	0
	Total	Total	247	Total	44	Total	2

### Q5 - Do you eat meat?



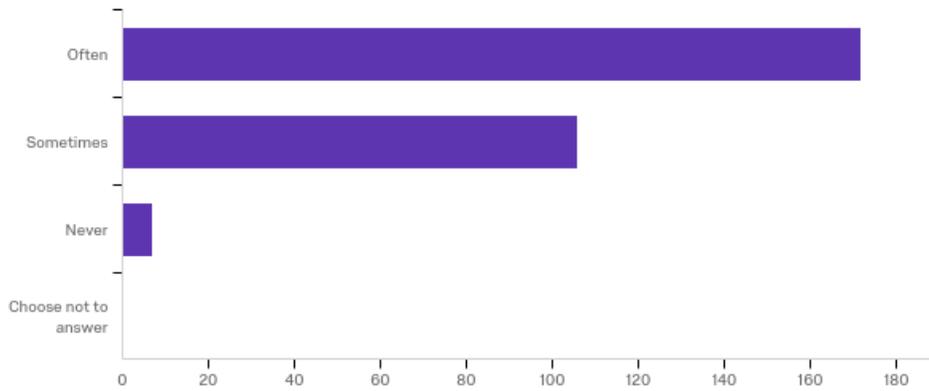
#	Answer	%	Count
1	Yes	84.30%	247
2	No	15.02%	44
3	Choose not to answer	0.68%	2
	Total	100%	293

### Q6 - How often do you eat meat?



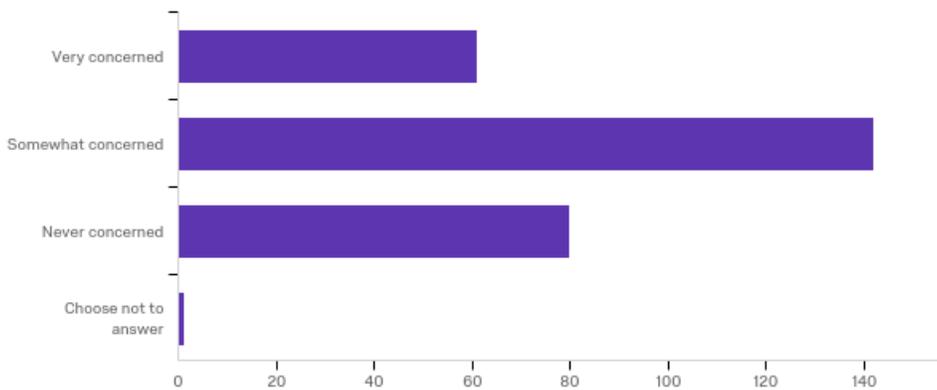
#	Answer	%	Count
1	Multiple meals a day	36.82%	88
2	Daily	41.84%	100
3	Weekly	20.50%	49
4	Monthly	0.84%	2
	Total	100%	239

### Q7 - How often do you pick your food based off nutritional value?



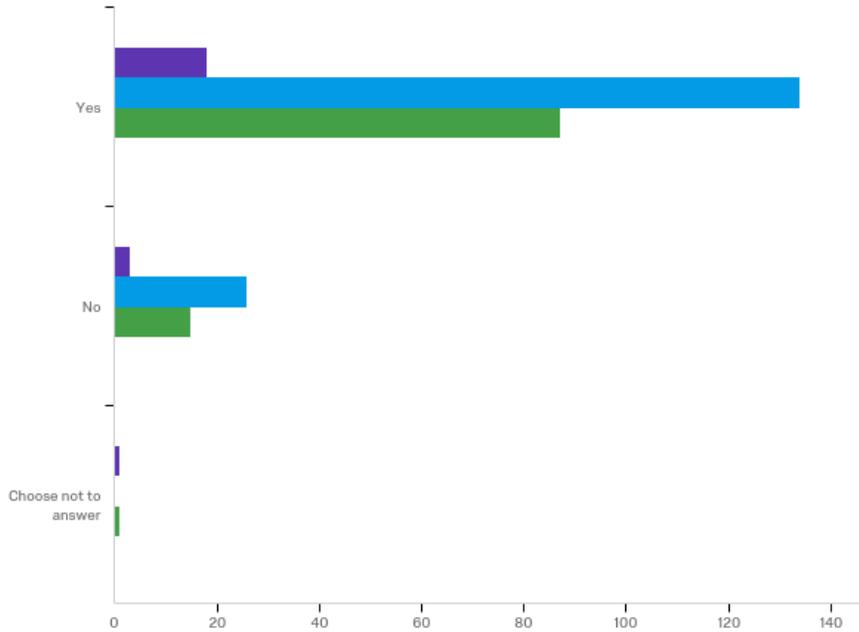
#	Answer	%	Count
1	Often	60.35%	172
2	Sometimes	37.19%	106
3	Never	2.46%	7
4	Choose not to answer	0.00%	0
	Total	100%	285

**Q8 - To what extent are you concerned about the environmental impacts of your food choice? (i.e. pesticide use and greenhouse gas emissions)?**



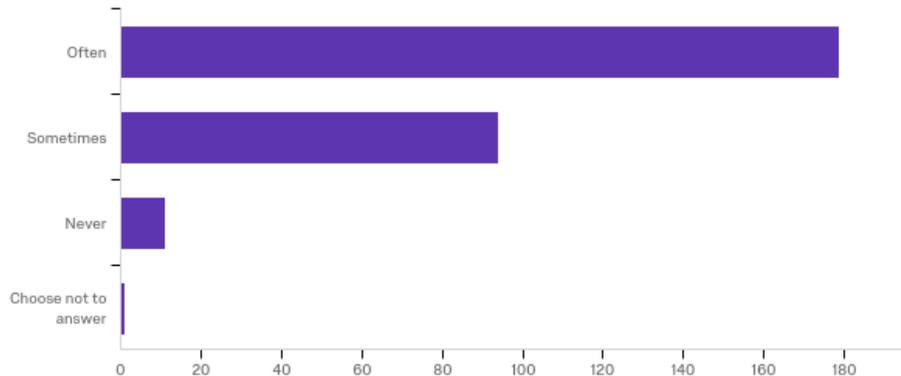
#	Answer	%	Count
1	Very concerned	21.48%	61
2	Somewhat concerned	50.00%	142
3	Never concerned	28.17%	80
4	Choose not to answer	0.35%	1
	Total	100%	284

**Q9 - How would you describe the variety of fruits and vegetables available on this campus?**



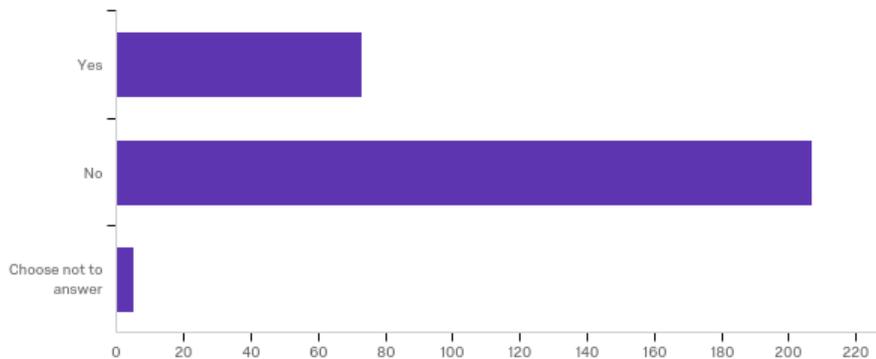
#	Question	Yes		No		Choose not to answer	
3	Low variety	36.40%	87	34.09%	15	50.00%	1
1	High variety	7.53%	18	6.82%	3	50.00%	1
4	Choose not to answer	0.00%	0	0.00%	0	0.00%	0
2	Average variety	56.07%	134	59.09%	26	0.00%	0
	Total	Total	239	Total	44	Total	2

**Q10 - How often do you eat all the food on your plate at the Heilman Dining Center?**



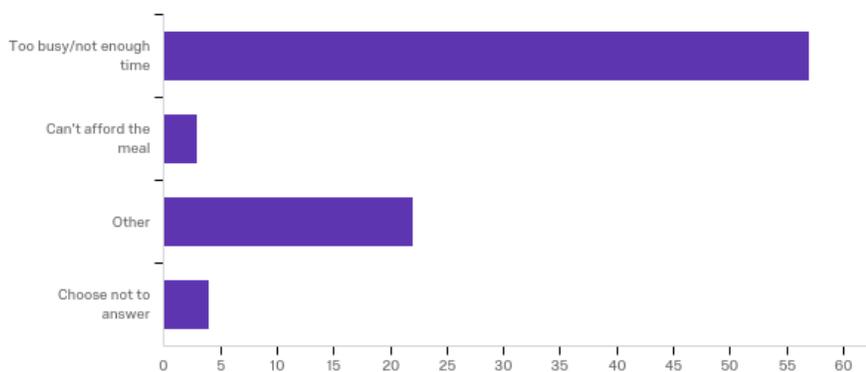
#	Answer	%	Count
1	Often	62.81%	179
2	Sometimes	32.98%	94
3	Never	3.86%	11
4	Choose not to answer	0.35%	1
	Total	100%	285

### Q11 - Do you intentionally skip meals?



#	Answer	%	Count
1	Yes	25.61%	73
2	No	72.63%	207
3	Choose not to answer	1.75%	5
	Total	100%	285

### Q12 - Why do you intentionally skip meals? (Choose all that apply)



#	Answer	%	Count
1	Too busy/not enough time	78.08%	57
2	Can't afford the meal	4.11%	3
3	Other	30.14%	22
4	Choose not to answer	5.48%	4
	Total	100%	73

#### Q12\_3\_TEXT - Other

Other (such as didn't want to spend money)

..negative body image

Depression, anxiety

Diet

diet

don't like lunch options

Eating disorders are real

Good offered doesn't appeal to me

I know that Dhall food is going to suck and that Tylers makes me fat

I struggle with an eating disorder

Intermittent fasting. Gotta get cut for the summer

Its too gross to eat 3 times a day

lack of dining dollars/ bad dhall menu

not enough options

Not enough options on campus (from places other than Dhall)

Taste

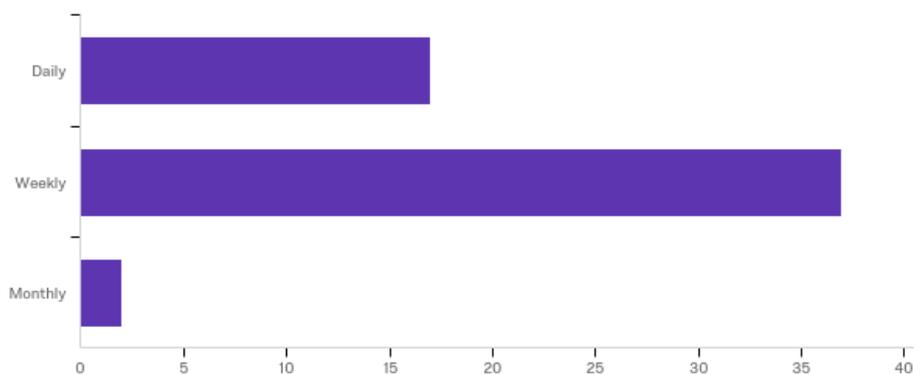
The selections offered at the dining center, or with dining dollars are inadequate.

To cut my overall intake of calories: Dieting

To eat less.

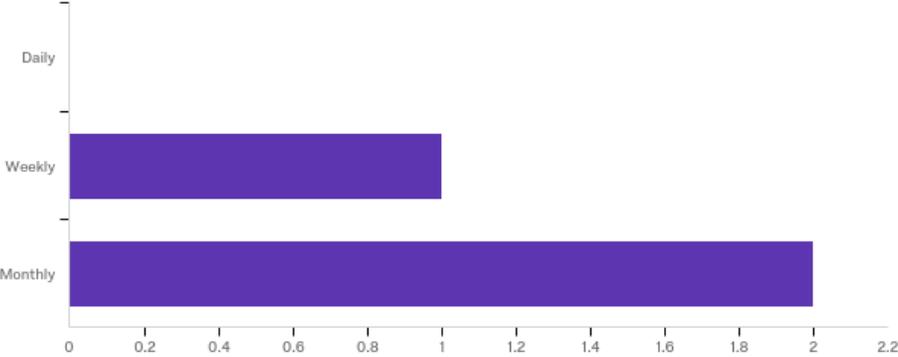
To lose weight

### Q13 - How often do you intentionally skip meals because of time constraints?



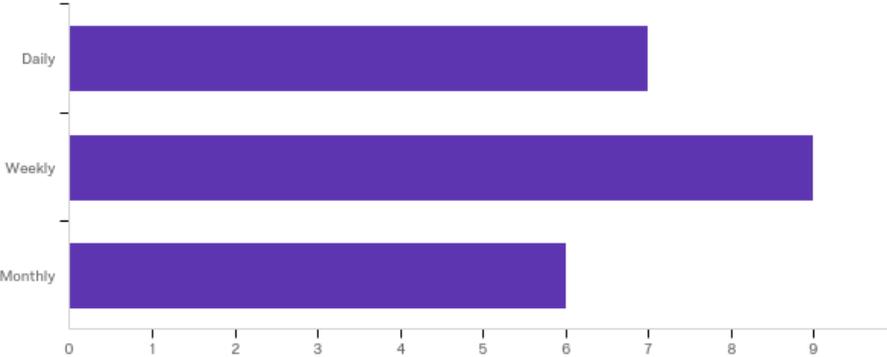
#	Answer	%	Count
1	Daily	30.36%	17
2	Weekly	66.07%	37
3	Monthly	3.57%	2
	Total	100%	56

**Q14 - How often do you intentionally skip meals because of budget constraints?**



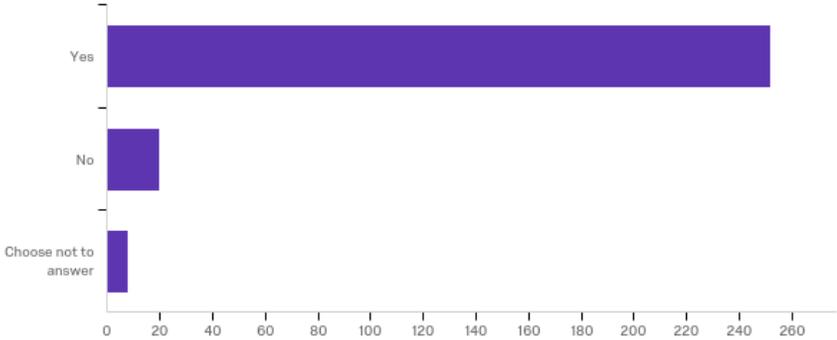
#	Answer	%	Count
1	Daily	0.00%	0
2	Weekly	33.33%	1
3	Monthly	66.67%	2
	Total	100%	3

**Q15 - How often do you intentionally skip meals because of other reasons?**



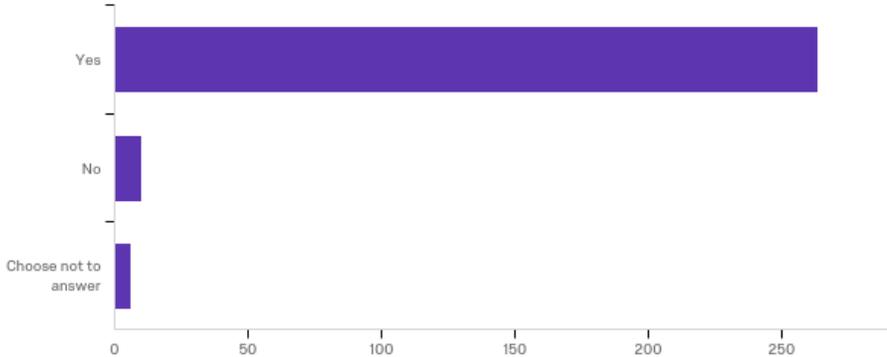
#	Answer	%	Count
1	Daily	31.82%	7
2	Weekly	40.91%	9
3	Monthly	27.27%	6
	Total	100%	22

**Q16 - Do you think that the University should source more of its food from sustainable food programs? (Sustainable programs focus on avoiding depletion of natural resources in order to maintain balance within the environment)**



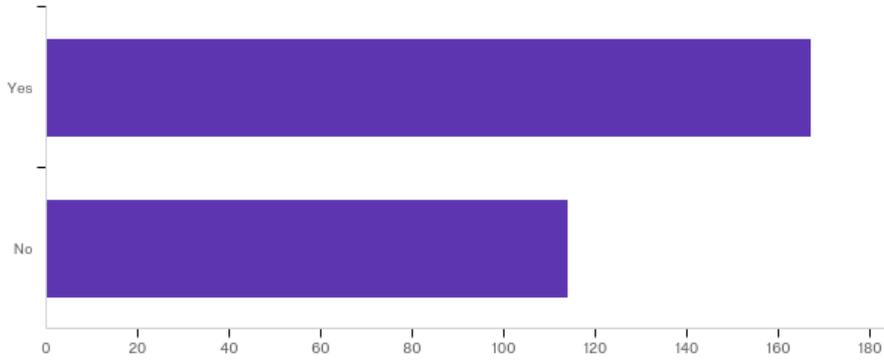
#	Answer	%	Count
1	Yes	90.00%	252
2	No	7.14%	20
3	Choose not to answer	2.86%	8
	Total	100%	280

**Q17 - Do you think the University should source more of its food from local farmers (ex: apples from Charlottesville, VA)**



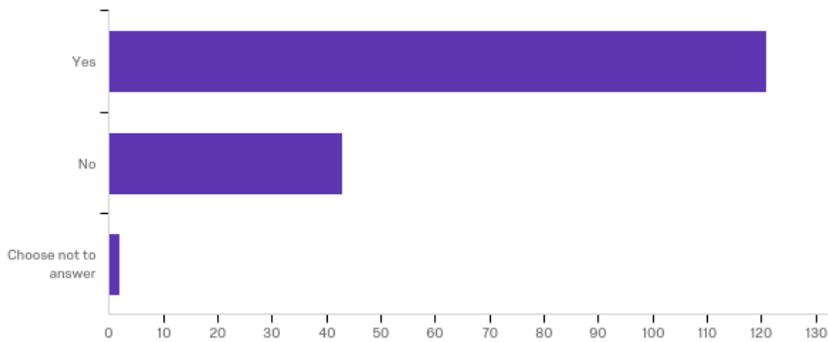
#	Answer	%	Count
1	Yes	94.29%	264
2	No	3.57%	10
3	Choose not to answer	2.14%	6
	Total	100%	280

**Q18 - Do you know the term “food desert”?**



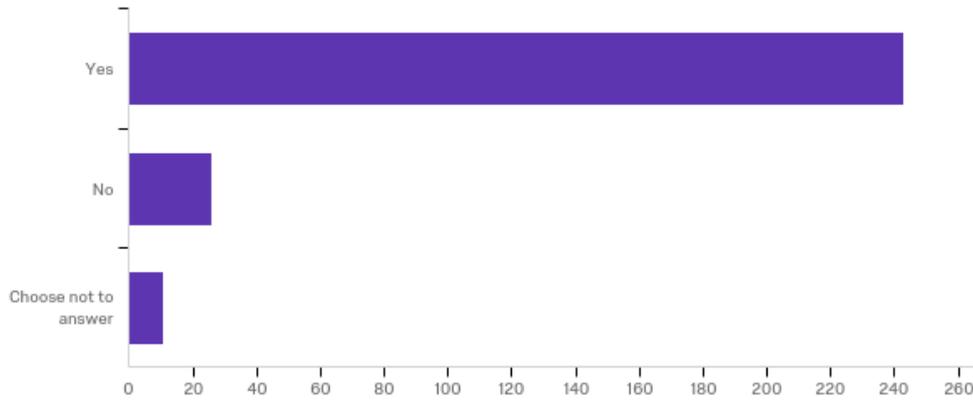
#	Answer	%	Count
1	Yes	59.43%	167
2	No	40.57%	114
	Total	100%	281

**Q19 - Are you aware the City of Richmond contains food deserts?**



#	Answer	%	Count
1	Yes	72.89%	121
2	No	25.90%	43
3	Choose not to answer	1.20%	2
	Total	100%	166

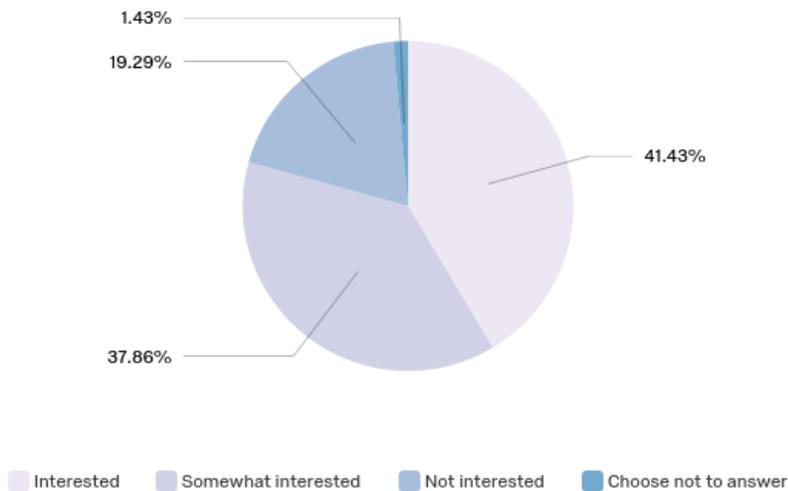
**Q20 - Do you think the University of Richmond should be involved in Richmond City food issues knowing 22.8% of City residents have some food insecurity?**



#	Answer	%	Count
1	Yes	86.79%	243
2	No	9.29%	26
3	Choose not to answer	3.93%	11
	Total	100%	280

**Q21 - How interested would you be to improve city or campus food issues through farming or gardening?**

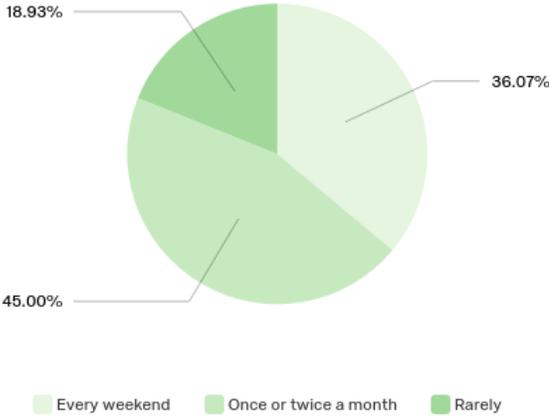
How interested would you be to improve campus food issues through farming or gardening?



#	Answer	%	Count
1	Interested	41.43%	116
2	Somewhat interested	37.86%	106
3	Not interested	19.29%	54
4	Choose not to answer	1.43%	4
	Total	100%	280

# Q23 - How often would you purchase food from a farmer's market that came to campus every weekend?

How often would you purchase food from farmer's market that came to campus every weekend?



#	Answer	%	Count
1	Every weekend	36.07%	101
2	Once or twice a month	45.00%	126
3	Rarely	18.93%	53
	Total	100%	280