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The Carbon Footprint of Penn State Dining's Buffet Menus

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ABSTRACT

In the face of an escalating climate crisis, the urgency of sustainability has reached every corridor of Penn State University’s operations; Penn State's Dining operations will need to follow suit in sustainability efforts across campus. Food choices significantly contribute to environmental challenges through the production of greenhouse gas-intensive foods, like red meat and dairy, which result in large amounts of methane emissions and deforestation, amplifying the carbon footprint. Penn State's buffet menus become the focal point, as this thesis employs a carbon rating system---utilizing carbon footprints from CarbonCloud and recipe specific information from FoodPro---to quantify greenhouse gas emissions for each recipe and menu item and identify which recipes have higher or lower carbon footprints. Recipe information specific to Penn State is pulled from FoodPro, including serving sizes, and each ingredient is attributed a certain amount of kg CO_2e, identified in CarbonCloud. Footprints are calculated in Excel, finding that steak is the most carbon heavy meal. However, it proves challenging to pinpoint strategies for reducing the carbon footprint without compromising student and customer satisfaction. Therefore, this study encourages Penn State to adjust its menus to offer less carbon heavy meat options (such as beef) and measure consumer satisfaction, and offers practical recommendations for sustainable dining practices. This thesis positions Penn State as a proactive institution, addressing the intersectionality of climate change and food choice and paving the way for a sustainable and environmentally conscious future for the University.

Keywords: Carbon Impact • Penn State Buffet Menus • Sustainable Dining • Climate Change • Greenhouse Gas Emissions

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This thesis idea would not exist if not for the passionate individuals at the University of Massachusetts, namely Kathy Wicks, who played a key role in initiating the launch of an A-E carbon footprint rating system on menu identifiers, complemented by their educational campaign titled Dining for a Cooler Planet. UMass utilizes carbon footprint calculations are carried out collaboratively with My Emissions, who utilize carbon emissions factors to assign values to food items. So, thank you, Kathy, for introducing this wonderful idea to Penn State.

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Chapter 1

Introduction

This introduction provides an overview of climate change, the environmental impact of food systems, and the logical processes lining carbon footprint calculations within university dining services. It underscores the urgency of addressing climate change and highlights the importance of sustainable practices in mitigating emissions. Additionally, it emphasizes the role of undergraduate students and outlines the benefit of carbon footprint calculations.

I. Climate Change

Climate change is a long-term alteration in the statistical distribution of climactic patterns over periods over a long period of time (decades to millions of years) (Fleming, 2005). Recent climate change is likely caused by anthropogenic activities---which increase greenhouse gas concentrations in the atmosphere---such as burning fossil fuels, deforestation, and industrial processes (Hardy, 2003). These gases trap heat from the sun, causing the Earth's temperature to rise, leading to global warming; the period from 1983 to 2012 was likely the warmest 30-year period of the last 800 years in the Northern Hemisphere (Hardy, 2003; IPCC, 2013).

We should be worried about climate change; the effects of this phenomenon include frequent and severe weather events, rising sea levels, biodiversity loss, and negative economic impacts. These changes can have significant impacts on human communities and health, ecosystems, and infrastructure (Urry, 2015).

Climate change is causing more frequent and severe extreme weather events, such as heatwaves, droughts, floods, and storms. For example, heat wave frequency and season has nearly tripled since the 1960s (Hayhoe, 2010). These events can cause significant damage to infrastructure, homes, and crops, leading to economic losses and displacement of people (Hayhoe, 2010). Additionally, global sea levels are rising due to the melting of glaciers and ice sheets and thermal expansion (Mimura, 2013). This poses a significant threat to coastal cities and low-lying areas, which could face increased flooding and erosion (Mimura, 2013).

Climate change is affecting human health in many ways, including increased air pollution, the spread of infectious diseases, and heat-related illnesses (McMichael, 2010). It is also causing species to become endangered or extinct as their habitats are altered or destroyed (Lovejoy, 2006). This can break chains in ecosystem interrelationships and impact society's access to adequate food, clean air and water (McMichael, 2010).

Society could also face economic impacts, including damage to infrastructure, loss of productivity, and increased costs associated with mitigation and adaptation measures (Mitchell, 2012). Just to stay even---according to recent global estimates and the IPAT formula---we must improve our environmental performance on goods and services by 5 percent a year (Mitchell, 2012).

Overall, climate change poses a significant threat to our planet's health, security, and prosperity. Therefore, it is crucial that humanity takes action to reduce greenhouse gas emissions and adapt to the changes that are already underway, including in food and dining systems.

II. Food Systems and the Environment

As the impacts of climate change reverberate across many different sectors of human life, the linkage between these climactic changes and food systems become increasingly evident. Recent studies indicate a concerning trend: food systems' emissions have been steadily increasing, now constituting approximately 26% of global greenhouse gas emissions (Ritchie, 2019). This trend highlights the need for action to mitigate the environmental impact of food production and consumption.

Within food production, three primary sources contribute to carbon emissions, as seen in Figure 1: livestock and fisheries, crop production, and land use practices (Ellis et al., 2020). Each of these sectors presents unique challenges and opportunities for reducing carbon footprints and fostering sustainability.

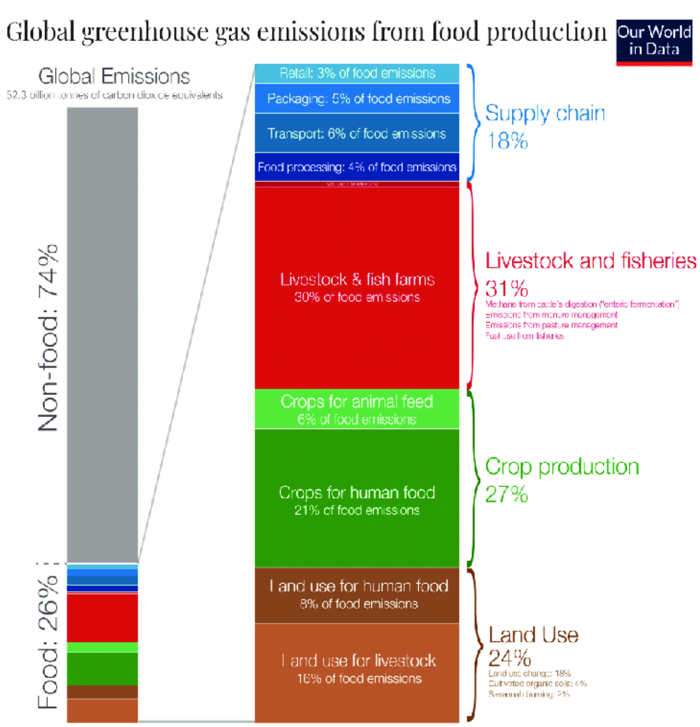


Figure 1: Global greenhouse gas emissions across levels of food production.

Livestock rearing, including cattle, sheep, and poultry, is a significant contributor to greenhouse gas emissions due to methane production and land use for feed cultivation (Sonesson et al., 2010). Similarly, industrial fisheries contribute to global emissions through fuel usage and habitat destruction (Sonesson et al., 2010). Addressing emissions from these sectors requires carbon drawdown approaches such as regenerative farming practices, dietary adjustments, and aquaculture reforms (Hawken, 2017).

Crop production, while essential for food security, also accounts for a substantial portion of food systems emissions, mainly stemming from fertilizer application, machinery usage, and land clearing (Sonesson et al., 2010). Embracing agroecological principles, promoting organic farming methods, and increasing resource availability can help in mitigating emissions in this sector (Hawken, 2017).

Land use changes associated with agriculture, including deforestation and habitat conversion, also negatively impact carbon emissions (Sonesson et al., 2010). Forest clearance for agricultural expansion not only releases stored carbon but also diminishes biodiversity and disrupts ecosystems (Sonesson et al., 2010). Implementing policies to protect natural habitats, promoting reforestation efforts, and incentivizing sustainable land management practices can drawn down on or curb emissions from land use (Hawken, 2017).

III. University Dining Emissions

As the need for action to mitigate the environmental impact of food production and consumption becomes increasingly urgent, the importance of university dining is highlighted, where the influence of undergraduate students on consumption patterns and carbon footprints holds power over university emissions. Undergraduate students compose the majority of the consumer base within university dining services, holding most of the influence over consumption patterns and food preferences (Costello, 2016). Their choices have a direct impact on the carbon footprint of Penn State Dining. Consumption of high-emission foods, such as beef and other meats, contributes disproportionately to carbon emissions, which highlights the need for additional, lower carbon dietary options (Costello, 2016). Additionally, food waste generated by undergraduate students only adds to university carbon emissions, further highlighting the importance of promoting mindful consumption practices (Costello, 2016).

Carbon emissions associated with food production extend across multiple stages, including agricultural practices, transportation, and waste management (Striebig, 2018). Penn State Dining's sourcing practices and supply chain decisions directly influence the carbon intensity of food offerings. For instance, the transportation of food products, especially those sourced from out of state or foreign locations, contributes significantly to carbon emissions, highlighting the need for a shift towards local sourcing whenever feasible (Striebig, 2018).

Promoting plant-based alternatives or sustainable seafood options can also reduce the carbon footprint of undergraduate dining choices while also accommodating for diverse dietary needs (Franchini et al., 2023). Educational initiatives and awareness campaigns within university communities can empower students to make informed and sustainable food choices, thus fostering a culture of environmental consciousness (Franchini et al., 2023).

The University of Connecticut (UConn) achieved all eight dining halls reaching the highest level of certification from the Green Restaurant Association (GRA) (Desroches, 2023). UConn stands out as the sole campus in the United States where every dining facility has attained a this four-star certification (Desroches, 2023). For instance, UConn has adopted trayless dining to curtail food waste and water usage, alongside initiatives such as pre-consumer waste measurement, waste transformation into biogas and compost, and recycling programs (Desroches, 2023). Additionally, UConn Dining prioritizes the procurement of local produce, further enhancing its sustainability profile within the community (Desroches, 2023). Through its comprehensive efforts across multiple sustainability categories, UConn sets a strong precedent for universities wanting to engage in sustainable practices. As evidenced by this case study, collaboration between Penn State Dining, students, and suppliers can aid in implementing effective sustainability measures, such as waste reduction strategies or carbon-neutral transportation initiatives.

IV. Carbon Footprint Calculations

In response to the growing concern over climate change and the contribution of agriculture and consequently dining services to greenhouse gas emissions, universities must therefore evaluate the environmental impact of food served across university-wide operations. The carbon footprint of food recipes encompasses the greenhouse gas emissions associated with every stage of food production, transportation, preparation, and disposal (Costello, 2016). To conduct a comprehensive assessment, universities must consider factors such as ingredient sourcing, cooking methods, portion sizes, and waste management practices (Costello, 2016).

Key steps in calculating the carbon footprint of food recipes include ingredient analysis, emissions estimation, portion control, and waste management; this thesis in particular focuses on ingredient analysis and portion control (Costello, 2016). Ingredient analysis identifies and quantifies the ingredients used in each recipe, considering their production methods, transportation distances, and associated emissions (Lambrecht et al., 2023). Emissions estimation determines the greenhouse gas emissions generated during ingredient production, transportation, storage, and preparation, using established emission factors and life cycle assessments (Costello, 2016). Portion control assesses portion sizes and consumption patterns to accurately estimate the carbon footprint per serving of each recipe (Costello, 2016). Waste management evaluates waste generation and disposal practices, including food waste prevention, composting, and recycling, to account for emissions associated with food waste (Costello, 2016).

By conducting carbon footprint calculations for food recipes, universities can identify high-emission dishes, prioritize sustainable alternatives, and implement targeted strategies to reduce their overall environmental impact. This data-driven approach not only promotes sustainability within university dining services but also educates stakeholders and fosters a culture of environmental responsibility campus-wide.

V. Stakeholder Engagement

The data on food carbon emissions can serve as a valuable tool for Penn State Dining in making informed purchasing decisions and creating educational materials. By prioritizing low-emission ingredients and sustainable sourcing practices, Penn State Dining can reduce the environmental footprint of its operations without compromising consumers' needs and enjoyment (Lambrecht et al., 2023). Moreover, leveraging this data can facilitate discussions around climate goals and foster collaboration towards reducing carbon emissions throughout the entire university.

Chapter 2

Literature Review

I. Root Causes of Agricultural Pollution

Over the past five decades, advancements in agricultural practices and increased harvests have contributed to higher life expectancy and reduced hunger rates (Merrington et al., 2002). Despite these benefits, these developments have led to significant challenges for both human health and the environment, highlights by the large amount of emissions generated by food systems (Merrington et al., 2002). These emissions stem from underlying issues rooted in land use, crop production, livestock and fisheries, and supply chain complexities, which are further compounded by intensified food production efforts (Poore et al., 2019). One may only understand the fundamental causes of these challenges through the examination of the social and economic factors influencing food carbon emissions.

Income disparities play a crucial role in exacerbating food emissions, as rising incomes often correlate with increased consumption of meat and dairy products (Song, 2022). Healthier food options, such as fruits and vegetables, have become more costly and less accessible to economically disadvantaged households (Song, 2022). Thus, when, financial constraints arise, nutritious foods are often the first to be sacrificed, further exacerbating this disparity and increasing emissions.

Meat protein production has a notably higher greenhouse gas emissions rate when compared to vegetable protein, as seen in Figure 2 (Suri et al., 2023; Song, 2022). Feed production for animals typically generates more emissions compared to vegetable protein farming due to factors such as low digestibility and growth of feed by-products and the need for additional transport to deliver feed to livestock (Song, 2022). Additionally, deforestation for agriculture---particularly for feed crops like soy, maize, and pasture----contributes significantly to greenhouse gas emissions, resulting in carbon losses from both above- and below-ground sources (Song, 2022). So, not only are these inequities harming human health, but also the environment.

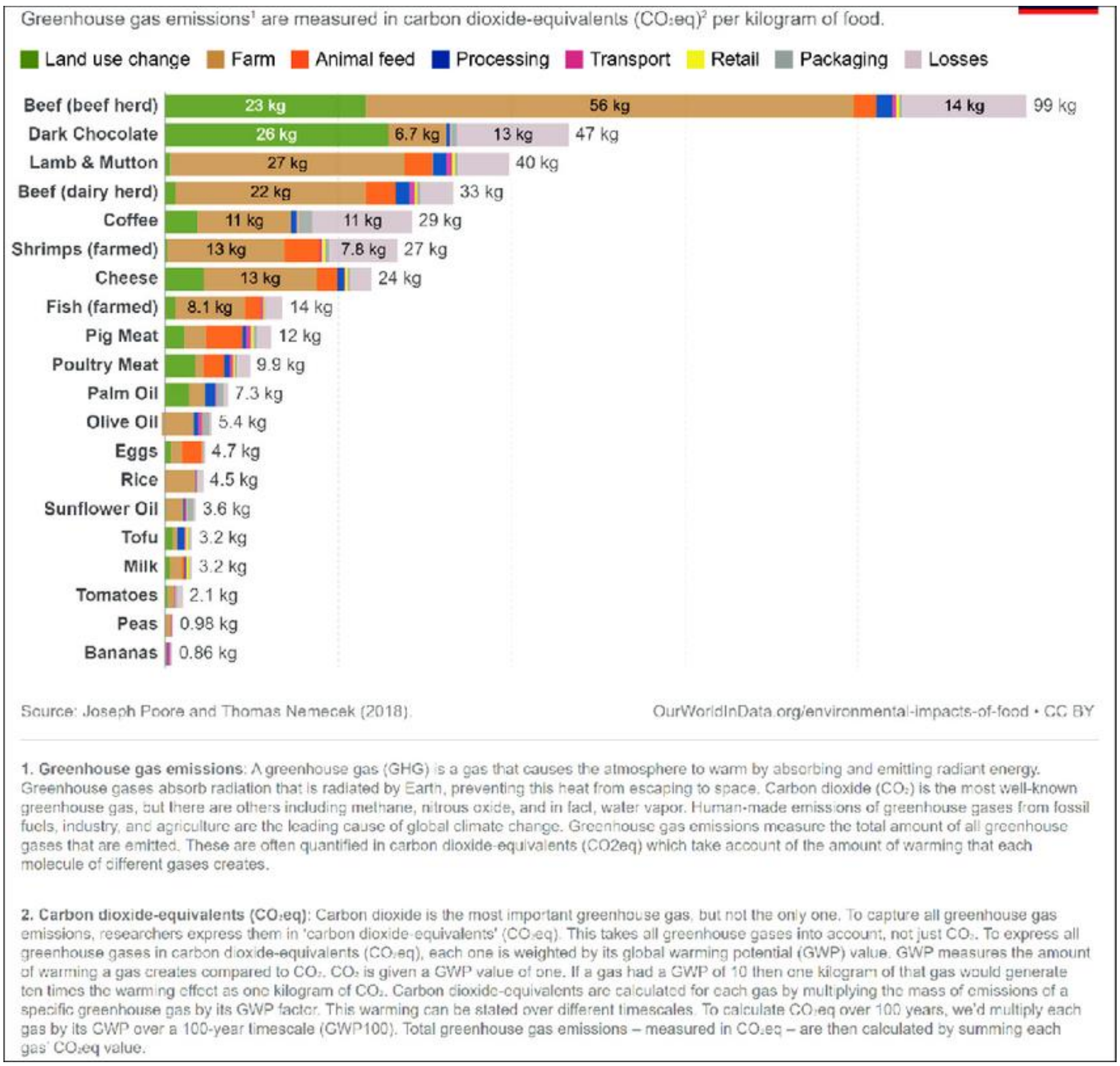


Figure 2: GHG Emissions Across Various Food Productions

II. Food Justice

The alternative food movement scrutinizes the global food system, particularly focusing on environmental and social issues such as topsoil loss, greenhouse gas emissions, food-related diseases, and poor labor conditions (Horst, 217). Researchers criticize the movement for focusing too much on local food and environmental sustainability, neglecting social injustices inherent in food production, distribution, and consumption (Horst, 2017). They argue that the movement's emphasis on consumer choices and neoliberal strategies fails to address structural causes and promote systemic change (Horst, 2017).

In response, food justice emerges as a more radical approach, prioritizing equity and systemic change over local and sustainable food systems. It emphasizes the racial and class disparities embedded in the food system and advocates for policies and practices that address these inequalities (Horst, 2017). Food justice movements seek to undo institutional racism, critique policies upholding inequalities, and develop non-exploitative relationships within the food system (Horst, 2017).

Municipal governments, particularly in the USA, have increasingly engaged in food systems planning, aiming to address issues of food access and sustainability (Horst, 2017). However, researchers argue that municipal efforts often prioritize economic interests over equity and justice. While some cities like Seattle have prioritized equity in their food planning efforts, challenges remain in effectively promoting food justice within the constraints of modern policy frameworks (Horst, 2017).

The case study of the Puget Sound Regional Food Policy Council (PSRFPC) illustrates the challenges and progress in achieving food justice within municipal contexts (Horst, 2017).

The PSRFPC has made strides in identifying and prioritizing equity in food systems planning, demonstrating progress in addressing race and class-based disparities (Horst, 2017). However, modern governmental structures hinder further advancements. A key challenge is the lack of sufficient and stable resources, reflecting broader trends of reduced funding for local government initiatives (Horst, 2017). Despite such obstacles, municipal food systems planners can drive deeper change by engaging in anti-racism efforts, advocating for redistributive policies, and nurturing alternative forms of land management and exchange (Horst, 2017).

III. Gaps in Research

Various measures have been proposed to mitigate the environmental impacts and carbon emissions associated with food systems, with solutions often categorized based on stakeholders (consumers, producers) and methods. This thesis aims to address existing gaps in sustainable food production by emphasizing the importance of food choices and consumer behavior in reducing greenhouse gas emissions.

Meat from ruminant animals like cows stands out as a significant emitter of greenhouse gases, primarily methane, with a kilogram of beef producing substantially more GHGs compared to plant-based alternatives (Lambrecht, 2023). Consumers can play a significant role by adopting dietary changes, such as reducing consumption of animal products, which could lead to substantial reductions in environmental impacts (Poore et al., 2019).

Additional mitigation strategies should involve empowering producers to monitor and mitigate their impacts through setting and incentivizing targets (Poore et al., 2019). However, relying solely on producers may not be sufficient, and efforts should also involve other actors in the food supply chain, such as processors, distributors, retailers, and consumers (Poore et al., 2019). Communication of environmental impacts up the supply chain and to consumers is crucial for driving change.

There still remains a critical gap in procurement information, highlighting the need to assess whether knowledge of food carbon footprints influences purchasing decisions among large organizations. While food transportation contributes to emissions, the overall impact of locality is relatively minor, with food transport accounting for only a fraction of total emissions (Poore et al., 2019).

Building upon the foundational understandings past research has set up, this thesis aims to address these gaps by emphasizing the significance of consumer behavior and food choices in mitigating greenhouse gas emissions. By focusing on the carbon footprint associated with dining choices at a specific institution, this study fills critical knowledge gaps by providing empirical insights into the carbon intensity of dining options and the potential for reducing environmental impacts through consumer-oriented interventions. By assessing the carbon footprint of various meal options and exploring strategies for emission reduction, this research offers practical insights for institutions seeking to implement sustainable dining practices. Furthermore, by examining the intersection of food justice and environmental sustainability within the context of institutional dining, this study contributes to a more holistic understanding of sustainable food systems.

IV. Existing Carbon Footprint Models

In order to assess the carbon footprint of meal options and explore strategies for emission reduction at Penn State, it is critical to look at other university models. UMass Dining Services has implemented a comprehensive carbon rating system in collaboration with MyEmissions, a leading provider of food carbon labeling (Howland, 2022). The system utilizes a standardized process to calculate the carbon footprint of each menu item, considering factors such as ingredient sourcing, preparation methods, and transportation (Howland, 2022). Once the carbon footprint is determined, each menu item is assigned a rating on a scale from A to E, with "A" indicating low carbon impact and "E" indicating very high carbon impact (Howland, 2022). These ratings are displayed on menu cards and the UMass Dining App, providing customers with clear and accessible information to make informed food choices (Howland, 2022).

The existing carbon footprint model implemented by UMass Dining Services presents strengths and limitations that inform the research approach for this thesis. UMass exports recipe information from FoodPro to MyEmissions, allowing for a streamlined calculation of the carbon footprint of each menu item that Penn State can implement as users of FoodPro. Moreover, the integration of carbon rankings into the menu card enhances customer awareness and facilitates informed food choices. The availability of reports on the carbon impacts of individual ingredients offers valuable insights for dining chefs to refine recipes, modify standard processes, and identify alternative ingredients to reduce carbon emissions. Additionally, the model serves as a valuable tool for measuring progress and tracking the percentage of dishes within specific carbon rating categories over time, enabling continuous improvement.

However, several limitations exist within the current model. The cost and resource intensity associated with setup and ongoing charges from MyEmissions may present financial barriers for universities or researchers with limited budgets. Furthermore, MyEmissions' reliance on standardized processes and carbon ratings may oversimplify the complex dynamics of carbon footprint calculation, potentially overlooking certain nuances or variations in ingredient sourcing, preparation methods, and waste management practices. Challenges also arise in calculating the carbon footprint of off-menu items or changes in ingredient availability. This thesis will particularly address the challenge in cost and resource intensity, with the carbon rating system employed in this thesis focusing on public software and software already employed by the university, coupled with calculations on Excel.

IV. Conclusion

Addressing the environmental impacts of food systems requires a holistic approach involving consumers, producers, and policymakers. This thesis serves as a prime example of this comprehensive strategy, emphasizing the significance of sustainable food choices, economic considerations, and university structuring. By promoting plant-based diets, improving access to healthier foods, and implementing sustainable procurement methods, universities can effectively reduce greenhouse gas emissions in food production.

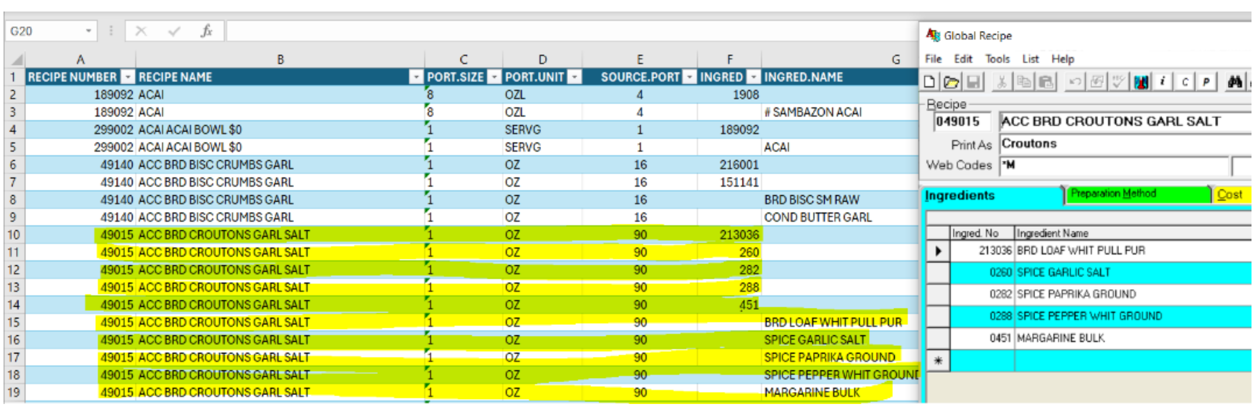
Chapter 3

Methods

This methods section outlines the steps taken to collect, attribute, and analyze carbon footprints for food recipes within university dining services, highlighting the use of relevant databases and software tools to ensure accuracy in the assessment.

I. Data Collection and Preparation

Global recipe data is obtained from the university dining services, specifically exporting all recipes located in facility 11 while excluding wraparounds, as seen in Figure 3. The exported data lacked immediate listing of ingredient names following the ingredients; however, it preserved the correct order. To organize the dataset effectively, the spreadsheet is sorted by the headers to ensure coherence and accuracy in subsequent analyses.



RECIPE NUMBER	RECIPE NAME	PORT.SIZE	PORT.UNIT	SOURCE.PORT	INGRED	INGRED.NAME
189092	ACAI	8	OZL	4	1908	
189092	ACAI	8	OZL	4		# SAMBAZON ACAI
299002	ACAI ACAI BOWL $0	1	SERVG	1	189092	
299002	ACAI ACAI BOWL $0	1	SERVG	1		ACAI
49140	ACC BRD BISC CRUMBS GARL	1	OZ	16	216001	
49140	ACC BRD BISC CRUMBS GARL	1	OZ	16	151141	
49140	ACC BRD BISC CRUMBS GARL	1	OZ	16		BRD BISC SM RAW
49140	ACC BRD BISC CRUMBS GARL	1	OZ	16		COND BUTTER GARL
49015	ACC BRD CROUTONS GARL SALT	1	OZ	90	213036	
49015	ACC BRD CROUTONS GARL SALT	1	OZ	90	260	
49015	ACC BRD CROUTONS GARL SALT	1	OZ	90	282	
49015	ACC BRD CROUTONS GARL SALT	1	OZ	90	288	
49015	ACC BRD CROUTONS GARL SALT	1	OZ	90	451	
49015	ACC BRD CROUTONS GARL SALT	1	OZ	90		BRD LOAF WHIT PULL PUR
49015	ACC BRD CROUTONS GARL SALT	1	OZ	90		SPICE GARLIC SALT
49015	ACC BRD CROUTONS GARL SALT	1	OZ	90		SPICE PAPRIKA GROUND
49015	ACC BRD CROUTONS GARL SALT	1	OZ	90		SPICE PEPPER WHIT GROUNE
49015	ACC BRD CROUTONS GARL SALT	1	OZ	90		MARGARINE BULK

Figure 3: Recipe spreadsheet next to global recipe

II. Carbon Footprint Attribution

Carbon footprints for ingredients are sourced from the CarbonCloud database, a comprehensive repository comprising carbon emissions data for over 50,000 products and ingredients, including more than 20,000 crop and animal ingredients worldwide (CarbonCloud, 2024). The data is derived from scientifically validated models conforming to the GHG Protocol and IPCC standards (CarbonCloud, 2024). Each data point is accompanied by detailed activity parameters used in the calculation and a technical report, enhancing transparency and credibility (CarbonCloud, 2024). The carbon footprints are attributed as emissions factors in kilograms of CO_2e per recipe-attributed amount of each ingredient.

As CarbonCloud pulls data from around the world to create emissions footprints, this thesis is limited by the assumption that carbon footprint for identical ingredients is equal across countries. Additionally, emissions footprint can be listed from “In Store” to “At Farm”, as seen in Figure 4; the secondary limiting assumption is that “In Store” and “At Farm” footprints are equal for identical ingredients.

Name	Organization	Category	Market ⬍	Stage	Live footprint ⬍
Tomato		Fruitbearing vegetables	UA Ukraine	At farm	0. 05 kg CO_2e/kg
TOMATO SAUCE, TOMATO	Topco Associates, Inc.	Food product	US United States of A...	At store	0. 61 kg CO_2e/kg

Figure 4: Set-up of CarbonCloud ingredient database

III. Recipe Analysis

Further analysis is conducted utilizing FoodPro, a food production, planning, and control system developed by Aurora Information Systems (FoodPro, 2024). This system provides comprehensive management solutions for food service operations, encompassing modules for menu planning, cost estimation, forecasting, purchasing, inventory control, food production, and financial analysis (FoodPro, 2024). This thesis utilizes FoodPro to determine the portion size of each ingredient, as seen in Figure 5, allowing for the calculation of emissions attributable to individual recipes (FoodPro, 2024). By integrating the emissions factor of each ingredient with its corresponding portion size within recipes in Excel, an estimation of emissions for each recipe is calculated.

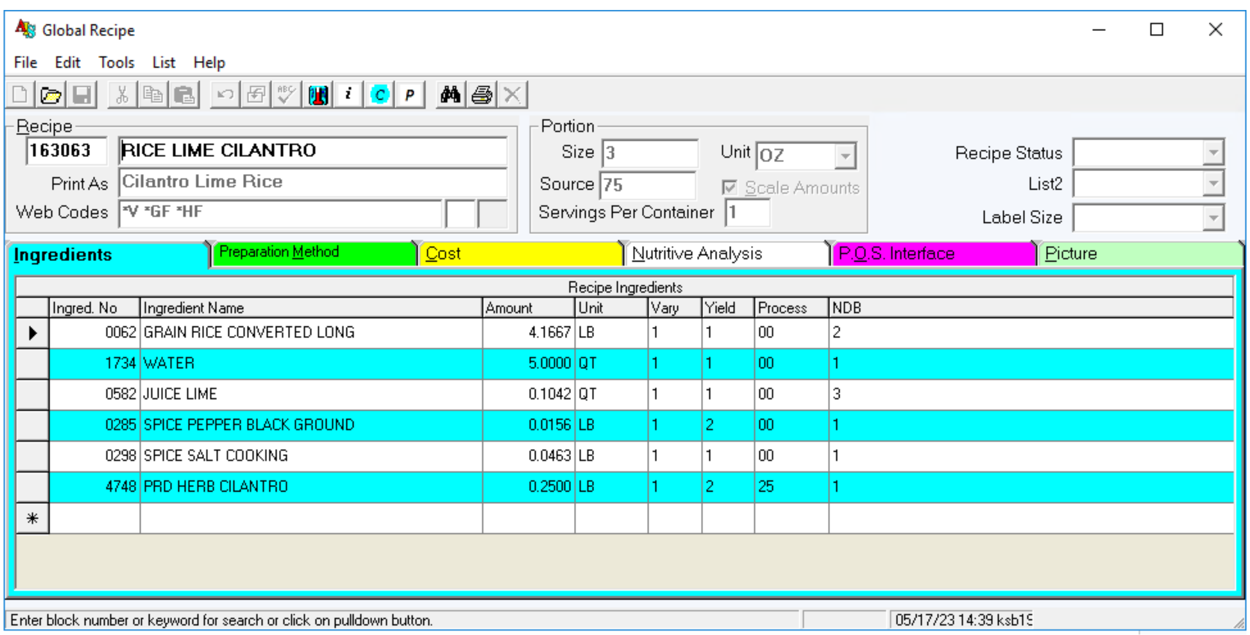


Figure 5: Set-up of FoodPro

IV. Analytical Exploration

To quantify the carbon intensity of the daily menus offered by the dining services, it is necessary to comprehensively analyze menu composition. This interrogation will be conducted along three main components to elucidate different aspects of carbon intensity and dietary choices: comparative analysis of dietary patterns, exploration of menu optimization strategies, and assessment of customer preferences.

a. Comparative Analysis of Dietary Patterns

The objective of this analysis is to determine the carbon intensity associated with various dietary patterns, including omnivorous, vegetarian, vegan, and carnivorous diets. This approach involves calculating the total carbon intensity in Excel of one serving of every item on a given day's menu, as shown in Appendix A. Additionally, items are further classified into main dishes (proteins) and side dishes (non-proteins) to compare their carbon intensities. Furthermore, this analysis examines the theoretical carbon footprint for individuals of specific dietary patterns, such as vegetarian, vegan, or carnivorous diets, on a per-day basis; for example, if a meal has no meat in its ingredients, it is categorized as vegetarian, and if it has no animal products in its ingredients, it is categorized as vegan.

b. Exploration of Menu Optimization Strategies

This approach involves identifying and prioritizing high-impact items and exploring strategies to decrease their frequency in menu offerings. This thesis will identify highest impact items via average footprint per serving and calculate the frequency it is served via occurrences in menu in Excel.

c. Assessment of Customer Preferences and Obligations

This approach will analyze consumption data to compare the popularity of meat options versus vegetarian alternatives. This thesis utilizes dining data of how often servings from meals of each diet (vegetarian vs carnivore) are taken, and calculates if more high-intensity or low-intensity meals are served from a consumer's choice point of view in Excel.

Chapter 4

Results and Discussion

I. Comparative Analysis of Dietary Patterns

The carbon intensity of 1 serving of every dish for each day, as seen in row 1 of Table 1, showcases that the most carbon intensive day is Saturday, where an individual's tray would contain 12.730 kg CO_2e. The least carbon intensive day is Tuesday, where an individual's tray would contain 5.831 kg CO2e. Additionally, when meals are further classified into main dishes and side dishes, one serving size of the side dishes have an average carbon footprint of 0.278 kg CO2e across 1 week and main dishes have an average carbon footprint of 7.348 kg CO2e across 1 week. Main dishes are clearly more intensive than sides, with main dishes being on average 7.070 kg CO2e more than side dishes.

Additionally, as seen in Table 1, if an individual were to eat only carnivore dishes on a given day, they would have an average carbon footprint of 7.187 kg CO2e, with the most carbon intensive day being Saturday, where a carnivore's tray would contain 12.527 kg CO2e. An omnivore would have an average carbon footprint of 2.812 kg CO23, with the most carbon intensive day being Saturday with a footprint of 5.396 kg CO2e. A vegetarian would have an average carbon footprint of 0.339 kg CO2e, with the most carbon intensive day being Sunday, with a footprint of 0.513 kg CO2e. A vegan would have an average footprint of 0.212 kg CO2e with the most intensive day being Friday, with a footprint of 0.378 kg CO2e. It is important to note that a feasible vegan meal could not be constructed for Sunday or Monday from the served dishes.

	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	**Monday**
Carbon Intensity (1 serving of every dish)	5.831217343	6.583225325	6.831631202	8.55585	12.73014955	6.888427019	6.603665939
Carbon Intensity of Side Dishes	0.453591881	0.559255481	0.28088897	0.210238	0.050869139	0.265223238	0.126218793
Carbon Intensity of Main Dishes	4.737006379	6.023969844	6.550742232	8.345611	12.67928041	6.62320378	6.477447146
Carnivore Meal Footprint	4.595922256	6.038398121	6.543774026	7.952826	12.52736233	6.355046353	6.293893004
Omnivore Meal Footprint	1.755045763	3.29370406	3.306421756	1.866317	5.396094648	1.956582976	2.106564949
Vegetarian Meal Footprint	0.365034336	0.39695388	0.206771016	0.377783	0.202787218	0.513355666	0.309772935
Vegan Meal Footprint	0.365034336	0.334851964	0.206771016	0.377783	0.202787218	-	-

Table 1: Dietary patterns derived from menu data

These findings reveal the environmental impact of meat consumption. Carnivorous diets consistently exhibit the highest carbon footprint, followed by omnivorous diets, while vegetarian and vegan diets have substantially lower carbon footprints. Moreover, all the main dishes---aside from one vegetarian option---include meat-based proteins, which, as highlighted by the carnivore diet example, have a higher carbon footprint compared to plant-based options. Thus, meat-centric diets contribute more to carbon emissions.

If an omnivore were to consume one vegetarian dinner per week---for example, to avoid the most carbon intensive day of Saturday---they would lower their carbon footprint by 0.742 kg CO_2e. This emphasizes the importance of individual dietary choices in mitigating carbon emissions, with plant-based diets offering a more sustainable alternative to meat-heavy diets.

This therefore raises considerations regarding Penn State Dining’s role in promoting sustainable food choices. While individuals have the agency to select their meals, dining establishments play a crucial role in shaping menu offerings and influencing consumer behavior.

The question of Penn State Dining's responsibility as an organization arises regarding offering meat-centric menus. The ethical implications of serving high-carbon items extend across contributing significantly to climate change, and thus, Penn State Dining needs to consider the feasibility of limiting or excluding such products from menus.

The feasibility of implementing low-carbon meal options lies in the balance between individual and collective actions in reducing carbon emissions. While individuals may express preferences for meat-based dishes, Penn State Dining has the opportunity to influence consumer behavior; if Penn State Dining is offering the food, it is unlikely that consumers will choose not to eat the higher carbon meat options (Lambrecht, 2023). This highlights the importance of collaborative efforts between individuals and organizations in promoting sustainable dining practices and addressing the environmental impact of food choices.

One concrete step Penn State Dining can take to improve sustainability is to be transparent about sourcing and preparation (University of Connecticut, n.d.). Penn State Dining can enhance transparency by identifying the farms that provide Penn State's meats and explaining the rationale behind sourcing decisions (University of Connecticut, n.d.). Providing information to students about food production methods and sourcing strategies can build trust and engage consumers (University of Connecticut, n.d.).

II. Exploration of Menu Optimization Strategies

The most intensive foods week by week are mostly meat based proteins; in fact, only 2 of the top 21 most intensive dishes are vegetarian, as seen in Table 2. 6 out of 7 of the most intensive dishes per day are chicken, with Saturday's most intense dish being Steak-Frites Au

Poivre. In fact, the Steak-Frites Au Poivre is the most intense dish of the entire week, coming in at 5.345 kg CO2e per serving. The second most intense dish overall, BBQ Chicken, is also served on Saturday, coming in at 4.097 kg CO_2e per serving. The third most intense dish overall, BBQ seasoned chicken, is served on Friday, coming in at 3.093 kg CO_2e.

The highest impact items are meat specifically, and the single most carbon intense dish is beef. If Penn State Dining would like to reduce its carbon footprint, it can easily reduce the frequency that these types of dishes are offered. By limiting the availability of these items, dining services can effectively lower the overall carbon footprint associated with meal choices. For example, implementing a policy to serve beef-related products every other week could substantially reduce carbon emissions without eliminating omnivore options entirely. Or, Penn State Dining could prioritize locally-produced, pasture-raised meats, which tend to have lower carbon footprints compared to conventional production methods, thus offering beef-related products in a more environmentally responsible manner (Costello, 2016).

However, the discussion extends beyond frequency reduction to consider the ethical implications of serving high-carbon items. Given the disproportionate environmental impact of meat production, particularly beef, Penn State Dining must evaluate whether the benefits of offering these dishes outweigh the environmental costs (Costello, 2016). There is a moral imperative to prioritize sustainability and consider alternative protein sources that have lower carbon footprints, such as bean focused dishes. For example, the Bean Bourguignon has 5.193 kg CO_2e less than the Steak-Frites Au Poivre.

Therefore, Penn State can take a concrete step towards leverage globally inspired, plant-based culinary strategies (University of Connecticut, n.d.). Shifting towards plant-based meals can have benefits for the environment, as evidenced by these lower carbon footprints associated with vegetarian and vegan meals (University of Connecticut, n.d.). Penn State Dining can explore new ways to incorporate popular plant-based dishes into its menu offerings, drawing inspiration from traditional food cultures that prioritize plant foods (University of Connecticut, n.d.).

Additionally, Penn State can reward better agricultural practices (University of Connecticut, n.d.). Supporting farms and ranches that prioritize sustainable and environmentally friendly practices can align with Penn State Dining's sustainability goals (University of Connecticut, n.d.). By emphasizing fresh foods during the peak of their local growing season and shifting purchases toward farms with responsible management programs, Penn State Dining can contribute to promoting better agricultural practices and reducing the carbon footprint of its food supply chain (University of Connecticut, n.d.).

	Tuesday	Wednesday	Thursday	Friday	Saturday	**Sunday**	Monday
Least intensive	Crumbled Queso Fresco	Roasted Garlic Mashed Potatoes	Chicken and Cashew Stir Fry	Boneless Buffalo Chicken Wings	Halal Grilled Chicken	Meatloaf	Country Fried Pork Chop
	Chicken Tinga	Grilled Corn and Black Bean Farro	Fire Cracker Shrimp	Boneless BBQ Chicken Wings	BBQ Chicken	Chicken Tandoori	Chicken with Preserved Lemon
Most intensive	Grilled Chicken	Grilled Southwest Chicken	Grilled Chicken	Halal BBQ Seasoned Chicken	Steak-Frites Au Poivre	Halal Grilled Jamaican Jerk Chicken	Halal Italian Herb Grilled Chicken

Table 2: Top 3 carbon intense dishes per day

III. Assessment of Customer Preferences and Obligations

Table 3 showcases how many servings of each meal were prepared for versus how many servings consumers actually used. For data taken from Findlay Commons during a Saturday dinner, consumers ate 176% of the prepared for amount of BBQ Chicken and 100% of the cauliflower and Bean Bourguignon. On the contrary, consumers only ate 77% of the Steak-Au Frites, which has a much higher carbon footprint than the more in-demand items.

	Meal	Prepared For	Actually Used	Percent of Prepared Actually Used
Saturday	Steak-Frites Au Poivre	691	530	76.70043
	Fries	840	800	95.2381
	BBQ Chicken	170	300	176.4706
	Cauliflower	280	280	100
	Sauteed Spinach	208	165	79.32692
	Bean Bourguinon	348	348	100
	Grilled Chicken	320	211	65.9375

Table 3: Amount of servings utilized at Findlay Commons

Thes findings challenge the assumption that carbon intensive meat options are inherently more popular than vegetarian or lower carbon intensity meat alternatives. While meat-centric dishes may have higher serving intensities, this does not necessarily correlate with consumer demand. Therefore, the question arises: should Penn State Dining continue to prioritize beef-related products if they do not align with consumer preferences and sustainability objectives? The overarching trend of Penn State being a meat-oriented campus underscores the need for dining services to reconsider their approach to menu planning and address the ethical implications of meat production and serving practices (Striebig, 2018).

Therefore, Penn State should focus on whole, minimally processed foods, aligning with consumer preferences for healthier and more sustainable options (University of Connecticut, n.d.). As seen in Appendix A, on a Wednesday, students consumed 225% of the steamed green beans; clearly, healthy options are in demand (University of Connecticut, n.d.). Penn State Dining can emphasize plant-based ingredients such as vegetables, legumes, and whole grains in its menu planning to meet consumer demand for nutritious and environmentally friendly meals (University of Connecticut, n.d.). By reducing reliance on processed meats and ingredients, Penn State Dining can align with sustainability objectives and address ethical concerns related to serving meats (University of Connecticut, n.d.).

Additionally, Penn State should reduce portions, emphasizing calorie quality over quantity, to address consumer preferences while promoting sustainability (University of Connecticut, n.d.). Moderating portion sizes can be a strategic approach for Penn State Dining to align with the findings highlighted in Table 3. By offering smaller portions of meat-centric dishes and larger portions of plant-based options, Penn State Dining can respond to the demand for healthier and more environmentally friendly meals (University of Connecticut, n.d.). This approach ameliorates the disconnect between students eating all, or even requesting more, of the lower carbon options, and leaving behind food waste of the higher carbon options. Consumers will therefore be encouraged to choose lower carbon options.

IV. Limitations

While the findings of this study provide valuable insights into the carbon footprint of dining options at Penn State, several limitations must be acknowledged. Firstly, the availability and quality of data present constraints. The carbon footprints of specific ingredients were not tailored to Pennsylvania specifically, potentially impacting their reliability. Instead, data from across the globe were utilized, as detailed information about where Penn State specifically sources each ingredient from was not available. This introduces variability that could affect the accuracy of the calculations.

Similarly, another limitation pertains to the scope of the analysis. Key steps in calculating the carbon footprint of food recipes include ingredient analysis, emissions estimation, portion control, and waste management; however, this thesis specifically focuses only on ingredient analysis and portion control. The other factors that significantly contribute to the overall carbon footprint are not fully accounted for in the analysis. Omitting these factors may result in an incomplete assessment of the carbon footprints.

Moreover, the generalizability of the study is partially limited. Section III focuses on a specific dining facility, Findlay Dining Commons, and a specific population consisting of first-year students. Consequently, the results may not be applicable to the other four dining halls across Penn State, which could have different demographics or dining practices. Variations in consumer preferences, dietary habits, and meal offerings across different dining facilities could influence the observed patterns and conclusions drawn from the data. Therefore, caution should be exercised when applying the findings to broader contexts within the university's dining services.

Furthermore, section III has a reliance on self-reported data from dining hall records, which introduces a potential source of bias. While efforts are made to ensure the accuracy of the data, there may be inconsistencies or errors in recording consumption and meal preparation quantities. Factors such as misreporting or variations in portion sizes could affect the integrity of the data and subsequent analyses. Therefore, the conclusions drawn from this study should be interpreted through the lens of these limitations.

V. Further Research

Further research would greatly benefit Penn State Dining in its journey to decreasing its carbon footprint. Further research could include longitudinal studies to track changes in consumer behavior and dining practices over time. By conducting longitudinal analyses, researchers can assess the effectiveness of interventions implemented by Penn State Dining to mitigate carbon footprints. These studies could provide insights into the long-term impacts of initiatives such as menu modifications, portion control strategies, and educational campaigns on consumer preferences and sustainability-related behaviors.

Further research can also focus on understanding consumer behaviors and educational programming on promoting low-carbon dining habits among consumers. This could delve into the psychological factors that shape individuals' food choices within the context of sustainability. By designing targeted educational interventions, researchers can explore strategies to encourage low-carbon diets.

Furthermore, further research could investigate the feasibility and impact of implementing carbon labeling on menus, similarly to UConn or UMass. Examining the practical challenges and potential benefits of integrating carbon labeling within dining establishments like Penn State can inform strategies for fostering environmental awareness among consumers.

Additionally, to address limitations within this study, future research could employ alternative data collection methods or validation techniques to enhance the reliability of the findings, conduct more comprehensive data collection efforts tailored to a broader sample of dining halls and student populations for a more representative analysis, and incorporate a broader range of variables to capture a more holistic understanding of the environmental implications of certain ingredients.

Chapter 5

Conclusion

This thesis provided insights into the carbon footprint associated with dining choices at Penn State, with the main dish meat proteins constituting 19/21 of the top carbon intense dishes. Through rigorous analysis of menu data and consumption patterns, key opportunities for reducing carbon emissions while maintaining customer satisfaction are identified; these findings advocate for a fundamental shift in Penn State Dining's menu planning approach, urging the elevation of low-carbon and vegetarian options to the forefront.

Penn State Dining's current approach to menu planning falls short of aligning with the University's commitment to sustainability. The findings underscore the urgent need for a paradigm shift in dining offerings. Rather than relegating low carbon and vegetarian options to the sidelines, Penn State Dining must elevate them to the forefront of its menus. By prioritizing healthy and sustainable choices every day, it can send a powerful message about the University's dedication to environmental responsibility and public health.

Moving forward, it is imperative that Penn State takes proactive steps to expand and diversify low carbon offerings. This may involve collaborating with local farmers and suppliers to source fresh, seasonal ingredients, as well as investing in its chefs to develop creative plant-based meals. Moreover, Penn State must actively engage with its community to promote awareness and appreciation for the benefits of low carbon dining. In doing so, it does not only reduce the University's environmental impact but also demonstrate leadership in fostering a culture of sustainability on campus. By embracing the principle that sustainability and culinary excellence go hand in hand, Penn State can pave the way for a healthier, more resilient future for generations to come.

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Appendix A

Data and Calculations from FoodPro and CarbonCloud

TUESDAY											
Meal	Ingredient	Emissions Factor kg CO_2e/kg	mount in Recip	Unit	Amount in Recipe in kg	Total Emissions per	Total Emissions per Recipe in	Serving Size	Unit	Serving Size in kg	Total Emissions per Serving
Cilantro Lime Ric	GRAIN RICE	2.19	4.1667	LB	1.889659864	4.138355102	5.119000327	3	OZ	0.085048478	0.063121195
Cilantro Lime Ric	WATER	0	5	QT	4.731765	0					
Cilantro Lime Ric	JUICE LIME	1.09	0.142	QT	0.134382126	0.146476517					
Cilantro Lime Ric	SPICE PEPI	28.18	0.0156	LB	0.00707483	0.199368707					
Cilantro Lime Ric	SPICE SALT	28.18	0.0463	LB	0.020997732	0.5917161					
Cilantro Lime Ric	PRD HERB	0.38	0.25	LB	0.113378685	0.0430839					
Chicken Tinga	OIL VEG CA	5	1.5625	QT	1.478676563	7.393382813	972.1873397	4	OZ	0.11339797	1.510420472
Chicken Tinga	PRD VP ON	0.24	7.8125	LB	3.5430839	0.850340136					
Chicken Tinga	WATER	0	6	QT	5.678118	0					
Chicken Tinga	SPICE SALT	28.18	0.3475	LB	0.157596372	4.44106576					
Chicken Tinga	VEG TOMAT	0.61	37.5	LB	17.00680272	10.37414966					
Chicken Tinga	BASE CPT	28.18	10.9375	LB	4.96031746	139.781746					
Chicken Tinga	PRD VEG G	0.71	1.5625	LB	0.70861678	0.503117914					
Chicken Tinga	CHIX HALAI	20.5	87	LB	39.45578231	808.8435374					
Charred Corn	OIL VEG CA	5	0.0312	QT	0.029526214	0.147631068	0.927729027	3	OZ	0.085048478	0.08803234
Charred Corn	VEG FZN CO	0.44	1.25	LB	0.566893424	0.249433107					
Charred Corn	PRD VEG O	0.24	0.625	LB	0.283446712	0.068027211					
Charred Corn	SPICE SALT	28.18	0.0312	LB	0.01414966	0.398737415					
Charred Corn	SPICE ORE	28.18	0.005	LB	0.002267574	0.063900227					
Chili Roasted Zuc	PRD VEG S	0.38	1.8182	LB	0.824580499	0.31334059	0.745753261	3	OZ	0.085048478	0.072796678
Chili Roasted Zuc	OIL VEG CA	5	0.0189	QT	0.017886072	0.089430359					
Chili Roasted Zuc	SPICE SALT	28.18	0.0189	LB	0.008571429	0.241542857					
Chili Roasted Zuc	SPICE PEPI	28.18	0.0067	LB	0.003038549	0.085626304					
Chili Roasted Zuc	CHILES GRE	0.92	0.0379	LB	0.017188209	0.015813152					
Pinto Beans with	VEG BEANS	0.99	12	LB	5.442176871	5.387755102	7.173469388	3	OZ	0.085048478	0.108707418
Pinto Beans with	PEPPERS J	1.66	0.25	LB	0.113378685	0.188208617					
Pinto Beans with	SPICE SALT	28.18	0.125	LB	0.056689342	1.597505669					
Crema	SOUR CRM	8.39	5	QT	4.731765	39.69950835	41.27991786	1	OZ	0.028349493	0.206100811
Crema	MILK HALF	1.67	1	QT	0.946353	1.58040951					
Onions and Cilant	PRD VP ON	0.24	2.625	LB	1.19047619	0.285714286	0.501133787	1	OZ	0.028349493	0.008084178
Onions and Cilant	PRD HERB	0.38	1.25	LB	0.566893424	0.215419501					
Salsa Roja	OIL VEG CA	5	0.0078	QT	0.007381553	0.036907767	1.506575429	1	OZ	0.028349493	0.033959034
Salsa Roja	PRD VP ON	0.24	0.0938	LB	0.042539683	0.010209524					
Salsa Roja	PRD VEG P	0.61	0.0625	LB	0.028344671	0.017290249					
Salsa Roja	PRD VEG G	0.71	0.0313	LB	0.014195011	0.010078458					
Salsa Roja	VEG TOMAT	0.61	2.3906	LB	1.084172336	0.661345125					
Salsa Roja	OIL VEG CA	5	0.125	LB	0.056689342	0.283446712					
Salsa Roja	JUICE LIME	1.09	0.0078	QT	0.007381553	0.008045893					
Salsa Roja	SPICE SALT	28.18	0.0375	LB	0.017006803	0.479251701					
Crumbled Queso	CHEESE QU	18.11	1	LB	0.453514739	8.213151927	8.213151927	1	OZ	0.028349493	0.51340931
Mexican Mushroo	PRD VP PO	0.26	0.8065	LB	0.365759637	0.095097506	4.193465767	3	OZ	0.085048478	0.141084123
Mexican Mushroo	OIL VEG CA	5	0.1008	QT	0.095392382	0.476961912					
Mexican Mushroo	PRD VEG M	2.06	1.6129	LB	0.731473923	1.506836281					
Mexican Mushroo	PRD VEG G	0.71	0.0252	LB	0.011428571	0.008114286					
Mexican Mushroo	PRD VP ON	0.24	0.4032	LB	0.182857143	0.043885714					
Mexican Mushroo	PRD VEG P	0.61	0.4032	LB	0.182857143	0.111542857					
Mexican Mushroo	VEG TOMAT	1.03	1.6129	LB	0.731473923	0.753418141					
Mexican Mushroo	SPICE CUM	3.29	0.0254	LB	0.011519274	0.037898413					
Mexican Mushroo	SPICE COR	1.38	0.0126	LB	0.005714286	0.007885714					
Mexican Mushroo	SPICE CHIL	28.18	0.0403	LB	0.018276644	0.515035828					
Mexican Mushroo	SPICE PEPI	28.18	0.0048	LB	0.002176871	0.061344218					
Mexican Mushroo	SPICE SALT	28.18	0.0417	LB	0.018911565	0.532927891					
Mexican Mushroo	VEG FZN PE	0.25	0.375	LB	0.170068027	0.042517007					
Grilled Chicken	CHIX HALAI	20.5	25	LB	11.33786848	232.4263039	235.3657143	1	EACH	0.15	3.085501784
Grilled Chicken	SPICE PEPI	28.18	0.06	LB	0.027210884	0.766802721					
Grilled Chicken	SPICE SALT	28.18	0.17	LB	0.077097506	2.17260771					

WEDNESDAY											
Roast Turkey	TURKEY BRS	10.71	8	LB	3.628117914	38.85714286	38.85714286	4	OZ	0.11339797	1.214492261
Turkey Gravy	ACC ROUX B	8.48	3.2	OZ	0.090718376	0.76929183	5.33242615	2	OZ	0.056698985	0.302978758
Turkey Gravy	SOUP BASE (	5.03	32	OZ	0.907183761	4.56313432					
Bread Stuffing	BREAD PUR (	0.89	2.5	LB	1.133786848	1.009070295	8.337738402	2	OZ	0.056698985	0.147873324
Bread Stuffing	MARGARINE	4.3	1	LB	0.453514739	1.950113379					
Bread Stuffing	PRD VP ONIC	0.24	0.75	LB	0.340136054	0.081632653					
Bread Stuffing	PRD VEG CEL	0.32	0.75	LB	0.340136054	0.108843537					
Bread Stuffing	SPICE SALT (	28.18	0.0313	LB	0.014195011	0.40001542					
Bread Stuffing	SPICE PEPPE	28.18	0.0026	LB	0.001179138	0.033228118					
Bread Stuffing	SPICE CELEF	28.18	0.003	LB	0.001360544	0.038340136					
Bread Stuffing	SPICE ONION	28.18	0.0032	LB	0.001451247	0.040896145					
Bread Stuffing	SPICE SAGE	28.18	0.0054	LB	0.00244898	0.069012245					
Bread Stuffing	SPICE THYME	28.18	0.0034	LB	0.00154195	0.043452154					
Bread Stuffing	SOUP STOCK	5.03	32	OZ	0.907183761	4.56313432					
Roasted Garlic Ma:	PRD VEG PO	0.26	3.125	LB	1.41723356	0.368480726	1.487356062	3	OZ	0.085048478	0.062101916
Roasted Garlic Ma:	*BUTTER CRM*	*1.67*	0.625	LB	0.283446712	0.473356009					
Roasted Garlic Ma:	MILK BULK 2:	1.67	0.3125	QT	0.295735313	0.493877972					
Roasted Garlic Ma:	SPICE SALT (	28.18	0.0063	LB	0.002857143	0.080514286					
Roasted Garlic Ma:	SPICE PEPPE	28.18	0.0049	LB	0.002222222	0.062622222					
Roasted Garlic Ma:	*VEGE FRE G*	*0.24*	1.25	OZ	0.035436866	0.008504848					
Steamed Green Be	WATER	0	80	QT	75.70824	0	10.7755102	2.5	OZ	0.070873731	0.008819468
Steamed Green Be	VEG FZN BEA	0.99	24	LB	10.88435374	10.7755102					
Togarashi Seared	OIL SESAME	5.02	0.39	QT	0.36907767	1.852769903	50.578844	4	OZ	0.11339797	1.421397848
Togarashi Seared	FISH TILAPIA	15.79	6.25	LB	2.83446712	44.75623583					
Togarashi Seared	SPICE SALT (	28.18	0.0417	LB	0.018911565	0.532927891					
Togarashi Seared	SPICE SHICH	28.18	0.1042	LB	0.047256236	1.331680726					
Togarashi Seared	SAUCE YAKI	2.94	25	OZ	0.708737314	2.083687702					
Togarashi Seared	PRD HERB CI	0.38	0.125	LB	0.056689342	0.02154195					
Honey Glazed Carr	*PRD VP PAR*	0.13	12.4997	LB	5.668798186	0.736943764	6.65084774	2.5	OZ	0.070873731	0.037482015
Honey Glazed Carr	PRD VP CARI	0.15	12.4997	LB	5.668798186	0.850319728					
Honey Glazed Carr	OIL VEG CAN	5	0.2498	QT	0.236398979	1.181994897					
Honey Glazed Carr	SPICE SALT (	28.18	0.1871	LB	0.084852608	2.391146485					
Honey Glazed Carr	SPICE PEPPE	28.18	0.0271	LB	0.012290249	0.346339229					
Honey Glazed Carr	*BUTTER CRM*	*1.67*	0.8394	LB	0.380680272	0.635736054					
Honey Glazed Carr	*HONEY WHI*	*0.76*	0.2769	QT	0.262045146	0.199154311					
Honey Glazed Carr	VINEGAR CID	1.18	0.2769	QT	0.262045146	0.309213272					
Grilled Corn and Bl	OIL OLIVE PU	2.35	0.0586	QT	0.055456286	0.130322272	8.761519088	3	OZ	0.085048478	0.288550481
Grilled Corn and Bl	VEG FZN COF	0.44	0.2344	LB	0.106303855	0.046773696					
Grilled Corn and Bl	PRD VP ONIC	0.24	0.1758	LB	0.079727891	0.019134694					
Grilled Corn and Bl	PRD VEG PEF	0.61	0.2344	LB	0.106303855	0.064845351					
Grilled Corn and Bl	PRD VEG PEF	0.61	0.2344	LB	0.106303855	0.064845351					
Grilled Corn and Bl	*GRAIN FARR*	1	0.9375	LB	0.425170068	0.425170068					
Grilled Corn and Bl	*SOUP VEGA*	5.03	55.3125	OZ	1.568081306	7.887448971					
Grilled Corn and Bl	PRD VEG ON	0.22	0.0625	LB	0.028344671	0.006235828					
Grilled Corn and Bl	VEG BEANS E	0.99	0.2344	LB	0.106303855	0.105240816					
Grilled Corn and Bl	SPICE PEPPE	28.18	0.0001	LB	4.53515E-05	0.001278005					
Grilled Corn and Bl	SPICE SALT (	28.18	0.0008	LB	0.000362812	0.010224036					
Grilled Southwest (	CHIX HALAL	20.5	4.5	LB	2.040816327	41.83673469	43.08792669	1	EACH	0.15	3.099529254
Grilled Southwest (	SEASONING	28.18	3	TB	0.0444	1.251192					

THURSDAY

Chicken and Cash	OIL SESAME	5.02	0.0325	QT	0.030756473	0.154397492	31.7521798	6	OZ	0.170096955	1.220381107
Chicken and Cash	OIL VEG CAN	5	0.0625	QT	0.059147063	0.295735313					
Chicken and Cash	CHIX BRST S	20.5	3.125	LB	1.41723356	29.05328798					
Chicken and Cash	PRD VEG GIN	4.66	0.0625	LB	0.028344671	0.132086168					
Chicken and Cash	VEG CHESTN	0.44	0.5	LB	0.22675737	0.099773243					
Chicken and Cash	VEG BAMBO	0.92	0.5	LB	0.22675737	0.20861678					
Chicken and Cash	BAKEA NUT C	1.38	0.5	LB	0.22675737	0.31292517					
Chicken and Cash	PRD VP ONIC	0.24	0.75	LB	0.340136054	0.081632653					
Chicken and Cash	PRD VP PEPF	0.61	0.75	LB	0.340136054	0.207482993					
Chicken and Cash	PRD VEG PEF	0.61	0.75	LB	0.340136054	0.207482993					
Chicken and Cash	PRD VEG CEL	0.32	0.75	LB	0.340136054	0.108843537					
Chicken and Cash	SUGAR GRAI	0.62	0.125	LB	0.056689342	0.035147392					
Chicken and Cash	PRD VEG ON	0.22	0.185	LB	0.083900227	0.01845805					
Chicken and Cash	SAUCE TERIY	1.18	25	OZ	0.708737314	0.83631003					
Brown Rice	GRAIN RICE E	2.19	5.7471	LB	2.606394558	5.708004082	6.73040771	3	OZ	0.085048478	0.062426937
Brown Rice	WATER	0	6.8966	QT	6.5266181	0					
Brown Rice	SPICE SALT (	28.18	0.08	LB	0.036281179	1.022403628					
Sugar Snap Peas	WATER	0	0.1875	QT	0.177441188	0	1.37329932	2.5	OZ	0.070873731	0.059968997
Sugar Snap Peas	VEG FZN PEA	0.95	3.1875	LB	1.445578231	1.37329932					
Fire Cracker Shrimp	SHLFSH SHF	10.48	0.3125	LB	0.141723356	1.485260771	2.739379471	6	OZ	0.170096955	2.237891136
Fire Cracker Shrimp	SEASONING	28.18	1	OZ	0.028349493	0.7988887					
Fire Cracker Shrimp	FLOUR CORN	1.08	0.03	LB	0.013605442	0.014693878					
Fire Cracker Shrimp	SEASONING	28.18	1	TB	0.0148	0.417064					
Fire Cracker Shrimp	SPICE PEPPE	28.18	0.0006	LB	0.000272109	0.007668027					
Fire Cracker Shrimp	MILK 1/2 GAL	1.67	0.01	QT	0.00946353	0.015804095					
Giner Thai Chili Sau	SAUCE FZN T	2.94	8	QT	7.570824	22.25822256	23.60005929	1	OZ	0.028349493	0.081086161
Giner Thai Chili Sau	VEG DRIED C	1.66	0.5	LB	0.22675737	0.376417234					
Giner Thai Chili Sau	PRD VEG GIN	4.66	0.375	LB	0.170068027	0.792517007					
Giner Thai Chili Sau	PRD VEG PEF	0.61	0.625	LB	0.283446712	0.172902494					
Roasted Garlic Bru	OIL VEG CAN	5	0.1638	QT	0.155012621	0.775063107	3.359259932	2.5	OZ	0.070873731	0.077406875
Roasted Garlic Bru	PRD VP BRUS	0.61	5.9401	LB	2.693922902	1.643292971					
Roasted Garlic Bru	SPICE SALT (	28.18	0.0535	LB	0.024263039	0.683732426					
Roasted Garlic Bru	SPICE PEPPE	28.18	0.0091	LB	0.004126984	0.116298413					
Roasted Garlic Bru	PRD VEG GA	0.71	0.4375	LB	0.198412698	0.140873016					
Red Chili Thai Tofu	OIL VEG CAN	5	0.0052	QT	0.004921036	0.024605178	21.53625966	4	OZ	0.11339797	0.006968206
Red Chili Thai Tofu	PRD VEG ON	0.24	2.25	LB	1.020408163	0.244897959					
Red Chili Thai Tofu	ENT VEGAN T	2.49	288	OZ	8.164653853	20.32998809					
Red Chili Thai Tofu	PRD HERB CI	0.38	60	OZ	1.700969553	0.64636843					
Red Chili Thai Tofu	SAUCE PEP F	2.94	0.2178	LB	0.09877551	0.2904					
Grilled Chicken	CHIX HALAL	20.5	25	LB	11.33786848	232.4263039	235.3657143	1	EACH	0.15	3.085501784
Grilled Chicken	SPICE SALT (	28.18	0.06	LB	0.027210884	0.766802721					
Grilled Chicken	SPICE PEPPE	28.18	0.17	LB	0.077097506	2.17260771					

FRIDAY

Boneless Buffalo C	CHIX BNLS W	20.5	6.25	LB	2.83446712	58.10657596	61.23210752	4	OZ	0.11339797	1.781518022
Boneless Buffalo C	SAUCE HOT H	2.94	37.5	OZ	1.06310597	3.125531553					
Hot Cauliflower Wir	PRD VP CAUL	0.37	4.6875	LB	2.12585034	0.786564626	4.632392129	4	OZ	0.11339797	0.139427293
Hot Cauliflower Wir	SOYMILK 32(	0.78	0.5	QT	0.4731765	0.36907767					
Hot Cauliflower Wir	FLOUR RICE	2.68	1	LB	0.453514739	1.215419501					
Hot Cauliflower Wir	SPICE SALT (	28.18	0.0139	LB	0.006303855	0.17764263					
Hot Cauliflower Wir	SAUCE HOT H	2.94	25	OZ	0.708737314	2.083687702					
Boneless BBQ Chi	CHIX BNLS W	20.5	0.25	LB	0.113378685	2.324263039	2.449284301	4	OZ	0.11339797	1.781518022
Boneless BBQ Chi	SAUCE BBQ	2.94	1.5	OZ	0.042524239	0.125021262					
Bleu Cheese Dress	DRESS BLUE	2.94	4	QT	3.785412	11.12911128	11.12911128	1	OZ	0.028349493	0.083347508
Vegan Ranch Dres	VEGENAISE	1.18	8	LB	3.628117914	4.281179138	5.858685179	1	OZ	0.028349493	0.042091313
Vegan Ranch Dres	SPICE GARLI	28.18	0.0208	LB	0.009433107	0.265824943					
Vegan Ranch Dres	SPICE SALT (	28.18	0.0417	LB	0.018911565	0.532927891					
Vegan Ranch Dres	SPICE ONION	28.18	0.0208	LB	0.009433107	0.265824943					
Vegan Ranch Dres	SPICE PEPPE	28.18	0.0156	LB	0.00707483	0.199368707					
Vegan Ranch Dres	PRD HERB P/	0.61	0.008	LB	0.003628118	0.002213152					
Vegan Ranch Dres	VINEGAR CID	1.18	0.2496	QT	0.236209709	0.278727456					
Vegan Ranch Dres	PRD HERB DI	0.12	0.008	LB	0.003628118	0.000435374					
Vegan Ranch Dres	JUICE FZN LE	1.09	0.0312	QT	0.029526214	0.032183573					
Celery Sticks	PRD VP CELE	0.61	1	LB	0.453514739	0.276643991	0.276643991	1	OZ	0.028349493	0.01729319
Orange Teriyaki Sa	FF FISH SALN	15.79	12.5	LB	5.66893424	89.51247166	93.56577793	4	OZ	0.11339797	1.296294338
Orange Teriyaki Sa	SAUCE GF TA	2.94	1	QT	0.946353	2.78227782					
Orange Teriyaki Sa	PRD FRU OR/	0.3	8	EACH	0.997904	0.2993712					
Orange Teriyaki Sa	SUGAR BRO'	1.4	0.75	LB	0.340136054	0.476190476					
Orange Teriyaki Sa	PRD VEG GA	0.71	0.125	LB	0.056689342	0.040249433					
Orange Teriyaki Sa	PRD VEG GIN	4.66	0.125	LB	0.056689342	0.264172336					
Orange Teriyaki Sa	MIRIN	1.65	0.0625	QT	0.059147063	0.097592653					
Orange Teriyaki Sa	LIQUOR SAK	1.58	0.0625	QT	0.059147063	0.093452359					
Jasmine Rice	RICE JASMINI	2.68	1.3887	LB	0.629795918	1.687853061	1.687853061	3	OZ	0.085048478	0.065040313
Jasmine Rice	WATER	0	1.6667	QT	1.577286545	0					
Summer Bean Bler	WATER	0	40	QT	37.85412	0	1.632653061	2.5	OZ	0.070873731	0.002465928
Summer Bean Bler	VEG FZN BLE	0.18	20	LB	9.070294785	1.632653061					
Vegetarian Grilled	OIL VEG CAN	5	0.03	QT	0.02839059	0.14195295	7.210321962	0.5	EACH	0.185	0.253358384
Vegetarian Grilled	PRD VEG SQ	0.38	0.7825	LB	0.354875283	0.134852608					
Vegetarian Grilled	PRD VEG SQ	0.38	0.7825	LB	0.354875283	0.134852608					
Vegetarian Grilled	PRD VEG PEF	0.61	0.7825	LB	0.354875283	0.216473923					
Vegetarian Grilled	PRD VEG ON	0.24	0.7825	LB	0.354875283	0.085170068					
Vegetarian Grilled	SEASONING	28.18	1	TB	0.0148	0.417064					
Vegetarian Grilled	VGTN BURGE	2.04	3.125	LB	1.41723356	2.891156463					
Vegetarian Grilled	VEG BEANS F	0.99	3	LB	1.360544218	1.346938776					
Vegetarian Grilled	SAUCE SALS	2.94	0.29	QT	0.27444237	0.806860568					
Vegetarian Grilled	WRAP TORTI	1.38	25	EACH	0.75	1.035					
Halal BBQ Season	CHIX HALAL	20.5	25	LB	11.33786848	232.4263039	237.6396039	1	EACH	0.15	3.093495395
Halal BBQ Season	SEASONING	28.18	12.5	TB	0.185	5.2133					

					SATURDAY						
Steak-Frites Au Pc	BEEF STK FL	20.5	4.6875	LB	2.12585034	43.57993197	46.45636536	1	EACH	0.34	5.345225509
Steak-Frites Au Pc	OIL VEG CAN	5	0.0475	QT	0.044951768	0.224758838					
Steak-Frites Au Pc	PRD VEG GA	0.71	0.0935	LB	0.042403628	0.030106576					
Steak-Frites Au Pc	PRD HERB R(	0.35	0.0312	LB	0.01414966	0.004952381					
Steak-Frites Au Pc	SPICE SALT (	28.18	0.0417	LB	0.018911565	0.532927891					
Steak-Frites Au Pc	SAUCE AU P(	2.94	25	OZ	0.708737314	2.083687702					
Fries	VEG FZN PO	0.26	25	LB	11.33786848	2.947845805	2.947845805	4	OZ	0.11339797	0.029483472
BBQ Chicken	CHIX QUARTI	20.5	5.625	LB	2.551020408	52.29591837	53.50445723	8	OZ	0.22679594	4.096635038
BBQ Chicken	SAUCE BBQ	2.94	14.5	OZ	0.411067642	1.208538867					
Cauliflower	WATER	0	40	QT	37.85412	0	4.027210884	2.5	OZ	0.070873731	0.005856225
Cauliflower	PRD VP CAUI	0.37	24	LB	10.88435374	4.027210884					
Sauteed Spinach	PRD VP SPIN	0.16	18.3824	LB	8.336689342	1.333870295	1.862125772	2.5	OZ	0.070873731	0.015529442
Sauteed Spinach	OIL OLIVE PU	2.35	0.0649	QT	0.06141831	0.144333028					
Sauteed Spinach	PRD VEG GA	0.71	0.1961	LB	0.08893424	0.063143311					
Sauteed Spinach	SPICE PEPPE	28.18	0.0039	LB	0.001768707	0.049842177					
Sauteed Spinach	SPICE SALT (	28.18	0.0212	LB	0.009614512	0.270936961					
Vegetarian Bean E	OIL VEG CAN	5	0.0325	QT	0.030756473	0.153782363	3.75715726	3	OZ	0.085048478	0.151918078
Vegetarian Bean E	FLOUR ALL F	1.22	0.0326	LB	0.01478458	0.018037188					
Vegetarian Bean E	OIL VEG CAN	5	0.0162	QT	0.015330919	0.076654593					
Vegetarian Bean E	PRD VP ONIC	0.24	0.2604	LB	0.118095238	0.028342857					
Vegetarian Bean E	PRD VP CARI	0.15	0.5208	LB	0.236190476	0.035428571					
Vegetarian Bean E	PRD VEG GA	0.71	0.0326	LB	0.01478458	0.010497052					
Vegetarian Bean E	PRD VEG MU	2.06	0.7812	LB	0.354285714	0.729828571					
Vegetarian Bean E	SPICE THYME	28.18	0.0027	LB	0.00122449	0.034506122					
Vegetarian Bean E	PRD HERB R(	0.35	0.0108	LB	0.004897959	0.001714286					
Vegetarian Bean E	SPICE BAY LI	28.18	1.0417	EACH	0.00020834	0.005871021					
Vegetarian Bean E	VEG TOMATO	0.61	0.5208	LB	0.236190476	0.14407619					
Vegetarian Bean E	SOUP VEGAI	5.03	8	OZ	0.22679594	1.14078358					
Vegetarian Bean E	LIQUOR WINE	1.33	0.13	QT	0.12302589	0.163624434					
Vegetarian Bean E	VEG BEANS I	0.99	1.5625	LB	0.70861678	0.701530612					
Vegetarian Bean E	SPICE PEPPE	28.18	0.0347	LB	0.015736961	0.443467574					
Vegetarian Bean E	SPICE SALT (	28.18	0.0054	LB	0.00244898	0.069012245					
Halal Grilled Chicke	CHIX HALAL	20.5	25	LB	11.33786848	232.4263039	235.3657143	1	EACH	0.15	3.085501784
Halal Grilled Chicke	SPICE PEPPE	28.18	0.06	LB	0.027210884	0.766802721					
Halal Grilled Chicke	SPICE SALT (	28.18	0.17	LB	0.077097506	2.17260771					

					SUNDAY						
Chicken Tandoori	CHIX HALAL	20.5	0.25	LB	0.113378685	2.324263039	2.402968155	4	OZ	0.11339797	1.869455675
Chicken Tandoori	MARINADE T	5.32	0.015	LB	0.006802721	0.036190476					
Chicken Tandoori	YOG CRMRY	2.85	0.015	QT	0.014195295	0.040456591					
Chicken Tandoori	ACC VEGE O	0.18	0.025	LB	0.011337868	0.002040816					
Chicken Tandoori	PRD HERB C	0.38	0.0001	LB	4.53515E-05	1.72336E-05					
Naan Bread	BREAD NAAI	0.89	0.25	EACH	0.0225	0.020025	0.020025	1	SLICE	0.0225	0.020025
Meatloaf	# BEEF GRO	20.5	2.5685	LB	1.164852608	23.87947846	34.74098464	4	OZ	0.11339797	1.338748692
Meatloaf	PORK BUTT	10.71	1.7123	LB	0.776553288	8.316885714					
Meatloaf	ACC VEGE O	0.18	0.4281	LB	0.19414966	0.034946939					
Meatloaf	PRD VEG GA	0.71	0.0428	LB	0.019410431	0.013781406					
Meatloaf	SAUCE CATS	2.94	0.1712	QT	0.162015634	0.476325963					
Meatloaf	SAUCE MUS	2.94	0.2055	LB	0.093197279	0.274					
Meatloaf	BREAD CRUI	0.89	0.4281	LB	0.19414966	0.172793197					
Meatloaf	EGG FRESH	3.2	4	EACH	0.268	0.8576					
Meatloaf	SAUCE WOR	2.94	0.0531	QT	0.050251344	0.147738952					
Meatloaf	SPICE OREG	28.18	0.0068	LB	0.0030839	0.086904308					
Meatloaf	SPICE BASIL	28.18	0.0068	LB	0.0030839	0.086904308					
Meatloaf	SPICE PEPPI	28.18	0.0068	LB	0.0030839	0.086904308					
Meatloaf	SPICE SALT	28.18	0.024	LB	0.010884354	0.306721088					
Beef Gravy	ACC ROUX E	8.48	16	OZ	0.453591881	3.846459148	4.275053821	2	OZ	0.056698985	0.047312732
Beef Gravy	WATER	0	4.8356	QT	4.576184567	0					
Beef Gravy	SOUP BASE	5.03	0.1667	LB	0.075600907	0.380272562					
Beef Gravy	SPICE PEPPI	28.18	0.0023	LB	0.001043084	0.029394104					
Beef Gravy	FOOD COLO	1.13	0.0177	QT	0.016750448	0.018928006					
Scalloped Potato	VEG POT SC	0.26	4.5	LB	2.040816327	0.530612245	1.505668934	1	EACH	0.141748	0.019789568
Scalloped Potato	MARGARINE	4.3	0.5	LB	0.22675737	0.975056689					
Scalloped Potato	WATER	0	9	QT	8.517177	0					
Harvest Blend	WATER	0	40	QT	37.85412	0	5.006802721	2.5	OZ	0.070873731	0.006549401
Harvest Blend	PRD VP BRC	0.37	12	LB	5.442176871	2.013605442					
Harvest Blend	PRD VP CAU	0.37	12	LB	5.442176871	2.013605442					
Harvest Blend	VEG FZN CAI	0.18	12	LB	5.442176871	0.979591837					
Sauteed Butter Th	OIL VEG CAN	5	0.0156	QT	0.014763107	0.073815534	1.381113191	2.5	OZ	0.070873731	0.171546537
Sauteed Butter Th	*BUTTER CR*	*1.67*	0.0312	LB	0.01414966	0.023629932					
Sauteed Butter Th	PRD VEG GA	0.71	0.0015	LB	0.000680272	0.000482993					
Sauteed Butter Th	PRD VEG MU	2.06	1	LB	0.453514739	0.934240363					
Sauteed Butter Th	SPICE SALT	28.18	0.0052	LB	0.002358277	0.066456236					
Sauteed Butter Th	SPICE THYM	28.18	0.0139	LB	0.006303855	0.17764263					
Sauteed Butter Th	LIQUOR WINI	1.33	0.0833	QT	0.078831205	0.104845503					
Vegetarian Pad Th	NOODLE RIC	3.64	1.2681	LB	0.575102041	2.093371429	8.271473586	6	OZ	0.170096955	0.315470159
Vegetarian Pad Th	OIL VEG CAN	5	0.0453	QT	0.042869791	0.214348955					
Vegetarian Pad Th	OIL SESAME	5.02	0.0226	QT	0.021387578	0.107365641					
Vegetarian Pad Th	PRD VEG GA	0.71	0.0453	LB	0.020544218	0.014586395					
Vegetarian Pad Th	PRD VP TOF	1.37	2.5362	LB	1.150204082	1.575779592					
Vegetarian Pad Th	FLOUR RICE	2.68	0.317	LB	0.143764172	0.385287982					
Vegetarian Pad Th	SAUCE PAD	2.94	28.9855	OZ	0.821724216	2.415869195					
Vegetarian Pad Th	PRD VEG ON	0.22	0.4529	LB	0.205396825	0.045187302					
Vegetarian Pad Th	PRD VP BEA	0.61	1.4493	LB	0.657278912	0.400940136					
Vegetarian Pad Th	PRD VP SPR	0.55	1.4493	LB	0.657278912	0.361503401					
Vegetarian Pad Th	BAKEA NUT I	4	0.3623	LB	0.16430839	0.65723356					
Halal Grilled Jamai	CHIX HALAL	20.5	4.5	LB	2.040816327	41.83673469	43.08792669	1	EACH	0.15	3.099529254
Halal Grilled Jamai	SEASONING	28.18	3	TB	0.0444	1.251192					

MONDAY											
Chicken with Pres	CHIX THIGH E	20.5	5	LB	2.267573696	46.48526077	54.0000806	1	EACH	0.15	1.980346156
Chicken with Pres	SOUP STOC	5.03	48	OZ	1.360775642	6.84470148					
Chicken with Pres	ACC LEM FR	0.21	1	EACH	0.1	0.021					
Chicken with Pres	VEGE FRE OI	0.24	5	OZ	0.141747463	0.034019391					
Chicken with Pres	VEGE FRE G	0.71	5	OZ	0.141747463	0.100640699					
Chicken with Pres	XANTHAN GI	7.75	0.014	LB	0.006349206	0.049206349					
Chicken with Pres	PRD HERB C	0.38	0.062	LB	0.028117914	0.010684807					
Chicken with Pres	SPICE SALT	28.18	0.014	LB	0.006349206	0.178920635					
Chicken with Pres	SPICE PEPPI	28.18	0.016	LB	0.007256236	0.204480726					
Chicken with Pres	OIL OLIVE PU	2.35	0.032	QT	0.030283296	0.071165746					
Country Fried Pork	PORK FRITTI	10.71	0.25	LB	0.113378685	1.214285714	1.444192536	1	EACH	0.198	1.128900268
Country Fried Pork	PICKLE CHIP	1.66	1	EACH	0.135	0.2241					
Country Fried Pork	*SAUCE HO	1.18	0.0052	QT	0.004921036	0.005806822					
Mashed Redskin P	PRD VEG PC	0.26	10	LB	4.535147392	1.179138322	3.971887061	3	OZ	0.085048478	0.056762536
Mashed Redskin P	BUTTER CR	1.67	1	LB	0.453514739	0.757369615					
Mashed Redskin P	MILK BULK 2	1.67	1	QT	0.946353	1.58040951					
Mashed Redskin P	SPICE SALT	28.18	0.02	LB	0.009070295	0.255600907					
Mashed Redskin P	SPICE PEPPI	28.18	0.0156	LB	0.00707483	0.199368707					
Broccoli Florettes	PRD VP BRC	0.54	23.4375	LB	10.6292517	5.739795918	5.739795918	2.5	OZ	0.070873731	0.038271815
Corn	VEG FZN CO	0.44	23.4375	LB	10.6292517	4.676870748	4.676870748	2.5	OZ	0.070873731	0.031184442
Vegetarian Cous C	GRAIN COUS	1.31	1.894	LB	0.858956916	1.12523356	3.988267666	3	OZ	0.085048478	0.183554142
Vegetarian Cous C	SPICE SALT	28.18	0.0394	QT	0.037286308	1.050728165					
Vegetarian Cous C	FRU RAISINS	4	0.4734	LB	0.214693878	0.85877551					
Vegetarian Cous C	VEG PEAS C	0.77	0.7161	LB	0.324761905	0.250066667					
Vegetarian Cous C	BAKEB SEED	1.27	0.3906	LB	0.177142857	0.224971429					
Vegetarian Cous C	PRD FRU LEI	0.22	2	EACH	0.116	0.02552					
Vegetarian Cous C	MARGARINE	4.3	0.1953	LB	0.088571429	0.380857143					
Vegetarian Cous C	SPICE PEPPI	28.18	0.0048	LB	0.002176871	0.061344218					
Vegetarian Cous C	PRD HERB C	0.38	0.0625	LB	0.028344671	0.010770975					
Halal Italian Herb C	OIL VEG CAN	5	0.0013	QT	0.001230259	0.006151295	2.747478333	1	EACH	0.15	3.18464658
Halal Italian Herb C	CHIX HALAL	20.5	0.25	LB	0.113378685	2.324263039					
Halal Italian Herb C	SEASONING	28.18	1	TB	0.0148	0.417064					

Figure 6: Conversions in Excel

$$Total\ emissions\ per\ serving = \frac{Total\ Emissions\ per\ recipe\ in\ kg\ CO2e}{Total\ amount\ of\ recipe\ in\ kg} * Serving\ size\ in\ kg$$

Equation 1: Total Emissions per Serving

	Meal	Prepared For	Actually Used	Percent of Prepared Used
Wednesday	Roast Turkey	1172	1000	85.32423
	Turkey Gravy	768	575	74.86979
	Bread Stuffing	800	804	100.5
	Roasted Garlic Mashed Potatoes	746	750	100.5362
	Steamed Green Beans	153	345	225.4902
	Togarashi Seared Tilapia w/ Soy Glaze	240	300	125
	Honey Glazed Carrots and Parsnips	352	300	85.22727
	Grilled Corn and Black Bean Farro	277	139	50.18051
	Grilled Southwest Chicken	270	202	74.81481
Thursday	Chicken and Cashew Stir Fry	1200	1000	83.33333
	Brown Rice	533	744	139.5872

Friday	Sugar Snap Peas	230	236	102.6087
	Fire Cracker Shrimp	373	373	100
	Ginger Thai Chili Sauce	N/A	230	-
	Roasted Garlic Brussels Sprouts	275	279	101.4545
	Red Chili Thai Tofu	80	80	100
	Grilled Chicken	150	169	112.6667
	Boneless Buffalo Chicken Wings	676	600	88.7574
	Hot Cauliflower Wings	160	166	103.75
	Boneless BBQ Chicken Wings	618	600	97.08738
	Bleu Cheese Dressing	N/A	91	-
	Vegan Ranch Dressing	N/A	50	-
	Celery Sticks	N/A	182	-
	Orange Teriyaki Salmon	290	480	165.5172
	Jasmine Rice	550	533	96.90909
	Summer Bean Blend	229	307	134.0611
	Grilled Vegetable Burrito	200	192	96
	BBQ Seasoned Chicken	137	175	127.7372
Saturday	Steak-Frites Au Poivre	691	530	76.70043
	Fries	840	800	95.2381
	BBQ Chicken	170	300	176.4706
	Cauliflower	280	280	100
	Sauteed Spinach	208	165	79.32692
	Bean Bourguignon	348	348	100
	Grilled Chicken	320	211	65.9375
Sunday	Chicken Tandoori	800	702	87.75
	Naan Bread	0	300	300
	Meatloaf	446	446	100
	Beef Gravy	300	300	100
	Scalloped Potatoes	600	675	112.5
	Harvest Blend	154	231	150
	Sauteed Butter Thyme Mushrooms	256	273	106.6406
	Pad Thai w/ Peanuts	160	250	156.25
	Grilled Jamaican Jerk Chicken	385	248	64.41558
Monday	Chicken with Preserved Lemon	440	315	71.59091
	Country Fried Prok Chop w/ Mike's Hot Honey Sauce	560	338	60.35714
	Mashed Redskin Potatoes	1067	851	79.75633
	Broccoli Florettes	448	448	100
	Corn	538	498	92.56506
	Cous Cous	171	169	98.83041

	Italian Herb Grilled Chicken	225	191	84.88889

Table 4: Comprehensive Meal Usage from Findlay Commons