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ENHANCING WKU SUSTAINABLE FOOD SYSTEMS THROUGH EDUCATION AND LOCAL AGRICULTURE DEVELOPMENT

A Capstone Experience/Thesis Project Presented in Partial Fulfillment

Of the Requirements for the Degree Bachelor of Science

with Mahurin Honors College Graduate Distinction

at Western Kentucky University

By:

Chloe A. Cooper

May 2021

***

CE/T Committee:

Dr. Leslie North, Chair

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ABSTRACT

In an effort to increase the amount of locally sourced food utilized by dining services at WKU, the Office of Sustainability, WKU Restaurant Group, and the WKU Agriculture & Research Education Center have partnered to establish garden spaces on campus properties. This project developed a detailed plan for implementation of this effort. In addition, this project established a plan to educate students and the local community alike on the benefits of sustainable farming and locally-sourced food, while also creating profiles on local farmers from whom the university could buy crops in order to further supplement items for dining services. Using these spaces to supplement available options for dining services will provide nutritional value as an added benefit of growing food that is sustainable and locally sourced. In addition, the use of these crops will be used as way to educate the WKU community on the ways in which food can be grown sustainably and importance of doing so.

Keywords: sustainability, farm-to-table, agriculture

ACKNOWLEDGEMENTS

I would like to thank Dr. Leslie North for aiding me through this process of developing and writing this project, while being patient and kind to me when life got a little bit tough. In addition, I would like to thank Madona May and Dr. O.E. Mansour for being a part of my committee, in addition to all of the people involved in this program that were willing to allow me to be a part of it. I would also like to thank all of my friends and family members that have supported me throughout my time in the Mahurin Honors College at WKU.

VITA

EDUCATION

Western Kentucky University, Bowling Green, KY — Anticipated May 2022
M.S. in Geoscience – JUMP Program
Thesis Proposal (in-progress): *An Investigation of Climate Change Impacts in Karst Areas Using the Karst Disturbance Index and GIS in Conjunction with Scenario Planning*

Western Kentucky University, Bowling Green, KY — May 2021
B.S. in Geography & Environmental Studies
Certificates in Geographic Information Systems and Emergency Management Disaster Science – Mahurin Honors College Graduate
Honors CE/T: *Enhancing WKU Sustainable Food Systems through Education and Local Agriculture Development*

PROFESSIONAL EXPERIENCE

U.S. Army Corps of Engineers — May 2020 - present
Student Trainee

Lost River Cave — Jan. 2019 - Aug. 2019
Park Guide

WKU Outdoor Recreation and Adventure Center — Aug. 2018- present
Trip Leader

AWARDS & HONORS

U.S. Department of Defense Science, Mathematics, and Research for Transformation (SMART) Scholarship, 2020
Academic Merit Scholarship, WKU, Fall 2017-Spring 2021

PROFESSIONAL MEMBERSHIPS

WKU Water Professionals
W.I.S.E. (Women in Science and Engineering)

CONTENTS

INTRODUCTION

In recent years, various industries have begun to implement and promote green initiatives and sustainable practices. This is a particularly important advancement within society due to the increasing threat of global climate change. As the global population increases, the climate changes, and the resources available are further strained, more sustainable practices have to be implemented throughout the world and various industries. The agriculture industry in particular is an incredibly important one, as all humans are inextricably tied to it. There is no possible future in which the agriculture industry does not exist, so activities and practices associated with it must be improved to be more sustainable and more focused on the impacts that the industry has on the environment and people around the world.

This project explores the sustainable aspects and benefits of implementing a farm-to-table program at Western Kentucky University (WKU). Benefits of a farm-to-table program at WKU can span beyond solely environmental sustainability to include economic sustainability, education opportunities, and improved healthy dining options. By sourcing food locally, a number of unsustainable practices associated with the agriculture industry can be addressed and progress can be made locally to mitigate the impacts of these practices. In addition, students and members of the WKU community can be involved in applied learning opportunities by helping with the actual process of food production (from seed to consumers). A program of this variety has yet to be

implemented on a large scale at the university level in Kentucky, making WKU a frontrunner in farm-to-table and locally-sourced food programs in the state. Given the accessibility and abundance of farmers and growers around Bowling Green and Warren County, a project such as this one could have a higher chance of success than one that is based out of a large city or densely populated area with little farmland around. Through partnership between WKU Restaurant Group (Aramark), the WKU Office of Sustainability, and the WKU Agriculture Research and Education Center (AREC or WKU Farm), the university will implement a farm-to-table program that is designed to be an ongoing project that will continue to grow and progress in the future.

LITERATURE REVIEW

There is a growing movement in the United States to reduce the amount of produce and food items that are imported or shipped long distances, as transportation is one of the largest end-use contributors to climate change in developed countries (Wakeland et al. 2012). According to some estimates, over half of the fruit sold in the United States is imported, with produce traveling an average distance of 2,000 kilometers between its source and point of sale (Wakeland 2012). Airplanes burn an excessive amount of fuel just to take off, while sea vessels used to transport food are not much better, with both methods of transportation contributing more fossil fuel usage and emissions than any other form of transportation (Konieczny et al. 2013). Navigating sustainable transportation and cost efficiency in such a large and important industry has proven to be a challenge, prompting the rise of advocacy for locally sourced food.

Unsustainable farming practices are particularly common when farms grow and produce food that is out of season. Growing crops that are out of season can use resources more heavily, such as increased water usage or fertilizers, because the process of growing food out of season is not a natural one, which contribute to the lack of sustainability associated with these crops. Because the global population is rapidly growing with some estimates of a 65 percent increase in population by about 2050 (or 3.7 billion people), there will be extensive strains on the freshwater systems that are currently used to produce the global food supply (Wallace 2000). Already, the agriculture industry

accounts for about 75% of human water usage around the world, making it the largest single user of freshwater resources (Wallace 2000). The amount of freshwater resources that the agriculture industry uses every year appear even more wasteful in light of increasing water scarcity around the world. Some estimates have found that already, two-thirds of the global population (4 billion people) live in areas with severe water scarcity at least one month every year, if not more, with nearly half of those people living in India or China (Mekonnen and Hoekstra 2016). Given not only that the demand for food will increase with the global population but also that climate change has been predicted to lead to water scarcity in regions that hold about a quarter of the world's population, there is an increased need for efficiency in water usage, particularly within the agriculture industry (Seckler et al. 1999).

The scale of production and trading that a farm operates on can also have a strong influence on the overall sustainability of the farm. Generally, buying locally sourced food can mean that the scale is much smaller than the large-scale farms that are growing primarily for big corporations. There is also a higher level of visibility in locally sourced foods, as there is more awareness about how the food was produced. Some large-scale or unsustainable farms use farming methods such as excessive use of inorganic fertilizers or pesticides, or lack of crop rotation that can lead to nutrient loss (Bergström et al. 2005). In particular, many modern large-scale farms overuse fertilizers and chemicals that typically contain nitrogen in the soil because monoculture practices have led to nitrogen deficiencies in the area where the crops are being grown. The nutrient runoff that occurs with the overuse of fertilizers can lead to algal blooms in the waterways around the farming area, as the runoff causes an overabundance of nutrients in the water (NOAA

2021). Plant life in the waterways are killed as a result of the algal blooms blocking needed sunlight, which in turn leads to the death of fish and other organisms in the water as the plants are no longer producing oxygen (NOAA 2021).

Not only does excess nitrogen from fertilizers cause problems in waterways, but also within the atmosphere, as nitrous oxide is a powerful greenhouse gas. In 2018, the Environmental Protection Agency (EPA) estimated that the agriculture industry was accountable for 77.8 percent of total nitrous oxide emissions in the United States (EPA 2020). This is exceptionally detrimental to the environment, as one pound of nitrous oxide in the atmosphere has an impact that is estimated to be about 300 times that of one pound of carbon dioxide (EPA 2020). If the amount of food waste in the United States was reduced, the total emissions of nitrous oxide should decrease respectively, leading to a more sustainable industry. A decrease in food waste would also decrease the total production of food, as the demand for products would lessen. Smaller-scale farming and buying locally sourced food could help to promote the decrease in demand and food waste because the amount of food being produced is much lower.

In the recent decades, more information has emerged in the media about large-scale food production and the impacts that this has on both environmental and human health. There have been stories and research about crowded factor-farms leading to increased levels of *Salmonella* and *E. Coli* in meats and eggs, chemical contamination in waterways leading to unsafe drinking water and damages to the natural process that depend upon those water resources, pesticides killing birds and animals, and so many more problems that have been a direct result of unsustainable farming practices (Vileisis 2008). The research that has been published about the harmful impacts of these farming

practices has served to emphasize how little the average person knows about where their food comes from or how the food is produced (O'Brien et al 2001). The need for education regarding the modern agriculture industry and how food is produced in the United States and around the world is becoming increasingly crucial as unsustainable farming practices and food waste have direct detrimental impacts on the environment. The growth of the agriculture industry with the growth of the population has led to an anonymous food system that highlights the physical and metaphorical distance between the farm and the kitchen. The impacts of such a gap can lead to the unsustainable farm practices that are prevalent today.

In order to address the distance between the kitchen and the farm, an increasingly popular trend around the country is to implement farm-to-table or community-supported agriculture (CSA) programs, whether at restaurants, schools, or other organizations. The U.S. Department of Agriculture reported in 2015 that there are over 7,000 registered CSA farms in the United States, meaning that these farms sold the products directly to the consumers instead of working through intermediary partners, though CSA farms do not account for all direct farm sales across the United States (USDA 2019). Direct farm sales accounted for almost $9 billion in food commodities in 2015, as consumers, retailers, institutions, and local distributers bought various food products including dairy, produce, meats, jams, ciders, and other commodities directly from the farm (USDA 2016). California alone accounted for about 33 percent of these sales, with the southwest region of the United States having the largest share of direct farm sales (USDA 2016). Institutions and intermediary businesses, such as schools, universities, hospitals, or wholesalers accounted for almost 40 percent of direct farm sales in 2015 (USDA 2016).

In the state of North Carolina, the public school system began a farm-to-school program that allows schools to have produce delivered, which generated almost $1.3 million in produce sales in the 2016-2017 school year with participation of 79 different schools across the state (Harvey 2017). Direct farm sales can help to eliminate long travel distances for commodities, thus helping to reduce the carbon footprint transportation accounts for within the agriculture sector. This practice is already well-established and has a history of success, which is also shown through the growth of direct farm sales and programs such as CSAs and farm-to-table around the United States since the start of the 21st century (USDA 2019).

Around the United States, farm-to-table programs at schools (also called farm-to-school programs) have increased dramatically in the recent decades. While efforts are being made primarily at the elementary, middle, and high school levels, numerous colleges and universities around the country have started to participate in these programs as well. Antioch College in Ohio founded Antioch Kitchens, where students are able to have applied learning opportunities through creating menu ideas, paid positions working in the kitchens, or through the Antioch Farm that supplies in-season products that are grown right on the college's campus (Antioch College 2018). In addition to growing crops and supplying products such as cabbage, potatoes, garlic, squash, and eggs, Antioch College raises sheep that graze in the solar panel field that the school owns (Antioch College 2018). The land was selected for the solar panels and sheep because the area is not good for farming but it can still be used efficiently, as the sheep help to reduce human labor and fossil fuel usage by grazing on the land, while also sinking carbon and improving the fertility of the soil with their manure (Antioch College 2018). The

sustainability practices at Antioch College has earned the school a Sustainability Tracking, Assessment, & Rating System (STARS) Silver rating from The Association for the Advancement of Sustainability in Higher Education (AASHE), which specifically highlighted the farm-to-table program and farming practices (Antioch College 2018). This farm-to-table program creates numerous applied learning opportunities for students that allow them to be more cognizant of where their food comes from, in addition to educating them on food systems and sources.

Implementing a locally sourced food program at WKU is a very feasible opportunity that would provide economic benefits as well as environmental or sustainable benefits. By buying and consuming locally sourced foods and products, unsustainable transportation and farming practices could be reduced while also stimulating economic and sustainable growth within the local community. These farms can more easily assess the level of demand for different products, as the farmers are much closer to their consumers. This helps the total amount of food produced better match what is actually needed, leading to lower amounts of food waste and a more sustainable system. Purchasing locally sourced food can address issues that arise with food transportation, unsustainable farming practices, and the environmental or climate related issues that the agriculture industry as a whole exacerbates.

STUDY AREA

Western Kentucky University (WKU) is a public university located in Warren County, Kentucky in the city of Bowling Green. The total student enrollment in 2019 was 18,183, which includes both graduate and undergraduate students, in addition to the regional campuses located in Elizabethtown, Fort Knox, Glasgow, Owensboro, and Somerset, Kentucky (WKU 2019). Undergraduate students make up almost 89 percent of total student enrollment, with about 69 percent of students pursuing degrees full-time (WKU 2020a). The number of full-time faculty at WKU was 681 in 2019, with an 18-1 student-to-faculty ratio (WKU 2020a). Over the last ten years, the total student enrollment has declined almost 13 percent (WKU 2020a).

In 1934, WKU purchased the Agriculture Research and Education Center, or the AREC Farm, for the Agriculture and Food Sciences Department at the university. The AREC Farm spans over 800 acres of land near WKU's main campus that is used to grow crops such as corn, soybeans, or hay, in addition to raising livestock such as dairy, beef, and equine (WKU 2020b). Research trials are also performed at the farm by both the USDA and WKU faculty (WKU 2020b). These programs provide opportunities for students in a variety of fields, including pre-vet, animal science, turf management, or soil science, to gain hands-on experience and work directly in their field of interest.

The WKU Office of Sustainability is a property located on WKU's main campus that is owned by the university and has been used in the past to grow crops sustainably.

Currently, the garden areas at the Office of Sustainability and the WKU Foundation House are under construction in order to use the space more efficiently, though they will be used as fruit and vegetable gardens, as well as an herb and sensory garden. These gardens help to provide learning opportunities for students as they are able to gain hands on experience growing their own food sustainably, while the produce and herbs can also be used by WKU dining services. Student involvement in the gardens also helps to promote the WKU Food Pantry at the Office of Sustainability. The Food Pantry is open to WKU students, faculty, and staff and is intended to help supplement the dietary and health needs of the WKU community through non-perishable foods and toiletries.

The city of Bowling Green in Warren County is the largest city in the region, with a population of 70,543 in 2019 (Census Bureau 2019). While this area is predominantly rural with low population densities currently, the area is rapidly growing at a rate that exceeds the national average of population growth (BGACC 2020). Warren County is a part of the Western Pennyroyal karst area, which is the largest segment of Kentucky's karst areas (Currens 2002). The area is populated with doline karst (sinkholes and depressions) and an extensive karst plateau, dominated by limestone and bedrock surface (White et al. 1970). The plateau of limestone has propagated the flow of water through the landscape, forming underground passageways. The karst nature of the region can impact the farming practices that are used, as the sinkholes and depressions vary the landscape.

The agriculture industry is one of the largest industries in Kentucky, with over $5.7 billion in sales in 2013 (NASDA 2021). The University of Kentucky estimated that in 2015, the agriculture industry produced a direct and indirect economic impact

throughout the state of $45.6 billion (Durham et al. 2021). While poultry and egg sales are the leading products in Kentucky, other commodities such as tobacco, corn, dairy products, and soybeans are common (NASDA 2021). Smaller scale farmers and growers are able to grow a wide variety of crops, including spinach, carrots, beans, tomatoes, and much more, which creates opportunities for a wide array of available options for consumers (Durham et al. 2021). In addition to crops, poultry, beef, pork, and dairy products are also viable commodities throughout the state.

METHODOLOGY

In order to help accomplish a farm-to-table project at WKU, the project author has attended planning and strategic meetings with representatives from Aramark, the WKU Farm, and the Office of Sustainability. These meetings are intended to plan out a farm-to-table project in a way that provides the most enriching opportunities for education for the WKU community, while also being strategically achievable for the university. These meetings generally cover the types of products that will be utilized, such as dairy products, meats, and produce, in addition to conversations about costs, timelines, and amounts of each product that will be needed. Each representative has the opportunity at these meetings to talk about problems they might have run into during the process and progress that has been made.

In addition to attending strategic planning meetings with representatives for this project, the project author also reviewed the literature necessary for creating a farm-to-table plan for WKU. The topics that were examined helped to emphasize the benefits of implementing a project like this on college campuses and particularly in Kentucky, as this type of project has yet to be implemented on a large-scale at any university or school in Kentucky. Literature topics that were reviewed by the project author include transportation in agriculture, sustainable farming, locally-sourced food, agriculture industry in the United States and specifically in Kentucky, farm-to-table programs around the United States, and the importance of educating the public on these topics. By

extensively reviewing the literature, an effective plan could more easily be made to target the specific problems that a project such as this could work to solve or alleviate. The literature also serves to showcase the types of programs that have worked well in other places, and the programs that were unsuccessful. This has helped the project author in building a farm-to-table plan for the university that could provide many benefits for the WKU community.

After attending planning meetings and comprehensively reviewing the literature regarding sustainable agriculture, farm-to-table programs in schools, and other related topics, the project author developed a strategic plan to outline the goals, ideas, and benefits of a project of this nature (see Appendix E for full Strategic Plan). This plan is intended to help give an overview of the project and the reasons why it will help the WKU community to be more sustainable and support green initiatives on campus, in addition to providing economic benefits. The strategic plan outlines the specific goals, targets, and timelines for each, such as increasing the poundage of locally sourced products served by about three percent every year for the first five years of the program. Furthermore, the strategic plan outlines the education and outreach components of this project that the project author has begun and will continue to work on after graduation. This project is designed to be ongoing and will continue to be improved upon during the summer months and the following school year.

The first goal outlined in the strategic plan is to increase the poundage of locally sourced products served by about three percent every year for the first five years of the program. Three percent was determined to be an achievable number for the beginning of the program, as the amount of resources that are currently available are still limited, in

terms of human time and effort, land space, and funding. The second goal is for each year for the first five years, the number of crops or products that are locally sourced should be increased by about five new products. The aim is to increase the amount of locally sourced products that are available, in addition to continually diversifying the types of products that are offered. The goal for student workers will be to increase the number of student workers by one to two each year for the first three years as the program grows. Increasing the number of student workers will allow for more products to be produced and at a quicker rate, as the amount of human power focused on the program is increased. Additionally, during each year of the program, five to ten percent of generated revenue will be allocated for the construction of a new greenhouse at the WKU AREC (or another appropriate location) so that additional crops can be grown throughout the year, with the goal of financing the new greenhouse within seven to ten years of the start of the program. A minimum of two foundation grants should be applied to annually to provide supplemental funding specifically for construction of a new greenhouse. The program will also continue to pursue alumni support, as each year for the first five years of the program, the goal is that alumni donations account for about five to ten percent of financial support for the program. After about five years, the program can be reevaluated to assess whether the threshold percentage should be adjusted, if land capacity has been reached for crops, where the program has fallen short or not achieved specific goals, and other factors. This will aid in continuing to refine the program so that it is more likely to be sustained and continued.

The first part of the outreach and education component outlined in the strategic plan is identifying stakeholders and possible partners for a project promoting and

implementing sustainable agriculture and locally-sourced food. Understanding who the current active stakeholders are and the ways in which they are involved will help to gauge which organizations might be interested in partnering for this project in the future. Stakeholders will be identified by contacting various groups and organizations, in addition to citizens or communities that are located around the Bowling Green area and could receive benefits for partnering with the Office of Sustainability and the WKU Agriculture Farm and providing food for the WKU community. Stakeholders could include TopCrops, members of the Community Farmers Market, and other local farmers around Warren County. After contacting and building a relationship with these stakeholders, the farm-to-table plan will be outlined and explained to the various stakeholders in order to determine the level of interest in partnering for this project. A meeting will be held so that stakeholders can voice their opinions and concerns, in addition to their goals for a farm-to-table plan with the Office of Sustainability and the WKU Agriculture Farm.

After stakeholders and partners have been identified and a formal relationship has been established, profiles will be created about the groups and farmers in order to further emphasize and showcase where the food that is being used is coming from. The farmer profiles will be created using interviews and public information. These profiles can be circulated using social media, flyers, and educational pamphlets. This will help to promote locally-sourced food and the people who grow this food, while also serving as an educational resource regarding how the food is grown and the purpose of the techniques that the farmers are using. The farmer and grower profiles can also serve to showcase the wide variety of options for sources of locally grown food and hopefully

promote increased usage of these different options and sources, which will help to provide economic benefits by supporting local farmers and growers. As a part of this project, a profile of Kenny's Farmhouse Cheese was made by the project author (see Appendix A for Farmer Profile).

As a part of the strategic plan, educational and outreach materials will be developed, such as presentations and pamphlets, and will be given to local elementary, middle, high school, and college students (see Appendix E for full Strategic Plan). Brochures and pamphlets developed by the author are located in the appendix (see Appendices B-D for educational and outreach materials). These materials will help to educate students on sustainable farming, locally-sourced food, and the associated benefits of these practices. After the presentations or the distribution of the pamphlets or brochures, questionnaires will be sent out to gauge how much the students learned or absorbed. Three months later, one more questionnaire will be sent out in order to determine what the students still remember and if they have made any changes in their behavior after receiving the educational materials. Doing this will help to understand what could be done better when educating the public about sustainable agriculture and the various benefits of locally-sourced food, while emphasizing the connectivity between the actions of the public and the sources of their food.

CONCLUSIONS

After reviewing the literature regarding implementing a farm-to-table program on a large-scale, university-level, the project author created educational and outreach materials that will aid in reaching a wider audience around Bowling Green. Included in the appendix are samples of educational materials that will be presented or given to local schools and community members in an effort to educate the public about the benefits of locally sourced food and sustainable agriculture, while also promoting the WKU farm-to-table program. Brochures, pamphlets, and handouts have been created to hand out to WKU community members and at local schools, in addition to being posted at various event and informational bulletin boards around Bowling Green and on campus. Once the program is officially announced, distribution of educational materials and presentations about the project and related topics will be main priorities. This will help to both promote the project and serve as an educational opportunity.

The project author also developed a farmer profile for Kenny's Farmhouse Cheeses, which will aid as an example for the creation of future farmer profiles (See Appendix A for Farmer Profile). Once more farmers and growers are introduced to the farm-to-table program and are active participants, additional profiles will be made in order to highlight the sources of the products that are being used in this project. These profiles can be utilized on social media, posted on bulletin boards around Bowling Green, and distributed at in-person events in the following school year. The profiles of the

farmers allow for promotion of various sources of locally-produced food, while highlighting the farm-to-table program at WKU. The consumers will additionally gain a better understanding of where exactly the food products come from and the ways in which the food is produced.

As of April of 2021, the WKU Farm has begun planting crops and will continue to plant more throughout the summer season. These products will be used in the farm-to-table program at WKU after being harvested. The goal is to continue to plant and harvest crops, and make products throughout the school year that can be used in dining services, including meats and dairy products. The official announcement and beginning of the program will be held in the Fall 2021 semester. After the start of the program, there will be locally sourced products offered in various dining services around campus. The products will also be highlighted on specific days, such as on national holidays like National Potato Day or National Pumpkin Day, or through implementation of regular events such as Farm Fresh Fridays. The goal is to encourage members of the WKU community, such as students, faculty, staff, or visitors to dine at WKU dining services and capitalize on the benefits of locally sourced products.

As the farm-to-table program is designed to be a long-term, ongoing endeavor, additional outreach and educational materials will be developed to maximize exposure and learning. As more farmers and local producers are a part of the program, additional profiles will be made as well. A farm-to-table program at WKU will have long-lasting benefits that go beyond solely healthier dining options, but extend to economic, environmental, and sustainability benefits as well. The goal is to inspire and motivate other schools and universities across the state to implement similar programs so that

green initiatives are better supported. With these changes, the pollution and unsustainable practices that are associated with the agriculture industry could be reduced, contributing to a more sustainable future.

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APPENDIX A: FARMER PROFILE

Farmer Highlight

Kenny's Farmhouse Cheese

KENNY'S FARMHOUSE CHEESE

Source: https://kennyscheese.com/

Striving Toward Sustainable Practices

Kenny's Farmhouse Cheeses has successfully transitioned their feed crops away from GMO and are not growing any GMO's on their land currently. They are presently working to source non-GMO grains that they use to supplement their cow's diet.

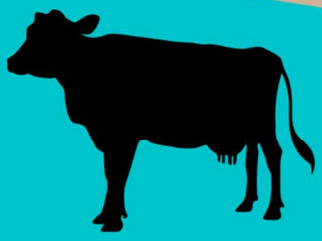
Kenny's does not use rBST, and only uses antibiotics if the animal's life is at risk. There is occasional use of steroids to aid in reproductive health.

The Herd

Today, Kenny's herd is made up of a crossbreed of several different types of cow. Some of these are American Holstein, European Holstein (smaller), Australian Red, Brown Swiss, and Jersey.

It is a closed herd and has been for several years. This means Kenny's has total control over the breeding process and raise their own calves from birth.

Kenny's now utilizes one of the latest trends in dairy farming, robotic milking, in which cows allow a machine to milk them whenever they want, rather than twice daily.



Feed & Diet

Kenny's cows are grassfed, but not all of the time.

"We believe that a completely grass-fed diet would be prohibitive to the nutrition of our cows, based on their genetics. In other words, it would not be the healthiest choice for them. Our cows have access to pasture the majority of the time. We feel putting them out to pasture is not only good for the grass eating aspect of it, but for the exercise and sunshine they receive."

APPENDIX B: FARM-TO-TABLE PROGRAM BROCHURE

Quick Facts

Imported produce

According to some estimates, over half of the fruit sold in the United States is imported, with produce traveling an average distance of 2,000 kilometers between its source and point of sale.

Direct Farm Sales

Direct farm sales accounted for almost $9 billion in food commodities in 2015, as consumers, retailers, institutions, and local distributers bought various food products including dairy, produce, meats, jams, ciders, and other commodities directly from the farm.

Farm-to-Table at School

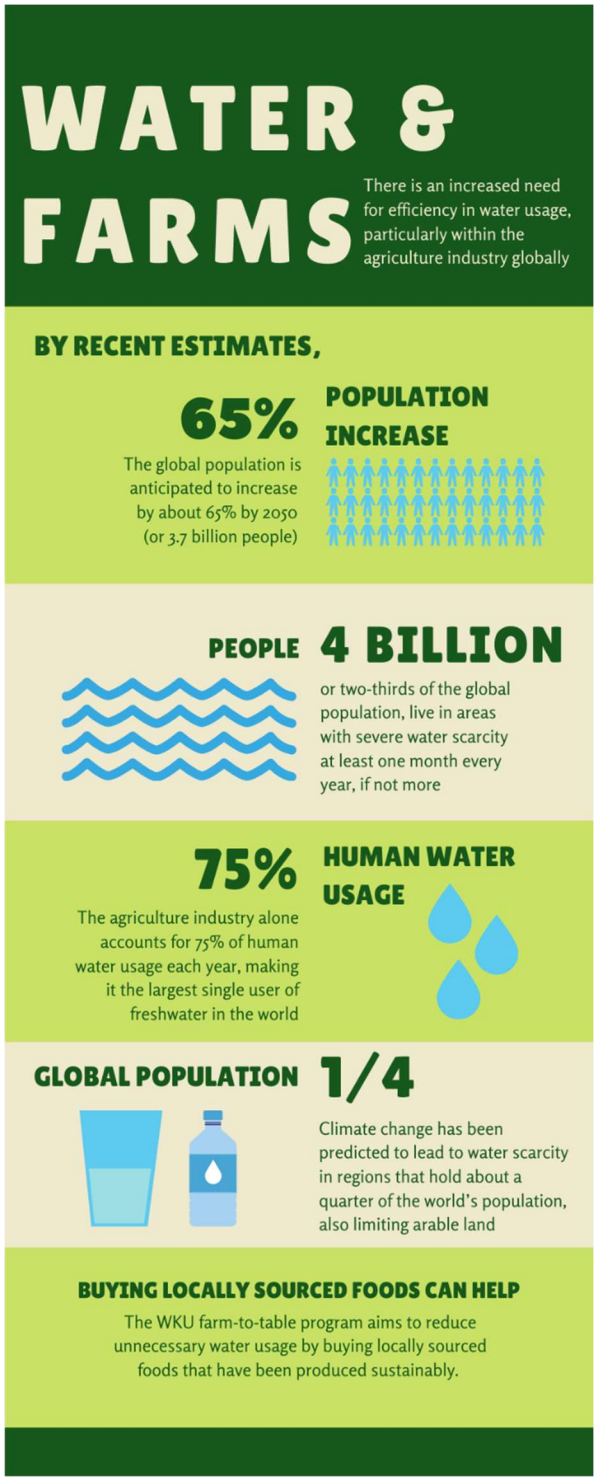
In the state of North Carolina, the public school system began a farm-to-school program that allows schools to have produce delivered, which generated almost $1.3 million in produce sales in the 2016-2017 school year with participation of 79 different schools across the state.

Farm-to-Table

WKU

In an effort to increase the amount of locally sourced food utilized by dining services at WKU, the Office of Sustainability, WKU Restaurant Group, and the WKU Agriculture Research and Education Center (WKU Farm) will partner to establish garden spaces on campus. Using these spaces to supplement available options for dining services will provide numerous benefits by growing food that is sustainable and locally sourced.

APPENDIX C: WATER AND FARMS HANDOUT



APPENDIX D: TRANSPORTATION AND AGRICULTURE HANDOUT

TRANSPORTATION IN AGRICULTURE

Western Kentucky University

NEW FARM-TO-TABLE PROGRAM AT WKU

In an effort to increase green initiatives on campus, a new farm-to-table program is being implemented at dining services at WKU.

UNSUSTAINABLE TRANSPORTATION

Buying food locally can help to reduce the carbon footprint of the agriculture industry by reducing the need for produce traveling long distances.

There is a growing movement in the United States to reduce the amount of produce and food items that are imported or shipped long distances, as transportation is one of the largest end-use contributors to climate change in developed countries.

According to some estimates, over half of the fruit sold in the United States is imported, with produce traveling an average distance of 2,000 kilometers between its source and point of sale.

Airplanes burn an excessive amount of fuel just to take off, while sea vessels used to transport food are not much better, with both methods of transportation contributing more fossil fuel usage and emissions than any other form of transportation.

Buying food locally can help to eliminate long travel distances for commodities, thus helping to reduce the carbon footprint transportation accounts for within the agriculture sector.

APPENDIX E: STRATEGIC PLAN

Strategic Plan

Executive Summary

In an effort to increase the amount of locally sourced food utilized by dining services at WKU, the Office of Sustainability, WKU Restaurant Group, and the WKU Agriculture Research and Education Center (WKU Farm) will partner to establish garden spaces on campus. Using these spaces to supplement available options for dining services will provide numerous benefits by growing food that is sustainable and locally sourced. In addition, the use of these crops will be used as way to educate the WKU community on the ways in which food can be grown sustainably and importance of doing so. Alumni connections and involvement in this project will be a priority in order to foster continued community with WKU students of the past and present. This project will also provide an opportunity to educate students and the local community alike on the benefits of sustainable farming and locally sourced food, while also creating profiles on local farmers from whom the university could buy crops in order to further supplement items for dining services. Each year, the goal will be to increase the pounds of locally sourced food offered in dining services by at least three percent.

Introduction

There is a growing movement in the United States to reduce the amount of produce and food items that are imported or shipped long distances, as transportation is one of the largest end-use contributors to climate change in developed countries (Wakeland et al. 2012). According to some estimates, over half of the fruit sold in the United States is imported, with produce traveling an average distance of 2,000 kilometers between its source and point of sale (Wakeland 2012). Airplanes burn an excessive amount of fuel just to take off, while sea vessels used to transport food are not much better, with both methods of transportation contributing more fossil fuel usage and emissions than any other form of transportation (Konieczny et al. 2013). Navigating sustainable transportation and cost efficiency in such a large and important industry has proven to be a challenge, prompting the rise of advocacy for locally sourced food.

Purchasing locally sourced food can address issues that arise with not only food transportation, but with unsustainable farming practices as well. The scale of production and trading that a farm operates on can have a strong impact on the overall sustainability of the farm. Generally, buying locally sourced food means that the scale is much smaller than the large-scale farms that are growing primarily for big corporations. There is also a higher level of visibility in locally sourced foods, as there is more awareness about how the food was produced. Some large scale or unsustainable farms use farming methods such as excessive use of inorganic fertilizers or pesticides, or lack of crop rotation that can lead to nutrient loss (Bergström et al. 2005). Buying locally from smaller scale farms can help to avoid unsustainable practices in the food production industry.

An increasingly popular trend around the country is implementing farm-to-table or community-supported agriculture (CSA) programs, whether at restaurants, schools, or other organizations. The U.S. Department of Agriculture reported in 2015 that there are over 7,000 registered CSA farms in the United States, meaning that these farms sold the products directly to the consumers instead of working through intermediary partners, though CSA farms do not account for all direct farm sales across the United States (USDA 2019). Direct farm sales accounted for almost $9 billion in food commodities in 2015, as consumers, retailers, institutions, and local distributers bought various food products including dairy, produce, meats, jams, ciders, and other commodities directly from the farm (USDA 2016). California alone accounted for about 33 percent of these sales, with the south-west region of the United States having the largest share of direct farm sales (USDA 2016). Institutions and intermediary businesses, such as schools, universities, hospitals, or wholesalers accounted for almost 40 percent of direct farm sales in 2015 (USDA 2016). In the state of North Carolina, the public school system began a farm-to-school program that allows schools to have produce delivered, which generated almost $1.3 million in produce sales in the 2016-2017 school year with participation of 79 different schools across the state (Harvey 2017). Direct farm sales can help to eliminate long travel distances for commodities, thus helping to reduce the carbon footprint transportation accounts for within the agriculture sector. This practice is already well-established and has a history of success, which is also shown through the growth of direct farm sales and programs such as CSAs and farm-to-table around the United States since the start of the 21st century (USDA 2019).

Implementing a locally sourced food program at WKU is a very feasible opportunity that would provide economic benefits as well as environmental or sustainable benefits. The agriculture industry is one of the largest industries in Kentucky, with over $5.7 billion in sales in 2013 (NASDA 2021). The University of Kentucky estimated that in 2015, the agriculture industry produced a direct and indirect economic impact throughout the state of $45.6 billion (Durham et al. 2021). While poultry and egg sales are the leading products in Kentucky, other commodities such as tobacco, corn, dairy products, and soybeans are common (NASDA 2021). Smaller scale farmers and growers are able to grow a wide variety of crops, including spinach, carrots, beans, tomatoes, and much more, which creates opportunities for a wide array of available options for consumers (Durham et al. 2021). In addition to crops, poultry, beef, pork, and dairy products are also viable commodities throughout the state. By buying and consuming locally sourced foods and products, unsustainable transportation and farming practices could be reduced while also stimulating growth within the local community.

Currently, WKU's campus generally lacks food options for the school community that are fresh or locally sourced, which is a significant missed opportunity. Many universities around the country have not yet implemented a program in which dining options include a farm-to-table component, making WKU a frontrunner with this project. Pursuing this endeavor could help to promote an increase in locally sourced dining options, in addition to educating the WKU community about the importance of locally sourced food and edible landscaping. Outreach components of this project can help to reach a larger audience in the Bowling Green area, which can help to educate the general public on the options that exist for them through not only their own gardens and

landscaping but also local farmers and their crops. This could not only serve to better establish food security for the WKU community, but also provide economic benefits as local growers are supported, while the university saves by eliminating the costs to import different foods that can be obtained locally. Implementing this type of program at the university level could have long-lasting and far-reaching benefits.

This project could also foster sustainable activities in the community as people will be able to take this knowledge into their daily lives. In addition, this project will create an applied learning opportunity for students to learn more about sustainable farming and help to put their education into practice. Utilizing the plans for the WKU Office of Sustainability and the WKU Farm to grow crops for dining services will aid the university in creating an educational platform to teach students, faculty, and other stakeholders about the benefits of sustainable farming and edible landscaping. There is an added opportunity to educate about crops that are easy to grow at home, while also providing information for social media pages and outreach through local farmer profiles to promote locally sourced food.

Goals & Ideas

The main overarching goal of this project is to increase amount of locally sourced products utilized in dining services operations at WKU. The pursuit of this goal will provide numerous benefits for the WKU community, including increasing the public's understanding of the importance of locally sourced food and creating an applied learning opportunity for WKU students. There is also an overarching goal of supporting the WKU

agricultural farm and research by using products grown there as dining options on campus, which helps to support the university. By buying and growing food locally, green initiative on campus will hopefully be promoted and emphasized. The purpose is to go beyond solely telling where this food came from, but to take it a step further and showcase how the food got to dining services, how was the food was grown, and to describe in detail the process from start to finish to help educate students and the public.

One of the focal points in the long-term for this program is to increase the amount of alumni support and involvement. This project could be incredibly beneficial for the WKU community and it is important to have the support of alumni. Alumni could support this program even in small ways, such as providing funding for a flat of produce, helping student workers on the WKU farm, or dining at WKU restaurants on days with locally sourced foods. A main goal of the applied learning opportunity that students could have through this project is to continue to be involved after graduation. These alumni will hopefully have more appreciation and a stake in the project and its growth. Some of the alumni that will have worked this project could come back to help the students that are working on the project now, which fosters community and promotes the sustainability of the project being successful in the long-term. Alumni that have personal connections to the program might also be more willing to help fund the project. Additionally, student workers on the farm that operate their own farms upon graduation might eventually partner with the stakeholders in this project to provide products for dining services.

Specific Targets

In order to definitively quantify progress, specific thresholds will be established. The program will start on a smaller scale in order to initially assess how much of each

product can feasibly be both consumed and produced. As there is currently little to no locally sourced food offered on campus, progress in the first year should be significant.

1. For the first five years of the project, the target will be to increase the poundage of locally sourced products served by at least three percent each year.
    1. Three percent was determined to be an achievable number for the beginning of the program, as the amount of resources that are currently available are still limited, in terms of human time and effort, land space, and funding. Attempting to pursue a percentage increase that exceeds about three to five percent could be unobtainable in the first few years of the program as the process is refined and made more efficient. In the event of crop failure due to weather or implementation of experimental practices, reaching higher percentages could be incredibly difficult as well. As the program grows and progresses, the percentage threshold that the program is working towards can be reevaluated.
2. Each year for the first five years, the number of crops or products that are locally sourced should be increased by about five new products.
    1. This could include different dairy products, jams, produce, meats, etc. The goal is to increase the amount of locally sourced products that are available, in addition to continually diversifying the types of products that are offered.
3. Over the next few years of the program, external funding and grant opportunities should be pursued in order to provide funding for increased numbers of student

workers, in addition to the construction of new greenhouses or acquisition of supplementary farm land.

1. The goal for student workers will be to increase the number of student workers by one to two each year for the first three years as the program grows. After three years, the program will be reassessed to determine if there is a continued need for increased numbers of student workers. Increasing the number of student workers will allow for more products to be produced and at a quicker rate, as the amount of human power focused on the program is increased.

2. Each year of the program, five to ten percent of generated revenue will be allocated for the construction of a new greenhouse at the WKU AREC (or another appropriate location) so that additional crops can be grown throughout the year, with the goal of financing the new greenhouse within seven to ten years of the start of the program. This will be reevaluated after three years, five years, and seven years to ensure threshold is continually appropriate and feasible. A minimum of two foundation grants should be applied to annually to provide supplemental funding specifically for construction of a new greenhouse.

3. In addition to utilizing grants and generated revenue to support the program, the program will pursue support from WKU alumni through private donations, SpiritFunder, Giving Tuesday, and others. Each year for the first five years of the program, the goal is that alumni donations account for about five to ten percent of financial support for the program.

4. After about five years, the program can be reevaluated to assess whether the threshold percentage should be adjusted, if land capacity has been reached for crops, where the program has fallen short or not achieved specific goals, and other factors. This will aid in continuing to refine the program so that it is more likely to be sustained and continued.

Goals & Objectives	Target or Threshold	Proposed Timeline
Increase the poundage of locally sourced products served.	By at least 3%	Each year for the first 5 years of the project (reevaluated after 5 years)
The number of crops or products that are locally sourced should be increased.	By at least 5 products	Each year for the first 5 years of the project (reevaluated after 5 years)
Increase the number of student workers.	About 1 to 2 student workers	Each year for the first 3 years (reevaluated after 3 years)
Generated revenue will be allocated for the construction of a new greenhouse at the WKU AREC (or another appropriate location).	5% to 10%	Within 7 to 10 years of the commencement of the project (reevaluated after 3 years, 5 years, and 7 years)
Foundation grants should be applied to provide supplemental funding specifically for construction of a new greenhouse.	At least 2 grants	Annually for at least the first 5 years of the project (reevaluated after 5 years)
Pursue support and donations from WKU alumni.	About 5% to 10% of financial support for the program	Each year for the first 5 years of the project (reevaluated after 5 years)

Table 1: Proposed goals, targets, and timelines for the farm-to-table program at WKU

Promotion / Education / Outreach

An important part of a successful farm-to-table plan is an outreach and education component. The first part of this component is identifying stakeholders and possible partners for a project promoting and implementing sustainable agriculture and locally-sourced food. Understanding who the current active stakeholders are and the ways in

which they are involved will help to gauge which organizations might be interested in partnering for this project in the future. Stakeholders will be identified by contacting various groups and organizations, in addition to citizens or communities that are located around the Bowling Green area and could receive benefits for partnering with the Office of Sustainability and the WKU Agriculture Farm and providing food for the WKU community. Stakeholders could include TopCrops, members of the Community Farmers Market, and other local farmers around Warren County. After contacting and building a relationship with these stakeholders, the farm-to-table plan will be outlined and explained to the various stakeholders in order to determine the level of interest in partnering for this project. A meeting will be held so that stakeholders can voice their opinions and concerns, in addition to their goals for a farm-to-table plan with the Office of Sustainability and the WKU Agriculture Farm.

After stakeholders and partners have been identified and a formal relationship has been established, profiles will be created about the groups and farmers in order to further emphasize and showcase where the food that is being used is coming from. The farmer profiles will be created using interviews and public information, and will require the approval of the Human Subject Review Board. These profiles can be circulated using social media, flyers, and educational pamphlets. This will help to promote locally-sourced food and the people who grow this food, while also serving as an educational resource regarding how the food is grown and the purpose of the techniques that the farmers are using. The farmer and grower profiles can also serve to showcase the wide variety of options for sources of locally grown food and hopefully promote increased

usage of these different options and sources, which will help to provide economic benefits by supporting local farmers and growers.

Educational and outreach materials will be developed, such as presentations and pamphlets, and will be given to local elementary, middle, high school, and college students. These materials will help to educate students on sustainable farming, locally-sourced food, and the associated benefits of these practices. After the presentations or the distribution of the pamphlets or brochures, questionnaires will be sent out to gauge how much the students learned or absorbed. Three months later, one more questionnaire will be sent out in order to determine what the students still remember and if they have made any changes in their behavior after receiving the educational materials. Doing this will help to understand what could be done better when educating the public about sustainable agriculture and the various benefits of locally-sourced food, while emphasizing the connectivity between the actions of the public and the sources of their food.

Funding

In order to fund this project, external opportunities will be pursued such as foundational grants, alumni donations, and revenue generated after the commencement of the program.

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