NUTRITION IMPROVEMENT

Proposal to the National Institute of Food and Agriculture

Develop products that increase the consumption of healthy foods, reduce obesity, and alleviate urban and rural food deficits while improving farm sustainability.

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Executive Summary

The goal of our research proposal is to eliminate food deserts by increasing nutrient awareness in the consumer and nutrient density in our produce, while increasing the sustainability of farming practices and reducing the costs to farmers and our environment.

Consumers rely on inaccurate nutrition labels to inform them of the quality of their food. Even the most conscientious consumer can suffer from nutrient deficiency because of these inaccurate data sources. Additionally, whole foods are less nutrient dense now than in previous generations. This is caused by nutrient deficiency in the soil by using farming practices that are environmentally damaging.

Our technology consulting company, in conjunction with the Michigan State University School of Agriculture and our research partners, will use the full $100,000 amount of this research grant to develop food analysis and farm sustainability systems that we can market to consumers and farmers to reduce urban and rural food deserts and increase nutrient density in whole foods.

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Introduction

The obesity epidemic has reached staggering proportions in the United States. The CDC's National Center for Health Statistics released a report in February of 2020 that states the prevalence of obesity in adults was 42.4%.

What is not as well known is that while many people are eating more calories, they are not receiving as many nutrients. Modern whole foods, when analyzed, are not as nutrient dense as they were in previous generations. This is evidence that the quality of food we are consuming is degrading even with the availability of modern farming techniques and technology.

Even when people are careful with their consumption by utilizing nutrition labels, they are not receiving accurate information about the nutrient density of their food due to variances in reporting by food producers. This leads to unintended nutrition deserts even in areas where mass produced food is readily available.

This proposal will explain Right Side Brain's research plan that will help us identify new farming techniques to create highly nutrient dense whole foods and new financially viable testing practices that will increase the accuracy of nutrition information. This will provide better ingredients for processed foods which will allow for healthier foods overall.

With the research we conduct into better farming and testing practices for nutrient dense foods we plan to create a marketable system that will increase the sustainability of farms at all levels, reduce farmers costs, increase the accuracy of nutrition information, and decrease the occurrences of nutritional deserts in both rural and urban environments.

Current Situation Regarding Nutrition Labels in America

Whole foods usually do not possess food labels and the nutrition information comes from averages, independent research, and outdated information. These inaccurate labels cause consumers to be misinformed about the nutrition in the foods they are consuming.

In 1990 the Nutrition Labeling and Education Act required values for specific nutrients be reported in a standardized format. The Food and Drug Administration allows a margin of error up to plus or minus 20 percent (Freuman, 2012). The 100-calorie snack that a consumer eats could have anywhere from 80 to 120 calories and be within compliance of these FDA guidelines. However, there is no oversite by the FDA regarding these labels. Manufacturers are expected to self-regulate and follow these guidelines which leads to inaccurate nutrition data labeling.

An independent study found that 90% of the major food labels follow these guidelines for most nutrition information, as inaccurate as they may be. Iron and vitamin A fall outside of these accuracy requirements frequently. Iron is often found to be overestimated and vitamin A is often well under reported (Freuman, 2012).

With a change to the guidelines in 2020, labels are required to include added sugar in grams and percent daily value. The percent daily value tells you how much of a nutrient is in a serving of based on a 2000 calorie diet. 2,000 calories a day is used as a general guideline and is a skewed average for daily caloric

necessity. Also included in the update are vitamin D, potassium, calcium, and iron due to the increased cases of deficiency in these vitamins and minerals (Medallion Labs, 2020). If a consumer relies on these labels to plan their nutrient intake they are relying on inaccurate information which leads to health problems often related to nutrient deficiency.

We intend to develop a system that more accurately provides the nutritional content to consumers by analyzing the nutrient densities of whole foods as they are being produced.

Effects of Current Farming Practices

Different plants have different nutritional needs and are susceptible to different pathogens and pests (Rodale Institute, 2018). Monocropping, or simple dual crop rotation deplete the soil, creating the need for synthetic fertilizers and pesticides in order to control pests, like soil fungi and insects. Synthetic nitrogen fertilizer decreases or alters the soil's beneficial bacterial and fungal diversity in favor of more pathological strains. Some types of nitrogen fertilizer can cause soil to become more acidic which negatively affects plant growth. Excessive fertilizer use can also cause a buildup of salts, heavy metals and nitrates in soil which are sources of water pollution and harmful to humans. (Food Print, 2020)

Synthetic fertilizer is not just damaging to soil, it also contributes to climate change and water pollution by releasing nitrous oxide. This causes algae to pollute water sources in several areas of the US. (Food Print, 2020)

Our research is intended to increase the sustainability of farming operations while subsequently increasing nutrient density in foods by replenishing nutrients in the soil.

Nutritional Deserts

Without a change to the current situation foods will continue to lose nutrient density when grown in an industrial farm setting. This lack of nutrition will cause poor and urban areas to require more food intake to obtain the required nutrition to survive let alone thrive. The dearth of vitamins and minerals contained in these foods will cause the numbers of disease and malnutrition to rise.

These foods are being engineered to grow faster and bigger, increasing the caloric values without increasing the beneficial elements they contain. The increase in caloric consumption compared to the amount of nutrition obtained will cause a further rise in the obesity and illness levels in these areas, possibly leading to death.

Specialty stores and farmers markets that contain foods grown or raised on smaller farms that practice sustainable growing models often charge more for these products, making them hard to obtain for low-income households. These stores are less likely to be located in poor and urban areas and thus the more nutritionally balanced foods are made unavailable to consumers located in these markets.

Project Plan

Developing a program to identify the best mix of sustainable farming practices that produce the most nutrient dense foods will take the full course of the 8-month research program. Our primary aim is to focus on developing the marketable tools and practices to identify the best methods of providing nutrient dense foods and preventing the formation of food deserts in both rural and urban areas.

Providing systems for both accurately measuring nutrition density and properly labeling whole and processed foods for their nutrition content is a secondary goal that will ultimately allow consumers to best obtain the optimal intake of calories versus nutrition, limiting health conditions brought on by poorly informed dietary decisions.

Step One: Partnership

We will secure the partnership of multiple farms that will be willing to work with us to conduct the research we are proposing. We have obtained the provisional support of Michigan State University's Agricultural College and we plan to work with at least three different producers on various scales to analyze the best practices for different sized agricultural systems. Once we know which farms we will be working with we will use the data from Michigan State's past research to coordinate the best path forward for each system.

Step Two: Planning

After obtaining the relevant research data we will negotiate with each partner their level of participation in the research as well as the best method of gathering data for the scale that the farm operates on. With that negotiation complete we can standardize the information that will need to be obtained for the project.

With a standardized system we will compile more complete datasets that will be used for our final product. We will Consult with the School of Agriculture as we develop these processes and identify the most important aspects of our data gathering process to incorporate into our nutritional analysis programs.

After developing the process, we can train the farmers on the use of the system and begin implementation of the research project.

Step Three: Research

This step will take the most time out of the 8-month process. We will work with the different farming partners to identify which practices are best on different scales of farming and with different products as they are being cultivated by the producers.

This will involve the data gathering and analysis of nutrient density as well as the impact the various agricultural techniques have on the soil quality of the various test farms. We will be using analytical systems provided from a contracted medical lab that has experience in nutrition data analysis as well as in-house soil analysis equipment to retrieve the raw data and then process that data with our proprietary software.

This will be done in conjunction with a comparative cost analysis which will provide us with a cost-to-outcome comparison that we can use to identify which systems produce the highest quality food with the least environmental impact, while maintaining a comparable or better operating cost.

Step Four: Development of Adoptable Systems

After the research data is compiled and analyzed a marketable adaptable system will be created for dissemination to producers. We will create and finalize the tools and systems that can be used in different environments and for different crops. With the creation of these systems we can begin to standardize pricing and create user friendly interfaces that are easy to use on a small-farm or industrial scale.

Step Five: Dissemination

After the tools and practices have been developed and the benefits are identified, the last step is to disseminate the systems to farms on a national scale. This will be done with an information campaign that will be supported by an informational website as well as a marketing campaign that will inform and encourage farmers to adapt and adopt the new tools and systems. Special emphasis will be made to coach the benefits and potential cost-saving effects of our product to the producers, encouraging farms to adopt better practices voluntarily.

Secondary Outcome

Our goal is to create the tools and procedures to enhance the efficiency of agriculture on an industrial scale without sacrificing the sustainability of the farms and the quality of the foods provided. As a byproduct of our research we will have created a system of accurately measuring the nutrition content of whole foods that we can provide as a product or service on a national scale to consumers, thus increasing the availability and accuracy of nutrition information from individual producers. This is in line with our secondary goal of creating a competitive labeling system that will allow the end consumer to decide which products to buy based on the health quality of the product.

Qualifications

Our company is uniquely qualified to pursue a project involving agricultural and nutritional research. Located in Westland, Michigan we are positioned equidistantly between an urban environment, Detroit, and multiple rural farming operations located near Ann Arbor and the surrounding areas.

Our company offers technology consulting across multiple areas of industry and we have partnerships with many local businesses that we will work with to develop the technology and practices to identify areas of improvement for increasing the nutritional value of whole and processed foods. This will decrease the instances of food deserts in the immediate area and allow us to provide a plan that can be applied at the national level.

Key Personnel

The project leaders for this research opportunity will be Daniel Colby and Jenna Smith.

- Daniel Colby founded RSB Tech in 2004 and has been the lead programmer for the company since its inception. With over 16 years of programming experience he has been the main project manager of the application development department since its creation in 2007.
- Jenna Smith is the lead analyst of the data processing department. With dual degrees in Project Management and Information Systems from Michigan State University, she has headed all the data analysis projects since the founding of the department in 2009.

Other staff in the company will be earmarked for this project during the relevant stages of development.

Additional Resources

In addition to the in-house staff that are leading this project we will be working with local farms that we have contracted with in the past to streamline the process of developing sustainable practices while increasing nutrition density. These farms have connections to the University of Michigan agricultural school and are experienced in applying new techniques and technologies quickly and effectively while keeping meticulous records. This allows us to research more methods and retrieve the information more accurately, resulting in fewer costly errors.

Background of RSB Tech

RSB Tech is a small business that was founded in 2004 as a builder of custom applications and since then has expanded to include data processing/analysis, web services, and technical consulting. Using our data processing centers we have streamlined the process of gathering and analyzing data with proprietary software developed by our talented staff.

Past Research Experience

We provided technology and analytical services to Priority One Emergency (P1E), an installer of emergency services equipment, working in conjunction with the Detroit Medical Center (DMC) to identify the most effective siren and light combinations on new model emergency vehicles. This research was conducted by P1E in an effort to reduce the incidents of accidents and injury during patient transportation due to cases of color blindness and hearing impairment.

Conclusion: Costs and Benefits

In conclusion, developing a new system of growing nutritious food in a sustainable manner and creating a system for accurately analyzing the nutritional content of food in a cost-effective way will take time and effort. We will utilize the full Phase 1 research time of 8 months to develop and test a sustainable method of farming that we can market to growers at every level. During this time, we will simultaneously work on an inexpensive accurate testing system that can be utilized by food producers to accurately inform consumers about what they are ingesting.

The costs of this project lie mostly in land and time. As shown in our budget analysis (Appendix 1) we will be utilizing the amount of $99,540 obtained in this grant predominantly to obtain farmland and materials for farming and for paying the people who will be developing these systems. Some of the money will be going towards obtaining third-party tests — to verify the accuracy of our testing systems and the effectiveness of our sustainable farming methods.

By creating a marketable system of sustainable farming we will reduce the strain on our environment and increase the nutritional content in our food we will begin the process of healing our country's land and people while reducing the costs to our pockets and environment.

By creating an inexpensive accurate food testing method, we will create a system to create well informed consumers who are better able to choose foods that will increase their health and reduce their chances of receiving Improper nutrition through ignorance. This will reduce the number of food deserts in our country and increase the overall health of our population.

Healthier, happier people will reduce the strain on our medical system, while more productive, less resource intensive farming will stimulate our economy and reduce the strain on our environment. We believe that our plan offers us a way to achieve these goals.

Thank you for considering our research proposal. Contact Daniel Colby at (313) 555-6740 if you have any questions, comments, or concerns regarding our proposal. He can also be reached at dpcolby@asu.edu. We look forward to hearing from you about our grant request.

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Appendix 1
Budget Analysis

1. Management		**Salary**	**Time on Project**	**Total Cost**
	a. Project Manager – D. Colby	$30,000	8 Months	$20,000
	b. Project Lead – J. Smith	$22,500	8 Months	$15,000
	Benefits provided by company			
	Total Management Costs			**$35,000**
2. Labor		**Project Hours**	**Cost/Hour**	
	a. Direct Labor (Farming Experience)	2400	$16.82	$40,368
	Benefits provided by company			
	Total Labor Costs			**$40,368**
3. Facilities				
	a. Kent Non-Irrigated Farm-Land Lease, $125/Acre/Month,2 Acres 8 Months			$2000
	Total Facilities Costs			**$2000**
4. Materials				
	a. Corn Seed	$118/Acre	2 Acres	$236
	b. Oat Seed	$33 / Acre	2 Acres	$66
	c. Soybean Seed	$204/Acre	2 Acres	$408
	Total Materials Costs			**$710**
5. Testing (provided by Nutridata)				
	a. Soil Test	$1887/Test	6 Tests	$11,322
	b. Nutridata Lab Test	$895/Test	6 Tests	$5370
	Total Testing Costs			**$16,692**
6. Travel to Kent County by Car				
	a. Office to MSU (round trip) ~151 miles	~$.54/mile	32 trips	$2,610
	Total Travel Costs			**$2,610**
7. Communication to MSU and Direct Laborers				
	a. Internet Service and VPN	$210/Month	8 Months	$1680
	b. Phone	$60/Month	8 Months	$480
	Total Communication Costs			**$2,160**
	Total Costs			**$99,540**