Altering Consumer Diet Towards a More Sustainable Indiana

Whether and how public policy can encourage Hoosiers to eat more of a plant-based diet in order to reduce local contributions to climate change

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Abstract

Globally, raising animals for human consumption contributes to nearly one third of all greenhouse gas emissions and within the United States specifically, animal husbandry accounts for roughly fifty percent of all agricultural greenhouse gas emissions, not including the environmental impacts of the large quantity of grains grown to support the industry (~70-80% of all grains). Reducing the amount of animal products consumed by the average Indiana resident may help to reduce the state's contribution to global climate change. This study evaluates several public policies that are designed to encourage consumption of a plant-based diet, and the prospects for successfully implementing these policies in Indiana. Some of these policies have been pursued in other states or countries, and others have been proposed by researchers but not yet implemented. This study examines the consumer characteristics and other factors that policymakers and researchers suggest will contribute to their policies' success, and considers whether and how these factors exist and are likely to shape consumer behavior in Indiana.

Background: Why it Matters

Environmental Concerns

Effects on Indiana Residents

Declining corn and soybean yields. Fewer spring days suitable for fieldwork. (Bowling et al, 1) Nutrient loss from agricultural fields. Increasing numbers of weeds, pests, and diseases on agricultural products. (Bowling et al, 2) These are among a handful of the detrimental impacts that Purdue University states currently befall many Indiana farmers, yet research shows that these conditions will only become more prevalent in the coming years, particularly nearing the mid-century mark, in accordance with the growing threat of climate change on our state. The 2018 report by Purdue University titled "Indiana's Agriculture in a Changing Climate" highlights theses and other severe and negative consequences our state farmers can expect at the hands global climate change both now and in the coming years.

In the mid-central United States, climate change can often seem a far off concern; one that poses no immediate threat except to those individuals living with the threat of sea level rise along coast lines and in other specific climates that are extraordinarily susceptible to changing climate conditions. Yet this study should prove to be a wake-up call for those within our state that climate change is a real and pressing issue that needs to be dealt with not just for the sake of

those around the world already feeling its effects, but even simply as a means of protecting ourselves from the the capricious weather patterns we are already facing and which we can only expect to see worsen within the coming years.

Indiana's Role in Global Climate Change

Undeniably, Indiana- along with the rest of midwestern America- is a major force in contributing to climate change. In fact, if the American midwest were its own nation, it would be the fifth largest emitter of greenhouse gases in the world. (World Resources Institute, IX) Indiana alone creates the most greenhouse gases per capita in the region (World Resources Institute, XI) and is the sixth largest emitter in the entire nation. (World Resources Institute, 31) Currently, emissions for the state of Indiana is predominantly due to energy production, particularly the generation of energy through coal-powered plants, (World Resources Institute, XI) but focus needs to be given to much more than simply our energy sector if we wish to protect our environment and create a more sound future for our state's resources and people.

Animal Products and Environmental Degradation

A topic often left behind in the discussion of creating a more environmentally sustainable future is that of animal agriculture. Animal agriculture is a primary driver of air pollution and greenhouse gas emissions; animal rearing and the grains grown to support the industry make up approximately eighty percent of all greenhouse gas emissions from the agriculture sector,

(Tubiello et al, 6) and roughly thirty percent of global greenhouse gas emissions. (Hyner) Looking to methane release specifically- a highly potent greenhouse gas that possesses a global warming potential over thirty times larger than that of carbon dioxide- in the early 2000s, methane release from livestock accounted for seventy one percent of all agriculture emissions within the United States, and also nearly twenty percent of the US's total emissions. (United Nations FAO, 96)

Animal agriculture not only has a severe detrimental impact on our air, but also on our water. Livestock production is the leading cause of waterway pollution within the United States, and studies by the United States Geological Survey agency have found one or more pesticides present in ninety seven percent of waterways in both agricultural and urban areas of the US. Even undeveloped land is not immune from these damages: sixty five percent of waterways in undeveloped portions of the country are contaminated by pesticides. (USGS) This contamination within our water not only stands to harm humans, but also the millions of other plants and animals that we cohabitate with.

Health Concerns

Inevitably, not every individual in Indiana will be concerned and persuaded by the environmental implications previously mentioned. Yet, there are still a variety of other reasons to consider bringing our state to a more plant-based diet besides simply environmental conservation: there are also health aspects to be considered.

Dietary Considerations

Not only has ditching animal based foods and replacing them with plant-based alternatives been proven to be environmentally sustainable, but it also leads to better health and well-being for those who make these changes in diet. Vegan and vegetarian diets lower in animal products have been shown to promote better cardiovascular health, protect from cancer, lower obesity rates, (Tai Lee et al), and lower the risk of diabetes. (Tonstad) For these reasons, adopting a more plant-based diet could stand to greatly improve the quality of life for Indiana residents. As of 2017, Indiana possessed the twelfth largest obesity rate amongst US states, accounting for a total of nearly thirty four percent of Indiana residents being obese. (State of Obesity) Further, nearly seven hundred thousand Indiana residents- approximately thirteen percent of the total population- suffer from diabetes. (American Diabetes Association) Through leading Indiana residents towards a more nourishing, nutritious plant-based diet, the rates of these common ailments and diseases, amongst others, can be expected to dwindle.

Antibiotic Resistance

Lastly, another serious human health implication lies in the concept of antibiotic resistance. In the United States, eighty percent of antibiotics sold are for use in animal agriculture; these antibiotics are used for a variety of purposes, from helping to bolster animal growth rates, to preventing infections and illness brought around by the close confines of the animals. (Martin et al) The threat of new bacteria emerging that possess a resiliency towards our medicines is believed to be a growing health crisis, with animal agriculture being a large driver of this problem that receives far too little attention. Antibiotics given to animals are generally

either consumed by humans through consumption of these animals, or these antibiotics are released via urine and manure to be absorbed into the soil or other waterways. (Ventola) This large quantity of antibiotics released via animal agriculture is a primary factor of our global problem of antibiotic resistance; by either reducing the amount of animals raised for agriculture, or by limiting the use of antibiotics on these animals- or most preferably, a combination of the two- we can help to limit the looming global health crisis that fears of antibiotic resistance brings.

The Importance of the Consumer

So what can be done to alleviate the environmental and health concerns cited above? The answer is simple: we can begin substituting animal-based products within our diet with plant-based sustenance. Research has shown that the environmental impact of animal agriculture substantially exceeds that of the various plant-based proteins in the market. Meat, egg, and dairy are responsible for the use of roughly eighty three percent of the world's farmland, yet these foods only add up to roughly eighteen percent of our total calories. For this reason, scientists and researchers both nationally and globally recognize the importance of re-shaping our current agricultural habits. (Poore et al.)

Historically, attention in this field has been directed towards supply-side corrections to our current approach to factory farming; for this reason, included in this piece are a couple of supply-side options intended to influence the suppliers into directly limiting the impact of the animal products they produce. Recently, instituting changes through supply-side means has

become disfavored. Supply-side corrections can be a very long, strenuous process, and many scientists believe we need to see more rapid efforts towards achieving dietary sustainability if we wish to achieve our climate change alleviating goals. This realization has recently led to an examination of a relatively new method towards achieving sustainability within our food system: the use of demand-side economics as a means of re-shaping our American diet to become a more healthful and less environmentally degrading means of feeding our population. The consumer's role in the system is beginning to be seen as a necessary forefront towards improving the long-term viability of our food system and even the planet, (Poore et al.) and three primarily demand-oriented policy options will be discussed over the course of this paper.

This intersection between consumer supply and demand and how these impact sustainable food choice is the essence of this paper. What sorts of public policies could help to institute the previously mentioned changes to our food system that are so desperately needed? Through an examination of a variety of policy options currently implemented in other states and nations as well as those that are endorsed by scientists and researchers in the social sciences, this paper endeavors to connect current research on the drivers of consumer food purchases and to show the means in which the adoption of certain policies could both individually and jointly lead to a positive change in our food consumption habits.

Consumer Decision-Making

If we wish to begin to understand how we can rethink our current food system and begin leading the way towards a more healthful and environmentally sound way of eating, we need to

first begin by asking the questions of why people choose to eat in the ways that they do, and what can be done to gradually change these habits.

Economics

Financial Attainability for the Consumer

One of the largest determinants of an individual's eating habits is simply reliant on socioeconomic status: the financial well-being of the individual or family. When studying food buying habits, particularly those of the younger generations, these individuals tend to purchase more fruits and vegetables as their incomes rise. (Kuhns and Saksena, 2) This is largely due to the fact that foods such as fruits and vegetables- foods that comply better with scientific nutrition guidelines- generally tend to be more expensive than animal-based foods, particularly when considered along the lines of price in comparison to the caloric content of the food. (Carlson and Frazao, 5) In light of this fact, it becomes clear that for many Americans- especially younger generations- economic obstacles can prevent these individuals from being able to purchase more healthful plant-based foods, and are instead financially coerced into buying animal-based products, which tend to be cheaper and more affordable to individuals and families on a budget.

This disconnect between consumer desires and their financial status could be fixed with the implementation of a taxation and subsidy regimen. Researchers have found two different means through which a system such as this could be implemented: via a model that taxes unhealthy foods (such as meat, dairy, and other fattening and highly processed foods) or via a

model in which emissions pricing is implemented on highly resource intensive, environmentally damaging foods (ie: animal-based products). While these two options address the problem in different ways, both models would ideally lead to the same result- a lesser reliance on animal products- which could help to bring about a healthier environment, and even healthier lives, for Indiana residents.

The first option stated to make healthful and environmentally sustainable foods more financially viable would be the implementation of emissions pricing on food. If emissions taxes were to be placed upon highly resource-intensive food commodities, researchers believe the positive impact on our environment would be substantial. If food choices such as meat, dairy, and eggs were to receive an additional tax for the added environmental impact of these foods, and other, more healthful and less impactful foods such as fruits and vegetables were left as being tax-free, the government could help to shift demand away from highly resource intensive animal products and more towards the fruits and vegetables that leave a much lower footprint on our environment. Ideally, an emission tax possesses the capability of lessening our food systems impact on our environment, while at the same time creating a healthier, better quality of life for citizens. (Springmann)

The other option presented, an unhealthy foods tax, consists of providing subsidies for fruits and vegetables and paying for said subsidies through the taxation of foods considered unhealthy, such as highly processed foods and animal-based products. This option could help to eliminate the market failure currently in place in which citizens that are more financially disadvantaged are often forced into eating foods which could harm their long-term health and well-being. Making wholesome foods more financially affordable through a subsidy/taxation

regimen such as this has been predicted to be able to lead to an increase in fruit/vegetable consumption of over ten percent, which could stand to save thousands of lives annually from diseases such as heart disease, stroke, and cancer and could at the same time help create a more sustainable food system. (Nnoaham et al.)

Although emissions pricing specifically on food has yet to be implemented in practice, and consequently it cannot be said what degree of success would be obtained, carbon emissions taxing in general has been shown to work in the past. In 2008, British Columbia introduced a carbon tax across the province on both families and businesses; through this tax, emissions dropped between 5-15% and any negative implications on the province's economy were miniscule. (Porter) The success of British Columbia's emission tax displays that emissions pricing can work, not only in theory but also in practice, making it appear likely that a carbon tax on resource intensive foods could produce the desired reduction in emissions hypothesized by researchers.

Further, there is also an application of a health-oriented tax on animal products that can be examined. In the year of 2011, the nation of Denmark instituted a tax on saturated fats. The tax- which included meats, dairy, and other high fat animal products as well as processed, high fat plant-based foods such as margarine and other oils- was passed as both for public health purposes as well as economic purposes of raising money for the government. Yet although this tax was short-lived (being abolished in 2013 after facing much criticism from farmers and food retailers) the implementation of the tax did create a noteworthy change in the diets of Danish citizens during the time of its enactment. The saturated fat tax led to a reduced saturated fat intake of 4% among Danish citizens, it led to an increase in vegetable consumption, and

researchers of the tax also state the tax led to the saving of 123 Danish citizens annually from complications due to a higher fat diet. (Smed et al)

Ultimately, the Danish saturated fats tax led to a minor, but positive change in the Danish diet and indicates that the institution of taxes on animal products (and other high fat foods) has proven in practice to lead to a reduction in their consumption. However, given that studies on the Danish tax are centered around purely health-related aspects to a diet lower in animal products and other saturated fats, there are limitations to this research as to the still unknown results as to what extent a tax on animal products would lead to more sustainable food choices- which would depend largely upon what foods were substituted for these animal-based products. Further, it is currently unknown whether the short-lived tax has led to any permanent changes on the eating habits of citizens of Denmark- another intriguing area for future research.

Applicability in Indiana

The potential of an emissions-based tax on animal products, or even a health-oriented tax on high fat foods appears it could prove to be a positive means of lowering consumption of animal products, which should lead to a more sustainable diet as well as a healthier populace- although the extent that Indiana could attain these goals still remains to be determined. Given the political and economic obstacles faced in the implementation of a tax on animal products, the probability of implementing such a tax in Indiana at this period of time appears highly improbable. Just as the Danish tax faced much opposition from the farmer organizations and food retailers (Vallgarda et al, 224) the same pressures would likely be felt by Indiana, likely even to a greater extent given that a larger percentage of Indiana residents work within the

agricultural sector (Purdue University) than that of Denmark. (Trading Economics) For these reasons an animal product tax appears to be largely unattainable at this point in time, but it still remains a compelling option that Indiana may wish to consider again in the near future at a time if/when the health and environmental implications of animal products are more well-known and in which public opinion of a greater number of Indiana residents is shifting towards a more plant-based diet.

Education

Animal Welfare

Surveys given indicate that the vast majority of US citizens (approximately seventy-eight percent) possess concerns over how animals within our food system are treated. Consequently, a growing trend in consumer purchasing decisions is the desire to buy food that is believed to originate from reputable and trustworthy sources. Around seventy percent of people tend to take into consideration how they believe the animals behind the animal products purchased were treated, and these same individuals were often more than willing to pay more money for products with a more ethical background. (Spain et al)

Yet this compassion for the well-being of animals leads to another problem in our current system: most people are unaware of standard animal rearing procedures in the US. This issue at hand ultimately ends up being a problem of education, specifically the expanding disconnect between “typical US consumers and food production” (Tonsor). Surveys undertaken by Purdue

University have shown that although many citizens consider themselves well-informed about the agriculture practices that occur both around the country and within their own state (Cummins et al 10), research has shown that these perceptions are often erroneous. Take for example the question of the average size of a hog farm in the US. The most common perception amongst survey respondents was that the majority of pigs raised in the US are reared on farms containing between one hundred and four hundred ninety-nine pigs, (Cummins et al, 11) yet this perception was far from the reality that the majority of pigs raised on farms with the number of pigs exceeding five thousand. (Cummins et al, 12)

Evidently, a disconnect exists in society between what consumers desire- an ethical food system that treats animals justly and without inflicting any unnecessary suffering on these beings- and what actually exists in our society- a large, commercialized form of animal agriculture which puts profit above the well-being of either animals or the environment. Yet attempts to directly inform consumers directly about animal welfare in the past have been largely ineffective, particularly along the lines of product labelling. A variety of different labels exist in the marketplace that, although they have no definitive definition, are used by companies to insinuate a high quality of life for the animals their farms grow, even when these terms are legally meaningless. Terms such as “humanely raised” and “sustainably farmed” are often used to deceive animal welfare conscious consumers into purchasing such products, but generally there is no evidence to back up these claims, and these terms are simply used by companies to create a false aura of high animal welfare in order to elicit a higher price for their products in the market. (Animal Welfare Institute, 8) With so much confusion currently existing within the humane meat, dairy, and egg marketplace, a better means of creating a more sustainable, cruelty

free system of animal agriculture lies within obtaining the help of private organizations. Private organizations can, and with the proper motivation will, be able to help create higher standards of animal welfare which are actually based on predetermined criteria of animal well-being, rather than upon subjective, ill-defined terms of ethics.

Perhaps the best means of achieving better standards of ethics amongst companies involved in the sale of animal products lies in incentivizing private organizations to adopt their own welfare standards which include clearly defined terminology and objective measures of animal welfare. Incentivizing private animal welfare standards could stand to be a highly beneficial means of increasing the well-being of farmed animals, yet without being overly strenuous and requiring additional regulation by the government. Private animal welfare standards that institute stronger protection than state and national laws are becoming increasingly common in the private food sector, not simply for purely altruistic purposes, but rather because adhering to these higher standards can help businesses to be viewed as providing better products and, consequently, they become able to receive better profits from the animal products that they sell. (Lundmark et al)

Private animal welfare regulation has been seen widely across Europe, where many nations have began pushing private regulation in lieu of additional public regulation. Such regulations have seen beneficial results, as the industries and companies that have adopted their own private animal welfare standards have repeatedly been noted to possess a higher degree of welfare for their animals than companies that are governed solely by governmentally imposed welfare standards. (Clark et al, 2) These private animal welfare initiatives can be initiated by a large number of different actors at a number of different levels on the food supply chain

including: the farmers, the food processors, the retailers, non-profit organizations, etc. Initiatives beginning at each of the following levels have all been able to successfully show an increase in animal welfare standards, and many of these private welfare standards are not simply designed to increase animal well-being, but also to achieve secondary objectives such as environmental sustainability and food quality. (Lundmark et al.) Further, the organizations that implement these higher standards state their primary driver for the increasing their product standards as being the motivation to present a better product in the eyes of consumers, and consequently, to be able to charge higher prices for their products and generate greater revenue. (Lundmark et al)

As previously insinuated, not only are such standards good for industry profits, they also stand to have a great benefit towards achieving the goal of a more sustainable food system. Firstly, a higher degree of animal welfare requirements would lead to a decline in the highly industrialized, confined animal farming operations which possess and are responsible for many of the worst environmental impacts currently seen by animal farming. (Tilman) Secondly, and partially as a consequence of the first, animal products are inherently priced higher when produced with more stringent welfare standards; with higher prices beginning to be charged, these meat products should begin to see a decrease in purchase and consumption- given that meat products tend to show a large elasticity in response to changes in price. (Green et al)

Applicability in Indiana

Private animal welfare standards have been shown to be successful when implemented on a multitude of different levels within the animal product supply chain. Perhaps the best level to encourage the creation of private animal welfare standards in the state of Indiana to would be

upon the farmers themselves- the individuals who possess the most immediate connection to how food in Indiana is grown and as to how much of an impact that food possesses on the local environment. Through the reward of subsidies and/or tax incentives to participating parties, the government could encourage Indiana farmers and farming organizations to design and abide by animal welfare standards beyond those imposed by government regulations. These standards could touch on important public health and environmental well-being concerns such by requiring greater space allotment to animals which would help to reduce the number of diseases generated by the cramped confines of modern farming operations, and lead to a decrease in farm size overall.

Private animal welfare standards could be of great benefit towards improving our local environment, and would also be relatively easy to implement within Indiana. Private standards have been adopted by a number of different regions and countries across Europe, and the majority of these adopting localities have shown a greater attainment of the animal welfare, environmental, or health-oriented objectives the enacted standards hoped to achieve. Through encouraging the adoption of standards above those set by the state government, the state of Indiana could contribute to the creation of higher animal husbandry standards without having to directly step in to impose regulation on the farming industry. Lastly, the adoption of private animal welfare standards can be a highly flexible means of encouraging practices that would improve the well-being of both animals and the environment. Perhaps best of all are the benefits that farmers themselves can gain from the creation and enactment of these standards; through the publicity and higher quality products generated by following these higher standards, the

implementation of private animal welfare standards can ideally lead to greater profits for farmers as well.

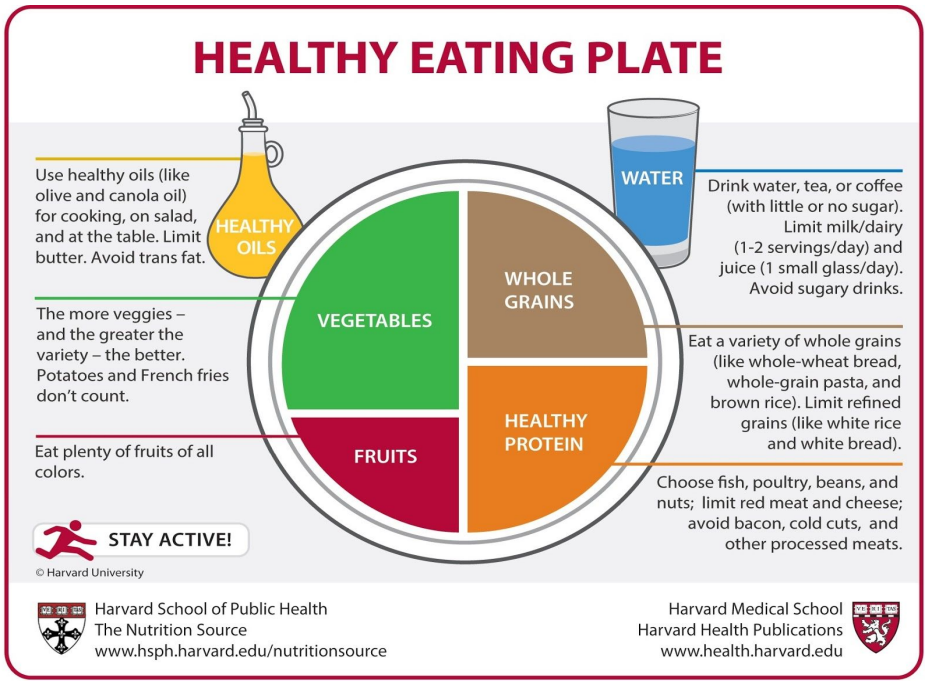
Nutrition Guidelines

Research on the progressing buying habits of consumers shows that people are beginning to have an increasing desire to purchase foods that are fresher and healthier, particularly consumers of the millennial generation. (Kuhns and Saksena) Yet, what many people consider to be a healthful diet is not necessarily the same as what is considered by researchers to be healthful. Numerous surveys conducted in not just America, but across the developed world, show a discrepancy in nutritional knowledge between what consumers believe are healthy foods, and what foods are proven by researchers to be healthy. A prime example of this research is seen in the work of Dickson-Spillman and Siegrest who made use of surveys to show that many consumers still believe that a healthy meal should include some form of meat or that people need to consume as much dairy as they do fruits and vegetables if they wish to remain well. (Dickson Spillman and Siegrest) Through eliminating common misconceptions about nutrition, specifically the misapprehension that animal products are a necessary part of a healthful diet, we can begin lessen the populace's dependence upon these food sources, and consequently encourage them to begin consuming plant-based alternatives to meat and other animal products, ideally leading to not only a healthier populace, but also a more sustainable food system.

In recognizing dietary misconceptions, many nations have began undertaking campaigns to help correct these misbeliefs. For one example, Canada has began to push a much more

plant-based diet in their 2019 national food guidelines. Canada's new food guide is a drastic change from their previous guideline that was issued in 2007: the category "Dairy" has been dropped completely from the menu, and the protein section from the new food guide places a much greater emphasis on plant-based forms of protein than its predecessor. When confronted about the new changes to their dietary recommendations, the Health Canada agency noted that the primary motivator for the change was promoting better health among Canadian residents, but the agency also noted that by eating more plant-based diets, that Canadians could "help to conserve soil, water, and air." (Kirkey)

America's dietary guidelines administered by the US Department of Agriculture, however, are often considered to not be the best nutritional information available for American citizens. For years our current dietary guidelines issued by the USDA have been criticized by many for not taking all of the most recent and best available nutrition science into consideration. Our current food guidelines do not differentiate between proteins, ie: the health impact of eating beans or nuts as opposed to eating red meat; further, the current My Plate standards even go so far as to recommend dairy consumption, although many studies have linked an increase in dairy consumption to many



different types of cancers. For these reasons, amongst others, the School of Public Health at Harvard released their own dietary guidelines that aim to promote a more healthful diet than those presented by the USDA- dietary guidelines which is not subject to the "political [and] commercial pressures" such as those that are placed upon the USDA by lobbyists of the food industry. (Harvard School Public Health)

Although an advancement in nutritional knowledge would be beneficial for all stratas of society, of preeminent importance is the need to articulate proper nutrition education to the youngest generations of society. Beyond a simple, but also accurate, 'the children are our future' style argument, scientific data itself shows that younger generations of people are more receptive towards accepting change than their older counterparts (Matamales et al) and consequently, targeting this information towards young people would stand a better chance of being recieved and abided by. This leaves us with the questions of where children would be most accessible to be taught this knowledge; the answer clearly lies in our public school system. Not only would school corporations prove an easy means of reaching nearly all young people in the state, but it would also stand a good chance of actually making a positive impact: research has shown that a child's school and peers play the largest role in shaping a child's lifelong eating habits- not an individual's parents as has been historically believed. (Wang et al., 188) Ideally, by teaching children from a young age to choose more healthful and environmentally sound food options, we could greatly stand to increase the amount of healthful foods they consume in the future.

In order to achieve this goal, nutritional information taught within Indiana schools should be taken from a variety of sources in order to achieve a more well-rounded nutrition information. For example, the Harvard "Healthy Eating Plate", the Canadian food guidelines, or a variety of

other nutrition recommendations could be adopted in Indiana schools as a means of educating younger generations and helping them lead the way to better eating in the future. Nutrition education in Indiana can still teach the standards as taught by the USDA, but it also needs to acknowledge that no dietary guidelines are ever perfect or free from outside influence, and consequently, food guidelines from a single source should not be considered definitive, and multiple sources should be examined. A good example of this alternative can be seen in the Hanover Public School Corporations in Massachusetts, in which the school corporation released a 2012 Wellness Newsletter that compared the USDA My Plate with the Harvard Healthy Eating Plate through an examination of how the two nutrition guidelines differed, and why Harvard chose to make the certain changes to the USDA guidelines as they chose to do.

Although simply teaching children about proper nutrition is in a sense a bandage fix to a much larger issue of lax regulations and standards of school lunches, it would still prove to be a step in the right direction towards combating this issue. Currently, economic pressures and our nation's current political environment have made broad reformation of school lunch programs unattainable (T.H. Chan School of Public Health), but that does not mean that the fight for healthier schools are futile. Increasing understanding of proper nutrition and stressing the importance of consuming more plant-based foods stands to serve in paving the way towards attaining broader change in the future.

Applicability in Indiana

While greater changes to the diets of our younger generations will likely be desirable in the near future (such as the reformation of the cafeteria offerings served), educating young

Hoosiers as to to the viability of a plant-based diet, and the benefits of simply eating more plant-based offerings, could create an environment and openness to plant-based eating which could pave the way to further advances in children's nutrition in time. While more extensive reformation of school cafeteria offerings and nutrition education as a whole will prove to be more difficult to attain, this first step of simply informing students of a variety of interpretations of a healthy diet can be a very simple endeavor.

The USDA guidelines have for years been the cornerstone of nutrition education within the nation, which does not have to change in the immediate future. Schools can still teach the USDA nutrition guidelines, but by supplementing the USDA's recommendations with the recommendations of other sources- particularly those of Harvard or even other countries such as the Canadian food guidelines- students can receive a more well-rounded knowledge of nutrition and will learn that the USDA guidelines do not have to be the definitive source of understanding proper nutrition. By doing so, schools can help to eliminate extensively believed misconceptions such as that meat and dairy products are an essential part of a healthy diet, which can help to lead students to a better understanding of how to eat a more plant-based diet and ideally a willingness to experiment with abiding by a more plant-based diet for their own health and well-being.

Availability

Increasing the ease of accessibility to plant-based options is also a vital part of making environmentally sound foods a more prominent portion of our diet. Many of the barriers that keep families, particularly lower-income families, from reaching towards a diet high in animal

products are obstacles related to ease of access to plant-based foods. Barriers such as “inadequate geographical access” to fresh, plant-based foods as well as “poor quality” of these foods when they are available keep many individuals from being able to consume fresh fruits and vegetables as well as a variety of other healthful plant-based foods. (Evans et al) In order to increase the amount of plant-based foods consumed within our society, the ease of attainability of such foods needs to be considered, both within public and private spheres.

Accessibility in Public Establishments

Making plant-based options available in public institutions is a very positive first step towards making these more healthful and more sustainable foods offerings increasingly accessible and readily available. Making plant-based food options the norm in institutions such as hospitals, prisons, and schools has been a task undertaken by many nations, and even other US states. A very recent example from the United States would be Senate Bill 1138 from the state of California. This bill, which was passed in 2018, amended both the Health and Safety Code for the state as well as the Penal code in order to mandate that hospitals (as well as nursing homes, psychiatric hospitals, and other care facilities) as well as prison facilities need to offer an option of plant-based meals to those under their care. (SB-1138 Food Options: Plant-based Meals)

Even beyond the US, a variety of nations and cities across the globe are making moves towards becoming more plant-based, both for the environment and for the health of their citizens. Early in 2018 the city of Veracruz, Mexico undertook a “Conscious Monday” initiative at the municipality’s schools; the Conscious Monday program is a venture to advance the use of

vegetable protein as a more healthful and more environmentally sustainable source of protein for children in the community. (Secretary of Education, Veracruz) Through implementation of the program- which went into effect this past April- schools within the city of Veracruz are aiming to reduce their use of animal products by roughly twenty percent and to begin holding Conscious Mondays, which recommends that schools in the municipality make meals with no animal products on Mondays. (NYC Food Policy) Another global example would be the Bahia province of Brazil. The province has recently began their Sustainable School project which aims to begin serving local plant-based foods to school children. The ultimate goal of the campaign is to have schools serving one hundred percent plant-based meals by the year of 2019. (Humane Society International)

Taking inspiration from these initiatives, Indiana could become a leader in the push towards making plant-based meals more available within the public sphere. Passing policy that requires that a plant-based offering be available at public institutions within the state would be a huge step towards both normalizing plant-based meals and towards making them more accessible to the citizens who desire to have this option for meals without the use of animal products. Yet beyond simply helping citizens towards a plant-based diet, such a push could also stand to have positive effects for the government economically. Serving meatless meals has actually been shown to save a significant amount of money in public institutions. Look towards Maricopa County in Arizona: in the year of 2013, Maricopa County prisons began feeding inmates vegetarian diets which led to annual savings of roughly seven hundred thousand dollars annually. (Wolf) Ultimately, the switch to more plant-based meals in public institutions could stand to benefit the state not only environmentally, but also monetarily.

Applicability in Indiana

Making plant-based meals available in public venues would be a very beneficial step towards shifting consumer preference towards more sustainable food choices. Unfortunately, this new trend of requiring plant-based meal options in public establishments was fairly recently established and as of this given time, little to no research exists as to how great an effect these measures might have towards pushing the implementing states/countries towards a more plant-oriented diet. Yet regardless of what (if any) effect such measures would have on turning individuals to a primarily plant-based diet, these measures would prove beneficial towards individuals already following a plant-based diet and would provide them with equal access to food which many following vegan/vegetarian diets struggle with in the Midwest. (Sulzberger)

The prospect of ensuring plant-based meals are available in public facilities in Indiana would likely prove to be a fairly simple starting point towards creating a more sustainable food system in the state. Requiring a plant-based option in state hospitals and prisons, such as is being done by the state of California, would be great starting point to making plant-based meals accessible. The initial stipulation could be as simple as requiring one plant-based meal option at all public venues, but dependent upon the success of the legislation, the number of plant-based options required could gradually increase. Eventually, the initiative could expand to require a certain number of plant-based meals served in public schools, such as is being done with the Conscious Monday program in Veracruz, and someday this initiative could even grow to entirely plant-based school systems, as is being done in the Bahia province. Further, this objective to increase access to plant-based meals at school would greatly supplement the educational aspect

of plant-based eating: if children knew the environmental and health benefits of more plant-based eating, and plant-based meals were available in their schools, children would have not only the knowledge, but also the ability to start eating a plant-based diet if they so desire.

Currently, a wide variety of different nations, provinces, and even a US state, have began implementing these forms of policies for a variety of different environmentally-oriented, health-oriented, or simply consumer-demand oriented purposes. Given the expansive number and variety of localities implementing these forms of legislation, it appears more than plausible that such a policy could be enacted in the state of Indiana as well. Passing legislation making plant-based meals available in public institutions would be a great means of increasing accessibility to these more healthful and sustainable meal choices, and normalizing plant-based diets in the Indiana populace.

Accessibility in Private Establishments

There is a growing trend, particularly amongst younger generations, of eating meals outside of the home as opposed to cooking in-home. (Kuhns and Saksena) In order to truly make the plant-based diet a ubiquitous part of everyday life for Hoosiers, these dietary offerings need to be readily available in private establishments as well. One of the best means of doing so lies in the creation of voluntary industry agreements that seek to promote plant-based eating.

Voluntary industry agreements are just as they sound: they are non-binding arrangements between a government and the industries within their jurisdiction to set out to reach certain specified goals. In voluntary agreements, businesses have free choice to enter/leave the

agreement as desired. With this being the case, these agreements are generally used to accomplish objectives in which the government and the industries have a common goal, such as for reaching public health or environmental sustainability objectives. Given this non-compulsory nature of these agreements, the government needs to provide factual reasons as to why industries should stick to these arrangements. (Bryden et al)

One of the best aspects about the concept of applying a voluntary industry agreement towards reaching our state's food sustainability objectives is that these sorts of agreements have proven successful numerous times in the past. A recent example would be a voluntary industry agreements signed by service providers to increase the energy efficiency of set-top boxes. This agreement- signed by At&T, Time Warner Cable, Verizon, Directv, Dish, and a cohort of other influential American cable, television, and satellite providers equating to over 90% of the pay-tv market within the United States (Energy Efficiency Voluntary Agreements)- was agreed to by these organizations as a superior alternative to the government enacting legislation to govern the efficiency of these tv boxes. (NCTA) As a result of this agreement, set-top boxes now use forty six percent less power than they did prior to this agreement's enactment. This energy savings has helped to prevent twenty million metric tons of carbon dioxide release. (NCTA) With private industry agreements proven as being successful in attaining greater energy efficiency amongst United States service providers, it appears attainable that these forms of agreements could similarly be used to attain sustainability within the food sector as well.

To achieve the desired objective of orienting Indiana towards a more sustainable food system, voluntary industry agreements could be drafted to provide targets for Indiana restaurants and grocers to aim to begin selling more plant-based options within their businesses. The

non-compulsory nature of such partnerships could be beneficial in that these establishments would receive additional encouragement towards offering more healthy and environmentally friendly options, but at the same time the non-mandatory nature of these agreements do not place any undue strain on local businesses. Rather, these agreements could lead to businesses enhancing "their public image" through joining a movement to help solve the shared problems of climate change and the obesity crisis within the US. (Garnett et al, 50) Further, a voluntary agreement would prove beneficial to the government as well by the fact that such an agreement could help to bring about desired changes in diet in ways that are faster and cheaper than the passing of ordinary legislation; plus theses agreements tend to improve government relations with the industries that the agreements are made with. (Bryden et al)

Applicability in Indiana

Voluntary industry agreements to encourage consumption of meat alternatives could prove to be one of the most easily attainable options for the Indiana government. Voluntary agreements to attain environmental objectives have been successful previously in the United States (NCTA) and it stands to reason that these forms of agreements could also benefit achieving food sustainability- so long as the state could get businesses willing to take part in them. While statistics such as the environmental and health-oriented reasons for offering more plant-based diet are compelling, likely the best means of getting businesses to desire to undertake this change voluntarily is to show the economic benefits of adding plant-based diets on their menus. Plant-based diets have been on the rise globally, and the United States has been no exception: in the past three years, the US has seen a roughly six hundred percent increase in individuals following vegan (plant-based) diets. (Oberst) Through articulating the potential

economic profits as well as the positive public relations benefits the companies could attain, these local businesses can be encouraged to take part in an agreement to begin offering more plant-based options within their establishments.

A truly extensive effort to make plant-based meals a greater portion of the Indiana lifestyle would be best accomplished in two different agreements: an agreement made with grocery stores as well as one with restaurants. The Indiana government could set a desired level of attainment level for plant-based products in both large Indiana grocery chains as well as in large restaurants, or restaurants with multiple locations around the state. Potential arrangements for these agreements could be to have a certain percentage of food products sold at the store or restaurant to be plant-based options, or simply to have a minimum number of plant-based offerings set to be provided in these establishments. With success thresholds set for attaining these objectives, and with the positive public relations benefits businesses stand to gain, ideally these organizations should be inclined to reach their set goals. Yet the addition of government granted rewards for attaining agreement objectives have also shown to increase the likelihood of creating the desired results. Publishing listings of the businesses participating in the agreement as well as providing financial rewards for businesses who do an exceptional job of attaining their goals can help to encourage fulfillment of the specified objectives. (Bryden et al)

Making the Change

Why Switch to Organic Produce Farming?

It is naive to push such a drastic change of diet within the state and not acknowledge the political and economic pressures that will make instituting such change possible. Our current agriculture system is very ingrained within our state culture; at the status quo, agriculture represents a thirty-one billion dollar industry and supports jobs for over one hundred and seven thousand Hoosiers. (ISDA) For these reasons, it is acceptable and completely rational for many Indiana residents to be fearful of the changes that could occur through such a large shift in our agricultural practice. Yet, this change does not have to be detrimental to Indiana farmers, and in fact, many of them could actually stand to benefit from the transition to these changes.

Farm incomes are on a decline within America. The year 2018 showed a decline in the profitability of American farms (Economic Research Service) and in Indiana specifically, the outlook has not been much better. Over the past three years, farm incomes in Indiana have dropped nearly one and a half billion dollars annually, and expectations for 2019 are also similarly grim, particularly for animals/products such as pigs and dairy, which are both expected to remain below their breakeven profit margins for the year. (Hurt) With the profitability of animal farming practices in the decline, there is no better time than now for Indiana farmers to turn away from meat, dairy, eggs, and the grains grown in Indiana to support these industries (which, statistically speaking, would be roughly seventy to eighty percent of total grains grown in the country (Shah)).

A switch to organic farming of fruits and vegetables proves to be a viable option as we begin to turn towards a more sustainable, and even more profitable, farming system in the state. The demands of organic foods are on the rise with demand for organic fruits and vegetables being the best selling category of organic foods. (Economic Research Service) In our current market, profitability from organic agriculture has proven to be higher than that of conventional agriculture practices, thanks to the monetary premiums that consumers are increasingly willing to pay. (Reganold, 6) Yet even without premiums, many crops that are staples of Indiana agriculture- such as grains and soybeans- can still be equally profitable if not more profitable than conventional agriculture. Thanks largely to the lower input costs of well-managed organic farming systems as well as the increased resiliency that organic crops possess in the face of drought and other adverse agricultural conditions (harsh conditions that can be expected to become more common in light of current climate change rates), at least half of all organic grain and soybean producers are able to turn a greater profit than conventional growers of these crops even without calculating in the premiums farmers can make through organically grown crops; calculating in these premiums, the profitability of organic crops greatly exceeded that of non-organic. (SARE)

Not only would a switch to organic farming stand to benefit farmers financially, the switch would stand to have a major positive impact on the local environments around these farms. Organic farming helps lead to long-term environmental sustainability for farms by preserving soil nutrient constitution, decreasing pollutants released in nearby streams and other waterways, preserving local biodiversity, and reducing the amount of air pollution released by the farming operation. (FAO) With both environmental as well as economic reasons for Indiana

farmers to contemplate a switch to organic farming practices, it is important for local farmers to have adequate and reliable information about organic farming, and to have the knowledge to be able to change if they wish to do so.

Current Assistance to Indiana Farmers

Farmers of the state of Indiana do not have any shortage of reputable resources and financial assistance at their disposal on their journeys towards organic produce farming. Purdue University offers a variety of programs relating to organic farming, from information sessions on how to convert a conventional farming operation to organic, to even knowledge building and networking meetings for organic farmers currently involved in the practice. (Purdue) Financially, the USDA offers numerous funding and economic assistance opportunities for farmers wishing to make the conversion to organic farming and then assisting and protecting farmers once they make the switch to organic agriculture. (Farm Service Agency) With so many resources at the disposal of Indiana farmers to make the conversion to Indiana, it is up to demand and consumer preferences to encourage many Indiana farmers to take this leap into organic farming.

Grants for Farming Conversion

Many foundations and non-profit organization across the country, and even around the world, exist either for the sole purpose, or take on the vital role, of helping farmers of conventional animal husbandry practices learn how to make the switch towards organic farming of produce and grains. One example would be the organization Farm Transformers from

California. (Blue Horizon). Organizations such as Farm Tranformers help provide individualized service and know-how to farmers to teach them not only what crops would be viable to grow on their land that was previously used for animal rearing, but also help teach the best practices to become successful in organic produce farming. These organizations also help to connect farmers to one another as well as to other local organizations that could assist them. (Farm Transformers) Providing grants for organizations in Indiana to begin serving this important role would be a major step towards making a more sustainable food system in our state, and making this change viable and even economically beneficially for local farmers.

Conclusion

Ultimately, there are numerous options available that can help lead the state of Indiana towards a more environmentally sustainable food system, each option possessing its own unique strengths, but also obstacles. Financially, consumers often have difficulty in affording less resource-intensive and more healthful foods such as fruits and vegetables due to the relatively high cost of these products in comparison with the caloric content these foods possess. A beneficial means of lessening this gap involves the implementation of taxation regimen which taxes resource-intensive animal products and further subsidizes the purchase of fruits and vegetables. Yet, although emission taxes as well as taxes on high-fat foods have proven successful in other nations in the past, the possibility of implementing these same practices in Indiana would prove difficult due to the political backlash that any new tax would inevitably face.

Further, education is another key issue when it comes to animal products in our food system: large misunderstandings exist between not only what consumers know and understand about the animal rearing process, but also about what constitutes a healthy diet in general. To answer the former, and to deal with the lacking regulation of food product labelling, the best means of creating more standardized farmed animal rearing practices would lie in the encouragement of private animal welfare standards. Through the implementation of private welfare standards to decrease farm density, many of the most damaging environmental concerns of large-scale factory farming could be ameliorated; further, the addition of these higher standards would drive up the price of products for the participating farmers. Such an action of increasing the price of meat would simultaneously make these farmers a greater profit while also decreasing demand for these products. Beyond the lack of knowledge as to farm rearing practices, many people in both America and across the developed world lack up-to-date nutrition education. Studies have shown that much of an individual's eating habits are formed during their school years, and consequently, teaching proper nutrition education at this age is vital to a lifelong understanding of the benefits of eating a largely plant-based diet. Through teaching children nutrition education through multiple sources, and not simply the USDA guidelines, schools can provide a more well-rounded nutrition education that stresses that animal products do not need to be a fixture of an individual's diet, and that a diet consisting of many whole grains, fruits, and vegetables is good for not only human health, but also the environment.

Lastly, availability is a key factor as to assisting this switch and to making a more plant-based diet a possibility for Indiana residents. Numerous other states and countries have already implemented legislation requiring plant-based meals in public institutions in hopes of

encouraging consumption of these meal options and making them accessible to the people that desire them. But going further, plant-based options would become truly ubiquitous in Indiana life if these meal choices were available in private institutions as well. While the Indiana government cannot force grocers and restaurants to make this change, it can be encouraged through promoting voluntary industry agreements between the government and these industries, in which the industries can set the goal of adding more plant-based items to their establishments in exchange for public praise and rewards. Taking on actions such as these could help to normalize plant-based eating in the state and would make these options more accessible to the people who desire them, or to the people who would simply be interested in trying them.

The implementation of any of these recommendations either solely or in conjunction with one another could stand to be greatly beneficial towards lessening the consumption of animal products within the state, which could help to lead Indiana towards a more sustainable environment and even a healthier populace. Yet such an outcome does pose potential challenges towards our current food system. Switching diets away from animal products and towards more plant-based diets would stand to alter the status quo of our food system, but this change could be weathered in ways that would prove beneficial to local farmers. With farm profits already in decline for many animal-based products, this change of diet presents an opportunity for farmers to undergo a conversion from conventional farming towards the farming of organic produce. Organically grown produce is typically more resilient to adverse weather, it is more environmentally sustainable, and it generally leads to greater profits for the farmers that produce it. Through providing grants to help in the conversion from traditional agriculture towards organic agriculture, the state of Indiana could help to lead Indiana residents towards a more

sustainable food system without allowing this transformation to have adverse effects on Indiana farmers.

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