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The Balance between Food and Fuel Needs in Brazil

With gas prices continually on the rise and the increasing inconsistencies in the world's food supply and distribution, the use of biofuel technology is developing into a matter of heated debate as its applications become more and more prevalent to our daily lives. Nowhere is this more true than in Brazil, where a global economic power that places agriculture as a primary focus is facing an increasingly apparent divide across the poverty line. Although more than 100 million workers are involved in the Brazilian labor force, in one of the fastest-growing economies in the world, nearly one-third of the nation's population lives in food insecurity. This shockingly unequal distribution of wealth necessitates the call for change. Though measures are already being taken, such as through the Zero Hunger program enforced to aid and assist those suffering from food insecurity, there remains the need for developments to be made in the industrial sector of biofuel production alongside political action.

As a student in Indiana, I travel for what feels like hours through endless fields of corn to get to school. It is difficult to think that there exists such a multitude of people who still suffer from undernourishment when what seems like miles and miles of corn are available for consumption. And it's true, the corn does go to use, but not in the way one might initially imagine. Upon further research, I discovered that since the 1970s and 80s, the ethanol industry in the U.S. has expanded, largely in the Midwest, and some 20% of America's corn production goes towards making biofuels. This sparked my interest in the correlation between the use of potential food sources as fuel and global food security.

Typical Subsistence Farm Families in Brazil

In Brazil, where nearly 30 million people are considered to be the rural poor ("Country profile"), the contrast between large plantations controlled by wealthy landlords and small family-run farms is striking. Out of the country's 4 million farms, the majority consists of small subsistence farms in communities where adequate education and health-care programs are not always readily available and poverty-stricken people suffer from inequality in land tenure ("Rural poverty"). Brazil's growing interest in pursuing agribusiness has caused many families to become pawns in larger commercial functions, but the ensuing economic benefits are collected by the wealthy, and not the poor, as illustrated by the World Energy Council's estimate that the poorest 11.5% of Brazilians receive a mere 1% of the nation's GDP.

The northeastern region of Brazil, where the climate and environment are less suitable for productive farming and the economy suffers from a lack of natural resources, is also where the highest concentration of impoverished people can be found, in a group largely made up of women and children. In such rural areas, the poverty rate is almost double that of the national average, and although Brazil's literacy rate is around 90%, this number is much lower in areas with limited access to proper education facilities, or for farm families who cannot afford to let their children attend schools that are far away, leading to some 14 million illiterate adults living throughout the country. Although the size of the typical family has decreased throughout the years, to an average of around three or four persons per family, the poorest

region of Brazil is also where the largest households can be found, as family is considered the basis of social structure and extended family is often very close (Givisiez 16).

For small family-run farms, sugarcane, soybeans, and coffee are among the top crops grown, along with staples such as rice and beans, which are integral to the diet of Brazilian families. The diversity in Brazil's agriculture accounts for the country's theoretical ability to sustain itself in terms of food. Nevertheless, despite the fact that Brazil produces per person 1000 kcal/day more than the recommended minimum intake, some estimates say that approximately 10% of Brazilians are still chronically undernourished ("Brazil's Food Security Policy"). Additionally, for subsistence farming families where agriculture is the main source of income, and where the majority of income goes to food, climate and environment also play a significant role in determining their success and fiscal stability. In the disadvantaged, impoverished northeast, semi-aridity and less fertile soil impede agricultural productivity. Furthermore, the insufficient infrastructure of rural areas leads to inaccessibility to markets for their products and food crops.

Because of such environmental challenges and social inequality, the world's 7th largest economy is in dire need of action, to encourage and allow the rural poor to contribute to and benefit from the country's economic success. Could improvements and developments in biofuel technology be the key to bridging the income gap and feeding the hungry in Brazil?

The Current State of Biofuel Use in Brazil

Beginning in the 1970s, following an oil crisis where gas prices quadrupled, the Brazilian government became involved in producing ethanol and enforcing its use. Today, it is one of the world's top producers of ethanol, and its biofuel industry is a success story unparalleled in the realm of renewable energy. Out of an approximate 16 million acres of cultivated land, almost half is dedicated to ethanol, leading to more than 4 billion gallons being produced annually. Some 80% or more of the nation's cars are able to run on any combination of gas, ethanol, or both, and can be fueled up at any of the more than 33,000 gas stations across the country where ethanol is provided ("Global Dynamics"). The efficient production of usable fuel from a widely-grown crop provides a seemingly perfect solution to the growing problem of meeting transportation and energy needs. All of this boils down to one word: sugarcane.

Ethanol is an alcohol that can be biologically produced through the fermentation of plant material; in the case of Brazil, sugarcane is the feedstock of choice. Used either in its pure state, or in a percentage-mixture with regular gasoline, ethanol from sugarcane is currently the world's largest source of raw material for renewable fuel. As a more cost-efficient process in comparison to the U.S.'s production of ethanol from corn, Brazil's sugarcane ethanol industry is cheaper, yields more energy per ton of feedstock, and is on the rise, looking towards future expansion with an estimate of more than 400 plants in the country by 2012 ("Global Dynamics"). But do all these facts and figures make ethanol sound too good to be true?

The biofuel industry is far from perfect. Increase in demand for ethanol from sugarcane cuts into farmland originally designated for other purposes, such as the booming soybean industry or grazing pastures for cattle. This in turn causes more deforestation in the already thinning Amazon rainforest, an environmental crisis in itself. Moreover, although it can be argued that the ethanol industry provides economic

opportunity, a country already second in the world in terms of inequality is certain to offer fewer benefits for the poor and elicit increased concern in issues about food supply and distribution. Why grow crops on land that could go towards feeding the hungry? Why spend government resources on fueling the needs of the wealthy, rather than aiding the poor? The question remains as to what alternatives to ethanol from sugarcane should be considered, and what course of action should be taken next.

Alternative Technologies: Influences on and Implications of Use

Bioenergy is based upon the use of fuels made from living matter, through the fermentation or processing of sugars in plant cells or oils from vegetables and animals. However, the feedstock used to produce the ethanol or diesel does not have to come from crops that could go to food insecure populations. Realistic alternatives are becoming more and more available: non-food source-based fuels have been successfully made from plants such as jatropha and camelina, and research continues to be done on developing cellulosic ethanol from non-edible plant matter.

Though the new and improved technologies are far from completion, cellulosic ethanol shows promise in providing another source to help meet the world's growing energy needs. As a way of diversifying agricultural output, the use of such developments is also a way to possibly improve economic yield as there is no need for the waste of arable land on non-food crops. Potential feedstock crops such as camelina have wider ranges of optimal growing conditions, so they are less likely to be adversely affected by changes in climate. And the plant material used to produce cellulosic ethanol also does not demand much of the environment of Brazil and its farmers. In spite of the fact that these processes are not yet as cost-efficient or universally available as food source-based ethanol production is, they still remain viable options for the future.

Of course, many factors affect the future success of these so-called second-generation and third-generation technologies. As the world's population continues on an upward trend, the growing pressures on the environment to sustain mankind with enough food and fuel are becoming more evident. If cellulosic ethanol can continue to develop in efficiency, non-food crops could be grown on land unsuitable for the growth of edible feedstock, so the issue of delegating land for use becomes less substantial. In addition, the use of inedible feedstock makes the relationship between food prices and fuel prices less direct, so that agriculturally-dependent subsistence farm families are not as drastically influenced by sudden changes in the fuel market ("Promises and Constraints"). Environmentally speaking, this also offers an opportunity to increase biodiversity and the health of ecosystems in Brazil.

In fact, for developing rural areas, harvesting biomass for fuel production or devoting land inappropriate for food crops to other plants that can be fermented to make ethanol can prove to be advantageous. For Brazil, the climate is suitable for the growth of a variety of plant life, but not all of the land goes towards farming food crops. Excess land could be used to plant trees or other vegetation that could be used as biomass for cellulosic ethanol, and in this way, farmers would be diversifying their output and lowering investment risks compared to farmers with dependence on specific crops. Particularly in Brazil, where the net yield of producing ethanol from biomass is greater than that of importing gas, in terms of energy and price, rural farmers can benefit from participation in the biofuel market.

Suggestions for Policy

Despite the potential benefits of introducing non-food source-based biofuel technology to rural farming families in Brazil, it is important to keep in mind that for such food insecure places, taking the risk to invest in the bioenergy market may not always be the wisest decision. For subsistence farmers, the uncertainty about the future of the biofuel industry is not comforting, and hungry families have more important matters to deal with than the possible long-term promise of profit from collecting biomass. Devoting land to feedstock for fuel may jeopardize rural families, meaning the implementation of programs to help solve food insecurity is still very necessary.

In order to effectively address the role new biofuel technology plays in relation to the issue of food security, it is essential to consider what steps have been and still are being taken to break the cycle of poverty and hunger. As a government, Brazil is already very aware of the social challenges it faces in solving the crisis of food insecurity, and President Luíz Inácio Lula da Silva already instituted the Zero Hunger Program in an effort to promote regular, nutritious food for all Brazilians. According to the Ministry of Food Security and Hunger Combat, the Zero Hunger Program understands food insecurity as the lack of "access to dignified food, with sufficient regularity, quality and quantity" and seeks to resolve the matter by directly providing for those who suffer from hunger, encouraging the participation of various parties in national policy-making, and enforcing policies designed to target the root causes of hunger and poverty ("Brazil's Food Security Policy").

One of the United Nation's Millennium Development Goals is to halve the number of people suffering from hunger from 1990 to 2015. To ensure that Brazil is on its way to reaching this goal, the government needs to enforce limits on the amount of food crops going to ethanol production, while continuing to endorse research in the field of alternative energy. If too much of the nation's resources are being exhausted on producing fuel, not enough land or money will go to impoverished rural families who require food crops not only to sell for income, but to sustain life. Additionally, while there is hope for the development of fuel technology produced from non-edible biomass, research is necessary to make such processes cost-competitive and more widely available.

By emphasizing development among local communities to help generate economic growth, and providing venues for food insecure families to eat and healthily sustain themselves, the government of Brazil can cut down on the percentage of the population affected by poverty and hunger. Implementing programs that invest in improving infrastructure and supporting rural families can assist those willing to become involved in the farming of non-food crops for ethanol, and break the cycle of unemployment and falling food supply.

Looking Towards the Future

Biofuels are one of the world's hottest topics on the future of energy; given humankind's rapidly increasing fuel needs, we are soon reaching the point where we must question the sustainability of the globe. With some 7 billion people sharing planet Earth, and that number constantly on the rise, the challenge remains to feed hungry mouths and fill empty gas tanks. In Brazil, the economy is quickly becoming one of the world's most successful, but factors such as the environment and social inequality

stand as obstacles to the country's goal of eradicating hunger.

A global power in ethanol production, Brazil has already recognized the benefits of utilizing renewable energy sources, but the sugarcane industry is still tarnished by the issue of rural poverty and inequality in land tenure. When one-third of the nation's population suffers from food insecurity, what must be done to provide both food and fuel? One of the answers lies in the development of non-food source-based technology. Through stimulating local economies, promoting environmental sustainability, and encouraging the use of clean energy, this is the fuel of the future. All that remains is for continued research and implementation of government policy to retain a balance of land use and keep equal distribution of resources, for both the wealthy and poor. If these steps are taken, Brazil can look forward to a well-powered, well-fed future of continued economic and environmental success.

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