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The Effectiveness of Ethanol in a Globalizing China

Trying to solve the problem of food security in rural China is a difficult and seemingly impossible task. One must carefully explore possibilities without disrupting the local systems of administration in rural China. Traditional methods must be utilized to the maximum level of efficiency. New methods are examined under strict scrutiny to test their effectiveness. The driving force, the centralized communist government, is capable of quickly producing results anywhere on the board, either positive or negative. Even with a strong leadership, it will take years of intensive work for Chinese farmers to climb out of poverty. China has a huge potential to not only develop economically, but also to improve the standard of living for all Chinese, not just the majority of the population that live in the eastern third of the country, where the citizens receive most of the benefits of westernization. With a recorded history of more than six thousand years, China is one of the world's oldest civilizations. Some of the most important inventions were made in China, such as paper and gunpowder. However, Europe achieved undisputed technological superiority after the Industrial Revolution. China was forced to resist European and American imperialism in the 19th century. In the 20th century, a massive civil war was fought and a communist government was established under Mao Zedong. In 1958, Mao began the Great Leap Forward. The goal of this campaign was to keep the growth of agriculture on a par with the growth in industry by achieving self-sufficiency. Many farmers were pulled off their farms to run furnaces for metal production. This not only decreased the agricultural labor force, it also caused major deforestation throughout China to meet fuel demands for the furnaces. In 1978, the state began to experiment with a mixed economy, blending communist and capitalist ideals. Communal farming was replaced with individual farms that were still under government control. After meeting an annual quota of grain which was sold at a predetermined price, farmers could sell the remaining produce on the market. Over the past few decades, the government has become more and more capitalistic. This has led to tremendous economic growth in recent years. As China transitions into the 21st century, it must become agriculturally self-sufficient and decrease the number of subsistence farmers in order to thrive. Market-oriented farm production will become a necessity.

With the world's fourth largest economy, China has the potential to invest in agricultural production. However, there are major problems with Chinese farmers today. Some farming practices are inefficient. They are not affected much by the globalization that is changing the rest of the country. The Chinese government must maintain the current growth of annual income of farmers and develop new economic plans to help farmers. Globalization affects these factors by giving the Chinese government more resources and opportunities to improve farming methods and the standard of living for farmers. As China increases industrial output, it will begin to compete with the United States for access to oil. It is imperative that an alternative fuel source be found; biofuel in the form of ethanol is an effective means of responding to the plight of food security. A key factor in improving food security in China is conducting scientific research into crop biology for improving yields, disease and drought resistance, and sustainable agricultural systems.

It is impossible to define a "typical" subsistence lifestyle with so many diverse types of subsistence farming in China, ranging from a wheat-based diet in the northern plains to rice, fish, and greens in the southwest. However, the economic situation of all the groups is similar. The majority of the Chinese population, consisting of 700 million people, lives on less than 2 US dollars a day. Income-wise, Chinese farmers face being left in the dust while city-dwelling Chinese reap the benefits of westernization. In 2005, the average yearly income rose 6.2% in rural areas compared to 9.6% in urban areas. This may not seem like a huge difference until one considers that the average income in urban areas was already

over four times greater, 2,622 Yuan compared to 637 Yuan. When benefits such as healthcare and education are calculated in, the difference expands to seven times greater. 10% of people live under the line of poverty as defined by 1 US dollar a day. Millions of farmers are unable to afford tuition fees for their children. No government-subsidized health care system is available. The government increased the amount of money spent on rural areas and farmers by 14% to 339.7 billion Yuan from 2005 to 2006. This trend must continue to allow farmers to afford education and improve their farming practices.

Farming methods not only impact yields, but also have profound effects on the well-being of the population. NASA scientists have noticed that the decline of the amount of methane entering the Earth's atmosphere over the past 20 years may be linked to changes in rice farming over the same period. Beginning in the 1980's, Chinese farmers started to drain rice paddies in the middle of the growing season because they realized that it not only increased yield, but decreased the amount of water use as well. Draining rice paddies allows for the production of more nitrogen in the soil. Without drainage, microbes begin producing methane with anaerobic processes. In recent years, many farmers have actually been forced to drain rice paddies due to water shortages. Also, the replacement of organic fertilizers with nitrogen fertilizers has decreased emissions. Aerating the soil lowers the amount of methane produced. An example of a detrimental effect is the unsanitary method of raising livestock. In Guangdong, the farmers have access to antibiotics that should require a license. There is a possibility of bacteria developing resistance to the antibiotics. The creation of a "superbug", or multiresistant bacteria, could result in the deaths of thousands or even millions of people. The first case of SARS, severe acute respiratory syndrome, was in the village of Dongxing. The lack of sanitation for livestock is appalling. Pig wastes are emptied into ponds that raise shrimp and fish for human consumption. Chickens are kept above pigs, with their waste emptying into the pig troughs. Over 800 people died. Bird flu is another disease that originated under these conditions. Health officials around the world say that improving farming practices and segregating livestock from humans is a key to stopping the spread of the disease. The regional director of the World Health Organization stated, "We cannot kill all the chickens and ducks to prevent bird flu from spreading among them and to humans, therefore we have to make sure the chickens, ducks and humans do not mingle together." The Avian Influenza Organization estimates the H5N1 strain would cause about 150,000,000 human deaths if it mutated into a form that is transmittable by humans. Since the strain was discovered in Hong Kong in 1997, tens of millions of birds have directly died from it and hundreds of millions of birds have been culled. The Chinese government must actively try to educate farmers to prevent future outbreaks such as these. It should organize programs to teach professional skills.

Even though the average size of land for each farmer is smaller than in the US, China ranks first in the world in farm output. Most of this is due to the sheer number of farmers, more than 329 million. China has about 7% of the world's arable land to feed 20% of the world's population. The government is concerned with the amount of output not meeting demand in the future. In the first half of 2004, China imported more than 10 billion US dollars worth of farm produce. Self-sufficiency is always a problem, along with surplus labor due to excess population. China is capable of ensuring its food security though. Lester Brown, president of the Earth Policy institute, believes food security is possible because of the growth in the Chinese economy, but a new economic plan must be developed to be sustainable and in accordance with the current situation in China. It will be impossible for the Chinese economy to sustain the same level of growth over the past few years.

Globalization doesn't so much cause insufficient income as it does prevent farmers from receiving it. For many farmers, not very much has changed since 1978 when China adopted a new economic policy. This new market-oriented economy is directly beneficial to everyone except for farmers. The richest 10% of the Chinese population, those living in the cities, control 45% of the wealth, whereas the poorest 10% of the people, rural farmers, control only 1%. Of course, China as a whole is much better off with the current system. According to some Western analysts, its GDP has at least

quadrupled since 1978, with the Chinese government making estimates as high as a tenfold increase. In the book The World is Flat, Thomas Friedman writes about how China and India became major parts of the global supply chain for services and manufacturing. Look on the back of most everyday products and a “Made in China” label will be there. There has been a phenomenal increase in wealth in the middle class of these two countries. Individual empowerment is an important part of developing nations. It used to be that companies were the only entities that could effectively globalize. Now services and jobs are outsourced to individuals. Low-level database work to even high-level IT management systems of US companies can be outsourced to start-ups in India. In a truly flat world, huge global supply chains can commoditize most jobs and can outsource them to where labor and services are cheapest, namely China and India. It’s possible for individuals to compete in the global job market, not just local ones. Sure, this is really great for the middle and upper classes. They can take advantage of these new opportunities to improve their lives. What about the lower classes, the rural farmers who live under the line of poverty? For now, they are stuck at the bottom of the social pit with no ladder and are just waiting for the government to slowly fill up the hole with small subsidies every year. They will eventually climb out, but it’s possible to facilitate the process. Friedman writes:

Let’s stop here for a moment and imagine how beneficial it would be for the world, and for America, if rural China, India, and Africa were to grow into little Americas or European Unions in economic and opportunity terms. But the chances of their getting into such a virtuous cycle is tiny without a real humanitarian push by flat-world businesses, philanthropies, and governments to devote more resources to their problems. The only way out is through new ways of collaboration between the flat and unflat parts of the world.

The “flat-world” that he is referring to is a level playing field, which can be created by multinational organizations coming together to create methods to help rural farmers.

Increasing the farming of genetically modified crops is one method. In 2004, the Agricultural Biotechnology International Conference published a manifesto titled “Science Helps to Improve Agricultural Systems”. As the human population increases and as more countries start developing, a much greater supply of food will be necessary to feed everyone. The manifesto states:

Consumer diets in developing countries are increasingly changing from plant-based proteins to animal protein, a trend that requires a greater amount of crop-based feed. In spite of improvements in agricultural production within the last few decades, e.g. in yield and quality, intensive agriculture can have significant negative impacts on the environment including intensive use of water, reduced biodiversity, soil erosion and salinization. Hence, the introduction and widespread adoption of better agronomic systems, that result in crops higher in quality and yield and reduced land use, and even more sustainable and environmentally friendly agricultural practices, are essential if we are to meet the population growth and environmental challenges of the future. The undersigned are convinced that these premises are true and accurate and, therefore, freely subscribe to the following conclusions: Eco-compatible agriculture, that provides high quality and high yielding crops, should take advantage of all available technologies, including genetic modification, to develop crop plants that are optimally adapted to their environment. Science has for many years played a pivotal role in providing people with more and better food.

In 2001, China produced 3% of the world’s GM crops. This number will steadily increase as the Chinese government encourages the use of GM crops to benefit farmers. Most of the crops are rice, cotton, and corn. GM rice has already been shown to be easier to grow than conventional rice. In a two-year study begun by researchers in China, Rutgers University, and the University of California in 2003, farmers growing GM rice had less pesticide use and pesticide related illnesses, and they had greater yields. The

two main strains were the Xianyou 63, which is resistant to the rice borer and leaf roller due to an inserted Bt gene, and the Youming 86, which has a resistance gene implanted from a cowpea plant. The farmers grew the variations by themselves with no help from the researchers, and had to make their own decisions regarding the spraying of pesticides. The differences between the number of times pesticides were sprayed between the GM rice and conventional rice in a growing season were astounding. The two varieties of modified rice averaged less than 1 spraying whereas conventional rice required 3.7 sprayings. This means that some farmers didn't spray their GM rice a single time during a season. Not surprisingly, no farmers who had planted the genetically modified varieties of rice reported any cases of pesticide-related illnesses. In 2002, 8.3% of the farmers who grew conventional rice reported adverse effects from pesticide-use. That number decreased to 3.0% in 2003. There was a difference in yields as well. Yields of the Xianyou 63 strain were 9% higher than conventional rice. The Youming 63 strain did not have a significant yield difference, but researchers attributed this to the fact that it was only planted in one village and in relatively few farms in that village. The improved well-being of the farmers should be reason enough for the Chinese government to strongly encourage farmers to plant GM rice even without increased yield.

Now, where does ethanol fit into the picture? According to the Renewable Fuels Association, ethanol use may decrease the mileage in some vehicles by 10-15%. However, the Chinese government views the reduction of air pollution as a worthy benefit capable of offsetting the negative costs of ethanol. China is the third largest producer of ethanol; farmers mainly utilize cassava and sweet potatoes. By encouraging the production of ethanol, China is able to wean itself off its dependence on oil and will help rural farmers by raising profit margins. It is a win-win situation.

Despite the obvious benefits of ethanol production for rural farmers, many obstacles still exist, such as price regulation and dependence on government subsidies. Another problem is the recent ban of the use of corn for the production of ethanol. Because corn is a major food crop in China, the government is worried that the rising demand of raw materials for ethanol will result in increased food prices. The Food and Agriculture Organization of the United Nations supported the decision. However, while it is generally agreed that decision is not in the best interest of rural farmers, the production of ethanol using non-food crops is an important issue to be considered. The United States is the largest producer of corn, and an increasing proportion of it is used for ethanol. This is responsible for driving up corn prices, which also affects livestock feed markets and meat prices. China and the United States are so economically interconnected that policies regarding issues such as ethanol production greatly influence both countries.

The emphasis on globalization is not that it directly benefits rural farmers, but it enables the government and private organizations to create programs to benefit them. In this century, China will determine its own purpose in the world. The centralized government will continue to play a pivotal role in maintaining the safety and well-being of its people. It has spent the past 30 years developing an economy that is "Socialism with Chinese characteristics". The policy has proven to be very successful. With the economy growing at unparalleled rates, China's ability to devote resources to the development of its rural areas will become crucial to assisting farmers by getting them out of poverty. 700 million Chinese live in impoverished conditions: that is more than twice the population of the United States. Rural farmers must be educated so that their farming methods are not harmful. Improper methods are detrimental to the environment and to the rest of the population. The government could subsidize a large part of farmers' education. This in turn benefits the country as a whole because agricultural output would be increased and China would become even less dependent on imports. Despite the relatively high population-to-arable land ratio, China maintains the ability to feed its population for now. Many people are worried about what may occur in the future. China must utilize genetically modified crops not just because it's necessary, but because GM crops are the next logical steps to achieving the maximum amount of agricultural output with the resources on Earth. The crossbreeding of various strains of crops

created the Green Revolution. The genetic modification of existing strains will produce the next Revolution. Even though many countries around the world oppose GM crops, China's embracement of their use allows the country to take full advantage of this weapon against hunger. Rural farmers will benefit from decreased pesticide use and larger yields. The production of ethanol will be a defining characteristic of farming policy as demand for alternative fuels increases every year. All ears will be on the United Nations and other organizations regarding the issue of ethanol. Globalization has shrunk the world. It is increasing the level of interdependence among individuals in all societies. Now is the time to begin a global effort to improve the standard of living for all human beings.

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