

WPSA INVITED LECTURE

Impact on the World Poultry Industry of the Global Shift to Biofuels

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ABSTRACT The shift to biofuels is a worldwide phenomenon, but the most notable recent development has been the rapid increase in the production of ethanol in the United States. Ethanol production in the United States enjoys a substantial subsidy, tariff protection, and mandated use. The consequence of increasing biofuels pro-

duction is to raise the cost of feed and food worldwide. Those that suffer from this policy include all consumers of food, most notably the urban poor of developing countries. Those that benefit from the policy are farmers everywhere, including farmers in developing countries.

Key words: corn, ethanol, agricultural policy

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INTRODUCTION

The global shift to biofuels currently encompasses many different countries and products. In the Americas, ethanol is made from sugar in Brazil and from corn in the United States. Biodiesel is produced mostly in Europe, using rapeseed and sunflower seed. Ethanol is also produced in Asia from cassava and in Europe from sugar beets and wheat. Vast areas of Asia are being planted to oil palms destined for conversion to biodiesel. Everyone seems to be jumping on the biofuels bandwagon.

Until this decade, sugar-based ethanol in Brazil contributed the most to the increase in world biofuels. However, that massive 3-decade effort in Brazil has been overshadowed recently by US corn-based ethanol production.

According to the USDA (2007), in the last crop year (crop years run from September 1 to August 31), 40 million metric tons of corn were used to produce ethanol (1.6 billion bushels), and in the next crop year, 85 million metric tons of corn (3.4 billion bushels) of corn will be used, fully 25% of the US corn crop. The 1-yr increase in the use of US corn for ethanol next crop year will, by itself, be greater than the total production of corn in Argentina, the world's second largest exporter of corn. Each week (on average), the United States uses 80 thousand metric tons or 2 million more bushels of corn to produce ethanol than the previous week. This massive increase in the volume of corn required by the US ethanol industry is sending a shock wave throughout the world's food system.

Although the United States is not alone in the global shift to biofuels, it is the most notable at the moment. The rapid diversion of corn to make ethanol in the United States is arguably the single most important agricultural policy issue in the world today. Therefore, this paper will concentrate on the origin and consequences of the US ethanol subsidy policy.

ORIGIN OF THE US CORN ETHANOL BOOM

The origin of the US corn-based ethanol boom can be found in the energy crisis of the 1970s when efforts were made to reduce US dependence on foreign sources of oil. Policy initiatives in the 1970s included significant increases in the fuel economy of cars combined with a subsidy for the use of gasohol, the mixture of ethanol and gasoline. The subsidy never led to any significant production of ethanol because of the drop in the price of petroleum in the 1980s. Even the word, gasohol, disappeared. What did not disappear was the subsidy; it remained on the books even if there were few takers.

As documented by Tyner (2006), the first ethanol subsidy came out of the Energy Tax Act of 1978, which provided 40 cents per gallon of ethanol tax exemption. In 1982 the Surface Transportation Assistance Act increased the tax exemption to 50 cents per gallon. In 1984 the Tax Reform Act increased the tax exemption to 60 cents per gallon. In 1990 the Omnibus Budget Reconciliation Act reduced the exemption to 54 cents per gallon. The 1998 Transportation Efficiency Act of the 21st Century reduced the exemption to 51 cents per gallon. Finally, the Jobs Creation Act of 2004 changed the mechanism of the ethanol subsidy to a blender tax credit instead of the previous excise tax exemption and extended the ethanol tax exemption to 2010. That is the situation today.

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It was difficult for the ethanol industry to become established in the 1980s, even with the subsidy, because of the low price of fossil fuel energy. When oil became more expensive in the last decade, the subsidy began to provide an incentive for the expansion of the industry. As the price of oil rose higher and higher, the incentive became compelling. For this reason the ethanol industry experienced explosive growth in the last few years.

The origin of the ethanol subsidy, the oil crisis of the 1970s, focused attention on the depletion of easily obtained oil supplies around the world. Although the total quantity of world oil reserves is unknown and controversial, what is not controversial is the fact that the easiest-to-reach oil reserves are fast disappearing.

The Hubbert peak theory, named after the American geophysicist Marion King Hubbert, has gained currency in the last few decades. According to this theory, the rate of petroleum production for any given geographical area, from an individual oil field to the planet as a whole, tends to follow a bell-shaped curve, rising, reaching a peak, and then falling. Peak oil refers to a singular event, the peak of the entire planet's oil production. In 1956 Marion Hubbert (1956) predicted that 2006 would mark peak world oil production. It is already clear that 2006 did not mark peak world oil production. His prediction is therefore incorrect. However, it is possible that M. Hubbert, while being wrong about the date, was correct at least to the extent to which his concept applies to easily obtained oil.

An example of a Hubbert peak may be found not too far from San Antonio in the Cantarell oil field in Mexico. It is the second largest oil producing field in the world and produces 60% of Mexico's oil. Without Cantarell, Mexico would not be exporting oil. Production at Cantarell peaked a few years ago and is falling. Another example is Prudhoe Bay, AK. From peak production of 1.6 million barrels per day, production there is down to a little over 300,000 (State of Alaska Tax Division, 2007).

An even more serious threat to the world's supply of oil is the inevitable decline in the world's largest oil field, the Ghawar field in Saudi Arabia. How much oil is left in Ghawar? There is no public information available on that subject. However, it is known that massive amounts of seawater are now being injected daily into Ghawar to maintain production. This typically happens toward the end of the productive life of an oil field.

Does this mean that the world is running out of oil? Probably not, however, the easy-to-obtain oil from mammoth oil fields is running out. The oil that costs \$1 per barrel to produce is coming to an end, to be replaced by sources like the oil sands in Alberta, Canada, that yield oil costing \$30 to \$40 per barrel.

Since the time of President Nixon, energy prices and imported oil have generated heated political debate. In the 1970s the combination of high oil prices and a relatively successful conservation effort led to improved energy efficiency and lower energy prices. There was a temporary reduction in the percentage of imported oil. However, lower oil prices in the 1980s led to increased use,

decreased efficiency, and complacency, which ended, not surprisingly, in much higher energy prices and a rising percentage of imported oil. That is the situation of the United States at this moment.

At this juncture in US history, it might be a good idea to give conservation another try. Unfortunately conservation is not popular, and in this we are all complicit. As Pogo the comic strip character said in 1971, "We have met the enemy and he is us." In the United States, most of us prefer an energy intensive lifestyle.

As a result, instead of energy conservation, the United States has an expensive crash program to produce energy from corn. It has been deemed more politically popular to burn food rather than change the need or desire to drive alone for long distances in inefficient 5,000-pound vehicles.

It is understandable why ethanol is politically popular. The United States wants to keep large cars and trucks. Crop farmers are, of course, happy—particularly those in Iowa, the site of the first presidential caucus. Ethanol plants bring jobs to rural areas and reduce the amount of oil imported from volatile areas around the world. Is there a downside to ethanol?

THE DOWNSIDE TO ETHANOL

The downside to ethanol is the consequence of shifting a massive amount of grain from use by people and livestock to use by automobiles and trucks. Put in the simplest terms, the problem is that the price of food worldwide is rising due to ethanol, and the number of undernourished people will, as a consequence, rise as well. According to a study done at the University of Minnesota by Ford Runge and Senauer (2007), the number of undernourished people will rise by 50% from 830 million to 1.27 billion people due to the US ethanol policy. Even if that study significantly overestimates the effect, there will still be hundreds of millions of people adversely affected by ethanol.

Why can't the poor just eat cake as Marie Antoinette suggested? As the price of corn goes up in the United States due to ethanol production, the costs of all other grains and foods around the world go up as well. A vivid example of rising costs was found next door in Mexico this year. White corn is traditionally used for tortillas in Mexico (which, by the way, is the place corn was discovered or invented by the Aztecs). A lot of yellow corn from the United States is used for animal feed in Mexico. Last year as yellow corn soared in price, people began feeding white corn to animals in Mexico, which increased the price of white corn, which started street demonstrations about the cost of tortillas. In the end, the Mexican government was forced to step in and subsidize the sale of corn for tortillas.

It is not just Mexico that is affected. Because of the interconnected nature of the world market for grains, the prices of grains and foods everywhere rise when the price of corn goes up in the United States. This policy will lead

to increased hunger for all poor consumers who are not producers of food.

As a result of the rapidly accelerating use of corn for ethanol, inventories of corn are likely to fall to minimal levels. Low inventories not only increase prices but make the world more vulnerable to sudden spikes in price caused by disruptions like, for example, a possible drought in the United States.

The anticipation of low inventories caused corn to rise from \$80 to \$160 (\$2 to \$4 per bushel) per ton in Chicago and from \$120 per ton to \$200 per ton in many corn importing countries. Higher international prices combined with poor transportation, and tariffs brought corn prices up to \$280 per ton or \$7.00 a bushel in some countries. Those higher corn prices provide a powerful stimulus to production in the United States and around the world. As a result, extremely high prices will, with all else remaining equal, be brought down by increased production. However, if ethanol production continues to be increased in the United States, world corn and other grain prices will remain high. It is only when the US ethanol policy changes that the grain prices can readjust to lower levels.

POTENTIAL TROUBLE SPOTS

The effects of rising prices will be felt differently in different countries. Countries that are large net importers of grain and oil and who also have a large portion of urban low-income citizens and landless rural residents may be headed for political unrest. Countries that would fall into that category include several in Latin America, the Middle East, and Asia.

THE COST OF POULTRY MEAT AND EGGS

Because of the increase in the price of grains, the cost of producing poultry meat and eggs increased significantly around the world this year. The cost of producing poultry meat and eggs has increased approximately 12.5% worldwide.

The consequences for the world poultry industry are a reduced ability of the world's population to purchase chicken meat and a lower consumption of chicken meat, all else remaining equal. Lower total chicken consumption caused by ethanol is not distributed equally across the world's population. Higher income groups may actually eat more chicken per capita as chicken is substituted for beef and other meats, which are also rising in price. Middle and lower income groups will eat less meat in general and less chicken meat in particular.

Because everything refuses to remain equal just to please economists, the actual consumption of chicken meat may rise this year instead of falling. Although higher cost places downward pressure on consumption, 2 other factors are more important this year, the rebound in confidence in chicken meat due to reduced fears about bird flu and a relatively rapid increase in world per capita income. As a result chicken consumption is increasing

despite higher costs. World trade of chicken meat is increasing as well.

WINNERS FROM THE ETHANOL POLICY

Not everyone is a loser because of the higher cost of grain. United States grain farmers and ethanol producers are obvious winners, but they are not the only winners. Many farmers in the developing world are also winners. According to the United Nations (1997), the rural population of the world is still large, consisting of approximately 50% of the world's population or 3 billion people. Of this rural population at least 1 billion are small landowning farmers, many of whom will benefit from higher grain prices.

For decades, the United States and Western Europe have manipulated the production of several crops, including feed grains and cotton with farm subsidies. Farm subsidies are payments made to compensate farmers for products sold below the cost of production domestically and in export markets. The payments provide support for the rural economy of the United States and Western Europe, but they hurt farmers in developing countries. Other countries have complained bitterly about subsidies, most notably in the cotton dispute of the last few years. The World Trade Organization Dispute Settlement Body recently ruled against the cotton subsidy system of the United States.

Besides cotton, there is also a corn issue before the World Trade Organization Dispute Settlement Body accusing the United States of acting in a similar manner in corn production. This dispute may become moot. Subsidies for the production of corn have ended and low prices have been replaced by high prices. If the United States continues with the current ethanol policy, the effects of this new policy will be the opposite of the earlier subsidy policy. Instead of helping urban poor and hurting rural small farmers, the new policy will hurt urban poor and help rural small farmers.

The US ethanol policy provides an economic stimulus to hundreds of millions of poor rural farmers and could hypothetically be beneficial to some predominantly rural countries with large numbers of landowning small farmers. Nevertheless, it is sobering to contemplate the testing of this hypothesis on billions of poor people. In addition, the effect on the environment of a large increase in intensively cultivated farmland with the associated increase in the use of chemical fertilizers and pesticides needs to be taken into account.

For the world poultry industry as well, the effects of the US ethanol policy are not entirely negative. Chickens are excellent converters of grain to meat and eggs. As a result, when grain prices rise, the relative competitiveness of poultry meat and eggs increase in relation to other sources of protein. Higher grain costs can therefore result in greater competitiveness and potentially compensate for the negative effects of higher prices and lower consumption.

POLICY CHOICES

United States agricultural policy toward corn production has been characterized by extreme positions over the last several decades. One extreme, that of subsidizing the production of corn regardless of the quantity produced, led to unusually low international prices. It was low corn prices combined with subsidies on ethanol production that attracted the attention of the world energy sector as explained by Hudson (2007). That led to the other extreme, the recent unusually high prices.

The abrupt swing in corn prices from one extreme to the other raises the question of a middle ground. Among practitioners of agricultural policy, the piece of advice often heard is to "get prices right" (Timmer, 1986). A US agricultural policy that gets prices right would be one that avoids policy extremes. There are numerous middle ground suggestions currently being made. These include such ideas as variable subsidies, an end to the tariff on imported ethanol, and a limit to the amount of corn that can be used to produce ethanol. If cellulosic ethanol becomes feasible, that could replace corn ethanol. However, it appears that at least another decade will be required before cellulosic ethanol approaches economic feasibility. Cellulosic ethanol is currently more expensive than corn-based ethanol, and it is easy to forget that corn-based ethanol is not yet economically feasible without subsidy.

CONCLUSIONS

The effect of significantly higher corn prices caused by the US ethanol policy is negative in the short run to the world poultry industry. All else being equal, poultry consumption will decline because of the increase in feed costs. In addition, higher feed and food prices are detrimental to the overall food consumption of hundreds of millions of the world's urban poor and landless rural residents.

The suffering of the poor may hypothetically be balanced at least in part by the beneficial effects of the policy on rural farmers. After decades of artificially low world grain prices, many rural farmers may now be able to take advantage of higher prices. The poultry industry itself may find some benefit in the long run because of the comparatively low feed to meat conversion ratio of chickens and turkeys.

When making a judgment about the effect of the US ethanol policy on the world's poultry industry and on the world's population, the negative of an increase in human malnutrition must be compared with the positive of higher incomes for rural poor farmers. It is not an easy call to make. Can human malnutrition be balanced in any meaningful way? However, the most troubling aspect of the policy is the apparent failure by the United States to take into account international repercussions. Ethanol policy appears to be currently driven by narrow domestic political considerations rather than a view to the wider implications of the policy.

REFERENCES

- Ford Runge, C., and Senauer, B. May/June 2007. How Biofuels Could Starve the Poor. *Foreign Affairs*:41–53.
- Hubbert, M. K. 1956. Nuclear Energy and the Fossil Fuels. Publ. no. 95. Shell Dev. Co., Houston, TX.
- Hudson, W. February 2007. Ethanol Opinion—Beyond the Eighth Grade Level. The ProExporter Network, Olathe, KS.
- State of Alaska Tax Division. 2007. Alaska Oil Production. <http://www.tax.state.ak.us/programs/oil/production/> Accessed Jul. 2007.
- Timmer, C. P. 1986. *Getting Prices Right*. Cornell Univ. Press, Ithaca, NY.
- Tyner, W. E. 2006. US Ethanol Policy—Possibilities for the Future. Purdue Extension ID 342-W. Purdue Univ., West Lafayette, IN.
- United Nations. 1997. United Nations Urban and Rural Areas, 1996. <http://www.un.org/esa/population/pubsarchive/ura/uracht3.htm> Accessed Jul. 2007.
- USDA. 2007. Ethanol Use. <http://www.usda.gov/oce/commodity/wasde/> Accessed Jul. 2007.