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It's Time to Rethink America's Corn System

Only a tiny fraction of corn grown in the U.S. directly feeds the nation's people, and most of that is from unhealthy, high-fructose corn syrup

By Jonathan Foley | Tuesday, March 5, 2013 | 11 comments

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Image: Illustration by Kelsey King

Nothing dominates the American landscape like corn.

Sprawling across the Midwest and Great Plains, the American Corn Belt is a *massive* thing. You can drive from central Pennsylvania all the way to western Nebraska, a trip of nearly 1,500 miles, and witness it in all its glory. No other American crop can match the sheer size of corn.

So why do we, as a nation, grow so much corn?

The main reason is that corn is such a productive and versatile crop, responding to investments in research, breeding and promotion. It has incredibly high yields compared with most other U.S. crops, and it grows nearly anywhere in the country, especially thriving in the Midwest and Great Plains. Plus, it can be turned into a staggering array of products. Corn can be used for food as corn flour, cornmeal, hominy, grits or sweet corn. It can be used as animal feed to help fatten our hogs, chickens and cattle. And it can be turned into ethanol, high-fructose corn syrup or even bio-based plastics.

No wonder we grow so much of the stuff.

But it is important to distinguish corn the *crop* from corn the *system*. As a *crop*, corn is highly productive, flexible and successful. It has been a pillar of American agriculture for decades, and there is no doubt that it will be a crucial part of American agriculture in the future. However, many are beginning to question corn as a *system*: how it dominates American agriculture compared with other farming systems; how in America it is used primarily for ethanol, animal feed and high-fructose corn syrup; how it consumes natural resources; and how it receives preferential treatment from our government.

The current corn system is not a good thing for America for four major reasons.

The American corn system is inefficient at feeding people. Most people would agree that the primary goal of agriculture should be feeding people. While other goals—especially producing income, creating jobs and fostering rural development—are critically important too, the ultimate success of any agricultural system should be measured in part by how well it delivers food to a growing

population. After all, feeding people is why agriculture exists in the first place.

Although U.S. corn is a highly productive crop, with typical yields between 140 and 160 bushels per acre, the resulting delivery of *food* by the corn system is far lower. Today's corn crop is mainly used for biofuels (roughly 40 percent of U.S. corn is used for ethanol) and as animal feed (roughly 36 percent of U.S. corn, plus distillers grains left over from ethanol production, is fed to cattle, pigs and chickens). Much of the rest is exported. Only a tiny fraction of the national corn crop is directly used for food for Americans, much of that for high-fructose corn syrup.

Yes, the corn fed to animals does produce valuable food to people, mainly in the form of dairy and meat products, but only after suffering major losses of calories and protein along the way. For corn-fed animals, the efficiency of converting grain to meat and dairy calories ranges from roughly 3 percent to 40 percent, depending on the animal production system in question. What this all means is that little of the corn crop actually ends up feeding American people. It's just math. The average Iowa cornfield has the potential to deliver more than 15 million calories per acre each year (enough to sustain 14 people per acre, with a 3,000 calorie-per-day diet, if we ate all of the corn ourselves), but with the current allocation of corn to ethanol and animal production, we end up with an estimated 3 million calories of food per acre per year, mainly as dairy and meat products, enough to sustain only three people per acre. That is lower than the average delivery of food calories from farms in Bangladesh, Egypt and Vietnam.

In short, the corn *crop* is highly productive, but the corn *system* is aligned to feed cars and animals instead of feeding people.

There are a number of ways to improve the delivery of food from the nation's corn system. First and foremost, shifting corn away from biofuels would generate more food for the world, lower demand for grain, lessen commodity price pressures, and reduce the burden on consumers around the world. Furthermore, eating less corn-fed meat, or shifting corn toward more efficient dairy, poultry, pork and grass-fed beef systems, would allow us to get more food from each bushel of corn. And diversifying the Corn Belt into a wider mix of agricultural systems, including other crops and grass-fed animal operations, could produce substantially more food—and a more diverse and nutritious diet— than the current system.

The corn system uses a large amount of natural resources. Even though it does not deliver as much food as comparable systems around the globe, the American corn system continues to use a large proportion of our country's natural resources.

In the U.S., corn uses more land than any other crop, spanning some 97 million acres— an area roughly the size of California. U.S. corn also consumes a large amount of our freshwater resources, including an estimated 5.6 cubic miles per year of irrigation water withdrawn from America's rivers and aquifers. And fertilizer use for corn is massive: over 5.6 million tons of nitrogen is applied to corn each year through chemical fertilizers, along with nearly a million tons of nitrogen from manure. Much of this fertilizer, along with large amounts of soil, washes into the nation's lakes, rivers and coastal oceans, polluting waters and damaging ecosystems along the way. The dead zone in the Gulf of Mexico is the largest, and most iconic, example of this.

And the resources devoted to growing corn are increasing dramatically. Between 2006 and 2011, the amount of cropland devoted to growing corn in America increased by more than 13 million acres, mainly in response to rising corn prices and the increasing demand for ethanol. Most of these new corn acres came from farms, including those that were growing wheat (which lost 2.9 million acres), oats (1.7 million acres lost), sorghum (1 million acres lost), barley, alfalfa, sunflower and other crops. That leaves us with a less diverse American agricultural landscape, with even more land devoted to corn monocultures. And according to a recent study published in the *Proceedings of the National Academy of Sciences*, roughly 1.3 million acres of grassland and prairie were converted to corn and other uses in the western Corn Belt between 2006 and 2011, presenting a threat to the waterways, wetlands and species that reside there.

Looking at these land, water, fertilizer and soil costs together, you could argue that the corn system uses more natural resources than any other agricultural system in America, while providing only modest benefits in food. It's a dubious trade-off—depleting natural resources to deliver relatively little food and nutrition to the world. But it doesn't need to be that way. Innovative farmers are exploring other methods for growing corn, including better conventional, organic, biotech and conservation farming methods that can

dramatically reduce chemical inputs, water use, soil losses and impacts on wildlife. We should encourage American farmers to continue these improvements.

The corn system is highly vulnerable to shocks. Although a large monoculture dominating much of the country with a single cropping system might be an efficient and profitable way to grow corn at an industrial scale, there is a price to being so big, with so little diversity. Given enough time, most massive monocultures fail, often spectacularly. And with today's high demand and low grain stocks, corn prices are very volatile, driving spikes in the price of commodities around the world. Under these conditions, a single disaster, disease, pest or economic downturn could cause a major disturbance in the corn system.

The monolithic nature of corn production presents a systemic risk to America's agriculture, with impacts ranging from food prices to feed prices and energy prices. It also presents a potential threat to our economy and to the taxpayers who end up footing the bill when things go sour. This isn't rocket science: You wouldn't invest in a mutual fund that was dominated by only one company, because it would be intolerably risky. But that's what we're doing with American agriculture. Simply put, too many of our agricultural eggs are in one basket.

A more resilient agricultural system would start by diversifying our crops, shifting some of the corn monoculture to a landscape rich with a variety of crops, pastures and prairies. It would more closely mimic natural ecosystems and include a mixture of perennial and different seasonal plants—not just summertime annuals with shallow roots that are especially sensitive to dry spells. Furthermore, it would include conservation tillage and organic farming practices that improve soil conditions by restoring soil structure, organic content and water holding capacity, making farming landscapes much more resilient to floods and droughts. The overall result would be a landscape better prepared to weather the next drought, flood, disease or pest.

The corn system operates at a big cost to taxpayers. Finally, the corn system receives more subsides from the U.S. government than any other crop, including direct payments, crop insurance payments and mandates to produce ethanol. In all, U.S. crop subsidies to corn totaled roughly $90 billion between 1995 and 2010—not including ethanol subsidies and mandates, which helped drive up the price of corn.

Today, one of the biggest corn subsidies come in the form of federally supported crop insurance. In fact, for the 2012 season U.S. crop insurance programs will likely pay out an estimated $20 billion or more—shattering all previous records. Amazingly, these record subsidies are being paid as corn just had one of the most lucrative years in history. Even with the 2012 drought, high prices meant that U.S. corn broke record sales figures. Do record subsidies make sense during a year of record sales?

Naturally, some farmers were hit harder by the drought than others, and crop insurance programs are intended to help them make up these losses. That's a noble goal. But should taxpayers be paying higher prices for a crop that was never harvested?

It might be time to rethink our crop subsidy programs, to focus tax dollars where they will achieve the greatest public good. We should help farmers recover their losses during a natural disaster, making them whole again, but not gain from failed harvests at public expense. We should also consider helping *all* farmers who suffered losses, not just those growing only certain commodity crops. And we should look to support farmers for important things that markets don't address, such as reducing runoff and erosion, improving soil and biodiversity, and providing jobs for rural America. Farmers are the stewards of our nation's most fertile lands and should be rewarded for their work to carefully manage these resources.

Bottom line: We need a new approach to corn

As a crop, corn is an amazing thing and a crucial part of the American agricultural toolbox. But the corn system, as we currently know it, is an agricultural juggernaut, consuming more land, more natural resources and more taxpayer dollars than any other farming system in modern U.S. history. As a large monoculture, it is a vulnerable house of cards, precariously perched on publicly funded subsidies. And the resulting benefits to our food system are sparse, with the majority of the harvested calories lost to ethanol or animal feedlot

production. In short, our investment of natural and financial resources is not paying the best dividends to our national diet, our rural communities, our federal budget or our environment. It's time to reimagine a system that will.

What would such a system look like?

This reimagined agricultural system would be a more diverse landscape, weaving corn together with many kinds of grains, oil crops, fruits, vegetables, grazing lands and prairies. Production practices would blend the best of conventional, conservation, biotech and organic farming. Subsidies would be aimed at rewarding farmers for producing more healthy, nutritious food while preserving rich soil, clean water and thriving landscapes for future generations. This system would feed more people, employ more farmers and be more sustainable and more resilient than anything we have today.

It is important to note that these criticisms of the larger corn system—a behemoth largely created by lobbyists, trade associations, big businesses and the government—are not aimed at farmers. Farmers are the hardest working people in America, and are pillars of their communities. It would be simply wrong to blame them for any of these issues. In this economic and political landscape, they would be crazy not to grow corn; farmers are simply delivering what markets and policies are demanding. What needs to change here is the *system*, not the farmers.

And no matter what happens, this won't mean the end of corn. Far from it. Corn crops will always be a major player in American agriculture. But with the current corn system dominating our use of natural resources and public dollars, while delivering less food and nutrition than other agricultural systems, it's time ask tough questions and demand better solutions.

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