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Population Growth, Biofuels, and the Meat of the Future

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Population Growth, Biofuels,

By Duncan Reilly

How to Feed the 21st Century

There is not a problem facing society today that wouldn't be at least somewhat alleviated by ending world hunger, or that wouldn't be exacerbated by a failure to deal with it. With the population steadily climbing, climate change looming, and a corn industry turning an ever-growing percentage of its crop into fuel, the problems that stand in the way of a dependable food supply are social, political, and economic all at once. It will be the job of scientists, politicians, and laypeople to arrive at realistic solutions to them.

Population Growth

The United Nations' Department of Social and Economic Affairs reported in 2008 that the years leading up to 2050 would see the world's population increase to seven billion in late 2011, and to nine billion by 2050, with the vast majority of those new people being born in the developing world. Simply put, there won't be enough food for all of them. With climate change threatening to destabilize an already shaky system of food production, and no sign of a miracle cure to the problem coming soon, the ability to produce enough food for everyone will be one of the major factors in making sure that the population can continue to grow.

Improving the planet's food output might be difficult, but imagine the alternative: trying to control the rate of population growth. Spreading

access to contraception will only do so much, and it is hard to believe that citizens of a democratic nation would accept a one-child policy like the one China has implemented. Barring some major depopulation event — say, a nuclear war, or a large-scale outbreak of antibiotic-resistant disease — the best bet is to shift the focus towards the food supply.

Climate Change

When considering the future, it is essential to think about not only how many people will need feeding, but also about the resources that will be available to produce the food. Climate change poses the most serious threat to agriculture; even if everything possible is done to decrease carbon emissions, it is likely that humans have already done substantial damage to the environment. A joint study by the International Centre for Trade and Sustainable Development and the International Policy Council considered the massive damage that climate change could do to agriculture around the world. Sub-Saharan Africa, for instance, is projected to lose an average of 12% of its grain farming capacity by 2080. Adapting globally, the study says, might require an excess of \$170 billion a year, taking into account basic agricultural needs, finding clean water in increasingly dry climates, providing for public health, and infrastructure, among other things. Until climate change becomes impossible to ignore, this will be as big of a political problem as an economic one, especially in the U.S. where skepticism still pre-

vails over climate science.

Corn

This past summer had more record high temperatures than any other recorded in the U.S., and few groups felt it more acutely than the corn farmers. It couldn't have happened to a more important crop — most foods in the average American kitchen have at least some sort of corn by-product in them, whether it's starch, corn syrup, or cooking oil. Also, most livestock is fed on a diet of corn and soybeans. All told, only about 12% of the corn grown in the U.S. is sold for direct consumption. If the summer of 2012 is indicative of future summers, massive and permanent increases in food prices all over the world would occur. People in the developing world would feel the strain the most. Though agriculture is heavily subsidized in the U.S., American agriculture still accounts for more than half of the world's grain supply. Any severe corn shortage could lead to food shortages of a global scale.

Compounding the problem, corn's use as biofuel has meant converting more farmland to a fuel source. Corn ethanol is much cheaper to produce than gasoline, and produces less carbon emissions. On the other hand, every acre of corn grown that's used for fuel is an acre of corn that cannot be eaten. Although recent studies by the World Bank, the Organization for Economic Cooperation and Development, and other organizations show that biofuels have not affected food prices as much as previous research has claimed,





and the Meat of the Future

having to make the decision between food and fuel sets up two indispensable industries to be dependent on each other. If global industry reaches the point where it can no longer depend on fossil fuels, it will be necessary to convert an unsustainable amount of corn into fuel. Likewise, if the corn crops fail in large volumes, fuel prices could jump astronomically. Either one of these outcomes would be devastating to the global economy by itself; tying one to the other is simply too great of a risk. In the short term, corn ethanol has been an effective way to decrease gas prices, but given rising food demands the costs might outweigh the benefits in the long run.

The Meat of Tomorrow

Even more in need of an overhaul than the corn farming industry is the meat industry. A 1997 report by the Department of Agriculture found that livestock take up 80% of farmlands, and consume 70% of all grain, 80% of all corn, and 90% of all soy grown in the U.S. A study done around the same time by Cornell University revealed that the grain consumed by livestock could feed 800 million people. U.S. consumption of meat is about 5 billion pounds per year higher than it was in 1997, although fortunately it is dropping after peaking in 2007. Solutions here can be tricky. Those with the option to eat meat will continue to do so, and it is doubtful that public service announcements will stop people from ordering hamburgers.

However, some scientists think they have

an answer. Using research originally done by NASA, dozens of labs are now working on creating in vitro meat. Instead of raising an animal for its meat, this research aims to grow tissue in a laboratory setting. A few stem cells are taken from an animal. They are placed in a protein-rich environment, and from there, are allowed to grow and divide into muscle cells. There is no theoretical limit to how much meat could be produced this way, and as any of the cells produced could themselves be used as cultures, an actual animal would only be necessary at the very beginning of the process. The process has yet to be perfected. No complex structures can be made (most experiments with in-vitro meat have looked more like bologna than steak), but someday, the process might produce meat more cheaply than factory farms do. The corn, soybeans, and grain fed to animals could largely go back to being used for human consumption. It offers other benefits, too, including cruelty-free meats that might appeal to ethical vegetarians.

Still, in vitro meat faces a few challenges. Nobody has proved that it could be done on a large scale. All the experiments that have happened up to this point have been too slow and expensive to make in vitro meat economically feasible. Currently, a single steak's worth of in vitro meat costs approximately a million dollars. Furthermore, most investors will wait until it seems likely to be profitable. Even if it can be done, consumers will have to accept it on a large scale for it to work. All of its benefits will come to nothing if people can't get used to the idea of eating meat grown in

a petri dish.

Giving the People What they Want

Perhaps the greatest challenge of the next century will be getting used to the food of the future. People will eat what tastes good and what they feel comfortable with when given a choice, regardless of what it means to the future of the world. It is important to realize that there is much more than personal comfort at stake here, and as such, people will have to get used to eating foods that may be more and more removed from nature.

Generally, this is the easiest when people don't have to think about it. The vast majority of soybeans, for example, are genetically modified, but tofu still remains popular amongst organic food enthusiasts. Milk produced by cows injected with bovine growth hormones still sells well, mainly because it is not labeled prominently as such and is generally understood to be safe. Bread with preservatives sells well because, to the few customers that read ingredient lists, benzoic acid could be any number of things. The point here is not that consumers are ignorant, but that they are willing to put up with a great number of things they would consider unnatural in their food if their attention is not drawn to them. When the foods of the future are developed, scientists will need to ensure that they are safe, sustainable, and that they avoid any obvious ethical dilemmas. But above all, they have to be things that people will want to eat. ●

