
Policy Issues Impacting Agriculture and Bioenergy

Panel Discussion and Q&A

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Doug O'Brien: I've worked at the state level and as council on the federal Senate Agriculture Committee for the 2002 Farm Bill and I've done some teaching at the National Agricultural Law Center at the University of Arkansas. So, I bring a policymaking perspective.

The presentation on ethics was very helpful. Over the past 6 or 8 months, it has become clear that there is a real need to figure out how we deal with food-versus-fuel, nature-versus-fuel debate. Not surprisingly, an international forum on global hunger issues, in progress in Rome¹, is turning into a huge debate on food versus fuel. Also, it's maybe not surprising that policymakers, from USDA Secretary Schafer to the leaders of sub-Saharan Africa, are not on the same page. They are talking about different things, and a lot of work is needed in this area.

The big question is whether policymaking processes in the United States and globally will be able to react in a timely fashion to the energy—I'll just use the word—"crisis" that we find ourselves in. Can they react to this megatrend? In Ohio, a major energy bill, dealing mostly with electricity, was passed recently. In the next week or so, the governor will sign a major stimulus package with alternative energy and bioproducts as key components. On the national level there is the federal energy bill, part of the Farm Bill, and climate change is being debated in the Senate. A lot is happening. It is absolutely a teachable moment; the need for more research into crop productivity, *etc.*, is reported in the likes

¹The United Nations Food and Agriculture Organization (FAO) hosted the *High-Level Conference on World Food Security: the Challenges of Climate Change and Bioenergy*, June 3–5, 2008. <http://www.fao.org/foodclimate/hlc-home/en/>.

of the *Columbus Dispatch* and the *Des Moines Register* almost on a daily basis. Things are moving, but there is a huge question mark for me on whether the policymaking processes can catch up. The answer has to be “yes,” but how do we get there?

Matthew Roberts: About 4 miles from here, fifty-two undergraduates are sitting through my final exam in econ 200. The textbook I use is organized around ten principles of economics, the first of which is that life is about tradeoffs. This is the essence of why economics is commonly referred to as “the dismal science”; economists are forced to constantly point out the tradeoffs that people face in life. Discussion of biofuels, bioenergy, population growth and other megatrends brings us to a clear confrontation with the tradeoffs that we as humanity currently face, many of which are uncomfortable. This is an overriding force that we cannot forget.

To gratuitously self-promote my profession, I see economics as truly at the center of this discussion. I agree with Harry de Gorter that thresholds greatly oversimplify. When we state that there’s a maximum or a limit of feedstocks that may be used to produce various energies or fuels, substitutions occur throughout the energy chain. However, I disagree with the comment that energy is energy. Were that the case, we would all be delighted to know that one medium-sized banana is fully equivalent to one Twinkie because both have 150 calories. Energy does have other characteristics. I point that out, not as a correction, but as a reminder that this is a discussion of tradeoffs. Further to Dr. de Gorter’s remarks, I would like to emphasize import tariffs. There is so much discussion around them, and I don’t think you would disagree with me that there is much discussion in the policy arena about federal biofuels regarding the VEETC, the Volumetric Ethanol Excise Tax Credit, and blending mandates and consumer mandates. But, in the long term, the import tariff is probably the most damaging and most distorting aspect of federal policy for US biofuel use, simply because as long as it’s in place, the chart that Ken Cassman showed—relating the value of corn in fuel consumption to oil prices—will remain in place. The only way to fundamentally alter that is through relaxation or elimination of the import tariff, allowing fuels to be derived from their most efficient sources. It allows all economic players to specialize in what they are better at. And, frankly, Brazil is better than we are at sugar and simple starch production. We are better at oilseed, and complex starch production through soybean and corn. That is our comparative advantage. So, Dr. Cassman, the one point I would like to make, and I think you’ll agree so it’s merely a point of amplification, is that when you describe a yield converging on a theoretical maximum, and the difficulty, as you call it, of the razor-thin margin for error in production and management, we call this the law of diminishing returns. As we approach the theoretical maxima, each successive bushel becomes more difficult to obtain. And why I believe that this is important to point out is that corn, soybean, wheat, sugar—all of these crops—are globally fungible commodities and, therefore, we must realize that changes in production and yield in other countries are economically equivalent to changes in this country and that the lowest hanging fruit may not be to attempt to move US yield in corn from 152 to 158 or 168 bushels but it may be to improve average yield in the developing world from 38 bushels to the acre to 42 bushels or 46 bushels. Greater returns on investment

are more likely to be through education and infrastructure construction in the developing world, in areas that currently have low yields yet their potential is similar to ours.

Chris Schmid: JumpStart was founded 4 years ago to improve the entrepreneurial and economic climate in northeast Ohio and help make it a nationally recognized center of innovation. Funding is from the state, federal government, foundations and corporations and we are working this field through an Evergreen Fund, assisting businesses through outreach and networking. Our website² allows mentors, investors, idea people and service providers, to connect in a social-networking environment and then through follow-on funding going through the United States and beyond trying to find capital so that our companies can continue to grow. Significant emphasis is on women and minority entrepreneurs.

Since 2007, we have connected about 25,000 entrepreneurs in northeast Ohio. We've vetted about 1,280 business ideas, approximately one idea per weekday. We have assisted 160 companies, including investment of \$10 million in twenty-nine companies, creating a total economic impact of \$56 million—not a bad return. And we have generated follow-on funding from outside sources, many on the East and West Coasts, of \$41 million. We have created 175 jobs with incomes in the range \$70,000 to \$80,000 a year and moved the national entrepreneurial ranking of northeast Ohio from 61, which was dead last, to 24. In 4 years we've made significant progress.

We are really on the investment side, working with companies in the idea stage, the dream stage, with which the yield is probably 10 years out, maybe even longer. We are looking at ideas that have high growth potential.

As investors, we are quite often accused of having no ethics; in fact, we care a lot about ethics because they determine what will be acceptable in the future. The ethics debate was interesting and I learned a lot from it. When we make an investment decision today we really are making a decision for the future and if ethics are changing—and yes, they are changing—and people are thinking differently about certain investments, then we need to know that. Underlying economics are extremely important and, therefore, in all of our decisions we typically strip out tariffs and barriers to entry imposed by the government because they all can change, even at a moment's notice. I was recently in Europe attending meetings on biorenewable energy and the total market is dead. There is no investment in Germany for the simple reason that subsidies ran out. The subsidies did not keep up with the cost of feedstock, the cost of the raw materials. No one can afford to invest before the new subsidies are established again. Clearly, building a whole industry based on subsidies is dangerous. Also, we know that the next bubble will probably be one of "dot com" size, in the renewable energy area. A lot of money is chasing new ideas, some of them crazy ideas. Of course, we consider crazy ideas. Every idea that won't make money for 5 to 10 years is crazy. Nobody knows what will eventually survive. We invest in ideas that we think make a little more sense, and, hopefully, one of them will take off.

²<http://www.jumpstartinc.org/>

The total investment climate around bioenergy, in my mind, is very, very risky. Because of the bubble mentality, everybody runs in the same direction. Everybody ran towards ethanol, and currently no ethanol plants are going up. Biodiesel plants are not going up either. Actually they are being shut down or plants that have been started are not continuing. It cannot be done in Europe where a kilowatt-hour of electric energy costs 3 cents and a gallon of gasoline costs \$10, and it's no surprise that we can't do it here either. The reason they cannot do it is because feedstocks cost rose. Materials that were considered to be waste before, have become valuable commodities. While I was over there I was interested to follow the so-called paper war. Companies go into communities and collect paper from households. Municipalities are now fighting them in court because that removes the most valuable part of the waste and municipalities can no longer continue free waste collection. This shows that when waste becomes a commodity, it becomes a race to the bottom. Economists have pointed this out very clearly; whether prices are bid lower or prices are bid up, there is no money to be made. Any resource that is limited in the energy market should be viewed with caution. Renewable energy will be viable from resources that are guaranteed free forever like sun, wind, water and geothermal energy. Those are basically the four forms of energy we are investing in. We haven't really found anything in bioenergy. We are hoping for a big breakthrough, but the problem is that as soon as there is such a breakthrough, there will insufficient biomass to keep the prices low forever. The prices will go up and it will eventually become a game of what is the content of the raw material, of the biomass, and what is the cost of conversion? And a huge part will be the costs of distribution and logistics. One of the speakers talked about this; most people underestimate the cost of collecting raw materials at a huge plant—only huge plants will eventually be successful. And then distribution of the energy material becomes an issue. That will rely to a great extent on the companies that are currently serve our energy markets, the Exxons and the electricity-generating companies. There won't be a lot of shift because those large plants cannot be built by anybody else. Who else has a \$100 million or a billion dollars handy to build another manufacturing plant?

So, we are not really shifting the paradigm, we are just shifting the game to a different area. And then we will deal with the same market forces again. From our viewpoint, it's an exciting time. It will be a lot more exciting when we know what really shakes out and when the politicians step out of it and let the markets drive it. And I think that the ethics debate will be critical for us as investors, to see what the general population will accept in the long term.

David Benfield: We've had interesting presentations from our keynote speakers and good comments from our panelists. Now, I'll open this up to questions and comments from the audience.

John Glaser (US Environmental Protection Agency): I've been told that people are in the practice of landing biodiesel from South America and the Gulf Coast areas and mixing it with petro-diesel and then reloading it on vessels to take to Europe and pocketing the extra fee that is available to them. This is outrageous and I can't understand why in the world

we designed ourselves into this set of circumstances. Would you care to comment?

Harry de Gorter: The list of policies that I put up was only a subset of the total policies directly affecting biofuels in the United States. You are referring to “splash and dash,” where you have a dollar tax credit for biodiesel. I just used ethanol in the United States as an example. My framework analysis is applicable to any kind of tax credit for any kind of biofuel in any part of the world. So, yes, in the United States we have a dollar tax credit for biodiesel; if you mix it with normal diesel, you will get that dollar for the biofuel component, then you can sell the mixture anywhere you want. The tax credit for biodiesel in Europe is higher, as is the price, so why sell it in the United States? It’s a scam. Taxpayers lost some \$300 million dollars this past year on that. The beneficiaries are, of course, the people who are doing it, US exporters. Some of it obviously goes to Asia, because they import palm oil from there, and transport it over to Europe. And of course the European biodiesel producers are hurting. It’s such a bad scam. I don’t study it because by the time I write a paper on it, surely it will be gone.

Roberts: I think if we attempted to make a list of all the unintended consequences of policy in just the energy field, we would need a few more days at this conference.

Tony Shelton (Cornell University): Regarding Chris Schmid’s statement about Europe looking for resources that perhaps will not be taxed as commodities—wind, solar—I’m wondering if there’s a negative aspect of that, which will come out in some sort of policy. It sounds free, but are there consequences of that? Will there be taxes on them or will the technologies to harness those sources of energy be such that it will not play out quite as free as we might want to think?

Schmid: Absolutely right. The sources are free. The wind is free. The sun is free. But what we are doing with them becomes a tax on the environment, becomes a tax on people, on their living conditions. For example, large wind farms are now undesirable in Europe because people know what it means to have a big rotor blocking out the sun every so many seconds, creating noise and impacting wildlife; there is now policy to discourage them. Or maybe it’s an agreement. It’s more or less an ethics issue; people say, “We don’t want this in our backyard any more, so where do we put it?” We had the long discussion on Cape Cod. If we put a wind farm in the Atlantic Ocean, it would be a great way of harnessing the wind, but, on the other hand, we are losing other things and it’s one of those tradeoffs. The only thing I looked at was the availability of the raw material in itself. That will be free. Now how we are going to convert it, that’s different. Just like coal is free, but the smokestacks and emissions have an impact on the environment. We need to look at the whole system, whereas, as investors, we look at the fundamentals. How much does the raw material, the feedstock, cost? What is the expected long-term development on the feedstock? And what are the cost of conversion and logistics? Those things taken together determine whether we want to invest or not, especially since we at Jumpstart invest in ideas, not expecting any return on our investment for 5 years.

Benfield: Paul, I know you talked predominantly about biofuels, but in terms of other forms of energy how would that fit into your model in terms of ethics and so forth?

Paul Thompson: I'm not sure I understand.

Benfield: Chris said that there might be some tradeoff between nature versus wind power.

Thompson: That we need to face tradeoffs is certainly right and these alternative energies are proving to be much more difficult to implement than expected. Certainly wind power was embraced early on by what I would broadly describe as the environmental community, whereas it's turned out to be divisive within that community. These are things that, as we learn more, will require what I was calling "democratic discussions." And, frankly, the more that we do that up front—before deeply investing in a technology—the better off we will be. We will have an understanding of where people's sentiments really are.

Steve Howell (Iowa State University): Paul, with reference to the conflict between industrial and agrarian cultures with respect to biofuels, if you have read the *Wall Street Journal* in the last 3 or 4 years, you will have a feeling for the industrial support of biofuels. In editorial after editorial it has called biofuels a boondoggle for the Midwest. What we have here is a situation where the industrial community views biofuels as a very strong agrarian activity. I'd also like to comment on Ken's comments on biotechnology. This is the National Agricultural Biotechnology Council and I think there is a message that we need to convey to young people who are working in this field to understand the role of biotechnology in the future of agriculture. In an important paper about a year ago in *Science*, Enrico Coen asked whether nature and evolution have thoroughly explored genetic space. And he came up with the concept that no it had not, and so one of the problems we face today in improving agriculture is to go beyond what natural diversity and other natural components and characteristics that are out there at this point and to expand allelic diversity in our genetic systems, *etc.* And that's something that can be accomplished through biotechnology. And I think that is why there is great hope for biotechnology improving agriculture in the future. I would like to leave our young people at least with a fairly optimistic note about what can be done in this area and what the opportunities are.

Thompson: I see the logic behind the comment that biofuels are an agrarian strategy. In the book, *Sacred Cows and Hot Potatoes*, we had a Doonesbury cartoon with Doonesbury's mother, who is a farmer, showing up in a gingham dress to defend farm subsidies before Congress. The point of including the cartoon was to play up the way agrarian symbolism is often used in a self-contradictory way to support a set of policies that support an agriculture that is organized much more on industrial principles. I recognize that there are important positive norms behind this agrarian vision, but there are also important positive norms behind the industrial vision. The industrial vision is the vision that helps

us think about internalizing environmental costs. It actually is the vision that helps us think much more productively about meeting food needs of poor people. What we really need—and here I'll quote F. Scott Fitzgerald who said, "The mark of a first-rate intelligence is the ability to keep two opposed ideas in mind at the same time and still function"—is to learn how to do that in agriculture. My concern about biofuels is that, to the extent that they resonate with a kind of agrarian mentality, it is purely at this fairly cynical and ironic kind of level and its not really connecting with that aspect of the agrarian mentality that is trying to link up with food consumers and people who are enthusiastic about going to farmers' markets and people who are subscribing to food magazines and reading the food sections in their local newspapers. That component of agrarianism is all about food. I don't think it necessarily has to be all about food, but right now, at the same time that there is this sense that ethanol is a kind of bailout for farmers who are looking for some way to squeeze the last little bit out of their corn production and maybe preserving a kind of agrarian economy in that sense, the way that is being integrated into the larger economy and the way that is connecting with the lives of the vast majority of Americans, at least, is simply when they drive up and pump gas. And that is not something that makes people feel connected to nature. So, I don't know where to go with this point, but part of my comment is that we need to explore that tension and we need to figure out where we go with that point. And part of my warning is, to the extent that biofuels become seen as antagonistic to the whole agrarian ideal, suspicion, distrust and opposition are engendered to rational biotech and biofuels policies.

Kenneth Cassman: I would like to recapitulate the key point, because I'm not sure you got it. I was making a moral argument that if we are not going to be able to meet human food and fuel needs, then food should be first with the current national and global research priorities and with the current amount of funding. Now, one option would be to triple the amount of funding and then we could continue doing what we are doing without increased thought as to what is right or wrong and then start funding some of the other things that were lacking. I doubt that will occur. So my call was for a better prioritization of what we are doing, based upon a much more realistic and theoretically justifiable investment in biotechnology at least in the public sector. Let the private sector do what it wishes. So, it follows that there are traits that are not likely to be successful through biotechnology intervention for strong theoretical justification and I quoted the work of Denison³. But it doesn't mean that biotechnology isn't a critical part in addressing the long-term challenges that we face and the opportunities. It's just in the prioritization of it. One of the basic tenets is that no large gains are to be made in improving some of the more complex traits like yield potential, nitrogen-use efficiency and drought tolerance from simple up-regulation or down-regulation of existing genes or through modifications that change existing enzyme activities, protein confirmations, *etc.*, because those would have been tried and tested vastly by evolution. One example, C4 photosynthesis: there are nineteen different cases of parallel evolution of C4 photosynthesis from C3

³Pages 174–175.

photosynthesis where there was competitive pressure for that particular construct to be advantageous. And in those, C4 photosynthesis involves numerous genes. So, nature can do amazing genetic engineering under the right circumstances with enough time. It's a matter of prioritization; biotechnology is a critical part of the toolbox.

David Sylvia (The Pennsylvania State University): Ken, I thought I heard you say that the better way forward is through ecological intensification. I'm not sure what you mean by that, but it sounds to me like the industrial model and I wonder, in terms of the growing agrarian sense in developing countries, if we will be able to implement that.

Cassman: I found Paul Thompson's dichotomy between industrial agriculture and agrarian very interesting because in many ways we have an agrarian movement for sure. However, in many ways society at large has made the decision. Only about 1.4% of our population has anything to do with agriculture or wants anything to do with agriculture. There's a larger population that romanticizes agriculture, but very few want to actually move manure and husband livestock and crops. Internationally, you have two major forms of agriculture. You have the industrial agriculture. Even though farm size is small in the rice-wheat systems in Asia, the corn systems in China, the rice systems throughout Southeast and South Asia, these are industrial models. The other is true subsistence agriculture, which is non-commercial. Farmers are farming for their own needs mostly, and mostly without inputs or access to infrastructure. A lot needs to be done there and this gets to the comment that they are so far down the yield curve that it would be better to invest in raising their yields as opposed to those that are higher up the yield curve. The problem is that the reason they are in subsistence agriculture is because of failure of governments, failure of infrastructure, lack of access to markets, corruption, *etc.* Sub-Saharan Africa is the best example. And science is on the shelf for major advances in productivity in those systems; we're not lacking in science there. The problem is solving the other constraints that haven't allowed that science to be used. Until those conditions can change, it's not likely you will see significant increases in yields in those areas

Thompson: Certainly in terms of the producers, that's right. But my sense is that the segment of the urban population now interested in agriculture—I call them agriculture's potential fan base—is growing. Probably, it's the first time that it has been growing in 50 years. Can it grow in a way that is healthy, beneficial to farmers and helpful to agriculture? Part of my message is that this movement hasn't had much help from the agricultural establishment. It hasn't had much help from land-grant universities. It hasn't had much help from agricultural input firms. And that it's crazy to treat your fan base this way would be the quick thing that I would say. But, neither can one invest all of one's time and energy in that component of agriculture. Certainly, from a global standpoint, that would be an ethically irresponsible thing to do. Again, part of my sense is that the mindset of many of my colleagues in the land-grant colleges of agriculture, and virtually everybody I run into from the commercial side, is strictly in the industrial framework. On the other hand, a lot of farmers are of two minds about this. They are industrialists when they are

making their basic production decisions, but then they are agrarians when they show up in Washington and lobby for farm policy. But we have to learn to think in these, if not contradictory at least somewhat intentional, kinds of ways. And find ways to re-imagine agriculture. It may well be that we need to foster this agrarian component, which I think will bring beneficial things for agriculture. It will make people interested in agriculture again. It will make people think about where their food comes from. It will change some of their dietary habits and it will change some of their buying habits, albeit as a small component of the total agricultural production system. It may never exceed 5 or 7% of the actual land use in agriculture, and it may never actually exceed more than 2 or 3% of the population in terms of where their primary income originates. There's a long-standing view that these folks producing on 5 acres of land and making a living selling at farmers' markets don't count as farmers, and I think that's something that should change.

Sivaramakrishnan Muthuswam (The Ohio State University): Dr. Cassman, you expressed concern that present-day science will not take us to the next level to meet food and fuel needs. I don't know whether to agree with that. The role of the scientist is to think outside the box. For example, I am a plant biologist and we use the enzyme polymerase, which is everywhere. But the PCR revolution came by taking this enzyme from a thermotolerant bacterium, illustrating how science can solve problems. Natural selection doesn't work that way; it works in a given environment, in small increments. Scientists compare and contrast two environments, bringing fusion that can lead to revolution, which is what Borlaug and Swaminathan did.

Cassman: There's a bit of semantics in there, but I don't think we disagree on that.