# Checking in with CenUSA

## *Sustainable Production and Distribution of Bioenergy for the Central US*

CenUSA Bioenergy is a multidisciplinary project funded by the U.S. Department of Agriculture-National Institute of Food and Agriculture (USDA-NIFA). The goal of the project is to research the production and use of perennial grasses on marginal lands for use as alternative biofuels and bioproducts. Learn more about CenUSA at www.cenusa.iastate.edu

Keri Jacobs[1] and Dermot Hayes[2] are professors at Iowa State University. Jacobs is an associate professor of economics and is the Iowa Institute for Cooperatives Endowed Economics Professor, and Hayes is a professor in the Department of Economics where he is the Pioneer Chair in Agribusiness and professor of finance. In March 2019, they spoke about their work and experience as co-project directors focusing on markets and distribution with CenUSA Communications Intern Tyler Worsham.[3] They emphasized the difficulty of multi-year investment for farmers and the all-encompassing importance of profitability.

Keri Jacobs, CenUSA Bioenergy Co-Project Director

Dermot Hayes, CenUSA Bioenergy Co-Project Director

**How did you get involved with CenUSA?**

**HAYES: "**Jill Euken, from the BioEconomy Institute, called and asked us to participate in the original proposal."

**JACOBS:** "The main thrust behind the project was Robert Brown, Jill Euken and Ken Moore. They were interested in assembling a team of investigators to submit a proposal to the USDA National Institute of Food and Agriculture Coordinated Agricultural Projects (CAP) in the area of regional bioenergy systems.

The economic component in this proposal is especially important because we were contemplating the development of a market for a product. I had done some work with producers in the use of alternative cropping systems. My dissertation was on CRP (conservation reserve program), so I have the experience in understanding producers' choice in land-use."

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[1] Learn more about Keri Jacobs at https://www.econ.iastate.edu/people/keri-jacobs

[2] Learn more about Dermot Hayes at https://www.econ.iastate.edu/people/dermot-hayes

[3] All of the words and ideas expressed in this interview fairly and accurately represent the speaker. Some quotes may be paraphrased for brevity and clarity. The opinions expressed in herein do not necessarily reflect those of Iowa State University, USDA-NIFA, Purdue University, Ohio State University, USDA-ARS, the University of Minnesota, the University of Nebraska, Lincoln, the University of Vermont, or the University of Wisconsin.

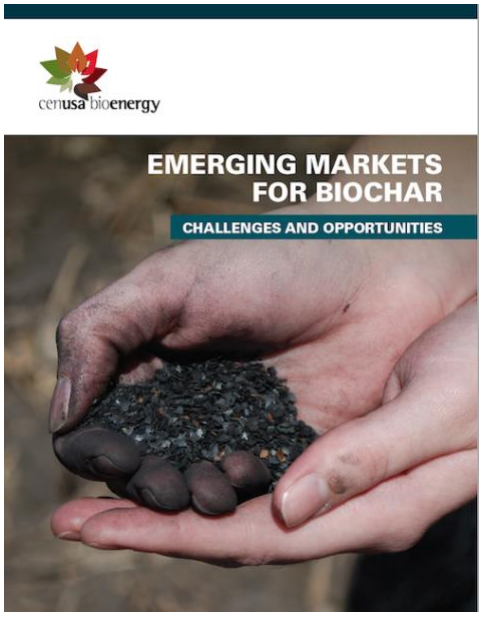
**What made you an ideal candidate for your position?**

**HAYES:** "I've worked on the economic viability of first-generation biofuels, ethanol and bio-diesel, so this was a natural extension."

**JACOBS:** "I understand production agriculture because of my background. I grew up on a farm, and I now work with producers in my Extension positions. I have experience with producers and the decision-making they go through, and my dissertation was on a working lands conservation reserve program. Dermot and I could provide the analysis and expertise this project needed."

**Could you go into a little more detail on your dissertation?**

**JACOBS:** "My dissertation focused on the Conservation Reserve Program (CRP). I was interested in the political economy and market forces that led to CRP adoption by farmers. The primary focus was on understanding how producers bid into the CRP. It's a competitive process where producers enroll their land in a retirement program. The analysis took the opportunity costs producers face for their land into account, and whether or not it made sense to bid into a long-term land retirement program."



CenUSA Biochar Paper White Paper

**HAYES:** "There's a lot of similarity between someone deciding to grow switchgrass and someone deciding to enroll in the CRP. They both require you to seed down the land for multiple years, and it's that multiple-year commitment that makes Keri's work so valuable."

**In what ways did the project broaden and challenge your professional knowledge and skillset?**

**HAYES:** "Our project was intended to look at the cost of supplying the cellulosic material to the plants, corn stover in particular. When those plants are purchasing stover, they are the only stover buyer in the area, so they have what we call monopsonistic competition. That was an area of economics in which I haven't worked on before then."

**JACOBS:** "I think what I took most from that was the experience of working with a team. The analyses were not unlike others we typically do. It was just a new application. The project required working with a diverse team, with scientists in different disciplines who were feeding information and data that they generated into the analysis we were doing. Understanding the multi-institutional grant process and having a long-term project to work on was very valuable for me."

**What new ideas and disciplines were you exposed to as a part of your work with CenUSA?**

**HAYES:** "Well, I learned a lot about corn stover, but also about switchgrass and pyrolysis. I also got to visit and spend a lot of time with the people in the plant in Nevada, Iowa."

**JACOBS:** "We were working with project directors, leaders and scientists in other disciplines, learning about feedstock conversion, about efficiencies, and how to exploit certain crop traits that impact production characteristics and economics. As economists, we use data to understand the underlying processes of how those data are generated."

**Could you go into a little more detail about what you learned specifically, or at least what you thought was most relevant?**

**HAYES:** "The big takeaway from our work was that corn farmers are not going to deliver the kind of stover that is needed to meet the federal mandate. The plants aren't going to pay the farmers enough for them to do that, so we will need to use switchgrass in order to meet the second-generation biofuel mandate."

**Have you worked in any other projects as large or as well funded as CenUSA?**


**JACOBS:** "No, that was my first experience with a multi-state interdisciplinary project."

**How have any of your past projects differed from CenUSA?**

**JACOBS:** "This is different because it's multi-year with complex work plans involving graduate students and collaborators at other institutions. I did not have experience thinking about and conducting research projects at that scale."

**Did you and your team encounter any obstacles in your research, whether unforeseen or as expected?**

**HAYES:** "What we thought was going to be a relatively straightforward economic cost-benefit analysis turned out to be much more challenging, in part because the plants are monopsonistic as I previously mentioned, but also because farmers are very different in their willingness to supply stover. Lastly, I went into it thinking stover would provide all of the feedstock required to meet the federal mandate, and we quickly realized that switchgrass would be needed."

**JACOBS:** "Stover in our area is the dominant feedstock, but what we came to understand is that there is a role that grass and other alternative energy feedstocks can play because of the economics of stover and how it is used."

**What would it take for producers to make the investment of growing perennial crops?**

**HAYES:** "That multi-year commitment is a big deal. They don't like to tie up their land looking into the future. Let's say I decide to grow switchgrass because I can expect to make $100 per acre. Now we have these acres of land that are tied up, perhaps in a contract with a feedstock buyer. Because the agronomy of switchgrass requires you to commit your land for multiple years, economists call that the real option problem or real option impact. It's a pricy decision to get farmers to lock in their production for such a long period of time."

> "It all comes down to economics in the end, and what the economists are saying is that you have to provide them some sort of incentive that the expected value of return from that (grasses) is higher than any other expected value of return." *Keri Jacobs*

**JACOBS:** "Another example of where we see what it would take to make that happen is CRP. If you look at conservation reserve programs and other working land or land retirement programs, farmers often need some form of payment or incentive in order to participate because they are tying up their land for multiple years. That takes away the option of investing in other crops and getting the returns from other crops that may exceed them (grasses). It all comes down to economics in the end, and what the economists are saying is that you have to provide them some sort of incentive that the expected value of return from that (grasses) is higher than any other expected value of return. With a commodity market like corn and soybeans, the future expectations are unknown, so producers put greater weight on being able to benefit from that market."

**I suppose that leads into the next question. What do you think is the tipping point that will convince producers to adopt these switchgrasses? What are these necessary incentives?**

**HAYES:** "We were primarily interested in the large-scale adoption by farmers who would switch out their crops and grow switchgrass as a crop. I know that there are some people interested in grassy waterways and filter strips, but that's not something we were focused on because ours was about conversion of cropland into it (switchgrass). To do that will require the federal government to implement the second-generation biofuel mandate. That feedstock will be stover early on, and that stover will not be available to meet the full mandate. That's when large-scale conversion of cropland to switchgrass will occur."

**JACOBS:** "You're asking questions a lot of people ask, that if switchgrass or other bio-renewable feedstocks are 'better' for the land and environment, why wouldn't they adopt those practices? What's missing here, and what people don't understand, is that there are other benefits that are being provided by these other feedstocks, but they are not necessarily benefits that accrue to the producers. If the producers aren't getting value from those things, there's lesser value to them. I put myself in the producer's shoes. Would I switch if I was faced with the decision to make $200 per acre planting corn or soybeans or $150 per acre from switchgrass? Which would you choose? I don't think anyone would choose switchgrass in that environment. The decision comes down to the economics, and right now, in most cases, the economics in the Midwest favor traditional row crop production.

As Dermot said about government mandates, the only way that is going to happen on a large scale is if the government mandates it and provides industry with the incentives to invest in it. The smaller things make sense in niche markets. It can be used in markets like cat litter or for biochar. If you consider biochar and the downstream co-products of this processing, although these niche (switchgrass) markets do add value, it doesn't make sense to take major land that is productive in other uses (growing conventional crops) at a higher value on a large scale at this point."

**What advances can be made that can make switchgrasses more competitive faster than is currently anticipated?**

**JACOBS:** "They have to get a handle on logistics. What they are realizing is the importance of how hard it is to transport, so making the logistics and storage more cost-effective would be one way to help the economics

of that system. That's the supply side of that issue. The demand side is a bigger issue that is probably going to dominate."

**What do you think is the best way to communicate the financial opportunity in growing switchgrass?**

**HAYES:** "I guess what we're saying is that there is no financial opportunity to grow switchgrass right now, but if the mandate is implemented as scheduled, then farmers will quickly learn of the financial opportunities because companies will be out there asking them to commit acres. I think the private sector will take care of the incentive to grow the products if the government implements the mandate that we have expected it to implement, but so far, it's not implementing it, so things are kind of dead in the water."

**What are the most interesting or most important facets of your research beyond what we have discussed that you think that the general public should understand about your work?**

**HAYES:** "I think the number one thing is that stover is not available in sufficient quantities to meet the mandate, and that's why this other product (switchgrass) will need to be there as a supplement."

I guess what we're saying is that there is no financial opportunity to grow switchgrass right now, but if the mandate is implemented as scheduled, then farmers will quickly learn of the financial opportunities because companies will be out there asking them to commit acres. *Dermot Hayes*

**JACOBS:** "The general public is looking at these markets and wondering why producers aren't doing more of these things that they believe have environmental benefits. They need to understand that it is a big deal to ask producers to make multi-year commitments to something without a proven market. I think they need to have an understanding of the decision processes that producers are faced with, as well as the commitment and risks that they require.

The bottom line is that producers will respond to the market. They always have and always will. They are making the best decisions that are in the best interest of their land and the sustainability of their operation. Some people would think that producers aren't making the right decisions, that they should be making better decisions for environmental reasons, but unless the market incentives signal for that, they are going to make decisions along profitability lines as they always have. It's just like any other business."

**How will you both take your experience with CenUSA and put it to use in other research projects?**

**HAYES:** "I learned about an area of economics with which I wasn't familiar called spatial competition, so now that I am interested in that and know enough about it, I will probably write more papers in the area."

**JACOBS:** "I would probably say the same as Dermot, but in terms of the experience and future research, it helped me understand the mechanics of production in multi-year commitments and what that means for producer decisions. How to solve multi-year commitments are interesting from the market and policy perspective."

**In what new directions do you personally hope to take your own work moving forward?**

**JACOBS:** "I was kind of already on that trajectory. I don't know that it necessarily implied a new direction, but like Dermot said that in the process of this, we did more research and learned about an area of research involved in spatial economics and spatial market pricing. I think we can incorporate that into future research."

**HAYES:** "Something in which I had always been interested in and have had an opportunity to develop is understanding what the BioEconomy Institute is about and what the other projects are that are going on there. I'm now interested in fast pyrolysis and biochar and have work going on in that area."

## Dermot Hayes and Keri Jacobs CenUSA Bioenergy Work Product

### Extension and Outreach

- ✓ Research Summary. Competition for Land Use: Why Would a Rational Producer Grow Switchgrass for Biofuel? 2015. Keri Jacobs, Iowa State Univ. (2015). https://cenusa.iastate.edu/files/cenusa_2019_031.pdf
- ✓ Webinar. Competition for Land Use: Why would the rational producer grow switchgrass for biofuel? 2015. (43:22). https://www.youtube.com/watch?v=nQbWCdMHqgE
- ✓ Drivers & Barriers to Perennial Grass Production for Biofuels. 2013. Keri Jacobs. https://cenusa.iastate.edu/files/drivers_barriers_-_perennial_grass_prod.pdf

### Publications

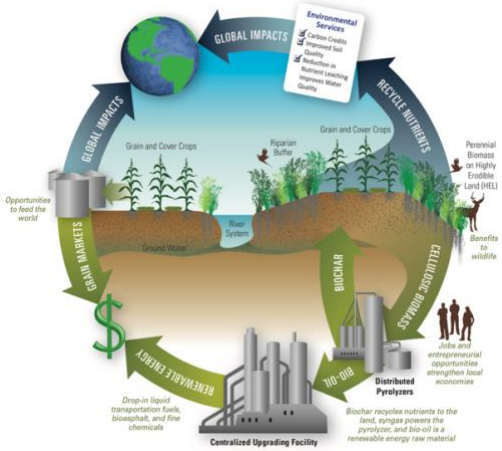
- ✓ Dumortier, J., N. Kauffman & D. Hayes. 2016. Production and spatial distribution of switchgrass and miscanthus in the United States under uncertainty and sunk cost. Working Paper 16-WP 568, Center for Agricultural and Rural Development, Iowa State University, September 2016. http://www.card.iastate.edu/products/publications/synopsis/?p=1254
- ✓ Elobeid, A., M. Carriquiry, J. Dumortier, F. Rosas, K. Mulik, J.F. Fabiosa, D.J. Hayes & B.A. Babcock. 2013. Biofuel expansion, fertilizer use, and GHG emissions: Unintended consequences of mitigation policies. Economics Research International. Article ID 708604. http://dx.doi.org/10.1155/2013/708604. (Open access)
- ✓ Fidel, R., S. Archontoulis, B. Babcock, R.C. Brown, H. Dokoohaki, **D. Hayes**, D.A. Laird, F. Miguez & M. Mba Wright. 2017. Commentary on 'Current economic obstacles to biochar use in agriculture and climate change mitigation' regarding uncertainty, context-specificity and alternative value sources. Carbon Manage. 2: 215-217. doi. 10.1080/17583004.2017.1306408
- ✓ Hill, Jason, **Keri Jacobs**, Anne Kinzel & Ken Moore. 2012. Fueling the Future with Energy Crops. 2012 Farm Bill White Paper. https://cenusa.iastate.edu/files/cb87-rep_yr_1_fueling_the_future_with_energy_crops.pdf.
- ✓ Kauffman, N. & **D. Hayes**. 2013. The Trade-off between Bioenergy and Emissions with Land Constraints. Energy Policy 54: 300-310.

- ✓ Kauffman, N., J. Dumortier, **D.J. Hayes**, R.C. Brown & D.A. Laird. 2014. Producing energy while sequestering carbon? The relationship between biochar and agricultural productivity. Biomass Bioenergy 63: 167-176

- ✓ Li, C. D. Hayes & **K. Jacobs**. 2018. The "Stover Availability versus Supply" Puzzle and Contracting Options for Cellulosic Biomass. CARD Ag. Policy Review Winter 2018. https://www.card.iastate.edu/ag_policy_review/pdf/winter-2018.pdf

- ✓ Li, C.D. & **K.L. Jacobs**. 2018. Biomass for bioenergy: Optimal collection mechanisms and pricing when feedstock supply does not equal availability. Energy Economics 76 (403-410)

- ✓ Moore, K.J., S. Birrell, R.C. Brown, M.D. Casler, J.E. Euken, H.M. Hanna, **D.J. Hayes**, J.D. Hill, **K.L. Jacobs**, C.L. Kling, D. Laird, R.B. Mitchell, P.T. Murphy, D.R. Raman, C.V. Schwab, K.J. Shinners, K.P. Vogel, J.J. Volenec. 2014. Midwest Vision for Sustainable Fuel Production. Biofuels 5(6): 687-702. doi: 10.1080/17597269.2015.1015312


**CenUSA Bioenergy Vision**

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