

Remarks by Catherine Woteki, Ph.D.,  
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U.S. Department of Agriculture  
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[First slide: Title slide]

Good morning. Thank you for that kind introduction, and thank you for inviting me here to speak. It is an honor to be here with you to celebrate the 125th anniversary of the signing of the second Morrill Act and recognize the extraordinary impact of the longstanding partnership between USDA and the 1890 land-grant universities. Together, we've developed some of the sharpest minds in food and agricultural science, pioneered research, and left contributions that have had an undeniable impact on the face of American agriculture. And it's important that we continue to build on these achievements to meet the enormous agricultural challenges ahead.

At USDA, creating the science base and educating community leaders to confront these challenges are among our top priorities.

These challenges include producing enough safe, nutritious food – both in the U.S. and abroad — in the face of emerging diseases of crops and livestock, finite arable land, more severe weather, increased fire and drought, delayed recovery from the global financial crisis, and a projected growth in global population to 9 billion – level by mid-century which would require us to double our current agricultural production. There's also a budding bioeconomy to build in which agriculture holds the promise of providing alternatives to petroleum and the source of chemical feedstocks for fuel, pharmaceuticals and other industrial products.

Agricultural science is the driving force behind the new technologies and innovation needed to ensure greater food security and a better future for everyone in the face of these challenges. And there couldn't be a more appropriate place to talk about the future of food than University of Maryland Eastern Shore (UMES) – a university that remains a pillar in our Land-Grant University System, shaping the progress of our nation's agricultural infrastructure.

[next slide: Next Gen Ag]

Between now and 2050, today's students will be doing the research, producing new products, and making the policy decisions that will determine whether the world will surmount the challenge. This is the challenge of your careers and of your lifetimes.

And with a rigorous commitment to science, technology, engineering, and mathematics (STEM) education, we will be able to prepare the students of today to become the world-class innovators and community leaders of tomorrow.

[next slide: Value of Land Grant University System]

In 1890, the Second Morrill Act was passed, designating a number of historically-black colleges and universities as land-grant institutions. Today, there are 19 1890 land-grant universities in 18 states dedicated to providing educational opportunity for all through innovative scientific research and community-minded

Extension programs. Central State University in Ohio is the latest 1890 LGU, as established under the 2014 Farm Bill.

Since the signing of the Morrill Act and creation of the Land-Grant University System, our state colleges and universities have graduated more than 20 million students, produced countless scientific breakthroughs, vastly increased agricultural productivity, and improved the lives of people everywhere.

And the historically black land-grant universities play a critical role preparing students for leadership not only in research areas that are vital to the well-being of our nation's health, environment, food, fuel, and fiber, but also to become leaders in the U.S. and the world.

[next slide: Cooperative agreement highlights]

The partnership provides several ways that USDA supports learning, discovery, and engagement. Students can intern with scientists at our Agricultural Research Service (ARS) – the intramural research arm of USDA. With a network of over 100

labs, USDA's principal in-house research programs give students first-hand accounts of careers in science.

The National Institute of Food and Agriculture (NIFA), collaborates with institutions of higher learning and provides grants to support the development of the next generation of agricultural leaders.

NIFA administers a number of 1890 LGU education grant programs that support projects that strengthen teaching, research, Extension, and facility programs in the food and agricultural sciences. These include:

- The 1890 Institution Teaching, Research, and Extension Capacity Building Grants program that strengthen teaching and research programs in the food and agricultural sciences through cooperative linkages with federal and non-federal entities;
- The Evans-Allen 1890 Research Formula program that supports basic and applied research at the 1890 institutions in the food and agricultural sciences;

- The 1890 Extension Formula program that supports Extension education programs that respond to the changing needs of limited resource clientele; and
- The 1890 Facilities Grant program that provides funds for the acquisition and improvement of agricultural and food sciences facilities and equipment, including libraries, so that the institutions may participate fully in the production of human capital in the food and agricultural sciences.

[next slide: UMES success stories]

Here, at UMES, there have been numerous NIFA-funded projects that help communities in Maryland and beyond. From helping poultry producers develop sustainable ways to recycle/stabilize poultry litter to using ruminants to control unwanted vegetation in tree farms and recreational areas, UMES continues to produce both the talent and agricultural research fundamentally important to our general welfare.

The 1890 institutions are places of cutting-edge research and technology, empowering many students to become the leaders we need to feed the growing world population. With the agricultural challenges looming over us all, it is crucial that we continue to revolutionize agriculture with groundbreaking ideas and build sustainable agricultural systems.

It's important that I emphasize the urgent need to *reaffirm* our commitment to agricultural science, research and education. These are the foundations that will allow us to innovate and meet the challenges of the future.

[next slide: 21<sup>st</sup> Century Challenges]

In the work I do at USDA, we have focused our research and education programs on addressing five grand societal challenges - food security, food safety, promoting life-long health through improved nutrition, building the bioeconomy, and (in order to accomplish all of this) developing long-term sustainable agricultural systems resilient to climate change. These are the priorities in the research done through both the intramural and extramural agencies at USDA, and each is a complex challenge that requires multi-faceted approaches to research.

[next slide: Food Security Challenges]

So when I think about the food security challenge, I think we need to consider all aspects of producing a health-promoting diet that will be long-term sustainable: enough food; of the right mixture of fruits, vegetables, grains and animal products; and food that is free of disease-causing pathogens and toxins. The adaptation of agricultural systems to climate is increasingly the organizing principle for agricultural research, and sustainable intensification of agricultural production is increasingly recognized as the key to food security.

I hope as we move toward that goal of climate-adapted-sustainable intensification of production, that we can begin to organize our thinking to also include the science we need to a healthful as well as sustainable diet. Calories will be important for 9 billion people, but not sufficient. Calories alone will not support our burgeoning population. So I'm very pleased that work is under way in the US and other countries to expand the models currently used to project the effects of changing climate on agricultural production. Current models are based primarily on the major grain crops – rice, wheat, corn – the sources of calories

from the starchy crops that are staples for people around the world. The work under way will expand the models to encompass fruits, vegetables and other sources of important nutrients to maintain good health.

Making sure we can provide the safe, nutritious food and clean water needed to support an ever-growing domestic and global population is not going to be easy given the ever-increasing estimates of where global population is headed.

Feeding the world, and doing it in a sustainable manner, with farmers getting a fair return, is a challenge that we will all have to pull together to face. This is now a global problem, and it's going to require a global solution.

[next slide: Shared problems, shared solutions]

Today, the scope of our work is much larger; the technology and means of communication more advanced; and the issues we face more complex. But we still are dedicated to sharing our work with as many people as possible.

As the world grows more interconnected every day, it is imperative that we reach across borders to help other countries solve issues as fundamental as the ability to feed their people. Communication is different today than it was even ten years ago...even five years ago. Can *you* recall the last time you used a payphone? Today, we're texting, Tweeting, 'Facebooking,' Instagramming, Snap chatting, and I'm sure there is something else that is all the rage that I'm not cool enough to know about. But the gist is: the ability to share information is literally at your fingertips.

[next slide: Open Science for Agriculture]

We live in a time when technology makes the prospect of globalized "open data" a possibility, and we must take advantage of that to make it a reality. So far, there are promising pockets of international collaboration for specific initiatives. But we can do much more to coordinate global ag and nutrition research and strengthen planning and encourage knowledge sharing. Open data for agriculture and nutrition moves us all closer to addressing the global food demands on the

horizon. In this internet age, information from all corners of the world can be accessible to every producer, scientist, and policymaker.

[next slide: Global Open Data for Agriculture and Nutrition (GODAN)]

A new, global initiative, launched October 2013, is making strides in providing solutions to the world's challenges in agriculture. The Global Open Data for Agriculture and Nutrition — or GODAN, as it is commonly called — focuses on making agricultural and nutritional data available, accessible, and usable for unrestricted use worldwide. This voluntary association is centered on building high-level policy and public and private institutional support for open data. The initiative encourages collaboration and cooperation among existing agriculture and open data activities, without duplication, and brings together all stakeholders to solve long-standing global problems.

[Next slide: Regional Climate Hubs]

Here at home, USDA's recently launched Regional Climate Hubs will help producers succeed in the face of a changing climate. This vibrant network of public, academic, and private sector organizations, researchers, and outreach specialists will provide the technical support, assessments, regional forecasts, and outreach and education to the American people. Each climate hub will offer science-based solutions to vulnerabilities specific to that hub's region.

These are just two examples of how data can be shared to advance research and development. Open science and open data will ultimately help decision-makers, companies, researchers and – most importantly – farmers, access and effectively use new forms of critical agricultural knowledge, information and technology in ways that were never considered before.

They're also examples of using innovation to sustainably intensify agricultural production to meet our future needs.

[next slide: Building the Bioeconomy]

As the federal leader in helping to create a thriving bioeconomy, USDA has added value to American agriculture by creating everyday finished products like biolubricants, bioplastics, construction materials and cleaners using agricultural feed stocks.

With university partners, our research on the bioeconomy centers on:

- Development of emerging biotechnologies to enhance crop breeding techniques, including for drought, pest and disease resistant crops;
- Environmental management and restoration;
- Biodegradable plastics from biomass;
- Biosensors to monitor pollution;
- Synthetic biology - which has allowed researchers to more quickly and cheaply engineer DNA - and ultimately, organisms, to produce the desired industrial chemicals;
- Streamlined risk assessments and rulemaking processes; and
- Bioeconomy agricultural exports - such as wood pellets that are exported to the United Kingdom and the Netherlands for power generation.

Creating a true bioeconomy means our research must be multi-faceted, focused and ultimately successful. The success of the bioeconomy will also be a boost to our rural economies.

But there is an ominous trend that is challenging our ability to provide the research base to address the grand challenges I've been discussing – and that is the decline in funding for agricultural research in the United States.

[next slide: Ag Research Funding]

Recently, the American Academy of Arts and Sciences released a new study called “Restoring the Foundation: The Vital Role of Research in Preserving the American Dream.” The first sentence of the report states that “The American research enterprise is at a critical inflection point.” They go on to make the case that the United States has slipped to tenth place among The Organisation for Economic Co-operation and Development (OECD) nations in over-all research and development investment as a percentage of GDP and that has big implications for our future. The report makes the case that the public investment in fundamental research is the “lifeblood” of the economy and is essential for the economic and personal well-being of citizens. While this most recent report focuses on all public sector support for fundamental science, we can draw similar arguments for agricultural research.

The new report cites the iPhone as an example of how the public investment paid off. The iPhone depends on 7 or 8 fundamental scientific and technological breakthroughs – like GPS, multi-touch screens, LCD displays, lithium batteries, and others. But Apple made none of the discoveries – rather, they came from research that the Federal Government supported at universities and in government labs.

Now more than ever, we need to reinforce our commitment by investing in the research needed to spur this type of innovation in agriculture.

[next slide: Continuing the Work of the 1890s]

The best investment we can make, then, is in the most valuable commodity we can cultivate – each of you – by supporting the next generation of food, ag and natural resource scientists and those dedicated to training them.

USDA is committed to working with land-grant universities, other Federal agencies, and folks with like-minded vision to recruit and develop the intellectual capacity needed to tackle the immense challenges that lie ahead. I have faith that together, with the creativity and dedication of all of us in this room, we will find new ways to do research, and find the new innovations that our country and the world are waiting for. Thank you.

[Final slide: Thank you]