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Before the

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Chairman Roberts, Ranking Member Stabenow, and other members of the committee, on behalf of Michigan State University (MSU) thank you for the opportunity to host today's hearing to highlight growing jobs and economic opportunity.

I serve as Dean in the College of Agriculture and Natural Resources, I consider myself relatively new to the university, having arrived last summer. I am an alumnus of MSU and the College of Agriculture and Natural Resources and so my return is a bit of a homecoming.

As dean, I oversee the college, MSU Extension and MSU AgBioResearch. Michigan State University was founded in 1855 on the land-grant mission of teaching, outreach and research.

MSU was the first agricultural college of its kind in the nation. It also served as a prototype for land-grant institutions under the Morrill Act, enacted by President Abraham Lincoln. In 1888, MSU also became one of the first U.S. institutions under the 1887 Hatch Act to create a network of agricultural experiment stations where research trials and field studies are conducted on behalf of farmers. In 1914, Congress passed the Smith-Lever Act, which created the Cooperative Extension System and directed the nation's land grant universities to oversee the outreach work.

And while all of that may seem like ancient history, I assure you that the relevance of teaching, research and outreach never wanes. It is our charge to pivot, adapt and provide leadership in the areas of food, energy and environment and we take that charge very seriously. Today, you will hear from people whose lives have been impacted by or impact the work we all do. There are more voices, though, that you won't hear. And, when I think about who we serve daily – I count all of those people who woke up this morning with access to a healthy breakfast and a clean environment, and all of those who didn't – as people whose voices matter in this conversation too.

There is perhaps no greater time to be in involved in research pertaining to sustainable and nutritious food production. Today, the world population is growing by about 80 million people each year and is expected to continue this upward pace for the next several decades. This presents immense challenges to food supplies and our natural resource base. In our country, the United States Department of Agriculture (USDA) estimates that 13.1 million children are living in homes with insufficient food, at the same time, children here are being diagnosed with Type 2 diabetes at a clip faster than we have ever seen in history.

We need solutions that will keep our food supply healthy, safe and secure, while protecting our natural resources. Since our need is constant, the food and agriculture industry provides great opportunity for growth and increased employment.

MSU remains committed to discovering practical, adoptable solutions that address these serious issues. And it is through research and outreach that these answers will continue to be unearthed, shared and put into practice at home and around the globe. Our research in the areas of food, energy and environment happens broadly across campus, the state and the world because we do not approach solutions to problems in a vacuum.

Solutions to crisis issues like clean water and nutritious food mean not only providing and growing food and water but understanding human behavior and the challenges that face people across the country and around the world. We cannot just grow more nutritious food and provide clean water, we need to find ways to distribute and understand the importance of both. We also need to better communicate the economics of food and agriculture, so that more people understand the vitality of the food and agriculture industry.

The MSU College of Agriculture and Natural Resources, MSU AgBioResearch and MSU Extension work hand-in-hand with commodity organizations to address the issues facing growers and producers throughout the state – solutions on everything from disease management to food processing.

Recent Highlights

- With funding from USDA, NIH, USAID and other sources, **Felicia Wu** heads up a new center aimed at studying the overall implications agricultural practices have on human health. The **Center for Health Impacts of Agriculture (CHIA**) focuses on three pathways by which agriculture affects human health: nutrition, which includes the quality, macro- and micronutrient content, and diversity of food; economics also play a pivotal role, particularly in underdeveloped areas where resources are at a premium; and the unintended negative consequences of agriculture on human health and the environment. Wu, a John A. Hannah Distinguished Professor in the departments of Food Science and Human Nutrition and Agricultural, Food and Resource Economics, came to MSU in 2013 because of its robust agricultural research coupled with strong medical programs — a rare combination for a land grant university.
- The MSU Lake City Research Center is the first accredited **Savory Institute hub** to be affiliated with a university. The Savory Institute, which has 30 global hubs and plans to expand to 100 by 2025, was co-founded by Allan Savory in 2003. Savory founded the non-governmental organization to encourage a comprehensive systems-approach in agriculture to manage resources, particularly grassland degradation. The approach has become known as holistic management. Savory's method takes into consideration several factors impacting ecosystem health and is said to mimic nature's way of regenerating overgrazed land, increasing its biodiversity, improving water retention and soil health, and sequestering carbon. The hubs provide holistic management training and implementation support for farmers, ranchers and land managers. The specific charge of the new Savory hub in Lake City is to examine soil health and carbon sequestration in pasturelands.
- **Entomologist Rufus Isaacs** is another example of an MSU researcher who is leading work that transcends barriers – this time of the geographical sort. He is leading a multi-state, multi-institutional project that impacts crops from apples to pickling cucumbers. As honey bee populations decline, Isaacs is looking at alternative pollinators to help maintain the vitality of U.S. crops that are pollinated every spring and valued at more than $14 billion annually. Major funding from Isaacs program comes from USDA, MSU Project GREEEN and industry organizations.

    - Isaacs and several colleagues are also addressing ways to control the Spotted Wing Drosophila (SWD), an invasive species that seriously threatens fruit crops such as apples and cherries. Unlike most pests, the SWD mandible is so strong it is able to burrow its way into unripe fruit, leaving irreparable damage to the fruit and unavoidable economic loss to the grower. The Asian insect is believed to have come to the U.S. via food crates and has become one of our region's greatest fruit production threats.
- The **potato** is intrinsically linked to the history of America. Today, Michigan boasts a vibrant potato industry. Michigan is the No. 1 producer of potatoes for the chipping industry and eighth overall in potato production. The Michigan potato industry annually generates approximately $1.24 billion, accounts for more than 3,200 jobs, and involves 70 farms and nearly 50,000 acres. And, we are not just keeping this work to ourselves. Professor **Dave Douches**, who mapped the potato genome, is working with the United States Agency for International Development (USAID) in Bangladesh and Indonesia to grow potatoes there.
- The fungal pathogen *Puccinia striiformis f. sp. tritici*, more commonly known as **wheat yellow or stripe rust**, is often a passenger of spring wind gusts. This year, the parasitic disease reached epidemic proportions, exceeding historic levels to become the most significant yield-reducer on Michigan's 500,000 acres of wheat. Wheat, the third largest cereal grain in Michigan, contributes more than $388 million to the state economy annually, according to the **Michigan Wheat Program**. This makes the threat of stripe rust a significant problem. MSUr esearchers are developing new tools and tactics that can be applied in the field to mitigate the effects of stripe rust and keep the wheat supply healthy and secure.
- **Antibiotic resistance**, declared a major public health threat by both the Food and Drug Administration and the World Health Organization, is a high priority topic within CHIA research as well as other laboratories at MSU. Increasing and occasionally inappropriate prescription of antibiotics has led to significant bacterial resistance in humans. In animals, the use of antibiotics to promote growth, in addition to fighting bacterial infections, decreases the drug's ability to efficiently eradicate illness when needed. When used in excess, antibiotics end up in the environment — in the air, water and soil — and humans can become exposed not just to the antibiotics but to antibiotic-resistant bacteria. A goal is to illuminate these pathways of exposure by studying the transportation and fate of antibiotics and antibiotic-resistance genes in the environment.
- Fisheries and Wildlife Professor **Joan Rose** is the 2016 recipient of the Stockholm Water Prize, the world's most-prestigious water award. She is a global water science expert and the MSU Homer Nowlin Chair in Water Research. She was recognized by the Stockholm International Water Institute (SIWI) for her research on microbial risk to human health in water, her successful translation of the science to policy makers, and for her leadership in developing the tools and guidelines required to give policy and regulatory life to the science. The Stockholm Water Prize is awarded to recognize outstanding water achievements and encourage interest in water and sustainability issues.
- A $1.65 million National Institutes of Health and USDA grant that looks to bring a better understanding about fertility treatments in women by studying the effect of hormones on ovulation and reproduction in cows.
- In 2015, Michigan State University (MSU) unveiled **The Global Impact Initiative**, a strategic plan to tackle some of the world's most pressing challenges. The plan calls for the addition of 100 new faculty members in education, energy, the environment, food and health, and encourages current faculty to submit proposals to enhance research that builds upon MSU's strengths.
    - Michael Thomashow, a University Distinguished Professor in the Department of Plant, Soil and Microbial Sciences, saw this as an opportunity. He solicited the assistance of fellow MSU plant science experts Gregg Howe, Brad Day and Sheng Yang He to develop a project that addresses the growing world population's need for more food

produced with fewer resources under increasingly difficult conditions.
Together, they drafted a plan for the **Plant Resilience Institute** (PRI), where scientists will use basic research to pinpoint the biological mechanisms that stimulate plant resilience

Maintaining the Momentum

Michigan's food and agriculture industry supports nearly one million jobs in the state. Successful partnerships between the federal government, industry, the Michigan Department of Agriculture and Rural Development and Michigan State University can grow the sector.

We know that in order to meet the growing needs of Michigan's food and agriculture system—a system with a combined economic impact of more than $101 billion—we will need to do more. We are working with state government and industry partners on creating a food processing certificate program. A full 47 percent of the agriculture jobs in Michigan involve food processing. Additionally, we are working with those partners, and community college partners, to build three mobile food processing labs - staffed with highly qualified teaching faculty - so that we can offer hands-on experience to students throughout the state. This will complement our offerings in the Institute of Agricultural Technology and prepare students, both on campus and at partner community colleges, for jobs with any of the hundreds of food processors who call Michigan home.

While Michigan's agriculture production has expanded - facilities, workforce development and nimble research dollars have not kept pace. Targeted investments in workforce development, facilities, and research can enhance Michigan's agricultural success and retain talent.

Like other land grant universities, we look forward to continuing to generate and disseminate new knowledge and educate young people to work in the food and agriculture industry. As the world population is expected to reach 9 billion within the next few decades, our work is more important than ever.

While we have been incredibly successful for many decades, the system faces major challenges. The declining buying power of appropriations makes it difficult to maintain the long-term programs essential to addressing many agricultural and natural resource issues. The cost of research is rising and funding limitations not only slows progress of scientists in traditional areas of agricultural research, but it also impedes our ability to bring a broader array of scientists to address agricultural problems. The current levels of funding in competitive grants programs has resulted in extremely low funding rates, leaving meritorious projects undone and discouraging young scientists from entering the field. In short, it is creating a system that is not welcoming to the best and brightest young scientists. If this continues, it will erode our ability to respond to the challenge of feeding the world while protecting our environment.

We look forward to continuing our tradition as a strong land-grant university – educating future generations to meet the growing demands and discovering and sharing advancements that will benefit our state, the nation and the world. Agriculture is America's oldest career, and today it is arguably one of the most complex, technology-driven, knowledge-based industries in the world. We've come a long way, but there continues to be so much more to do.

Thank you for this opportunity and your support.