

**THE CHALLENGE OF CHANGE: ENGAGING PUBLIC UNIVERSITIES TO FEED THE WORLD**

**Panel Moderator: *Randy Woodson***

October 12, 2016 - 9:00 a.m.

*Introduction*

**Ambassador Kenneth M. Quinn**

President - World Food Prize Foundation

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Good morning, good morning. All right, we've all had breakfast with the delicious Melinda biscuits and sausage, a wonderful, terrific Liam Condon presentation, which, very nourishing. So here on the stage are three members of the World Food Prize Council of Advisors, so I know one of our laureates and one person who I don't know at all. So I'm going to introduce him, and he's going to introduce all the guys I know. Well, you know, it's morning, Friday morning – everybody was out late, so kind of get things started.

So Randy Woodson is the Chancellor of North Carolina State University. If you were at the Award Ceremony last night, you saw the promotion video that I put together for NC State and our laureates. Two of the laureates have their degree from there, and it's an incredible university. I went to the University of Maryland, which was a rival to North Carolina State. And at the epic moment of our sports achievement at Maryland, North Carolina State ripped our hearts out and threw them away.

But I'm so taken with the research and academic leadership and how Randy Woodson has taken NC State University and put it at the pinnacle of agricultural research in the land-grant system in America, which is, after all, the largest and most significant agricultural research university system ever created by human beings.

So, Chancellor Woodson, over to you.

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*Panel Members*

**Gebisa Ejeta**                      2009 World Food Prize Laureate

**Louise O. Fresco**                President & Chairman Executive Board, Wageningen

**Steven Leath**                    President, Iowa State University

**M. Peter McPherson**        President, Association of Public and Land-grant Universities

## *Panel Moderator*

### **Randy Woodson**

Chancellor, North Carolina State University

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Well, thank you, Mr. Ambassador. Ripped your heart out – that was a bit strong for Friday morning, but it was a tough game. I think it's the reason Maryland left the ACC – I'm not sure. Well, I'm going to get around to introducing the panelists, but I want to start by giving the audience a brief introduction to work going on at the Association of Public and Land-Grant Universities under Peter McPherson's leadership.

We formed a commission that I'm chairing, called "The Challenge of Change: Engaging Public Universities to Feed the World." And we're very grateful this work has been supported by the Kellogg Foundation, and I want to give you a brief overview of the work that we're doing so that you can anticipate what could come out of this.

To set the challenge – and this is something that we've all reflected on these last few days and we all reflect on in our lives every day – we have a significant challenge in the world for food security. Despite the progress that we've made toward the goal of food security and eradicating hunger worldwide, nearly 800 million people – that's 1 in 9 – are food secure. And in the U.S., which we don't talk about enough, there are over 14% of the households, 17.5 million people who are food insecure at sometime in the recent years. And the World Food Program estimates that one in six children – nearly 100 million – are underweight. One in four are stunted, when poor nutrition causes 3.1 million children under five to die each year. So that's the challenge that we all are about in our work.

The second part of the challenge is that the global demand for agricultural products is increasing dramatically. In fact, we all know this statistic that by 2050 it's estimated that we'll need to have 60% higher food production and availability. And that's something that is both a consequence of growing population but also a consequence of changing diets and consumption patterns around the world.

So these are daunting challenges, and at APLU, we wanted to... There are a lot of organizations talking about this challenge and doing things about it. What we wanted to do, as the representatives of the public and land-grant universities in the U.S. and also with our partners from Mexico and Canada, to really help our universities think about how they can respond to this global challenge.

And most of us that have been in higher education for a long time know that students these days are really interested in addressing the grand societal challenges that we face, and they want to make a difference in the world. And that's true at land-grant universities, but it's true at all universities. And so we wanted to do everything we could as an organization that represents that membership to help our universities think about how they can participate effectively in meeting this global challenge. And it's something that we're passionate about.

So the focus of our effort in the Commission is really in these three critical areas of access, availability and utilization. And we've got spokes off of this wheel with working groups focused on each of these areas, and they'll be reporting back to the Commission. In fact, our next Commission meeting is in early November. And the goal, the objectives of the Commission, are to identify the key constraints to a food system's ability to sustainably feed the

world and to identify how institutions of higher education can best provide the knowledge to remove food security constraints.

Now, one of the things that's been said by members of our commission is – "The world has problems, universities have departments." And if you're a university faculty or administrator, you actually get that as a joke. If you're not... I mean, it's not that funny anyway, but the reality is that challenges like we face in global food security are inherently interdisciplinary and need to bring people together across our campus and across universities in unique ways. So one of the things that we're hoping to stimulate in the thinking of our universities is how they can organize themselves to effectively address some of the grand challenges.

So we've got a panel today to talk about the issues surrounding this grand challenge and how universities can be responsive. And I'm not going to do them justice the way Ambassador Quinn would because he knows them all so intimately. I actually do know several of these fairly intimately. But the panelists today are Louise Fresco, who is the president of, without a doubt, maybe, depending on the rankings, the world's strongest agriculture university, and that's the University of Wageningen. And I was telling Louise earlier that, throughout my career as a plant scientist, I've had many colleagues at Wageningen and been there many times for seminars and conferences. It's a world-class university, and they're thinking very creatively about how to organize themselves to address challenges like healthy food and living environments.

Steve Leath, many of you know, is the president of Iowa State University. Before that, he was at NC State, a long career in ARS as a plant pathologist, associate dean at our university, and then went on to become a vice president for the system before coming to Iowa State University – a great friend and a great colleague.

And third, Gebisa Ejeta, a laureate of the World Food Prize, a colleague of mine. We published papers together – I'm proud of that because he's so smart. Gebisa Ejeta, as you all know, is a distinguished professor and geneticist at Purdue University where I was a colleague of his for many years and a dear friend. My claim to fame is I lived in Gebisa's house when he was on sabbatical and I was kicked out of my house. It was a long story – I was evicted.

And then finally, Peter McPherson, my boss, is the president of APLU, known to many of us in this room as a tremendous leader for public universities, the spokesperson and the heart and soul of the public university system in the country – a long history in higher education, having served as president of Michigan State University and, before that, he was a banker in international development work. So Peter is a tremendous leader and someone that has great vision for our public universities.

So with that, I'll go to my seat and we'll get this started.

Woodson      So I'm going to start with a question to Louise. And as the University of Wageningen focuses on a healthy food and living environment, resulting in an integrated multidisciplinary approach, perhaps you have some advice for those of us in the backwards North American universities to think about how we might address some of the interdisciplinary opportunities we face.

Fresco      Well, thank you for the question and thank you also for your kind words. I have to admit immediately, because Ambassador Quinn just told me, we're, of course totally

at the bottom of the ranking because we do not have a university football team. So that's a major drawback—I realize that.

For you to understand what makes Wageningen so strong, it's important to notice Wageningen actually stands for a dual community. We have on the one hand a university and on the other hand we have what would be your equivalent of the USDA applied research stations and institutes. And what they've done in the last ten years is to try to merge these in two directions. On the one hand, we try to have a really strong continuity from fundamental to applied and back.

So our scientists are very close to the application to the real questions in the field. And that means that even very practical questions sometimes bring up very fundamental questions. For example, we had a problem with warmer winters, that some of the seeds of certain plants weren't flowering or were flowering too early. And that led to a whole series of very advanced fundamental work in physiology. And because that distance between applied and fundamental is not very great, often the same people in the same department, that really helps.

On the other hand, we still have what you would call "departments," although we are all part of only one faculty—and are no other disciplines, the food, applied lab sciences and agriculture and environment—we do have the traditional. We have plants, we have animals, we have environment, we have food science, and we have a smaller part of social science. And what we've done over the last two and a half years is to really try to integrate those more. To get literally the plant people to talk to the animal people, you have to find a common denominator—not only a common language but also a common problem.

So we have a number of major subject areas that really bring everybody together. And I've coined the term, "one Wageningen approach" for that. So, for example, in the area of climate, climate-smart agriculture, all the different departments, we call them science groups, all participate. We have an initiative, called Global One Health, which again brings everybody from the vector, entomologists, to the human nutrition people, all together. And we have one other thing, for example, Metropolitan Solutions: Food in Urban Environment or Food Linkages. And so, by working not just in a disciplinary fashion but in a schematic fashion, I think that has been our great strength.

The other one is that we've always felt that we are part of a network. First of all, we've always been very strong with the CGIAR and of course partnering with many universities including many U.S. universities. And feeling part of a network means that you're by definition very open. So you get a lot of people who come and visit our MSc and PhD students. Sixty percent are not Dutch. We do all our teaching now in English. And then I say not Dutch—the first, single-most important group after the Dutch are Chinese, then Ethiopians, Indians and so on. So we have a really broad array of people. And I think it's the intercultural aspect as well as the interdisciplinary aspect that makes us quite unique.

So lessons for the U.S.: Open up even more. Try to define things that can mobilize people. And our overall banner on this is "Science for Impact," so that's what motivates people—and nurture that motivation.

Woodson Thank you. Well said. Steve, as a president of a leading land-grant institution and a plant pathologist that's practiced in this field for many years, I know you're a member of the Commission, so as you think about the work of this commission and you think about the work on your own campus, what do you see the opportunities for the Commission to inspire our campuses to be responsive to this global challenge?

Leath My information's top secret. But as I think about what we can work, on, I'd like to talk a little bit about that, but then talk about maybe the way we work on it in a way to inspire progress and real change. Because I think all of the land grants are thinking about 2050. They're thinking about the things that we've talked about, this whole World Food Prize week in terms of population growth, sustainability.

And so specific areas that come to mind right away are big data. We're all working on it. We all need to work on it more. The amount of data that we're generating and the whole approach we have, not just in agriculture but everywhere but specifically in agriculture, this whole idea of digital agriculture. It's going to take more effort. We can't fully solve these problems we don't understand, and we have some tools now that we're continuing to work on. They're going to give us more information than we've ever had before. So I think about that.

And on kind of the opposite side of the spectrum, I guess you could say, global food security is still a major issue. There is still a large number of people that do not have adequate food or adequate food is not delivered to them in a quality way – it's already spoiled. So I think about the long history in global food security. And we've made tremendous progress but we're not there. So we don't want to lose focus on some of the more traditional areas that still need great emphasis.

I also think about sustainability – the more people we have, the less tillable land. If you look at the numbers, we're going to have to feed people on less tillable land than we have in the past, and that will be a challenge. If you look at many states – this is one – the population is more focused than ever on water availability, something you're not worried about right now in North Carolina – right? – but water quality, these types of issues. We are as a society no longer satisfied with just production, it's production in certain ways, shapes and forms. And that's a realistic thing, but it presents a tremendous challenge that goes back to what Randy was saying about interdisciplinary work. You are not going to solve these things working by yourselves.

Bio-renewables, again, great progress, but we've got to continue to push forward on bio-renewables. We're not going to get where we need to without that. And I could name other things, you know, microbiomes and other things. But I think the point I'd really like to transition to is – the simple problems are solved, folks, and I think most of us realize that. The problems that we're looking at now are the complicated problems, the ones we were working on for 30, 40, 50, 100 years. If you look at even things we continue to make success, like yield improvement in hybrid corn, every incremental increase in yield now costs more money than it did before. So there are tremendous challenges.

We're going to have to work together. So whether it's big data, whether it's systems biology, conventional plant breeding, the great progress we made in genomics and phenomics, we are going to have to work together in a much more integrative way.

And I'm not just talking about everyone sitting here. I'm talking about our corporate partnerships, our USDA partnerships. It's going to have to be a ramped-up effect, multidisciplinary partnership research at a level that we've not seen before.

Part of the reason I say that also is, our funding is inadequate, folks. If you look at NIH in this country, it gets roughly 13 times as much money as USDA research. Obviously, medical research is important, but for the people in this world that are starving and their growth is stunted, they need more than medicine. They need food first. We have got to all work together, really, once we figure out our priorities, which this commission I'm confident can do. We're going to have to have the resources to act, and if we don't all work together getting our corporate partners, our government partners working in unison and telling the same message where we're not picking away at each other's budgets, we're not going to have the resources to really make progress.

Woodson Steve, one of the things that Louise said that I'd like your perspective on as a university president – this notion of getting our faculty and our expertise across our campus to rally around problems rather than disciplines. You've pointed out Louise the notion of metropolitan issues or whatever the topic; water is something. What's your experience been as a president, of getting the faculty inspired about working toward solutions to a problem?

Leath Well, you know, when it comes to carrots and steaks, I'm more of a carrot guy. So what we've tried to do at Iowa State, and I think other folks have done, we've done things like cluster hires. We've identified key problems and given the faculty resources in terms of other faculty to excite them, give them partners to tackle these problems. Other things we've done is we've put money forward for large, complex interdisciplinary projects. This is a way faculty are incentivized, because they can form teams, they have the resources to form initial conferences, write big grants, give them grant writing support. So there is a reason for them to rally around these problems. And I think, I know you've done this, Randy, others have done this where we've really looked at the problems ahead, thought what we need to do to solve them as a university, and put the faculty and other resources together. I think it's worked really well. We just need to do more of it.

Woodson Gebisa, one of the things that I know we've talked a lot about in our private moments is the capacity building challenge that we face around the globe and the long history of universities, North American universities in particular, playing a key role in helping to develop human capital around the world. I think most of us would understand that, for us to meet global food security, we've got to build capacity in country where food security issues are most paramount. Our hope, I know your hope, is that our commission had some focus on this issue of capacity building. Would you comment on where we are and where we need to be in the future?

Ejeta Sure. Just this week we had a panel on this agenda, and some of the things that came up are really along the same lines. I think the premise for this commission and a food-secure world by 2050, the premise that I read in it is that this is a global problem, a global agenda; and, therefore, it's going to require a global partnership, a partnership of the Western universities, U.S. and European universities, universities in general, and the international agricultural research community, and the national agricultural

research services in developing countries, and the private sector civil society – because we are addressing the most fundamental need of humanity, and therefore it requires a partnership all the way from the farmer to the best minds in major universities that are addressing knowledge generations and so on. But for developing countries to be in the realm, to be part of the game, they really need to enhance their capacity, and they need to invest in their own infrastructure, in their own institutions. And for the longest time they haven't done that.

And assistance from abroad was coming in various forms, but the evolutionary changes of those development assistance programs, in my mind, have shifted heavily on others coming in to help those in need in developing countries. I think that's wonderful, but that assistance is going to be of much greater value if internally there are some commitments made in building some foundational institutions and so on, but at the best time the best minds there are also given the educational opportunities so that they come into the fold in the global intellectual engagement to address these complex issues that are emerging.

Unfortunately, while these developing countries could do a lot for themselves, tertiary education building and enhancing higher education program is not the easiest thing to do from within. It's going to require engaging and partnering with those that have really built their institutions over a long period of time. Europe and North American universities have built them for decades. Even the youngest nation, the United States, had done it for nearly 200 years. And so the beauty of many of these mature institutions is, even as good as they are, they usually ask of themselves where they can improve; and so there's a knowledge generated over a long period of time to make them as good and better every time. And those investments are taking place.

So there is so much benefit for investing the major resources from within, complemented by development assistance from our side, by engaging universities in developed countries with universities, the fledgling universities in developing countries. Without any doubt, the hundreds of thousands and millions of developing country young men and women are not likely to flood U.S. and European universities to get advanced education – it's not feasible. But what can be done is, some of the leadership, the potential leadership in so on, those can engage in coming out and learning – you know, North Carolina State, Iowa State, and don't forget Purdue. And we can do that, but I really think the greatest opportunity that we have is what I talked about the other day about the old Point 4 program, the vision in that that really transcends all other political problems but saying that investing in developing countries, building institutions in there is not handout. It is building opportunities for those in the West as well.

And so I am a great advocate of having U.S. and European universities partnering and identifying institutions in developing countries, building sister university relationships, and over a long period of time, learning together. This is not without benefit to the European or U.S. universities as well, because the most pressing climate change is occurring in places like Africa. And so you've got living laboratories passing it out there where you would have an opportunity to bring the best minds in the West and with the best minds in developing countries, working together, particularly engaging the youth in the future of solving their own problems in the future is a vision

that I see, I sense in the Kellogg commissions and in some of these initiatives coming up.

To me, that's the most fundamental investment that needs to be made. NGOs and so on – it's wonderful. One of the things that I have observed in my mind, in my own experience, is that it is amazing to me that there are so many European, North American young men and women going to college so that they're able to go and help the poor. It's a wonderful spirit. On the other hand, we don't have that experience in developing countries because of the desperation and the urgency there. The most they see, or I saw when I was a young man is how can I get to college? I can work for the government and help my family – a noble cause, but it's not as noble and as game-changing as envisioning that someday, given the opportunity, you can solve the problem of your nation and the world and so on.

And we have so many millions of young men and women in developing countries denied of that opportunity because they did not have that fundamental early education in college and university that instills that kind of spirit that I was fortunate enough to have the land-grant university spirit that Oklahoma State University opened up in my home country. So to me, that is again the most fundamental of the needs there is, if we are going to be bringing along developing countries like the continent of Africa in this fight of securing the human food for 2050.

Woodson      Your point about the return on the investment to the universities that partner in this way, we see in real terms every day on our campus. I mean, we're celebrating here this week the laureates, two of which did their PhDs on our campus. But the relationship that our sweet potato breeding program under Craig Yencho has with Uganda is just amazing. And there's no question that the farmers in our state have benefited from that long-term, positive relationship. If only the crops wouldn't be flooded right now, we would have sweet potatoes for everyone, but we have a flood in the state.

So, Peter, I'm coming to you. You lead the great system of public universities across the country. What's your hope for this commission, and how do you see this commission play into the strengths of the public universities?

McPherson    The fundamental concept is that we need to determine, recommend, the key grand challenges, researchable issues that the public university system in the U.S., Canada and Mexico should take on to achieve the food needs by 2030 and then '50. That's the fundamental challenge. And that has to be done in the context of, we only have so much water, in the context of, whatever the costs of energy are in various places, and the carbon footprint, environmental questions. And that's different in some ways, at least feels different than it was 20, 30 years ago.

So the fundamental, principal idea is that, if you can identify the big problems that we should work at – we're not going to get every problem identified in this report, but the big problems; so this isn't three or four, this is a list of 25, 30 probably – the big problems by focus, we can mobilize. That word was used a while ago. We can mobilize energy on campus and across campuses. Many of our campuses, particularly in the last few years, have gone through a process one way or the other of saying –



what are comparative advantages? What big things should we focus on? And almost always for land-grant schools but for many others too, food has been part of that.

So if we can identify these grand challenges, then no doubt there's going to be a lot of work across... I really believe that this is the way to cut across the bureaucratic lines within our institutions. The way, incidentally, NIH funding big projects has helped cut across in that area. We can do this – we'll cut across the institution and across institutions and clearly within this region of the world but also outside, such as with the Europeans and others.

Well, let me just give a couple of examples of what I think this means. And this isn't the report yet but just to give a flavor. If you could have photosynthesis work just a little better, it would have a huge impact. I remember sitting next to John Holdern, president's science advisor, six months ago. And I said to John, "If you could wave your wand, what would be the scientific breakthrough you'd like to have?" He said, "Photosynthesis – just a little bit, Peter." A lawyer, yeah.

Fifty percent of the nitrogen that we put on plants isn't used. Well, can we do something with the microbes in the soil with the plants for better utilization? What about food safety? By the way, we're talking this is a holistic view, is nutrition. We can't just feed people enough food. We've got to have the food they get to eat be nutritional. And it has to be safe. Can we use the new tools and information technology analytics to better identify safety issues, food safety issues?

What about food losses? I mean, I envision a set of grand challenges. I'm convinced that we don't have the technology, the knowledge and practice and procedures and technology to solve this problem. It's not just distribution of what we have, important as that is – we don't have the answers yet.

So with these grand challenges, what do we do with this report? Because there's lots of reports, and I'm just intent, I'm intent it's not going to be a nice little report that sits on a shelf someplace. Well, I should step back and say again, as Randy has, that this is... APLU has Mexican and Canadian members. I was at the Dean of Agriculture's vet dean meeting earlier this week in Canada. I mean, I want this report to be as much a product of the Canadians as it is here and the same in Mexico. I don't want to have the U.S. universities have full ownership of this.

What we'll do in our country with this report – we're going to have a new administration, obviously, in the next couple months – I want to take this report, go to the new administration and say, "Okay, here we are. This report is your grand challenge, we hope, in all its various components. Now, we have a history in this country of occasionally effectively working across the technology issues. The genome issue, a problem, a challenge – the president has proposed something with the brain, etc. Can we not make this food? Because it's not USDA that's working on photosynthesis census right now, whether it's a few million a year – it's the Department of Energy. Most nutrition work in our country, research, is done of NIH budget. It's not done in USDA. So we hope to have across the government, some effort to drive it.

It all comes back to the concept that, if you can identify grand challenges, big issues, the way Howdy and his colleagues did with biofortification that we all heard about this week, big issues, by then you mobilize people, you mobilize resources, and you get things done. That's what is biggest.

Woodson Before I open it up, and there are microphones, I think, in the aisles, at least I think. And before I open it up in case anyone has a question, let me see if any member of the panel has heard something? Gebisa?

Ejeta I spoke about the developing countries, but I also wanted to say something about engaging the university community. When you talk about food security for the poor mainly, a lot of the emphasis is looking at developing countries and not necessarily engaging the talent pool that is available in the developed world. And the U.S. universities, with all the talent pool that there is, and having built this infrastructure over decades, and the contractual agreements that we have within our university system, is a comparative advantage. And that is that this tenure that we have, allows us to look at the long term, have a long-term outlook at the problems.

Unfortunately, having built the human capital within and the infrastructure, we still rely on competitive funding to address these long-term, more complex problems on a project-to-project mode. Those two don't align very well. And in the past, these other contractual agreements that we had, federal, state and county, that gave us the land-grant university spirit, when those were flowing and working very well, the land-grant universities were exemplary in solving local problems and providing solutions. As we engage in these more complex problems, I think we need to provide opportunities for funding that would address the food systems of the world, of this nexus of food, nutrition and health, and the energy, and water and food agenda that is developing. That is going to require a more long-term outlook.

Sustained investment is going to be necessary until... If I may just be a plug for Purdue University, just even in the last ten years, having built up an incredible research infrastructure, the discovery park that provides grand challenge idea engagement across campus. And very recently a \$30 million-dollar investment to build up the state-of-the-art phenotyping facility to be able to take advantage of the genomic revolution that is coming up. But we still rely, to fit into that facility for competitive funding that comes on a two-year, three-year project, that just doesn't match very well.

Fresco I think this is a real structural problem that we have in our field, and that is that public funding has declined over time – that's also true in our case – and that there has not been a long-term engagement from other actors to sort of move this forward, which means that scientists are spending a lot of time just writing grants and not doing the work they should be doing.

That problem is not easily solved if we use the same kind of paradigms that we have today. As much as we feel here that food security is the number one issue, it's not the one that's going to mobilize a lot of funding from new partners. I think what we need to do is to rephrase part of our problems in a new way. And the most important entry point I see is that we say there cannot be a post-carbon, climate-smart society if agriculture with biomass is not part of the equation.

So agriculture and food, being always part of a problem, now have to be part of the solution. Our future economy in a few decades from here – and some of you here in this room will still live to see it – will be a bio-based economy with all the recycling, etc. In that bio-based economy, the single-most important actor will be agriculture, because that is where agriculture and forestry, where the biomass will be produced.

So we need to look around us to new partners who are willing to invest in a sort of post-carbon or de-fossilizing world where bio-based and biomass is going to be part of the equation.

And in that context, we cannot say, look, nutrition and food are actually essential in a new society, as Dr. Kim said very clearly, where we need the brains, to deal with quite new problems with quite new technologies. But let's make sure that we don't phrase our terms in too narrow a sense, because we will not get – and I think this is true for this country as well – funding from our traditional classical sources in a generous, long-term way. We need to look at other funding. And maybe that's something we should explore. What kind of new consortium can we create in developing and developed countries that moves towards a completely new economy?

## Q&A Session

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Woodson I've got a line over here of really smart people that want to ask a question, so let me go to that Peter, and I'll come back to you. Question.

Q Thanks for your input this morning. I just wondered if you could share your thoughts on diet-driven disease. Most of what we have today is diet-driven disease, not infectious disease, in developed countries. And we spend so much money on treatment rather than prevention. Could you share your thoughts on reversing that and providing incentives and multisector efforts to kind of reverse those trends?

Woodson Thank you. Anyone?

Leath I'll start Randy. I think we have come to that realization, and we started a good discussion on that yesterday when the president of the World Food Bank addressed the problem of obesity. Some people don't have enough food; some people are consuming way too much food and that, not only obesity in itself, but it contributes to things like Type 2 diabetes, other issues.

I think as a society, as our incomes have gone up and the middle class has grown, these problems grow with it. So as we look at this, we're going to have to look at this holistically when we're looking at biofortification in terms of more nutritious foods. We're also going to have to look at the types of food we consume and do better educational programming on nutrition eating. Nobody wants to talk the issue on subsidies, but there was a comment in there, too, that our economy is focused, our ag economy, on subsidizing the staple grains. And maybe there needs to be more emphasis as a society put on other foods so we can put a more affordable pallet out there for people.

And I think these are things that don't just rest in agriculture, these are major policy decisions. It's good we talk about them, but we're going to have to be broader than this agricultural community to solve these.

Woodson I think of the U.S., the medical community also in particular needs to bring nutrition more into the preparation of medical doctors in the country, so that there's a stronger sense of the connection between diet and disease in the medical profession.

Fresco But there's more than that. There's also looking at hygiene, looking at the environment. Where are the sources of disease? I mean, the way you organize cities, for example, has a lot to do with prevention. And the problem we have in many countries, I think in nearly all countries, is that the government departments are so very much organized according to sectors. So there again, looking for an approach to tackle problems transversely is the only way to move forward, in my view.

Woodson Thank you.

Q So workplace wellness is a highly successful model for preventative healthcare, and it's driven financially when they give incentives to participate in the workplace wellness program, and that gets people that are not normally participating in wellness to participate. Just wondered if you could briefly share some thoughts on those financial incentives.

Woodson Well, I think most of us come from institutions that have those kind of wellness programs for employees and give them financial incentives for participating. But there's no question that at least it's had an impact on the employee base at our university. And when I was at Purdue, the same was true there. And, Steve, I suspect you have similar... I think there's a lot of evidence that those kind of incentive-based systems do work and do change behavior.

One more, another question? We have just a few more minutes. Oh, I didn't... I'm sorry.

Q Hi.

Woodson I was looking down the... Your turn.

Q Oh, well, thank you. Thanks so much for your comments this morning, and I agree a lot with the discussion on multidisciplinary team and getting the faculty to really engage in this issue from different dynamics. However, I would like to hear you all speak, because of the fact that you are from the university side, to – what are some interesting ways that we can learn to incentivize and evaluate faculty differently when dealing with these types of projects? Because I think we get in situations where you have young faculty that are looking to be tenured, and so they're really focused on that. And then you have older faculty who have created their channel, if you will, and now they have responsibility to continue to keep either a certain lab running or a certain extension program going, and they don't have the time. So what can you do in the university system to begin to free up faculty who might want to engage but don't feel like they can.

Woodson Can I jump on this one? So I think this is one of the biggest challenges you face in a hierarchal system like a university. It's not unusual in universities for more senior faculty to tell junior faculty – Don't collaborate, don't participate in teams until you get promoted. And I think one of the rationales behind a cluster hiring approach that increasingly is occurring on campuses is to help people understand that we expect our faculty to work in teams, and we expect them to collaborate from the very beginning of their careers; because we need that to be successful as a university and as a society. Changing the process, though, is one where you have to really start to get faculties and departments and other areas to understand the value of a colleague that may be publishing in a field foreign to other members of their department. And so it is a challenge. To suggest that it's not, would be putting your head in the sand. But I think there is progress being made.

Fresco I think we can do a lot more than we're doing. First of all, I firmly believe that some of the most interesting and fundamental breakthroughs will take place at the friction borderline between disciplines, and we should look for those and clearly cite them as examples.

Secondly, there are many more journals today, that there are interdisciplinary journals than before.

Thirdly, if the faculty is really focused on impact and as an administration you show that impact is at the end against which you rate people, then that becomes part of the assessment process. So publications are one side, but the contributions to education, but also to the debate as a whole to the value we create as an organization is a way to assess faculty. And if you have that as part of the culture, then I think you move into a more interdisciplinary focused way.

Leath No, that's fine. Yeah, I agree with everything that's been said. I do think, though, that we have done a good job in the last years of putting more emphasis on impact, and regardless of where it comes from as a team, and put less focus on individual accomplishments than before. But like Louise said, we have to continue in that trendline.

McPherson NIH has got lots of issues and those working with it will list them all, but an impact of NIH over the last several years is that they focus on trying to deal with cancer or some other problem that clearly cuts across many departments' disciplines. I think it has forced that whole area to do a much better job. And I think, I know part of the whole idea of the grand challenges is to focus on problems to solve, and with leadership from presidents, provosts, deans, chairs, we've got to solve these problems. I think then a lot of these issues get sorted out.

Woodson I think we have time for one more question, and I'll jump back to this side.

Q Hi. My name's Jesse, and I asked a question yesterday to Secretary Vilsack about what kind of the role of public universities..., like how he's kind of supporting public universities. Because as you said, like there's been a lot of divestment in public universities. We fund the National Institutes of Health apparently 13 times more than we do support these universities. And one phrase he introduced me to do is this "pipeline of talent," which like there's a lot of people that, I mean, like, for example, go

into studying agriculture because we heard about things like the grand challenge. When we get there, because of how little funding there is for public research and how it's declining, all the pipeline for talent gets pushed out towards the private industry, where I have professors telling me, "If you're studying agriculture science, you're studying soil science, you're going to want to do private research. Like public research, you're going to spend all your time applying for grants – you're never going to get enough funding." And when I think about like where I want, like my innovation or any sort of invention I come to create, I don't want to necessarily going to a CEO or board of directors for them to be able to determine how it gets used. And I think the role of the land-grant institutions is to be able to have a lot of the best researchers so that their research gets quickly disseminated to the farmers of New York State. My education is subsidized by the New York State government so I can go to the land-grant institutes and my research can be available to New York State farmers.

So that was a long, little statement, but my question is really – I'm with you guys. I want more funding for public land-grant institutes, and I don't know how that can happen as more and more funds get moved away from them.

Woodson      Very good point. We all don't know how it can happen, but we are looking forward to it happening. But your point about the talent pool, there are a lot of young people that are inspired by the challenge of food security, and there are a lot of young people that enter into the pipeline of our universities that get directed in various paths, based on where they see opportunities. And I think one of the critical things for the human resource side of agriculture is that they see opportunities in this amazing field, because resources are available.

McPherson    I think if we can articulate the grand challenges, well enough, we have a possibility of not just mobilizing government money but donor money. You look at what's happened to donor money. Of course, Gates plays such an important role in agriculture but in health... You see there's lots of billionaires these days and hundreds...

Woodson      And now that there are lots of billionaires...

McPherson    We want their money.

Woodson      We want their money. Thank you for your attention. Join me in thanking the panel.