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Science, Sustainability, and Society

Dr. Roger Beachy, NIFA Director and USDA Chief Scientist

USDA Outlook Forum 2010, Dinner Speaker, Thursday, February 18, 2010

Thanks very much, Joe. It's a real pleasure, and I've never been introduced a Chief Scientist by the Chief Economist.

[Laughter]

So I have enjoyed getting to know Joe and others in the Department of Agriculture. It's been a wonderful experience to start out with a slate of outstanding colleagues at a department led by a dynamic individual. You heard our Secretary this morning, and I hope you'll agree that Mr. Vilsack has an outstanding grasp of agriculture, of rural America, and a dream that takes us to the next generation of agriculture and rural America far beyond what we might have anticipated.

Now I'm also glad that you are here eating dinner with us tonight, and I don't know about you, but I've been busy watching the Olympics, and the snowboarders last night just caught my attention so much. And I wondered, how am I going to compete with a snowboarder who does a triple corkscrew and a flip or something on this new page?

So I'm glad you're here, and especially if you are young and athletic and are still here tonight. It's great to see the FFA here. Thank you for taking time out of your evening to hear some ideas and some remarks that I've never made before. So if you'll forgive me, unlike the Secretary of Agriculture who really can run anything without notes, I have notes. So if you'll forgive me tonight, I'm going to read from some remarks.

Because I really believe that it's important that we frame the discussion about sustainability around what science teaches us, but also around the part that recognizes the importance of society in how we provide food and sustain the environment while doing our work in agriculture and agriforestry.

So one of the advantages of speaking at the end of a day such as today is that many of my friends and colleagues have already talked about how they feel about the topic, and you've all benefited from the wisdom that they shared in the sessions through this morning and this afternoon. And each of them have given careful thought to the issue about sustainability in agriculture.

The danger of being at the end of the day is that they might have covered everything, but I'm going to take a chance and say they didn't cover everything. So I'm going to talk tonight about some of the things that I think were I think left unsaid. But the conversations and dialog today have been truly outstanding. I've appreciated the time that some of you have spent with me and have taught me as I've gotten to know some of you.

On the face of it, no one in this room or in agriculture or in forestry today disputes that sustainability in agriculture and in our broader society in general is critical to leaving the planet in a better place tomorrow than it is today. That is why we're here. That's why

we think sustainability is important. There is a growing understanding that sustainability is an important organizing principle for agriculture and agriforestry production and for the research that leads to a new and different future.

And today's program marks a far-reaching consensus that sustainability should be a hallmark of USDA's work in bringing quality food, fiber, and energy to homes in America and increasingly across the globe. But underneath this consensus lies some deep concerns about how we will achieve sustainability, about who will shoulder the brunt of the changes in the practices that are needed to support sustainable agro-ecosystems, and about the role that science and technology will play in fostering sustainability.

These concerns may be lulled into quietude during sessions like the ones we've attended today. We all agree on the importance of sustainability. And that's the remit that we have in our role in farming and agriculture. But as sure as the sun will come up tomorrow, a consensus built on such broad outlines will break down. And once outside these doors tonight we will again return to arguing over the particulars of what sustainability means and at what cost it will be achieved.

It is easy to sign up for sustainable agriculture without having to come to grips with what it actually may require of us. For those of us in this room and in much of the developed room, the necessity to practice sustainability is not difficult to conceptualize. And most of us do not experience hunger.

Certainly deep and persistent pockets of hunger exist in America, those areas that are defined as the Food Desert; but this is a problem in food distribution and acquisition, not food supply, per se. We experience what I have often referred to as the "arrogance of plenty." American farmers and foresters produce an abundance that most of us can afford, yet it masks the difficulty many of our global neighbors face in bringing food to the table and energy to power their homes and industries. In many of these cases, neither environmental or economic sustainability of agriculture is practiced or can be practiced.

Grappling with the concept of sustainability has been made immensely more difficult in part because of the lack of consensus around what sustainability means for policymakers and decision-makers of the administration and on Capitol Hill and for those for whom farming and forestry are a way of life and indeed for scientists themselves. But it isn't the lack of definition. We've had a statutory definition of "sustainable agriculture" since the 1990 Farm Bill. It's in the Definition section of the Research, Extension and Teaching chapter, that's Chapter 46 of you who know the tax codes or the legislative code, of Title VII, the Agriculture Title of the U.S. Code.

And it starts by saying that the term "sustainable agriculture" means "an integrated system of plants and animal production practices having a site-specific application that will, over the long term, accomplish certain things." Note specifically the words "integrated system" and "site-specific application," as they are likely the points around which the dialog us most needed.

The Farm Bill goes on to list five things that sustainable agriculture systems should accomplish. And I think we can agree with all of these.

It should satisfy the human need for food and fiber.

It should enhance environmental quality and the natural resource base upon which agriculture economy depends.

It should make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls, sustain the economic viability of farm operations of course, and it should enhance the quality of life for farmers and society as a whole.

Now, no one in this room will disagree with any of these principles. The consensus clearly has emerged that sustainable agriculture systems must be productive, they must be profitable, they must enhance the environment, and steward both nonrenewable and ecological resources; and they should improve the quality of life of both farmers and society. We shouldn't forget that the farmers are also part of society. Their life should be safer and profitable as a consequence of what they do.

So why then are discussions about sustainability so charged? First, I believe it's because we have framed or allowed others to frame sustainability as a practice itself or a set of practices. It's not. Sustainability is a goal, and therefore the focus should be on outcomes rather than specific practices. Certainly both science and field experience are leading to a better understanding about what practices there should be and under what circumstances, and should move us closer to sustainability. But as with any goal, it is important to keep the focus on the goal and be open-minded about ways to achieve the goal.

Secondly, by its very nature sustainability has multiple dimensions—economic, environmental, and social. And all of these dimensions must be addressed simultaneously if we are to truly develop sustainable agriculture.

Much of the disagreement about the path forward to a sustainable future results from developing practices of economic sustainability or environmental sustainability or social sustainability in isolation from the other two. Environmental practices that do not help create rural wealth and allow farmers to stay on the land are not sustainable. Economic practices that do not preserve clean water, reduce greenhouse gas emissions and maintain natural biodiversity are not sustainable. Social practices that cede agriculture production only to a few agribusinesses are not sustainable.

Third, there is widespread agreement that agriculture is incredibly diverse. You all know that from what you do. It's in what we produce, where we produce it, how and by whom. That diversity means different operations will pursue different paths to the same sustainability goals. And while both science and field experience may find that some paths are better than others, we should respect differences and celebrate the coexistence of multiple approaches to sustainability.

Now attentive listeners tonight will notice that the Farm Bill definition of “sustainable agriculture” doesn't say anything about what type of farm, small or large, organic or conventional, with local or global markets. All types of agriculture needs to put, and indeed they are putting, greater focus on sustainability. And we need to keep our minds

open and apply our best science to better understanding the ways that sustainability can be improved across this vast diversity of agriculture in the U.S. and globally.

We are fortunate that coalitions of commodity and producer groups, environmental organizations, universities, industry and others are working to develop sustainability indicators for key sectors of agriculture—forestry, field crops, specialty crops, biomass and biofuels crops, dairy, rangelands, and more. But while our paths to sustainability require multiple approaches, they all need to meet at a common place.

The 1987 Report of the UN World Commission on Environment and Development had it right when it wrote about agricultural innovation that “meets the needs of the present without compromising the ability of future generations to meet their own needs.” Leave the world a better place than when you found it.

This definition and the one in the Farm Bill are as revealing about what they don't say as what they spell out. They do not address the use of any particular technology in achieving a sustainable agriculture. As a scientist, I believe strongly that we need to avail ourselves of a wide range of tools of modern science and technology have to offer—genomics, nanotechnology, biotechnology, computer simulations—in addition to the genetics and plant and animal sciences and social sciences that have already yielded immense benefits for food security, food safety, nutrition, energy security, environmental stewardship, and community well-being.

I became a scientist because one of my goals was to develop disease-resistant crops that require fewer chemical inputs than non-resistant crops, disease-resistance that didn't need a chemical treatment. When that solution came through biotechnology, I considered it a sustainable outcome. Others define “sustainability” as not involving biotechnology. We disagree.

Today agriculture production systems are under pressure as never before. The FAO warns that the combined effects of population growth, strong income growth and urbanization will require a doubling of food production by 2050. Our speaker spoke of that, gave some of those numbers earlier today.

That doubling of food production will need to occur despite climate disruptions, critical water shortages in some parts of the globe, increased salinity of soil because of the way we've done our irrigation, and the necessity to reduce the energy and environmental footprints of agriculture practices.

And this is not just a problem in those other countries. American farmers and foresters already are seeing strong downward pressure on the production system, and many areas of the U.S. are as vulnerable to climate disruption as anyplace on earth. Our longstanding commitment at the USDA is to make absolutely sure that this production system that we have is sustainable, both in terms of being able to keep America as the supplier of the world's food, feed, fuel and fiber and in nurturing and safeguarding the natural resources that make this production possible, while ensuring economic vitality of rural America. The Secretary spoke eloquently this morning about the importance of rural prosperity.

We can ill afford the divisive rhetoric from some stakeholders that holds that we must choose either a healthy environment with low intensity agriculture or a high intensity

sustaining food production system. Both high crop yields and safe and sustainable practices are critically important and both deserve USDA's continued full support.

Furthermore, both are attainable. Science and technology must engage this challenge, and it must be permitted to change as scientific knowledge is gained. A timely bellwether for broad scientific change is described in a recent publication from the National Research Council. This is a research arm of the National Academy of Sciences. They issued a report entitled "New Biology for the 21st Century,.." ensuring the United States leads the coming biological revolution.

For those of you who don't know the report, I highly recommend it as it is a blueprint for revitalizing agriculture research. Now the report makes a very compelling case that we are at the cusp of a truly transformative epoch in science and science education. It is a time in which we can make incredible gains by breaking down the silos that separate physics and chemistry and biology and earth sciences, and adopt a unified approach to bold, big questions.

Allow me to quote from the prefix of the report. "The lessons of history by the Committee on a New Biology for the 21st Century, to recommend that a new biology initiative be put in place and charged with finding solutions to major societal needs. Sustainable food production, protection of the environment, renewable energy and improvement in human health. These challenges represent both the mechanism for accelerating the emergence of a new biology and its first fruits."

So directly relevant is this report to our work at USDA that I joked with colleagues that we should simply replace the cover into one that says The New Agriculture and just re-release it.

Now the report has an even greater impact as a statement about the role of agriculture because ironically the report was funded by the National Science Foundation, the National Institutes of Health, the Department of Energy—not by the USDA. We didn't fund that report. It was done by the other eight research agencies.

The new biology foreshadows a time of momentous change in agriculture sciences. IN talking with many of you since I arrived in Washington, it is clear that we stand at a teachable moment in America where agriculture is again recognized as woven into the fabric of American culture.

Now the most visible sign of the transformative change that we have set in motion at the USDA is the establishment of the National Institute of Food and Agriculture that was launched in early October. NIFA, as we say, funds extramural research including a highly competitive grants program as well as the capacity funds that many of your institutions apply to great effect.

The competitive grants portfolio of NIFA will change to reflect our desire to work at a meaningful scale on a discrete set of overarching scientific issues. Those issues must have great potential to improve lives. We are a small agency in comparison to the National Institutes of Health which has a budget increase this year larger than all of NIFA's budget. Just their increase is more than our total budget.

Most of these scientific issues that we will face are the same ones that were identified by the Biology for the 21st Century. And like its predecessor, that is the CSREES agency that many of you knew, NIFA will ensure that the outcomes of research find its way into the hands of farmers, foresters, consumers and others through the unique education and Extension System that we help to support. We will do this by requiring meaningful linkages between research and education and extension.

In 2010 and beyond more of our grants will require this combination of research and education or outreach. They will require creating opportunities to recruit more students to the excitement of research in agriculture. We will look for more ways to meaningfully engage with colleagues at the 1890s in tribal colleges and equally important to attract young students to our field. There will of course be greater opportunity in those priority areas that I mentioned than in nonpriority areas; that's the hard part about focusing our limited resources on specific outcomes. We are going to narrow what we do.

Our partners and stakeholders should prepare themselves well for focusing in the area of food production and sustainability, biofuels, climate change and environment (that's got a great sustainability component), in food safety and nutrition, and in reducing childhood obesity. And while competitive grants are central to our strategy, intramural research capacity also needs to be transformed to better compliment the extramural funding that we do.

An important focus of the intramural research in the ARS and other agencies at the Department is the science that directly supports the needs of USDA delivery programs such as the Food Safety Inspection Service and that of other federal agencies. Our intramural research also has the flexibility to turn on a dime and to address emerging problems that require immediate response to health, safety and policy challenges.

This is critical and important work, make no doubt about it, and it will remain a significant component of our research portfolio. So the question that was raised this morning, how can I find a job in the USDA? There are lots of ways, and some of those are in the research component.

But we must also use the strength of this intramural capacity to focus on the same kind of concrete results as our competitively funded programs. We need to find greater alignment so we have greater impact. Increasingly the work of both intramural and extramural research will be aligned on those priority areas and towards reaching those priorities in a sustainable manner.

To do the new things we want to do, to grow our enterprise in ways consistent with our vision, we also need to make some hard choices about what we won't be doing. I spoke about some of the changes at NIFA at the address to the APLU in late 2009 and the address is found in our website. I won't go through it again.

Doing less of what we don't do well or what other agencies do better or what is unlikely to reward our investment will let us focus on visions and goals for what USDA science can accomplish. Furthermore, the areas of research that focus on agriculture per se, will be required, and you'll see this in the grants announcements, there will be a requirement to consider sustainability issues, economic sustainability, as well as environmental sustainability in each of those successful—those who are successful in your grants.

You may have heard me or others who represent the USDA research portfolio at NIFA list the areas of focus. They include, and this is one that's been added this year, addressing global food security issues through far greater degrees of inter and intra-departmental cooperation than we have in the past. The recognition is, we have much to offer. When I was a graduate student there were something like 17 or 18,000 graduate students that were sponsored by the USDA to come to our universities and study and then return back to build their agriculture systems. In the last 10 years, that's dropped down to something under 7,000. So we have a lot to do. We have to contribute through our educational systems that we can help others to gain from our knowledge.

The desired outcome is to increase food availability in target countries by improving the management of the natural resources and sustainably improving the productivity of crops and livestock. This will require increasing the access to and the efficient use of agriculture inputs and technology generated through the collaborations that we can provide.

In the end we will be successful if there is improved access to markets, improved capacity and infrastructure, improving the business and policy environments, and improving the capacity to ensure the quality and safety of food. And we will continue to improve the effectiveness of the delivery of humanitarian aid as well as nutritional quality of the food that we deliver. You heard this comment made this morning by the Secretary. He is committed to help use agriculture, have agriculture play a significant role in prosperity in developing economies as well as here in the U.S.

Secondly, in the goal to increase the production of biofuels, as President Obama announced on February 3, we will accelerate the commercial and sustainable establishment of the advanced biofuels industry through a regional supply chain strategy. We will support feedstock research and demonstration to ensure that the development of sustainable supply chains that minimize transaction cost and then create wealth for the farms and the rural communities. You notice, we leave to DOE what DOE does best. We take on in agriculture what agriculture does best.

The successful projects will identify important economic, environmental and social issues up front to build confidence in the producer as well as those that will invest in the industry that follows the development of the new feedstocks.

Third, we must develop food and biomass production systems that are more resilient to climate change. This will require genetic improvements that provide resistance to drought and temperature extremes in crops and in livestock. We heard Dr. Fedoroff today talk about the impact of heat on fertility of crops and animals. We will need soil and water management techniques that conserve water, energy and nutrients, and reduce greenhouse gas emissions, without sacrificing productivity across the wide diversity of environmental conditions and the management systems that comprise agriculture in America.

We need economic analysis to inform emerging markets for trading in carbon credits and environmental services that you heard also discussed this morning, that can help farmers, ranchers and rural communities benefit from their contributions to environmental quality.

To internationalize this important work, Secretary Vilsack announced in Copenhagen last December a Global Research Alliance of more than 20 countries to develop and share

knowledge and technologies for climate change adaptation and mitigation with scientists and practitioners from around the globe. The first meeting of this group is in April in Wellington, New Zealand.

Fourth, another area of focus is to reduce the increasing prevalence of overweight and obesity, in particular in children. We need to understand the behavioral factors that influence weight gain and apply that understanding to the development of effective programs to prevent weight gain. We have a special opportunity to influence behavior through the school meals program that the USDA supports. And that would be to over 31 million schoolchildren nationwide.

The Department is working to change its National School Lunch Program and School Breakfast Program policies based on recommendations from the Institute of Medicine and of the research results that come from those of you who are the social sciences who study the problem in local schools. Coordinating our research, education and extension nutrition programs with these changes in the school meal program will enable us to have impact on a wider scale.

Fifth, as you heard this morning as well, we are also moving to expand and focus our food safety efforts to reduce the hazards of introduced and naturally occurring toxins in foods and feed, including pathogenic bacteria, viruses, parasites, chemical contaminants and micro toxins. Our aim is to strengthen surveillance and control pathogens in the preharvest stage and to develop innovative intervention strategies and ensure post-harvest quality and safety.

These programs that I just described are now across agencies within the Department, and between departments of the government. Our goal is to be collaborative and parallel with others, not competitive with others; to align with the NIH, with the CDC, and with the Cancer Institutes and with others that care about the obesity issue; to align with those in the Department of Energy who can convert our biomass into biofuels while we provide services in production.

I wish all of you could have been in the room of the National Press Club when we launched NIFA in October. It was a standing room only crowd, and these included stakeholders from the diversity of America. It included farm groups, consumer groups, health advocates, even fuel companies, universities and a variety of companies, and the federal and state government representatives as well, educators, media.

And I wish you would have heard what Secretary Vilsack and the President's Science Advisor John Holdren and from agency officials from the State Department, the FDA, NIH, the DOE and the NSF—(Nice acronyms, aren't they? You'll get them some time.)—that now is the time to reinvigorate agriculture science. Now is the time to bring agriculture, not just to the dinner table but back to the policy table as we grapple with some of society's pressing issues that the report from the National Academy talked about.

These agencies, these individuals who joined us, pledged us their complete support for this effort. This support is evident in a research portfolio for USDA Science that saw a substantial increases for competitive research in the President's Budget released earlier this year. In NIFA we have targeted \$426 million towards competitive research in priority areas and increase of \$162 million, a more than 65 percent increase above the

2010 level. This support comes in a budget year that acknowledges that unsustainable debt accumulated in the past decade or so and the need to get fiscal house in order, a budget that essentially freezes funding for discretionary programs in 2010 at the 2010 level. It's a budget that reflects a difficult economic climate in 2009, but more and more Americans had to rely on USDA to help them put food on the table.

But it is also a budget that recognizes that science is an investment, not an outlay. There is something between 15 and 20 years between a discovery and when it's actually applied in society. We have to plan now for what the challenges are that lie ahead, and that takes a research investment. It recognizes that the difficult policy and program decisions that need to be made here in Washington will benefit from science. And while few decisions will be made in a vacuum with science as the only factor, this administration and this Congress clearly understand that the best science should be used to inform their decisions.

We hope that the calls for research that we will release next month attracts the brightest and the best scientists to meet the looming societal challenges outlined in the NRC Report and the priorities that the Secretary has laid out. And moreover to achieve them sustainably. We want the involvement of scientists, not only those in our great Land Grant University systems, but outside—because the challenges are far greater than we have ever faced before.

Achieving sustainable agriculture and forestry must be factored in as both a lens to focus our research and a metric to evaluate our success. Now this is a concept that sometimes doesn't come readily to scientists. We as scientists are accustomed to producing knowledge and a fundamental tenet of scientific philosophy is that science is neither bad nor good. Many scientists feel less responsibility to apply the discoveries that we make. The metrics in use in science often are publications that report new knowledge, not people delivered from starvation or water resources improved or preserved, or billions of gallons of fossil fuels replaced by second and third generation of biofuels.

I often remark that before the age of 50 as a scientist you want to be famous. After 50 you want to be useful. And I think we need to find that utility earlier in our careers rather than later.

This perspective has to change, particularly in agriculture which has only modest resources for investment in public research. Expectations from consumers, the marketplace and society are placing demands on agriculture producers, processors and distributors to assess and report their performance on a host of topics—food miles, climate footprint, water consumption, pesticide use, labor practices, and many, many more.

The marketplace is responding with everything from behind-the-scenes programs to visible labels for consumers. We heard about some of these responses from the food industry representatives in this morning's program, and we are seeing them in our daily lives in settings as diverse as local farmers markets, all the way up to the Big Box Stores.

I have every confidence that the women and men in USDA and our partner institutions who work daily to unlock the secrets of human, plant and animal health and well-being can be equally responsive to the challenge of building of sustainable future for agriculture and forestry. And I have every confidence that we will leave this forum having formed

another level of consensus on sustainability, the need to engage science at every level, from the farmer to the fork.

I look forward to working with each of you to make certain that the science we support here at USDA makes its way to each of you as we build a common future of agriculture sustainability. Thank you for your attention, and thank you for being here tonight.

[Applause]