UNITED STATES DEPARTMENT OF AGRICULTURE

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STAKEHOLDER WORKSHOP ON COEXISTENCE

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THURSDAY
MARCH 12, 2015

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The Workshop was held in Duke Energy Hall, North Carolina State University James B. Hunt Jr. Library, 1070 Partner's Way, Raleigh, North Carolina, at 8:30 a.m., Abby Dilley, Vice President of Program Development, RESOLVE, facilitating.

SPEAKERS

TOM VILSACK, Secretary of Agriculture
LYNN CLARKSON, President, Clarkson Grain Company
DAN GLICKMAN, Former Secretary of Agriculture
MICHAEL GREGOIRE, USDA Animal and Plant Health Inspection Service
JACK HOUSENGER, US Environmental Protection Agency, Office of Pesticide Programs
RUTH MACDONALD, Professor, Food Science & Human Nutrition, Iowa State University
PETER RAVEN, President Emeritus, Missouri Botanical Garden
RUSSELL REDDING, AC21 Chair, Acting Pennsylvania Secretary of Agriculture
MICHAEL SCHECHTMAN, USDA Agricultural Research Service
JILL SCHROEDER, USDA Agricultural Research Service
ERROL SCHWEIZER, Executive Global Grocery Coordinator, Whole Foods Market
CINDY SMITH, USDA Animal and Plant Health Inspection Service
CATHERINE WOTEKI, USDA Under Secretary for Research Education and Economics

PANELISTS

LAURA BATCHA, Organic Trade Association
PETER BRETTING, National Program Leader, USDA
NICHOLAS KALAITZANDONAKES, University of Missouri
ANDREW LAVIGNE, American Seed Trade Association
RON MOORE, Illinois Soybean Association and American Soybean Association
LOGAN PETERMAN, Organic Valley/CROPP Cooperative
BETSY RAKOLA, National Organic Program, USDA
ANNE MARIE THRO, Office of the Chief Scientist, USDA
BRANDON WILLIS, Risk Management Agency, USDA

JIM ZIMMERMAN, National Corn Growers Association

ALSO PRESENT

ABBY DILLEY, Facilitator, RESOLVE

WARWICK ARDEN, Provost and Executive Vice Chancellor, NCSU

CATHERINE GREENE, Panel Moderator, Senior Agricultural Economist, USDA Economic Research Service

JENNIFER KUZMA, Professor, School of Public & International Affairs, Co-Director GES Center, NCSU

C O N T E N T S

P R O C E E D I N G S

DR. KUZMA: Good morning. I'd like to invite everybody to take their seats fairly quickly, we have a tight agenda today. So if you can grab your last little drop of coffee or whatever and take your seats that would be fabulous.

(Brief pause.)

SESSION 1: COEXISTENCE CURRENT STATE OF AFFAIRS

DR. KUZMA: All right. You guys listen well, thank you.

We have a very important and exciting event today so thank you very much for being here.

It's really my pleasure to welcome you to North Carolina State University today. My name is Jennifer Kuzma and I'm a professor in the School of Public and International Affairs here at NC State and I'm also co-director of the Genetic Engineering and Society Center. And the Center is really very pleased to help USDA host this important workshop which is designed to advance an understanding of agricultural coexistence and discuss opportunities for making coexistence work for all stakeholders.

And I have the pleasure of introducing our Provost today who will then introduce the Secretary. But before that I'd like to take a minute or two to tell you about the Genetic Engineering and Society Center and set perhaps the context for this meeting.

The GS Center is the collection of faculty, staff and students coming from multiple disciplines, colleges and perspectives and we all have a commitment to engage scholarship, inter-disciplinary research and analysis and inclusive dialog surrounding the opportunities and challenges associated with genetic engineering, synthetic biology and advanced biotechnologies and their societal context. We believe that we are unique in our blending of the natural sciences, social sciences and humanities.

As a center we've been in existence for about a year and in that time we have launched several new translational research projects. And by translational I mean research that serves the needs of practitioners and bridges the gap between academic work and the needs of practice. In this time we have developed tools for analysis hosted over half a dozen public and stakeholder engagement events and partnered with key local, national and international organizations.

In the interest of time I can't tell you more about these efforts but suffice it to say we had a very productive year and we're very proud of the path that we started on. There is a need, I believe, in society for the type of work that we do and the balanced and engaged approach that we are trying to achieve. More about the Center can be found in your packet, there are brochures and there's a website. And then you can listen to the video about the Center that we'll play during one of the breaks.

But I think it is worth time taking -- worth taking the time to highlight perhaps one of the projects of our students as an example. We also have an academic interdisciplinary program here in genetic engineering and society that's in part supported by the NSF, National Science Foundation interdisciplinary graduate education, research and training grant. In this program where students come from diverse academic disciplines, colleges and departments, and for example one group participated in the international genetically engineered machines competition this fall and won the policy and practices division.

In this work they developed a values mapping tool for better understanding the choices and the ethical dimensions underlying decisions about genetically engineered organisms. With the idea that researchers, developers, policymakers and other stakeholders can benefit from more deeply examining their choices and understanding the values behind their choices as well as the choices of others. So we're quite proud of that group of students. And other groups have done some other amazing things but that just serves as one example of how we are training the next generation of scholars who can blend natural and social sciences and humanities work.

So in the GS program we work in inter and multidisciplinary teams and most often -- and I would say almost always -- as a team. As a group of faculty, staff and students we represent a range of voices but we do not always agree yet we all share a commitment to open inquiry and learning from each other to better understand multiple points of view, arguments on different sides of the debates and diverse ways of collecting, using and interpreting evidence.

It is in this context that we are very pleased to have assisted USDA in this important workshop on coexistence and we really commend USDA and the Secretary for hosting this critical dialog. We envision that in the next two days we can each individually and collectively embody the spirit of the GS Center, what we are trying to do, by embarking on open and respectful conversation with the goals to learn from each other and to achieve a better understanding of each other's viewpoints.

So on behalf of my co-director, Professor Fred Gould and myself, I want thank the USDA for choosing NC State as the venue for this meeting. I want to thank the staff at USDA, Doctors Michael Schechtman, Kim Ogle, Michael Tadle and many others, USDA staff for having the courage to work with us and host this meeting. And I also want to thank the NCSU GS Center staff, Alison Wynn who is the deputy director, and Sharon Stauffer, the program assistant, for working hard with USDA to make this workshop possible. So again, I'm very pleased to be here and very pleased to be a part of this.

Finally I am now very pleased to introduce our Provost. Provost Warwick Arden is Provost and Executive Vice Chancellor of NC State and this is a position he's held since 2010. This past year he also became the senior vice president for academic affairs for the whole 17 campus UNC system, so he's a very busy guy. Prior to this position he was Dean of the College of Veterinary Medicine at NC State from 2004 to 2010 and prior to that he was professor and head of the department of veterinary clinical medicine at the University of Illinois at Urbana-Champaigne.

Provost Arden has degrees in the veterinary sciences from the University of Sydney, a masters in physiology from Michigan State University and a Ph.D. in physiology and biophysics from the University of Kentucky. And in the past few years the Provost and his office, including key faculty members such as Laura Severin and Duane Larick have championed and executed the Chancellor's Faculty Excellence Interdisciplinary Cluster Program at NC State. This program and the Provost's efforts have greatly enriched the scholarly environment here and they're also responsible for recruiting our core GS faculty, myself to NC State, Jason Delborne and Zack Brown, and making this Center and making our program possible. So I want to thank him for his support and please join me in welcoming him to the podium.

(Applause.)

PROVOST ARDEN: Thank you, Jennifer.

Good morning everyone.

(Audience response.)

PROVOST ARDEN: It's great to see you here this morning and it's certainly a great honor for us to welcome Secretary Vilsack. Thank you so much for being here this morning and all of you for attending today. Chancellor Woodson sends his regrets that he's not able to attend this morning.

Thank you to the Genetic Engineering Society Center, Fred and Jennifer, for working with USDA to host this meeting.

So the problem of how to enable the coexistence of conventionally-bred crops and genetically engineered species of these crops is very challenging. And I'm pleased to see such a diverse group come to NC State to really wrestle with this problem. I know that there are many, many different perspectives both across this country and indeed around the world but often the problem is so many of those who have these perspectives only share those with others who also have the same perspectives. So it's great to have a forum where we can come together and truly share diverse opinions. I applaud all of you for stepping up on this important two-day conversation and for focusing on the goal of moving forward. I hope the liberation will serve as a moral for others who are concerned with this issue.

Your meeting offers a perfect example of the kind of conversations that we try to encourage here at Land Grant Universities. Now whether the issue is agriculture or internet security or global warming, a university must serve as a meeting place for a thoughtful dialog that can lead to new solutions. NC State's a leader in new genetic engineering technologies as well as in alternative agriculture. Our Center for Environmental Farming has just celebrated its 20th anniversary and today the Center flourishes as one of the nation's most important programs in research, extension and education for sustainable agriculture and community based food systems.

Genomics research in crops as diverse as corn, casava and sweet potato has also flourished at NC State and these programs are funded both by federal agencies and by the Gates Foundation as well as by private industry. Of course our Genetic Engineering and Society Center is another example of how the university promotes thoughtful and respectful dialog around these issues. This Center is just over a year old but already has moved quickly to pull together NC State faculty in diverse disciplines to address questions about genetic engineering. It's also done a job, and I was having a great conversation with Secretary Vilsack earlier about the need to reach out beyond the walls of academia and stimulate and have this conversation with the citizens of our state and of the nation and, indeed, around the world.

Our reach at NC State is global but our roots are local. Some of the North Carolina farming communities that we serve rely on genetically engineered crops. Other North Carolina farming groups need seed and produce that is free of engineered DNA and we strive to address the problems of all of our stakeholders so that our entire agricultural economy can thrive. Therefore the work that you are doing today is extraordinarily relevant to us here at NC State and in North Carolina.

Your success in the next two days is important to NC State, our farmers and worldwide agriculture and I'm pleased that the secretary has arranged for this meeting. I'd also like to thank the Secretary's staff and the staff here at NC State for working closely together to make this possible.

Now it's time for me introduce Cindy Smith from USDA APHIS who will give an overview of today's agenda and introduce Secretary

Vilsack. Thank you so much for spending time with us here today.

(Applause.)

MS. SMITH: Good morning. My name is Cindy Smith and on behalf of the United States Department of Agriculture welcome to our stakeholder workshop on coexistence.

We are so very pleased that you have agreed to join us either here in person or via web cast or audio cast for what I promise will be two days of very informative, interesting and challenging discussion. We are here to advance the discussion on agricultural coexistence which we define as the concurrent cultivation of conventional organic identity preserved and genetically engineered crops consistent with producer choices and consumer preferences.

So what does this really mean? It means that Secretary Tom Vilsack feels passionately that every American farmer should be able to grow whatever crops he or she chooses to, whatever crops meet consumer and market demands and whatever crops address national and global needs and challenges. Secretary Vilsack has an unshakeable belief that no problem is so big or complex that it cannot be solved by having reasonable people around the table with their sleeves rolled up and working together to find a solution. He demonstrated this when he convened the AC21 committee and charged them with facing the challenge of coexistence head-on. And under Russell Redding's leadership they proved him right and reached a remarkable level of consensus providing numerous recommendations for USDA.

Since then multiple agencies and more than a dozen inter-agency task groups have been working collaboratively across the department carrying out as many of these recommendations as possible, advancing 18 initiatives or proposals. And this is where you come in. Once again the Secretary wants the right men and women in the room and around these tables. We believe that we have invited the right people to help us gather as much input as possible who will collaboratively develop new ideas and who will take full advantage of the diversity of perspectives and expertise in this room and across agriculture by participating in proactive problem solving discussions.

Before we hear from the secretary I want to give you an idea of what to expect during these two days. You will hear directly from the Secretary as well as from other high-level members of his team, USDA's perspective on coexistence. You will learn about the deliberations and the recommendations of the AC21. USDA will share openly what information we know and what we don't know regarding coexistence. You will learn how identity-preserve practices can achieve coexistence and what are our limitations. You will hear the science that assures us that biotech crops which have completed the scientific reviews of our regulatory agencies are as safe as other products.

` That said, you will hear about the

market demand for organic and non-GE products. We will also speak honestly about our less than successful effort to obtain a variety of information particularly relevant to coexistence outreach and education through a federal register notice. Additionally you will hear from a variety of industry, commodity and academic perspectives on what is known and not known regarding economic implications of coexistence. We will speak honestly about what we can do and where we have limitations.

USDA and EPA will share federal actions to address herbicide resistance in weeds, an issue which sometimes identified as a coexistence issue but is really a much broader agricultural issue worthy of broader attention. While there are various issues beyond coexistence that could be addressed through an update of APHIS's biotechnology regulations, with the recall of the APHIS draft revised biotechnology regulation USDA can now engage in a discussion regarding what we can and what we cannot do from a regulatory authority perspective. And if all that isn't enough information to set the stage for some great discussions we are very fortunate to have a former Secretary of Agriculture and a World Food Prize Laureate as lunch keynote speakers for additional perspectives and insights.

Our closing poster session this afternoon that you will not want to miss will feature industry, stake and academia, academic initiatives as well as local food and drink. You won't want to miss the local food and drink.

Tomorrow we will spend the better part of the day in smaller group discussions with three objectives. We will provide an opportunity for each workshop participant to discuss each of the 18 projects we will roll out today and tomorrow. We will also ask you to identify other steps USDA and other entities -- that means you -- might take to bolster coexistence.

And finally, we will ask you to consider how local coexistence conflict resolution activities might be conducted when they are needed and who might be best placed to conduct this work.

It is our hope that these breakout sessions will enjoy the benefit of proactive problem solving. You will notice that while the general sessions of this workshop are being web cast the breakout sessions will only be summarized by a recorder. We hope this will foster an environment where people can feel free to be creative and collaborative. We recognize that most of our discussion will be challenging so to assist we have engaged Abby Dilley, a seasoned facilitator, to ensure our success. Abby Dilley is Vice President for Programs of Resolve. She has a long history of working with diverse stakeholders on agricultural policy including facilitating previous USDA AC21 discussions on coexistence. She will help keep the workshop on time and focused and address and process all your questions.

Unfortunately while Abby was due to

arrive yesterday an unbelievable series of mishaps has her plane just about landing right now at Raleigh-Durham airport. So she will join us later in the morning.

When we adjourn at the end of this workshop we hope the following will be accomplished. We will have had very robust engaged discussion focusing on fostering coexistence and associated strategies, and that USDA and all of us have lots of information, insights and ideas to encourage coexistence including specific feedback on activities and efforts currently underway and new ideas for additional activities and efforts for USDA and for other stakeholders to take up and pursue or champion.

And now it is my great pleasure to introduce a man who cares deeply about ensuring the opportunity for every farmer to successfully grow the crops of their choice. Secretary Tom Vilsack.

(Applause.)

SECRETARY VILSACK: Cindy, thank you very much. And a welcome to everyone here.

Let me begin by extending an incredible thank you to North Carolina State for allowing us this wonderful venue and this opportunity to collaborate and come together. We appreciate the work that North Carolina State does on this conference but also what it does for all of agriculture. And Provost, I appreciate your welcome.

I do want to thank our team from USDA, Cindy Smith and Doug McKalip, Michael Schechtman for the hard work that those three individuals in particular have been doing to get this conference scheduled. I certainly want to acknowledge my good friend and I hope a colleague, soon-to-be Secretary of Agriculture for the great state of Pennsylvania, Russell Redding who chaired the AC21 committee and really appreciate him being here, especially at this point in time in his life when he's going through a nomination process. I understand how rigorous that can be.

So Russell, thank you for your leadership and best of luck in your new opportunity.

(Applause.)

SECRETARY VILSACK: Yeah, please give him --

I want to thank Secretary Glickman who is a good friend who you'll be hearing from later, as well as World Food Prize Laureate Pedro Sanchez. I also want to acknowledge Cathy Woteki who is here from -- who heads our research effort at USDA who has also been intimately involved in all of this. And I want to most of all thank all of you because I know many of you have come from significant distance to be here and anyone who spends a couple of days talking about critical issues deserves our thanks and acknowledgement.

And I think we're here because we all care very deeply about the future of farming and agriculture in this country. We have a shared responsibility to that future, we recognize that agriculture must provide for the needs of American consumers and billions of consumers around the world. We recognize the responsibility that we have in agriculture to care for the land and the water and the air that serve all of us so well. We also have that responsibility to build up and invigorate our rural communities to respond to evolving consumer needs and tastes in the shadow of increasingly taxed natural resources. In short, we have the responsibility to enhance and expand opportunity in agriculture.

In the six years I've been honored to be Secretary of Agriculture I think we have all seen a vigorous and robust expansion of our agricultural sector. You know, the world's population is growing at a net rate of six million more people per month. Now to put that in a perspective that I can understand as the former governor of Iowa, that's roughly twice the population of my home state increasing every single month. And farmers must rise to the challenge of feeding those people two or three times a day and at the same time provide additional product for record exports that support jobs in the American economy.

There are few people who can say that their work touches every single person every single day on this planet but farmers can and do say that. And I would say that no one else is better at it than America's farmers, ranchers and producers. Now they have significant influence but it also comes with a number of challenges. Feeding all of us in a changing climate with more intense weather patterns is a significant challenge that must be addressed. And I think it underscores the importance of the conversation we're about to take -- that's about to take place here about the future of agriculture, one that I believe must center on the diversity of production methods as well as the diversity of producers.

Farmers are also increasingly accountable to a nation and a world of non-farmers. Today's consumer is constantly asking to rate their experience, from YELP to Amazon to

Netflix. They're invited to give feedback. They expect responsive changes and adjustments from companies that receive their business. Consumers are motivated, they're engaged, they're conscientious and they have access to more information about everything including their food than ever before. I don't see this as a bad thing. Consumers can and should be our partners. Consumers have a stake in what happens on our farms and ranches. They're interested. They have a right to know about their food, where it's grown, the impact of its production on the land, how it will impact their health and how it was cultivated.

Consumers can also expect a wide variety of affordable choices and they are bombarded with information that helps them make those selections. From health claims to ingredients listed on the side of a package to labels to price tags, consumers rightfully expect that the product they choose to purchase matches their expectations. And American agriculture has a unique responsibility to meet those expectations. That's why we're restarting this conversation about coexistence and choice. I believe it's so important. There is a diversity of opinions and motivations on coexistence and choice issues, as there should be.

Unfortunately in my view, both sides of the debate have failed often to speak truly about these issues in a way to advance the conversation. It's confusing, it does little to advance the interest of either side and it may negatively impact consumer confidence in our farmers, ranchers and producers. It's also unfortunate that this sort of debating is also going on within agriculture. I'll give you an example. Cindy alluded to this earlier.

In November of 2013, to help gather information on how best to spearhead an outreach and education effort, which was one of the recommendations from the AC21 committee, USDA published a notice requesting input from an engaged public on a number of topics. We were interested in soliciting the brightest and best ideas. Our hope was to get substantive comments where farmers and others laid out the challenges that they faced, and suggested ways in which USDA could help.

Unfortunately in the vast majority of those comments, and in much of the ongoing public dialog about these issues, the conversation about coexistence and choice appears to have backslid towards more inflexible and strident and contrasting positions. It devolved back into the bitter rhetoric of what is good and bad, right or wrong. And in my experience in life, very rarely is the world so black and white, and agriculture is certainly no exception. Both sides and all sides of the issue have fought one another for the last five years and I asked the question, what has it achieved? I say very little in the way of progress. And while that time was spent battling opportunities have been missed.

This infighting has impacted consumer confidence and trust in GE products with the risk that it will bleed over into organic and non-GE products as well. And I'm personally concerned that this attention and controversy will well increase cost of product development and ultimately deprive all farmers of the tools they need to remain competitive. I think this lack of common ground also increases the likelihood and risk of litigation, litigation that potentially leads to courts deciding who gets to farm and exactly how they farm. I don't believe we can continue to go down this path as a divided industry. It's not sustainable and it's bad for business.

American agriculture will fail to reach its fullest potential if we don't move past the heated rhetoric and focus on developing real solutions. Coexistence and choice have to be more than buzzwords. They have to be the only viable option. And that's why it's time to move beyond this idea of one side winning and one side losing. I believe, and I hope you do as well, that there's a better way, a solution that acknowledges agriculture's complexity while celebrating and promoting its diversity.

Each of you in this room have skin in this game and in this conversation. And today we hope we are kickstarting a more stable, measured conversation about how to move forward and to discuss how USDA can help make coexistence more achievable and become a basic and routine consideration for all stakeholders.

Our purpose at USDA first and foremost is to support all farmers, and I emphasize "all farmers." To give them the tools and the technologies they need to success. We support farmer choice. Organic, conventional, biotech, they all should be viable options for producers. All three types of agriculture are important for consumers, for farmers and for the health of rural communities. From USDA's perspective those GE products on the market today that have completed a stringent review by several government regulatory agencies are safe and as safe as any other product out there. We'll have some conversations about those conclusions today and around some of the concerns about the GE products. But ultimately this meeting ought not to be about a conversation as to whether or not these crops are safe.

We've proved GE crops are safe for many farmers and those who wish to plant them should have the freedom to do so. Equally important, those who wish to produce valuable organic and non-GE products for market and for their consumers should also be free and encouraged to do so as well. Organic farmers and farmers growing identity-preserved non-GE crops express the concern that the presence of nearby GE crops have made it difficult for them to produce products that meet their consumers' specifications. They've even experienced shipment rejections because of unintended GE presence at a testing destination. They have expressed a desire to us for more active collaboration with their GE crop growing neighbors to help enable them to meet their customers' needs or, failing that, for more government involvement to mandate such actions.

We recognize at USDA the incredible challenges that all farmers face and the practical challenges of producing products that are being scrutinized ever more coarsely by policymakers and lawmakers and by the public. Those are at the core challenges that all farmers share no matter their production method. And they have a responsibility to consumers and to one another to be a good neighbor. It's just good policy and it's good business. Today USDA will present the activities and tools that we've been working on but ultimately we cannot solve this problem alone. It will indeed depend on the cooperation across all forms of agriculture.

In 2011 I brought back USDA's advisory committee on biotechnology in the 21st century agriculture known as AC21. To take a shot at addressing the frictions that have been reflected at the farm level, when neighboring producers are trying to market different products to meet different market demand. A number of the members of that body are in attendance today but this is not an AC21 meeting. We've brought a wider group of stakeholders together to convene this public dialog.

I'd like to take a moment, though, to touch on some of the work that USDA has done to follow up on the AC21 recommendations because I think it has a bearing on your conversation today. Through the extraordinary leadership and work of Russell Redding and the AC21 committee, you'll hear from Russell in a few minutes. They produced a near-consensus report and, trust me, that was not an easy task. It contained a balanced package of recommendations in the areas of risk management, stewardship, outreach, research and seed quality. When I received the report from Russell and the committee I committed to him and to the committee that USDA would implement the recommendations where we were able to do so.

At this meeting we'll describe our

progress in doing so and some of the challenges that we still face. Frankly achieving some of the recommendations will require more time and a longer-term commitment and others may indeed require additional authority from Congress. But overall USDA has made progress on each of the main recommendations in the report. We recognize that the ability to produce crops and products starts with access to high quality locally adapted seed that fits the appropriate production method.

So we have restarted the National Genetic Resources Advisory Council to help us work on and guarantee seed availability. In the area of risk management we have created new crop insurance options for organic farmers and we're beginning through a survey process to gather data on the economic losses associated with unintended GE presence. Our research and regulatory efforts will continue to support the development of new technologies, both GE and non-GE, that will meet diverse needs. Now that's a start and it's what we can do within our limited authority.

But today is about restarting a broader conversation about what mutual success looks like. For conventional and biotech interests that means acknowledging the promise and the importance of new technology while also acknowledging that there is an economic issue that some farmers face and experience because of unintended presence. For non-GE and organic interests, while acknowledging the importance of your products to fulfilling consumer demand and biodiversity means acknowledging that there's room in the marketplace and in agricultural production for both biotechnology derived crops and non-biotech crops.

Anything less, messages of all or nothing campaigns or fear of this product or that, in my view are counterproductive and will not bring out a viable solution. Websites and organizations that exist solely to discredit one another and spread partisanship increase the cost of doing business on both sides, increase the public's distrust of all agriculture and increase consumer uncertainty about the safety of our food supply. When farmers target each other we're actually making all of agriculture a target and that's simply bad business. So it's imperative for all of us to find common ground on coexistence and choice issues. To do so we obviously have to listen hard and we have to listen to one another.

We have to think big picture about how to advance a diverse agriculture in this great country of ours that's ready to meet the challenges of the future of meeting and feeding an ever-expanding world population and doing so in a sustainable way. Accordingly USDA's here today to share information, to listen to constructive feedback and to make commitments to further action. In short, we're here today to chart the path forward.

Now I am fully aware, very aware of the difficulties some of you have faced in even coming to this meeting. You're likely under pressure to adopt certain positions and not to compromise. Appreciate you've made the choice to be here, to attend this meeting, to participate. And I hope that everyone is here with an open mind and a willingness to look at and to envision future compromises. In the long term we need farmers and stakeholders to be forthright and forthcoming about the problems agriculture faces and how together we can fix those problems in a way that respects the needs of everyone involved and ensures that all forms of agriculture thrive so that our food in the U.S. and across the globe can remain abundant, affordable and safe.

Today I'm here to recognize a simple fact and that is that we need diversity in agriculture and I mean diversity in production methods, in crops produced, in size of farming operations and in the farming community and producer community itself. Failing to recognize and act on that fact will indeed compromise agriculture's future and the future of our entire country.

Let me close with just a personal note. I've been in Washington, D.C. now for a little over six years. I came from a state as a governor where I dealt with a Republican legislature for the entire eight years that I was governor, the last two year I had a tied senate. But we got things done even though we had disagreements. And I for one, as an American watching the discussion and discourse today on a variety of issues, have become exceedingly tired with the divisive nature of our conversations in America today. It is all about division, it's all about conflict, it's all about my way or the highway.

So I think this conversation is equally important beyond the significance to agriculture and the important issues that agriculture faces as potentially an example for the rest of the country. That you can take things that you feel passionately about, that you care deeply about, that you can listen to those who feel passionately and deeply on the other side of an issue and that you can be challenged to find that elusive center, that creative solution that speaks to the needs and respects the concerns of all.

As a country we've got to get back in that business because not only do the people in this country and future generations in this country depend on this conversation but literally the future of the world depends on this conversation of being able to feed a growing population in a sustainable and resilient way in the face of a changing climate. We need you engaged in this conversation and I'm confident as I was in AC21 that, indeed, as Cindy indicated, if you put reasonable, smart people in a room and you challenge them to listen, to learn and then to solve, there is no problem that is too big or too complex or too difficult that can't be solved.

Thank you very much.

(Applause.)

MR. REDDING: I have to read my

instructions.

SECRETARY VILSACK: Russell, come on up here.

I just want to take this opportunity again to introduce Russell Redding. This is a man who has had extraordinary career in agriculture and is somebody who cares deeply about the future of agriculture. I've had a number of conversations with him during the AC21 conversation and candidly I think he's one of the best people I have met in this line of work that I've been engaged in the last seven years. I have a tremendous amount of confidence in him.

And I'm very appreciative of Governor Wolf in Pennsylvania reaching out to Russell and asking him to take on the responsibility of being the Secretary of Agriculture in that great commonwealth. I will say that he understands and appreciates the partnership between the federal government and the state governments not just in terms of agriculture but in terms of the entire rural economy and the rural landscape. He is passionate, he is thoughtful, he is creative and we have been blessed by his work at AC21 and I'm sure we'll be well served today. And the people of Pennsylvania are going to have a very, very great secretary.

Russell Redding.

(Applause.)

MR. REDDING: Mr. Secretary, thank you.

Good morning, everybody, it's good to see you. Thank you for being here. A special thanks to the Secretary, I appreciate very much, as all of us in agriculture do, your leadership in agriculture, your public service, your understanding of what it takes to run both a state and all the complexities of our larger government that you just spoke to. Thank you for that. And for recognizing that agriculture is at the intersection of many of those contemporary issues that we are dealing with as a society.

We also appreciate your reconvening AC21 and for selecting an exceptional group of passionate folks who wanted to be, wanted to serve on the AC21. Each one of them great perspective, as I have shared with some of you I thought I understood agriculture until I accepted this task, right? I thought I did. And for all of us, it really was a revelation in that this is an incredibly vibrant industry, it is incredibly important to us. It is amazing where people connect to food and agriculture in their daily lives but also in this topic.

I also want to say thanks to the Secretary for staying engaged in the conversation. Certainly reengaging here today in this critical conversation. Like most things that you care about, it requires a lot of conversations and more than sometimes we prefer, but it is required for this issue of coexistence because it embodies so many of the fundamentals of agriculture. Choice, science, marketing, management, our neighbors, the consumers, responsibility and change. Leading change is difficult. As stakeholders and thought leaders we are entrusted with this responsibility. Change is often painful, it means leaving things behind, it means changing habits and expectations. It means stress and some level of uncertainty.

But my experience at Delaware Valley College as Dean was people will willingly put up with this pain only if going forward is a more attractive option than staying in the same place. On a college campus, you understand, right? Having watched that with students and faculty, that was very important. They had to understand going forward was less painful. I believe this is where we are with coexistence.

So today let me outline just a couple of objectives. Is that going to be run from the little black thing in the case? Yes. All right.

(Brief pause.)

MR. REDDING: So there will be three objectives to this presentation. One is providing some background and context for the AC21 and the role of AC21 for the USDA.

Secondly, looking at the process of our committee, some of the challenges, the controversies that were part of our discussions as well as the consensus or almost consensus, near consensus, and the impacts and implications as well.

Looking at objective one, I won't spend a lot of time on this but it's worth repeating that there is a charter that governs the AC21. And it's not something I understood well until I stepped into this conversation, that it actually has some structure to it. It's not a routine sort of committee, it really is set forth that had guided the AC21 work over several administrations and several committees. But what it does, it really recognizes the multiple and repeating responsibilities and expectations that we have as an industry and certainly as consumers of the USDA. It embodies all of those issues and technology, farm programs, economic development, food safety. So the charter became important as we looked at our work and our charge from the

Secretary.

The bylaws -- it also has bylaws so it really sets forth the long-term, looking at the long-term impacts of biotechnology and provide, really provide guidance to the USDA. And that's what today's stakeholder workshop is about. It also builds on previous work and as we step into this conversation there were some members on the committee who had been involved previously, but it was helpful to sort of look back, right, because the -- both in understanding the charge from the Secretary but also how the conversation has evolved over time, is that we weren't going to look back, we're trying to take that as a foundation and look forward. It was important to recognize that there has been a lot of good work done by previous committees that we were the beneficiary of.

Our charge from the Secretary, sort of three part charge, one was looking at the type of compensation, if any, clause in there, and I'll come back to that in just a moment. What would be necessary to implement such a compensation mechanism and then looking at other items. So when we look at the report that we had produced for the Secretary there was an overarching issue in here of how do we enhance coexistence between different forms of agriculture understanding that it is growing both in complexity and diversity? And for somebody who thought they understood agriculture, my initial thinking was this is between sort of organic and genetically engineered.

As the conversation evolved it was quickly apparent that it was not one dimensional by any measure, right? And what we thought would be sort of, you know, two parties in that conversation are multiple parties in that conversation, even within the production community. And this conversation, as we went through the exercise it became evident that it was also a conversation between GE and GE with any number of traits that wanted to be protected and needed to be protected. That again was one of those issues that I just hadn't focused on as a producer and somebody in agriculture but that's where the conversation went. It also made our conversation much more lively, much more complicated because everyone then understood that, while they didn't think they were going to be impacted potentially by this coexistence discussion, they were.

So that report, I just ask that as you look at the report is to read the section on background and context. It is important and it was important for the committee because in that section we captured a lot of the concerns and beliefs that committee members had. We tried to embody that in the front side of that report. And I've looked at it again, read it last night just to refresh my memory, and then went back and read the letters, the signing letters that are part of that document. And it was really critical to get us to the near consensus that we did. So take a look at that.

But the package of recommendations

that went to the Secretary, there were five worth repeating. Certainly education was important, tools and incentives through the USDA, some research components looking at the quality and diversity of the U.S. seed and germplasm as well as the framework for a system of compensation. And those points will be discussed further at this workshop as well.

So what are the impacts and implications of our report? What does it mean to U.S. agriculture? I think the Secretary laid that out well in his comments but just to reiterate, certainly the conversation, keeping that conversation open, looking at the relationship that we have between and among neighbors, looking at the importance of putting our collective energies as an industry into the things that are going to advance the industry versus sort of pull us back. And looking at the incentives, I mean, how do we continue what we're doing? It spawns creative policy discussions, it addresses this issue of integrity, it demonstrates coexistence as a shared responsibility on a core principle of production agriculture.

Let's touch just briefly on the challenges and controversies. And I had a hard time sort of getting this on to one page.

(Laughter.)

MR. REDDING: I'll be very honest about it. I am certainly a better Secretary of Agriculture for having had the experience of an AC21 chair, I will tell you. And I hope that shows just because of what it means.

But the issue of this recognition, is there a problem? You know, I again sort of assumed that folks who came to the table, and understand that there here to solve a problem, right? What became apparent is there wasn't sort of a collective appreciation that there was a problem. And some solid, some maybe solid but, you know, there just wasn't that sort of unanimous consent that there actually was a problem so you had to sort of restart that conversation.

Again I think, read those signing statements will help you.

But we had to -- we started with some skepticism and it took a little while I think to sort of bring that along. I realized as we went through the process that some of it was based on the charge in that the charge is predicated on certain information that would be available or an assumption of that information being available. But there wasn't a full recognition that this issue of coexistence had great potential to exacerbate the tensions at the fence rows between neighbors, that we had the potential for market disruption, and we really needed to see that there were actually document losses, right? So we needed to see that. So part of that led to a little bit of a challenge to get folks looking at the problem.

There was also this cultural divide and the question of this moral obligation. What does that mean? So do neighbors and industry have a moral obligation to manage their production practice differently when a problem is identified, even if everything they are using and doing is legal? Right? Doing everything right and you still have a problem, what do you do about that? So there's a question in there whether I have an obligation as a producer or neighbor to address that.

We had limited data and folks, I would say for the first meeting or two, even to the end if you read the signing statements again, there was some level of is this really a problem, right? They wanted confirmation by -- of the problem, they wanted to see the data that supported that. What was the scope of the problem? Was the response that we were working on fitting of the problem, right? And that was an issue.

There was also this undertow concern about the government's involvement in the issue. How do you manage this? I mean, if you have a compensation mechanism, how does that get managed in terms of using the crop insurance, risk management system that we have knowing that you've got to set, you know, triggers and protocols and due diligence that's going to lead to somebody making a determination of loss. How does that work in this system? So some concern about that.

And as I mentioned at the outset, this clause that the Secretary put in the first point of the charge, you know, two little words, "if any," right? And it really was challenging because what it did was it raised this question that -- of doubt. And I think I understand what the Secretary was doing by putting it there. It wasn't prejudging it, it was just saying, committee, look at this, okay, and you determine "if any." And what it did was it provided a great conversation among the committee about the data point for sure, but I think it was one of those times when your words are important, those two little words. But take a look at the signing statement.

So looking at -- I'll try to wrap this up here. In terms of the consensus, I mean, we were almost there and there were times when I was pretty sure that it wasn't going to happen at all, eight? And those who are chuckling are committee members.

(Laughter.)

MR. REDDING: Because, I mean, you got in this conversation and, you know, there wasn't an identified exit, right? I mean, you entered this conversation, you could own this highway and then all of a sudden you've got all this information to manage, you've got things that are distractions off to the side, you've got some question about what your destination is. But in all of that I think, as we worked through it, we understood that our collective responsibility was to advance the conversation based on the previous reports and work of the USDA and that we could really contribute to that.

I think there was a recognition that this was not going to be the Alpha and the Omega of coexistence but it was going to move this conversation forward considerably from where it was. And in that process what we recognized that was important to have individual members who felt very passionately about different areas of this charge but also coexistence, is to allow them in the report, what we call sort of the signing statement. And I appreciate the Secretary's willingness to include that as one of the really principles of the report. And to Dr. Schechtman's sort of really good work trying to bump and steer these things.

But I would say to each of the committee members, this was the piece where they were allowed and encouraged to really express the issues as they saw them over the course of a couple years and qualify their support. And that's okay, right? Because to the Secretary's point, this was about sort of transparency, this is really digging into this issue so we appreciated that. And in the signing statements what I found really helpful, the technical points of concern by the committee.

But every single person said how much they appreciated being in the conversation. And again, it was one of those things sort of you can run by that pretty quickly but you understand the significance of what you're doing when people say "I appreciate being at the table," right? And we can disagree, we had some very spirited debates and discussions but the end result was we produced a report that had five recommendations that advanced back to this, the bylaws of AC21, advanced the conversation, advised the Secretary.

So with that I would just say in summary, coexistence is about finding solutions and not differences. And it's probably not a bad motto for public service, right? But ag production is complex, it's growing more complex, you know, to believe somehow that we can just sort of stay where we are, that is not where agriculture has been for 300 years. We've been on the path of change for 300 years and the one thing we've proven is perseverance, that we can take all kinds of obstacles and at the end of the day have people appreciate what we do in food systems, in the environment, in so many ways. So as the Secretary said, well, that diversity is our strength but we need to stay engaged. I mean, I would just say that, and that's the purpose of today.

So I'll end where I began with a simple thank you to the Secretary and to the committee, to Dr. Schechtman and the USDA team for an exceptional job. And I look forward to, both in my capacity as chair but certainly as Secretary of Pennsylvania, staying involved. Thank you.

(Applause.)

MS. SMITH: Thank you, Russell, for your remarks and for the remarkable leadership you've demonstrated through this process.

Now that we've had the foundation laid for the work that was done by the AC21 we have microphones set up on both sides of the room and I think we have people that are eager to ask some questions of the Secretary. So Mr. Secretary, can I ask you to come back up, please, and entertain questions?

SECRETARY VILSACK: I may not be as eager to answer them, but --

(Laughter.)

DR. GOULD: Well, I'm not that eager to ask you the first one. But as the co-director of the Genetic Engineering and Society Center I was asked to get things started --

SECRETARY VILSACK: Okay.

DR. GOULD: -- with a question to you. But first I really want to thank you and Russell Redding for getting this conversation started this morning and really thank you for organizing and getting this happening. You know, I heard from your staff how interested you were in having this kind of open conversation and that is so critical. And I would say that this idea of having a respectful conversation is something that, in the Genetic Engineering Society Center is also very important to us and I have been involved in some of these kinds of conversations where it's kind of hard to keep everything respectful. I've actually been asked to watchdog this thing a little bit and make sure that the conversation stays very respectful. And I will make some comment in that way, if necessary. I hope not.

But I do want to ask you a question. Russell brought up the fact that this is not just a question of genetic engineering and conventional crops, it's also GE and GE. And as somebody involved in some of this I see the technology moving ahead very quickly. And you know, years ago USDA was regulating just about every product that came out that would be considered genetically engineered but today there are more and more products that don't fall under USDA regulatory authority. And I see a point at which some of the new technologies with CRISPR/Cas9 systems and such will allow genetic engineers to make changes that won't be apparent. It will be difficult to even notice.

And so I'm wondering in terms of the definition of genetic engineering, are we including only things that are under regulatory authority of USDA or other things that need to be governed because some people consider it genetically engineered?

SECRETARY VILSACK: Well, I'd answer it this way. This is about the path forward and to the extent that science seems to be able to move at warp speed and government regulatory processes are sort of moving at prehistoric age speed. And we have made an effort to try to better align the speed of regulatory decision making. So it is important for us to know what is indeed the current state of play and what is likely to be the current state of play in the future. And as we essentially withdrew our regulation that we were considering, it was really designed to open up a conversation so that we would get input because a lot has changed over the several years since we initially proposed the regulatory changes on 340. So it's going to be important for us to know what the state of play is.

It's also going to be -- we're inviting folks to come to us because we want to -- we have a responsibility to put together regulation and that regulation should be timely. It is also, I think, important for us to be able to make recommendations to Congress if there needs to be a change based on this science, in terms of what we are to regulate and how we are to regulate it. So this is part of the conversation. And that's why, you know, you start -- as Russell found out, you start unwinding this it gets pretty complex. But I would certainly encourage you to educate us on the current state of the science and allow us to understand how the regulatory system should reflect that current state. We don't want to be behind.

I think frankly we have been behind in this particular area. One of the frustrations for folks who are strongly concerned about the future of GE in terms of our current regulatory system is the belief that we have this massive regulatory capacity to say "no" to an item that some folks are concerned about.

The reality is, and you'll learn I think throughout the course of this discussion, that our capacity and our authority is really narrow in terms of what we are to look at when we deregulate a particular product. And it may very well be that people would like it to be broader but it currently is not. And so it would be helpful to have those suggestions and directions. And then it will be a question of what we can legally do under the current statutory framework and what Congress might consider in the future in terms of enlarging or changing that statutory framework.

Yes, sir?

DR. SEDEROFF: So USDA has always argued that the decisions about evaluations are science based but that's not true. In the beginning it was strongly recommended by at least the National Academy, and others, that evaluations be product based rather than process based. That puts everyone in a logical quandary because you have products that are essentially equivalent but are subject to completely different kinds of regulation. So there should be no question that the goals and the term "finding common ground" is more profound than amusing, which we must do in terms of nutrition and in terms of safety, in terms of the environment.

But can we get to a situation where we evaluate things based on product not based on process?

SECRETARY VILSACK: Help me understand that question better. Give me sort of a hypothetical example of what the difference would be, in your view?

DR. SEDEROFF: You create an organism by two different technologies; one by conventional means, for example by spontaneous mutation, and the other by genetic engineering.

They're created by two different processes but the product is identical. Yet one is subject to regulations that have been unprecedented in agriculture and the other is unregulated completely. It should not be a question of how you got to a product, it should be a question of evaluating the product itself based on its nutrition, its safety, its impact. That than saying because it was created in a particular way, it is intrinsically legal or intrinsically wonderful where the products are the same.

SECRETARY VILSACK: That's -- you know, that's a very significant observation and I think it does point out the fundamental challenge with the regulatory system as it exists today because it is based on our understanding of what Congress directed us to do. It is very process oriented and not product oriented. So that is the kind of thing that, if you all come back to us and say, hey, this process orientation is not the way that is consistent with what you ultimately want to get done, that's the kind of thing that we can go back to Congress and say, look, you all need to take a look at how you structured this thing 15, 20, 25 years ago because a lot has changed as we know a lot more.

I would say that it is a challenge to use the concept of science because, you know, I wish science were as certain as some people would like to think it is. What I do know about science is it is evolving and so our systems have to have that -- have to take that into consideration and I don't think they do very well. I think our systems basically create a situation where we examine something at a specific point in time based on science as we know it and it's very rigid, in my view. And it's not as flexible as the, I think, government's going to need to be in the future.

DR. SEDEROFF: One aspect of it is that we scientists frequently forget that we -- that science exists in a political context.

SECRETARY VILSACK: Oh, my.

(Laughter.)

SECRETARY VILSACK: Truer words were never spoken there. You know, Cathy Woteki, if she had a dollar for every time I had kind of made that point she'd be wealthier than she already is, if she is wealthy. And I would make a further point, look, what science does and what scientists do is absolutely phenomenal. It's inspiring, it's overwhelming, it's been so impressive.

The problem is you don't know how to talk to the rest of us. You don't market it. And so we fuss and fight with limited resources to get money into research and we try to convey to folks how great this stuff is but you have to help us convey that message. Because with open data and with big data we're going to see an accelerated pace of change here. You all are going to come up with a million different new ideas and we have got to have regulatory systems and structures and a government that's capable of dealing with that. I don't think we have that today and I think that's one of the big issues that this country has to confront.

DR. SEDEROFF: If you've had the scientists feel that Congress doesn't listen and it's been more than 150 years since we recommended that the country adopt the French Metric system.

SECRETARY VILSACK: I get that Congress not listening thing.

(Laughter.)

SECRETARY VILSACK: Yes?

MR. KEMPER: (Inaudible comments.)

SECRETARY VILSACK: Geez, I can't believe you started with corn, Alan.

MR. KEMPER: Are we okay, Mr. Secretary?

SECRETARY VILSACK: Yeah.

MR. KEMPER: Yes. Thank you, Mr. Secretary.

SECRETARY VILSACK: I would have thought you'd started with soy beans. Okay. Go ahead.

MR. KEMPER: Our farm's been around

since 1888. We think the coexistence discussion today is something new. I want to give you three little things about it.

Back years ago farmers had coexistence discussion over a fence when certain neighbors all got out and changed the genetics of the new calves being born and the cows. A few decades later over the small country elevator over a soda we talked about coexistence when maybe spray drift happened from one neighbor to the other. Today with the help of expansion and coffee shops and things we still talk about coexistence on the farms, maybe it's genetics or drift or what have you.

My point is on this -- and I have a question. But my point is that coexistence discussions happen locally and are addressed in the discussions locally with the help of expansion and others that help facilitate that.

Mr. Secretary, you talked about the right to know a little bit ago and about the consumers' right to know. It's also my right to know. And so I think maybe you have some thoughts on maybe Q code readers and some things in the supermarkets that maybe we all can work on together to help coexistence and to help the right to know of everybody.

Thank you, Mr. Secretary. Any comments?

SECRETARY VILSACK: Alan, thanks.

Well, so I sit in my office and I have -- I have friends on all sides of these issues, close friends, good friends. I practiced law in a small town starting 1975 during the farm crisis in the '80s and I got to know farmers. And I will tell you there's just no greater group of people in my view in terms of how passionate and caring they are about their community, their country, their family.

I also have entrepreneurs and folks who started businesses who have grown into really large businesses who have been extraordinarily successful who believe just to their very core the power of organics. And so I sit there and I watch these friends of mine fussing and spending hundreds of millions of dollars fussing on the issue of labeling. And I say to myself, this is a tough issue because it's hard for any businessperson to make the case that a consumer doesn't have the right to know something. The consumer does have the right to know.

On the other hand, traditionally and historically in this country labeling is done for primarily two reasons. One, to let you know the nutritional value of a particular product, how many calories, what the sodium content is, fat content and so forth, so you can make an informed decision in that respect. Or two, to warn you or to give you notice that there may be something about this product that may potentially be harmful to you because you've got an allergy and this product may contain peanuts, for example. So nutritional value, warning.

The labeling discussion today with reference to GE products and GMO products is basically the consumer's right to know versus the ability to convey that information in a way that doesn't necessarily send a misconception or misimpression about the safety of the product. Because many folks will interpret the label "does contain GMO," "may contain GMO" as a warning of sorts which is, from my perspective anyway, a difficult one because I don't know that there's any scientific proof that there is any known hazard or danger associated with consuming these products. Some people may disagree with that but I think the science, at least as far as I know, is fairly clear about that.

But there is this consumer right to know. So how do you basically balance it? Well, it seems to me that that conversation is stuck in the 20th century when we're now dealing and living in the 21st century, and virtually as I drive to work every day I'm able to watch from my perch in the back seat of the car how many people have devices and how frequently they use devices. It is incredible how connected we are to these dog gone things, and how much capacity they have.

So I thought, why can't that be the answer? Why can't the consumer have the right to know by essentially creating something on the package, an extended bar code or whatever you want, those little QR code deals, that a consumer who's genuinely interested and wants to know about whatever is in the product will have the capacity to get to understand and know everything about that product. Smart phone. Some people say well, what if you don't have a smart phone? Fair enough.

Scanners in grocery stores, USDA should be in a position to help grocery stores meet that need just in the same way we met the need with EPT card readers for our SNAP program. Because it's important to agriculture and it's important to the country. So the consumer would have the right to know. On the other hand, you wouldn't necessarily convey the misimpression about the product. That seems to me to be a way of listening to both sides and trying to find that elusive middle ground. And there may be better ideas, I'm sure there are. But that seems to me to be how folks ought to be focused on this.

The reality of what's happening is there are state legislatures and their referendums, millions of dollars being spent on lobbyists, ad guys, political consultants and so forth. You're not going to have -- this I'm very confident, you're not going to have 50 different sets of regulations. You're just not going to have every state decide what they want to do for themselves. That is not ultimately going to be upheld by some court, it's going to be struck down because you cannot have 50. Because if you do you have massive confusion in the marketplace.

At the same time I think it is a fool's errand to think that in this Congress that you'll be able to get something that sort of sticks it to one side or the other through a federal piece of legislation. There needs to be some piece of legislation that people is an appropriate compromise. This may be it where USDA, FDA are directed to create this system, help to fund the scanners for the grocery stores, help to create the template for what information would be available. The industry comes in and provides the information, consumer groups work to make sure it's user friendly, grocers embrace it. Now all of a sudden you've got information that's being provided.

Because here's the reality, as testing equipment becomes more sophisticated it's going to be really, really easy for somebody to find one part per trillion of something in a product. And we've got to have a conversation about what that means. And that's science getting ahead of government. And what I'm trying to do is I'm trying to play catch-up here because I can see all these issues. And then this is a huge trade issue. It's a huge trade issue. We have an opportunity to have the largest trade agreement in the history of mankind in the trans-Atlantic partnership discussions, but there are several issues and one of them is this whole issue of Europe's view about GMOs and our view about it that have to be worked out. And what Europe has now decided is they're going to give every country the right to make that decision for themselves. That's going to create some very interesting dynamics in Europe when that ultimately happens.

But that still -- we're going to have to figure out how we define what is GMO free, is it 100 percent free or is it 99.999999 percent free or, you know, what -- that's a conversation that needs to take place. You can't take -- you can't have that conversation if it's winner take all. You've got to figure out how to come to the middle on this issue. It's not easy, I'm not suggesting it's easy at all. But Alan's question is a good one and there needs to be that kind of thought process, I think.

MR. KEMPER: Thank you, Mr. Secretary. We stand with you on QR code readers.

SECRETARY VILSACK: Yes?

MS. RAVEN: It is common knowledge that GE enzymes are used regularly in beer manufacturing and cheese making, that GE yeasts are used for common purposes in bakery products and that GE is important in medicine for the production of insulin, possible cures or treatments for Ebola and HIV. Why is it that plant products and plants themselves are being held to a different set of standards than these other commercially-acceptable products?

SECRETARY VILSACK: I have this great temptation to be a bit flippant about the response. Look, beer, you know, why wouldn't you like beer and cheese? But in that flippant response there is the kernel of truth about this which is it's how you begin the conversation. And meaning no disrespect to the folks who developed this science who thought, golly, this is fabulous, this is going to expand production, it's going to allow us to use less chemicals and pesticides and we'll be able to feed a hungry world and, boy, everyone's just going to love us for doing this.

So all we have to go out to Alan there and convince Alan, he's going to be a little bit skeptical because he'll have to pay a little bit more for this but he's going to see his neighbors' yields go up and he's going to want to know what the heck's going on. So they sold it to Alan. They didn't sell it to consumer Cathy over here. They didn't -- they just assumed Cathy would be fine with it. That was a big mistake. Big mistake.

If you're selling something from a medicine standpoint what you're saying to that person is, take this and you will feel better. Take this and your disease will be cured. Take this and you won't get a severe heart attack, whatever, right? It's a direct benefit to the consumer. It's pretty easy to sell this.

Drink this beer and, you know, at least for a while you'll feel pretty good.

(Laughter.)

SECRETARY VILSACK: You know? But

they didn't do that. They didn't sell it to the consumer. And now after 20 years, someone's figured out, geez, maybe we ought to figure this out. So now there is an effort to try to educate people on what this science is, what it actually means, what the benefits are and they're playing catch-up.

So part of it is really how the conversation starts. And you know -- and it's also part of agriculture's challenge. I mean, I sort of hammered scientists, now I'm going to hammer farmers a little bit. You know, farmers, golly, they love talking to each other and they have forgotten that they represent one-tenth of the one percent of the population and the other ninety-nine percent is, what, two, three, four, five generations removed from the farm. They have no clue what goes on in a farm. They have no clue about the financial risk of farming, they have no clue about hard physical labor. They have no clue about the dangers inherent in using some of that large expensive equipment. They have no idea how caring farmers generally are about the soil because that's their -- you know, that's their livelihood, right? They don't have a deep understanding of how sincere farmers are about water quality because it's their families who are drinking that water as well.

We need to talk to people. We need to convey to people the message of agriculture. Every single -- how many farmers are in this room? Raise -- people who are farmers.

(Audience response.)

SECRETARY VILSACK: All right. The vast majority of people in this room are not farmers. Have you ever thought about why you're not a farmer?

(Laughter.)

SECRETARY VILSACK: You're not a farmer in part because you delegated a responsibility of feeding your family and yourself to these folks who just raised their hand. I mean, you didn't maybe make a conscious decision about that but in reality that's what you did. And you were able to do that because these guys have been just extraordinarily productive.

And you're able to walk in a grocery store and you're able to walk out that grocery store and you've got more money in your pocket than virtually anybody else in the world after you've bought your food because of how good these guys are. That is a powerful message that agriculture, I think, needs to convey to people. Say hey, the reason why Tom Vilsack, you're lucky enough to be a lawyer and that gave you an opportunity to be a mayor and a state senator and a governor is because you didn't even think about feeding your family. You let Alan feed your family.

And you know, every once in a while we stop our kids and, you know, we say a prayer before meals and we say, you know, thanks for the farmer. But we don't really consciously understand how significant agriculture has been. In my lifetime these guys have become 12 times more efficient and productive, just in my lifetime. Twelve times. Show me virtually any other industry in this country that has had a 12-fold increase in productivity? You're going to have a hard time. I just saw statistics recently that shows that the overall productivity of our economy in my lifetime is like 82 percent. I don't know -- what's 12 times? Okay, is that 1200 percent? What percent is that? It's a lot. Okay? It's a lot more than the overall economy.

And the reason we have the economy we have, the reason why you're able to have the jobs you have, the reason you're able to go to all the shops that -- all the malls that I drove by here getting to this place is because we don't spend as much on food as a lot of other people do. And so that has spurred the ability to have a consumer-oriented economy which in turn has created lots of jobs.

So part of it is the conversation that needs to take place. Part of it is science is talking to ordinary folks about the importance of science. Part of it's having more young people getting into the sciences so that we have a broader societal understanding of science. You know, right now everything thinks science is all criminal investigation based on TV. There's a lot of great work being done on this campus by great people.

But you know, the sad reality is, if I went out there on the street and asked folks who scored more points for North Carolina State last night when they beat Pitt, I'll bet you that most people could answer that. If I asked them who their top-notch scientists are in genetic engineering, they may be able to answer it, probably not. Why is that? Why is that that we know more about a kid who scores 20 points in a basketball game than we know about a scientist who's making life better and safer for all of us? Why is that? I would like to know why. And I'd like to be able to do something about it because I think if we did we'd be having a much different conversation than you all are going to have for the next day and a half about this because it's how you start the conversation.

(Applause.)

MR. DILLON: Secretary Vilsack, do you have time for one more question?

SECRETARY VILSACK: Sure.

MR. DILLON: Thank you.

Matthew Dillon, I'm a director of agriculture policy and programs for Clif Bar and Company. I also serve on the National Genetic Resource Advisory Council. I want to ask you a question about genetic diversity. But before I do just one comment on the Q code. I live in Oakland, California and if you try to photograph every single piece of product you want to buy off the shelves you're more likely to end up in the hospital before you can get your cart filled. I mean, crowded supermarkets, people photographing every single item, I'm not sure that's actually a solution in today's very busy urban supermarket. So something to think about, I'm not sure that's as efficient of a solution as we all might think.

But on the question of genetic diversity, you mentioned the diversity of producers, diversity of agriculture, and we need seed for all of them. We need solutions for all forms of agriculture, conventional, biotech, organic, when it comes to genetic diversity. One of the questions I have regarding genetic diversity for you is that we are seeing an increase in crop epidemics globally. In the U.S. Goss's wilt has gone from being a disease that was only in a few counties in Wyoming and Nebraska, it's now spreading throughout the upper midwest.

On the National Genetic Research Advisory Council, all of us on the council are talking about our concerns that we are vulnerable genetically when it comes to our key crops, corn and soy, that the base, the foundation parents of our key crops are too narrow and that makes all producers, all stripes vulnerable to crop epidemics.

So we've asked ourselves this

question, what can we do about it? What do we know? What data do we actually have going forward, do we have good science to address that issue of the crop genetic diversity and vulnerability of our crops? And what we've realized is that we can't actually get the baseline data that we need, that intellectual property restrictions and patents and ownership of genetic resources makes it so that the scientists who even want that information on genetic vulnerability or diversity, if diversity is what we have, can't get that information.

Now I've talked to colleagues at Pioneer who are saying, hey, we can get through this. Some of us as individuals, we want to share this information. I met with Robert Fraley from Monsanto in November and he says, we want to collaborate on these issues. There's a lot of talk but really we need the USDA to lean in and say this is essential for the security of American agriculture, for the success of American farmers that we have baseline information on crop genetic diversity and vulnerability.

So I want to put you on the spot and ask, will the USDA lean in on this issue and work with industry to develop methodology to assess our crop genetic diversity or vulnerability and move forward into more a secure genetically diverse future for our key crops?

SECRETARY VILSACK: Let me respond to your first comment by suggesting that I think the growing trend in grocery shopping isn't going to be crowded grocery stores. With Amazon and home delivery I think there's going to be a lot of activity that you're going to see a change in the way retail operates in this country. So it may not be quite as problematic as you are suggesting.

Look, I'm happy to lean in but I have to know what I'm leaning in to and I have to know precisely what you're asking. In other words, that's why we put the council together, that's why -- you know, that's why we're having this conversation. I'm happy to lead the charge, I just need to know what I'm charging with and for. I'm not a scientist and so it's going to be important for me to get recommendations from this group, get recommendations from the council, get recommendations from Cathy and her team, get recommendations from farm organizations and groups, a variety of recommendations. And I need to figure out how do we press forward, where do we press this issue, how do we explain it?

One of the challenges of this job as the United States Department of Agriculture Secretary is that nobody understands my job. Nobody understands how diverse this department is. You know, I'll go tomorrow and talk to the forestry people and then they'll say, why aren't you talking more about forest health and forest fires? And then I'll go down and talk at a housing conference and they'll say, why aren't you talking more about low-income housing? I'll go to a nutrition conference and they'll say, geez, we really need you to be forward leaning on SNAP and child nutrition. And then I'll go to a world development conference and they'll say, why aren't you focused on expanding broadband and why can't you then, at the Renewable Fuel Association speech, why aren't you forward leaning on renewable fuels? And then I go to the Food Safety Consumer Federation of American speech and say why aren't you doing more about E. coli? And then I'll go to the Chamber of Commerce and they'll say, you know, you really need to press forward on trade. That is my life, okay?

I'm happy to press forward on stuff but I have to have a concrete set of proposals. I have to know why we're pressing forward, I have to know what the end of result of pressing forward is. This coexistence and choice conversation is one that I pretty much generated myself based on the fact that we were faced with a series of applications for deregulation of products that were generating -- crops that were generating a lot of controversy and there didn't seem to be any kind of outlet for the folks who were concerned about all this. And our regulatory system was so constrained and it was hard for anybody to understand how constrained it was, everybody assumed that we could say "yes" or "no" easily. That wasn't the case.

So we needed to have some opportunity for conversation. You all came back in AC21 with a set of recommendations and I can tell that, you know, we've created a whole farm policy for crop insurance, we've reduced the price election of organic, we've expanded crop insurance protection. And it's not quite the compensation mechanism but it's an indication of our sensitivity to it. We're including questions in our survey to find out precisely how often this contamination issue crops up, how often there is unintended presence, how -- is it real, is it not real? We'll find out from information that we get.

We put the council together in order to begin the process of ensuring that we actually do have diversity. This is extraordinarily important and frankly, as we deal with a changing climate I think crop diversity is going to become even more important. And I think a lot of producers are already -- we're already beginning to see the trend. There's an increase in cover crops, there's an increase in double-cropping, there's an increase in agroforestry. I mean, these folks on the farm are paying attention to all this stuff.

But I'm happy to do this, but I have to have a specific set of concrete recommendations and I've got to know why I'm pressing forward. And then I'll figure out how we message this in a way that doesn't create division. I mean, I'm telling you folks, the one thing I am really tired of is division. I mean, I got -- you know, I got no time for it. I mean, I'm 65 years old, I'm thinking, you know, I've only got a few more ticks on the clock here and I've got to deal with people who don't want to get along. I see this in Congress all the time.

We got a farm bill in part because I just kept pounding the table forcing people to think. And then there was a big problem in dairy and I picked up the phone and I called my Republican friend Frank Lucas and I said, Frank, here's the solution to your problem. You take and run with it. It's not my idea, it's your idea. I didn't care who got the credit, I just wanted a farm bill. And I'll tell you, there are a lot of people better off today because we have that farm bill. So that's what I'm trying to press here. I'm trying to say, look, we got problems, everybody can -- you know, they're very complex. You have to help us. You have to give us a path forward. You have to tell us what's the most important thing we need to be addressing? What's the priority? Because we -- you know, I got two years left in this job probably -- shoot, I may only have one day, the President -- I serve at the pleasure of the President.

(Laughter.)

SECRETARY VILSACK: He may not be happy tomorrow. So you know, we got limited time here so we need a set of recommendations. But leaning forward, shoot, if I were afraid of leaning forward I wouldn't be standing here today, I'll tell you that. There are a million places otherwise I'd be.

Other questions?

(No response.)

SECRETARY VILSACK: Okay. Thank you all very much.

(Applause.)

MS. SMITH: Thank you again, Mr. Secretary.

I think what we've heard this morning from the Secretary and from Russ Redding provides us a good backdrop for the discussions that we'll continue this afternoon. There will be much information between now and lunch and then after lunch that will -- I'm really excited about how well I think these discussions are going to go based on the questions that we had here.

We're asking everyone to come together, respect each other's views. And while we want to be respectful we also have to be honest in order to make some progress here. We have to be comfortable in asking the tough questions and it's clear we have a group that's willing to do that.

So with that I'll just make one reference, as we have more speakers start after the break, one of the decisions we made was to try to be a little green for this meeting and so we are not sending everyone home with a full notebook of everyone's presentations. That said, for those of us that still like to have that information, either digitally or on paper, all of the presentations will be loaded on our meeting website, they're probably there now, so you'll be able to access them during the meeting if you have an iPad. Or after the meeting you can go home and take a look at them.

We also, though, for those of us that are a little older, we do have a stack of all the presentations in the back of the room for those that would like to go ahead and grab papers without the downside of that big notebook.

So with that, why don't we take a break and we will come back at 10:25.

(A brief recess was taken.)

FACILITATOR DILLEY: So good morning. As people are filtering back into the room I just want to say good morning. And I'm your travel-challenged facilitator so I'm really, really happy to be here after 24 hours of trying to get here.

As you're taking your seats I know there was a bit of background just for context of the series of panel presentations we're going to have before lunch and then after lunch to help set up for some of the discussions tomorrow. And some of these, the topics for each of these panels are identified through a background or context for some of those deliberations and reflecting on products underway that you USDA has and some other initiatives that they're contemplating. But also from public comment, when they provided some opportunity for questions and public comment. And the next couple of panel presentations will help provide some backdrop to that.

This next one on science safety and diversity of biotech crops, and we have Dr. Peter Raven who's the President Emeritus from the Missouri Botanical Garden. And then also Dr. Ruth MacDonald who's a professor of food science and human nutrition from Iowa State University. So we'll begin with Dr. Raven. They will give their presentations and then we'll have a little bit of time for some questions. So with that I will turn it over to Dr. Raven.

DR. RAVEN: Thank you very much. It's great to be here today and be able to talk with you about some of the background material concerned with this discussion that we're having about coexistence.

I want to say that I've spent my whole career in botany, plant evolution, plant ecology and so forth, and since the mid-'60s have been deeply concerned with conservation of plants and animals around the world. So I look on it as -- I look on this in that context and that might be a somewhat different point of view from the one that you're coming here with yourself, which is the whole point of the discussion. Considering that both land devoted to the cultivation of GE crops and land devoted to the cultivation of organic crops is growing in the United States, and they're both popular and they are believed to come in competition with one another, this kind of ecological background I hope will be useful.

First I want to make a few remarks about the process itself of producing these plants and then about food safety, which is just a little whisker of what you'll get in a minute from my colleague. The first thing that many people don't understand is that the transfer of genes between unrelated species and organisms is exceedingly common in nature and people like Nobel Laureate Werner Arbor of Switzerland has demonstrated that over and over again. One of the ways of demonstrating it is just to point out that three percent of our genes are actually derived from viruses and if you look on it that way then you begin to understand that this is not some really bizarre process that's outside the scope of nature.

Also a kind of a fallacy that people have is that genes have a little label on them which says "I came from a pig" or "I came from a duck" or "I came from a goldfish" whereas actually genes are simply something like parts of the music score that you play on the piano. They're instructions for the cell to manufacture through the complex and modulated process that we have a certain kind of protein.

When the first genes from an unrelated species of organism, namely Escherichia coli were transferred into another one, namely the African clawed frog in 1983 by Boyer and Cohen, people got very upset. Scientists got very upset and as a result they called a conference in Asilomar two years later, in 1975. And at that conference they set up a number of standards for protecting everyone from the possible outcomes that these combinations might have when put into play in nature. They set up very protected laboratory situations and other methods of watching out for consequences and eventually, as no consequences were found, lost interest in the process.

It's common in nature, there's nothing intrinsic about the process that can cause problems. And that's why so many of us have come, as one of the questioners asked earlier, to the point of view that it's the product not the process that we need to be concerned about.

What about food safety? Well, the first thing we can say about food safety is that, in the United States we've been consuming for about 18 years, hundreds of millions of people have been consuming foods produced from GM organisms and billions of farm animals have been consuming foods produced from GM organisms, and there's not a single case of sickness or illness reported in any one of those hundreds of millions of human beings or billions of farm animals.

When you add to that what one of the questioners brought up earlier, that beer, cheese, white bread, medicines, insulin, the proposed cures for Ebola, the proposed cures for greening disease of citrus and all of those things are derived, involve the products derived from genetically modified organisms and modified by transferring genes into them. Then you begin to understand why it is that every single academy of sciences around the world, most leading scientific organizations all that have made a point of -- a statement on this, and have come to the conclusion following the scientific process that there's no intrinsic difficulty with the process itself that's unusual in nature and that there's no true risk of food safety from the process itself, as such.

Now obviously you can make a poisonous tomato, you can make a poisonous tomato by conventional breeding as well as by genetic engineering. But hopefully nobody would choose to do that. So the controversy -- I mean, the ridiculous nature of the controversy is illustrated by the argument going on now about non-browning apples when there's nothing wrong with the process as viewed by scientific bodies throughout the world, when there's nothing wrong with the product, that is the apple not browning, you know, where's the beef?

That's why, you know, if you put all this together, that's why in the March issue of "National Geographic Magazine," which is on the newsstands right now, it talks about the war on science which we engage on in many fronts. And among the war on science this is a staged moon landing with people taking photographs of it. There's still a substantial percentage of people in the United States who do not believe that we landed on the moon.

Climate change does not exist, and incidentally the scientific evidence and consensus on climate change is exactly the same in degree and nature as the scientific consensus that I just pointed out to you on GM foods. It's studied by the same bodies, committees of the same bodies, the same people, and they've come to the same conclusion.

So it always seems strange is that scientists have the one thing, global climate change, accept it and say that all scientists agree on this and have the other thing rejected saying the scientists don't all agree on it. When, if you actually go to the scientific bodies concerned you find the same answer. Evolution never happened, the moon landing was fake, vaccinations can lead to autism and genetically modified food is evil. These are the scientific myths that the "National Geographic" has just discussed for its eight million readers and is an idea of where the state of the science actually is now as opposed to the state of belief.

Now in -- a few years ago, Perry Gustafson, a professor at the University of Missouri, Norm Borlaug, just before his death, and I collaborated on a scientific paper on agriculture and feeding the world. And we outlined seven ways in which scientists produce more productive crops, tissue culture, anthro culture, mutagen technology, just shooting random mutations into them, utilization of marker assisted selection, the application of genome-side selection, whole genome sequencing and plant transformation technology, which is what we call GE or GM technology. Now in the last year it's gotten even more complicated than that with gene editing and which tells us, which shows us that in remarkable ways we can alter the genes of organisms and the products produced from them that were completely unknown and very complicated, very flexible and very interesting. The same way epigenetics, the methylation of parts of the DNA which can come about as a result of experience and change and produce heritable characteristics in organisms.

All of those things have come together and they take us back to the original truth which is still as true today as it was when we at the National Academy of Sciences pretty well agreed on it in the 1970s, and that is that the characteristics of crops are what are important to judge the characteristics of the foods rather than how you got them. None of the ways that you can get them are intrinsically evil.

Now worldwide the domestication of crops led to them changing very rapidly. Human beings have now been, we believe, around about 2.8 million years but it's only about 10,000 years ago that products of crops became a substantial part of our diet that supported what first were villages and then were towns and then were cities and then were states for the last 10,000 years. Most of what we consider civilization originated within the last 10,000 years as these group of people came together and could specialize in a way that their hunter-gatherer precursors could not. Writing was invented about 5000 years ago and that changed the nature of human progress profoundly.

Now 10,000 years ago there were about one million people in the entire world, as well as we can estimate. There were about 100,000 in Europe. Just 10,000 years ago, about 2.8 million years of human history. But now the population has exploded to the point where we have 7.2 billion people, 800 million of whom are malnourished, about 100 million of whom are on the verge of starvation or near to the verge of starvation at any given time. If you haven't consulted it look up FootprintNetwork.org on your website, the global footprint network which estimates that where, in 1970 we were using about 70 percent of global sustainability, today we're using about 156 percent of global sustainability. In other words, far beyond the capacity of the earth but still leaving 800 million people malnourished. Half people malnourished if you take into account nutrients.

What about ecological damage from GE crops? What's special about them? Well, the first thing to observe is that, since we have 11 percent of the world cultivated in crops, 11 percent of our land surface, and another 20 percent devoted to pasture, about a third of the world is already very vastly changed from what it was to begin with. And we can be certain, when we're talking about extinction that the expansion of agriculture over a third of the world's land surface drove to extinction hundreds of thousands if not millions of biological species over the course of the last 100,000 years.

So when we're talking now about different agricultural processes continuing to have a negative effect on the system, we have to take into account the fact that the area devoted to agriculture is fairly stable now and those negative effects have to be seen at the end of what has always been regarded as perfectly acceptable extinction for the purpose of agriculture in the past.

As crops were domesticated they began to be changed in their characteristics. People growing those first crops would have selected them for better yield, better productivity, more years on them, everything else, so that any crop and -- well, 200 years ago in England people actually began to do this starting with wheat on a more meticulous scientific basis. So any crop that we're growing has been changed drastically genetically over the course of the years and there is no rationale to look back on what we were growing in 1880, for example, and say that it's more pristine or wonderful than what we're growing in 2015. It's already highly altered. And of course, the easiest way to demonstrate that is by pointing out that there's no such thing as wild corn, native corn, there's no such thing as wild hexaploid wheat, bread wheat, and those are entirely the products of cultivation and, of course, vastly changed.

So the question that strikes many of us is, why if we've been changing those crops all those years, do the last, among the nine more modern forms of changing crops that are used in schools of agronomy and programs like that around the world, have we selected one for particular scrutiny and worry when there's no scientific evidence to support that?

Now there are two different kinds of biological diversity that we can talk of in terms of crops. The first is diversity of the individual crops. Modern agriculture, as soon as it spread out over large areas, began to get more uniform crops and began to drive the genetic diversity that would have been characteristic earlier downward. So if you think about hybrid corn spreading in the midwest starting in the late 1930s you had a great reduction in genetic diversity of corn going along with a great increase in the productivity of corn.

Genetic diversity related to crops is very important but it's relatively difficult to preserve. To give you kind of a counter-example there's something like 500 varieties of soy beans grown in the United States and every one of them has been individually genetically engineered since they grow in particular places to allow them to survive in those particular places to suit them for growing in particular places. So in that sense it has no net effect on diversity at all.

Massive industrial scale agriculture has an effect on diversity but that's independently of whether the plants that are massively grown in uniform fields were produced by genetic enhancement, by the transfer of genes or by one of the many other methods that are available to change their characteristics. When crop varieties are grown in places where they're native we speak of land races.

But we need to remember in speaking of land races is that plants have hybridization as a regular part of their adaptive system and those land races are continually hybridizing with one another and with more modern strains of the same plants that are grown in the vicinity so that they keep changing like a kaleidoscope and are never really the same from year to year. So you can't go down and freeze the land races of corn in Mexico, for example, because those are the products of the last years of selection as farmers have moved on in different directions depending on the variability they had to work with.

Now there's quite a discussion about what happens if some transgenes escape into nature. As usual that depends on the nature of the gene. The two commonest -- the three commonest genes that are used are, of course, producing Bt toxin in the plant, making the plant resistant to glyphosate or another herbicide or resisting viruses. If plants that produce Bt toxin, that trait goes into wild relatives they'll be better protected from their predators, from the things that are actually eating them than those wild relatives would be if they didn't have those genes.

If glyphosate resistance becomes characteristic of natural systems it will last in the population as a geneticist only if there's continued selection by pouring glyphosate on the natural populations. If not it will be bred out of the populations soon. Ditto for viral resistance. There's no real way that any of those genes can be established in nature except if they confer a selective advantage on the plants that have them.

If we talk about the appearance of weeds resistant to herbicides, that comes about as a result of bad agricultural practices. When I was writing the first edition of my General Botany book in the late 1960s, which was well before any of this was even thought of, I was talking about weed resistance to herbicides because herbicides were sprayed around too broadly. If somebody grows a genetically modified plant or any other kind of plant crop in a huge field and sprays herbicide all over it and widely, weed resistance will develop. It's exactly analogous to antibiotic resistance in human beings and needs to be treated in somewhat the same way.

Collectively the environmental risks posed by different GE varieties are the same as those posed by non-GE varieties and they can certainly be managed in similar ways and need to be managed in similar ways. Bad agricultural practice, bad agricultural layout is agricultural practice whether it's dealing with GE crops or not and it needs to be made into good agricultural practice. And what that is needs to be found out the same way that antibiotic resistance is in human beings, for example, needs to be countered.

Now what about the preservation of biodiversity generally away from the crops? Well, one obvious point, if you can stand hearing this, is that of course all the genes and the individual genetic products of all the plants in the world or all the organisms in the world can be used to adapt our crops with the methods that we have now to the rapidly changing conditions that have been brought about by climate change and by habitat destruction and all the other things. We do depend on plants directly for -- or indirectly for all of our food. Two-thirds of the people in the world depend on them for medicines. And even for those of us who buy our medicines in drug stores, a quarter of those medicines come from wild plants. And that says nothing about ecosystems serves as retarding erosion, beauty or any other major characteristics.

Many of us believe, and I have devoted most of my life to this, that preserving wild biological diversity, any biological diversity is very important and therefore we should do whatever we can to do it, remembering that we only reached a billion people, less than the current population of Indochina, in Napoleonic times and that the world population has tripled since the time that I was born in the '30s and that we're adding 100,000 people net per day. If you think about all of those things, agriculture has the potential of destroying everything if improperly managed.

It seems to me an obvious conclusion of this that practicing agriculture well and productively on the lands that are already cultivated is an absolute necessity. The native Mayans who were in the highlands of Chiapas in southern Mexico grow corn but they have a yield of something like one bushel per hectare. And as a result Mexico is importing one-third of its corn from us, competing with its use as biofuels to get something even more controversial into the picture.

Low-grade agriculture is very destructive to biodiversity. High-grade agriculture, by being concentrated, can be much less destructive to biodiversity but we can't expect it to do all things, for example, destroy the Monarch butterfly spraying the plants with glyphosate drove out the milkweeds that were weeds in the fields. Well, duh. I mean, what college of agriculture would say you didn't want to drive out the weeds that were in your fields? If we want more Monarchs and more milkweeds we've got to find other places to plant them and build up their numbers. And many of us are engaged in that at the present time.

Now when GE -- now we get closer to the subject for today. When trans-genes are transferred by natural hybridization from a wild or weedy relative of a crop to that -- the other way around, from the crop to a wilder weedy relative we have some cases that where the weeds can become resistant to the treatments for the crops. In other words, herbicide resistant or something, and two major cases of that are beets and sunflowers, where the wild ones could become weeds and the cultivated ones. But then again that needs to be treated. It's not an example of how you got that herbicide resistance which proves that GE is bad in some mysterious way, it's an example of what the characteristics of those particular plants are.

Then there's always the bugaboo of new kinds of weeds. Well, there are about 20,000 kinds of weeds classified in the world, sometimes 30,000 depending on who you follow. There's one of them -- there are only two of them known to me that were produced by hybridization between cultivated plants and their wild relatives. One is red rice which is a bad weed in rice, and the other is Johnson grass which is a really bad weed in the U.S. But again, GE crops had nothing to do with any of that. They're totally pre-GE.

Among the 20,000 plants of the word, plant species of the world, which is about five percent of the total number of species that are weeds. We haven't really got the possibility particularly of producing more through any of the modern genetic methods than we could without them, and they will have to be managed in the same way. In fact, that's the takeover -- that's the take-home lesson for everything that I've had to say.

On the balance it's come to seem clear to me as an environmentalist and conservationist that there are no unique problems associated with any of the modern methods of plant breeding. And by improving the productivity of agriculture in areas that are already cultivated, they do, in fact, have the potential of lessening the pressure on areas that are not currently cultivated and hence protecting more species into the future.

Judging crops on their characteristics would give us an agreeable new standard which we can do, and which farmers do all the time anyway, to let us know where the problems are, try to evolve agricultural practices that will deal with them and manage them in ways that are well known.

Thank you very much. I think questions will wait until after both of us have spoken.

MS. DILLEY: Yes. Thank you.

(Applause.)

DR. MacDONALD: Thank you. It's a pleasure to be here today.

My role at Iowa State is to be the Chair of the Department of Food Science and Human Nutrition. And so I live in the world of food and human health and the connections between the two. And as you can hear from this -- every speaker this morning has already brought up the issue of food safety. And it's almost impossible in consumers' minds to separate genetic modified organisms and their food and their food safety and the safety of their children and their families.

So I've spent a great deal of time in the last several years talking to stakeholders. I come from the state of Iowa, we're a major producer of grain and so I've talked to consumer groups, I've talked to farmers, talked to seed producers and then I also teach a class on campus where I get to hear from students about food systems and their concerns. And so there's a huge input about this topic and there's a huge dialog going on in the consumer world about what we should do about this. So this is a very important topic and something that you can't separate it all from the issue of genetically modified organisms in agriculture.

So my presentation today is a lot of background information, just to kind of cover the waterfront and give a perspective of where food safety issues are. It's really hard to kind of see that slide from here. But so where is it in the food supply? First question I get when I talk to consumers in particular is, like you know, they hear like 70, 80 percent of their food is containing GMO. And so where is it in the food supply? It's in the corn, the soybeans, it's in the canola oil, it's in the sugar that we get from sugar beets. And so the majority of those crops end up in some way in our food supply, whether it be in corn oil or soybean flour or in the sugar or any of the other derivatives from corn such as lecithin or some of the enzymes that we derive from corn and soybean ingredients.

It isn't in the produce aisle, particularly. There are a couple of crops that are approved, Papaya, squash and sweet corn, but other than that most consumers don't have the sense that -- they see all the beautiful fruits and vegetables in their produce aisle and they think they're all genetically modified.

The other aspect of genetically modified ingredients is the indirectness of that. So we get a lot of food from animal, food animals, and we know that the majority of those food animals are eating genetically modified grain at some point in their production. So from those animal sources we have, of course, meat, milk, eggs and all the derivatives of those so that any product that contains any of those would indirectly have come from a genetically modified source. In some people's minds this is of concern. So when you think about baked goods, you think about prepared meals, you think about any of the desserts that are made from milk or eggs, you in some way have an indirect link back to genetically modified grain and that what was fed to the animals.

So just to put it into some timeline perspective, this all really got started in the '90s with the introduction of this technology, FDA policy in 1992 first defined how we were going to deal with foods that contained genetically modified traits. The first introduction of tomatoes and squash in 1994, the tomato didn't survive very well in the market for a couple of technical reasons but soon after that, of course, the corn, soybeans and canola introduction really took off in a big way. And you can see from the graph that in a very short amount of time, the amount of -- the percentage of the crops that we grow in the United States in corn and soybeans have become increasingly genetically modified.

The papaya story is classic, the example of savings a crop in Hawaii that was on the verge of becoming unsustainable because of a virus. And so I think about 30 percent of the papaya that's marketed today coming from Hawaii would be genetically modified. And then we're all probably aware of the more recent struggles with sugar beets and getting that approved and some newer traits coming along in soybeans.

And just to put it all into great perspective as well, I don't think a lot of consumers are aware of the vast amount of research that's involved in genetically modified traits and crops. And here is just a snapshot of APHIS data of what actually is in the pipeline, what's actually been approved. Thousands of new traits have been approved for study and for testing in field trials which have the potential to enter the food supply. So this is a vast number of traits, a lot of things that have potential to benefit farmers, production and then ultimately end up in food.

So to put the FDA perspective on this, the 1986 coordinated framework, regulation of biotechnology that the Secretary already spoke about identified the product not the -- the process -- the product and not the process. And so trying to understand the equivalency of the food and understanding that it was not different from a consumer perspective, not nutritionally different, not chemically different, not structurally different and therefore should be treated the same as a regular food.

So the -- looking at safety, questions I get from consumers a lot is, where is the data? Where is the safety testing? Who's testing this stuff? Is it just the companies that are making the seeds and they're totally responsible for making sure this is safe? And the answer is there's a lot of testing that goes on that isn't necessarily as readily accessible to the consumer, however, so understanding that's very complicated. So the levels of testing that have to be demonstrated are toxicity, that there isn't a known toxicity from either the gene or from the protein that's being expressed as related to any other known toxin or chemical that would be causing a toxicity or an illness.

Adverse nutritional changes, so there isn't anything in the product that would inhibit the absorption or the availability of another nutrient or cause any kind of a biochemical imbalance in the nutritional assessment.

And then allergenicity, trying to assure that the proteins that are being expressed will not create an allergic response.

And then the issue of horizontal gene transfer, about what would happen with the exchange of the genes in that plant.

So the testing approaches include a variety of different techniques one of which is very readily available in today's scientific world. There's the bioinformatics world to try and look at plant -- protein sequences or gene sequences and map them to other known -- the databases of other comparable proteins or DNA and try to understand and verify that they would not be similar to any known toxin or compound that would be dangerous to health.

It's also important to demonstrate that a compound is digestible and degrades and this can be done in vitro using the pure compound. It also can be done in vitro using animal models to demonstrate that the natural digestive process is adequate to destroy the compound, either the DNA or the protein.

And then looking at the metabolomics

both in the plant and in the animal that might be fed the product, to look at protein expression to see that there isn't any abnormal or any inadvertent expression of proteins from the gene transfer of the gene that's in the plant or the response in the animal.

Feeding trials are both acute and chronic. These are done both by the company and also by independent scientists to show that the traits are not harmful to health. And then, of course, field trials.

So looking at what some of the concepts around the safety testing also included within this discussion is the idea of trying to identify potential hazards that would be -- before the trait is actually being considered to be developed looking at the history of safe use. An example of this could be the Bt toxin. The Bt toxin had been approved as a pesticide since the 1800s and had been widely used in agriculture. To assume that that would have been a long history of use of safety and being part of the food supply was fairly obvious. So connecting that then to a genetically, you know, produced trait was a logical step from the history of use.

I already mentioned bioinformatic analysis, to try to identify traits and to look for the database of information that we have on proteins. And then to look at the mode of action and specificity of whatever is being expressed to be sure that it does what it does and doesn't do something else. Digestibility and liability we already mentioned, as far as the enzyme degradation in the GI tract, pH of the stomach, all of that having the ability to destroy the compound.

And then also looking at what would be the expected level of exposure. Where would that end up in the food supply, what would be the average amount of consumption and how would that relate to potential toxicity? So this is all done in a lot of ways and a lot of studies have been done to try to assure that these products are safe and have no risk for human health.

One aspect that I hear a lot about in consumers' concerns is that these are newly expressed proteins that we don't know anything about. They tend to link GMO with allergies, we see a lot more talk about allergies in children, much more common to have allergies. And so consumers are very worried about this. Example, of course, is gluten sensitivity. A lot of people are worried about gluten, we hear a lot more about that, and they make the assumption that we have more GMO in the foods we eat today therefore we're seeing these more allergic reactions. Those of us in the room already know that wheat is not a GMO crop at this point in the U.S. so linking that doesn't make a lot of sense. But consumers don't know that and they don't understand all of the complication around allergenicity, they don't understand all the different nuances of even how we digest foods.

There is a limited number of known proteins that are toxins and that are known allergens and so to link that to the GMO expression and make sure that those are not in the same category is very important and is -- has been done for the crops that are being -- that are released now.

And there hasn't been any documented evidence of a allergic response in a human to a GMO crop that I could find, and I've tried to ask a lot of people that question and there's no evidence that anyone can verify an allergic response to a genetically modified trait even though a lot of people think that they have had an allergic response. And so that's a little complication of the fact that we all eat food every day and we all have reactions to food and we don't always know where they come from.

So some of the evidence to support the safety of the -- or the fact that we think that these are safe, Dr. Raven already mentioned studies that have been done using animals. This is a -- I always say this is one of the most long-term studies that could ever have been done. We track livestock, we track animal health probably more than we track human health in a lot of ways. Agricultural production knows when animals are born, they know what they weigh, if they got sick, what drugs they were treated with and all that can be -- data can be tracked and accessed.

So the group from UC Davis took that data and looked back before animals were fed genetically modified grain and after they were fed genetically modified grain and they -- over 100 billion animals in a very short amount of time were included in these studies. So it's a huge study that never could really be funded to be done but fortunately the data was there and allowed this analysis to be done. No difference in the composition of the food, no difference in the animal health outcome, and this graph just shows weight as an example of health and you can see that over the time period from before genetically modified foods were -- or grains were introduced back in the 1980s all the way through 2011, there was actually an increase in animal efficiency, animal growth rate, no evidence of any major diseases, no evidence of increased illnesses, you know, weakened immune systems or any evidence of any harm in animals that were fed genetically modified grain for their life cycle and that of their prodigy.

So the other studies that have been done in animals to show that there's no transfer of the genetically modified trait through the good system, this is another concern that consumers often express, is that the DNA lives on in the animal food whether it's in the meat or whether it's in the eggs or in the milk coming from animals. And as Dr. Raven eloquently expressed that the transfer of DNA is very low and there isn't any evidence that DNA from a genetically modified trait is passed through animal foods or that it can be persistent in the human body.

Also among consumers' interest right now is the idea of the gut microflora. There's a lot of interest now in what is happening in our guts so colon health and GI health is a major discussion among consumers. And there's a lot of belief that the GMO traits are surviving in the food supply and ending up in the colon and then they're messing around with the microflora that we have down there and that they're creating illnesses and creating mutant bacteria that are somehow having negative influences on our health.

We link this sometimes to obesity. There's some substantial data that can -- that's talking about whether microflora in the gut lead to obesity and how that can be linked. So the natural kind of link next to it is to say, okay, well now we've got these GMO foods and now these gut micro -- is that all coming together and causing obesity? The evidence is pretty weak in this regard to show that there is any transfer of DNA into microflora and just the technical aspects of making that happen in a way that would actually change the structure of the microorganisms is pretty unlikely to be a problem.

So the genetic stability is the other issue that the consumers are worried about. They feel that there's going to be some mutations that are arising in the food and that the crops, and that this somehow is going to lead to abnormal expression of other things that then will have negative consequences. And the evidence is pretty weak in that regard, too, that there isn't any evidence that that is happening in a widespread way.

So coming back to human health and how do we know? The question that is the hardest to answer sometimes when I talk to consumer group is, show me the long-term study that humans have been eating this stuff and there isn't any risk? And of course, we can't do those kinds of studies, it would be prohibitively expensive, it would also be a little bit just challenging technically to figure out what you would feed people over their life span. We do have some other ways to look at that, though, as far as epidemiological data, comparing different cultures and different groups of people. And again there isn't any evidence that consumption of genetically modified foods over a period of almost 20 years now has led to any examples of correlations with risks in human health.

We know that the foods that we are consuming, the grains, corn, soybean typically are processed and a lot of the traits that we're worried about, the proteins, the DNA don't end up even in the oil or the corn starch fractions or the sweeteners that we produce from those so there really isn't any traits in the foods that we're eating. So the exposure rate is very low. Heat treatments happen, processing of food happens, so all of these factor also limit the amount of exposure. But even with all of that there isn't any evidence that human health has been impacted negatively.

But there is this always coming back to the evidence that we are exposed to every day that Americans have chronic diseases associated with our food supply, that obesity is becoming epidemic. People worry about cancer, we hear all stories all the time about friends and relatives who have acquired cancers. Food allergens I already mentioned. There is also a daily story I think on autism and ADHD and how that's linked to our food supply. We see more people acquiring Alzheimer's disease, depression, heart disease continues to be a concern.

So when you put all of that together, you look at what we're eating and our food supply, it's natural for consumers to want to make correlations between those. But we all know as nutritionists and food scientists, we all know that these are complicated diseases and there isn't probably one factor that's a causative agent. Certainly there are links between our food supply but none of these at this point have been linked to genetically modified organisms or the consumption of foods.

One of the things that I try to point out sometimes when I look at consumer groups, talk to consumer groups is cancer rates, for example, have gone down since we started introducing genetically modified traits into our food supply except for liver cancer. Liver cancer has gone up a little bit and a lot of people correlate that with our increased obesity risk because there's a link between obesity and liver cancer. But colorectal, stomach cancer where you kind of make the consumption -- the link with food have actually declined.

We also see a decrease in heart disease. Of course, that increased pretty dramatically up until about the 1970s and then has come down. So that's a lot of factors, I'm not saying that it's because of GMO food that that's happened but of course there is the assumption that, you know, if it goes up then it must be linked. So if it goes down then it can't be linked.

We do, of course, have other diseases that are on the rise and this includes ADHD and it includes Alzheimer's and it includes obesity. And so it's difficult for consumers to sort this all out in their minds. They hear that these foods that we're eating have a link to this, that they're complicated. They're concerned especially when it comes to their children. Allergies and responses to foods is something that everyone takes very seriously. But at this point there isn't any evidence to link any of these, even though there are a number of studies that come out on a regular basis that show the opposite.

And another piece of this whole story is trying to explain science to consumers. As the Secretary mentioned scientists aren't good at that. We don't like to get out of our laboratories and talk to people and it makes us uncomfortable. But when we do go out and talk to consumers and try to explain this they do value that input and they do want to hear from us. So scientific -- science is not neat, it's not clean, we have other studies that get published, even those studies get published that show rats with big tumors or, you know, links between --

you know, correlations between Alzheimer's and GMO foods. Even though those are refuted by the scientific community they live on in cyberspace and have a life of their own.

So there's a lot of confusion also when it comes to food safety. If you read some of the stories in the paper or on the web about GMO food, they can't separate out GMO technology and the fact that this is DNA and protein from the fact that we're spraying glyphosate all over the United States. So in a lot of people's mind they're intimately linked. And so it's the glyphosate, is it the GMO traits, is it the technology? Consumers can't sort that out and trying to help them work through that is very important to understand. And at this point glyphosate is probably one of the safer pesticides that we have at our disposal. And so trying to convey that to consumers in a way that they understand is very challenging.

So as was mentioned already today, the scientific evidence is strong for the safety of genetically modified foods. Even the Center for Science and the Public Interest has taken a position that there's no reason to think that these are unsafe. Most of the medical associations in the U.S. and in Europe have also stated publicly that this is a safe technology and that there shouldn't be a concern. But yet we have consumers that don't want to believe that, consumers that are concerned, and our challenge is try to figure out to convey that information.

Sending more scientists out to talk is one step, of course, but I think we all have to do a better job of trying to be transparent about what we are doing, how these tests are done, trying to use technology in a way that allows consumers access to it in a place where they are willing to accept that information. And then also to be aware of the fact that the technology is not standing still. As Dr. Raven mentioned new technologies are coming along all the time and how are we going to communicate those technologies to consumers to allay their fears?

So that is the end of my presentation.

MS. DILLEY: Thank you very much.

(Applause.)

MS. DILLEY: So we do have a bit of time for a couple of brief questions before our next panelists. Should people use mics or hand them out or -- oh, there it is. Good. It's resting.

DR. KUZMA: Hello. Thank you both for your presentations. These are both subjects that I'm very interested in and have spent some time thinking about.

I wanted to ask a little bit about this issue of correlation arguments and what that means in the context of GM foods. And so I appreciated your remarks on the correlation between, you know, human allergenicity and ADHD and such and that you cannot necessarily attribute that to GM foods.

I was wondering about the livestock study, though, if you could explain a bit more to

-- it's really the one kind of long-term feeding study we have on GM foods and kind of a natural context, if you go on livestock in the U.S. over 20 years, which is commendable. Could you comment a bit on how the correlations were teased out of that study and whether weight gain was the only end point? And whether weight gain in itself is a health issue. And it could be compounded with three-D, you know, better animal breeding, selection, other nutrition science that has gone into how we feed livestock.

And then second, what was the life span of the animals? Because usually they're killed, you know, at a very early age in order to, you know, reap a profit. You don't want to keep these animals around too long -- you know, alive too long. So I just wanted to know more about your perspective on the life span issues associated with that study, the correlation arguments and the weight gain as a health end point, and what other end points.

DR. MacDONALD: Perhaps I didn't

explain that clearly. This was not a research study, this was analysis of data collected on animals in the food sector. So it was including dairy cattle, beef cattle, hogs, poultry, laying hens. All the animals that have been fed genetically modified grain in the production system. So this was not an isolated study that someone did. So basically it was the life span of the animals in their production system.

DR. KUZMA: Which is pretty young for animals that have been slaughtered.

DR. MacDONALD: Well, it depends on the animal. But most -- yeah, most of them are dairy cattle that live longer than some of the others but, yeah. But reproductive life, of course, was taken into consideration because it was -- it's generations beyond just one. And then that -- weight was not the only measure that was studied in that. And weight is an indication of health and efficiency and production and it does include a whole variety of other factors besides what they're eating, of course. The fact of the presentation, the paper was to show no negative consequences, that there wasn't any evidence that animals that had transitioned from conventionally grown hybrid corn and soybean to genetically modified corn and soybean had some rare evidence of increased numbers of cancers or early deaths or, you know, rates of illness. So there was a whole spectrum of data that was looked at to show that there wasn't any negative influences of that change of diet. So weight was just one factor.

MS. DILLEY: Do you know a reference? Maybe that would be helpful, too.

DR. MacDONALD: The reference is on the slide.

MS. DILLEY: It is on the slide?

DR. MacDONALD: Yes.

MS. DILLEY: Okay. Thank you.

DR. RAVEN: I just wanted to add -- go back to what I said in the very beginning. DNA is only a set of instructions to produce RNA and to produce certain proteins. There's no pig DNA, eagle DNA or corn DNA and if you change those genes around, you're basically just changing the instructions. And that's, of course, why the argument falls apart scientifically that GM products are dangerous because GM products by definition involve a whole variety of different kinds of genetic instructions transferred into a whole variety of individual kinds of organisms. And not only is the process not harmful, not only does the process not have a collective negative affect on food but there's no conceivable scientific theory that would give the transfer different parts of instructions into different parts of organisms anything in common that could possibly make them all dangerous. There's absolutely nothing in common.

MS. DILLEY: Okay. Other questions? We have time for maybe one more.

(No response.)

MS. DILLEY: All right. It not then thank you very much.

(Applause.)

MS. DILLEY: So our next panel is shifting gears, it's on market managed organic and non-GE products and Errol Schweizer, who is the Executive Global Grocery Coordinator for Whole Foods Market is our next presenter. I turn it over to you.

MR. SCHWEIZER: Good morning. My name is Errol Schweizer, the Executive Global Grocery Coordinator for Whole Foods Market. I am responsible for about 30 percent of our company's sales, grocery being dry goods, packaged foods, dairy, bulk, frozen items. So I'm intimately familiar with this concern since it's primarily related to what we sell every day. I've been with Whole Foods about 13 years selling natural foods for about 20 at this point. So I really appreciate the USDA for hosting this and for inviting us.

So Whole Foods Market has always been a trend leader in terms of establishing standards so I just want to give a little context to my presentation here. Since our inception in 1980 we've usually been a few steps ahead of policy as well as even consumers in establishing trends on products. And I'm actually going to walk over here so I can see my slides, too, because I do not have them memorized.

So among the first standards that we established in 1980 was no artificial preservatives, flavors, something we've held to through the years. 2002, no antibiotics in meat, a certain fast food chain, looks like they're trying to do the same thing. They're also adding kale to their menus. That's McDonald's, by the way.

2003, no hydrogenated oils, 2012 no red-rated seafood and 2013 -- that's why we were asked to come here -- we were the first national grocery chain to set a deadline for GMO transparency for all products that we sell. And how we're going to do that is working in collaboration with all of our suppliers, not only on sourcing non-GMO ingredients and verifying non-GMO claims but really assessing what's in supply chain. We sell at least 100,000 items alone in my department from thousands of suppliers.

So I'll skip this because this was actually covered but as everybody knows GMO crops are hegemonic in certain commodities, 94 percent of soybeans or 90 percent of corn, cotton, as well as other crops making it quite a challenge to source non-GMO and organic. So this prevalence of GMOs in our supply chain as well as the absence of any sort of federal mandatory labeling makes it very difficult for grocery stores such as ourselves to source non-GMO and for consumers to source non-GMO. Yet we know firsthand that our consumers are passionately seeking non-GMO products.

We have over 7 million transactions a week, just about everybody who's shopping our stores is buying organic and non-GMO. Our stores are primarily located in middle to high-income areas although we are looking at food deserts now and moving into lower income areas. But primarily we have a very highly educated customer base, folks who read a lot, folks how want to know what they're eating. So as we know, the U.S. and Canada still have no real labeling laws while more than 60 countries do.

So our policy covers all food products we sell. This includes plant-based processed foods where there is heavy GMO concern, as well as animal-derived ingredients in prepared foods. It includes GMO transparency for animal feed. We actually sell several varieties of eggs from suppliers who are using non-GMO feed. Not only has it not affected our organic sales it's actually one of our top growth trends. And as one of the lead buyers at Whole Foods, that's my job, to find new growth trends and amplify them.

At this time Whole Foods recognizes independent third party non-GMO verification including the USDA Organic Standard as well as the Non-GMO Project. So it's a commitment of our -- it's actually an example of our commitment to transparency and a way to create a deeper conversation about food, where it comes from, how it's produced, and it's consistent with our other standards including sustainable seafood, animal compassion, household cleaning products, et cetera. And if you read food publications, food news, we see other folks coming onboard. Once again, McDonald's making statements, Campbells recently, Chipotle is a leader in this space.

The context of this is that transparency is trending. I did hear it mentioned earlier and I appreciate that. Customers want to know what they're eating. They want to know what's in the ingredient list, how it was made, where it was stored and whether or not it's safe. Accentuating what's not in a product is as important as accentuating what is. As we know the market for "free from" goods is growing rapidly, we have been a leader in the gluten free space now for well over a decade.

And then we want folks to prove their commitment to product safety by enforcing and publicizing their standards and their transparency. I mentioned Campbell's before, Denise Morrison, CEO of Campbell's -- I don't work for Campbell's, I work for Whole Foods, but when I read this I thought this came from one of our folks. We are consenting with what I've previously characterized as seismic social shifts that are redefining the fundamental framework in our relationships with customers and consumers and along with this has come a mounting distrust of so-called big food. The large food companies and legacy brands on which millions of consumers have relied on for so long. It's profound that we're hearing about this from a major CPG.

GMO transparency is trending very strongly. Consumer awareness with the term has increased 12 points, it's over 54 percent. The greatest awareness growth are among folks a little younger than me, the millennials. The uses of non-GMO foods is up 16 points across the general populous led by mostly younger people. GMO concerns are trending, over 40 percent of consumers are avoiding or reducing GMOs in their diet, mostly young folks as well as parents of children under eight. Over 60 percent of respondents in some of the largest countries in the world, 49 percent are also concerned.

And a bit of a segue to what I do for a living, food launches with organic and GMO-free claims have increased. Organic claims are more prevalent on new items in 2011-2012 but that was actually surpassed by products with GMO-free claims, huge jump up to 45 percent in 2012 to 2013. Organic claims also jumped admirably. No large percentage of snack launches, 34 percent and 10 percent of dairy launches in the last three years of GMO-free claims. Huge growth in GMO-free product launches in both the EU and the U.S., 145 percent. That's over 1350 in this timeframe, over 350 percent growth since 2008. The EU is a little ahead of us, 460 percent, but we'll catch up.

How do we recognize GMO-free claims? We actually don't. We recognize non-GMO claims. There's really no such thing as GMO-free, guys.

So we're talking about coexistence but what we're actually talking about is protecting the organic integrity of our food, protecting non-GMO crops. And non-GMO verified we estimate was about 22,000 products in the market, this is outside of and inclusive of Whole Foods, over 1500 companies. Over eight and a half billion, with a "B" in sales, and this is 2014. So assume this is over 10 billion by the end of 2015.

Well, what does it mean? The cost of GMOs is so prevalent it requires ongoing testing of all that risk ingredients. We use an action threshold the same as the European Union does, .9 percent, so it's a little over 1 percent. So when you see a non-GMO claim it's not a GMO-free claim. So this notion of coexistence has some concern because, even if you're attempting to buy non-GMO you may still be consuming GMOs. And that's a big concern as I've shown.

The absence of all GMOs is the target for the standard and it requires rigorous traceability and segregation so it drives up our costs. It's a lot of work to do but it's working. It's up 16 percent this year, it's our fastest dollar growth trend at Whole Foods Market. We have nearly 10,000 items which has more than doubled since our transparency announcement in 2013. Hundreds of leading brands led by our own store brand "365," large national food brands such as Pacific Foods, Hain Celestial, a publicly traded company, 99 percent of what Hain Celestial does is organic and/or non-GMO. And then smaller brands.

Just a question, anybody here shop at Whole Foods Market?

(Audience response.)

MR. SCHWEIZER: Anybody buy any of these brands?

(Audience response.)

MR. SCHWEIZER: Well, this is what the growth trend looks like, 426 growth since the advent of non-GMO verification since 2010. This is not the same growth trend that the U.S. economy is having. This is in a sense one of the fastest dollar and rate growth trends we see in food. And it has not taken away from organic, in fact it's amplified organic. It's helped clarify organic. Organic is our largest product trend and product segment at Whole Foods. It's up over 10 percent which is faster than our store growth. Organic sales have doubled in the last five years, probably double again in the next five so we've got a little supply work to do.

We have at last 15,000 items in my department, probably close to 30,000 across the store. And I can't emphasize this enough, the sales growth is constrained by supply, particularly in grains and dairy. We have a supply problem. The demand's there. You know how we know? All our competitors are coming after it. Last year Wal-Mart announced, Target said they wanted to double organic sales, Kroger wants to sell more organic than Whole Foods, Costco is doubling down on organics, and I welcome them all to the party but I wish they would make it a potluck and they'd bring their own supply with them because that's what we all need. So organic sales in the last few years, up 77 percent and growing.

As some of us are aware of the USDA NOP prohibits GMOs, it's an excluded method. Not allowed in organic food production and, as we also know, organic is non-GMO plus many, many other desirable attributes for our customers. It's really the gold standard, it's the golden child of American food production. Non-GMO sourcing is a way to protect the heritage and biodiversity of crops but we're also utilizing it as a bridge to organic. And we have quite a few suppliers who are doing this so not just stopping at non-GMO but using it so they can build their supply so they can take an additional added value for the product in that three-year transition program. When they are organic we can't sell it as such. So non-GMO is a bridge to organic, they're complimentary and mutually beneficial. And there's a great potential to grow the supply, as

I said.

So Whole Foods Market transparency is our growth engine. As the world's leading retailer, natural foods retailer we see other folks jumping on the bandwagon so it's exceeded overall store growth in the last few years by 54 percent. This is what our customers want so that's what the growth curve looks like. So this is the change relative to our department sales. So it's exceeded our own growth, non-GMO and organic. It's also a greater percentage of our own sales, 60 percent, which in itself is up 10 percent. Organic is close to half of what we well, non-GMO is close to a third, and that's only in the last five years.

We have categories that are nearly 90 percent transparent already so we're only two years into this commitment. Consumers are voting in greater and greater droves. And for those of you who don't know what Kombucha is, it's a fizzy beverage. Our customers drink it like it's soda. They may bathe in it, they buy so much of it, for all I know.

Frozen vegetables, non-dairy beverages like almond and soy milk, non-GMO and organic, over 20 categories are greater than 70 percent transparency including eggs, and that includes the non-GMO fed as well as organic, pasture raised.

And then acquisition categories -- so if you're in retail you know what that means, it's like baby food. You want to get those baby food customers. Almost all the baby food we sell is organic.

Whole Foods' position is that federal mandatory GMO labeling is needed for consistency. It's what consumers are demanding proving that they want this. They want this information inside Whole Foods and outside Whole Foods. They don't have this transparency and protection when they're not in our stores and it's our hope that we can eventually get to this place as a country and as an industry. And as I pointed out on that first slide, Whole Foods tends to be a little ahead of trends so just consider me a visitor from the future.

I also want to say that, as a organic procurement, non-GMO procurement we need more science on the organic and non-GMO side, especially organic. We need more organic seed research. Actually, I'm a biologist, I'm a scientist. We need organic seed research and organic production systems so that it's comparable and it's relevant to the types of crops, types of conditions, types of locales that we need. Most of the organic products that we now sell have been developed in conventional systems and that puts the whole industry at a competitive disadvantage because we're not focused on yield and productivity and efficiencies, taste, flavor. One of the biggest transparency trends that we're actually seeing in food are more customers demanding products, bread for those attributes such as taste, flavor. And farmers wanting yield and efficiencies. Organic farmers, farmers who are focused on non-GMO.

I'll hold for questions.

(Applause.)

MS. DILLEY: Thank you.

So some questions?

DR. SEDEROFF: So you talked to us a great deal about how popular organic food is. I shop at Whole Foods but I don't like it.

(Laughter.)

DR. SEDEROFF: Because of your attitude towards GMO food. But so what I want to ask you is your opinion based on the evidence you know, whether you think GMO food is really a hazard or not, or is it just really a matter of marketing which is most of what you've told us about? And if you're not convinced that it's safe, what would convince you?

Now I want to just give you an example. No one talks about radiation induced changes to crops and a considerable number of our crops have been modified by radiation induced mutation. There's nothing said about it, it's actually quite undefined. There are lots of genetic changes that occur, it's not regulated as far as I know at all. And why is that safe as opposed to the changes we talk about? Would you market a radiation -- you are marketing radiation induced food and I for one am shocked that you do so.

So could you please comment?

MR. SCHWEIZER: Sir, our policy is transparency. So customers have a right to know and our company mandate that if a customer asks us a question it's our responsibility as a retailer to give that -- to give them an answer and to give them a choice. So whatever the assumed attitude is, I'll just clarify that we are pro-GMO transparency, we want our suppliers to label what they're selling. That enables our customers to have a choice in what they're buying.

And so all the other information, I know there's going to be a lot of debate here, there's a lot of back and forth on that, and ultimately our customers want non-GMO and organic products. And as a retailer, as a publicly-traded company, it's our mandate to respond to those trends.

In terms of irradiation, I think the only thing I'm aware of in irradiation is that we do not source a lot of our spices that irradiated. Our private label spices are -- go through a food safety process of steam sterilization.

Thank you for your business as well, appreciate it.

(Laughter.)

DR. KALAITZANDONAKES: Nicholas Kalaitzandonakes from the University of Missouri.

Thank you very much for all the numbers that you provided. I had two questions that are related.

One, the source of the data. And let me qualify my question. For example, you mentioned eight and a half billion dollars of non-GMO sales. I would like to know where that number comes from.

And a lot of the growth numbers that you were talking about, I worked with non-GMO consumer data for about two years now. And as a researcher -- I'm an economist by training -- it must be one of those frustrating data sets that I've dealt with. The reason is, it's very difficult to basically tell what's growth, in essence. And by that I mean if I had an SBU that today is conventional and then exactly the same SBU tomorrow becomes non-GMO because somebody put a label on it, how do you quantify that? Let me make an example.

I like, for example, peanuts that there's no GMO counterpart and I buy them from Target. And one day they became non-GMO overnight. So is this a growth in sales or is this a growth in a number of the products? Do you count it as such? Or is it the same SKU only with a label with similar sales as before?

So I would like to know, what goes into your calculations as you are putting these numbers and then the sources of the numbers.

Thank you.

MR. SCHWEIZER: Sure, good question. Appreciate it. It would be a lot easier for us to track the sales if it was all labeled accurately. As what we have done internally as well as through market data collected from the Natural Food and actually all the food industry. So my sales data were from internal Whole Foods metrics. I was actually not allowed to put our actual dollar values but we are able to share the rough metrics. The $8.5 billion number is estimated from the Non-GMO Project, from the Organic and Non-GMO Report and from my own conversations and compilations with about 1200 suppliers who are currently verified.

In terms of your other question, I think one of the main reasons why we're seeing so much move on non-GMO is that the vast amount of acreage for GMOs in this country are patented pesticide delivery systems. So those customers who have a perception that they want to avoid additional pesticide use, whether it's Bt in the corn or Roundup resistant trait, which you know, obviously the American farming community has embraced, consumers are rejecting that and that's what we're seeing. A lot of consumers are rejecting pesticides and they see non-GMO as one way to do that.

Obviously organic is the gold standard for doing that, but in terms of non-GMO, that it doesn't contain a Bt corn, it doesn't contain an oil derived from a Roundup resistant canola or Roundup resistant soy. That's primarily why you're seeing that label spread through so many products as well as the fact that it's being spread in multi-ingredient products, not just the share commodities.

MS. DILLEY: There are two more questions. Dr. Raven?

DR. RAVEN: Well, it would obviously be possible to take any one of the sort of non-modern ways of plant breeding that were not practiced in Edwardian times and put a label on it and then keep hyping it to the point where people began to believe that it was more important than some other thing. And obviously the big publicity campaigns around this are really what are driving the sales, not any real intrinsic knowledge about the science.

Now scientists worldwide, in all academies, health organizations, individual labs agree that there is not only no general danger to GMO foods but there is no theory that could possibly account for them having anything in common that would make them dangerous as a class because they're not really a class. So when you say you're transparent do you want to give the entire pedigree of all the plants you sell for the last 10,000 years or will you just go on hyping this one particular easy to remember GM, non-GM bad -- argh -- stuff and drive sales up? Because obviously as people found by posting pictures of people drinking beer, surrounded by sexy individuals of the opposite sex or anything like that, we have an advertising system that will allow you to hype anything to where you get good sales for it.

Are you really interested in all the other ways that plants are bred and what their characteristics are? Or the fact that there is a general scientific consensus that there's no basis for the fear that is being spread by these campaigns or not?

MR. SCHWEITZER: Great. We're hoping that you folks start labeling the products.

DR. RAVEN: Ha ha.

MR. SCHWEITZER: That way the consumer can just make the choice. In terms of --

DR. RAVEN: We'd rather label them if they're radiated or if they're gene edited or if they're --

MR. SCHWEITZER: I think you already had a chance here.

DR. RAVEN: -- I mean, you can't --

MR. SCHWEITZER: I actually do want to make one quick correction on --

DR. RAVEN: -- label every single way that we breed plants. It's just nonsensical and this is a championship example of that.

MS. DILLEY: He's trying to respond to the question.

MR. SCHWEITZER: I appreciate your passion on the subject.

So it's our position as a retailer that we're going to label products. It's the national food industry's position that we're -- for federally mandated labeling of GMOs and we're going to let the customers decide. And for those of you who studied science and, like I said, I actually am a scientist as well, know that science evolves in paradigms. There was a theory of gradualism in geology for years started by Charles Lyell in the 19th century, and I think we all know that geologists don't consider gradualism as the current theory of geology. I believe spontaneous equilibrium and evolution and similar behaviors in geological systems, and we're assuming that biotechnology and genetic modification, as is, is a current scientific paradigm that will evolve, as you said. And so in the meantime we're going to label foods that contain GMOs.

MS. DILLEY: Okay. We have question over here.

DR. SANCHEZ: Yes, please. I'm Pedro Sanchez from Columbia University.

I wonder if you have statistics of what happened to organic sales in the States during the great recession, this 2008-2009 thing? There are numbers saying that -- what I hear is that organic sales dropped down during that time. My question is, is that true? And by how much?

MR. SCHWEIZER: No. In fact, my grocery sales continued to grow during the so-called great recession. We continued to account positively and our growth trends were led by organic primarily, and organic dairy and commodities. So organic continued not only to exceed store growth but was well positive in the double digits during the so-called great recession. Consumers who buy organic are dedicated to it, there's a whole host of attributes of why folks are buying it and we didn't see any downturn. In fact, the numbers that I shared are inclusive of that timeframe.

DR. SANCHEZ: But that's in your stores. But overall?

MS. DILLEY: Oh, you're asking generally?

DR. SANCHEZ: Overall.

MR. SCHWEIZER: I don't have that with me and so I don't want to misquote.

MS. DILLEY: Somebody from ADS may be able to answer that.

DR. SANCHEZ: They did go down. If you go to --

MR. SCHWEIZER: If you know the answer you shouldn't probably be asking the question.

VOICE: They did not go down, they just slowed.

MR. SCHWEIZER: That sounds accurate.

DR. SANCHEZ: Overall. Okay, thank you.

MS. DILLEY: Here.

MS. OLSEN: Hi, my name is Angela Olsen, I shop at Whole Foods every weekend but not for GMO reasons. And so I was curious, you clearly are driven by data and I know Whole Foods is and that's a great thing. I was curious whether you had gone deeper into doing some additional survey data? Again, I'm there every weekend, I like the seafood you sell, I don't like fillers in my food, I don't like artificial colors, there's a variety of reasons why shop there none of which are GMO related.

And so I was curious whether you have done an additional survey or whether Whole Foods plans to do such a survey to determine why people are buying certain products? A lot of my cupboards have the non-GMO project over the last couple of years but that's not why I'm buying it. I'm buying it for a very different reason. But it just so turns out that Annie's or, you know, a lot of the products that you put up there, you know, also are involved in the GMO discussion. So just curious whether you also had done an additional survey about why are people buying the products? Because again, for me, and for a lot of my colleagues and demographic, the folks that are in my demographic, we're not buying them for GMO reasons. So I was just curious about that.

MR. SCHWEIZER: Sorry, I'm in procurement. I look at what customers do not what they say, and I give them more of what they want.

(Laughter.)

MR. SCHWEIZER: So you could probably get a whole hose of SPINS data, IRI, Nielsen HomeScan, Natural Marketing Institute, Hartman, they've all done studies on this and they all have information related to your question that you can access publicly. In fact, the Hartman study is online, you can download the PDF, and I think that's probably the most valid and thorough. But as my job as lead category manager for the company's largest department, it's my job to find trends and amplify them and be accountable to our P&L.

MS. OLSEN: Right. I was just wondering if perhaps those trends aren't really related to GMOs. They may be, I haven't seen the data.

MR. SCHWEIZER: They're definitely related to GMOs.

MS. OLSEN: Thank you.

MR. SCHWEIZER: So the one study I referenced was the Hartman Group, you should definitely check that out. NMI and Nielsen all have information on this. So this is well outside of just Whole Foods Market.

And I also want to point out that our largest competitors, including Wal-Mart, Target, Kroger are not only increasing the number of organic and non-GMO items that they sell in their stores but moving of store brands into that same space. So that's profound.

MS. DILLEY: So we just have a minute or two for one more questions.

MR. SCHWEIZER: I've got one over here.

DR. ZILBERMAN: Okay. David Zilberman, Berkeley.

First, congratulations for having a great business and basically taking over a nice slice of customers.

You spoke about -- do you really believe that you'll be able globally to feed the nine billion people with organics since it's a gold standard and that everyone goes to gold standards?

MR. SCHWEIZER: Yes.

DR. ZILBERMAN: And how do you seek to tackle or take advantage of new discoveries in biology and new knowledge in genetic, do you try to incorporate it or you try to ignore it altogether so you'll stay pure?

MR. SCHWEIZER: Like I said, it's my job to give customers in our stores what they want. I think there are starting to be more studies showing about the yield and efficiency in organic systems, including the Rodale Institute's farming systems trial which is a 30-year crop study comparing conventional GMO and organic systems. That is a scientific study, you may want to check it out. And it does show that organic improves yield with lower costs and higher profit.

And I did say before and I want to emphasize, we need more research, we need more information. There is SRI rice systems that are being developed in India as well as Southeast Asia showing that you have higher yield, lower water usage, high efficiency systems are growing rice, especially in drought conditions that are non-GMO systems. So there is some data. And as a scientist, but also as a retailer I'm looking forward to seeing more.

MS. DILLEY: And we have a question over here.

MS. BATCHA: Thanks, Errol, for sharing with us. Laura Batcha.

I have two quick comments and then a question for you. I think just to corroborate the question about organic sales during the recession, it never dipped below negative. It went below double digits which has been our trend over the last ten, fifteen years, but it went down to about five percent growth during the height of the recession. So to clarify that.

Second clarification, irradiation is also an excluded method in the organic standards so it's not allowed in the organic production systems. And I'm not an expert outside of organic but my understanding is products that are irradiated also require labeling for communication to the consumer.

So I want to try to bring us back to the discussion that we're here to have based on coexistence. And as the secretary laid out, I hope that we don't get too bogged down all day long on debates that are outside of this idea of farmer choice and consumer preferences because I think there's a lot of experts in the room and other areas, and I just -- you know, I call on all of us in the room to sort of stay with our task here and talk about that.

So I'm wondering, Errol, if you can share with us in your move to try to meet your mandate in 2018 where you're having challenges in terms of sourcing ingredients and supply chain issues and some of the nitty gritty of what you have to work through to meet that preference?

MR. SCHWEIZER: Yeah, it's like pushing a rope uphill.

So I actually just want to respond to a statement earlier today about the U.S. importing corn to Mexico. I'm actually importing corn from Mexico, Heirloom corn because we can't get farmers here to grow enough non-GMO varieties. We're having to import organic and non-GMO crops. It's, I feel, a huge issue and I think we need a lot more farmers in the United States to really get with the market. There's not honest market signals for organic and non-GMO. They're not traded as futures on the CME. Most farmers are not aware of it unless they have a Whole Foods or Kroger or some retailer in their area.

So I think there's not enough market signal to show that the consumer in the United States is demanding organic products and the supply is not keeping up. We had 50 percent out-of-stocks in our organic butter during the holidays for a couple weeks. It was really scary. And that's because the supply is constrained, there's not enough organic grain and obviously our customers are drinking a lot more whole milk so there's not enough skim to make butter fat. So we need more organic grain production in the United States and we need more research on organic dairy production to make it higher yield and more efficient.

So I think that's the major issue we're having right now with organics. And demand in those growth charts, those growth numbers I showed you guys would be a lot higher this year if we'd actually been able to keep in stock of all the products that we sell that are organic. And I think that's the major thing I want to get across here, not only is organic the gold standard for agriculture, organic is the future of American agriculture. You don't see growth trends like this in any other attribute in the food industry. Customers want organic so we need to produce more organic.

MS. OLSEN: Thanks.

MR. SCHWEIZER: We got time for one more?

MS. DILLEY: It has to be brief because we --

MR. L'ETOLLE: It will be brief.

I'm a farmer from Massachusetts, we grow identity preserved grains, a variety of them, corn, wheat and many others. We struggle a lot with this idea of coexistence and making sure that we're giving the customers what they want and one of our biggest customer demands is, in fact, GMO-free which is really easy on something like wheat. It's hard on corn. But we grow it, we process it, we sell it ourselves, we self-distribute so that does make it easier.

What we struggle with is making sure

that we're not trying to create a market for a particular thing the consumers are looking for and not getting in trying to boost that. You made a comment earlier that Whole Foods not only meets the customer demands but they lead the trends. How do you make sure you're not creating those trends that are missing and therefore being able to meet them, and that is something that divides agriculture? I think selling identity-preserved or GMO-free grains does not divide agriculture, does not hurt coexistence but creating those trends yourself does. And what do you do to prevent that from happening?

MR. SCHWEIZER: Yeah, sure. As category manager I review dozens of categories every month as well as many different product attributes. For instance, gluten-free is no longer growing at Whole Foods Market. It seems that the allergen-free community is either finding it elsewhere or it's not as popular. We're finding that other product attributes such as cleaning standards are not as big a growth trend. It's not as attractive to have a transparently labeled dish soap or laundry soap -- which by the way, we're the first retailer to ever do as well.

So when we find a product trend with not only this annual, year-over-year growth but the compound annual growth, it's profound, and it's showing us that there's a consumer behavior. And the fact that our suppliers drove this for us, we didn't drive our suppliers into this, suppliers were beginning -- becoming non-GMO verified in 2010 and 2011, their product sales shot up once they put that logo, including organic items, because the consumer, we're assuming, is seeing it as an additional level of assurance and a way to validate that it's organic and non-GMO.

So because I'm able to review -- I mean, I have 90-plus categories in grocery, each category has, you know, one to two dozen product attributes. Some categories, classes -- I'm a data jockey, like I look at this stuff and some stuff doesn't work. But when you have something like this it's a big deal. And I think that the USDA needs to respond, I think, like I said, we want to see a federal mandate of labeling and it's obvious the consumer's ahead of trend at Whole Foods.

And by the way, we do sell a lot of identity preserved and heirloom crops as well. And in some cases those sell really well and in some cases the consumer actually doesn't care.

MS. DILLEY: Thank you again.

(Applause.)

MS. DILLEY: So an identity-preserved question was a great segue into the next panel. We have Lynn Clarkson who is president of Clarkson Grain Company and he's going to talk about coexistence and practice with identity preserved products. I do -- as you're making your way up here, I just want to reinforce what was said. I was going to invoke the Secretary's comments earlier but it was very articulately said by the woman, I didn't catch your name --

sorry, there there you are -- thank you. Of just really staying focused on it's not about one's better than the other, it's really about choice and supporting coexistence and really trying to stay focused on that.

So with that, Lynn, I know you'll stay focused on that. We'll turn it over to you.

MR. CLARKSON: We have a pretty long food chain in this world and we all see different links in that chain. The chain that I work with on a daily basis connects the farmer to the markets. So we segregate corn and soy for GMO sensitive markets. We've been segregating corn and soy for 100 years, that's not new. This particular distinction is new.

Now we have a smiling lady up there. I'm willing to assume she bought a product that she liked. That's what I care about. I don't tell her what her values should be, I ask her what she wants then I try to feed it.

I've given you some pictures of some tools of the trade. Down at the bottom you have a green elevator with 120 10,000 bushel silos. Why? For segregation. The best you can do. You can see a stack of containers there, that's what links most of our IP markets to the international markets. Japan, increasingly China, and up the top, if you want to know who's doing IP in China you stop by a warehouse in Yokohama and you walk through. So these will be climate controlled warehouses where the Japanese buyer pays as much per month as you would pay a U.S. elevator to store something for a year.

Now my goal, a happy client. What's the purpose? The purpose is to provide an advantage. If you just want corn you buy a commodity. If you care about protein levels, process characteristics, flavor, color, aural characteristics, the quickness with which it absorbs water, the amount of energy used, you go IP. How do we get it? We can't buy it on the open market, we have to contract with farmers before they plant it. And we ship by container truck and all the normal attributes, including ocean-going ships that carry about 2 million bushels per. And we secure growers by paying them a premium. And it's too expensive to ride the learning curve every year with new people so the premium has to be high enough people come back.

Down a the bottom you've got a picture of a IP corn, which is the dark blue corn. It's even being turned into bourbons these days. Now we make distinctions on a daily basis between organic, convention which is GMO, and non-GMO, and within the GMO sector we make distinctions as well. Not just between GMO and non-GMO. Our buyers range from food processors to industrial processors to feeders to cosmetics companies. Evolution, go back about 1994 and our biggest challenge was keeping corn out of soybeans or soybeans out of corn. 1994 you 1996 the distinctions became invisible without testing at very small levels and created an entire new constraint for us.

As of today in our IP world, for

almost everyone that does identity preservation, the single biggest difficulty is contamination through adventitious presence, unwanted presence, unintended presence, and our ability to keep that within tolerance levels. We are not biased against any technology, we do have a bias against crops that are raised in such a way that they determine what the neighbor can do. We want him to be able to hit his markets, too.

Purity is really what we're going after in these things. The first part of any of our discussion with a client, the first part of the discussion here is "define what you mean by non-GMO." And we have lots of definitions out there contending. People call you and they want zero GMO, which is a standard first question, at which point we offer to have a drink and part friends because we can't do business. It's just not possible. We have folks that want five percent but my problem is who's going to buy it? I don't have a client anywhere in the world that will accept five percent GMO.

Now Leon will rush to tell me that the official Japanese standard is five percent. I don't know anybody in Japan other than government that accepts five percent. I know a few people that are willing to accept three percent but when you get into the food and feed it's the same thing as the Europeans, 0.9 percent. Now you need to know that there's a flex factor in Japan. If they see that you're trying hard, and most of your deliveries are within tolerance, they will grant you a tad of out-of-tolerance so I can't say they've got a really rigid limit. But the one that I have to deal with is .9. It means the new labeling standards, reasonably consistent. U.S. and Canada, what's emerging for my industry is 0.9. In soybeans that's still pretty easy. In corn it's becoming seriously difficult.

Now the positions in play on tolerance levels range greatly and some people believe in a static tolerance level and other people want a changing tolerance level. They want the level to go down to zero after a while. Very difficult to get people to invest in doing things for you when they don't know what the rules are going to be next year or the year after. That's a problem. Crop protection traits, I call those cultural distinctions, and the 0.9 provides the tolerance level for that fine.

But we now have functional traits out here. This is irrelevant really, whether it's GMO or non-GMO, we have functional traits in the field that will change the process characteristics in the nature of any other corn at one part in ten thousand. That's enormous. My company would not want to buy within one mile of you if you were raising that corn. And if that corn's in Iowa and it's so low I can't test it, what would my company do? We won't buy from Iowa. This leads to private zoning and this is a serious issue for our community in agriculture and the food system to decide how to grapple with.

Then who defines these tolerance levels? Are these done by private entities?

Are they done by federal government, state governments or others? There's a research study done by the University of Illinois back in -- I think it was 2005 that concluded that people have more confidence in the government than anybody else. And if we have several privates making up tolerance levels it's sort of organic before we defined what organic meant. We might have 15 churches and they're all closer to God than the next one. So this is a problem.

Now how do we get the things? We contract production. We have to establish the standards when we're talking to a farmer. He's got to know that he can meet those standards before he agrees to organize resources. We lay out the segregation protocols, we establish verification methods and we incentivize the purity issue.

So what are the corn incentives? Over the last two years we have paid a premium for non-GMO corn going from 15 to 75 cents, depends on the vagaries of the market what you get, timing. If your corn were -- let's say today in central Illinois we're paying 3.75 for corn, we're probably paying a little over $4.00 a bushel for non-GMO corn. If that corn were non-GMO and organic we're paying between $12.50 and $13.00. That's a significant incentive.

On soybeans, last year the standard for non-GMO soybeans was $2.00 to $2.50 a bushel, this year it's probably $1.50 to $2.00 a bushel. If your soybeans are organic compared to conventional, conventional I'm guessing we're around 9.50, 9.50 today, okay? So we'll be paying $11.00 for non-GMO bean. If that same bean carried an organic certification we would pay you $30.00. Enormous difference. So we're trying to get you the supplies that you need.

How do we verify? With documentation, a lot of it, which farmers hate by the way. But some of them can do it pretty well. We have testing challenges. How do we get a representative sample? A lot of MBAs think that out here we can just play with the widgets and get a representative sample. It is extraordinarily difficult to get a representative sample of a commodity like corn or soybeans especially if we're looking down into parts per thousand.

We really would like government's intervention here. If we got a buyer, he could be domestic or international, we want the same test results all along the chain. Most of our companies will say, dear buyer, you pick the test that you want, you pick the testing agency that you want. We're willing to settle for anything but please, let's accept the test result prior to engaging in shipping, whether it's across an ocean or across the country. So if we had a government lab that we could go to and have acknowledgement, or a private, we don't care, but we would like to put that efficiency in the system.

Contamination vectors, seed, up until about two years ago, in watching the products of hundreds of farmers we could see the GMO content start high on the edge of a field and drop as you moved into the center of the field. And typically it would blend in so it was less than 0.9. Starting about two years ago we saw an increase in problems coming from seed contamination. Too much GMO in the seed. And I think that's becoming a worse problem. What we're seeing is, if the hybrids have been out for six or seven years in commercial, every year it picks up a little bit. You can't get rid of it but you can pick it up. So after about six or seven years a hybrid is pushing the limits of acceptance.

Now on seed, what do we do? We test for it. Typically when you as the seed company, you're selling me non-GMO seed, what does that mean? The answers get a little shaky. We don't know. Or our average is under .5 but our range might be zero to five or six percent. Now who gets the six and who gets the non-detectable? Are there messages on bags that tell you how much? And seed companies, I understand why they don't want to do that, there's a whole bunch of liability that comes with that.

Do we test on the stuff that arrives on the farm? Or do we start buying our seed in places where there's no GMO seed raised, like in Eastern Europe? And it's my understanding, subject to challenge here, that some of the major seed companies in the United States are no longer producing their GMO seeds in Eastern Europe, they've gone to all traditionally-bred seeds. So for those of us who are concerned about our tolerance levels, may we buy seed from that source? Unanswered questions.

When you get to the field it's all about clean equipment and not having field contamination. We have third parties that test, farmers are pretty good about this, the seed industry itself has shown people how to do this and do this well year after year. We have buffers. The EU has done some real good studies on buffer needs to hit different levels of purity. And for 0.9 percent on corn we need maybe 70 to 100 feet of horizontal separation, normally. You can drive an extreme argument that troubles all these things. But for soybeans, 12 feet probably does it. So it's not a terrible burden there.

Post-harvest it's all about cleanliness and making sure you don't contaminate with something else. We test every load as it comes in to the first receiving point. We test every load as it leaves the first receiving point. And some end users test when it arrives at their processing plant. Now the tests that we have handy that work in the agricultural world, which is fast-paced at harvest, tend to be tests for protein levels, ELISA tests. They cost us along with the labor and materials about $25 to $30 a test. I don't care whether a truck's carrying 50 bushels or 1000 bushels. So on average we're probably spending five, ten cents a bushel just to run tests on corn.

Now the benefit, these things are relatively inexpensive and they take about 15 minutes to do. So if you're a farmer sitting there with a truck, I'm not keeping your capital asset just sitting there burning diesel fuel for hours. But the sensitivity only goes down to about one part in four hundred. PCR tests are the more serious test but the cost goes up to hundreds of dollars per test and the time needed to get results out in the field is a long time. It takes two, three days for us to get the results back on that. And at several hundred dollars per test, if we were testing trucks in and out, we could easily rack up $1.00, $2.00 a bushel just on PCR testing.

Now if I'm worried about a functional trait and I'm worried at a level of one in ten thousand, there is no strip test that goes that low today. In fact, that is so low I won't know I have a problem until a problem happens in a processing plant, so it's something that will no longer process the way it was anticipated by the buyer. This is a serious problem. Cultural standards, 0.9. You get to the functional standards, the functional standards are going to depend on things way out, way beyond this conversation.

The reality for GMO farmers here, is organic products free of GMO? In the process they are. That's the rule as I understand it. In reality there is some GMO in almost all organic products. But it's a process definition so how can the organic farmer be hurt by this? Well, here's how he gets hurt. Crops can be certified organic and still not merchantable. I can't sell it. Now if a farmer comes in with more than 0.9 and he's done everything right for the organic it's organic, but I can't buy it because I don't have a place to sell it. So what's he lose? I was going to pay him $30.00 but it's going to go into the commodity market and now I'm going to pay him -- excuse me, on soybeans it's $30.00. But in the commodity market I'm going to pay him 9.50. If it's corn I was going to pay him $13.00 and now it's going into a market at $3.50. This gets his attention.

This hurts.

So vision of U.S. agriculture, I'd like to see us support farmer choice and protect the farmer from being dominated by his neighbor in choice of his market. I'd like to support buyer choice and I'd like to support more continuing technical and market improvement in corn and soybeans. Now how we balance those things, the conflict of those issues brings us here today. We don't have really ready answers. But I want to offer you some suggestions.

I think we need to acknowledge that a significant percentage of our community wants to know whether they're eating GMOs or not, or got them in their life. I think we need labeling. Now my change on this is somewhat different than you heard. I know the Europeans label it if it has GMO in it. I would label it if it didn't. I think that involves a lot less expense in the system and I think the critical nature -- the critical question here is I want to know. Well, it tells you what you want to know if you do that.

I think we should agree to federal non-GMO labeling. We've got to define the meaning of non-GMO. So that's going to be a long discussion, what it is. And it's a complex discussion because it's not the same definition for functional traits as it is for protective or cultural traits. And it may change over time. I think we should enforce labeling through either the FTC or the USDA and not create a new regulatory structure. I think there's credibility to be gained from a government service doing this. Right now you've got a private service that's dominating the market, that's growing so quickly that it gives mixed messages. So we see some processors being asked to meet a .9 standard and somebody else producing exactly the same product being asked to meet a .5 standard.

The organic analogy here is, until about the year 2000, 1999, we didn't have a definition of what organic was. So we had a group, several groups of people saying, I'm more organic that you are. It didn't inspire confidence on the consumer's part. We defined organic, and I think the market acceptance just took off. And I think that's important to have a community definition. I think a similar thing would happen in non-GMO.

Now GIPSA, the Grain Inspection, Packers and Stockyard Act defines what corn is, defines what soybeans is, and sets up some standards for testing. GIPSA could be involved in this. I'm not sure they'd want to, I think they like to stay out of these controversies, but they would be an appropriate player.

Then I think there has to be an acknowledged agreement that farmers don't have the right to damage their neighbors. If that means a horizontal segregation, for cultural traits, I'm telling you for corn, which is the one I'm most seriously worried about, it's only about 100 feet. Fences were paid for for a long time, 50 percent by each neighbor, even though the one that didn't have the cattle was paying for half the fence. I think each neighbor should do half of the 100 feet. Now that's not going to please anybody but my perception.

Seed approval, right now we're just considering safety. And I've heard a number of you folks talk passionately about the safety argument, you can't understand why that consumer may not agree with you or may have other values other than safety. I'm involved in this from the market standpoint and market disruption is extremely critical factor. And right now we don't have regulatory authority to consider market disruption unless we sort of pervert the argument about weeds or a couple other issues. But I think we need to take a look at market disruption. Are we going to manage this technology or are we just going to throw it in our gene pool and say, let's see what happens?

For less disruptive traits, the one with the 0.9, I think we could get by with some segregation buffers. For the ones that can do functional damage to the neighbors for a significant distance, I think to be permitted those should have markers in them. Now many of us in the IP world run the latest generation of optical scanners. We can scan with multiple wavelengths and are fully computerized. And if you can't articulate what you want you can freeze frame a passage of a kernel and draw a circle around it and say, I want more of these or I don't want any of these. So if we could have a color distinction or maybe even a distinction you don't even see that allows us to get about 99.5 percent purity.

I think appropriate segregation requirements should be included in the contract between the seed provider and the farmer. And I think some of these seed companies are moving to do that right now. I think one of the seed representatives here today showed me that as a new contract protocol. Such policy moves could, I think, start reducing the cost we see going into this. We're seeing a couple class action suits that have got the entire farm community involved at some level, and it will probably be going for a billion dollars or so. We've got other people saying the suits won't go anywhere. But they're happening and they're extraordinarily expensive and disruptive.

I think it would be -- ease the controversy over introducing new traits if we thought those traits would be managed well and not be left out there to disrupt the markets. I think this would satisfy many who want to label -- it wouldn't satisfy everybody but I think it would satisfy a lot. I think it would support the U.S. farmer no matter whether he was conventional, GMO, non-GMO, organic as being a go-to place. My company works on several continents and we have buyers that are shying away from the United States because they don't think we manage our traits well. They're worried about what we're dropping into the system and they look at things like StarLink and say, "failure."

So that's a list of the organizations that I spend time with so I want you to know what my biases might be.

Other than that, thanks for your attention.

(Applause.)

MS. DILLEY: So unfortunately we've run out of time. But are you here after lunch?

MR. CLARKSON: Yes, ma'am.

MS. DILLEY: So perhaps before we get started with this afternoon's panel we could take some questions because I think you've laid out some really great ideas and suggestions for discussion, and I'm sure there are questions. We just can't do it justice right now.

What we want to do is get you fed. I know it doesn't say that on the agenda but as you can smell from the nice aroma, and probably your growling stomachs, that it's time for lunch. I'm going to have Sharon come up here and give you a little information on the lunches. Then what we thought we'd do is maybe take down this line, half of you to come up for your food in just a minute, and then do the other half. And we'd like to get you seated so that we have former Secretary Dan Glickman who's going to provide some comments over lunch. So we want to do that at the appropriate time.

So with that, Sharon.

MS. STAUFFER: Thank you.

I just want to give you some brief information on our lunch today. First of all we have a few that have special dietary needs and we've created special lunches for you. So if you would kindly raise your hand when I say your name we'll bring that lunch to you.

Mr. Dillon, Matt Dillon? Right here, okay, thank you.

And Ms. Hughes, Melissa Hughes is there.

And finally Ms. Sonnabend, Zea. Am I saying that right, Zea? Okay. Excellent, thank you.

So we have three different offerings

for you this afternoon. We have at the far table closest to the doors is our GMO offerings that includes a grilled breast of chicken with papaya corn salsa and roasted sugar beets. The next table up is the vegetarian table and that includes stuffed Portabellos with fresh spinach, a sauteed vegetable medley as well as desserts. And finally, the table up here at the front is the organic menu that includes free-range bone-in chicken and wild rice pilaf as well as salad.

So thank you very much. I am going to ask that the further half of the group, you come on and get your meals first and once the line thins out just a little bit then we'll take this half and go ahead and get your food.

So thank you very much.

(Lunch break was taken.)

A F T E R N O O N   S E S S I O N

MS. DILLEY: If people would take their seats we can go ahead with lunch conversation and presentation. But first we wanted to thank North Carolina State University for sponsoring such a lovely lunch. Hopefully everyone got plenty of food.

(Applause.)

MS. DILLEY: So we want to thank them for that and for Sharon for introducing your choices there.

So we next have Dan Glickman who is Vice President of the Aspen Institute and Executive Director of the Aspen Institute Congressional Program. It's a non-partisan public policy education and civility building program which we all know we need more of, for sure. And Mr. Glickman served as Secretary of Agriculture from March 1995 until January 2001. So without further ado, welcome you to the podium.

(Applause.)

MR. GLICKMAN: Thank you.

Sometimes when my bio is read it says I'm with the Aspen Institute program which is to promote civility among members of Congress. And I have done a fabulous job the last six years.

(Laughter.)

MR. GLICKMAN: We've changed the world.

Anyway, I thank you very much for being here. I see my friend Cathy Woteki here who is a great public servant and a great scientist in her own right. Tom Vilsack who asked me to come here and then left, but it's okay. You know, I was going to say that he was -- I usually say that he is one of the two greatest Secretary Of Agricultures in the history of America. But to be honest with you he has done such an amazing job in so many complicated areas, including this one, and I'm proud to be his friend and I think the fact that he's tackled -- is tackling this issue is certainly a benefit to him as well.

Nancy Creamer is here, where is she? Raise your hand? Okay. So I'm -- at least for the time being, the Secretary has asked me to be the chairman of the new Foundation for Food and Agriculture Research, FAR or it was called F-FAR but we changed it to FAR. But Nancy's on the board with me and she represents NC State and other issues. And so I'm glad that she's here as well.

A lot of experts in this room that know much more about this than I do. I used to tell the story when I was at USDA about the two dairy cows that were grazing along the side of the road and all of a sudden a milk truck drives by. And on the side of the milk truck is written in big red letters, "Pasteurized, Homogenized, Vitamin Enriched, Good For You." And one dairy cow looks at the other dairy cow and says, "kind of makes you feel inadequate, doesn't it?"

(Laughter.)

MR. GLICKMAN: So you've got a lot of experts in this room that know much more about this issue than I do, although I was present at the beginning of the organic issue, at least. I was a Congressman in 1990 when we passed the Organic Standards Act and I was Secretary, I think in 2000 -- I'm sorry, 1998 or 1999 when we did the rule, we promulgated the final rule. Any USDA people were here with me at the time of that final rule? Or it may be former USDA people.

And I remember when the rule, initial rule went out and we didn't close the door on GMOs being part of the definition of organic. And we had the largest -- and back then, you know, this is before social media. But we had the largest mail-in campaign, I was told at the time in the history of the United States government, opposing some of our proposed rule. So we pivoted quite quickly, which I was known to do a lot. And anyway, that rule was promulgated with the help of Senator Patrick Leahy, Kathleen Merrigan who, of course, became Deputy Secretary, and others. And I think was a very important rule.

We're here to talk a little bit about this issue of coexistence. I don't know who came up with that word, I've been in the world of foreign policy a lot and, of course, I remember coexistence being an issue between the Israelis and the Palestinians, an issue between the Soviets and the United States. These definitions are difficult -- remember the old Potter Stewart was a Justice of the Supreme Court and he had that famous line, when he was asked to define pornography in a famous Supreme Court decision, he says, "well, I can't define it but I know it when I see it." And I think coexistence is even a more difficult term to both define and to know when you see it.

There are a couple of quotations that struck me, Bertram Russell said, "it's coexistence or no existence." But a Chinese compatriot of Mao Tze Tung said, "there cannot be peaceful coexistence in the ideological realm. Peaceful coexistence corrupts." So the question is, where are we in this? Are we in the ideological realm? Do we believe that our positions are somehow Biblical and close to God? Or do we believe that these are more practical decisions to be dealt with for the larger good? And that's a question that folks, not only in this room but around the country, have to answer. What is this coexistence about? Who is it with?

Just drawing you back to another subject, back when I was in the Congress I was the House author of the legislation which led to the creation of something called the U.S. Institute of Peace. Any of you been in Washington, you've seen this big building behind the State Department with the big angel wings over it? And this was enacted in 1987 as a way to train people and teach people conflict resolution techniques because there is a science of resolving conflicts. And the institute was largely geared towards resolving international conflicts.

They became very involved in the truth and reconciliation process in South Africa after

Apartheid ended and they helped design the programs on which South Africa dealt with people who were engaged in the Apartheid government. And as you recall, Mandela and others engaged in a kind of a policy which was based on forgiveness and which a lot of people found difficulty with. But that was, in part, based on conflict resolution techniques. And sometimes I think maybe this is an issue that requires some scientific conflict resolution techniques to resolve.

I was listening to the speaker before who I thought did an excellent job of decomplexifying an issue in terms of practical things that, you know, can be done. But I only mention this U.S. Institute of Peace because there are an awful lot of people whose livelihoods are based on how to resolve these serious conflicts when you have people of seemingly irreconcilable differences, especially if they are based on some ideology. And so I urge you to maybe give that a little bit of thought as we talk about these issues.

So I thought I just might mention just a couple of things that strike me about this. One is, let's look at this whole issue from a 30,000 foot level. What are some of the principles and themes out there that kind of governing agriculture generally, not just the issue of coexistence or organic or not organic or GMO or non-GMO? One is, of course, the concept that we were moving much more into the arena of different strokes for different folks. That one size fits all agriculture is fine when we had basically just purely commodity driven agriculture. But it's much different today with diet and nutrition and with all the entrepreneurial techniques that are out there in the private sector. And I think that's an important thing to remember.

Some of you remember the movie "Field of Dreams," in Iowa, Kevin Costner. And in there the famous line was, "if we build it they will come." That was true in agriculture for a long time. If we grow it or if we raise it they will buy it. But today the -- probably the more guiding principle is, if they want it we will grow it. And so that's a changing trend and it's not universal because we still need row crop agriculture and we still need large-scale agriculture. But the demands of consumers out there are just -- provide a whole different scenario to the business of agriculture and food and farming than they used to be in.

And that relates to the second issue which is that there is a deveoping high-value, consumer-driven agriculture which can produce a higher rate of return, higher income for a lot of people in the field of agriculture so that there is obviously a mass produced agriculture in the commodities but there's also high value agriculture, both in the grains and especially in livestocks and especially in fruits and vegetables, where people can make a lot more money if it's segregated, if it's targeted and if it's part of a marketing plan. And that's certainly different than it used to be.

Third is the science is changing so rapidly and the -- with the mapping of the human genome and people's views on diet and nutrition, things that were applicable 30 years may not be applicable today. And therefore the regulatory system that even we developed in the '90s on the Organic Standards Act may not be as relevant today as it was 20 and 30 and 40 years ago, with the science changing so rapidly.

As I mentioned before, the commerce of agriculture is changing so rapidly, I see that -- I think it's McDonald's that's going to offer kale salads. I mean, I don't know who would want to buy it but, you know, McDonald's and Burger King and Wal-Mart and the entire business of commercial agriculture is changing rapidly and on a dime as it relates to consumer taste. So it's just different than it used to be. And I say that the regulatory system is -- has to deal with that in some way.

And also the relationship between

farmers and seed companies, and our last speaker talked a little bit about that. That is and will be changing in the years to come, clearly to face the challenges that he pointed out. Now this whole issue of how we relate organic and non-organic and GMO and non-GMO has been a difficult subject. So in my post-USDA life I've been involved in something called "AGree" I don't know if any -- how many of you are aware of "AGree?"

So AGree is an effort put together by the largest foundations in the United States, Gates, Ford, Rockefeller, Packard, McArthur, et cetera, to try to see if we could bring different stakeholders together to talk about a variety of things in agriculture, not just this subject but nutrition, rural development, how to bring more small farmers into agriculture, how to encourage entrepreneurial agriculture. But it's to challenge and connect leaders from diverse communities to build consensus, catalyze action and elevate food and agriculture as a national priority. Because we believe that for a long time in the public policy arena, agriculture has not been at the top of our national priorities list. It's been a secondary issue. I sense that is really beginning to change, hopefully.

So we've had a lot of dialog on issues like how do we move beyond arguments about small scale agriculture versus large scale agriculture? Organic versus conventional? Low-tech versus high-tech? And instead focusing on embracing the diversity of systems that will allow us to maintain productive and profitable farms, healthy working lands and ecosystems and consistent production of affordable, safe and nutritious food?

We met together with a broad range of stakeholders from the seed companies to the major retailers to small scale farmers to advocates to NGO community and just common citizens to talk about the GMO issue and talk about biotechnology and contentious issues and challenges, potential actions, research questions that are unanswered.

And there's no question that genetic engineering and production of GMOs represent a high-tech tool in our agriculture toolbox that will help us weather unforeseen challenges, what I call the asteroids of the future. Drought, extreme weather events, agriculture disease outbreaks and serious nutritional challenges. And to think that these can be done without new technologies, including genetic engineering, is very short-sighted. It just will not happen.

We find changes happening in science all the time. They're happening in the medical field and they're going to happen in the food and agriculture fields. But at the same time there is no question that there are environmental, social and economic challenges and opportunities to all of these things as well. Questions about the use, safety and future of the technology abound. One emerging question lies in how we as a society evaluate the risks associated with GMO crops and then how we communicate those risks to farmers and to the public as a whole.

There's no question that the technology implores us to challenge our current understanding of risk assessment, it also requires us to understand that there is no risk-free work in this world. I'm flying back today, I presume that US Air airplane is going to do it okay and the engines are working. But like most fliers I'm not 100 percent sure. I'm 99.9999999 percent sure. So we've got to realize that you cannot operate a society on a totally risk-free orientation.

At the same time, there are potential risks to GMO crops. The gentleman was talking about this today in terms of contamination, in terms of marketing, and there may be other challenges as well that we can't be afraid to ask, to talk about. Because if we don't, consumers will, and I guarantee you, marketers and retailers like Wal-Mart will respond to those concerns. It's just going to happen.

As we examine the potential costs and benefits of GMO crops, including increases in yields, impacts on pesticide and herbicide use, the development of resistance among weeds and pests and potential health impacts, which risks are most reasonable and unreasonable. That's something that the experts need to decide in a non-ideological way, without saying none exists or the whole thing is fraught with problems and we shouldn't go down this road.

The next generation of GE crops may involve nutrient enrichment, bio-fortification, healthier oil content and reduced allergenicity. Maybe they'll help men grow hair, too. I've said that would be a positive -- personally that would be something I would appreciate. But how would these widespread health benefits stack up against potential social, economic and environmental risks? We have the capability with modern science to answer all these questions, if we're open about it and we're reasonable about it.

So there are a whole bunch of other issues involved with this -- these technologies. I note that the pharmaceutical industry does not face the same level of public scrutiny for using biotech and genetic engineering to create medicines and drug therapies. People are accepting of drugs made through biotechnology to treat cancer, diabetes, arthritis and a myriad of health ailments. Why is this? Do you think that the FDA's process is so good that we think that it shouldn't be challenged? Or is it that there is a perceived benefit that outweighs any of the negative implications for this kind of stuff? What lessons are there for seed technology and agriculture biotechnology that we can learn from the pharmaceutical industry about risk assessment, about transparency and about communication?

There is one other emerging challenge to which I'd like to draw your attention. For the past few years, instances of domestic and international cyber security breaches have been on the rise. Although GMO crop patents are proprietary information they may be less secure than we realize. How can we transparently use genetic engineering technology risks while adequately protecting patents? So to address these concerns, risk assessment, transparency and cyber security, further social, economic and environmental questions will arise as up and coming GE technologies, such as synthetic biology, gene editing and induced gene mutations are increasingly developed and utilized.

Along with robust science, respectful dialog leaving dogma at the door, and partnerships are needed now more than every to confront legislative and regulatory challenges and opportunities. Can we develop a strategy collectively to make substantive progress on GMO issues? My tenure on the Hill at USDA, as co-chair of AGree and now as chair and member of the FAR, the Foundation, have shown me time and time again that a collaborative approach among producers, the supply chain, researchers, health professionals, consumers and other key stakeholders is critical to creating the future we would all like to see if we want it there.

So my -- I guess my main point here is on the issue of coexistence, if we want it to work it can work. If we don't want it to work and want to fight then it's a losing battle and probably the marketplace will fill in the gaps as consumers make choices and as the retailers decide what's in their best interest and what consumers will buy. But I don't think these are impossible problems to deal with, myself. And I think the longer we wait the more the science is going to -- and marketing issues are going to leapfrog us. And the rules and regs that we have on the books in the past are going to be less and less relevant to deal with these issues.

Now I want to mention one other issue because Kathleen Merrigan and I did a joint op-ed almost a year ago in the "Los Angeles Times" on the issue of GMO labeling. And it's -- I'm not a fan of mandatory labeling but there is no question that, when we created the Organic Standards Act we did, for process purposes, said that organic products were GMO-free. I recognize that, as we analyze these crops, it will be harder and harder, and they can't be 100 percent free in the purest sense of the word, but we try to make them as free as possible.

Many Americans would like to know more about what they eat, including whether the food they purchase contains genetically modified organisms or GMOs even though by and large they do not relate to the health and safety of the products, in my view. On the other hand, people still like to know what's in their product, in their food, much more than they like to know what's in their Lipitor or in their other medicines that they're taking. Because that's kind of the simplicit stuff that, if the doctor gives it to you, then it's good for you. And consumers' choice on food is cultural, it's historically much different than that.

So you see these valid initiatives all over the country, bitter fights, should be label, should we not label. And I understand the concern that's out there, but there is a way already to ensure the foods they purchase are free of GMOs. Now I'm not saying it's a perfect way. During the Clinton Administration we were responsible for implementing the Organic Food Production Act. One of the implementation decisions that had to be made about the law after its passage was whether GMOs could be used in organic food. After receiving nearly 300,000 public comments during the rulemaking process, and after kind of a jerky start to this whole thing, we said "no." That means that food certified as organic are also GMO-free.

So why aren't consumers aware of this? Some are. But it's certainly not on the package in most cases, because producers of organic food are effectively banned from letting them know right now. Personally, and I can't speak totally for Kathleen, although she's left the department, I don't want this labeling issue to be used as a ruse to prevent GMOs and the science of genetic engineering from going forward because that would be a serious mistake. But the public through their letters and the Congress made it clear that organisms that belong in food with an organic label should be not -- have no GMOs in them.

For more than a decade organic farmers, ranchers and food processors have been subject to rigorous annual inspection to ensure they are in compliance with national organic standards. The scrutiny is carried out by agents accredited by USDA but responsibility for overseeing food labeling lies with another part of USDA, along with the FDA. And they have, for the most part, although Secretary Vilsack has opened the door to all of this in a very dramatic way and a positive way, but there has been a rejection of petitions by organic food producers who want to label their products as GMO-free or produced without the use of GMOs. Now again, it's required to be certified as organic.

Okay. So absent something along this line we continue to have these really high expensive fights on labeling that I -- you know, I personally think it's unproductive but I understand why it's taking place. I personally believe that some of the energy around GMO food labeling would dissipate if the federal government honored the original deal we struck on organic food and allow producers to label their products as GMO-free. I recognize that the definition of GMO-free and contamination of products may make this somewhat complicated. On the other hand, it's still the rule.

And resistance by the government to this seems somewhat inconsistent given that one branch of the agency enforces the organic rule, including the GMO prohibition, while down the hall another rejects labels submitted by organic companies. For many years the agency said this was because it had no way to verify such claims. Thanks to Secretary Vilsack who issued a memorandum earlier this year directing all USDA agencies to recognize the department's organic standards, the verification objections are dying down. But now, of course, there's a debate about what the label should say, who ultimately should do it, whether it should be a non-GE label versus a GMO-free label, and I'm not smart enough to tell you exactly how this will happen.

But this seems to be an area where industry and government can work together to find ways to get something like this done, ways to either both prevent cross-contamination of product, of crops, and at the same time provide a justification so that a GMO-free label, or something equivalent can be put on organic food so it will quell, in some degree, this massive push for national labeling of all foods, which I personally think is a mistake. Mandatory GMO labeling of all food will arouse passions on both sides of the issues and it's not a subject for coexistence, I can tell you right now.

While it may not satisfy all GMO labeling advocates nor be welcome by all leaders in the biotech industry, allowing a GMO-free label provides more choice in the marketplace for -- GMO-free organic label provides more choice in the marketplace in response to the demands of millions of American consumers in a practical and common sense way. I think the trick on all of this stuff is to recognize that we've got -- there's more than one way to skin a cat here. And that the public has an increasing demand for organic foods but we're not going to feed the world with organic foods, you know. It's a subset of the population. And we don't want the tail to wag the dog unnecessarily in this regard, either.

So can we come up with some kinds of solutions that make sense, that don't require either side, so to speak, to capitulate and can move our regulatory process along? What I think is going to happen is, if nothing happens in the regulatory process, I think the market will just pass this by. The science and the market will make the regulatory systems less relevant. And so in that -- it may or probably won't protect consumers very well in the process.

So I end with those thoughts. Fortunately I'm out of government, I don't have to make any of these decisions myself. I'm not getting paid for this speech, I want you to know that, so -- as you can see, nobody would pay me for this speech anyway because I haven't made anybody happy in this process.

(Laughter.)

MR. GLICKMAN:

But you know, my theory of government is the same as Tom Vilsack's theory of government, I think. We want this thing to work. We want -- and we want a growing marketplace for farmers and ranchers and producers and retailers to grow their business. And you know, when you look at -- I think Tom may have talked about this, when you look at the aging of the farm population and when you look at the entrepreneurial opportunities, as I started my remarks, there really are different strokes for different folks and we ought to be encouraging that.

So with that I thank you very much for listening to me, and delighted I'm back with some of my friends in the agricultural world. Thank you all.

(Applause.)

MS. DILLEY: We have time for a couple questions and then we'll have Lynn come up and maybe take a couple of questions after that and then we'll move into our afternoon.

MR. GLICKMAN: Yes, sir.

DR. SEDEROFF: I hope you simply made a mistake by implying that there was a categorical risk to genetically modified crops.

MR. GLICKMAN: No, I didn't mean to say that.

DR. SEDEROFF: Good.

One of the fundamental problems is we can't agree on what constitutes evidence. And scientific evidence is not ideology. So there is, I think, a flavor involved in coexistence which simply puts scientific evidence in a equal standing with things that are not scientific evidence which puts scientists at a disadvantage. And I think we should fix that.

I have a comment on labeling because

I think the labeling genie is out of the box. And what that means is that labeling will not be restricted to something that just says "not GMO." Then I expect there will be labeling that says "virus free," "fungus free," "fungicide free," "pesticide free," "hemolytic E. coli free," "Anthrax free," "botulism free," "no animal manure used on this product," "no migrant labor," "no student labor," and "no animals have been harmed in the production of this crop."

MS. DILLEY: Did you have a question?

MR. GLICKMAN: I think that's his question, that labeling leads to all different variations on the theme, is what you're saying.

I think an intelligent population and hopefully an intelligent government and regulatory system can draw lines, however. I don't think that we're necessarily obligated to do all those things that you're talking about. I've heard that argument before, it's the old "New York, New York" argument, if you can do it here, you can do it everywhere, so to speak. And

I just don't buy that myself.

DR. SEDEROFF: We shall see.

MR. GLICKMAN: We shall see. Thank you very much.

DR. KUZMA: Yeah, hi, I just wanted to comment on the last point about labeling and how, if we label -- I mean, I honestly don't know where I fall on the issue of mandatory labeling, so that's my bias. But I have thought about it and we did do a survey with consumers -- this isn't published yet -- but where we asked the question a little bit differently. Instead of asking them do they want labeling or not, we gave them a list of the twenty things and said choose three that you want to see on a label. And I was surprised at the results that GM actually rose to, I think it was the second or third, and I can go look at that, behind pesticides, was the first one. So I think the policy argument that we cannot label for everything therefore we shouldn't label for something like GM foods, I'm not sure if it's the best counter-argument to the labeling debate.

So I just wanted your -- you know, just to follow up to this point. I just wanted, you know, your thoughts on that.

MR. GLICKMAN: I agree with you more than I agree with him. But I would say this, that the problem with mandatory -- anything that's mandatorily labeled has to be something that's, in my judgment, the evidence is quite substantial or a preponderance that it impacts consumers' health or safety or is otherwise critical to their livelihoods. And that's why a lot of these things he said, they're nice, they're interesting, and you can have companies that produce crops that don't use labor that's uncompensated or that kind of stuff. But as a general proposition you have to make some choices in life and the choices have to be ones that impact, I think, health and safety of a consumer. And nutritional labeling we've decided impacts their health. So I would say, you know, it's a policy issue.

DR. KUZMA: Yeah.

MR. GLICKMAN: What's going to happen to this issue is that, if consumers demand it, then the Wal-Marts of this world will start requiring it. And if the Wal-Marts require it, it will become a standard because they sell 23 percent of the food in the United States. I don't think that they're going to go to that point unless there is just a massive groundswell and I don't see that happening certainly right now.

DR. KUZMA: But I appreciated your comments. I just thought I'd add that bit of information.

MR. GLICKMAN: Sure.

MS. DILLEY: Make it one more quick question.

MR. GLICKMAN: Yes, sir.

DR. ZILBERMAN: I think that one of the things that we have is that there is this assumption that there is a very strong consumer awareness about what's going on. Recently about

80 percent of the consumer wanted that we would label foods that contains DNA. So to some extent I think we really have recognize about some criteria that we have to use beyond the consumer because people use the consumer in order to further their own interest.

Obviously we have several camps that want differentiated products. From the perspective of -- it's great if rich people pay more for an organic product even if there is no scientific base for it. But the question is, how can the government develop some sort of standard that allow poor people who don't care about all this stuff to buy McDonald's without feeling guilt about it? To me the key element of their coexistence is not between organic but between rich and poor. And now satisfying the rich would make the --

MR. GLICKMAN: Well, maybe the ideal of the coexistence is the gap between Democrats and Republicans. But you know, Cathy is here and Cathy is obviously very keen to answer this stuff. You know, I mean, I suppose ultimately in the United States the ultimate arbiter of this would be the United States Congress. They ultimately make the decisions to pass the laws, to decide issues like do you need something labeled or not, and in the past they've done it on fairly narrow circumstances. Nutrition labeling was one of them, and they've also provided authority to the FDA and USDA and regulatory agencies in limited authorities. So the Congress is not going to go down this road if they don't think that there is a scientific basis for it, and there is strong political support across ideological spectrums. That's the great protector of this issue.

The trick is in the future, because notwithstanding Congress, I still have confidence that on a lot of these issues they will step up to the plate on this. The real trick is that, is the science moving so rapidly and is consumer demands and is the use of these things moving so rapidly, and information moving so rapidly that the regulatory process can't cope with it at all? In which case you get 1000 flowers to bloom but a lot of those flowers may stink and not be very good. And that's why you do still need I think effective regulatory authorities by the agencies. And by and large, I think they do a good job, given the circumstances of what they have to deal with.

MS. DILLEY: Thank you very much.

MR. GLICKMAN: I think that's it. Thank you all very much. Appreciate being here.

(Applause.)

MS. DILLEY: So Lynn, do you want to take just a couple of questions? And as Lynn is responding to maybe a couple of questions, if we could have the panel members for the next panel come up, and then I'll turn it over to Catherine Greene who will be moderating that panel. But any -- again I think there are lots of suggestions that you put forward in terms of fostering coexistence and reducing market disruption.

MR. CLARKSON: Thank you.

MS. DILLEY: And food for thought, and we have a question.

MR. DILLON: Well Lynn, first of all, great presentation. A lot of really good information in there, and points, and I think looking at things from a -- you know, you stand in a place where you really are seeing the multiple markets and the multiple types of producers, so I really appreciate your perspective as always.

I do have a question, though, on your recommendation that in terms of labeling, we have the USDA or some federal agency oversee a non-GMO labeling process. My question for you is, as a food producer, let's say I work for General Mills actually, instead of working for Clif Bar. Let's say I work for General Mills and I'm moving some of my cereals that General Mills has into non-GMO. And the federal government is testing, let's say that they are requiring me to test to 0.9 percent.

What happens when we have a particularly bad year with corn pollination where it's a cooler season and the pollination period lasts longer and isolation via timing doesn't work quite so well, and suddenly we have an increase in adventitious presence of GMO traits in non-GMO corn. What happens when I can't buy enough non-GMO corn in the marketplace and now suddenly I can't change my packaging, I don't want to do that every 12 or 18 months, what do I do with my product line? Do I simply not put SKUs on the shelf? I mean, do you have any thoughts on how that type of a process would work given that there are bound to be times when there's a bottleneck in the supply because of biological events in the field?

MR. CLARKSON: You bring the answer back to a favorite word of lawyers, "reasonable."

MS. DILLEY: Favorite what?

MR. CLARKSON: Favorite word of lawyers, keeps them busy for many years. It's defining the word "reasonable."

So if you had a rule that said, under the following situation when an entire industry is impacted rather than just a particular company then we will flex the rule. Now you have to have a body of people, or it built into the rule, what kind of determination you have on how much flexing you will allow. But you bring up a problem right now with a hard and fast rule conceptually, you'd be out. I know that the non-GMO project has tried to put in a flex standard if the entire industry was affected, I think that's probably a reasonable way to go.

MR. DILLON: Yeah, as a private label, the non-GMO has been able to do that. But if it was a government label wouldn't consumers have cause to say, well this is a government label and I'm expecting this 0.9 percent and now you're selling me products that are not 0.9 and the consumers would lose confidence in that government label, if not sue to --

MR. CLARKSON: The one study I've seen on this which was done by a couple professors at food institutes in the midwest came down on private labels satisfying many of the concerns but government labels satisfy more of the concerns and are more trustworthy. When I pointed out to you that currently on the private label standard we see that one of the leading groups growing so rapidly, they're passing out confused messages. That's a little hard to correct. I would think that the government would not be so apt to provide mixed messages. I could be wrong, but the studies I've seen would give the nod to the government over private for consumer confidence. The government, too, could build in some flex, I suspect.

MS. DILLEY: If we could take one more quick question from Nick and then we'll move on.

MR. CLARKSON: Hi, Nick.

DR. KALAITZANDONAKES: Yes, hi, Lynn. Thanks for all of this.

But I think I want to really follow up a comment that I think Errol made a little bit earlier, and the question that was just being asked. So if I am a buyer of non-GMO products and come to you and I say I would like to increase my purchases by say 300,000 acres, and I want to do over the next two years, three years, would you not be able to do it?

MR. CLARKSON: No, we would be able to do it but the answers come from several perspectives. I would have to ask you where do you want your stuff originated? Do you mind foreign sourcing or do you want all domestic sourcing? I would be keenly interested in what your tolerance level was to do that. Right now I think there's probably enough seed available, there are niche market seed companies coming in that focus strictly on the GMO issue, they're doing a pretty good job with controlling tolerance levels in their material. So I think there's enough room there for a 300 or 500,000 or even a million or acre flexibility.

DR. KALAITZANDONAKES: I mean, I was asking exactly that question. Okay, thank you very much.

MR. CLARKSON: You're welcome.

MS. DILLEY: So Catherine -- there you are. I'm looking -- every time I look toward the light I can't see anything. Maybe that's a metaphor for something, I don't know. But I'm going to turn it over to you.

MS. GREENE: Hi, Cathy Greene from USDA's economic research service. We have a great panel here today. Obviously a lot of different views and we're going to go fast. Each speaker is going to have eight minutes to present some ideas and then we're going to have hopefully a half an hour to discuss with the audience.

And the first person up is going to be Ron Moore with the American Soybean Association. He grows conventional and biotech crops and I'm sure has a lot of interesting things to say for us.

MR. MOORE: Well, thank you. It's a great opportunity to be here. I thank USDA for inviting me here.

Again, I'm Ron Moore. I'm a farmer in

western Illinois, I grow soybeans, corn and alfalfa and I've been involved in the agriculture industry for several years. Former chairman of Illinois Soybean Association currently serving as the Secretary of the American Soybean Association board of directors and have worked in -- on the Illinois Council for Best Management Practices trying to promote good stewardship of the land through farmers in Illinois.

I've been asked to talk a little bit about biotech and why we use biotech for weeds and pests, weather stress, yield and profitability. And one thing that I've worked on quite often in the last decade is sustainability. Oops, let me get my pages right here.

Weeds and pests on our farm, we've had lots of issues with resistant weeds ever since I started farming in 1977. When I started farming we moldboard plowed every acre, buried the residue and turned the soil black. With the advent of no-till we left more residue on top of the ground and it did help suppress some of the weeds but we ended up in the 1995 having a weed that we couldn't control with conventional herbicides. It was called tall water hemp. And so when the Roundup ready system became available we put 100 acres in that field that was -- we had the resistant weed and then it controlled that weed. So the next year we put in 300 acres, Roundup soybeans, and then we also after that we're all 100 percent Roundup soybeans or glyphosate resistant.

We had a pest in our corn that when they came out was a rootworm, and I used to out insecticide on every acre. If I planted -- back in late 1990s, if I had planted the same number of acres then that I do now I would have had to handle 15,000 pounds of an insecticide to control the rootworm. If you don't control those pests they chew on the roots, eat the roots and it reduces the ability to the plant to take up nutrients, water and nutrients.

We try to keep the plant as stress free as possible. Some of the things that also are weather stresses, they're developing some drought-tolerant herbicides now. Some of them are through the GM process, some are through the conventional breeding process. When we put the -- use the rootworm gene in the transgenic corn it increased our yields 12 bushels to the acre. Now that may not seem like a lot but it was a significant amount that we continued to use those traits.

We do talk about sustainability briefly. As I said, we moldboard plowed everything when I started farming. When I was in high school my father and I and my brother put in a tile drain or tile outlet to drain a seepy spot on a hillside. I was there when the contractor put the drain in. Five years later we had a problem with that tile line, needed to dig it up and repair it. We couldn't find the outlet that outletted into the stream. I know it was there, I saw it get put in, I saw the guy out running the backhoe cover the dirt up. We finally had to get him to come in and dig across the tile outlet, we found it three feet below where it was originally placed.

Because the hillside had eroded to the point where it had -- the grass waterway had captured the silt but it was three feet deeper than it should have been. So using biotechnology derived crops has allowed us to use no-till to preserve our natural resources, which is the soil and the nutrients that I've applied on it to continue to be profitable.

Just a -- this slide is just a recap of what I talked about. But we do have challenges with biotech. We have weed resistance, we're currently having some issues with Palmer amaranth and some mare's tail and giant ragweed that are resistant to the glyphosate, or they -- the glyphosate doesn't do as well as it used to. And so we've had to go through different modes of action and to control those weeds because if we go back to no-till -- go back to moldboard plowing we'll end up with more soil erosion, more nutrients into the water systems of the United States.

But the problems that we come up with also include some of the regulatory issues and approvals for both international and domestic approvals. China's approval process has become less transparent and we're just challenged always to make sure that our seed that the tech providing companies are producing meets the requirements that those countries have. And so timely approvals is extremely important for a whole multitude of either new traits that are being put out or traits that you have multiple stack genes on top of another gene, where you have herbicide tolerant gene versus an insect resistant gene.

And we've worked very strong -- very closely with the American Seed Trade Association in trying to make sure that the commercialization of these new traits is in a timely manner and not before they're approved overseas. And again, there's an issue of the global market acceptance of biotech. We heard a lot about it today and I want to make sure that we continue to have that conversation and dialog with consumers here in the United States and also overseas.

We talked a little bit about anti-GM and I'm stepping out on a limb here. For retailers to talk about one production system over another as being the gold standard disparages the production system that I use. And I don't think that's a -- conducive to having a conversation about coexistence. When we do have that conversation about coexistence, farmers are using technologies to reduce our drift so we don't go having our herbicides sprayed on another and be off-target, offsite. We use precision agriculture tools to make -- to ensure that.

I mentioned about the working with the American Seed Trade Association. The American Soybean Association is supportive of voluntary labeling, we think that's -- that the consumers, if they would like to know what's in their food they have that ability to find that information through a voluntary label. We're very much in favor of consumer's choice.

I'm a businessman, I make my decisions based on what I can -- the income that I can earn off my farm. I've all got bills to pay, I've got a mortgage to pay. If the market says that they want non-GM corn and soybeans and farmers will respond to that market signal. But until those signals are put in place why we'll continue to use the biotech traits that we have.

I look forward to your questions.

(Applause.)

MS. GREENE: Thank you, Ron.

Our next panelist -- and again we're holding questions until all six speakers have gone and then we'll have Q&A with you all.

Our next speaker is Jim Zimmerman. He is also a farmer with the -- in Rosendale, Wisconsin and he's with the National Corn Growers Association, on the Corn Board. So thank you.

MR. ZIMMERMAN: Thank you.

Thank you for allowing me to participate in this panel here today. And yeah, my name is Jim Zimmerman, I'm from Rosendale, Wisconsin and it's there where, you know, we grow corn, soybeans and wheat on a multi-generational family farm. And we also do some grain merchandising, too. And also, I'm a member of, of course, National Corn Growers Association.

And when we're talking about coexistence we know it isn't something that's new, it's been around for a long time, right since when the land was plotted and the fences went up. So it's been working for a very long time. But it requires, you know, a solid foundation on communication and that has to happen between the neighbors there. And of course, the fence line is the key and land owners and growers, you know, have to be on the same page with that. And one of the central tenets is that grower producing the value-added product has a responsibility to maintain that value.

Now before corn planted was -- before it became 93 percent of the crop GE, you know, a few years back, NCGA developed a identity-preserved cost calculator and that was done so that -- to develop a business model for growers so that they could better understand what the cost structures were to obtaining and maintaining certain purity levels. But one of the things that come out of that is that, you know, that it -- to maintain these different levels, if it's easy the value was going to go away and it wasn't going to amount to much. So you know, in looking at those costs you can identify with how hard some of those practices are or we're going to be relative to what it would mean for our value or what you would need for our value to properly manage that.

When we look at the economics of different coexisting strategies -- and again, communication is the key and we know that it has minimal impacts if we have very good communication. Now I have a neighbor that grows organic sweet corn and he didn't start that lightly or easily but the first thing he did was communicate with his neighbors. And the first thing I did is get in touch with him and give him an idea what our rotation would be and give him some backup plans, things he could do to adjust for what we were doing on our side of the fence.

When we look at physical buffers we know that they have very straightforward impacts as far as the economics go. You know, the grain that's grown in those buffers usually goes as commodity grain and not a value add. But it should be well understood that that should be part of the original business plan and that should be calculated in.

When we look at temporal buffers it depends on geographies as far as their economic impact, temporal buffers work very well when there is a longer growing season and that maturities for different species of crop or corn that you're growing wouldn't be affected. Now you get into northern growing regions that they'll have a different economic impact. And also, too, when we look at rotation there's variable impacts with that in regards to that.

If the neighbors do see a point where they can go to their second crop some of those impacts will be variable in case by case.

When we look at contract thresholds that also, you know, looking at it on a case-by-case scenario, we know that that can lead to unknowns. And that happens particularly when you have an oversupply of production or of a value-added product likewise. And it's where buys can then become more choosy about what they want.

We look at some of the gray areas with coexistence. We know that in these contract thresholds that the grower needs to know precisely, you know, what it's going to take to produce 100 percent of purity or every level from that. And also, you know, the idea of standardization, is there an opportunity to have a certain level out there that's known, that's workable for a certain level of purity? And when we look at different geographies, we know with the diverse agriculture that we have, we know that there is many more different value-add or different production systems that go on in certain areas. And so when you look at those areas compared to others it's going to be a geographical difference or an effect on those different production systems.

What I mean by that is, there are certain areas around the midwest or the country in which there might be four or five or six different types of value-add systems going on. It might even be as simple as a launch zone for a new product introduction versus, you know, a zone where it's a non-launch for that. So there is competition for different value added production systems.

When we look at a gray area here for testing we know that market conditions can make for some differences there, too, in regards to some rejections and that's largely comes from the fact that, you know, we can't predict the weather and we can't predict the size and quality of the crop that's being produced. And this is something that I learned a long time ago, you know, in regards to producing a value-added crop, did that on a smaller level.

And as we were delivering this value-add, and it was a distance to travel to make this happen, but the one frequency that I noticed -- or that we noticed, I should say, is that as the vessels or containers got full the rejections seemed to increase. And you'd say, well, if that just happened one time maybe you've got a problem in your bin. But when you recognize -- see it happen, the pattern repeat itself you'd say, well, I don't -- you draw your own conclusions. But what it told me was is that somebody who was closer to that actual destination point had a competitive advantage and they could identify when was a better time to deliver in that delivery timeframe. And somebody being 150 miles away doesn't have that. So there are differences, there are gray areas as far as coexistence goes.

And that's all I have. Thank you.

(Applause.)

MS. GREENE: Our next speaker is Dr. Kalaitzandonakes -- mispronunciation alert.

(Laughter.)

MS. GREENE: So he's going to give us some really interesting survey research that he's done at the University of Missouri. He's been doing this research on biotech and coexistence for at least a dozen years because that's how long I've been reading his papers.

DR. KALAITZANDONAKES: Thank you.

Thank you very much, first of all, for including me in this gathering. And I certainly appreciate the opportunity.

The chairman of AC21 earlier this morning talked about lack of data and I would want to use my eight minutes to kind of give you some data points that might be useful for our discussion in this panel. I will do it very quickly, I will flash a number of tables and graphs in front of you. There is a printout, we have a lot more data that we'll show you but I hope that at least will generate some points of discussion. As Cathy said, this all has come out of our latest three surveys that have been done in the last 18 months and everything is nationally representative sample.

So very quickly, who is known GMO grower? And we have looked at the number of demographic factors and farm characteristics to kind of understand if there are significant differences. I will show you only a couple of tables but the bottom line result is that really there are no significant demographic or farm characteristic differences between known GMO farmers, other IP farmers and IP -- I mean, identity preserved specialty crop and commodity farmers. They are not larger or smaller, they are not younger or older, they are not more leveraged or less leveraged. They are not more educated or less education than commodity growers. As a matter of fact, one of the most interesting aspects is that most of them, most of the known GMO growers are commodity growers in that they have some of their acres into known GMO production. They also have in some cases some of their acres in other specialty crops, but they also produce commodity crops themselves. And so the key takeaway out of all of this is that known GMO growers actually manage to coexist first and foremost within their own farms.

This table is a little busy and we have lots of information about what defines a farm to be well suited for known GMO and IP production. But the bottom line is you wouldn't be surprised that known GMO self-select themselves to be such because they feel that their farms are well suited. What is more surprising, however, in this table is that many commodity growers also think that their farms are well suited for production. And I'm using this to drive the point that there is actually a lot of latent supply in as long as premiums are high enough. And that's why I posed the question before to Lynn to some of these numbers. In other words, how much flexibility is there in the system if we want to bring additional acreage in production as market demand picks up.

Okay. Now let's move to an issue about perceived constraints on growth. So the questions that we have asked relate to if you're already a known GMO grower and we want you to increase your acreage, your known GMO acreage a lot to a very large number, how many constraints, what kind of constraints do you face? If you are a commodity grower what type of constraints do you face?

And again, a busy table, but what I want to point out out of this table is that there is not a single factor that jumps out on you that says this is the factor to, in essence, remedy. And this has important implications both for market initiatives but also policy. In other words, if you are going to target something what it is that you're going to target and what kind of efficiency you're going to have in terms of the outcome. Because there are a lot of different factors that influence a lot of different farmers very differently. And that's important to remember.

Okay. We talked a lot about coordination and communication over the fence and we asked both IP growers and known GMO growers how much they talk to their neighbors, in what ways they talk to their neighbors, what kind of information they exchange. As you can see there is a lot of that kind of coordination that does take place and many of the factors relate, of course, to what is being planted, when it's being planted and so on. And so there is quite a bit of that happening. If you look at the difference between known GMO growers and other IP growers you can see that very little is different except in the case of when the neighbor plants, which speaks to the issue of temporal isolation as a coexistence strategy.

Now the next issue I want to touch is a bit on the cost of known GMO programs. And as Cathy said, we have gone around this issue for a number of years and we have gone around this issue with a number of different methodologies.

We've done simulations, we've used market evidence, we have done budgeting approaches. What this approach does is basically, there's a little bit of what you just heard from the two growers that spoke ahead of me. We use in essence a methodology called choice experiments to ask, in essence to find out what it is that you need to pay growers for what kind of activities in order to participate and therefore get a sense of what goes into the cost of known GMO programs.

And what I want to point out is that such things as delivery and storage, distance to the delivery point and tolerance levels alone, those factors account for about 70 percent of the premiums that are being paid. And so back to the issue that the growers brought up, these are pure costs, they have to do with the cost of doing business and it's very difficult to work irrespective of what kind of coexistence policy you have because this has just purely to do with how you do business in this particular market.

Now there is a lot of discussion about how often do we have product failures? How often do we have rejections? And there has been very little or no existing evidence on this. We have asked some, in our surveys some questions around this. We also have done some work with known GMO programs around the country using their testing programs to kind of buck up some of the numbers that I will show you. But in the surveys we asked known GMO growers and other IP growers how often have you delivered something and it has been rejected by your buyers over the last five years? And the numbers that you see there is what they declared.

Then we asked them why were you rejected? And so there are a number of factors that might go in, quality, you know, whatever other factors except non-GMO. Non-GMO accounted for about 25 percent of the cases. And the producers had the opportunity to put in whatever those factors were. So when you actually look at the numbers, what that basically says is about ten percent of all the growers over a five-year period had at last once been rejected by a supplier. So if you take that and you average, per year is about two percent. So two percent incidence is what we think is this survey said.

This is actually fairly consistent with the type of numbers we have received from known GMO programs around the country which vary between one and three percent. But Lynn runs a very successful one and so, you know, we hope that you can provide some additional information on this. So that's with respect to incidence of rejection.

Now let me show you my last slide. And we use a number of sophisticated statistical methods that go into the estimation of a supply function like this. Basically you can look at this as just a -- how much flexibility there is into the market in terms of increasing acreage, known GMO acreage if you increase or decrease that premium that you pay. And so you can see the premium that farmers receive and you can see the number of acres or share of acres, how that values. And what I want to point out is that, from an economist's perspective this is a very elastic market. That means it responds pretty quickly to increases in premiums. As a matter of fact, what you see is with 50 percent increase on the premium I get double the acres. So from my perspective this kind of market isn't indicative of a particularly restricted market. The -- I would say the opposite.

So let me leave you with these thoughts. I hope I didn't go over my eight minutes. I want to acknowledge the funding, the United Soybean Board and U.S. Soybean Farmers funded these studies and so I want to appreciate that.

Thank you.

(Applause.)

MS. GREENE: Thank you.

Our next speaker is going to be Laura Batcha and she's been at the helm of the Organic Trade Association for a number of years now. OTA has also done some really good work on the coexistence issue.

MS. BATCHA: Thanks, Cathy. And I'm going to try this from here. I think if I reach over I can see where I am on my slides and we'll give this a try.

I'm Laura Batcha with the Organic Trade Association and we represent about 7000 certified organic operators across the entire supply chain, everything from single owner-operator growers to distributors and retailers and publicly traded companies. So the whole gamut in the organic space. So while I would try to address some questions around the economic impacts of coexistence at large, my area of focus and expertise is specifically on the organic sector.

So I think I just want to ground in sort of the definition of coexistence from the Department of Agriculture that brought us here. And again, it's about market preferences and farmer choices and I'm going to try to address this topic from that perspective. I do want to sort of just make a clarifying point about the elasticity in the market, additional constraints for organic with three-year transition. We're in a marketplace that doesn't respond that quickly because we have unique regulatory requirements. So just sort of keep that in mind in terms of attributing data around identity-preserved non-GMO crops to the organic space.

So what I've done here is tried to identify some of the zones of conflict and some of this is a redo from all those discussions we had at the AC21. And Russell, our chair, did a great job recapping those discussions. But really one of the things that I think we came to as a committee in our discussions is, it's not just about organic and identity preserved crops coexisting with biotech crops, it's also biotech crops coexisting with biotech crops. And then the dynamic between domestic and international markets.

So as it relates to organic and

identity preserved crops and their coexistence with biotechnology, oftentimes we see particularly in the documentation on commercialization of new GE traits or in this debate itself, the recognition that the organic standards are process space standard without a threshold. So adventitious presence of genetic material in and of itself doesn't disqualify you from certification for the crop. But the reality is what we're talking about in coexistence is market preference and there is a default threshold in the marketplace regardless of how any of us feel about that. I think Lynn articulated it, if you have to pick a number it's .9 percent. And so that's a function of international requirements, private standards in the United States, and it has become the point at which people trade, quite frankly, and it's there. And that applies to organic in the supply chain in most cases.

In terms of the discussions on the conflicts between biotech and biotech, a number of folks have discussed that a little bit. But I think in our early conversations at AC21 we started to get at this discussion and I think Lynn Clarkson was sort of one of the foreshadowers of what will happen in regards to functional trades and asynchronous approvals and acceptance in foreign markets. And I think we're seeing through the courts and class action suits that that's a real zone of conflict. How that resolves itself, that's not my area of expertise or particular concern from my stakeholder perspective. But it is, I think, not to be disregarded in this conversation in terms of economic implications and how we manage concurrent cultivation for preferences.

And on the domestic and international, outside of the approvals and a lot of the work going on there, I just want to say that as far as it relates to the organic market we have just begun to track the flow of goods in and out of the country through a limited set of harmonized system trade codes that have been established.

And one of the things that we're finding year over year right now is these pressures of coexistence continue to exist in the marketplace without real movement towards solutions, are that we're seeing increasing imports for organic soybeans and corn coming into this country. We're in supply shortages here, I think Errol from Whole Foods spoke about that. But this year alone we're seeing a 60 percent increase in organic soybeans coming into this country. Soi when you talk about that price differential at $30.00-plus a bushel for food grade soy, what's the non-organic price, Lynn? Twelve?

(Off-mic response by Mr. Clarkson.)

MS. BATCHA: Nine-fifty. Okay, thanks.

So that's a differential premium that is becoming really outsourced at this point in organic production. And you know, we'd like to see U.S. farmers take advantage of that value-add here and find a way, while this discussion we're having right now is not the only factor, I think we know that for sure, it's definitely a co-factor in a host of policy issues and production issues related to it. So it's a zone of conflict, at least from where my stakeholders sit.

I'm going to talk about some of the types of economic implications in the current system and that's the title for our panel so I'm going to try to stick to that a little bit. We went around this at AC21. I think there's good aggregated data out there that Cathy referred to that the Trade Association brought forward a number of years ago that's really about the presence of GE traits in organic and IP crops and the percent of times at which that exceeds this .9 percent threshold and how that falls out. In our AC21 discussions it kind of broke down, okay, well it's there, but how do we know that there's a consequence to the presence in the marketplace?

So I'm trying to walk us through sort of the continuum of cost that might, you know, accumulate through the production system related to coexistence. One of them is production and segregation costs. And we've talked about buffers and delayed plantings and the costs associated with that. And at least for organic producers, the standards have requirements there. And to date, the mandatory requirement for absorbing those costs has been on the organic producers in terms of their establishment of buffers and maintaining the segregation through the supply chain so that there's not comingling.

I'm going to refer to some data that was compiled in a survey with some good work from the Organic Farmers Agency for Relationship Marketing, and John Bobbe's here with us in the audience. If you have specific questions around the survey itself I think we can do some follow-up there, done in conjunction with Food and Water Watch. But it was a survey of farmers done across 17 states with 1500 farmers surveyed and a 19 percent response rate. And the farmers and their surveyor identified the average cost of those buffer strips to be about $2500 in terms of production value per year and delayed planting, in terms of loss of yield, between $3000 and $5300 per farm responding.

The next area is testing. And again, Lynn talked a lot about this but again that requirement about .9 percent in marketplace, if you're just relying on the regulatory requirement organic you run the risk of not having visibility about whether or not your product's going to be accepted when it gets to the elevator or to the foreign port or wherever it's going, or to the buyer and food maker. So there's testing going on in the system and those tests can run the gamut, Lynn identified that from the ELISA strip tests which are much more affordable to the PCR tests that get more expensive. In the O farm survey the growers themselves identified about $200 on average in terms of tests.

And I'll just point out that, at least for organic, because we're a full-value chain process-based certification system, a finished food product can have five, six, ten, twelve testing points by the time that product gets brought to market because there's multiple ingredients coming from multiple sources continuing to test down the line. And that's a lot of requirement, a lot of verification going on along the way.

In terms of price loss, I think this is the area that some of the most important discussion has happened. And there are absolutely recorded incidences of these rejections. And if you calculate out the size of a truckload or the half size shipping container that you fill with organic corn and soy and you talk about the price differential between organic corn in the marketplace and conventional corn in the marketplace, one load rejected can, for corn, cost a farmer between $3000 and $5000 and that number is much higher for soybeans when you look at those differentials. You're talking over $9000 in lost value in the rejection of one shipment, in one load. That's one truckload or one 20-foot container of soybeans. So those are real costs.

And I appreciate that there's a value out in the marketplace but I think it's important to understand that one of the major reasons why there's a value-add is because this is a hard way of farming, to produce corn and soybeans without herbicides. I think people shouldn't underestimate actually how hard that is to do.

A couple more areas just quickly, brand equity cost. This is where you become associated with a zone that's hot, for example, a geographic region where a lot of loads are coming in over the shipment, and what does that do to your business as a farmer, and your choices as a farmer, as well as your reputation. And then again, this is not my area but the economic implications of what happens when trade starts happening and approvals haven't cleared in other countries.

So how do we prevent economic loss? Because that's what I think we're here to discuss. There's a lot of discussions going on and USDA has put efforts behind this idea that it happens farmer to farmer over the fencerow. And I'll share my perspective on this, certainly not to be disrespectful of these conversations that do happen across the country but in many ways it's an outdated concept. Number one, we have very complex land ownership agreements and lease agreements with multiple partners and it's not always meeting at the coffee shop in town that these issues can be resolved.

I think second, there are things that farmers to farmers can't resolve if they don't have transparency in the marketplace. How do two farmers negotiate their delayed planting when the root cause may be the level of seed purity that any one of them is working off of to begin with? You may not stand a chance, it may not have to do with your delayed Planting, it may not have to do with your buffer zones. It may have to do with the quality of your seed that you're planting and that may not be visible to the farmer and it may not be something you can resolve with your neighbors. So I want to sort of underscore the limitations of that as an approach.

It looks like I've lost -- is that me that's done that? I can carry on while they try to figure that out.

The other area is voluntary versus mandatory requirements. And I have a quote here from USDA's ARS Stephanie Greene's work that she did, and this is from a piece that was put out in 2011. "Since the first deregulation of GE alfalfa, industry has been testing to conventional seed lots for adventitious presence of GE traits and has been detecting low level AP. Levels as high as two percent have been reported. This suggests that early proposed best management practices may be insufficient to support coexistence. Across the board the industry has emphasized the need for further research and refining strategies."

So this is an ongoing challenge we have and we have to understand what's actually happening in terms of gene flow. We have to get to a point where we can put some parameters on this because otherwise people are going to find out when they have a problem later, we're losing markets, we're losing zones, we're losing reputation and incurring costs along the way. So I think understanding the science of what's happening is so critically important but we really believe we can't get there unless we get to a place where there are some mandatory constraints. And that goes to my last area which is the rewrite of Part 340.

And from our perspective as a trade association we really think this is an underpinning of all of this. Unless we can get to a place where can apply good science to what those stewardship practices need to be and the Department of Agriculture uses its fullest authority to condition approvals on those stewardship practices, we're going to continue going around and around on this. And we need to get to a place -- I'll quote Lynn again -- where, you know, let's strive for 50/50 on responsibility on this. And I think looking at Part 340 and the way that that can be used to encourage and require non-GMO refuges, buffers, isolation zones, protection of seed purity, address some herbicide tolerance issues.

I know that's probably not a great well-received in this room entirely but we really think it's critical that there has to be authority. There's so many times when we see the commercialization of crops come out that says we understand a lot about this science and we understand how the genes are going to flow but our hands are tied because we can only address this from the perspective of plant pest.

So let me see if I can get there. Sort of to wrap it up, what's changed since we had our AC21 conversation? And I'm going to talk about the non-browning apple, not from a health perspective or anything like that but I want to quote from the environmental assessment that was released on that.

"Requiring isolation distances would be inconsistent with the statutory authority under the Plant Pest provisions of the PPA and regulations of 7 CFR Part 340." So this is the limitation of the presumed authority by the Department of Agriculture. It goes on to say that "individuals might choose on their own to geographically isolate their non-GE apple production systems or to use isolation distances and management practices."

So just to see this in writing, the idea that you might move your organic orchard someplace because somebody else made a production choice next to you is almost unfathomable, right? And then it goes on to say that "organic growers who wish to reduce the likelihood of pollination from GD743 of GS784 may need to discuss their needs with their neighboring orchards, incorporate pollination control strategies and the primary strategies would include sufficient isolation distance, the use of border rows and restricted use of commercial beehives." So the recommendation is actually that organic growers restrict the use of commercial beehives for pollination of the orchards. So that's kind of onerous.

So I think again, as we move beyond corn and soy and some of the crops where we have widespread adoption we're going to come into new crop types, this paradigm of fencing in and fencing out may not apply if we're talking about new cropping types. The debate around labeling might not apply. As a representative of an industry that's built on absence claims the organic program, this certain appeal to say let's go with a non-GMO label but we can't possibly mean label every market -- every apple in the marketplace in order to provide information to consumers. So some of these contexts and paradigms that we're working on start to break down as we move forward with different crop types.

So those are my ideas to share and I look forward to questions.

(Applause.)

MS. GREENE: Thank you, Laura. You brought up so many issues only one of which, but a really important one, is the issue of seed and seed purity. And Andrew LaVigne -- close -- is going to -- American Seed Trade Association is going to share some ideas with us on that.

MR. LaVIGNE: Thanks, Cathy, and I appreciate the opportunity to be here on behalf of the American Seed industry.

I will say right out of the bag it's great to be here. I congratulate the Secretary and the Department of Agriculture and Russell for having this conversation. Because I think at the end of the day, what the Secretary said this morning, is finding a resolution. If we're going to sit here and fight and say organic is better or GMO is not this or that we're not going to find a resolution.

I think what we're looking at is the evolution of agriculture and the evolution of the food system. And thank God we live in a country where we can have that conversation. And so I say that because I heard the Secretary say that last week at the Commodity Classic. That's the benefit of what we have. So let's think about it that way. And I have a whole new respect for where AC21 was trying to go when this started because, I'll tell you from our industry, we weren't real comfortable with phraseology that was coming out around AC21 when it rolled out.

And I'm really happy that we're in the spotlight. Not just these three here but the fact that either we don't have good quality seed or it's not pure or we are the solution to the future because of the evolution of breeding techniques. We're excited about that so we want to talk a little bit about where we're going.

A couple other factors that you have to remember is we're all dealing with a biological system. If you're processing food you have parts per bug that you can have in your food. All of those factors that we know are part of this. Corn is a biological system. We tried it before, you all know what the name of the product was where pollination didn't happen with corn and it was canned because the consumer didn't want it. And now we want it back. How do we get there?

So when we look at it from the seed industry we operate from a coexistence standpoint. We have long before biotech came into play. And whether it's producing vegetables or whether -- next to each other and vegetable seed next to each other, whether it's producing soybeans or different types of corn, we have systems in place that deal with a lot of these factors as things evolve. There are some challenges and we have percents acceptable, you know, in some of those and that's why we label those because they're required under federal law. Those are things obviously that we can look at but also we get into that issue of safety versus, you know, what science says versus what the market demands and how do you deal with that.

I put I my document that is in the

information for the meeting, we've got a guide to seed quality management practices and it talks about that across the board. We have members from alfalfa to zucchini and every crop in between. Anything planted for agriculture we represent; organic, conventional and biotech. And I think the Secretary was saying, it's a line I use often is, no matter who the crowd is, don't ask me to pick my favorite child. We represent all three of them the same because in our mind we produce seed for production. The grower chooses how he wants to produce, the seed company decides whether they want to put a seed treatment on it to make it biotech or make it organic. But that's what we do in the industry. We produce good sound varieties for the marketplace and we continue to. We're evolving and that's where we are in this place right now with respect to non-GE and organic, especially in feed.

Growers do the same, and you've heard this from Lynn and others, when a grower sees an opportunity to get -- produce an identity-preserved product and get a premium they're going to look to see if it fits his operation or her operation. I don't care whether it's seedless watermelons or whether it's corn or whether it's sweet corn. I have a good friend who sells sweet corn outside of Asheville. It's -- how does he label it -- "pesticide free." It's one of our large companies' biotech sweet corn. It's beautiful sweet corn. You don't have to break the end off or anything else. But it depends on the market, it depends on your farm and it depends on a lot of factors that come into play there. So identity-preserve is not a foreign concept in agriculture.

Coexistence is the same, again, across the board. We use pinning in a lot of counties and production areas for seed across the country. You go into your extension office, you put up on the wall I'm going to plant this at this time, please don't plant rhubarb or don't plant kale -- although I do like the purple kale from Whole Foods so I'll keep buying it. So there are practices in place that will continue to evolve to help deal with these situations.

We also will continue to work to educate our seed companies and grower community about seed production practices, about identity preserve because there is a demand. The market's evolving. Fifteen or twenty years ago when Whole Foods was just a small little company some of these issues didn't exist there. You know, the food market has evolved and it's continuing to evolve. So how do we move with it? The agriculture community, or at least the seed side and research is not -- we're not rapid movers because of the research requirements.

Four years ago, I believe it was, in working with the organic seed alliance in AOSCA, the Association of Official Seed Certifying Agencies -- Chet Boruff is in the room, he's their executive -- we created the organic seed finder database. It's out there. We need people to use it. We have a lot of people -- we have some of our members that aren't using it but we also know that there's a lot of organic seed companies that are not using it, either. How else do we communicate to the growers what's there and how they can get it and what's available, and what the demand is? Right now there's -- it's just listing organic varieties so if there's a variety that's produced conventionally untreated it's not going to be on that list if a grower doesn't have -- can't find the variety that they need and can use that loophole to produce conventionally. Right now there's 13 vendors, 281 ag row crop listings and 1900 fruit, vegetable, flower and herb listings.

I do what to clarify, and I guess we are probably a little sensitive in this area, that what we're talking about principally -- I'm just saying principally -- in the coexistence arena is in the feed area or -- excuse me, the row crop biotech area. We have a pretty extensive vegetable business out there and we have more and more companies producing to the organic vegetable marketplace or other areas there that fit the organic arena. So I do want to make it clear, and I've had to do this in several situations, it's not all across the board. Those big beautiful red strawberries you get out there, they're not biotech, they're conventionally bred through selection. So eat them, lots of them.

We need to continue support for the organic seed finder from seed companies and from USDA. As we work through issues with NOP I think that's a key area that we have to deal with. And also over the last three years with the Institution or reinstitution, constitution of AC21 we started a few practices or we've started a few projects and asked to look at some of the issues out there. We wanted to really define what is that concept that kept coming up, free -- excuse me, "clean seed," excuse me. How do you deal with clean seed or what is clean seed? And what we determined is it's that ability to find either non-GE or organic seed for the feed market or the process milled market, principally with corn and soybeans.

And so as we are looking at that arena we're trying to determine how many acres is it? Well, I've surveyed our guys and they estimate somewhere in the range of a million acres. And I talked to some other people and they estimated in the range of ten million acres. How do you plan as a seed producer to produce for that market? Unless the growers talking to you a year or in advance in order for you to produce that, it's tough. You have to have seed systems around you to produce it, you've got to find if it's organic or organic acres to produce it on.

If a farmer's already getting a premium to sell to Lynn why does he want to -- you know, are you going to give him that much more of a premium to produce seed that's going to take a lot more maintenance, like dealing with no use of herbicides? So there's a lot of factors that come in this. You can't just start growing organic seed tomorrow because you talked to somebody today. So those issues come into play and it would be interesting to better understand what are those acres of demand so that we could try to produce to it. We have a lot of companies that want to do that.

We started an organic seed committee, we've had a lot of participation both on the vegetable side as well as the row crop side. And a lot of that is how do we get information from NOP and others to better determine demand? We're currently trying to survey our companies that produce for the non-GE organic market to see what's out there, what's that availability. And then we're also looking at developing a process where seed companies that do have elite lines can make a deposit into a foundation seed company or seed association in the state and those varieties can be user for multiplication or further breeding.

There would be licensing, it's not free, a lot of money went into developing those varieties. It would also be -- you know, we're talking about deposited with X -- you know, no detect and X amount but then, you know, the next person has to take the liability from there and the next person has to take the liability from there. So there's some things that we can do there and there's some of that going on now, we just weren't talking about because to some extent we didn't know about it.

So I go back to, it is imperative that the growers talk to each other. Whether you mandate it, I don't know how you'd do that. It's got to be over the fence, it's got to be more open, there's got to be an encouragement of it. Seed companies will produce for the non-GE and the organic market. We have the opportunity out there. But I will tell you, as was also mentioned earlier, it is a challenge. It's a biological system, we have no control of Mother Nature. This year was a longer pollinating window. What does that mean, if you offset those kind of things? Two years ago it was a drought.

And if you weren't counter-seasonally producing in Chile you probably didn't have enough conventional organic on you because it was -- you weren't producing down there and our guys got hit really bad. So there's a lot of factors that come into it. We can't just say you come in to see me in March, I want to plant next month, and expect for us to have 500 acres of organic corn seed. It doesn't work that way. Growers have to talk to the seed companies. In our organic situations I'd say it's two years in advance.

There are some companies out there that are doing this. If you go online and look at Blue River Hybrids they're producing a PuraMaize variety. PuraMaize is somewhat like Terminator, naturally -- conventionally bred but it doesn't allow acceptance of pollen from other varieties. Try it, it's out there.

And then I would just say the education channels at the state and local level have to continue to provide that tailored opportunity. If it's one million acres or it's ten million acres, seed companies are only going to produce to what the growers in the area want. And if 95 percent of them want biotech corn then they're going to produce to that. How do you get to that other five percent? You've got to have a relationship with that seed company or go a little further out to get that. What that expectation is, whether it comes from USDA, we would have a little bit of a challenge out there because I think the seed industry is creative and we're looking at ways to deal with those.

Lastly, it's the politics of agriculture and I encourage and would reiterate the Secretary's words this morning, is we can find a solution to this because America's farmers find solutions to their production challenges daily. So I hope that we can continue to push this forward and I look forward to any questions.

(Applause.)

MS. GREENE: Thanks, Andrew.

Our final speaker in our short amount of time left is Logan Peterman, he's with Organic Valley, it's a marketing cooperative. Probably most of you here have had Organic Valley milk. I'm going to let him give you his ideas.

MR. PETERMAN: Thanks, Catherine.

Thank you everybody.

Good afternoon. I'm the last word, I feel pretty fortunate here.

For anyone that's not familiar, Organic Valley is a marketing cooperative based out of southwest Wisconsin and at this point represents over 1800 farmers across the country, all certified organic operations and the cooperative market's a broad range of food products, again all certified organic, predominantly dairy.

My role within the cooperative and in my interaction with this space has, because of that dairy focus, generally been all about feed. And before I get into the details of that aspect I want to frame a little bit of the why of the cooperative being very involved with seed issues and with organic integrity. At the co-op, about 50 percent of our gross annual sales are branded products. We've got a pretty broad portfolio of different offerings, some of them bulk, some of them ingredient sales. But that branded offering, the Organic Valley brand is very much the bulk of the business. And protecting that brand as a result is a huge, huge focus for staff and farmers alike.

We know our customers very well. We're very fortunate because they tend to be very proactive and they tend to communicate with us very openly. And as a result we've gotten to understand where -- what niche we occupy in their lives. And to explain exactly how that looks I just want to invoke a little mental image for you. About ten years ago I worked and lived in the back country of northwest Montana. And in the lower United States had the highest per-square mile population of Grizzly Bears anywhere, so you learn very quickly how to interact with these bears. And you hear all kinds of advice on what to do and what not to do.

And you know, as with most things,

people disagree a great deal, there's a lot of interpretation. But there was one rule, there was one thing that you never, ever, ever did, and that was to get in between a mother Grizzly and her cub. And it occurred to me when I was thinking about this and I was thinking about the economic implications and I was thinking about our interaction with the market that that is the niche that we occupy. We sit in between the mom and her child, our predominant market by far are young mothers, they're feeding our products to their children. It's our milk, it's our cheese, it's our eggs, it's everything sitting on the breakfast table. And that has some distinct advantages because if she trusts your brand and if she feels you're credible she can be an extraordinarily strong ally, she can be evangelical about your methods, she can be your best marketing force.

But much like the Grizzly Bear, if you lose that trust she's probably going to rip your face off. So as a framing for the why, this is why we spend so much time working on these issues that may seem like fringe ideas, they may be emerging in the market. We will fix on them, we will find out where the grain of truth is there and we will pursue it. And then we will do our absolute best to communicate that to our customers. Because that is our only shot at credibility. In an age where information is as ubiquitous, video is everywhere, our only hope is to be completely open with our consumers about what we're doing, where we're coming from.

So to step back to the knowns and unknowns of the economics in this discussion, with regard to feed, with regard to feed purity, there are a lot of unknowns in the supply chain and that makes it very difficult for an organization like ours where we're interacting with farmers from the point of purchase seed all the way through to end of the line consumers buying our milk. They've got a lot of questions and frankly we've had a lot of questions. So I think one of the most interesting known economic drains, I would say, in regard to this issue is the testing load.

Now I can only speak for the cooperative but my role at the cooperative has been to oversee testing of corn, soybeans and in some limited cases alfalfa in our supply chain simply because the executive management was extremely and acutely interested to understand what was actually there, right? Enough of the speculation, enough of the vagary, let's see what's actually there, because they are being questioned very, very acutely in public circumstance.

Now I can't tell you any of what is there. I can tell you we've been somewhat discouraged but this is one of the really interesting things about the landscape right now. There are many companies, there are many organizations out there that have tested throughout the supply chain. And as I think you all know, the agricultural supply chain for many products, livestock included, is complex. It's long, there's a lot of different entities, there's a lot of different ins and outs in terms of these inputs. But the difficulty is whether you're talking about Andy and the seeds men, whether you're talking about the farmers growing the crops, whether you're talking about a cooperative like ours, we cannot dependably release information in the organic sphere without fearing that we will lose that brand equity.

And I think that that speaks to a role for some sort of governmental intervention in terms of quelling the speculation and to some degree quelling the hysteria by actually measuring in an anonymous fashion that won't differentially damage any of the particular players in saying this is what's here, this is what we have. Is it still a problem? Because I think that's one of the great unknowns with our consumer base as well. We recognize, as Errol has mentioned, that they are buying on the basis of non-GMO labeling, that this is changing people's decisions.

But one of the questions is how extreme is that belief structure? Is it the EU standard that they will only accept? Is it .9? Is it 1.25? Is it 2? Is it .1? We don't know. But on an agronomic scale it has massive implications. So we have this strange kind of imbalance right now, in between the agronomic realities for organic producers and organic see companies, and juxtaposed with it we have very little information about the actual detail of consumer choice.

Another unknown that I wanted to mention, and this comes out of a lot of conversation that I've had with our primarily corn seed providers, and that is to say these folks market seed to our members, the co-op itself does not purchase corn seed. But in working with these companies to understand how adventitious presence in organic and conventional untreated lines of corn can be managed and ultimately tracked or reduced, if need be, we've found that there is some level of impediment to the development of lines among these organic seed companies because of their internal standards, because of market pressures that they feel are being exerted on them. And I think that the amount of impediment to this burgeoning organic seed market is a real question mark at this point, and probably very difficult again to quantify because we're in this sort of "don't ask, don't tell" landscape.

Now whether or not the government has a place to step in and mediate that conversation, try to quantify some of those difficulties I'm not yet certain. But in these conversations it does continually come up, that there may be substantial loss to these producers, especially in the case that they provide only organic product. If a seed company has the opportunity to sell both conventional and organic they can obviously mitigate some of their loss in the case that a field has an event, has higher adventitious presence for some reason, they can channel that into one of their other outlets.

But for those companies that are only organic, I've recognized that there is a real liability there.

The testing program that I mentioned earlier, and the burden of that testing program is one that I can speak to in terms of the co-op, number somewhere in the range of $50,000 a year. Now how that circulates out over the entire industry is another question. How many other companies are investing that kind of money on an annual basis to test their supply chains because of that speculation would be another open economic question.

Cathy's giving me time. Thank you very much.

(Applause.)

MS. GREENE: I think that we did get started a little late on this session so I'm not sure exactly how many minutes we're going to have for questions. But likely there are some questions so let's go for a while.

MR. KEMPER: Thank you, I appreciate

all your comments and particularly Laura on coexistence and such. But Logan, I think it is, I would like to ask you, do have now in your co-ops -- and I really appreciate the co-op aspect. Do you have any forums or any discussion on coexistence with any of your members or the dairy producers or ag producers, or do you see that in the future? I mean, is there a dialog going on? Thank you.

MR. PETERMAN: Certainly. Yeah, it's a good question. And to answer directly, yes, we do. We spend most of our time actually transitioning farmers to organic so there is a very, very deep culture in the co-op of working with the whole farming community and doing our absolute best not to draw distinctions with us and them. Because there's this deep understanding that, you know, the conventional farmer of today may be our hot prospect the next day. So we do spend a lot of time looking at buffers, looking at different ways to manage between farms in a real and neighborly fashion.

MS. GREENE: Let's go back and forth. So let's take one from over here.

DR. ZILBERMAN: Two quick questions. The first question is sometimes seeing that they look terrible, in the past they may not look that bad, what do you see in the concept of something like the Terminator gene only with a different name, because that name was terrible, some sort of thing using a system that will reduce the likelihood of spinoff by controlling it.

But secondly, the .9 percent is a nice number, it's not scientific, it was designed by -- did anyone in the USDA study what would be the cost if you moved to Dukustan, or five percent? When I do a test, a statistical analysis I use five percent significant. Is any scientific base to the .9 percent? It's not given by Moses in the Ten Commandments. So that's something we have to study.

MS. BATCHA: I can try, and I'd love to hear from my colleagues.

You know, I would agree with you that

the .9 percent is the .9 percent, so -- but I think you also have to sort of not, in a sense, fight against gravity because it may not have sort of a scientific underpinning but it is what it is and it's what people trade on, so we can't ignore that at the same time. So I'm not sure that a government action or any action can say we're going to snap our fingers and we're going to make that number something else because there is all types of actors on either side of the buying and selling relationship that have to go along with that.

So and I think, you know, Logan's talking about the co-op, you know, asking those questions about where's the -- you know, where's the true inelasticity and the consumer expectation there? But we all live in a world where people buy and sell things and that's predominantly what they're buying and selling them on.

On your question about seed developments that block gene flow, I think -- you know, I caution against any belief that there's a silver bullet for all of this. You know, there's going to be a whole host of strategies that might get us there.

DR. KALAITZANDONAKES: I have no comment for obviously the Terminator issue but I do have on the thresholds. And my comments are two-fold. One that today's market actually trades more than .9 percent. There are active known GMO programs that sell to 3 percent thresholds, they sell to 2 percent thresholds, they sell to .9 percent thresholds, they also sell to .1 percent thresholds, depending on the buyer. So the market is more than segmented than what we are trying to make it sound sometimes.

In addition to that the issue of thresholds from an economic perspective, in my mind, is probably the most important discussion that we should have because the economics are very strongly affected. In the sense that based on the research that we have done, both from a simulation perspective, from a survey market analysis perspective, we find the same result over and over again, which is that the cost associated with thresholds are nonlinear. That means that, as you push lower and lower those thresholds the cost increase exponentially. And so the choice of number is not immaterial. And so it is really important that lots of consideration goes into it.

But today's market actually does trade thresholds at differential costs and the premiums do reflect the kinds of markets that are being targeted. And I'm sure Lynn might have more thoughts on this because I'm sure some of that he does already.

MS. GREENE: Thank you.

MR. BOBBE: We had an organic producer yesterday, to bring a little reality to this whole thing, that shipped four loads of food grade corn yesterday, every one of them got rejected. That producer lost $5000 yesterday alone. This is a farm I've been on, complies with all of the organic regulations and so on.

And to finish the story from this morning about the bull getting over the fence and doing the damage and putting the bull back, in the old days the owner of the bull paid for the damages.

Now what is the incentive for that producer to continue to produce organic when everybody's saying there's a need for it yet taking a $5000 hit in one day? And if it had been the price differential that had been more between where that grain went, ended up going and not, it could have been $10,000.

MS. GREENE: I'm not sure there's a question there but it's certainly important information.

DR. SANCHEZ: I'm new to these debates and my background is more scientific. But it seems to me that the main problem that you're all hovering around is this business of the GMO content of an organic product. How about if you separate that? Go back to the original and say, don't worry about GMOs and all that, organic is organic. Maybe it will make life a lot simpler to a lot of people. It's just a naïve idea but I thought I would throw it out.

MS. GREENE: Again, that's more commentary but --

MR. PETERMAN: I would respond by saying that, to a degree we don't have a choice in the matter. You know, as I was trying to describe in terms of our customers and the influence that our customers have on us, they are coming to us asking what the level is in the food. Is it -- and the first question that was brought up earlier, and I think it may have been Lynn that brought it up and I very much appreciate it, the first question always is, "is it zero?" And you kind of close your eyes and shake your head. And then you have to start the educational process from there.

So I think that, at this point, my commentary would be that we effectively don't have a choice. That genie is out of the bottle.

MS. BATCHA: And I think that somebody in the room can help verify or fact correct me but on the original proposed rule on organic that Secretary Glickman referred to that received 300,000 comments, that was before the Federal Register was online. So that was like mailed-in comments. So I think there's a public element of that that's not to be understated.

MS. GREENE: Thank you for both responses.

MS. KUSTIN: Hi, Mary-Ellen Kustin, EWG.

I really appreciate Andy's example of the Blue River Hybrid and thinking that, you know, it doesn't accept pollen from other varietals. And I'm wondering if you could speak to, or anyone could speak to the need, the perceived need, the overabundance perhaps, of research and science and dollars associated with those for non-GE seeds and production?

MR. LaVIGNE: Well, I think this is probably where there's some disagreement in the room as well. But there is more, I would say more production of non-GE organic of regional or small seed companies today than there has been in many years. They -- a lot of people have, I would say, left companies as they've merged and consolidated and started their own operation. There's a couple people here in the room that can speak to that. You know, there's challenges to that, obviously, but they also can make a good living in doing that locally.

We have currently Illinois Foundation Seed licenses a lot of seed to seed companies and it's organic seed, no detect in 3000. So there are markets out there, it's getting the message out. And I think it's having the conversation because oftentimes I don't think the conventional seed company or industry, which I would say is all of us, was not talking to the organic community. And that demand was limited, I think a lot of people probably even through the '90s as they were feeding to livestock, they were feeding on farm.

They were getting seed either from, you know, local seed producer, conventional untreated, or they were, you know, saving their seed. They were doing something to deal with that process and it's changed dramatically, obviously, with GMO, with the additional invention or passage of the organic law and having labels. And so that's evolved over that time, too. It just wasn't flipped overnight.

So we have a lot of seed companies, I did say in my presentation, that produce seed and they've got it on the shelf. The challenge is they also have customers that they know are buying conventional untreated instead of organic or vice versa. And so how do we deal with that communication? Part of it is communication, that's why we work with the Organic Seed Alliance and AOSCA to help the organic seed finder, use this as a database. We've got to do some more work there but I think that there is a lot of money and a lot of research going into developing varieties and looking at seed varieties across the board, not just in the grains space.

MS. GREENE: Okay. One more response.

DR. KALAITZANDONAKES: I just have a short comment which is, it's important for the demand for organic seed to really strengthen and the supply of it to be there -- I'm sorry, let me rephrase.

For the supply to be there and strengthen, the demand also has to be there. And I'm saying this because in the early 2000 we had, especially in Europe, a very negative experience in the seeding industry where a lot of organic seed was being produced that was not being purchased. And so the demand was very weak exactly for what Andy was discussing, that organic growers would basically choose to buy conventional seed because it was much cheaper. So the supply for organic seed in Europe actually started to decline mostly because it was not being bought. And so it's both sides of the market that has to move together for this to happen effectively.

MS. GREENE: I believe we're over on this side.

MR. BUSHUE: I appreciate USDA putting this together and I do appreciate the discussion about GMO and the various seed types. But I want to expand the paradigm just a little bit if I can. I raise about 150 different cultivars, varieties of about 25 different crops. We sell all of them directly off the farm to people that come out. We are not GE, we are not organic, so I guess our farm is not the gold standard but our 2500 customers seem to enjoy us.

My question really goes beyond the whole concept of coexistence with just seed. On our farm we've had issues with downy mildew, glassy-winged sharpshooters, Drosophila suzukii, sudden oak death syndrome, weed infestations from neighbors who refuse to control their weed population. All of those things are an example of coexistence. They're all things. And if we continue to talk here about mandates and government intervening with the things that I do on my farm and the relationships I have with my neighbors, where does that end? So I guess I'm asking, do we just stop at seed then? Do we start -- you know, when you're a farmer, as somebody said earlier, it's a biological system. That's exactly what it is. There is risk, there is loss, there is damage. You make a business assessment.

I want to know how you're going to address some of those business assessments and some of those losses. Are we going to have the government or somebody responsible pay for every single one of our economic losses? I don't think so.

MS. GREENE: All right. So I think -- I've been given the word that we are out of time. I don't know if there is a burning response here, that seemed largely more commentary. If there's not a burning response I'm going to just have to cut it off right now. And --

MR. DILLON: I have a question for Jim, just super quick. Super easy question to Jim. I promise. Super easy.

MS. GREENE: We're out of time. We

will have -- I'm sure these people will be here for quite a while.

(Applause.)

MS. GREENE: Please, thank you to everyone.

MS. DILLEY: Thanks. It's always hard to cut off a good discussion but that's what -- I think the point that was just raised is what the whole workshop is trying to wrestle with. Where is it appropriate for government to have a role and where not? So we'll continue that discussion.

What we want to do is make a slight modification to the schedule given that we're running a little bit overtime. And we're going to take the next panel, Jill Schroeder of USDA ARS and Jack Housenger from U.S. EPA pesticide programs to talk about some of the government actions to address herbicide resistance and weeds and then we're going to take a short break. We're going to truncate that a little bit to ten minutes, and then come back and finish out the panel presentations before you get to the poster session.

And a lot of this is to set up some of the background context of -- yeah, come on up, Jill and Jack -- is to provide some context to then, at the -- almost the conclusion of the day Dr. Woteki will come up and talk about what USDA, what actions are underway based on the USDA AC21 recommendations. And then there's a poster session to look at other complimentary activities related to supporting coexistence. So we'll set up for that and talk a little bit about what we want you to think about as you take a break for the evening and go to the poster session and prepare for tomorrow.

So with that I'm going turn it over to Jill Schroeder of USDA.

SESSION 2: COEXISTENCE - THE CHALLENGES AND KNOWLEDGE GAPS WE FACE AND USDA'S RESPONSES TO THE AC21 RECOMMENDATIONS

MS. SCHROEDER: Hopefully I can work this.

Good afternoon. I really appreciate the opportunity to be here and I've been very impressed with what I've heard about weed science and weed resistance to this point in the workshop. And what I'd like to do first of all is to put the issue of herbicide resistance into a little bit broader context of weed management. To do that my topics today are going to be brief but I'm going to talk a little bit about weed persistence, selection pressures that affect weed populations, evolution for herbicide resistance, the concern about herbicide resistance in genetically modified crops and then, finally, the USDA activities in this area.

So to begin with, I just want to emphasize that weeds are a problem that farmers have had to address since they've been cultivating crops. Weeds compete with the desirable vegetation for resources including water and nutrients. When we don't control them they negatively impact yield and quality of the crops. And once weeds have invaded and established in a field, regardless of what your management practices are, your production practices, the species can persist. And the reason they can do that is because they've got very high reproductive potential, excellent dispersal capabilities and to the fact that the seeds in the crop yields can -- do not all germinate at the same time. So once they're in a field a good portion of those seeds can persist for many years and continue to dominate that field so this ensures their long-term survival of that species at that location.

So to then move on a little bit, many weed species of concern are highly genetically variable and very adaptive to many diverse environments. So what you're looking at here is indication of some -- how some of these plants can be successful. They're going to survive and reproduce if they're successful and it's going to increase their populations in that environment. So when managers impose weed control tactics in a field they're going to select for those plants or species that can survive that treatment, whether that treatment's mechanical, whether it's biological, whether it's cultural or whether it's chemical. So weeds are highly adaptive, they're part of a biological system and selection of that best adapted species is -- or populations are going to affect both organic and conventional systems.

So what this slide is doing is it's illustrating a few examples of how weeds have adapted over time to individual production practices. On the top left is a dandelion, our old friend in lawns and landscapes. They've evolved over time to have a shortened scape and so more prostrate growth habit so they survive repeated mowing. And if that's the only production practice you use the dandelions are going to become dominant in that field.

On the bottom left is barnyard grass. Barnyard grass has evolved over the centuries to be very, very successful in rice production systems and there is a particular ecotype of barnyard grass that's actually evolved characteristics, it looks almost exactly like rice does. And so if you go through the field and hand weed you're going to miss many of these plants and they're going to survive and populate that field.

In the center is an example of rush skeletonweed which is a major weed problem in rangeland and pastures. Many years ago USDA developed a bio control agent that was very, very successful in controlling rush skeletonweed except for there were a few ecotypes of that skeletonweed that were resistant to that biological control agent, they survived and became the dominant species in that population.

And then finally on the right is an example of Palmer amaranth, our friend that has evolved resistance to repeated herbicide use in many of our corn and soybean production systems. Over the last ten years we've talked and heard a great deal about weeds like Palmer amaranth that have evolved resistance to herbicides and unfortunately this problem of weeds evolving resistance to selection pressure posed by herbicide use is not a new problem. On the X axis of this graph it shows the number of resistant species -- or it shows years on the X axis and on the Y axis it shows the number of species that are resistant to a particular herbicide group.

As a reference, please note that crops that have been genetically modified to tolerate the herbicide glyphosate were introduced in 1996 and what you see, the top -- the blue line on this graph, it shows the number of weeds that are resistant to herbicides that inhibit photosynthesis in plants, in sensitive plants. We began seeing an increase in resistance to these herbicide families in the mid-1970s.

There was another group of herbicides that inhibit the synthesis of essential amino acids in sensitive plants and they were introduced in the early 1980s. We very quickly selected for plants that could resist these particular herbicides and they became very dominant in the population very, very quickly and that's shown with the red line on the graph.

The total number of species that have evolved resistance to these herbicides is far greater than the number of species that are resistant to the herbicide glyphosate which is the light blue line on this graph. As a matter of fact, the introduction of the glyphosate resistant crops and the increased use of glyphosate was -- very much helped us resolve some of the problems of herbicide resistance that we were seeing in the '80s and the early '90s.

So as you can see the problems continue to increase. Any time we use a single management strategy we wind up with a problem like this. And so what it indicates that we need different tactics in order to address the problem of resistance.

Another concern that we've debated a great deal is whether or not the occurrence of resistant weed populations is due to the introduction of crops that have been genetically modified to allow the use of glyphosate for weed control. And what this graph shows you is the number of herbicide resistant species that have been documented in different crops. On the Y axis you see the crop or the cropping situation and on the X axis is the number of herbicide resistant weed species that have been documented in that crop. And as you can see the top five crops on that graph, three of them are wheat, rice and roadsides and none of these situations involve genetically modified crops. So herbicide resistance is a much broader issue than what we talked about in terms of genetically modified crops.

The problem with herbicide resistance occurs when herbicides are used exclusively to control susceptible weed species that are highly genetically variable. And so individual plants that survive the treatment and reproduce will begin to dominate the population and become a bigger problem.

So just to recap, selection occurs when the best adapted plants leave more offsprings than others that are less adapted to that herbicide tactic or that management tactic. Weed control, regardless of the type of weed control, is going to select for those weeds that are best adapted to survive that control method. So when herbicides are used repeatedly plants that are either resistant or were never affected by that herbicide will survive and reproduce. So the bottom line is overall, thinking about this system biologically the best approach for weed management is to manage the selection pressure. And the only way to accomplish this is by diversifying tactics.

It's easy to say this and it's easy to say that growers just need to diversify practices, however as you've already heard many times today, implementing this change becomes very complicated when you consider the economic issues, the conservation issues and all the other issues that affect growers and their management decisions.

So last fall Secretary Vilsack announced steps that the agency is taking to help farmers address the increase of herbicide resistant weeds in our agricultural systems. The press release provided background on the issue and it included the fact that additional herbicide tools alone are not going to solve the problem. USDA is going to work in collaboration with EPA and the weed science professionals to identify ways to encourage growers to adopt more diverse tactics for weed management in addition to herbicide control.

So among these tactics that were identified in this press release includes actions by NRCS, first of all to make their EQIP programs for increasing use of IPM practices for weed management more of a national program, or available more nationally. And secondly, to include programs that address herbicide resistant weeds and their conservation innovation grant program to help identify programs that growers can adopt more successfully to manage herbicide resistant weeds.

APHIS is promoting the use of best management practices in all their design protocols for regulated trials of genetically modified crops. Other agencies in the department are very active as well. The Agricultural Weed Research Service weed scientists are conducting research to identify the basis for resistance and to develop management strategies to reduce the impact of herbicide resistance. And the National Institute for Food and Agriculture grant proposals solicit proposals that fund basic and applied research in weeds to address the herbicide resistance as well as to address some of the social and economic issues that are faced by growers as they deal with this increasing problem.

USDA is partnering with the Weed Science Society of America to develop educational materials for stakeholders who impact -- who are impacted by herbicide resistant weeds and to conduct work to address the impediments that farmers face when deciding how to adopt diverse weed management tactics.

So to conclude weeds are an ever-present problem. And no matter what we do they aren't going to go away, we have to learn how to manage them. However, reliance on a single tactic to control weeds is going to result in selection for species or populations that can survive that practice. Evolution of resistance is not a new problem, unfortunately, and it's not unique to genetically modified crops. If we're going to be successful management has to include a diversification of management tactics and new approaches to weed management, some that we may not have thought of yet. USDA agencies are taking measures in cooperation with the EPA to help growers diversify their weed management practices.

So with that, I thank you very much for your attention and I'll turn it over to Jack.

(Applause.)

MR. HOUSENGER: Thanks, Jill. If you'll notice, they put Jack and Jill together?

(Laughter.)

MR. HOUSENGER: You know, as I sat here and listened to the perils of having people believe that GMO food is safe I was thinking, what about GMO food with pesticide residues on it? If that -- if one is difficult the other one's impossible. So today I was asked to talk about EPA's perspective on weed resistance -- on herbicide resistance and weeds. Jill talked a little bit about Palmer amaranth. I just wanted to say that if no one's seen this it can grow like two inches a day and produce I think a million seeds. So it's really a problem and it's become resistant to glyphosate. So that's why it's always pictured.

I'm going to talk about the law under which we regulate pesticides and then kind of where we are in managing resistance issues. So we have a law called FIFRA, Federal Insecticide, Fungicide, Rodenticide Act. If you notice it doesn't include herbicides. It doesn't include antimicrobials and it doesn't include biopesticides or biotech which we also regulate. Maybe the acronym was too much with all those. But it is a risk-benefit statute, we can consider the benefits that pesticides provide and weight those against eco-effects and worker-effects. Any food risks are just solely risk based, it has to be safe under the Federal Food, Drug and Cosmetic Act. But we consider resistance to be part of that risk-benefit equation.

Certainly something that we're registering straight out of the box isn't going to have resistance issues but as it goes through reevaluation we can consider it. We register pesticides both on conventionally bred and genetically modified crops but we don't control the deregulation of the genetically modified crop, that's done by USDA. So once it makes -- once USDA makes its decision we're free to make a decision on the pesticide use.

So our goal is to delay resistance as

long as we can. And until very recently we really haven't focused that much on resistance, we've done things around the edges. One of the things that we're trying to stress is the flexibility to growers. And as you'll see in the example I'm going to talk about a lot of the burden falls on the growers but mainly on the registrant who holds the registration. Some registrants have put some advisory language on their labels about not treating consecutively, using different modes of action but those are usually just advisories.

Obviously when glyphosate was registered it was a miracle herbicide. People used it quite often and over the years it developed resistance. For a long time there were no new herbicides coming on the market because glyphosate did everything. And then when glyphosate resistance became a big issue we started to get -- last year we got our first genetically modified registration that was tolerant to 2.4-D so we got a combination product, the 2.4-D and glyphosate, called Enlist Duo on corn and soybeans. And it basically allows you to make a later application of 2.4-D over the top of corn and soybeans when it's like 48 inches high versus when it's smaller. So you get weed control a little later.

Some of the approaches that we're using are label directions, training and educational information, early identification and remediation. Reporting by the registrant so we know what's going out in the field, and then an opportunity after five years of use of this product for us and the registrant to kind of look back and say, what's happening resistance-wise and make modifications, if necessary, to the label.

Hard to see.

So some of the requirements for the label is that it has to include the mechanism of action. A lot of our labels now include that. Some registrants are reluctant to put it on there or they don't see if the value of it but a lot of the main registrants include this.

Generally included best management practices, I'll talk a little more about that later. And then because early identification of the problem is critical we want people to scout before, scout after and report performance and likely resistance to the registrant.

We put the BMPs on the label. These were developed by the Weed Science Society of America, largely Jill at the time, who was with them at the time, and working with EPA and also with USDA. Most of the elements describe cultural-mechanical practices to slow the rate of resistance. And this is -- this slide just gives -- I think it does -- some of the examples of the BMPs. Again, you know, use multiple mechanisms of action, mechanical practices, cultural practices, but most importantly scout and monitor the fields and report the problems.

When we registered Enlist Duo there's a problem in being the first one where an issue has come up like resistance and we want to do something about it. And Dow happened to be the first one out of the chute. They developed a stewardship program, training materials, on the label it requires, you know, to investigate cases of non-performance and this isn't -- this got into a little area of does that mean Dow goes into the farmer's field and does it? Or -- and again, we gave flexibility there that Dow would provide assistance in remediating the problem if the farmer required it. But we wanted to make sure that, if resistant weeds were identified, or likely resistant weeds were identified, that they were taken care of.

They also are required to annual report likely and confirmed resistance. Obviously if a weed isn't controlled it's a candidate for resistance but you're not going to know that for some time. So they would work on a diagnostic system and work for identifying that earlier and then reporting to us and stakeholders.

Like I said, this first weed

management plan, resistance management plan was something that we imposed on Enlist Duo but as we go through our reevaluation, which happens every 15 years, we're going to be looking at other pesticides as well. This -- I think it's this June we're going to take -- put out a draft risk assessment of glyphosate and we'll be looking to do something similar. Obviously with glyphosate, a lot of the resistance issues are there so it's going to be a little different resistance management plan.

But that's kind of how we're looking at things right now, and thank you for your attention.

(Applause.)

MS. DILLEY: We do have a couple of minutes for questions before we take a break. So questions for Jack or Jill, Jill or Jack, Jack and Jill? Please.

MR. MATLOCK: Jack -- this is a question for Jack. I'm Marty Matlock, University of Arkansas.

NPDES regulations for application of pesticides are a relatively new experience for agricultural producers. How do you see the Clean Water Act NPDES regulations under -- administered through EPA overlapping with this issue or intersecting this issue?

MR. HOUSENGER: I don't. Is this on?

MS. DILLEY: Yeah, it's on. You just have to get up close and personal with it.

MR. HOUSENGER: NPDES permits, unless they're applied directly to water, this isn't going to affect that. So I don't see it affecting it. I know Waters of the U.S. is a big issue and I don't want to touch that one. So --

MS. DILLEY: You're staying as far away from that as possible, huh?

(Laughter.)

MS. DILLEY: You're a wise man.

Are there any other questions?

(No response.)

MS. DILLEY: All right. Well, thank you very much, both of you.

(Applause.)

MS. DILLEY: So I have just a little before ten after, if we could come back at 20 after, so a ten-minute break. And then I'll take the last couple of panels' comments and then move into discussion of your homework and the poster session. So ten-minute break.

(A short break was taken.)

MS. DILLEY: If you'll take your seats we'll get started.

(Brief pause.)

MS. DILLEY: So we have two more panels this afternoon the first of which are two USDA representatives, Michael Schechtman who is ARS and Michael Gregoire who is with APHIS. And they are going to talk about USDA coexistence knowledge gaps and context for USDA's initial responses. So with that, as you take your seats and are ready to listen, I'm going to turn it over to Michael Schechtman.

MR. SCHECHTMAN: Thank you, Abby.

Good afternoon. Again, my name is

Michael Schechtman and I am biotechnology coordinator for the Office of Pest Management Policy in the Agricultural Research Service and also the Executive Secretary of the AC21. So I'd like to add my words of welcome to all of you here today, greetings to Russell, of course, and to those listening online as well.

I'm on the agenda today to continue the discussion on things we know about the current situation, things we don't, and to help frame the later discussions on the actions USDA has taken or is considering in response to the AC21 recommendations.

So I'd like to start by elaborating a bit on the federal register notice that Secretary Vilsack alluded to his remarks, talking about the reason for the notice, what information we hope to get, what in fact we got. As Secretary Vilsack noted on November 4th, 2013 we published a notice in the Federal Register seeking public input to help the department implement an AC21 recommendation that USDA foster communication and collaboration to strengthen coexistence. USDA's goal in publishing that notice was to gather information to determine how best to foster communication and collaboration among those involved in diverse agricultural systems on the topic of coexistence and to figure out how best the department can itself collaborate and communicate with all involved on the subject.

USDA requested input on a list of topics including information needs and preferred communication methods, tools for facilitating farmer-to-farmer communication, currently available information and tool kits available, geographic information on the types of crops currently planted, effective local voluntary solutions and coexistence practices and a number of other topics. USDA received over 4160 comments from a broad range of stakeholders.

Two large petitions were also submitted signed by over 27,000 supporters in one case and nearly 32,000 in the other which in general terms called for stronger controls over

GE production, the protection of non-GE crop production and seed and/or the labeling of GE foods. I'm not going to give you a detailed summary of the comments, USDA has provided a link to the comments summary on publication of the notice announcing this meeting. But I want to talk about them just a little bit, a few selections.

The majority of the comments generally opposed the growing, production and marketing of GE products and some favored banning GE crops. Many commenters raised concerns not included in the request for information, including labeling, potential human and animal health effects, effects of pesticide use, what we'll refer to as contamination risks for conventional and heirloom seed stocks, international trade, consumer rights and other things.

Most comments that referenced the AC21 report opposed the premise that coexistence would provide adequate protection for organic farmers and consumers. In contrast other comments argued that coexistence is nothing new for agriculture and is generally working. Many comments expressed the view that the responsibility for preventing contamination of IP and organic production should lie with GE growers and the GE industry however most of the commenters who opposed coexistence did not discuss the AC21 report's recommendations in any detail.

Very few commenters offered comments that were directly responsive to the items in USDA's request for information. Among the very small -- relatively small number of comments that were directly responsive to USDA's specific requests, among those many highlighted the need for additional information, whether about best practices in crop production or contracting, about economic damages, about seed purity, about locations of neighboring plantings or other topics, or a general need for increased education around any of these issues or around the science underlying it.

Some noted the value of farmer-to-farmer communications and indicated that such communications may take place but do not guarantee particular behavior changes. Other farmers, in discussing their neighbors, did not express any interest in entering into dialog with them. Some called for local crop-specific solutions led by farmers and educators.

I presented just these few selections of the comments to give you a flavor of the range of responses we received and also of the limited amount of specific usable information within those comments. A more detailed summary I mentioned is online. I would note, though, that we're attempting to be responsive to a number of the concerns raised in those comments through various segments in the agenda over these two days.

You've heard the remarks from Secretary Redding about USDA's charge to the committee in producing this report, its report. The charge addressed potential compensation mechanisms for GE related economic damages to farmers, how to make such mechanisms work and other steps USDA should take to bolster coexistence. As Secretary Redding noted one key point of controversy in the AC21 discussions was that data was not available on actual GE related economic damages incurred by farmers.

The committee did hear, and you heard today, about data on shipment rejections that occurred upon GE testing when a particular shipment was found to be outside contractual limits for GE content. Such rejections would mean that the farmer or seller would need to find another buyer or use for the product. Those circumstances could result in selling the crop at a reduced price or incurring other costs. But specific data regarding actual losses has not been available.

Now you will hear tomorrow about one new effort on our part to gather some of that data through an organic producer survey, at least insofar as organic production is concerned. So it will be at least a start in that direction.

In terms of other recommendations, one other important thing I should note at this time, relating to USDA limitations in implementing recommendations is that, according to our Office of General Counsel we do not currently have authority to implement a compensation mechanism for economic losses that may be incurred by farmers as a result of unintended GE presence. Nor do we currently have any clear legal authority under which to implement a general program for incentivizing the development of joint coexistence plans between neighbors. There were no provisions for the -- in the most recent Farm Bill addressing these recommendations so that action on these would need to await further Congressional discussions.

One place where we had hoped to get additional useful information from stakeholders was on identification of best practices in crop production. In IP production, vis-a-vis coexistence, and indeed in the ways farmers can work with their neighbors to address coexistence issues. We clearly need more information about these topics. What are the best practices? We heard at AC21 meetings in the past general discussions on these things.

We also need to have a better sense of whether best practices are, in fact, being followed. In the responses to comments in the federal register notice we received only a few comments directly offering potential best practices, though several commenters alluded to the roles of various organizations, especially local ones, in helping farmers manage coexistence challenges.

It would also be of use to us to get a better understanding of what the barriers are to greater cooperation among farmers to bolster coexistence. Some of the issues that surfaced in prior AC21 meetings were, on the one hand, that some farmers felt that growing bio -- who were growing biotech crops felt that the problems of IP farmers and organic farmers caused by the natural movement of pollen from their crops was not their concern. Inasmuch as the IP producers should have accounted for the costs of growing their crops in the contracts they signed for producing them and in the prices they charged for their IP crops.

On the other hand, some IP producers felt that the growers of biotech crops were imposing external burdens and costs on their operations which were sometimes unmanageable. So we need to understand better the complexities of making coexistence work at a farmer-to-farmer level. We would welcome comments from participants here about these issues as we move forward, not as a vehicle for folks to complain about their neighbors but as a tool to help us figure out what's going to be most equitable and effective in increasing efforts to bolster coexistence.

So where has this left us? As Secretary Vilsack has indicated it's USDA's view that coexistence is too important for the overall success of U.S. agriculture for us to stop pushing forward regardless of the input we have received. We have a series of items that USDA has developed, either directly in response to the AC21 recommendations or in the spirit of those recommendations which we'll be discussing over the next two days. We think these tools may offer some help in promoting coexistence and we would like your input on what you think of them, how they might be improved, what else we might be doing. We recognize, though, that coexistence will ultimately happen on the ground and will succeed or fail based on farmer actions and interactions.

So with that, I'd like to turn the discussion over to Michael Gregoire, APHIS Associate Administrator, who will discuss the USDA APHIS biotechnology regulatory program and the agency's recent announcement about withdrawing its 2008 proposed biotechnology rule.

Mike?

(Applause.)

MR. GREGOIRE: Thank you, Michael, and

good afternoon everybody. As Michael said, I'm an Associate Administrator in the animal and plant health inspection service of USDA and my portfolio includes the plant side of the animal and plant health inspection service. So that work includes the work of the biotechnology regulatory services unit, plant protection and quarantine and I'm also involved in policy, budget and administrative issues within the agency.

Our mission in APHIS is really at its core two-fold. One is to safeguard American agriculture from the introduction and dissemination of animal and plant pests and diseases, and secondly, to facilitate the safe trade of agricultural commodities. And since APHIS became a standalone agency in 1972 we've been called a lot of different things, we've been characterized in a lot of different ways, we've been called a trade agency, we've been called a food safety agency at one time, the Food Safety Inspection Service and APHIS were together.

We've been called a homeland security agency and we are often still called a regulatory agency.

We would like to emphasize that we are an animal and plant health agency. Regulation is and always will be an important tool in our tool chest but increasingly we are finding it very challenging, as the Secretary mentioned this morning, that the regulatory system is slow and deliberate by design and so it's very difficult to keep the regulatory system up with the speed of science, up with the speed of business, up with the speed of industry practices. So as a matter of general course within APHIS we are systematically looking at alternatives to regulation to address emerging animal and plant health and animal welfare kinds of issues.

Yesterday some of the APHIS leadership was meeting with representatives of the U.S. apple industry to talk about some of the pest and disease pressures that they're dealing with, their interest in being able to export more. This was a tremendous year for apple production, we got more apples than we know what to do with and part of our role, again, is to help facilitate safe trade and that's an important interest for the U.S. apple industry. And we also talked about biotechnology and the recent approval of the non-browning apple. And one of the industry representatives said APHIS is sure a lightning rod for biotechnology issues. And I said, well, that -- you couldn't be more accurate about that.

Prior to the time that I was in this position I served as the Deputy Administrator for the Biotechnology Regulatory Services Unit in APHIS for six years. And during that time I think I spent as much time with attorneys in our general counsel's office and in the Department of Justice as I did with our scientific staff. During that six-year period of time we dealt with nine different lawsuits that went to a whole bunch of different issues including the scope of regulatory authority, whether or not we were following all of the legal procedural requirements that we were required to follow as a federal agency, the adequacy of our analyses and so on. And all of that litigation is now done, it's behind us and has brought some more clarity to those kinds of questions.

And, quite frankly, when we put out proposed regulatory decisions for public input we hear a lot of the kinds of issues that we've talked about and heard about here today. The one we hear very little about is the one our regulations are designed to address and that is plant health. I have not heard any concerns this morning about plant health. So I am personally very happy with the leadership the Secretary has brought to this issue to provide a venue and an opportunity to deal with all these other issues that we hear about in the course of the regulatory decision making that we make. And so APHIS is delighted to be a part of this and to bring our resources and expertise to the conversation these two days. So we're very happy to participate.

So let me talk just a little bit about the current regulatory system that we administer and a little bit about the announcement we made withdrawing the rule we proposed, the rule changes that we proposed in 2008. So since 1987 APHIS has regulated certain genetically engineered organisms along with the Food and Drug Administration and the Environmental Protection Agency as part of the federal coordinated framework on biotechnology.

Our regulatory program is designed to ensure that genetically engineered organisms are safe for plant health and our program is carried out under the Plant Pest Provisions of the Plant Protection Act which is designed to give the Secretary the authority to prevent the introduction and dissemination of plant pests and not just weeds in the United States. The Act has a very kind of long and specific definition about what a plant pest is so I'll just paraphrase. It includes such things as bacteria, fungi, parasitic plants or insects that can cause harm, damage, disease to agricultural crops or other plants or plant products. So we regulate GE organisms when the donor organism or the recipient organism or the vector used to transform the plant is a plant pest. That's the regulatory trigger under our current system.

Regulated articles, if they're being imported into the U.S. or moved interstate are going to be grown in outdoor field trials require a notification or a permit from APHIS. A notification is basically just a simplified permit. And those permit conditions are designed to keep these regulated articles confined and accounted for, and we have a compliance and inspection program to ensure that the permit conditions are being followed. A regulatory system also provides a process whereby developers can petition the agency for non-regulated status if they can demonstrate with scientific evidence that it does not post a plant pest risk. And these petitions typically follow several years of field trials and precede the widespread commercialization of GE crops. Since our program has been in place we have granted non-regulated status 115 times.

APHIS, along with the other coordinated framework agencies, operate under some principles that come out of the White House that guide the regulation of biotechnology and emerging technologies. And I'll just talk about what a few of those principles are. One, decisions are based on the best reasonably obtainable scientific information within the boundaries of the agency's statutory authority and mandates. Regulations are developed with a firm commitment to fair notice and public participation. The benefits of regulation should justify the costs. Where possible regulatory approaches should promote innovation while also advancing regulatory objectives such as the protection of health, the environment and safety.

So while our regulatory objectives in APHIS aren't really coexistence I think there's a few ways APHIS program contributes indirectly to this, certainly for those things that are regulated and in research and development. The program is designed to keep them confined and accounted for and out of commerce because if they get into commerce that can be quite disruptive. Once we've granted non-regulated status, that U.S. government regulatory approval is important in terms of marketability of these crops, particularly in international commerce.

So when we are evaluating these petitions for non-regulated status, in addition to looking at the plant pest risk we have to comply with the provisions of the National Environmental Policy Act. And so to do that we prepare either an environmental assessment or an environmental impact statement and that statute really requires us to take a hard look at the environmental impacts of the proposed federal action and disclose what those impacts are. That statute does not give us any additional authority to act on any impacts we identify so our authority still goes back to the Plant Protection

Act.

Our environmental analyses do evaluate some of the socioeconomic issues related to the introduction of new GE crops and these analyses that we have done have -- or can and have, in fact, informed USDA policy and program decisions. The Secretary mentioned this this morning, that the reestablishment of the AC21 committee and several of the coexistence measures USDA announced grew out of and were informed by the environmental impact statement that the agency prepared on GE alfalfa. And more recently the environmental impact statement we prepared for the Enlist corn and soybeans helped inform discussions with EPA and the actions you just heard about in USDA and EPA to address resistance in weeds.

So that's just a quick snapshot of our current regulatory system in APHIS.

In 2008 APHIS published a proposed rule to significantly revise our biotechnology regulations. Those revisions were extensive and included significant changes in the scope of the regulations and the mechanisms of APHIS's regulatory oversight. On Friday February 27th we announced that we were withdrawing that rule. We managed what few have ever been able to manage, to get all biotech stakeholders to agree on something and that is no one liked the rule we published.

(Laughter.)

MR. GREGOIRE: For a lot of different reasons.

But we received over 88,000 comments on the rule in 2008 and 2009. Stakeholders were particularly concerned with several key aspects of the rule, especially about the lack of details surrounding the proposed risk based system that would determine what organisms would fall under regulation and how they would be regulated.

So based on the scope of the comments that we received and in light of the experience that we've gained with now almost 30 years of experience regulating GE organisms, the continuing advances in the technology and simply the amount of time that has elapsed since we published the rule, the proposed rule in 2008, we decided to withdraw the rule and begin a fresh start with stakeholder engagement aimed at exploring alternative policy approaches. And so that engagement will begin with a series of Webinars that the agency will be announcing in the very near future, that will provide an opportunity for stakeholders to provide some initial feedback on where the agency should go with this. The dates and times of those Webinars have not been announced yet but that will be coming out soon.

I know there is already a lot of speculation about what this really means, that the rule was withdrawn, and I just want to emphasize that what it means is we're going to take a fresh start and step one is that we're going to listen and then we're going to take that information and start to form a proposal of what this should look like going forward.

So with that I'll conclude, and I guess, Michael, we may take a few questions? Okay.

(Applause.)

MS. DILLEY: So some questions for Michael and Michael? Yeah. Use the mic if you would so that everyone can hear?

DR. SEDEROFF: So what's your assessment of the position with respect to CRISPR technology?

MR. GREGOIRE: I'm sorry, the --

DR. SEDEROFF: CRISPR.

MR. GREGOIRE: Well, I don't have a particular view on that specific technology. I will say that one of the principles for -- that the executive branch has with the regulation of technology is that we don't regulate the transformation process. The objective is to regulate the products of the technology, not the process. And one can argue if that's -- whether or not that is, in fact, happening. But that's one of the core principles that is in place and I think that will guide our thinking.

In APHIS, we want to make sure we're not introducing plant pests or noxious weeds into the environment. And that will be the lens through which we look at the products.

DR. SEDEROFF: That would really change things a lot.

MS. DILLEY: Okay. Any other questions?

(No response.)

MS. DILLEY: All right. Thank you very much.

(Applause.)

MS. DILLEY: So we next have Dr. Cathy Woteki who is Undersecretary for Research, Education and Economics and also Chief Scientist, and with her are going to be some subject matter experts. So if you all could come up and take a seat and then I will turn over to you.

DR. WOTEKI: Thank you so much, Abby.

We decided this late in the afternoon we needed to mix it up a little bit. So I'm going to talk a little bit, and the panel members, I'm going to throw them some questions and then we'll open it up for everyone.

So good afternoon. I'd like to start by saluting the work of the advisory committee on biotechnology and 21st century agriculture, or what we call for short AC21. And this session is really going to be focusing on what effects that committee's recommendations have had on the work that we're doing at USDA. So you're going to hear about some things that we've completed with respect to some of the recommendations and you're also going to hear about some things that are still ongoing but for which we've made some significant progress. So to Russell Redding and all the committee members I want to say thank you, add my personal thanks to those of the Secretary that he offered this morning.

I had the opportunity to participate in several of the meetings that AC21 held and really have a deep appreciation of the thoughtfulness that went into all of their work and that informed the recommendations that you're going to be hearing a little bit about right now. So all of us at USDA have been working hard and thinking, first of all, about how to implement them. And then there are a number of my colleagues who have had a leadership responsibility for responding and implementing several of those recommendations. And they're with me here today on the podium.

I don't know if you're seated -- no, you're definitely not seated in the order in which I'm going to be calling on you. So I'm going to introduce everybody now and then I'm going to be throwing them questions.

So Brandon Willis, Administrator for Risk Management Agency. Betsy Rakola who's the USDA's organic policy advisor. Dr. Anne Marie Thro who is on detail right now to my Office of the Chief Scientist where she's the senior advisor for plant health and production in plant products. Dr. Peter Bretting in Agricultural Research Services National Program leader for crop protection and production and Dr. Michael Schechtman who was just on the last panel so is familiar to everybody.

The recommendations that they've going to be discussing and that I'm going to give you just a brief overview on directly affect farmers' access to services and to data and therefore, they're very important to us at USDA. And the Secretary wants all elements of our vast agricultural community to have access to the services and programs of the department.

One service is helping more farmers, and to help them in the enhanced crop insurance program. Crop insurance is an important bedrock of the safety net for farmers as they're facing a wide variety of challenges from weather, natural disasters, market conditions and all the uncertainties that go with farming. Crop insurance provides that safety net and assistance when it's needed most. So this is an especially useful program for organic producers and they've lapped some real key access and safety net tools in the past.

So we've taken some steps to bolster the program to make relevant provisions more robust. And Brandon Willis is going to outline what some of those implications are. And so Brandon, what are the changes that you've made?

MR. WILLIS: Okay. We've tried to tackle the -- I guess you'd call them the primary hurdles, the primary challenges organic producers face within the crop insurance program. Most of these changes have taken place since 2012, the last year and a half mostly. The first one is, if you're organic producer you paid a five percent surcharge for crop insurance compared to your neighbors. We eliminated that a year ago and that no longer exists.

Another frustration for organic producers with the program was the prices. They received higher prices oftentimes, they have a market that reflects the organic production. The crop insurance program price did not reflect that. What we've done is we've tried to expand the list of crops that have what we call an organic price selection. It really just reflects the typical market price for that crop if it's grown organically. We've gone from about four just a few years ago, we're in the mid-twenties now and we've added nearly seventeen, eighteen just in the past two and a half, three years. We're actually looking to add another 20 in this next year as well.

The other thing we've done is contract price addendum. This is a fancy word to say many people grow their crops, they grow them with a contract. They know the price they're going to receive so why are we trying to set an organic price that we may not be able to find because there may not be enough market so we can get a good price for that? So what we created was an addendum that said, for nearly 62 crops, if you have a contract we will let you use that contract price when you suffer a loss in the crop insurance program so you'll be compensated what you would have been compensated in the market price in the marketplace. Last year was the first year we had that available, nearly ten percent of organic farmers used that. Taking all these together we saw an increase in organic acreage in the crop insurance program of nearly ten percent.

Another thing we did was we created a program called the Whole Farm Program. The reality is we'll never be able to have an individual crop-specific policy for some crops in some counties, there simply isn't the information. So the whole farm aggregates the revenue of all the crops a farmer grows into one big lump and they can ensure that revenue. Actually this was a product of Russell Redding and some of the work that they did that led to this in the state of Pennsylvania. This is a safety net option for organic farmers, and many farmers actually, that didn't exist historically.

It's an opportunity for people who have the opinion that crop insurance doesn't work for me because there has not historically been a policy. It works very well for people who are diverse because it rewards diversity recognizing that if you plant many crops, the chances of losing everything goes down because one crop's revenue will offset another's loss. It also works well for organic producers because it looks at your revenue, it looks at your actual revenue, the prices you receive will be reflected in that revenue. It's available in 45 states this year, moving forward we'll expand it hopefully to nearly the entire nation.

That sums up what we -- the progress we've made and what we anticipate making in the next year or so.

DR. WOTEKI: Great. Thanks, Brandon.

Another recommendation was to develop an organic seed finder database. Farmers were saying they needed easier ways to identify and get access to organic seeds that would meet their particular production requirements. And the AC21 report also asked whether similar informational support for non-GE seeds suitable for producers supplying GE-sensitive markets might also be useful. The Agricultural Marketing Service's national organic program awarded a one-year contract to the Organic Seed Alliance and its partner, the Association of Official Seed Certifying Agencies in February of last year to begin developing that database.

So I'd like to turn it over to Betsy to tell us what the status is.

MS. RAKOLA: Thank you, Dr. Woteki.

I will say Mr. LaVigne stole a little bit of my thunder in his discussion of the organic seed finder earlier today but I wanted to speak a bit more about the reason that USDA provided some support to this effort and some more details about the deliverables we're expecting from this contract.

So the organic seed finder fills an important information gap that we currently see in the organic seed marketplace. By connecting organic seed vendors to potential customers it helps organic farmers to find seeds that are most appropriate for use in organic systems. This information helps to support the growing organic industry and it also helps farmers to comply with the USDA's requirement that they use organic seed whenever it is commercially available.

The objective of the USDA's contract award is to better understand the current state of the organic seed market. We expect to have several deliverables very soon such as reports identifying needs for organic seed breeding, outreach materials about the organic seed market and targeted studies on certain seed types and seed locations. This will help us at the USDA to share better information on the organic seed market with both organic certifiers and organic producers as well as identifying specific needs for seeds and breeds and varieties. And we hope that that will help us to identify a path forward on organic seeds.

DR. WOTEKI: Thanks, Betsy.

The next item was not one that was a direct recommendation in the report but it was a constant refrain through many of the meetings. And that was the concern of plant breeders, that there -- particularly for the non-commodity crops, that we need to enhance plant breeding activities. I named a plant breeding working group which held a listening session and published a workshop report about what the needs are in plant breeding. And then in follow-up to that asked that this plant breeding working group within the department develop a roadmap to enhance plant breeding in the United States. I'm happy to tell you that earlier today we posted that roadmap for plant breeding on our website, USDA.gov, and it is on the website where the Office of the Chief Scientist on USDA.gov. But I wanted to ask Anne Marie Thro to tell you a little bit more about it.

MS. THRO: Thank you.

The plant breeding roadmap sketches out a vision for USDA's intramural work in plant breeding over the next five or ten years and beyond. Priorities are based on input from stakeholders across the range of views that are represented here today. They include the National Plant Germplasm Systems collections, development of new tools and methods for using germplasm from the National Germplasm collection and for using growing biological and environmental knowledge in plant breeding. They also include variety development in public goods situations.

We also heard stakeholder issues that are broader than USDA, in fact broader than any single entity. We heard about the importance of education and recruitment, for example, and that ties in with something we heard from Dr. -- pardon me, from Secretary Vilsack earlier today about the importance of teaching our fellow citizens about agriculture. When they know more about agriculture they'll be more excited about coming into plant breeding.

We heard discussions about what is optimal use of technology transfer methods and mechanisms. What's the optimal balance between public and private work in plant breeding? We heard a value for the U.S. system in which we have both federal and state plant breeding, we use different types of funding for plant breeding, core funding, capacity funding, competitive funding, farmer groups and others helping to fund plant breeding. And in general this kind of robust characteristic or this robust interaction of the different kinds of arrangements, it seems to be a unique U.S. genius. And we heard many stakeholder comments pointing to the question of how that model can be sustained in plant breeding going forward.

You heard from Dr. Woteki that that roadmap is online now. USDA plans to continue to engage with stakeholders about the roadmap so if you're interested, if you have any comments or questions, I will be here this evening during the poster session, and tomorrow, please talk to me or Dr. Woteki.

DR. WOTEKI: Great. Thanks Anne Marie.

We've also heard some questions earlier today about what are we doing with respect to our research investment to support the organic farmers of this country? We want to, in this next session, really address -- or this next part of this session address the research that we've been sponsoring with respect to crop stewardship and gene flow risk mitigation. We have a Biotechnology Risk Assessment Research Grants program, that acronym is BRAG. It was starting in 2013 that we oriented the programmatic request for applications soliciting proposals from the research community to focus on the issues that AC21 was considering. And the BRAG request for applications has included since 2013 funding for assessments of the efficacy of existing techniques for mitigating unintended presence on a crop by crop basis, or in seed production multiplication systems on a crop by crop basis, and the development of novel strategies to mitigate unintended presence of GE traits in non-GE production systems.

We've funded several research projects, three of them studying technologies to inhibit gene flow either by developing male sterility pollen confinement or plastid transgene containment. Another project investigating the control of seed dormancy for reducing fitness of GE plants in the environment. And another project studying an inexpensive in-the-field detection for monitoring GE organisms in the environment.

AC21 in its report also recommended conducting research on landscape scale gene flow in alfalfa. And within the Agricultural Research Service there is an ongoing project examining the movement of GE traits in feral and roadside alfalfa populations and modeling gene flow in alfalfa in the Pacific Northwest. Dr. Peter Bretting is going to provide us some more insights into that project. So Peter?

DR. BRETTING: Thank you very much, Dr. Woteki. And welcome everyone.

Yes, I'd like to provide a little more

detail for this research that was funded by USDA RS, by USDA NIFA and by a special allocation from the Office of Secretary. The Secretary of Agriculture really places a strong emphasis on this.

So the research has four primary elements. First to generate information that could be useful for refining isolation distances that's needed to limit adventitious presence of genetically engineered traits. There are industry-wide standards, longstanding efforts in this that provide a really strong foundation. So really the verb "refined" is appropriate here. Part of that is to identify the avenues whereby the genetically engineered traits would spread into feral alfalfa populations or into fields so that trait confinement strategies can be refined.

Part of this involves looking at pollinators that are provided commercially, honey bees and other bees are important for alfalfa seed production. What role might they play, what role might other avenues play? And as been mentioned, taking a particularly strong at feral alfalfa plants, do they -- are they genetically engineered in terms of the traits there? And do they play a role in the adventitious presence of these traits? And in alfalfa right now it's glyphosate resistance. I have to emphasize that this research really couldn't take place without very strong support and cooperation from alfalfa commodity groups, the seed industry and farmers who have been all too happy to help our researchers in the work.

So, so far the researchers have collected samples from thousands of plants in three sites in California, in Idaho and in the state of Washington. The research involves testing for the presence of the glyphosate resistant trait. First a simple spray with the glyphosate and then what's supposed to be non-genetically engineer materials. If the seedling survives taking a look with biochemical molecular analysis to confirm whether it's happening. And then as the samples are collected the GPS coordinates are taken and that's going to enable geospatial modeling that will be really important for addressing the goals of the research.

So it's well under way. There's a lot more data analysis and geospatial modeling. The initial results indicate that insights will be forthcoming about the role of pollenators and of seed that might spill off of trucks that have harvested alfalfa for seed.

So I'll stop there and turn it back over to Dr. Woteki.

DR. WOTEKI: Thanks, Peter.

We're going to go back to Anne Marie Thro for the next recommendation. It relates to research to control corn pollen generation. And as a result of that recommendation we have both intramural and extramural research projects looking to develop strategies for deploying genes to control pollen germination in receptive corn.

MS. THRO: Genes that prevent pollen --

DR. WOTEKI: Pull the microphone up closer.

MS. THRO: Thank you. How's that? All right.

Gametophytic incompatibility genes as they are known to those who study them, or genes that prevent pollen from fertilizing the silks of a different variety, these genes can limit undesired out-crossing among different corn market classes. And in the poster session outside, which you'll see beginning shortly and be able to enjoy also the North Carolina treats that are already being set up out there, in that poster session you'll see two examples of research that USDA is funding. One example is research that's being conducted right here at NCSU in collaboration with USDA and with NIFA funding and state funding as well. I'm sure you can hear about that. And another example from USDA research in the midwest that's being conducted in collaboration with two or three land grants and a private institute.

As we heard in a talk just a short time ago the private sector is also working on this trait and new corn hybrids that will not accept GE pollen are becoming available for some specialty types for organic systems. Future research may include development of similar systems for additional types of specialty corn as well as studies to look for genetic incompatibility systems that may exist in other crops. And again, as you'll on the posters outside, there may even be other types of genetic mechanisms that can further allow plant breeding to facilitate coexistence.

DR. WOTEKI: Great. Thanks, Anne Marie.

Another recommendation from the committee was that we develop a plan to prioritize the national plant germplasm systems accessions and more closely examine their trueness to type. This recommendation really is a huge one. There are 569,000 accessions currently in the plant germplasm system representing about 14,900 different plant species. So it's an enormous collection. And what the group tasked with responding to this recommendation has been doing is to develop a plan to prioritize how they're going to approach this huge project. And Peter has had a major responsibility for this so I'm going to ask Peter to fill you in on that.

MR. BRETTING: Well, thanks. And thanks for the background.

I might mention just briefly, we're using the term "trueness to type" rather than "purity" because in a lot of these materials it's difficult to think in terms of purity because they're wild species sometimes, they're farmer materials from indigenous, so-called indigenous land races and they're intrinsically highly variable genetically. So what we try to do is, when the material comes in to the gene banks and it's being conserved, is to try to maintain the original genetic profile true to type. You can think of it synonymous to purity but it has a twist to it and a complication.

So Dr. Woteki talked about the enormous numbers of different genetically distinct samples we have. The first thing to do is to look at them and just see what were most relevant to the concern here. And mine's up 569,000 or so samples represent 14,900 species. So the first way to deal with this was to say, well, of those species, what are the highest priority for concern? So we started with those 20 species for which there are authorized deregulated events so it's, you know, 20 over 14,900 is way under 1 percent. So that made us feel a little bit better. And of the 569,000, what of the accessions might have been -- come into the gene bank after genetic engineering started being -- varieties started becoming commercially available in the U.S. or were regenerated or since. And that was about 30,000 or so over 569,000, or about 5, 6 percent, 90 percent of which were in three crops, maize or corn, cotton and soybeans.

So that -- the plan then is to focus

on them. And I should mention here that the discussion we've heard through today and we'll hear tomorrow on best management practice certainly is appropriate to managing gene banks or our breeding programs. And we've had in place for many years best management practices or tutorial practices that are really very different than the commodity level discussions that we heard earlier. So when we regenerate materials in gene banks, oftentimes the pollenations are done by hand. Oftentimes the harvest is done by hand, everything is strictly labeled. The seed quantities are very small, sometimes they're in the hundreds, all in separate packets and labeled. So this is already in place.

But with genetically engineered traits there are additional wrinkles. Off types can be distinguished at very low frequencies, one in three thousand with certain tests. So with new detection technologies and the potential impact of having genetically engineered traits where they shouldn't be are causing us to look at our existing best management practices and see what needs to be done to upgrade them.

Part of this is we've conducted some small pilot projects, mainly with cotton, to look at what some of the key control points might be in terms of testing and best management practices. And we've been assisted in this by industry, industry is very interested in helping us.

So with that I'll close and turn the mic back to you.

DR. WOTEKI: Great. Thanks, Peter.

And we're down to the final recommendation that we're going to be covering this afternoon. The committee recommended that we conduct an ongoing evaluation of the pool of commercially available non-GE and organic seed varieties and identify market needs for producers serving GE-sensitive markets. We established the National Genetic Resources Advisory Council which had been in a period of hiatus, so this was a committee that had been functioning, had been dormant and we reestablished the NGRAC, as it's called, as a subcommittee of our federal advisory committee to the REE mission area, the NAREEE Board.

And among the projects that the National Genetic Resources Advisory Council, NGRAC, has been working on is a plan for how USDA should work with industry and other stakeholders to accomplish this goal. The committee has met several times beginning in 2013 and through 2014, and submitted its interim report to the Secretary last August. It's continuing its work to finalize its report and it's actually going to be meeting later this month to continue that work.

We've had Michael Schechtman up here on this panel and he's the one who's going to give the report on where NGRAC stands.

MR. SCHECHTMAN: Thank you, Dr. Woteki.

So the NGRAC has labored methodically on this task among the other tasks that are within its larger charge around the issues of protecting genetic resources within the United

States. The committee, as Dr. Woteki has indicated, met three times in person and quite a number of times via conference call and -- in 2013 and '14, and it would probably be inappropriate for me to omit the fact for you to realize that, as a subcommittee of the NAREEE Board it also went into another little hiatus for a little while because the NAREEE board is a committee that's statutorily authorized under the Farm Bill. So when the Farm Bill vanished the NAREEE board and consequently the NGRAC also vanished for a while until there was a new Farm Bill.

But that having been said, the committee has met a number of times, continues to meet. They produced an interim report for Secretary Vilsack in September of 2014 and addressing again the broad scope of things that the committee was working on. They recommended steps for maintaining the genetic identity of gene bank samples, highlighted the importance of genetic resources for adapting to changing agricultural conditions, identified the need for educating and training early career gene bank managers and breeders doing the work that Peter has spoken about. Supported the ongoing development of the GRIN global database on accessions, recommended monitoring genetic diversity of crops in the field and urged the U.S. government to become a party to the FAO International Treaty on Plant Genetic Resources for food and agriculture.

So the NGRAC is in specific reference to the recommendation from the AC21 that the committee provide a recommendation to USDA on how USDA should work with industry on these issues around the availability of seed varieties for these non-GE users. The NGRAC is currently finalizing a report and that report is going to discuss germplasm access points, various issues and components, and specifically this recommendation for USDA, how it should work with all of the stakeholders which includes the public and private seed sectors, the food and fiber industry as well as tribal governments for this ongoing evaluation of the pool of suitable available non-GE germplasm. And this report is scheduled to be delivered to the Secretary sometime in the third quarter of this year. Again, before a report is finalized you can never quite guarantee that that's going to happen, I think Russell can attest to that. But we hope that that report will be completed by the third quarter of this year.

DR. WOTEKI: Great. Thanks, Mike.

To sum up, what I've heard through today is coexistence is important for a lot of different reasons, and also it's really complicated. As you've heard we've made some very significant strides towards implementing the recommendations that came from the AC21 committee. Tomorrow morning you're going to be hearing about some things that are in the planning stages to continue and further the work that's ongoing within the department.

Abby, at this point should I turn it

back over to you to manage questions?

MS. DILLEY: Sure.

DR. WOTEKI: Okay. Great. Come on up.

And while she's coming up, join me in thanking this panel.

(Applause.)

DR. WOTEKI: And just one final note, for those who received the conference packet, there's a three-page insert in the packet that kind of summarizes everything that we've gone over in this session. So you can refer to that, you can share it, but it's a good summary of what you just heard.

MS. DILLEY: So why don't we take -- if there are questions to the panel, some brief questions, and then we'll talk a little bit about your homework assignment, which includes having some fun at the poster session.

So any questions? You have these all committed to memory? Excellent. Please.

DR. GOODMAN: While it may be worthwhile to survey the national germplasm systems accessions for contamination by GMOs, as a plant breeder -- I'm Major Goodman from NC State, by the way. As a plant breeder my concern is not so much a minor amount of contamination by some GMO pollen, my concern is the willful state of regeneration of our national collections. I don't think much of anyone outside this system realizes how underfunded and how overworked the people in the system are. But in maize alone, the last I knew they were years behind in regenerating collections that needed to be regenerated. They have managed to get some help from industry but many of these collections need specific ecological environments to be regenerated. And Monsanto and Pioneer are not going to furnish those, sorry.

MS. DILLEY: So it's overall fitness and support for the germplasm program?

DR. GOODMAN: Right.

MS. DILLEY: Okay.

DR. GOODMAN: And it's actual action on maintaining viability that I'm concerned with.

Not a big of contamination here and there.

MS. DILLEY: Peter, do you want to -- I know you were nodding, so --

MR. BRETTING: Yes. To respond to that, what Professor Goodman is referring to, in the last ten years or so the demand for the germplasm, the national germplasm system has doubled. Our budgets haven't quite moved in that direction that fast so as a result you have a mismatch between demand and ability to meet that demand. And these materials are not inert, it's not like Fort Knox, you put the gold in the bank and it remains there until you're ready for it. They have to be continually regenerated. And with this great demand, the capacity to meet that is -- is not really congruent.

So as we work on methods for enhancing our best management practices, we have to weigh this potentially additional work with the demands of keeping it alive, let alone keeping it true to type. So this is one reason that this is a very challenging exercise and why we need your input on how to do that in a best static funding situation.

MS. DILLEY: All right. Some other questions? Yeah, over here?

PARTICIPANT: Just to follow up on Major Goodman's point, Peter, if you were to think about a number in terms of percentage of increase of resources needed to bring the collection back up to speed and to have the kind of activity that we need to ensure that that collection is viable, would you say something about that?

MR. BRETTING: That's --

MS. DILLEY: Maybe a little more than "a lot."

MR. BRETTING: Yeah. Well --

MS. DILLEY: Yeah, get a sense. Right.

MR. BRETTING: Right. I couldn't give you an exact number. I just indicated that the demand has doubled in the last ten years, so it's a real challenge to do what we are trying to do with a currently static budget so we do need more resources. I couldn't put an exact figure on it but I can tell you that our funding at the moment is $44.6 million.

MS. DILLEY: And that's been fairly consistent or declined?

MR. BRETTING: It's gone up and down. In terms of real dollars it's below what it was in, let's say, 2010 and FY 2013, all of the agencies took a considerable hit. Thankfully in 2014 due to Undersecretary Woteki's leadership and that of others, we were able to increase funding. And in 2014 as funding increases came in, they were not spread across the board, they were targeted. And one of the targets for increased funding in 2014 and then in 2015 were the gene banks and National Germplasm Systems. So to the extent that we can, they're getting priority for whatever additional monies can come in but the demand is growing so fast that it's really outstripping the capacity. So if you think of $44.6 or so million, and a figure that in real-dollar terms is about 2010 or 2009, we're in danger of falling further behind and going to the situation that Professor Goodman mentioned.

DR. WOTEKI: I think, Peter, and this question actually goes to the heart of a real big problem for agriculture research, the plant germplasm collection certainly is one of those things that we look at as being a uniquely federal responsibility. As the question implied, this isn't the kind of thing that the private sector is going to support over the long term. So it is a federal responsibility and it is a unique resource, not only for scientists here in the U.S. but also around the world.

Across the board for several decades now there have been no real increases in the support at the federal level for agricultural research. And with the economic downtime and the cuts in budgets that were experienced across the federal government there were some very significant cuts that ARS and all of the agencies in the REE mission area experienced. The

President's budgets recently have had some significant increases. And as Peter has indicated we're trying to set some priorities within those budgetary requests. So we're hoping that there will be a turnaround, both with the respect -- within the country for investment in agricultural research, and very specifically in the support of the germplasm activities.

MS. DILLEY: Another question over here.

DR. ZILBERMAN: I think you mentioned the word demand all the time. Generally speaking, from what I feel there is -- it's almost natural that it was a given and increased need for better understanding of biodiversity in genetic material. You would need to see that more research is done. Did you think about element of identifying a certain amount that this core mission that no one else will do, and certain amount that will be paid by parties that benefit from it? Each of these demand, people are willing to pay for it and generally these are identifiable people.

So if you can really say, okay, we have these 45 million, and you think 30 million is a reduced thing that no one else will do it, we take $15 million and then we will do it only if people will add -- if there will be some sort of finance. Because to me, saying there is demand and not charging for it, it means that you have some private interests that benefit from it and they don't pay for it.

MS. DILLEY: So thinking through prioritization. Peter, you want to respond? Or Cathy?

DR. WOTEKI: Well, a core philosophy that undergirds the approach that we've taken with access to our collections is that there be access free of charge. So that has been a central principal for the public good.

MR. BRETTING: And I'd add to that that over -- as an average over the years consistently, two-thirds to three-quarters of the requesters are in the public sector and the largest single block of requesters are land grant university professors and researchers. So you know, if we were to charge, the burden would primarily fall on public sector researchers who are already struggling to do their job. So the ability to recoup significant amounts of money that way are really pretty limited. The demand is driven primarily by the public sector, especially in some crops where there isn't a large private sector profile in use. Aware there are crops where there is a substantial private sector activity. The materials that we distribute generally are long-term high-risk research experimental materials that require a whole bunch of investments ahead of it so -- before a product issues. So it's long-term high-risk, it's something we provide to the agricultural system as a free-of-charge access as a general service.

Also shouldn't stop before mentioning that the increases in the budget in the past, there was rapid increases in the late '90s and

2000s where our budget went from 20 million to about 40 million. One of the main drivers of that was very effective advocacy by the seed industry so it's not like the seed industry are saying this is a free ride. They've been among our strongest supporters as has been the public sector.

MS. DILLEY: Thank you.

We have time for two more questions. Go ahead.

DR. SEDEROFF: So what kind of genetic marker system do you use to ensure genetic identity and integrity?

MR. BRETTING: In plant breeding or in gene banks?

DR. SEDEROFF: In your gene bank.

MR. BRETTING: It depends upon the crop, Professor Sederoff. It could be morphological traits if they're easily visible, such as if you have an inbred line. You can tell an off type morphologically. In other cases we will use SSR markers and in some crops where we have the funding to apply it, also SNP markers. But the amount of resources available to broadly apply it just aren't there.

DR. SEDEROFF: So what you're telling me is that if there's no routine genetic marker system applied then there's no estimate of what proportion of the resources are actually redundant or properly identified?

MR. BRETTING: Well, up until recent years the marker systems were highly heritable phenotypic traits. So and in -- with skill dyes, that can get you a certain part along the way. For these highly heterogeneous, heterozygous materials it's a moving target, regardless of what marker system you use to -- it hasn't shifted significantly from one regeneration to another. So it's -- we try to apply it judiciously without putting too much of our resources into it that would detract from key regeneration and key viability screens also. So it's a real balance between how we can meet all these demands for trueness to type with a static budget and also still meet the demand for distribution. In an idea world we would be able to have a genetic profile of everything, at very expensive cost.

DR. SEDEROFF: I know it's expensive.

MR. BRETTING: We don't have it yet.

DR. SEDEROFF: I know it's expensive, but there are breeding programs that I know of where the lack of such kind of genetic identity tests are resulted in misidentification of something like 30 percent of the lines in a breeding program. So knowing what you have and having a way to test it turns out to be remarkably valuable and well worth the money, too.

MR. BRETTING: Thank you.

MS. DILLEY: Thanks.

All right. Last question.

MR. LaVIGNE: Yeah, Andy LaVigne with the American Seed Trade Association.

We would agree on the plant genome system and the importance of that and I think we really do need to look at -- I hate to use the phrase but a paradigm shift in this. This should be in the base budget of the USDA, it should be -- again, it shouldn't be 40,000, it should be 60,000 with an increase every year. It is the -- it's not just plant it is also animal so we have to think of it from that perspective. If you look at some of the collection centers around the country some can barely turn lights on and some are Taj Mahals, and it's really a challenge. And it got a little too political probably in the '90s and early 2000s because of line items from various members of Congress. But we need to get back to where that is not political and it really is supported.

And the other thing that I would ask, maybe Cathy and some of the others on the board is -- or on the panel, when we look at breeding as a whole, we try to look at it even as print system because it's not just breeding it's physiologists, it's everything across the board. So the challenge that we have to look at this in the big picture is the land grant system and ARS have been put under pressure. It's not a simple system of going and finding 100 or 300 or 1000 new breeders and we'll all be okay, it's a lot bigger issue than that.

So how do you look at a Bill Tracy who's really putting out some great corn breeders out of Madison but, you know, he's not long for retirement here and he's done a great job. But who comes in behind him? And we had a time there when breeding was not as sexy as it is today and so a lot of breeding programs went away. We don't have the financial resources or the personnel to reconstitute all those breeding programs. So there really is -- we need to look at this again in a fundamental way that says how do we do regional breeding programs? I know a lot of the universities don't like to hear that but there needs to be ways to do this in a more thought-provoking way instead of the old institution silo system that we've had in place before.

We appreciate the recognition of that and we look forward to trying work out especially those two areas.

DR. WOTEKI: And we agree with you, Andy, on the need to look at both the intramural and the extramural programs as a whole and also in the context of what the government role is, what the private sector role is. And if you look at our budget requests for this year there are cross-cutting initiatives where we're calling out we need this in the intramural programs, we need this in agricultural statistics, we need this from APHIS, for example, in order to accomplish this programmatic initiative.

And we're also working with the NAREEE board to develop a new approach for their annual report to the Secretary and to the Congress on the adequacy and relevance of our research programs that will again cut across our research programs in the mission area in plant production, in animal production, in food safety and human nutrition and natural resources and do this on a rolling basis. So there'll be -- I think when we get the NAREEE board in another year into that mode that that will also help with your concern about really being able to look across what we're doing in ARS, what NIFA is able to support at the land grant universities and within the whole context of agricultural research, public and private.

MS. DILLEY: So I thank the panel again for your comments and --

(Applause.)

MS. DILLEY: I'm just going to very briefly give a little bit of a preview tomorrow and get you set for both the poster session and some processing of all the information you've received over quite a rich day from all the different presentations and discussion of the AC21's report and recommendations and some of the actions that have been -- that are underway. And as Dr. Woteki mentioned, in your packets there are a couple things you can do to prepare for tomorrow.

Tomorrow really is all about getting you into smaller groups. I mean, we'll have some panel presentations but the majority of tomorrow, if you've looked at the agenda, is to get you into smaller groups and really have conversation and gather a lot of feedback, not only the USDA but just generally in terms of what are some other things that not only USDA can be doing and get some specific reaction to the recommendations, what's underway, what's proposed. But also what others could be doing. And that's a lot of what the poster session is about. And extract as much feedback from you as possible in thinking about how to move forward with supporting choices for growers and meeting the demand.

And as you've heard today, a lot of -- some of the -- where there's still some rubs or challenges from all different parts of the food production system and some ideas about how to address that.

So a couple things, one is the

materials that Dr. Woteki mentioned, there's a three-pager of activities that are already underway, that summarizes what the panel went over for you just now. There's also another document in your folder that are new proposed USDA activities. And this is actually how we're -- this first panel tomorrow will go over that as well.

But I think it would really help prepare you for tomorrow if you look that over, refreshes your memory from today's discussion and then also gets you set for that first panel tomorrow. That's really going to be the focus of the discussions in the breakout sessions. So it's really some feedback on what's underway and what's proposed, what are some things that are maybe missing from your perspective that not just USDA can do but others could do in helping support coexistence.

And then lastly, and Michael Schechtman alluded to some of this in some of the comments and some of the deliberations of the

AC21, there's a lot of coexistence starts at the neighbor-to-neighbor level. And others have noted that there are other things that could help support that, that that's not always enough from some people's perspective.

But a lot of it is trying to support that. And so what mechanisms could possibly support that, who could do that? It's not just USDA's potential role to do that but there are lots of candidates and lots of mechanisms that could be contemplated to help facilitate those kinds of discussions and dispute resolution mechanisms where those take place or to avoid disputes. So it's really to help foster that at the ground level.

Those are going to be the big questions of the working groups and we'll go over this tomorrow.

The other piece of it, along the lines of what else are we not thinking about or what else is out there is what the poster session is all about. So when you adjourn we'll go to the poster session -- is that right outside or is that downstairs? Right outside. And as somebody mentioned there's some good North Carolina treats out there including some fermented agricultural products for you to enjoy. And that's for -- to talk to people about the posters, to talk amongst yourselves about today's session, and we do -- I think we have to clear out of the building at 6:00. So you just need to be aware of that.

And you also should be aware that tomorrow we're meeting at a different location, if you didn't know that already. You should definitely know that by now because we don't want you to show up here. And Mike, do you want to give the location? Oh, here it is. Okay.

So it's at the McKinnon Conference Center, 1101 German -- oh, Gorman -- need glasses, sorry. Gorman Street -- yeah. So do you know how far or how close that is from here? It's on campus.

MIKE: It's about maybe a mile.

MS. DILLEY: Okay. So you can get

your coordinates. Those of you who have smart phones you can follow your smart phone.

Also just for the poster sessions, we're going to start tomorrow when we come back, just to warm you up, on some reflections on the poster session. It's not a quiz but it is kind of to process a little bit, get some reaction, get some thoughts just in terms of what you're seeing in the poster session and again, just to get you prepared for the discussion tomorrow.

So any questions?

(No response.)

MS. DILLEY: Any last comments? Mike? Michael? Cindy or Jim? Anything else?

(No response.)

MS. DILLEY: All right. Then with that we'll adjourn for the day. Please head to the poster session and thank you so much for a very productive day.

(Whereupon, the session was adjourned at 4:47 p.m.)

J

C E R T I F I C A T E

This is to certify that the foregoing transcript

In the matter of: Stakeholder Workshop on Coexistence

Before: USDA

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Place: Raleigh, NC

was duly recorded and accurately transcribed under my direction; further, that said transcript is a true and accurate record of the proceedings.

Neal R Gross

Court Reporter