

FOOD SECURITY IN THE NEXT DECADE: THE POWER OF THE PRIVATE SECTOR

Panel Moderator: *Ms. Cynthia Hardin Milligan*

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Panel Members

Mr. James Collins CEO, Corteva Agriscience
Mr. Liam Condon President, Crop Science Division, Bayer AG
Mr. Erik Fyrwald CEO, Syngenta
Dr. Chris Nelson President & CEO, Kemin Industries
Ms. Josephine Okot Managing Director, Victoria Seeds Ltd.

Panel Moderator

Ms. Cynthia Hardin Milligan

President & CEO, Wood Stieper Capital Group

Good morning. We're so pleased to see you all here. I am Cynthia Milligan. And yesterday we spent time with academia in the nonprofit sector on talking about the future challenges for agriculture production. Today now we're turning to the power of the private sector in addressing the challenges that production agriculture is going to be facing over the next few years.

So this panel is made up of CEOs of major companies that contribute to the solving of some of these issues for production agriculture. Let me introduce to you who is on the panel. I'm not going to use their time by giving their complete bios. You have those, as you know, in your book, so if you would look at those... But on my immediately left and you're right, next to me, I guess, your right of me, is Mr. Jim Collins, who is the CEO of Corteva Agriscience; then Liam Condon who is the President of the Crop Science Diversity of Bayer; and then Josephine Okot who's the Managing Director and founder of Victoria Seeds in Kampala, Uganda; third is Erik. We've got Erik Fyrwald, who is the President and CEO of Syngenta; and finally, in a different order than I had them, is Chris, Chris Nelson, President & CEO of Kemin Industry, which as you know is based here in Des Moines but is worldwide.

So we will get started with questions, and the first one we'd like to address is on the current trendlines – and with the increasing challenges of climate volatility, are we on track to feed the nine to ten billion people by the year 2050, and if not, what would be needed? So we'll start with you, Jim.

Jim Collins

Thank you. Thanks, Cynthia, and good morning, everyone. It's great to be back with you again today and with my colleagues here on this panel. It's a great question. For those of you who heard me speak yesterday on the climate panel, you might recall that I talked about Corteva's commitment to advancing the science behind making agriculture more climate-positive and we committed to doing some things immediately to really begin that now.

Now, that commitment, that is one of the big challenges that I think go hand in hand with your question around food security and the progress that we need to continue to make to feed the nine to ten billion people that we've talked about. So working in that one space to double productivity while improving the sustainability of the product system, we view those two things as hand in hand. So we've made good progress. I think there are recent studies out around food security that, at the pace that we're on, that we will continue to improve the food security of countries around the world. At the same time, that pace is not going to be fast enough or steep enough to rise to the challenge by 2050.

So it's going to take a number of elements, and I think that's why companies like ours and others represented here are a part of a very powerful opportunity to drive forward things like the use of data and information, the use of biotechnology, education, especially of the smallholder farmers. Our ability to double productivity in some of the African countries that we interact in today is simply a matter of just sharing good agronomic information – no big technical change is needed to take those first big steps.

So I would say we've made good progress but at the rate of change and the rate of pace that we're on today, we're still going to fall short.

Cynthia Milligan

Jim, do you want to make any comments about Corteva?

Jim Collins

As part of the opening, I think everyone heard a little bit yesterday about Corteva. As you know, we became a standalone, pure-play ag company effective on June 1st as we spun out of our parents, and we stood up a company some 20,000 folks around the world serving growers in over 140 countries. And we're real excited about the focus that Corteva has on the grower but also being very mindful of where the large consumer trends are headed and trying to be a champion to bring long-term consumer ideals together with helping those growers right there on that farm really rise to those challenges.

Cynthia Milligan

And Liam and each of you, why don't you tell us a bit about your companies and what you're doing as you address the question on the challenges.

Liam Condon

Thanks a lot, Cynthia. So it's great to be here, and I represent Bayer as the president of Bayer Crop Science. And we acquired last year Monsanto, and this is actually now the first full year of being together as a new, combined company. And the reason behind that at the time was

actually quite simple, and we both... I think both legacy companies foresaw an increase in the challenges in agriculture, that it was going to get more and more difficult, particularly also with climate change but simply due to the fact of the growing population, there's limited natural resources, limited land, limited water. And our hypothesis was – we still need a lot more innovation than we're actually currently producing. And to do that, we felt we could do it in a much better way as a combined company.

So that was kind of the background for us. And as we look at the situation today and with your opening question, I have to say I studied for a while economics, and the great thing about economics is – you can explain every problem in the world through a simple graph which is based on supply and demand. And if you look at the supply and demand equation of the food system, and we'd have to say that the food system is not on a sustainable trajectory on the demand side, and I think it's clear we have over 800 million people that go to bed hungry every night. We have another two billion who are somehow suffering from malnourishment. And so in essence you've got about half of the global population on the demand side is actually nothing served by the current food system adequately. And then on the production side, the supply side, clearly production is still too resource-intensive. We've made great progress, but if we continue at the pace that we've had in the past, this is not a sustainable trajectory. So I think both on the demand and the supply side, clearly we need a lot more innovation to get to a healthy, sustainable food system.

Cynthia Milligan

Josephine, if you'd tell us... I know 15 years ago you founded your company because you saw a need. If you would, tell us a bit about that and then talk about the challenges and what you're doing to meet them.

Josephine Okot

Yeah, in the context of feeding the world or feeding Africa in 2050, I think companies like Victoria Seeds, it has a role. But there are three areas that must be addressed if we are to achieve that. The gender gap, empowering women. The second one is public investment in, not just research but also extension, climate-resistant, climate-resilient agriculture, and it should be sustainable. And the third one is political will.

So start with the first one. When I speak of empowerment of women, if we look at the FAO, I think the report for Uganda in 2018, it still shows what was happening at the time I was starting the company, that, yes, 72% of the population is engaged in agriculture. But out of that, the labor force is provided by 76% of women, mostly crops. It's most of the crops produced, the labor is women, and men are mostly in fisheries and possibly fisheries and livestock.

So if the women are doing most of the production and the sad reality that the primary tool is still the rudimentary tool, the hand hoe. To me I see it as a disgrace to humanity. If we set a goal to eradicate polio by the year 2000 and it was done, I think we need to have some kind of goal to eliminate the hand hoe. You cannot feed any population without mechanization. And I think that is something that must be reversed. We must have mechanization. I know in your part of the world it's just something that is taken for granted but mechanization at production at crop management and post-harvest; very basic mechanization. And I think that's where perhaps the creativity and innovation should come in. If the women are doing most of the production and it's mechanized, then that would help address the gender gap, and they're empowered.

Then I spoke of public investment, yes, because climate change is something that, as a business, we are contending with. I spoke about it in other forums. Drought tolerance is critical, but the biggest challenge is what can drive growth: Agro-industrialization. But even if we have seed systems – if you do not have matching finances, it won't work. As of now, when I want to grow and I have any creative ideas, you can only get short-term loan of one year, and you borrow at 20%. I think there is no way that any kind of scaling up can happen; that is very, very difficult. And as I mentioned earlier, the financial institutions themselves, they don't have what it takes to provide the risk. They are bankers – they are not extension people. They don't understand how to provide this risk, and they therefore cannot come with proper products. So we really need to look at all the boards of the financial institutions on the continent. And it comes to the lower level loan officer. They just need their mindset changed, and they need also be trained to understand to provide the risk.

And the third one, political will. All these things, you can't do it without political will. And I mentioned, because we always have the regional blocs, COMESA, SADC, ECOWAS, East African community where I come from. I always see our heads of state going and taking photos, and they make decisions. But they need to start taking business leaders with them up to the African Union.

And then we have success stories over the continent. For example, if Uganda wants to go into agra-industrialization of cassava, we have Nigeria to learn from. So all those successes, it's political will that drives it. I think if all of that is brought, then you will have much more successful businesses, and then we will be moving towards the goal of feeding the world in 2050.

Cynthia Milligan

Thank you, thank you. Erik, we'll toss the ball to you, and if you want to make any opening remarks and then address this question of – can we meet the challenges of feeding the additional population?

Erik Fyrwald

Well, first of all, it's great to be back in Des Moines. I lived here with my family for a number of years back in '03 to '08 and also great to be here for the World Food Prize again. It's such an important town for agriculture globally and such an important event. In fact, you get a sense for how committed the community is to agriculture when at the front desk a volunteer was my daughter's eighth grade science teacher, Jodi Balmer, and see people like Paul Schickler and others that are here that have such a big impact on global agriculture. So, great to be here, first of all and also just great to be here for Ambassador Quinn's last year. He's had such a huge impact on global agriculture, so we really appreciate all that he's done.

But let me talk about the challenges. I'm now the CEO of Syngenta, and like Corteva and Bayer, we're a global agriculture technology company focused on seeds and crop protection and bring them to farmers around the world and bringing new technology to help farmers feed the world but also to take care of the planet while we do that.

And I think with the growing population, the growing needs to feed the world, I think we have challenges. I think we have big challenges. And you heard about some of these. I think the first thing we have to do is we have to help farmers adapt to climate change. Just think about what's

happened in the Midwest this year – the worst flooding in the history of the United States. This isn't... I remember 5-year floods or 10-year floods, or talking about maybe 15-year floods. This is in the history of the United States. At the same time we have the worst drought going on in Australia in the history of Australia. Highest temperatures in France and other countries. I mean we have dramatic weather events that we have to help farmers deal with. And we have to do that with technology, and we have to do that with agronomic advice and digital tools, but we need science-based regulatory processes around the world so we can keep bringing better and better technology to help farmers deal with climate change. And we have to help them with learning how to do it as well.

At the same time we have to help farmers reduce impact on climate change. Agriculture and food value chains contribute 25%, roughly, of greenhouse gas emissions. And I think we've done a great job of bringing farmers technology to reduce that impact, but we have to do more. We have to work together as agriculture technology companies, with farmers and through the value chain with food companies all the way to consumers to do things like increase yields throughout the system, reduce waste, be able to feed the world with less land so that we can not only stop deforestation but reforest.

And that takes technology and that takes training of farmers around the world. And in the developed world we have those systems to do that. In the developing world like Africa, we have to do more. We have efforts like the farm-to-market alliance that Syngenta, Bayer and food companies and others are working together to help farmers better access the right technologies, learn how to farm, but also get their crops to the marketplace. And we need to do that in a way that the farmers earn a decent living but also take care of the land, reduce the impact on climate change and produce more feed to feed the world. If we can do both of those, we will solve this challenge.

Cynthia Milligan

Chris.

Chris Nelson

Good morning, Cynthia. Thank you very much. I am Chris Nelson from Kemin Industries here in Des Moines. We're also a global company. We manufacture a series of ingredients that go both into animal feeds as well as human foods. Approximately 40% of the ingredients that we manufacture actually come from plants. We're the largest growers of rosemary, the largest growers of oregano. We're largest growers of spearmint in the United States. And we harvest these for very particular molecules that go into human food as well as animal feed to provide specific nutrition as well as to provide specific activities.

When I think about – can we actually feed nine billion people in, say, 2045, the pessimistic side of me says absolutely there's no way on our current trajectory that we will be able to do this. The negative part of me is not so much on the science and technology, because as a scientist myself, I know that we are on the road in many cases to be able to provide the technology to be able to feed nine billion people. The problem becomes really within our political, our regulatory institutions.

When I look across India, which we're very active in, and realize that there's still 80 million children that are stunted due to inadequate nutrition during the first thousand days of life and

then through age five, we know that that type of nutritional imbalance is not necessarily due to lack of technology but really is due to a lack of political will on so many levels to be able to get food to the right people and nutrition to the children, literally, that need it. That pessimistic side of me on a political area says that we who have been involved so much in the technology can no longer sit by and develop only the technology – and as the famous Iowa movie says – “Build it and they will come,” this is not necessarily the case.

Cynthia Milligan

So what technology are you all excited about that you think can make a difference? I feel there was some pessimism there. Let’s turn to a positive side. Is there something out there that you’re seeing or would you like to see that would really make a difference in the future?

Jim Collins

I could maybe start with two that I'm specifically aware of. One is the advances we’re making in data and informatics and use of tools like AI to help mine information and make it more broadly available so that everyone can use it. And I'm often struck by... On an annual basis here in the U.S. we have corn yield contests. And you’ll know that average yields in the United States, you know, about 170, 180 bushels an acre; really good soils, really high-managed farmland can do well over 200. And the people that are winning these yield contests are delivering 540 bushels of corn per acre. So this just isn’t a 5 or a 10% increase, it’s a dramatic increase and they’re using the same commercial hybrids that their neighbors use.

So the only difference between what that person is specifically doing versus another is knowledge. They have knowledge and information and other agronomic techniques to help squeeze that yield that is onboard that plant. It’s there today, to help squeeze that yield out and make it available. So if we can do this on an acre basis on a small farm in Virginia, for example, we should be able to take that knowledge and information and leverage it. So that’s why... And I agree with Chris – I'm optimistic that the technological solutions are not ten years away – they’re here right now. So knowledge and information is one area.

The second, I would agree, has to be about the regulatory frameworks by which we bring some of these newer breeding techniques that we have available to us to market. And it’s why Corteva, along with other folks here, have really focused on – how do we learn from some of the mistakes we made in the past around GMOs and GM technology? How do we become much more transparent and share the benefits? And how do we use those tools to actually do more good things that society will actually recommend as a positive. So things like I mentioned earlier, how gene editing could help with improving agronomics so that a plant could actually be part of improving the climate – not, as Erik said, having much more of an impact.

So those are two that I'm aware of that we have right now today. Those aren’t ten years away.

Cynthia Milligan

Liam, do you have something to add?

Liam Condon

Yeah, that may be three technologies that I'm very excited about that I think will be completely disruptive in agriculture in a positive sense but also related to that one big concern. So the three technologies, I'd say, is – number one, everything related to gene editing, CRISPR-Cas on the breeding side that I think there will be tremendous progress possible here that would also help us from a sustainability point of view. And number two, I'd say synthetic biology, so the ability to actually bioengineer microbes. And take the example that was on the previous panel as well, and if we can help, that microbes can basically fix nitrogen from the atmosphere and you'd need significantly less and synthetic fertilizer, the impact of that has from a sustainability point of view is tremendous.

And the third one is everything related to data sciences, the digitalization of the farm, because that allows us to act in a much more precise manner than was ever possible on the farm and with that avoid waste. And we're talking about dealing with a situation where again we have limited land, limited natural resources. So anything that can help us work in a much more precise manner, avoid waste - is going to be a huge benefit.

And I'm completely convinced that we have all of the technology and innovation either with us today and/or coming soon. So we can feed ten billion people probably on less land than we even have today. I think this is completely possible. I think the big issue is – Will this innovation be allowed? And that's been brought up a couple of times. Will the political/regulatory will be there? And the political/regulatory will is heavily dependent on whether there is a societal acceptance for the innovation. And that societal acceptance needs to be based on – and what are the perceived benefits for consumers? And I think this is a part of the equation that has been probably it's a muscle that's underdeveloped probably on the agricultural side. And as an industry, I think we've spent a lot of time focusing on benefits for farmers about what we do, and we've spoken less about benefits for consumers, either from a nutritional and/or from an environmental point of view. And unless we engage much more explicitly around this and make it clear what are the benefits but also be open about the risks of new technologies, I fear that there will be a pushback on the acceptance of the innovation that clearly has tremendous benefits for society.

Josephine Okot

Yeah, Cynthia, the technology that really excites me is precision farming. And precision farming is a way of addressing many of the challenges at once. As a seed company, we have the seed but we lack the extension now and perhaps even information on the market. Once you have the precision farming technology, then you are able to cut your cost of production – you know what is the nutrients required for the crop, the moisture and the soil, any outbreak of disease? So it's still a work in progress. I know under my heart was Uganda development corporation, on the board we are engaged with University of Turin in Italy and trying to use that technology.

So that is exciting. But then FinTechnology is very critical. As I mentioned, financing is that challenge. Because if we could use such information to de-risk financing, it would be very exciting. Because you know, there are foreign companies, Uganda is open, there are foreign companies that operate but not one of them borrows from the commercial banks in Uganda. In Masindi where my factory is, you find that they are borrowing at under 1% and competing with such companies. I think it's not fair. So if we can use the FinTechnology... So at Victoria Seeds I can also borrow from StanChart, USA, I can borrow from a European bank at 1%, because then they're able to provide my risk, I don't have to be stuck with this 22% interest. And really you can't grow your business. You are just meeting a dead-end.

And then maybe to the gentleman across, one other thing is – you should look at equity and developing partnerships. That is what, if you are very serious about driving growth in Africa... We can't grow our businesses with debt. There is very limited equity, actually almost zero. So you can come, instead of setting up Syngenta in Kenya, Uganda, Rwanda, you can get SMEs, partner with them, build their capacity, and then we address this common problem. Then the other FinTech is improving access to finance to the rural woman. Right now we have agency banking – it's great, but I think we need a lot more in terms of technology so that they can be profiled and they can access gender-based financing. And we need a gender-based financial policy, and that pushes us back to the political will. Thank you.

Cynthia Milligan

Erik, do you want to...?

Erik Fyrwald

Yeah, and I think GMO technology and gene editing technology... GMO is still very important and will be, and I think gene editing is a very exciting, new technology. Let me give you two examples.

All of us travel around the world around the world a lot and visit farmers throughout the world. And one of the... Really, the number crop in the world is corn, and one of the worst pests against corn is fall armyworm. And in the United States and Brazil, two big corn-growing countries, fall armyworm is not an issue. Farmers get a GMO trait that deals with fall armyworm, and it's not an issue. You go to Africa, and you meet with poor farmers, and you see that fall armyworm has devastated their crop – they've completely lost it. And they don't have funds to withstand that kind of damage. You go to Vietnam, you see the same thing. Now it's going to China. This is a devastating pest that we have technology today that absolutely takes away it away as an issue, and we would love to bring that technology throughout the world – all of our companies would love to do that. But we're prohibited from regulatory issues and other issues. But that's an example.

Another example is – There's a lot of waste in the food chain. You go to grocery stores, you see great fruit, and then a few days later it gets bad, and they throw it away. Gene editing, today we've developed a tomato with gene editing that stops the production of a chemical that degrades the tomato, that makes it become waste after a few days, extends the shelf life by one to two weeks. Technology like that, it's better tasting for the consumer, it lasts longer, and dramatically reduces waste. So these technologies are available today. They are perfectly safe. They are tested, proven safe. We've got to make sure that they can get to the marketplace.

Cynthia Milligan

And that is what Chris was saying earlier, yeah.

Chris Nelson

Two technologies are sort of exciting me, particularly in animal nutrition. The first is... I love your word about precision agriculture, because we're talking very much about precision nutrition. Dairy cows, for instance – we today waste enormous amounts of soybean meal, because we overfeed dairy cows crude protein. The reason for that is the rumen will randomize

amino acids, and we need to precision feed these animals so that the least amount of amino acids are utilized to be converted into milk. That technology is starting to exist. Unfortunately, only about 5% of the dairy cows in the world are now utilizing that technology. So it's a technology that's highly interesting, I think, one that can dramatically reduce the waste that is actually occurring today in dairy production.

The second one that excites me is really about the unlocking of the secrets of the microbiota. What is happening within the intestinal tracts not only of humans and of animals as well? And the efficiency gains that we can be able to achieve for the production of meat, milk and eggs through really an understanding of the microbiota, in my mind, truly revolutionize animal agriculture and again dramatically increase yields and drop the overall needs for these gentleman to provide the crops to feed the animals, that we hopefully can drop those needs a little bit so that we will not have to produce the hundreds of millions of tons of grains.

So those two technologies are the ones that excite me, Cynthia.

Cynthia Milligan

Great. Now, as each of you have been talking about some roadblocks to getting to where you'd like to be, using technology, what are each of you doing to bring other stakeholders into the conversation to maybe turn that around to help with that? Yeah, go ahead, Erik.

Erik Fyrwald

Liam mentioned the importance of getting consumer acceptance, that we need to make sure that people understand the benefits of technology so that they can weigh the risks or the desire to accept new technologies. I think one great example is, Impossible Foods and beyond meat and the new technologies for alternatives to meat that taste really great. So Impossible Foods came out with their soy-based burger, it was very popular with Burger King in some trials and then when it crossed the country with Burger King and a number of high-scale restaurants and a number of high-profile celebrities have endorsed Impossible as this great thing for the environment and great thing for people, for health. And guess what? It's GMO-based, the grain.

So at first they were getting attacked about that, and they were kind of defensive and wondering if they should go to non-GMO. But their CEO and their team studied it deeply, and they came out and said – "No. The GMO technology is helping farmers be more carbon-neutral, emit less carbon. It's healthy. There's no health issues with this. We're going to step up and say this technology is good for the world. We're not going to back off just because there's some non-science based discussions about it. We're going to back the science."

And I think that's really important, that not only a company like Impossible stands up for the science that's better for the climate and perfectly healthy for people but also the endorsers like Ellen DeGeneres and Venus Williams, Serena Williams and others are stepping up and saying this is great technology – this is really great for the world. I think that's what we need. We need the consumer pull rather than the technology push.

Cynthia Milligan

Liam, do you want to add to that?

Liam Condon

Yeah, I completely, completely agree with what Erik said. And I think what's really important for us and everybody working in agriculture, and we've got to make sure that we're not working in an echo chamber and just people talking to each other about the wonderful things that we do and complimenting each other.

And I think we've got to do a lot more outreach and particularly also to critical groups who do have concerns, genuine concerns about how agriculture is performed today and, but also often a lack of understanding. And there's often a lot of people in cities who have a strong opinion about agriculture but have never actually have been on the farm. And I think we need to encourage a much broader-based dialogue. And that requires outreach. I think all the companies here engage in this, but I think we need to do this simply at a different level. And this requires industry, but it also requires, I believe, academia, it requires government representation, NGOs, civil society.

And I think there's different ways of doing this, and we as companies can convene, but there's often a challenge to that, because it might be a perceived bias about what industry actually wants. Sometimes it's helpful to have neutral conveners, like universities. But I think the key thing is that we do have an open dialogue with all sections of society and focus on forward-looking – what do we actually want to improve? And always bring the conversation back to the farmer and how are we going to help the farmer in this specific situation.

And here I fully agree with what Josephine said. Particularly if we're thinking about smallholders and especially in Africa, the key is not that we're just pushing more, let's say, better products. The challenge is often much more basic than that. It might be access to finance. It might be access to markets and might be simple lack of knowledge about basic agronomic practices. We've got to make sure that there's a locally relevant ecosystem that is supportive of smallholders. And I think this is something where we're making progress, but we've got to be able to scale this. And I think the more we can go in this direction, the better.

But I think this broad dialogue in places like Europe and in the U.S. is really important, because what's often forgotten is these political decisions taken particularly in Europe massively affect Africa. So regulatory decisions taken in Europe and the example of gene editing – if Europe says they don't want gene editing, most likely that door is then closed for Africa. And this is basic. This is political colonialism, and it's based on pressure from society, and that's why we need to engage society to make sure that we can get access also for Africa.

Cynthia Milligan

Do you want to jump in there, Josephine? And then we'll come to Jim.

Josephine Okot

Yes, great point Liam. All the decisions that many times really impact on Africa, and I think it's common knowledge that I think when most of the multilateral systems were created, I think around 1947, Africa was nowhere in the room at all. They usually say they were in menu. Yeah, so then many times they're not part of these decisions.

So as a business, I think how we can influence these regional blocs, these regional blocs need to have a strong say, and they shouldn't just pick as a political bloc, but they need to engage with the businesses so that many of the decisions that impact on us, we can relate back. And to me I think that there is an understanding that, yes, there's a reason for climate change and the recurrent drought. I think we saw what happened in Mozambique earlier, and it's common knowledge, but it's not being translated into actual policies that even affect like nutrition – because it's related to nutrition, it's related to education, it's related to the financial sector. It cuts across the entire economy. So I think as a private sector, we really need to continue to lobby with both development factors and also the government and among our own industry and institutions.

Cynthia Milligan

Good, Jim.

Jim Collins

I think the only added thing... I agree with everyone that consumer demand pull is key and certainly the engagement that Liam mentioned, and we're doing a lot of that as Corteva. But the one piece I would add is about youth, the young folks, is getting them excited about agriculture early, explaining some of the things that we're talking about here early on and really mobilizing this next generation. Because we've lost a generation to some of the misinformation that's been out there, and so I think it's something that Corteva is also very committed to. It's that youth education, youth involvement, and the Borlaug Youth Dialogue is also something that I think does a really great job of bringing youth in from all around the world and helping them now go out and be missionaries and wanting to be part of agriculture and helping to educate others. They're our next consumers, and they're going to be excited, and they're certainly probably going to be involved in the political arena down the road. It'll be nice to have some friends out there.

Chris Nelson

I'd like to build this a little on what Jim said, because I think it's really critical. We at least at Kemin feel that very strongly we have to engage youth in understanding science early, that this starts off in first and second grade, that science is not something to be intimidated with. And unfortunately I think we've gotten into a generation where too many people have abdicated their thinking that you have to be a trained scientist to understand some of these issues. And these are critical issues facing us all with nutrition and climate change, and they can be understood by everyone. And so taking this aura away that we're going to have only the scientists be the ones who are educated on these areas is something we feel strongly about and that we just have to start in the very early grades, that regardless if you become a lawyer, a policeman, a fireman, that you too can have a scientific view on climate change and that you are adequate enough to do that with your education.

Cynthia Milligan

You know, our eating habits are constantly changing, but I think that's accelerating, and maybe it's through communication that we learn what's better for us. And so the public changes their eating habits in different parts of the world in different order. How can we respond to that? Can

we do it quickly enough to get it down to production agriculture? And are you involved in any of that?

Chris Nelson

Yeah, I can make an opening comment on that. There are enormous changes happening within nutrition as well as eating habits. And some of that comes from unfortunate, unfortunate rumors and things that... I would hate to say fake news that is within social media. But those types of things can only be dissipated through further education. And our efforts along those lines are really to specifically focus on coming back to the science of nutrition, because we do know so much that we just have to now push that into the decision-makers that are shopping and whether they're shopping in an open market or shopping in a grocery store, to be able to make the right nutritional choices.

Erik Fyrwald

Well, and also if you look at the data, and Louise Fresco who's on our board, the president of Wageningen University, keeps reminding us that people eat far less vegetables than they need, far less. We eat about 40% of the vegetables or less than we should be eating. So one of the things we're trying to do with our vegetable seed business is keep making vegetables taste better, make them taste better, make the shelf life last longer so they're less expensive for consumers to buy everywhere. But part of nutrition is so simple. We know we need to eat more vegetables, so let's make vegetables more available for people all over the world and make them more attractive, the look and the taste, so people will eat their vegetables. Simple.

Cynthia Milligan

I was going to do a follow up on how are you going to do that.

Erik Fyrwald

It also gets back to children. You start young children eating their vegetables, and then they expect to eat them for the rest of their life. If they don't eat them as a kid, they'll never start. So educate them as a kid that these are good for you and make them available. Don't make the candy and the easy stuff available, and they'll get the habit.

Cynthia Milligan

Anybody else want to jump in on this?

Josephine Okot

With vegetables, the context of climate change for us, I see we have exotic in the company and indigenous vegetables. So you see in terms of climate adaptation, the indigenous vegetables are more resilient. But the challenge is when you go to all the menus, you find that you need a mindset change so that the ones that are more resilient to the climate are the ones that should be readily available to be consumed. But in terms of eating habits, yes, the population is getting more health conscious, but also there is a drive towards organic products for the export market, which I think is a special niche for us, because we missed out in terms of high level of intensive farming. It's not yet there in the light portion of Africa. So perhaps we can capitalize on that and use that to drive organic production, together with conventional and I believe GM technology.

The challenge is just how do we get it segregated so that we know that this is GM, this is conventional, and this is organic. But I think there is great opportunity there.

Cynthia Milligan

As we work toward a close here – we don't have much time left – but why don't each of you tell us what work you're either doing or have done that you're most proud of.

Jim Collins

I think it starts with some of the things we talked about around taking these amazing tools that we have from a biotechnology perspective, conventional breeding, and thinking of ways to elevate the role that agriculture can play in solving the two big challenges that we've been talking – feeding – and we know we can do more with less inputs. But also – how could agriculture play this amazing role as being part of a solution around things like climate change. It can actually be part of the answer, no longer part of the problem. So the way our team has incorporated that thinking into the way we're designing and developing new products to Liam's point, the way we're engaging now with a broader set of folks. And every employee, 20,000 folks around the world knowing that they're a missionary for that and actively a part of their daily routine of finding some way to engage in the discussion to have a better dialogue to maybe move some perceptions. And that has occurred very, very quickly, so I'm really proud, as the Corteva team has come together globally, that we've really adopted helping farmers and also being connected to consumers and starting to be part of that dialogue of positive benefit and not so defensive on all the negative things.

Liam Condon

Yeah, I guess overall, I mean both as Bayer and as an industry, agriculture, I think we can all be tremendously proud that we are actually feed the world. I think if you look at where we're coming from – and I come from a country that was devastated by hunger. In Ireland in the 1850s a million people out of a population of eight million died because of hunger, because a potato crop failed for something as basically a disease as potato blight. Another million people left the country at the time because they were starving and they didn't see a future. And most of them, by the way, ended up in the U.S. That's why the genes in the U.S. are so good.

But I think the pivot now is for us as an industry and what we can and need to be more proud about but also make the pivot is, and similar to what Jim said, it's not just about feeding the world. It's about feed the world without starving the planet and making agriculture part of the solution of climate change as opposed to being seen as a key part of the problem. And I think if you can combine, if we can combine all together those two – feed the world and do it in a sustainable manner, there is no more exciting industry in the entire world. So I think we can all be proud about that.

Josephine Okot

What I'm most proud of... I come from Northern Uganda. We had a 20-year civil war, and my own observation during war, the women hold the households and it was the motivation that got me to start Victoria Seeds. Because I realized that to get their dignity back, they really needed to go back and have some control over what they do. And I remember while the very, very first farmer groups I engaged with were from an internally displaced peoples. And when I

went to them, I said, "You know, I've come to you today. I am not far. I am not CRIS. I'm not World Food that is giving you free handouts. But all these people will not be there, but I'll be there. I have nothing to offer you today except the knowledge and engage you as seed contract growers." And I know there was some book that was written later, and it's entitled *The Look on Their Faces*. So the look on their faces after they realized that when they engage with a seed enterprise price, it is not just knowledge but they also guarantee themselves some market. So that is something that always stays and makes me truly proud. But most important right now it's good to know that the farmers we engage with now the difference between just hybrid maize and drought-tolerant hybrid maize. So it took a lot of hard work for them to choose that and giving that basic opportunity for the farmer to be able to know that they better pick up the drought-tolerant hybrid maize to address the challenge of climate change is a major success for me.

Cynthia Milligan

Erik.

Erik Fyrwald

The thing I'm most proud of is how we help smallholder farmers around the world, as Syngenta and as an industry. Week before last I was in a small village area of Eastern India called Elru, and we have a Syngenta Learning Center there, and we only teach women from poor areas how to develop agriculture careers. And somebody asked, "Why only women?" Well, if we had a mixed classroom, the men would speak, and the women would be pushed to the side or they wouldn't be there. So we only teach women. And to see the faces of these women that otherwise would have no professional career – they would be at home doing very little, maybe getting water – but knowing that they're going to have a great career in agriculture just makes them so happy and so thrilled. So I'm very proud of that.

But I would also say that we're doing a lot as an industry to feed the planet and deal with climate change, but I don't think we should be proud until we stop the increase of CO₂ in the atmosphere and see that start decreasing. And one of the first goals that we have to have is stop deforestation. We cannot solve climate change as the forests burn. We have to stop that, as an industry.

Chris Nelson

You know, as I look back, probably the thing that I am most proud of is really the change that I have seen within our industry. When I entered agriculture almost 40 years ago, quite frankly in all of the technology fields, it was male dominated, completely male dominated, and there was nothing close to gender equality. And I look especially – and gender equality still has a long ways to go – but as I look across the scientists especially that have now come on and are now leading so much of the technological efforts at our company as well as throughout agriculture, to have this closer – I won't say equal – but closer to some sort of gender equality, and to finally been talking into literally half the population who was never asked about their ideas on science and how to solve these various problems. That gives me great hope that we will actually be able to feed nine billion people in 2045. Thanks.

Cynthia Milligan

Well, we have gone over, but I just personally, and I think I'm speaking for the audience, have been so fascinated with the knowledge you all have and what is happening, both the pessimistic side but particularly the optimistic side. And finishing with this optimistic side, I'm just sorry there's not more time. But we thank you for coming and talking with us this morning. We've all learned a lot. Thank you.