

**2014 BORLAUG DIALOGUE**

October 16, 2014 - 9:30 a.m.

Speaker: *Dr. Emma Naluyima Mugerwa*

*Introduction:*

**Ambassador Kenneth M. Quinn**

President - World Food Prize Foundation

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Now, another person I think he would run up and want to greet is Dr. Emma Naluyima. Dr. Emma, come up here. And you heard Ruth talking about her. I was in Uganda and just taken almost sort of by chance to go to her farm. And we were all astounded by what she was doing. But I thought, you know, I don't know so much about Africa. I don't know if it's a big deal or not. And then Ruth said, "Oh, my gosh! She's the model for what every smallholder farmer in Africa can be and should be." And so I said, "Dr. Emma, you have to come here and be with us and tell everybody about what you are doing."

So first time in the United States, is a doctor of veterinary medicine. Her farm is near Entebbe. Everybody who goes to Uganda should come and see her, because she's also building a school there for young students to teach them about agriculture. Dr. Emma, welcome to the World Food Prize.

**IS THIS THE MODEL TO UPLIFT THE AFRICAN SMALLHOLDER?**

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**Dr. Emma Naluyima Mugerwa**

Ugandan Veterinarian and Smallholder Farmer

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Thank you, Ambassador Quinn. Good morning, ladies and gentlemen. Like you've been told, I'm Emma Naluyima, a smallholder farmer. Between 4 a.m. and 7 a.m. I'm a farmer. Between 7 a.m. and 11 a.m. I'm a mother and a wife. Between 11 a.m. and 6 p.m. I'm a vet, and between 6 p.m. and 4 a.m. I'm the mother and the wife. How do I do all this. It's very simple – that's what I'm going to give you, and that's what I'm going to show you here today.

But we are here to answer the million-dollar question of – Can we feed nine billion people by 2050? And I'll use President Obama's catch-phrase – Yes, we can. We can. And how can we do that? I'm going to show you how we can do it, by tackling household by household. Like Mother Theresa said, "If you can't feed a hundred people, feed only one." So if we can teach our farmers how to feed themselves, household by household, then we have fed the whole world.

Is this the model to uplift the African smallholder? The answer is yes, and actually this is the answer to almost all the questions we've been asking the whole of yesterday, the whole of

today, dealing with gender – I’m a woman, so, yeah, we can actually tackle that through gender; the youth, I’m a youth, so we can actually tackle the youth and give the answers to the youth through agriculture.

Yesterday I was attending a reception of the livestock sector, and one person asked, “How come we are at a side event? How come we are not part of the real event?” Livestock fellows, I’m here now – we are part of the real event.

Also, questions about the developing world – I’m in the developing world. I’m a Ugandan, so we have answers to that. And all these answers are going through this smallholder unit. Land issues – issues of nutrition. Are we going to do agriculture? Yes, the issue of productivity. But are we producing the right amount of food with the right nutrients? The answer is still there in this smallholder equation.

Now, Africa has all it takes to be the food basket of the world, more so, my country, the Pearl of Africa, Uganda. But unfortunately, we still don’t feed our people. Most of our people are still going hungry. So what does that mean? Yet we have a lot of fertility soils – the soils, yes, they’ve gone down, but again they’re still fertile. Something to do with adequate rain. Right now in Uganda I think our minimum rainfall is between 1,000 to 2,000 millimeters – that is a lot of rain. And then you have fresh waters. We have all what it takes to actually produce food, but we are going hungry. It’s very absurd.

The reason why we are doing this is because we don’t know how to cut our coats according to cloths. Remember the song of Dolly Parton, “The Coat my Mother Made for me” – something like that. Now, if Dolly Parton’s mom didn’t have money but it was winter and Dolly Parton had to go to school, so the mom had two options, to either tell Dolly Parton, “You know what? I think I can’t give you a coat – stay home, and you don’t go to school, or you go to school cold.” What she did? She got the pieces of old clothes she had and made a coat for her.

So in Africa our problem is we have all these pieces of land, all the tiny little pieces of land, but we don’t know what to use them for. We think we must get something actually bigger to do, but if we utilize exactly that we have, we can actually make a very big difference. We are all millionaires, but we don’t know how to cut our coats according to our cloths.

Now, the solution that is the model for the smallholder – the model is integrated farming and energy production systems. This means to reconfigure our production model to optimize production, not only to increase quality and reliability of the product but also utilize the production waste to generate other product lines and revenue systems.

Now, we are using the theory of symbiosis where every element is interrelated. What we do upstream impacts on what the production process is. Take, for example, livestock – what you feed your cow will impact whether this cow is going to produce milk. Is it going to be actually enough milk? And then what you treat with the cow again, is the dung going to be enough. Are you going to use the dung for other issues, like producing biogas? So what you feed this cow will impact on what you are going to get later.

Now, my farm is a one-acre farm. It is a wonder farm, and I’m proud to talk about this farm. Now, on this farm you can do so many things. I’m endowed to have that one acre, but I make it

in quarters to make this other person maybe who doesn't have an acre to still be able to still be able to produce something on whatever piece of land they have. So this is what I do.

On a quarter acre you put a home. On the next quarter you plant perennial crops. On the next quarter I plant livestock, and the next quarter I put some vegetables. Now, the first quarter, that's where I have a home, and around the home you can plant whatever anyone plants. Now, this is what I do. So I have about five mango trees, two to three jackfruits, oranges, one to two paw paw trees, one to two guavas trees. And in the flower garden, instead of putting flowers – flowers are really nice, they're really, really nice, but they're not edible – so I put plants. If I were a florist, I would use them, but I'm not, so I put plants that I'm going to eat. And this is a hearty meal for breakfast.

Now, back home the only time someone can have this is if she went to a hotel, but here I have it almost every single day. That's what I have for breakfast, plus maybe a piece of cassava or a piece of bread or anything. And I'm proud actually to say that, when the members of the Sasakawa came, I fed them to a hearty breakfast. It was actually brunch, and everything they ate we got from the farm.

So this person, if they don't have the rest of the quarters, they can use this to actually do something in their homes, and that is our pineapple in the flower garden; the other side I have guava trees, the other side I have watermelon.

Now, in the second quarter, if this person is willing now to have the second quarter like I do, in the second quarter I do perennial crops. Now, back home again our staple food is Matoke so I plant a hundred plants of bananas just in a quarter acre. You may notice that on this slide I put dollars. Remember, we need to attach value to what we do, and the only way I can encourage the youth to actually go into farming is to tell them, "You know, this is what you get when you do this." It's subsistence, but actually you get money out of it, and you're actually saving a lot."

Now, in just a quarter acre I produce about seven to eight bunches of Matoke every week, and I only take one, so I have seven excess. I sell them, each \$12, so on average a month I get \$336 a month just out of a quarter acre. And with good management, the plantation stays on and on and on. I'm going to show you how this plantation will stay on.

And aside, just like a piece of an acre I put pineapples still that I'm going to use to eat, and I'm going to sell them. And I'm averaging about \$480 from that, only two tiny pieces of land. That's the Matoke. And if you notice that Matoke, that is red soil; that soil is rocky. Now, back home when they were training us, we were being told only can plant on loamy soils, black soils. This is red. The Matoke is saying, I will still thrive on red soil. How am I doing that? I'll explain later. And if you see, these are big bunches, very nice, very green. It was a dry season when I took pictures of this, but actually you think it rains every day. And actually I may say I'm a miracle maker – I make rain every single day in my home.

Now, the third quarter – livestock. Now, the livestock people come in. So depending on what the farmer eats, you can keep about 10 to 15 zero-graze cows on just a tenth of an acre. And on average I can earn about \$160 per day from milk if these dairy cattle are producing a minimum of 20 liters, so genetics is very important. And then about 30 sows or hogs on a 20<sup>th</sup> of an acre, or slightly a quarter acre, and on average I can earn about \$60,000 dollars a year from the hogs.

And 200 birds, and these are local birds. The beauty about these birds is they tell you one thing – give me only shelter, and I'll do the rest for you, because they are free-range, they scavenge. All you need to give them is shelter for them to go and sleep at night to save them from the bad dogs and all that. Then later, go scavenge, and they give you yellow yolk eggs, and actually you sell a tray of yellow yolk eggs at \$12. So a week, one can earn about \$336 a week.

Now, you may wonder, it's congested, this quarter – is it real? How can I do that without grass or what? Now, we embrace technology, hydroponic water. Now, this is fodder that we use to feed animals, and we do that in six days only. We plant grass for animals for six days. They're not GMOs, but we use the conditions of germination. Like actually God created the world in six days. If God can create the world in six days, why not produce animals in six days? We use grain legume seeds as fodder to produce highly nutritious, yes, cost-effective livestock feed.

Now, an area of about 162 square feet can produce an equivalent of 25 acres of traditional pasture. So this is where the issue of technology comes in. We must embrace technology, so we use, embrace technology. The only way you can tell these youth – you know what? You can do this and everybody likes smart farming, smart farms, so let's do smart farming, so the youth can be actually welcome to do this, simply because we don't like making ourselves dirty. We don't like doing so many other things, so it's easy to do it the smart way.

So in addition, you have not tractors, heavy machinery, commercial fertilizers, all that. And you can comfortably have something good. Now, that is the hydroponic fodder I was talking about. That is grass, and it actually grows just a short while, just 1/20 millimeters, but it's highly nutritious, highly nutritious. We only use conditions of germination – air, water and warmth, no soil. No soil, no big land, and you have your food for animals. Great. That's it when we've harvested it, so the animal only eats the roots, the pods and the leaves. That cattle, they are really enjoying, and it increases production.

Now, those are my hogs. You know, actually I have a unique name. I'm called, "Mama Pig," much as I'm small, because I'm what I am because of the pigs or because of farming. So those are my hogs. I'm busy feeding them the hydroponic fodder. Now, on the fourth quarter we can do greenhouse farming with high-value crops. How can we do that?

On an area of 8 millimeters by 15 you can yield about 250 tomatoes per week, which is about in six months. So on average again from just that little tiny space, you can earn about \$640 a month. Or I can use the same thing to rear tilapia. Now, we think we must keep or rear fish by going to a lake or a swamp. No. I actually comfortably do it in my compound while I'm looking after my kids. How I do it? It is with that same space I can keep about 1,500 tilapia, and in six months they've attained a kilo, so you can earn about \$3,750 from that tiny little space, all on a tenth of an acre. If I do catfish, I can earn about \$24,000 U.S. dollars from that. This is how it looks like. And it's actually not sophisticated. It's simple material readily available. If you notice, those are boxes of trees, polythene bags, and water. So all I need is to have water, either rain harvest or stream or a swamp, and I make my own lake, I make my own pond. And I can have everything I want; I can have as much fish as I want. That is it when it has grown. I'm benefiting it now.

If you notice, at the back of the garden there are Matoke. And this water – remember, it's stagnant – but this water we change every two weeks and only 10% of the water. And that water we don't waste. You will notice that on this farm nothing goes to waste, so that water when we get it from the fish, we take it back to the garden. Remember I told you that I produce rain every single day, yeah, so that's how I produce the rain. I take it back to the garden. Or these are my vegetables I still do.

Now, for people who say, no, I actually don't even have a single, I don't have that quarter acre you're telling me, I advise farmers – you know, funny thing about it, they're not nice. Back home we don't have a culture of keeping away rubbish; we just litter it around. So this is a way to keep away the rubbish. Just get the polythene bags, put soil, and put plants. And the beauty about it is that, let's take for example, if someone is going to going to ship, let me take, for example, if I'm a youth, I'm not yet married, but I'm doing some small-time farming and later I get a piece of land to go. You know the first thing you pluck is my garden, so this is what I pluck first because it's very nutritious. And look at how green, that is passion fruit, and that's part of whether I served Ambassador Quinn and his crew.

Now, we can also do again under the greenhouse the other part, catfish. Now, tilapia, remember needs a stream, but again I don't have a stream, but I can create the stream using technology. And it's simple technology, just a small, tiny farm, which cannot actually be run by solar, so that simple, tiny farm. Now, down here where there's water, that's fish, and if you notice, if your eyes are so sharp, there's water flowing. And when that water flows, we pump it out, and it goes to the plants. Now, each plant, those are towers. Each tower can take about 80 plants. Now, I can decide – if this is the only thing I have, I can decide, okay, now on each tower I'll plant different vegetables – cabbages, lettuce, spinach, strawberries, whatever I would want, or the alternative, now these are beans, so I can have beans all year around. So, depending on what the farmer wants, they can plant things according. Now, of course, if I want to be commercial, the best thing to do is high value, so I do things like strawberries, so that I get much out. Or if it's just leisure, I still have everything I need to feed my family.

Now, remember the cows – they ate, the pigs ate, the chicken ate, and they make poo, so there's dung. Now, the dung, back home again we have a problem. You find a farmer or a lady, she has dairy cows; they're really good with a big heap of dung. She has no light; she's in darkness. She fetches firewood. She has no electricity. And actually most people, why most people leave the country or the countryside to go to the city, they're just going to get power, electricity. They just want to live in a nice place, that is all. But they're going to live in that nice place at a cost. Now, why don't I stay in my village and just get me the technology of biogas, and I can be able to cook, to light, to have everything without actually hassle of paying for it anyway.

Now, a single dairy cow can generate about 12.5 kilograms of dung or manure every day. And, depending on the size of the herd, this can translate into a lot of manure, plenty of methane gas, and this fair amount of kilowatts cranked out to power generators. And this conserves trees that would be cut down for charcoal or firewood, so sustainability. This is an aerobic digester that I use to produce the biogas. So I collect the cow dung or the pig dung from where I get it from and I put it in that funnel and then put it up there. And the gas will go up. The slurry will go down at the tank like you're going to see here.

Now, remember I told you between 4 a.m. and 7 a.m. I'm a farmer, and I need to have breakfast by 7. So as I'm a farmer, I'm cooking, I'm making breakfast for my children – without soot. This saucepan doesn't have soot. Without the hassle of blowing. You know, back home we use firewood. Or without the hassle of paying for electricity. So I'm using exactly what the animals have given me to use, and I'm using it well. And this slurry is what it take back to the garden to make it very green, very productive and very fertile.

Why integrated farming anyway? It produces fresh fodder for livestock all year around; the production is increased, produces biogas for power, cooking and lighting. Excess power is used for sale to the national grid, depending on how big your farm is, and produces a natural fertilizer. And actually these crops are organically produced. So actually if I was to sell, I would sell them expensively.

Now, this is a slide to show you again why we are doing integrated farming. Because in between, take for example, if I have a cow, a calf one day old, it is going to take me 24 months for me to actually get productivity out of that cow. So what happens, as I wait for the 24 months for this cow to grow, I'm plucking vegetables because I'm using the dung, this calf is making or pooing to be able to grow my vegetables. Same thing if it's cattle or if it's tomatoes. Now, look, there's bananas, and just I'm showing you also the acreage that is just out of a hundred pieces. On a quarter acre I can get a hundred pieces. And depending on whatever you're growing, you can have monthly production, daily production, weekly production, yearly production.

So this farmer has income almost on a daily... Now, almost 50% of Ugandans live on less than a dollar. And these people living on less than a dollar, are sitting on, whatever chunk of land they have, big or small, is living on less than a dollar. But they're actually sitting on gold – they just don't know. So if we can tell these farmers what to do, they actually will do it, and it's going to reduce the urban migration. So all we need to do is to tell these farmers exactly what to do.

Now, again, if you notice, when I was making my quarters of acres and whatever, the first quarter was fruits and vegetables – what's that? Vitamins. The second quarter was perennial crops – that's maybe carbohydrates. The third quarter with livestock is full of proteins. So you see that this whole farm has different things – nutrition and income generating.

After the beauty of all these, why are we failing? We are failing because we have poor genetics. Our feeding programs are really bad because we actually don't know how to feed these cows or these animals or to feed the soils like we've been told. We just don't know. We have everything, but we don't know how to do that. So our management systems are poor. I call, back home I tell people they are telephone farmers, because she stayed in the city and starts calling, "Have you done this? Have you done this? Have you done every city?" She's not on the ground, so our management systems are poor.

But the worst is that we start farming at a very late stage. This is how we start farming at a very late stage. You find someone. We go to school, after vet school, then I go, I join, I work somewhere for maybe 25 years, then I retire at 50. Now, when I retire at 50, I'm really old, tired, I can't actually do anything, so I go back. But because I have nothing to do and have a piece of land, I'll stay and work, but I'm frail. I even don't have the money because, you know why? You didn't save your money. You are spending 60 to 70% of what you are earning on food in the city when you are buying it. So now you come back, you don't have money. And when you

don't have money, you can't do anything. Then you go back to become poor. It's really sad. One time you're very rich, you could buy everything, and then you retire, you have nothing.

Yet, if you start early there's a Catholic saying, "Give me a kid before he's ten years, and he will die a Catholic." Now, the solution – get African children in farming at an early age, and teach their old parents who never went to school new technologies that will maximize yield despite their small pieces of land or climate change issue.

I learnt most of the things I do at seven years with my grandmother, the power of a grandmother. So I lacked most of those things at seven, and I was well endowed to have a grandmother, and I was well endowed to have a good primary school. This is why my beloved husband and I are putting up a primary school to teach children, lifetime skills, especially in agriculture. Because if we do this, then we are actually going to change the world.

Now, these are my lovely children – they're twins. Oh, I'm a mother of two, so they're twins. Back home it is actually very important to be a mother of two girls or twins, so these are my children. And it's very interesting. When I took this picture, I'm showing you how it is when you start someone at an early age. So each time we go to the farm, they put on boots, so if they're like, "Mommy, we are going to the farm," they put on their boots. And when we enter the weiner's house, they said, oh... You know, the wieners are the hogs – the wieners are supposed to feed adlib, so they're like, "Mommy, the food is finished. The pigs don't have food." And they pick up the bucket – "I'm going to feed," - I was so surprised and shocked, and okay, you see they're feeding. And they're actually not scared. So if these kids grow up like this, definitely, definitely they will do something very, very good.

Now, this is the primary school I'm building. And why I took this picture is to show you that the mango trees I do, and at the back. Now, we need partners. I can't do this alone. If we can do this together, teach the young children. And actually I could name this the Borlaug Farm School. So if we can do everything, there's no better way to start than now. Thank you.

### **Ambassador Quinn**

So, yeah, look at this. Dr. Emma, look – everybody's standing up! Wow, wow! So, Dr. Emma, I have to tell everyone I was there talking to her. I say, "Have you ever been to the United States?" And I thought, "You know, I wonder how she'll do being on the stage in front of people. She might be scared or nervous." Oh, my heavens, wow, you're sensational! So, Ruth, I hope I can share credit. I want to be known as the one who discovered Dr. Emma. Because, Dr. Emma, I want to assure you of one thing – you're going to be getting a lot of invitations to speak at conferences and tell your story. Wow, it's so inspiring! Thank you, thank you.