

“The Human Face of Science: A Challenge for Agricultural Research in Advancing Global Food Security”

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Thank you Manjit [Misra] for your kind words; it is always rewarding to participate in your valuable programs on global food security. I am delighted to be with you today.

You know how your children have a knack for knocking you off balance? As I was preparing for this occasion, my son asked me what I planned to talk about at Iowa State. I said ‘understanding science’ – in other words, how we can get broader public support for agricultural science by communicating more clearly the ways that it benefits people – the ‘human face’ of science. He said, **“But Dad, you are not a scientist!”** I acknowledged that I got the memo on that, but perhaps I could approach it from a different perspective – as a beneficiary and a stakeholder of science.

Don’t worry, for me to talk about the intricacies of science with you would be like the fellow who went to heaven and when he got there, St. Peter explained that the tradition was for new arrivals to share their area of greatest expertise, so that they might broaden the knowledge of everyone in heaven. Upon hearing that, the new arrival told St. Peter that he wanted to talk about the Johnstown Flood of 1889. St. Peter said, “Well, that might not be a good idea.” However, the fellow went on to explain that while he, of course, was not actually there when the flood occurred, he had heard a lot about it from his grandparents. The fellow was determined that he would talk about floods – and particularly the Johnstown Flood. Finally St. Peter replied “OK. You may talk about the floods if you insist, but I should warn you – ***Noah is in the audience!***”

We have a lot of Noahs here today, so I will not presume to examine science policy. But, I do want to focus on why **it is critical that we tell the great story of science** – and particularly agricultural research – and that we tell it in a way that gains stronger public acceptance toward society’s goals. My message is about more effective communication and outreach – both essential elements in the strategy.

One of the most profound passages in verse was penned by the Scottish poet Robert Burns, over 200 years ago: *“Oh would some power the gift to give us, to see ourselves as others see us.”* That is what I would like to talk about today. But first I would like to review a bit of relevant history.

Given the demographics in this room, most of you know the essential history of American agriculture. However, the summer of 1862 remains such a remarkable moment in the American story that it is worth remembering – especially for younger members of our audience. That summer President Lincoln was dealing with the death of his own son, the serious condition of his wife, and the bloodshed and trauma of Shiloh and Antietam. He was spending up to 20% of his Presidency – according to some historians – with grieving families, and drafting his most glorious legacy, the Emancipation Proclamation.

With all of that on his plate, Lincoln still had the vision and the energy – working with Congress – to enact the three pillars of American agriculture that still stand today: the Homestead Act, the establishment of the Department of Agriculture, and the Morrill Land Grant College Act. And of course we take pride here that Iowa State University – the birthplace of agricultural extension – was the first school set up under the Morrill Act. Related, we should remember too, that the National Academy of Sciences – incorporated the following year – is another of Lincoln’s important legacies.

Most of you know George McGovern as a Presidential candidate, as the person who founded the UN World Food Program in 1961, or as a World Food Prize Laureate two years ago with Senator Dole for their International Food for Education Program. Relatively few realize however, that McGovern also is an eminent American historian; he is in fact a biographer of Lincoln. This is what he wrote just two years ago: *“These three landmark acts...formed a tripod on which much of America’s great agricultural success has rested from that day until the present.”*

Lincoln surely could not have envisioned the proud legacy that the Land-Grant system would become, with its powerful humanitarian footprint around the globe. Nor could he have envisioned what his ‘Peoples’ Department’ would evolve into today with a \$135B annual budget, 70% going to nutrition programs, and 100,000 employees, with 35,000 of those in the Forest Service. Nor that the USDA would be at the center of so many spirited national debates – ‘tensions,’ as IFPRI’s Judy Chambers calls them, or ‘paradoxes’ to use Bob Thompson’s term – swirling around agriculture:

- Agricultural subsidy policies vs. WTO compliance
- Labeling and consumers ‘right to know’
- Commodity crops vs. specialty crops, now of equal market value at \$65 billion each
- Agricultural subsidy policies vs. national nutrition goals
- Big agriculture vs. local food
- GM vs. organic
- Food vs. fuel
- Sustainability vs. productivity, ‘a false choice’ according to Bill Gates
- Contributor to climate change vs. one of greatest solutions
- Science-based policies vs. politically driven policies

Although Lincoln probably could not have imagined what his legislative legacies would look like today, clearly he did have a vision about the critical link between agricultural science and its essential benefits to people. This is evident from the early record. So a question I would raise 148 years later is: **Do we need a wake-up call? Have we failed to tell that story effectively, and in a way that will change political will to give agricultural science the resources it needs in this quest to end hunger in our time?**

Could this lack of public understanding be one of the principal reasons that agricultural development budgets have dropped so precipitously? No doubt you are aware of these distressing numbers over the last quarter century:

- Global development assistance to agriculture is down from 18% to 4%
- World Bank lending to agriculture has dropped from 30% to 8%
- U.S. foreign aid to agriculture has fallen from 25% to 1%

Perhaps last year's L'Aquila commitment will begin a reversal of this disturbing – even dangerous trend.

Of course we know the bitter fruit of this failure to invest in agriculture from the global food price crisis of 2008, and its dramatic impact on both global food security and political stability. It was an eerie reminder of those words from Nobel Laureate Lord John Boyd Orr, the great crusader against hunger and first Director General of FAO: ***“You cannot build peace on an empty stomach.”***

So, where do we find ourselves today? **How great is our food security challenge?** You heard much of it from Dr. Maunder this morning. The statistics are disheartening – even numbing, but let's just take a snapshot, starting locally and going globally. Ambassador Tony Hall once asked Mother Theresa (voted the most admired person of the entire 20th Century) “What can we do? We can't all come to India.” Her reply: “Just do the thing that is in front of you.” So let's start with what is in front of us.

In Iowa:

- 95,000 children live in poverty (14%)
- 55,000 households are experiencing hunger
- 147,000 children are on free school lunch
- 256,000 Iowans participate in SNAP, and
- According to FRAC, Iowa is not significantly different from Ohio or Colorado or Tennessee – they all mirror our nation.

In the U.S.:

- 49 million Americans are food insecure
- 17 million children (500,000 of these are **chronically** hungry)
- 39 million are on SNAP, and
- 14% of all American households are food insecure

And, according to a recent Sodexo Report, an exhaustive economic analysis by three universities, **hunger in the U.S. costs Americans \$90 billion a year** including malnutrition, hospitalizations, lost job opportunities, diminished outcomes in education, and costs to charities. Moreover, obesity is exploding – as are the ‘food deserts’ that exacerbate it.

Overseas

- 1 billion people are hungry (1/6th of the planet)
- 25,000 die each day (60 full jumbo jets each day)
- One child dies every 5 seconds
- One in three children in the world are malnourished, and
- 90% of the global child hunger is **chronic**

Incidentally, I tell my students, “If you can't remember one of these numbers, just remember the word ***‘unconscionable.’***”

So, how do we respond? There are many answers – democracy building, trade liberalization, debt relief, food aid, and so on. However, we know that of all policy interventions to effectively combat food insecurity, **agricultural research is among the most tangible, most effective, and most powerful weapons we have** – whether through improving seed, increasing yield, enhancing nutrition, making water safer to drink, or reducing post-harvest loss.

In fact, reflecting on your [BIGMAP] Symposium presentations over these last two days, it occurred to me that while they were quite different in focus, there was one common thread that tied them all together – all were about improving the lives of people and ensuring their food security. Indeed, you are a key part of Borlaug’s ‘vast army of hunger fighters’ and today you share in his prize of 40 years ago. And yet, your work clearly does not get the attention and support that it deserves. Why? Could it be that we do not effectively tell the story of how this critical science serves people?

Sir Gordon Conway makes that point in his new book, *Science and Innovation for Development*. Using the Millennium Development goals as a framework, this endeavor explores a wide range of development issues where science is particularly active: agriculture, health, and the environment. Conway says that he and collaborator Jeff Waage wrote this ‘labor of love’ because there is not enough understanding of science by laypersons. He said: **“People in developed countries sometimes forget how scientific innovations have transformed their lives.”** Waage adds: “We firmly believe that science is vital for development, and we want that to be well understood, particularly as science is often presented in a way that is not easily accessible to the non-specialist.

In the same vein, a senior commentator at USDA’s Agricultural Outlook Forum observed: “We as scientists are accustomed to producing knowledge, and a fundamental tenet of scientific philosophy is that science is neither bad nor good. Many scientists feel less responsibility to apply the discoveries that we make. **The metrics in use in science often are publications that report new knowledge, not people delivered from starvation or water resources improved...**”

So who does get it? Who does understand that agricultural development and agricultural science are about ‘lives being transformed’? The Bill and Melinda **Gates Foundation**, of course, is impressive – not only in their messaging, but in what they expect from others. AGRA can tell you. In fact, one of their guiding principles is that “Science and technology have great potential to improve lives around the world.”

Colleagues have asked me from time to time for advice on how to prepare an effective agricultural development proposal for a Gates Foundation grant. My answer is: “I would not presume to suggest that I know much about that, except to say that to have any chance at all, your proposal must be focused right at the top on small farmers and children and women. You must clearly convey that as a prospective grantee you understand that you will be working on behalf of the world’s poorest people to improve their condition. You heard that in Dr. Kebede’s powerful presentation this morning.

Gates is especially sensitive, as well, to the **extraordinary role that women play in African households**, including that about 80% of Africa’s farmers are women that get only 5% of the technical assistance to agriculture and own less than 2% of the land. Gates will not let you forget that central fact. Nor will Ertharin Cousin, U.S. Ambassador to the UN Hunger Agencies in Rome who said: “We know it is women who feed the world, and so it follows that governments and other implementing agencies must get serious about building this assumption into the design of their national agricultural policies.”

Who else gets it? Who else understands the need to communicate this human face of science, and how it serves people, to encourage more public support? Well, right in this neighborhood the **World Food Prize** is a classic example. We know how inspiring all of

the Laureates have been – the pantheon of food security champions: Ejeta, McGovern, Dole, Nelson, Jones, Bertini, and Swaminathan. Their great work is a sweeping chronicle of the perseverance of public servants determined to give children around the world a brighter and healthier day.

But for me, the most memorable of these stories is the lifetime of commitment by the leader of the ‘Blue Revolution’ Laureate Modadugu Gupta, and particularly how effectively his work was communicated in terms of the beneficiaries. Imagine a country with 25% of the world’s hunger – 75 million hungry children – and **someone comes along and uses agricultural science to triple the freshwater fish production.** That is what happened in India. Imagine what this means for the millions of children so desperately in need of animal-sourced protein in their diets. That is the human face of science written large. I would add that Dr. Ejeta’s work on sorghum is similarly impressive in its increase in yields.

Who else understands the importance of the message? Well, I should brag on Iowa State University since I am here, but I do so favorably in many other forums around the country. Just a few years ago I was having lunch with a top Washington government official that I considered probably the most knowledgeable and respected person on global agricultural issues. I asked him what were the very best Land-grant universities? He said there were four, and that one of them was Iowa State. “Why are those four different?” I asked. He said that it was because of three things: a) the quality of research, b) they are actually changing the world with their work, and c) they are telling their story – they are communicating their message about how people’s lives are being transformed. I hope our ISU students here today appreciate the enviable tradition you have in Ames, and your extraordinary reputation throughout the world.

A relevant point here, Manjit, about your **Seed Science Center: Dr. Namanga Ngongi**, President of the Alliance for a Green Revolution in Africa, **AGRA**, in Nairobi – and a colleague of our conferee Dr. Joe DeVries – was speaking at the World Food Prize Symposium last year, and made the following statement to the assembled audience: **“Iowa State’s Seed Science Center is probably the best in the world.”** This point from a native of Cameroon, a graduate of Cornell, who spent over 25 years in high positions in the UN system in Rome and Africa, and who has lectured at most of the leading Land-grant universities – quite an impressive world view.

Why would Dr. Ngongi make such a statement? After all, he is a scientist talking about his area of expertise. The answer: because the work of ISU’s Seed Science Center has been communicated; the story has been told – that the Center reviews 40,000 samples a year, from over 300 crops, for more than 300 pathogens, Dr. Ngongi knew of the Center’s valuable work in over 30 African countries to improve the lives of farmers and children. It is not just about science; it is also about telling a great story. As Dr. DeVries noted in his presentation this morning, these are the reasons AGRA, ISU, and the University of Nairobi are collaborating today. On a personal note I should add that it is inspiring to witness the commitment of Africa’s agricultural scientists and what their dedication will mean for the prosperity of Africa’s people once resources and science-based policies are in place.

At the same time there are **other organizations that do important work, but do not seem to understand the value of their communications relationship with their stakeholders** toward achieving their goals. I was doing a review of an international agricultural organization a few years ago, and suggested that the first step should be a

survey to determine how all stakeholders – public, foundations, government, media, Land-grants, food industry, etc. regard the institution. “We can skip that step,” the Director told me. “Really?” I said. “Why?” “Because, **we know who we are,**” he replied. I said with all respect, “Knowing who you are is not who you really are. You are who others think you are, because they will determine your future – how you are supported, your level of appropriations, your inclusion in critical policy forums, your public acceptance, and so on.” We need **‘to see ourselves as others see us.’**

One expert in the media world calls this concept **‘taking control of how you are perceived.’** In other words, your **reputation** is not just what you have accomplished, it is rather what you have accomplished multiplied by how effectively those accomplishments have been communicated. The advertising world often calls this ‘branding.’

A final example: I am engaged with a very respected NGO that works around the globe to empower disadvantaged people, increase economic opportunity, and sustain natural resources. It does great work as an implementing organization. Yet, while it is concerned about additional resources it relies on from USAID, USDA, and other donors, historically it has not seen the need to tell its wonderful story to the public. It remains to many a mysterious organization. In my view this NGO has failed to connect all the dots. Your reputation is what you have achieved times how effectively those achievements have been communicated. I would add as an encouraging footnote that this institution recently has decided to reconsider the priority of its communications and outreach.

If you are around Dr. Roger Beachy, director of USDA’s National Institutes of Food and Agriculture (NIFA) for more than ten minutes he will urge you to read the new NAS report *“A New Biology for the 21st Century.”* He says it is “a blueprint for revitalizing agriculture research.” It calls for a unified approach combining physics, chemistry, biology, and earth sciences. The objective of the initiative – solutions to major societal needs – sustainable food production, protection of the environment, renewable energy, and improvement in human health. He says that all of these issues are urgent, and interconnected; they must be dealt with together. We cannot examine one without reference to the others. We cannot analyze global food insecurity without exploring the issues of bioenergy and climate change. We must be aware of the relationship between nutrition and obesity, and so on. Beachy even joked that USDA could simply change the report cover and release it as *“A New Agriculture.”* Ironically, the report was funded, not by the USDA, but by the NSF, NIH, and DOE.

“A New Biology for the 21st Century” represents transformative change – which also is the idea underpinning his agency NIFA (formerly CREES) funding extramural research, including a highly competitive grants program on issues ‘that have great potential to improve lives.’ But, NIFA’s budget is relatively very small, and well less than 1% of USDA’s budget. In fact, the NIH budget increase this year is greater than NIFA’s entire budget. The way then Under Secretary for REE Rajiv Shah – formerly with Gates, now Administrator for USAID – expressed it at a conference in October, **“USDA has not been at the U.S. Government’s science table.”** He called for a **“rebirth on agricultural science,”** noting that **“NIFA will be our primary vehicle for change.”** Beachy concurs: **“We must make agricultural science competitive with these other government agencies.”**

Quite a climb when we consider the reminder from Dr. Nina Fedoroff, Science Advisor to the Secretary of State and to the Administrator of the USAID, that **in the U.S.**

agricultural research is about 1% to 2% of biomedical research. More specifically, according to William Danforth of the Danforth Center, three years ago, “Today the NIH spends nearly \$15 on research for every dollar spent by the USDA. The funding for competitive merit-reviewed grants is even more skewed – **NIH spending for peer-reviewed research is about \$120 for every dollar spent by the USDA.**” Imagine being a member of Congress and dividing \$121 billion; you send \$120 billion to NIH, and only \$1 billion to the USDA.

What is wrong with this picture? I reached out to Gordon Conway, to get his opinion. You recall that Bill Gates said that it was Conway who got him enthusiastic about agricultural development. Conway said: “I don’t think we have our priorities right. The U.S. spends on agricultural research the equivalent of a mere 1% to 2% of the biomedical research budget. Yet we have over a billion chronically hungry in the world, and because they are so poorly nourished, they more readily suffer from disease.”

Particularly ironic here is that **the more we can achieve through agricultural research, the more pressure we take off biomedical research budgets.** And you heard Jack Bobo’s message earlier: “For every \$1 spent on agricultural research, we get \$1.43 back.” Ag research in substantial ways is about preventing these problems – before the crisis – about protecting farmers from economic distress, about ensuring that children do not starve, about getting commodities to market after harvest, about keeping the earth from getting thirsty. Just one example: According to the USAID, for every \$1 spent on iron fortification, \$84 are returned in increased wages and decreased disability; in human terms that means a brighter day for children who will have fewer learning disorders. That is the message.

So, NIFA needs more money. Well, first it must more effectively tell its story. As USDA Deputy Secretary Merrigan recently remarked at a stakeholders outreach meeting, “We have a marketing problem.” Indeed. I believe that is another way of saying that the benefits to people on these research priorities should be more effectively communicated to the most important stakeholders, and in a way that brings additional support and resources. Outreach and communication are critical.

In that regard, it is most encouraging that President Obama just last week nominated ISU’s former Dean of Agriculture, Dr. Catherine Woteki, to be the USDA’s Under Secretary for Research, Education, and Economics (REE). In addition to ARS and ERS, her portfolio will include NIFA. Cathie Woteki is not only a deeply respected scientist; she is also a superb communicator who will bring new energy and vision to these critical priorities.

Let’s look at these NIFA priorities and their urgency to our society – both domestically and internationally. Here they are: **1) global food security, 2) bioenergy, 3) climate change, 4) nutrition/obesity, and 5) food safety.** Now **let’s focus – not on the scientific language – but on the human face of this science** to better understand why it is so critically important that the public, Congress, and other stakeholders get on board in supporting these priority challenges.

GLOBAL FOOD SECURITY. You have already been reminded of a lot of numbers about how people are affected – one billion are hungry, 1/6 of the planet; 25,000 die a day (half the population of Ames), and so on. But why would this be a USDA priority? One reason of course, is President Obama’s joining the G8 pledge at L’Aquila for \$22B. But beyond that, because we now better understand that **all Americans have a direct**

stake in this issue of hunger. In addition to its being a **moral issue** and a **faith issue**, we learned well from the 2008 crisis that it is a serious **national security issue**; “A hungry person is an angry person.” Moreover, it is a significant **economics and trade issue**; “Poor people do not make good customers.”

But let me just cite one example of why this is a NIFA priority – indeed a U.S. priority. It was highlighted in the recent Lancet Series on Maternal and Child Under-nutrition, and should be an alarm bell for the global community. It says that “our international nutrition system is fragmented, dysfunctional, and desperately in need of reform, that under-nutrition is the cause of 35% of all child deaths,” and that 180 million children are stunted – irreversibly – and will never have a normal life. That is equal to one half of the entire U.S. population. We know that a child’s height for age is the greatest predictor of human capital. It is imperative that we get this issue on national agendas. Getting greater support for scientific research is key to meeting this objective.

BIOENERGY. Why would this be a NIFA priority? Because we urgently need answers. Judith Rodin, head of the Rockefeller Foundation, told the World Food Prize Symposium two years ago in the context of discussing biofuels and ethanol: “Deforestation leaves the same carbon footprint as all the cars, trucks, and planes in the world.” So what is NIFA’s research focus? To find 2nd and 3rd generation options that can convert non-food crops into energy. Science can find the answers, but only if it has the public support.

CLIMATE CHANGE How do we understand the human side of how science helps people through adaptation to climate change? For example, why is the WEMA partnership—AATF, CIMMYT, and Monsanto, so significant? It is not just about conquering science by achieving a new trait, as important as that is, and I would add that it is the focus of many articles. No, it is about the reality that nearly 300 million Africans, many malnourished, rely on white maize as their principal food source. WEMA, at its core, and in its potential, is about people – about alleviating human suffering – about easing the pain of starvation. That is the public message that must be driven to get more support for NIFA’s strategies on adaptation and mitigation.

Just a word about population, a sensitive subject critically linked to climate change. Most speakers just touch on the population problem in passing – we are six billion going to nine billion. Just consider two examples: Uganda and Ethiopia. The UN’s Population Reference Bureau predicts that Uganda, currently at 32 million, and nearly the size of Oregon, will reach 96 million by 2050; in other words it will triple its population in 40 years. Ethiopia, through hundreds of years of human history, reached 10 million at the beginning of World War II; it is now about 80 million. In other words, it has grown 800% in three generations. These examples raise serious questions, including: At what population level is our planet no longer sustainable? We only have so many levers to adjust – population, available land, available water, new technologies, yield, post-harvest loss, and so on. My point here is not to debate the population issue, but to remind us how much agricultural science is being asked to do to find answers, and why it is critical that it have greater public support.

NUTRITION One example. Why is ‘golden rice’ so important? Not just for the recognition of the scientific accomplishment. It is important because 670,000 children died last year from Night Blindness and River Blindness traceable to Vitamin A deficiency. That is the compelling point. That should be the message. Incidentally, the USAID says that for every \$1 spent on Vitamin A fortification, \$7 is returned in

increased wages and decreased disability. Is our Congress aware of this linkage when it determines our research priorities?

OBESITY Why would NIFA now consider this issue a priority for scientific research? It was not a priority five years ago, or even ten years ago. What is the human dimension? Why is it critical that the public understand this issue? While most of our focus is on under-nutrition, one side of the two-sided coin of malnutrition. Remember that the other side – obesity – is far deadlier, far more costly, and far more burdensome to our own society, and increasingly so to our children. **Obesity is in fact our nation's #1 public health problem**, and will cost Americans \$200 billion this year; soon to be 20% of all U.S. health costs. This disease has tripled in children in the last 20 years, and those children will have their life spans reduced by 5 to 7 years. In fact, students here should know that your generation will be the first in our nation's history to have a shorter lifespan than your parents, due significantly to obesity. That is why NIFA has chosen this issue as a priority, and that is why Congress should be much more supportive.

FOOD SAFETY Just a word on foodborne illnesses, and its impact on people. Our own country has an impressive history of making our food safe for consumers, and arguably we have the finest risk assessment system in the world. That is what we claim. Yet, the latest CDC data tells us that in the U.S. this year 76 million of us will report an illnesses from foodborne pathogens; 325,000 of us will be hospitalized; and 5,000 of us will die. These numbers are unacceptable.

While it is expected that scientists would talk to each other in their own jargon, at some point the **message about the ultimate beneficiary** of that science - farmer, patient, customer, diner – **must be clearly communicated** to the policymakers and other stakeholders responsible for ensuring those resources. Let me be clear. In this quest for food security I am not suggesting that scientists also must possess communication skills. But, just as scientists should be respected for their academic rigor and their discoveries, communications expertise is a separate skill set that should be recognized as well. These two functions must work in tandem toward a common goal.

This point can be made with a political story. Thirty years ago there was a Chairman of the Ways and Means Committee named Al Ullman. His pet proposal was a way to ease the double taxation of dividends; tax experts say this is perhaps the most complex part of the Tax Code. In any event, Ullman was holding a re-election campaign rally in the October before he was defeated, and he was trying to explain his idea to supporters. Well, the groans from the audience got louder and louder. Finally, Ullman lost his temper, and blurted: ***“Look, just because you do not understand it, and I cannot explain it, does not mean it is a bad idea.”***

Well, that is a funny story, but it makes a serious point. It is **critical that we explain it**, and in an understandable way that changes political will to get increasing public support. Codex is not just about maximum residue levels and risk analysis, but about children blessed with safer food, and farmers able to raise their standards of living for the first time by exporting their cassava. ‘Golden rice’ is not just about a new genetic trait, but it is also about the thousands of children whose lives might be spared from the agony of Vitamin A deficiency. The WEMA partnership is not just about the science of drought-tolerance, but about saving small-scale farmers and their families from the devastating effects of drought and giving them hope for the future.

Please let me recap. **The world is a very hungry place:** 49 million Americans, including 17 million children; one billion people globally, with 180 million children stunted; 25,000 people dying each day – a child dying every five seconds. Of all the policy responses to alleviate this condition, **no set of interventions holds more promise than investment in agricultural science**, and yet it remains severely underfunded. To change this equation, we must summon the political will to gain more resources, a place at the policy table, and greater public acceptance. The glorious story of lives transformed and people delivered from starvation must be told more clearly and understandably. Whether responding to a distressed farmer in Western Iowa or to a starving child in Ethiopia, **science always must have a human face**. That is our challenge. Thank you.
