Feeding 10 Billion:

A Dialogue between Feed the Future and the International Research Community

By Simon Nicholson, American University

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A DIALOGUE BETWEEN FEED THE FUTURE AND THE INTERNATIONAL RESEARCH COMMUNITY

Simon Nicholson, Assistant Professor of International Relations
School of International Service, American University

SEE THE FUTURE
FEED
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Photos Page 3: Left, Susan Johnson/Global Livestock CRSP; Middle, Deborah Rubin/Cultural Practice LLC; Right, Courtesy of IPM CRSP.

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Foreword

This document represents a product of a new phase in the relationship between USAID and the higher education research community. Under USAID leadership, in coordination with USDA, APLU was asked to organize a process for researchers to have input into the research agenda of Feed the Future (FTF). The process was developed at a meeting at Purdue University in January 2011 that brought together a broad array of the researchers and international development community practitioners with key US Government agency representatives (USG). It was followed by a global e-consultation and a FTF Research Forum in Washington D.C. in June that attracted 381 participants from the research community and USG. The process was designed to garner and synthesize diverse and expert opinions into a report. This document is the result. The following pages provide FTF with input into their existing research strategy paper and additional input about how to make FTF research most effective.

USAID Administrator, Dr. Rajiv Shah, and the Obama administration have a renewed vision that emphasizes evidence-based decision making and values a scientific approach to development. This vision has markedly improved the university-USAID relationship. Internal restructuring of USAID has produced a Bureau of Food Security (BFS) that not only reflects the renewed importance given to agriculture but also reemphasizes research and capacity building.

Led by Dr. Rob Bertram and his colleagues in BFS and fully supported by Dr. Anita Regmi and her colleagues at USDA, USAID and USDA with the sponsorship of BIFAD[1] approached APLU to engage the research community to provide input into the FTF agenda. This engagement represents a very positive signal from the USG to researchers that their input is welcome, that communication has improved and that science and capacity building are part of the agenda.

FTF is a comprehensive and important initiative in concept and function. It spans the food system from production to consumption making the important link between food and human capital development. It calls on the "whole of government" to address food security, poverty and malnutrition. The challenge for all is to operationalize the research agenda so links are made across food system scientific boundaries and across agency boundaries in the whole of government approach. The present document focuses more on the former but by engaging U.S. universities and other research groups directly and their work with USAID, USDA, NSF, USGS and DOE, it increases the potential for interaction across USG entities. Such inter-agency, FTF-focused interaction is potentially very powerful. For example, the excellent work that is occurring at DOE on increasing photosynthesis efficiency for biofuels has the potential to be applied to food production, thereby not only impacting food supply but also changing energy input equations for crop production.[2]

Looming over FTF and the global community are the projections for food security for 2050. The importance of addressing food supply could well be as great a challenge and potentially as disruptive a force as climate change. As Dr. Cassman pointed out in his presentation at the Purdue Meeting, past research advancement rates will not be sufficient to meet the expected demand through 2050.[3] However, if they are sufficient, they may contribute to a more stable world. Without exaggeration the ability to increase food supply relative to population growth is a challenge of major proportions.

FTF addresses this problem by proposing a sustainable intensification approach that is both acceptable and palatable. To achieve sustainable intensification is challenging. To address food supply we have two choices at the extremes. We can increase food production by expanding the area of land under cultivation. This implies further deforestation of tropical regions, and further use of fragile lands which will have a major impact on the natural resource base and climate change. Alternatively, we can intensify production on existing agricultural lands, increasing yields on all land globally but with the largest gains on those where the yield gap is greatest. FTF's challenge is to ensure that intensification is sustainable.

FTF also challenges us to achieve this with a focus on small holders (although the approach is not limited to small holders) and to do it in a way that food systems provide the nutrition that is critical to pregnant women and children in the first 1000 days of life.[4] FTF recognizes the critical link between early nutrition and the cognitive and physical development of children that is the fundamental building block of social and economic development.

The FTF vision provides a realistic framework for development, but it challenges us to bring the best of our creative powers to solutions. This heterogeneous challenge landscape calls for a silver buckshot approach rather than a silver bullet approach. A comprehensive vision requires engaging the creativity and diversity of possible solutions to develop and choose the new approaches, technologies, and social and economic mechanisms that can achieve FTF goals within the constraints it imposes. The U.S. higher education system has the capacity to do this and desires to be a full partner in developing solutions. We at APLU are pleased to contribute to this process by helping to engage the U.S. scientific community as well as the global development science community at large to address these FTF challenges. We are also committed to facilitating ongoing engagement of, not only the US research community, but also the global development community at large, as collectively, we seek to address the challenges that FTF lays out.

Montague W. Demment
Associate Vice President for International Development
APLU

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[1]The Board for International Food and Agricultural Development (BIFAD) is a presidentially-appointed advisory council to USAID, whose primary role is to advise on agriculture, rural development and nutrition issues related to global food insecurity. The Board is comprised of seven members, four of whom must represent the academic community. BIFAD was established by Title XII of the Foreign Assistance Act. Title XII, the 'Famine Prevention and Freedom from Hunger Act', was passed by Congress in 1975 to address global food and hunger issues not unlike those faced by the world today.

[2]Blankenship, R.E. et al. (2011) Comparing Photosynthetic and Photovoltaic Efficiencies and Recognizing the Potential for Improvement. Science 13 May 2011: Vol. 332 no. 6031 pp. 805-809

[3]http://www.aplu.org/document.doc?id=3408

[4]The Lancet (2007) Child Development in Developing Countries Series.

Photo previous page by Montague Demment/Global Livestock CRSP

FEEDING 10 BILLION:

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Contents

EXECUTIVE SUMMARY **2**

PART I: BACKGROUND TO THE CONSULTATIVE PROCESS **6**

PART II: THE PLACE OF RESEARCH IN THE FTF PROGRAM **15**

PART III: MAJOR FINDINGS FROM THE CONSULTATIVE PROCESS **26**

- ADVANCING THE PRODUCTIVITY FRONTIER 28
  Research Challenge I: *Sustainably increase the productivity potential of high priority crops and livestock*

- TRANSFORMING PRODUCTION SYSTEMS 32
  Research Challenge II: *Improve soil fertility and quality, and the quality and availability of water resources, in target environments*

  Research Challenge III: *Better understand and manage the risk environment*

  Research Challenge IV: *Improve the use of relevant research outputs through effective extension delivery that provides feedback from intended beneficiaries*

ENHANCED NUTRITION AND FOOD SAFETY 38
Research Challenge V: *Improve availability of, and access to, a high-quality diet*

Research Challenge VI: *Ensure safer diets*

Research Challenge VII: *Reduce postharvest losses and waste*

CROSS-CUTTING CHALLENGES 44
Research Challenge VIII: *Sustainable development through high impact investment in building human and institutional capacity*

Research Challenge IX*: Develop methodologies and research practices to better determine what works, and to better determine how to take new and existing technologies and programs to scale*

Research Challenge X: *Develop food systems that mitigate, and that increase resilience to, the effects of climate change*

PART IV: RESEARCH AND FEED THE FUTURE—BEYOND BUSINESS AS USUAL 50

PART V: CONCLUSIONS AND FOLLOW-UP WORK 57

APPENDICES I - V A-1
LIST OF ACRONYMS A-23
LIST AND SOURCES: TABLES AND FIGURES A-24

Executive Summary

This report summarizes the key findings of a multi-stage consultative process that looked at the research component of the US government's new Feed the Future (FTF) initiative. FTF aims to bring the significant resources of the US government to bear in a coordinated and sustained way to produce real and lasting reductions in global hunger and poverty. Research of many different kinds will be key to the success of this effort. With this in mind, in late 2010, the US Agency for International Development (USAID) and the US Department of Agriculture (USDA) expressed a desire for input from the international research community. The Association of Public and Land-grant Universities (APLU) and the Board for International Food and Agricultural Development (BIFAD) developed this consultative process, in five steps:

STEP 1 A framing meeting at Purdue University, and convening of a long-term working group

STEP 2 Development of a white paper based on the Purdue meeting's findings

STEP 3 Dissemination and discussion of the research white paper

STEP 4 An extensive on-line e-consultation

STEP 5 A major research-focused forum in Washington DC

Those involved in the consultative process were asked to do two main things. First, participants were invited to provide open and objective feedback concerning the FTF initiative's research strategy. Second, participants were asked to collectively define a set of major research challenges in support of FTF's goals of hunger and poverty alleviation. The report below outlines ten major research challenges that emerged from the consultative process, along with five programmatic suggestions.

RESEARCH CHALLENGES

The consultative process developed ten major research challenge statements, each refined by way of accompanying a set of more specific research themes. The ten research challenges are grouped here under four headings, as follows:

Advancing the productivity frontier

Increase the productivity potential of high priority crops and livestock. There is a great need to increase the world's food output, in ways that simultaneously enhance environmental services and that build social resilience. This will require technological innovations and the better utilization of existing technologies.

Transforming production systems

Improve soil fertility, quality, and conservation. Research is needed to improve knowledge about the specific soil protection, remediation, and fertilization needs of FTF-focus regions. Work is also needed to generate new, game-changing fertilizer technologies that more efficiently make available critical nutrients and that are more environmentally sound.

Better understand and manage the risk environment. Research is needed to better understand the nature of the risk people face, the coping mechanisms that individuals and communities have used in the past, and potential new ways they can respond in the changing environment of the future.

Improve the distribution of relevant research outputs, and the ability of researchers to learn from intended beneficiaries. There is significant work—both on the programmatic and research fronts—needed to ensure that research outputs better find their way to those who need them, and that researchers of all types are better able to collaborate with and learn from the intended beneficiaries of their efforts.

Enhanced nutrition and food safety

Improve availability of, and access to, a high quality diet. Research is needed to more fully understand the appropriate points for targeted, high impact interventions that link increases in food production with better nutrition and increased human capital. In addition, work is needed to understand how nutritional education, resource accumulation, and other interventions can build demand and capacity so that populations can create a demand for high quality diverse diets because they understand the impacts on human health, child development and human productivity.

Ensure safer diets. Work is needed at the most fundamental level to identify the chief constraints preventing the development of safe food systems. Research is then required to develop new technologies and techniques that will dramatically improve the availability of safe and nutritious food, particularly in resource constrained regions.

Reduce postharvest losses and waste. There is a need for the development of new technologies and practices that tackle sites of loss and contamination throughout the postharvest value chain, and identification of avenues for spreading the best existing technologies and practices. A core component is connecting farmers to appropriate markets, so that sustainable intensification and reductions in crop loss can yield real returns.

Cross-cutting challenges

Identify avenues for the building of human and institutional capacity. Research must be undertaken to better determine and characterize the types of capacity building in which FTF might meaningfully invest. Research is also needed to understand how to give real voice in the FTF and other development processes to all major stakeholder groups, particularly smallholder farmers, women, and youth.

Develop food systems that mitigate, and that increase resilience to the effects of climate change. There is a need to work on climate change adaptation strategies, particularly for small-scale farmers and those particularly vulnerable to food price volatility. At the same time there is a need to work to shrink atmospheric greenhouse gas concentrations through the identification, development, and adoption of climate-conscious agricultural systems.

Develop methodologies and research practices to better determine what works. There is a clear need for better analysis of development efforts. What works? What are the kinds of strategies and interventions that in demonstrable and replicable ways alleviate hunger and poverty?

PROGRAMMATIC SUGGESTIONS

The consultative process also brought forth a number of programmatic suggestions, in support of a successful research agenda. In turn these were:

- The need for sustained attention to capacity building.
- A call for development of a new entity to take the lead on the more effective use of data collection and mapping technologies.
- Suggestions about how to best mesh globally defined priorities, Washington generated ideas, and country-led plans.
- The promise inherent in development of a true whole-of-government approach to the United States' hunger and poverty alleviation efforts.
- Expression of a hope for competitive and collaborative research programs established around problems rather than the pursuit of predetermined solutions.

NEXT STEPS

Participants in the consultative process called for the following urgent next steps:

1. Development of a set of targeted research-oriented workshops in FTF focus countries.

2. Development of a clear process by which focused research programs can be articulated for each of the FTF focus countries, and particularly for four geographic regions in India and Asia that have been highlighted as especially important for FTF research efforts.

3. Mapping of the current agricultural research landscape. This should, ideally, include mapping of work within US government agencies and offices and the programs they fund that reach out into the scientific community, to better facilitate whole of government cooperation.

4. Early attention to the establishment of a new body responsible for data collection, evaluation, and dissemination.

5. Reactions from USAID to the research consultation process, and particularly feedback on how recommendations contained in this report are to be used.

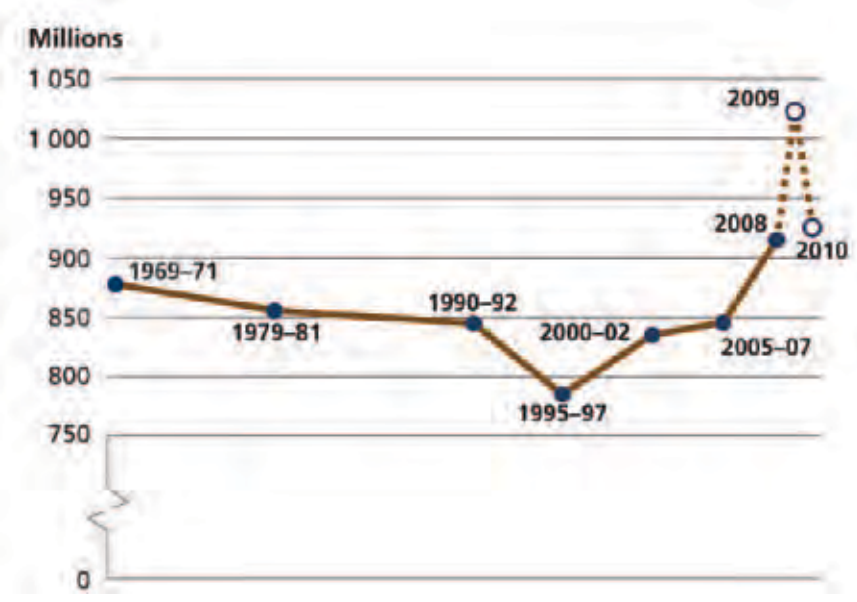
All told, the FTF research consultation has provided, with APLU and BIFAD's leadership and the US government's full support, an unprecedented opportunity for members of the international research community to provide direct feedback and input on the research component of a major US development initiative. An important takeaway point is that the researchers who were a part of the consultative process are overwhelmingly supportive of the general thrust of FTF's research strategy and of its ambitious overall program. This report aims to pave the way to further open collaboration, and to ongoing refinement of FTF's research goals.

PART I

BACKGROUND TO THE CONSULTATIVE PROCESS

Food price volatility, largely due to the fine line between global demand and production, and the tight grip of a global economic recession have contributed, since the late months of 2008, to an unprecedented spike in the worldwide incidence of chronic hunger and malnutrition. The absolute number of people suffering from hunger has risen to historically high levels (see *Figure 1*).[1] This has occurred even as the global food production system, needing to significantly increase food productivity, faces a range of other serious and pressing problems, from declining soil quality, shrinking availability of croplands, and degraded water resources to increasing climate-related uncertainty.[2]

Figure 1: Number of undernourished people in the world, 1969-71 to 2010

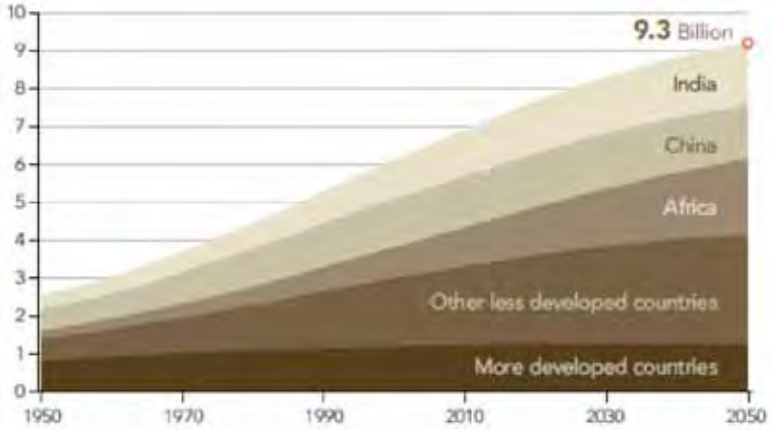


Source: FAO, 2010

The above-mentioned problems will be exacerbated in coming decades by a growing human population. By mid-century, it is expected that the number of people on the planet will have risen from its current level of approximately 7 billion to more than 9 billion (see *Figure 2*). Most of this increase will take place in the world's poorest countries.[3] In these countries appetites are also growing, in the sense that people are expecting, and in many cases demanding, access to higher quantities of safer and more nutritious food. Agricultural output will need to as much as double by 2050 in the face of growing population and other pressures.[4] This means, by one estimate, that globally, farmers will have to grow more wheat and maize in the next 40 years than was produced in the previous 500.[5]

The world is faced, then, with an extraordinary set of challenges, of which the need to produce vastly more food is but one component. Increased agricultural

Figure 2: World Population Growth, 1950-2050 (medium variant)



From Leslie Roberts, Science 333:540 (2011). Reprinted with permission from AAAS.

productivity must be achieved via methods that preserve or enhance the environmental condition, all while contributing to rapid and lasting reductions in hunger, malnutrition, poverty, and ill health. There are no straightforward answers. Discovering and implementing appropriate, sustainable solutions to the world's food challenges will be a momentous undertaking. It will require a coordinated global effort, driven by strong leadership.

As a response to these challenges, the US government has developed and launched the new **Feed the Future (FTF) initiative**. FTF represents a groundbreaking effort to tackle the endemic problems of global hunger and poverty. The initiative promises new thinking, new resources, and a renewed commitment by the US government to engage with these most vexing of human concerns.

The following pages examine one critically important aspect of FTF: **the research strategy and agenda that will support the initiative's efforts**. The crafters of FTF have recognized, since the initiative's inception, that to be effective, FTF must draw on the insights and energies of the various communities of researchers working around the world to understand and alleviate poverty and hunger. FTF promises a strong commitment to cutting-edge research and to evidence-based programming. The initiative also promises to devote significant support to strengthening the institutions that make high quality research possible and that ensure its widespread deployment.

At the same time, FTF serves as a challenge to researchers. The launch of FTF is a call to reflect on priorities, to better harmonize

[1]By late 2010 the absolute number of people estimated to be chronically hungry was 925 million, from a peak of 1.023 billion in 2009. See FAO, "Global Hunger Declining, but Still Unacceptably High," [September 2010], available at http://www.fao.org/docrep/012/al390e/al390e00.pdf.

[2]See presentation by Ken Cassman at the Feed the Future Research Forum, "Feed the Future: Framing the Issues on Spaceship Earth," [June 22, 2011], available at http://www.aplu.org/document.doc?id=3408.

[3]United Nations press release, "World Population to Exceed 9 Billion by 2050: Developing Countries to Add 2.3 Billion Inhabitants," [March 11, 2009], available at http://www.un.org/esa/population/publications/wpp2008/pressrelease.pdf.; also see a special issue of Science on population, 29 July 2011: vol. 333 no. 6042.

[4]United Nations press release "Food Production Must Double by 2050 to Meet Demand from World's Growing Population," [October 9, 2009], available at http://www.un.org/News/Press/docs/2009/gaef3242.doc.htm.

[5]Anonymous, "How Much is Enough? The Answer is Less Straightforward than it Seems," [February 24 2011], The Economist, available at http://www.economist.com/node/18200702.

efforts, and to forge new partnerships across institutional and disciplinary boundaries in pursuit of real, actionable responses to the many challenges confronting the world's poor.

The report set out below summarizes the key findings of an extensive consultative process that took place during the first half of 2011. The process invited the international agricultural and human development research communities to examine and comment on the research component of FTF's overall strategy. It also asked researchers to consider how best they might work individually and collectively in support of the FTF initiative. Below, the report begins by offering some background information, including a description of the consultative process and a brief summary of the FTF program. Feedback from the research consultation is then presented in two main ways:

- The report establishes ***ten research challenges*** that were identified by the consultative process as essential areas for focused attention.

- The report then highlights ***five programmatic areas*** that the process suggested need sustained consideration if research efforts are to succeed.

Together, the research challenges and programmatic suggestions provide a comprehensive account of the consultative process' outcomes. It is a harder task, though one no less important, for the report to convey the high levels of enthusiasm shown by researchers throughout the process. The report should be read as a clear statement of support for FTF from the international research community. Many suggestions were made throughout the process, certainly, about ways to improve, elaborate, and best implement the research component of the FTF initiative. Through all of these comments, the unifying thread was overwhelming support for FTF's general intent, and for the innovative thinking that characterizes the effort. Researchers are eager to see FTF succeed, and are ready to get to work to ensure that success.

Moreover, the FTF research consultation has provided an unprecedented opportunity for members of the international research community to provide feedback and input on the research component of a major US development initiative. Many participants expressed the hope that the FTF research consultation will become a template for future engagements between researchers and those US government agencies working on hunger and poverty alleviation. This report aims to demonstrate some of the fruits of such open collaboration, as well as to point the way toward ongoing refinement of FTF's research efforts.

THE FTF RESEARCH CONSULTATION PROCESS

In late 2010, the Association of Public and Land-grant Universities (APLU) was tasked with developing a process by which researchers could comment on the research strategy that the US government had developed to support the FTF initiative. The request was made by the US Agency for International Development (USAID) and the US Department of Agriculture (USDA). Representatives

of these government agencies were involved throughout the consultative process, providing ongoing support and guidance. The Board for International Food and Agricultural Development (BIFAD) was also, from the outset, an important partner in the consultation effort.

The consultative process that was developed by APLU is described in detail below. **The chief goals for the consultative process** were twofold:

1. Refinement and elaboration of the existing FTF research strategy; and
2. Development of a set of recommendations concerning how the FTF research strategy might best be operationalized.

This means, importantly, that the consultative process was *not* conceived as an exercise in strategic planning. Participants, that is, were not tasked with developing an entire strategic direction for FTF-related research. Instead, participants in the consultation process were asked to engage with a general research strategy that the US government had already developed via a separate, rigorous process.[6]

The research strategy developed to support the FTF initiative is spelled out in *The Feed the Future Global Food Security Research Strategy* ("the research strategy statement").[7] Authors at USAID

Table 1: Scale and Impact—Criteria for FTF Research Investment

While potential impact and scalability and spillover are critical for global research, a more detailed analysis guides investments. The following are the key criteria that guided the selection of research priorities for the Feed the Future initiative:

- **Relevance to poverty, women and children and reduced vulnerability objectives**
- **Likelihood of success: Technical merit, clear pathways for deployment/adoption**
- **Cost/Benefit: Estimated cost to develop technology vs. potential returns in terms of impacts**
- **Economic sustainability for producers/ adopters**
- **Natural resources sustainability: water, soil, ecosystem and climate change**
- **Institutional sustainability/impact on capacity: engagement of national and regional partners**
- **Time Frame: timeline, milestones**
- **Risks: potential impacts on vulnerable groups, environment or breakdown in key pathways**

Source: Feed The Future, 2011, p. 20

[6]For more on the development of the research strategy, see http://www.feedthefuture.gov/research_strategy.html.

[7]See Feed the Future (2011) Feed The Future: Global Food Security Research Strategy, available at. http://www.feedthefuture.gov/documents/FTF_research_strategy.pdf

and USDA prepared the document, which describes in detail the kinds of research the US government will prioritize as FTF moves forward. More particularly, the research strategy statement:

- Details how research is expected to fit within the framework of the broader FTF initiative;
- Establishes categories that the US government will use to target research investment priorities; and
- Sets out criteria and guidelines by which proposed research and the outcomes of any research tied to FTF will be assessed.

The major features of the research strategy statement are discussed in greater detail in *Section II* of the report below. This is because the research strategy statement was a central focus of discussions throughout the consultative process. Here, it bears noting that the research strategy statement was generated with much care. USAID conducted initial analyses to identify opportunities for research that would contribute to the agricultural goals of the FTF strategy, and over 50 experts were consulted during the strategy framing process. In February 2010, technical experts from the university, private sector, and US government research communities gathered to provide input on the criteria that should be used to guide research priority selection. The research strategy statement draft was then subjected to an external review process involving over 20 experts from USDA, the Consultative Group on International Agricultural Research (CGIAR), US universities, independent international agricultural consultants, and the private sector, and the draft was revised to respond to the comments.[8] The final document was made available to the public in early May 2011, in time for close consideration by participants in the consultative process described below.

Figure 3: FTF Research Consultation Process

The FTF Research Consultation process that was ultimately established to enable engagement with and reaction to the FTF research strategy proceeded via five major steps, as follows:

Step 1: Purdue Meeting, January 11-13, 2011

A framing meeting was held at Purdue University. The meeting included the convening of a long-term working group to oversee the consultative process and to provide expert assessment of its proposals (see Appendix I for the working group's membership, and Appendix II for the Purdue meeting's agenda).

The initial workshop held at Purdue University in January 2011 was designed to gather preliminary ideas about the FTF research program and to frame a process for researcher engagement. The meeting was organized by APLU in conjunction with BIFAD, with support from USAID and USDA. Over three days, the workshop engaged a broad spectrum of leaders in the US university and international research communities, as well as funding agencies, private foundations, industry representatives, and key representatives from US government agencies, in discussions about the research effort developing to support the FTF initiative. The participants engaged in wide-ranging discussion on the research challenges that are suggested by the FTF program. Particular emphasis was placed on the need to integrate research with human and institutional capacity building.

The Purdue meeting, and the steps in the consultative process that followed, were overseen by a working group of distinguished researchers and government officials. The members of the working group are listed in *Appendix I*.

Step 2: Preparation of White Paper, February 2011

A white paper exploring the chief findings from the Purdue meeting was prepared by members of the working group and an external author.

The insights and views expressed at the Purdue meeting were captured in a white paper commissioned by APLU, titled *A Research Agenda for Feed the Future*.[9] A major contribution of

[8]The information contained in this paragraph was provided by USAID.

the white paper was its proposal, based on conversations at the Purdue meeting, of a set of "guiding principles for FTF research." In particular, the white paper made the case for research that is:

1. "Purpose-driven and results-oriented."
2. "All about people," in the sense that FTF research should aim to live up to the broader initiative's professed desire that the FTF process be country-led and constituent-owned.
3. Based on an "attention to complexity," with a clear focus on the interactions within and between complex systems.
4. Evident of a "resilience mindset," in that FTF research must ideally be directed towards helping people cope with a complex and rapidly changing environment.

The white paper also described the outlines of the research strategy that USAID and USDA were then finalizing, and that was soon to find full expression in the research strategy statement. Preliminary efforts were made in the white paper to establish research priority areas and complementary research themes. This feature of the white paper received further attention in the steps that followed.

[9]Ann Carlson, Kathie Olsen, and Montague Demment (2011) "A Research Agenda for Feed the Future (FTF): Planning Workshop at Purdue University, January 11-13, 2011," available at http://www.aplu.org/document.doc?id=3109.
[10]The website on which the e-consultation was hosted, with an archive of the entire conversation, is available here: http://globalfoodsecurityresearch.net.

Step 3: White Paper disseminated and discussed, March-April 2011

The white paper was widely disseminated among members of the international research community and the government agencies responsible for FTF's implementation.

Over the following two months, the white paper was widely read and discussed, and put into final form. The Purdue meeting's analysis of FTF's research priorities, as captured in the white paper, set the agenda and framework for the remainder of the consultative process.

Step 4: E-consultation, May 9-27, 2011

An online e-consultation was convened to examine the published FTF research strategy and to begin formulation of a set of research challenges in support of the strategy's general aims.

Following the Purdue meeting, APLU convened an online e-consultation.[10] The e-consultation ran during the three-week period of May 9-27, 2011. It was designed to allow a much larger group of researchers and other stakeholders to consider and provide input on the research priorities and broad research agenda established by FTF, and to discuss how best to support and engage with the strategy by way of delineation of a set of research challenge statements.

The e-consultation garnered wide interest. More than 1,100 people registered to participate, representing more than 85 distinct academic disciplines and hundreds of distinct institutions. Between them, these participants contributed more than 600 separate written comments to a vigorous and wide-ranging conversation. The bulk of these contributions, 387 comments, were made by people based in the United States, with the university-based research community particularly active. Sixty-nine individual contributions were made by people living in developing countries. The website established for the e-consultation attracted, over the three weeks that the e-consultation ran, more than 2,000 unique visitors from 102 countries.[11]

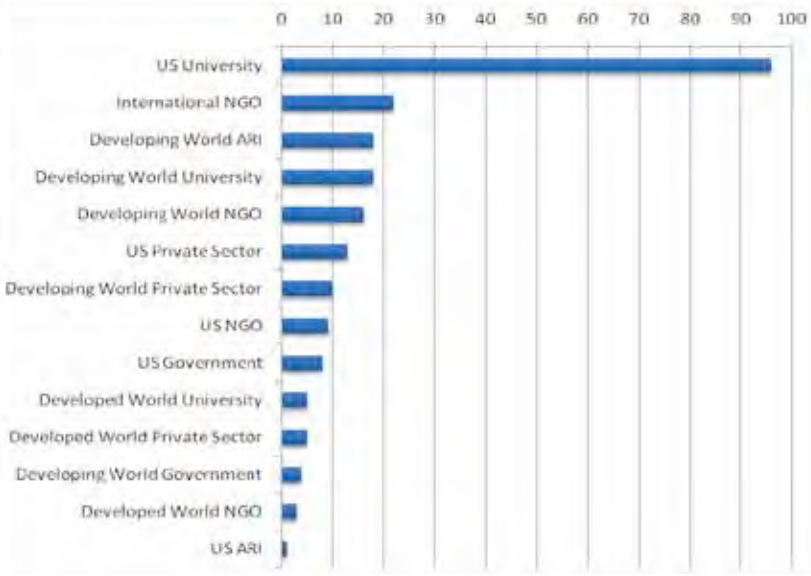
A report summarizing the e-consultation is available on the APLU website, and was provided to participants in the June research forum as the basis for conversations at that event.[13]

Step 5: Research Forum, June 21-23, 2011

A major conference was organized in Washington DC. The conference featured multidisciplinary breakout discussion groups to refine research challenges (see Appendix III for the research forum's agenda, and Appendix IV for a list of research forum participants).

The FTF Research Forum, the final step in the consultative process, brought together more than 300 registered participants in Washington DC for formal and informal presentations and discussions spread over three days. The forum was timed to coincide with announcement in Washington DC of the 2011 World Food Prize laureates, and with a public meeting of BIFAD.

Figure 4: E-consultation Participants by Type of Institutional Affiliation[12]



Source: APLU, 2011, p. 1

Speakers at the research forum included high-level government officials, leading academics, and well-known figures from the private and philanthropic sectors. Their presentations were organized around lengthy and well-attended breakout sessions,

[11]The data reported here were gathered from the forum website, and via Google analytics.

[12]This figure identifies those who were active during the e-consultation, grouped based on self-identification at registration. NGO = non-governmental organization; ARI = agricultural research institution.

[13]Association of Public and Land-grant Universities (2011) "E-consultation Summary, Synthesis of E-consultation Discussion Conducted May 9-27, 2011," available at http://www.aplu.org/document.doc?id=3253.

during which meeting participants were invited, in small groups, to further develop the research challenge statements that emerged from the e-consultation. Audio archives of each day's activities and copies of the resources presented to forum participants are available on the APLU website.[14] In addition, summaries of the keynote sessions were prepared by a team from the USAID-sponsored Agrilinks initiative and posted to their blog.[15]

Throughout the consultative process, the US government agencies responsible for FTF's implementation requested that participants provide direct and objective feedback. Those involved at the various stages of the consultation were asked to give their straightforward opinions of the FTF Research Strategy, to offer candid suggestions about the kinds of research that the FTF initiative should prioritize, and to provide detailed thoughts on the programmatic steps that must be taken to ensure that cutting-edge research can be meaningfully delivered and deployed. At each step, those involved certainly responded to this charge. The process ultimately brought together many hundreds of distinct and well-informed voices in rich, wide-ranging dialogue.

PAUL HASSEN/ APLU

Chancellor, University of Missouri, and BIFAD Chair, Dr. Brady Deaton, addresses participants at the FTF Research Forum.

[14]Archived audio of plenary presentations from the research forum, along with resources presented to forum participants, can be found here: http://www.aplu.org/page.aspx?pid=2054.
[15]Agrilinks blog entries from the forum can be found here: http://agrilinks.kdid.org/blogs.

PART II

THE PLACE OF RESEARCH IN THE FTF PROGRAM

This section of the report summarizes the key features of the FTF research strategy. It does so with reference to remarks made by speakers at the research forum held in Washington DC, June 21-23, 2011, and by drawing on published statements.

The research forum hosted an impressive array of speakers and attendees. In addition to breakout groups focused on building a research agenda in support of FTF, participants in the conference heard about the genesis and nature of the FTF program, and particularly about the initiative's prioritization of research. The opening plenary session featured **Gayle Smith**,[16] among other high level US government officials. Smith noted that the growing peril of food insecurity was the first development concern discussed in the White House when President Obama took office in early 2009. At that time the world was experiencing a severe spike in commodity food prices—a phenomenon that has continued to have a devastating impact on the world's poorest people. Smith suggested, during her remarks, that this state of affairs ran directly counter to President Obama's vision of a world in which people everywhere are able to live with dignity. It was a situation that demanded a swift response, and that called for leadership from the world's wealthiest nation.

Such leadership is welcome and timely, Smith and others at the research forum stressed, and the framers of FTF recognize in the publication that introduces the new initiative, *The Feed the Future Guide*.[17] There, it is noted that the US Government has long been the world's most important contributor to food aid programs and to other emergency response measures to situations of food shortage. This has been critically important work. In recent decades, however, even while emergency relief efforts have become more refined, less and less attention has been paid to long-term development assistance, with agricultural development programs becoming particularly degraded. In the late 1980s, as much as 17 percent of US official development assistance was devoted to agriculture. That figure is more like 6 percent today (see *Figure 5*).[18]

[16]Gayle Smith is Special Assistant to President Barack Obama and Senior Director of the National Security Council. She spoke to the FTF research forum at the opening plenary session on June 21. See Appendix III for the full research forum agenda.
[17]Feed the Future (2010) Feed The Future Guide, available at http://www.feedthefuture.gov/FTF_Guide.pdf.
[18]Ibid. at 1.

Table 2: Potential FTF Focus Countries[22]

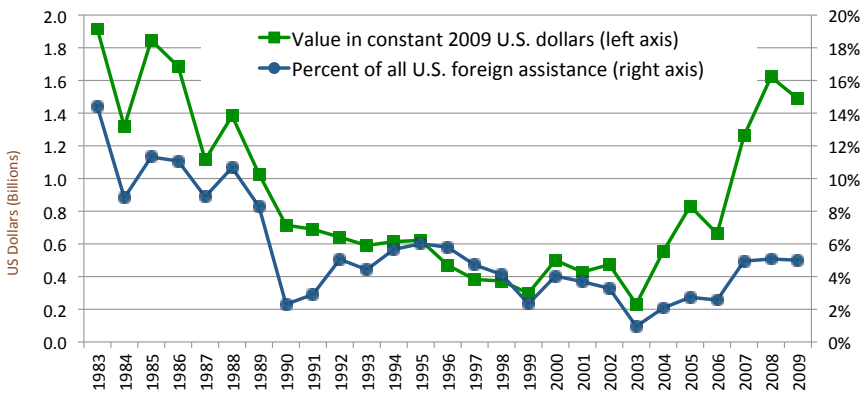
REGION	COUNTRIES
Africa	Ethiopia, Ghana, Kenya, Liberia, Mali, Malawi, Mozambique, Rwanda, Senegal, Tanzania, Uganda, Zambia
Asia	Bangladesh, Cambodia, Nepal, Tajikistan
Latin America and the Caribbean	Guatemala, Haiti, Honduras, Nicaragua

Source: Feed the Future, 2010, p. 15

As **Rajiv Shah**[19] stated in his remarks at the research forum's opening session, with FTF the US Government is signaling its intent to look once again to the long-term and to devote sustained attention to addressing the conditions and factors that are ultimately responsible for the production of food-related vulnerabilities and insecurities. Shah went on to suggest that even though the FTF program is still in its earliest days, it is already seeing success, most notably through beginning the task of rebuilding key agricultural institutions and infrastructure that have for too long suffered from inattention.

FTF began to take shape through US engagement in the July 2009 G8 summit in L'Aquila, Italy, and the World Summit on Food Security held in Rome later that same year. Between these two meetings, a set of new international principles for coordinated action on the world's food challenges—dubbed the *Rome Principles for Sustainable Food Security*—were negotiated and agreed upon (see *Appendix V*). FTF takes the *Rome Principles* and uses them as the foundation for a reconfigured approach to US aid programming. The initiative also pulls together significant new resources. At L'Aquila, President Obama pledged some $3.5 billion over three years for agricultural development and food security.[20] FTF is the chief means by which this pledge is being realized.

Figure 5: US Foreign Assistance for Agriculture, 1983-2009



Source: Catherine Bertini and Dan Glickman (Chicago Council), 2011, p. 2

The overarching goal of the FTF initiative is to "*sustainably reduce global hunger and poverty by tackling their root causes and employing proven strategies for achieving large scale and lasting impact*."[21] The initiative aims to achieve these goals through a number of carefully designed programmatic activities. Chief among these activities is the financing of carefully targeted interventions in a set of FTF "Focus Countries" (see *Table 2*), which have been selected both for their exhibiting high current levels of food insecurity and their assessed potential to benefit from agriculture-led development.

The interventions currently planned by FTF for many of these focus countries, and in some cases for the wider regions in which the countries are located, are available on the FTF website.[23] Each plan is being designed and implemented in keeping with the *Rome Principles.* Most notably, this means that:

- FTF aims to be a **country-led initiative**. FTF, as **Gayle Smith** made clear in her research forum presentation, is built around country plans prepared in close consultation with interested parties within each FTF Focus Country. US government agencies responsible for implementing FTF, and USAID's missions based in FTF focus countries, are taking seriously the needs and wishes of those whom FTF is designed to assist. Smith also noted that this approach invites real collaboration, by asking people to wrestle with how to make a broadly agreed plan effective and implementable.

- FTF aims to be **transparent**, such that each of its operations will be closely monitored and evaluated by USAID and other implementing agencies, and such that each intervention will itself be crafted based on the best available evidence, leading to the best possible opportunities for success.

In addition, speakers at the forum stressed that FTF is looking to produce a "**whole of government**" response, pulling together in new and meaningful ways the significant resources of the full range of US federal government agencies and offices. The constitution of a key panel on the first day of the research forum reflected this whole of government approach. The panel was chaired by **Julie Howard**, the Deputy Coordinator for Development for Feed the Future.[24] With her were representatives from USDA, the National Science Foundation (NSF), the US Geological Survey (USGS), the National Institutes of Health (NIH), and the National Oceanic and Atmospheric Administration (NOAA).[25] As Howard noted, this diverse group represented just a sampling of the agencies and offices touched by the FTF initiative. Developing a whole of government effort entails marshaling the combined energies of the full breadth of the US government. This represents, Howard told the research forum, an extraordinary opportunity. It also, as many participants in the consultative process pointed out, and as is discussed in more detail later in this report, presents significant challenges.

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[19]Rajiv Shah is Administrator of USAID. He spoke to the FTF research forum at the opening plenary session on June 21.

[20]Feed the Future (2010), at 1.

[21]Ibid. at 9.

[22]The criteria for selection of likely FTF Focus Countries has been as follows: "These countries experience chronic hunger and poverty in rural areas and are particularly vulnerable to food price shocks. At the same time, they currently demonstrate potential for rapid and sustainable agriculture-led growth, good governance, and opportunities for regional coordination through trade and other mechanisms. Our final selection of focus countries will also depend upon the timing and availability of FTF resources." See http://www.feedthefuture.gov/investment.html.

[23]See http://www.feedthefuture.gov/implementation.

[24]Julie Howard chaired a panel titled "Working Across the US Government in Support of Feed the Future Research" at the FTF Research Forum on June 21.

[25]The speakers were, in turn, Jill Auburn (USDA), Jane Silverthorne (NSF), Matthew Larsen (USGS), Van Hubbard (NIH), and Paul Sandifer (NOAA).

Through its whole of government mandate, FTF is striving to open up novel avenues for fruitful collaboration among US government agencies. FTF also has the potential to spark new, path-breaking programs between government, on the one hand, and external public and private sector partners, on the other. For instance, in his research forum remarks, **Rajiv Shah** pointed to opportunities for collaboration between USAID, the Peace Corps, the Millennium Challenge Corporation (MCC), and the private sector, to enhance the reach of capacity building and extension services.

In addition, Shah suggested that FTF is looking to play a **coordinating and catalyzing role** beyond US borders. This entails two things: 1) exploring opportunities for new programs in support of real reductions in hunger and poverty with partners around the globe, and 2) leveraging the work of existing multinational institutions and initiatives to better align their efforts and eliminate programmatic redundancies. This means, according to Shah, the need and opportunity for closer coordination between the work of the CGIAR system, universities and other public and private research institutes, and USAID's Collaborative Research Support Programs (CRSPs). It also indicates the need for new forms of collaboration between US government agencies, the private sector, and all other producers of high quality research. And it means continued and in some cases expanded support for various multinational food assistance and development programs, including, for instance, the Comprehensive Africa Agriculture Development Programme (CAADP).[26]

All of this is being undertaken with the intent of building, over the long-term, the capacity for developing countries to identify, diagnose, and tackle their own agricultural and human development-related challenges. As *The Feed the Future Guide* puts it:

> *We [the US Government agencies responsible for FTF] see our role and that of other donors as catalyzing pro-poor economic growth through providing political, financial, and technical assistance. We envision a world where private investment drives sustainable growth, and where country and market-led development supplants foreign assistance.*[27]

None of the goals of the FTF initiative is particularly new or radical in itself. Many people have for many years been suggesting the need for programs that tackle the various components that together make up the FTF agenda. The scale and ambition of the effort, though, and the levels of funding and coordination that FTF promises, mark the initiative as a potential game-changer. Much is at stake, and there is always the danger that so ambitious a program fails to fulfill expectations. Still, the collaborative intent of the initiative, the widespread support it is garnering in the United States and abroad, and the clear commitment of key actors in the US government to its success offer reason for considerable optimism.

Figure 6: Feed the Future Results Framework

Source: Feed the Future, 2011

[26]See http://www.nepad-caadp.net; "CAADP (Comprehensive Africa Agriculture Development Programme) aims to help African countries reach a higher path of economic growth through agriculture-led development. Through NEPAD (New Partnership for Africa's Development), CAADP addresses policy and capacity issues across the entire agricultural sector and African continent...is entirely African-led and African-owned...and aims for an average annual growth rate of 6 percent in agriculture by 2015."

[27]Feed the Future (2011) Feed The Future Guide. http://www.feedthefuture.gov/progress.

PART II

SUSAN JOHNSON

THE FTF RESEARCH STRATEGY

With the above goals in mind, USAID and USDA have been developing a new global research portfolio to support FTF's programmatic ambitions.[28] Every indication suggests that FTF's research portfolio, as it moves beyond conception to operation, will be bold, visionary, and far-reaching. It needs to be, if FTF's activities are to be commensurate with the potent mix of agricultural, environmental, and developmental challenges that lie ahead.

Support for research, and support, in addition, for the institutions and partnerships that allow for research of the highest quality to find its way to those who can best make use of it, are central components of the FTF initiative. The reason for this two-fold focus is straightforward: "Investment in agricultural research today," suggests *The Feed the Future Guide*, "drives the growth and resilience of the food supply for tomorrow."[29] **Lou Anna Simon**,[30] in remarks at the research forum, put it even more succinctly. She said that there is a high economic payoff to agricultural research. This point came with a caveat, however: economic payoff only accrues if technologies and other innovations are adopted by farmers. Research matters little, in other words, unless attention is also paid to the avenues by which the gains from research are spread.

The first goal of the research investments planned by FTF is the **sustainable intensification** of food production, the case for which was made in great and clear detail at the beginning of day two of the research forum by **Ken Cassman**.[31] Sustainable intensification involves boosting worldwide food output while protecting the environmental condition. Cassman and others viewed such a focus as an essential prerequisite for any other actions designed to tackle global hunger and human development. At the same time, Cassman, along with other of the consultative process' participants, noted that sustainable intensification is not in itself a *sufficient* response to the world's food challenge. Real progress on hunger and poverty depends on sustainable intensification being tied to improved nutrition and health outcomes for the world's most vulnerable people. The research strategy statement and remarks from government officials at the research forum made clear that this connection is a foremost consideration for FTF.

In pursuit of such important goals, a number of speakers at the research forum made clear that FTF investments will prioritize research into what have been termed **international public goods**. These are to be investments in technologies and practices that can have broad, perhaps game-changing impacts across a number of different FTF focus countries. Emphasis is on utilizing and leveraging the unique research capacities of the United States public and private sectors, and the international research community, most notably the CGIAR system, to produce the next generation of technologies and agricultural practices.

Kathleen Merrigan[32] focused in her research forum remarks on both the practical and the *political* importance of international public goods. The FTF initiative has significant but ultimately limited resources. Merrigan suggested that if FTF is to generate real improvements in the lives of the world's most vulnerable peoples, researchers and those tasked with implementing the program must adopt a "laser focus" on the development and deployment of international public goods, striving for rapid and demonstrable wins in order to keep momentum behind the program.

In addition to these general themes, there are a few additional specific features of the FTF research strategy that were highlighted by speakers at the research forum. The first is that the research strategy establishes **three overarching research priorities**, described below in turn. Each of the priority area descriptions below is taken verbatim from the research strategy statement:

ADVANCING THE PRODUCTIVITY FRONTIER

"Improving food availability is underscored in this research theme. While better management practices can reduce the prevailing yield gaps in many developing countries, productivity gains necessary to meet future food demand (under limited resources and with potentially adverse impacts from climate change) require developing new seeds and livestock breeds that push the productivity frontier to the next level. A focus of the FTF research strategy will be on breeding and genetics for major crops and livestock, vaccine development for livestock diseases, and better management policies and practices for fish (both capture fisheries and aquaculture) to increase the yield potential and provide solutions for major production constraints. To more effectively integrate the use of these technologies among poor farmers, research under this theme will encompass socio-behavioral and economic factors related to technology adoption including analysis of incentive structures and policies."

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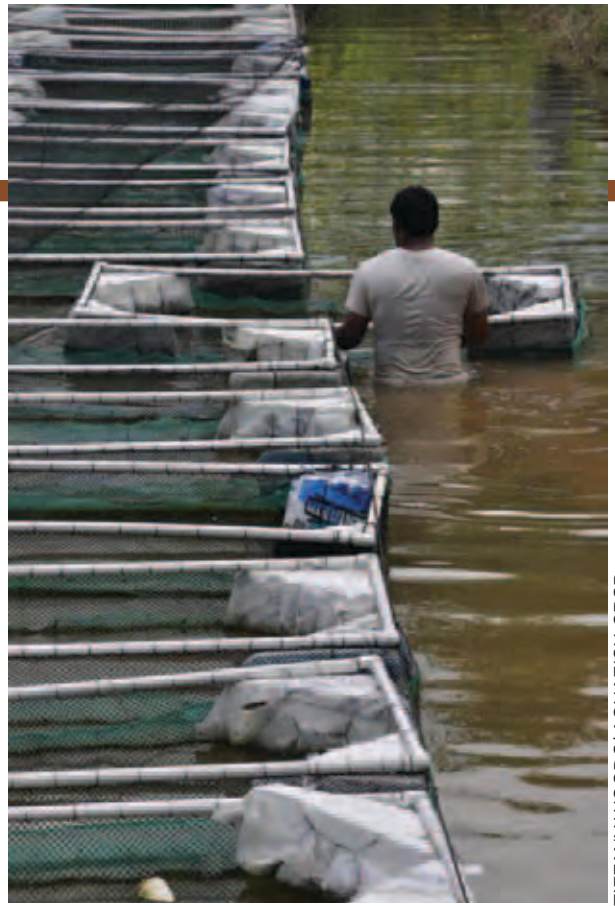
[28]See Feed the Future (2011) Feed The Future: Global Food Security Research Strategy. http://www.feedthefuture.gov/documents/FTF_research_strategy.pdf.
[29]Feed the Future (2010) Feed The Future Guide. http://www.feedthefuture.gov/FTF_Guide.pdf, at 24.
[30]Lou Anna Simon is President of Michigan State University. Simon's remarks were read on her behalf by Jeffrey Riedinger, Dean of International Studies at Michigan State University, at a research forum panel titled "The Importance of Research for All Stakeholders," on June 21.
[31]Ken Cassman is Heuermann Professor of Agronomy at the University of Nebraska, Lincoln, and Chair of the Independent Science and Partnership Council of the CGIAR. He gave his remarks at a research forum panel titled "Framing the Research Prioritization Process," on June 22. Cassman's presentation slides are archived at http://www.aplu.org/document.doc?id=3408.
[32]Kathleen Merrigan is Deputy Secretary of Agriculture at USDA. Her remarks were given at the FTF Research Forum's opening session on June 21.



TIFFANY WOODS/ AQUAFISH CRSP

TRANSFORMING PRODUCTION SYSTEMS

"Sustainable intensification places the agricultural research agenda into a broader context, spanning biophysical, policy and social elements of key production systems where the poor and undernourished are concentrated. Combined with research on natural resources at the systems level, this priority area emphasizes the integration of research advances (e.g., those from priority area 1) within production systems where poverty and malnutrition are concentrated. It also focuses on natural and social science research to examine impacts, particularly interaction effects, of component technologies to increase systems-level productivity and sustainability. Research within the systems context will contribute to improved stability of food production, incomes, and farmer resilience. Key opportunities include research on soil fertility, water and nutrient policy and use, aquaculture and fisheries policy and management, producer safety nets, conservation agriculture, input and output markets, and trade. Many of these areas offer significant opportunities for increasing efficiency and reducing risk."

ENHANCED NUTRITION AND FOOD SAFETY

"This theme emphasizes the importance of ensuring that agricultural systems contribute to nutrition and health goals. This theme will focus on opportunities to improve availability and access to a high quality diet, particularly for women and young children. Through targeted research in the natural and social sciences, we will focus agricultural systems on improving nutrition through diversification of production systems, enhancing dietary diversity and nutrient density of foods and reducing postharvest losses. This theme will also improve utilization of food through attention to food safety challenges with a focus on reducing contaminants in the food supply. Research priorities in this theme are integrally linked to the first two themes thereby leveraging those investments to ensure the dual focus on improving nutrition and reducing poverty."

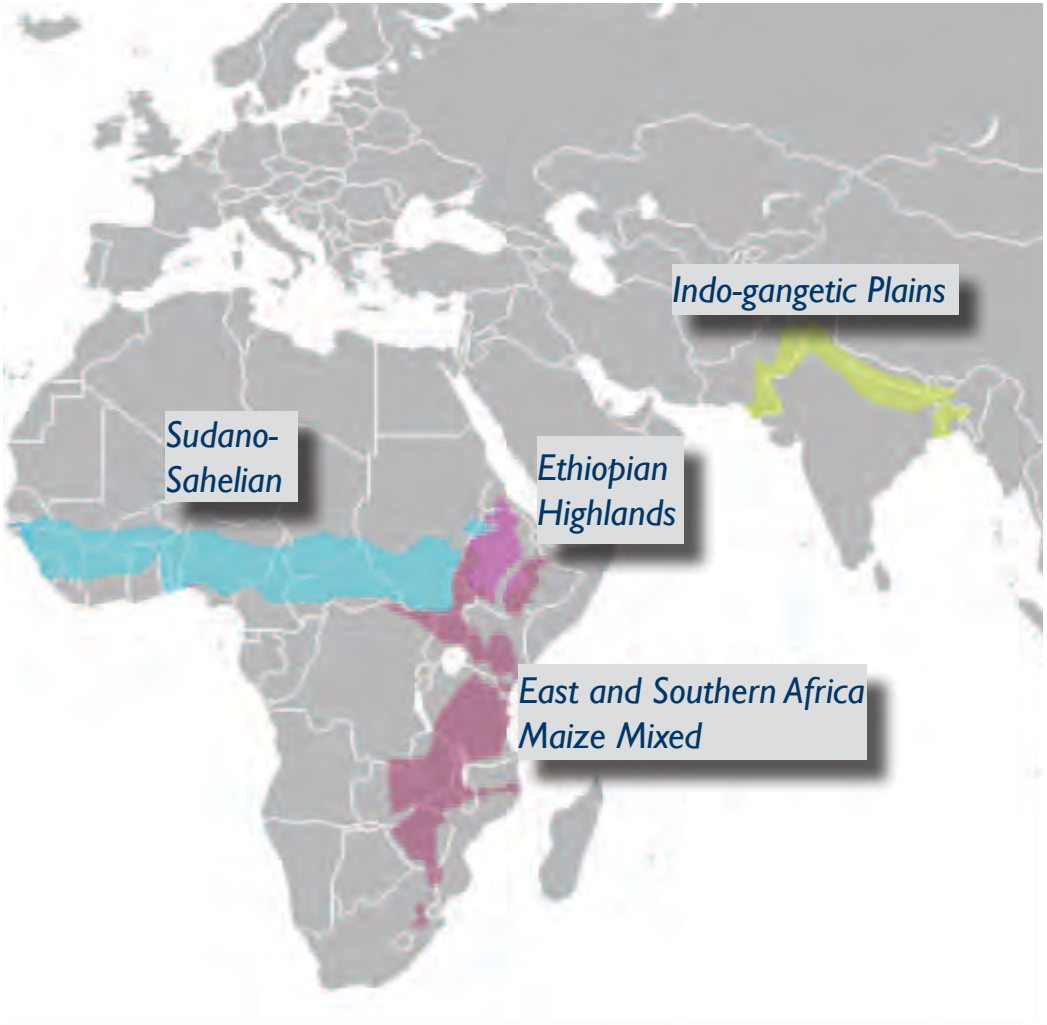
Participants at the forum and throughout the consultative process were asked to consider and to keep in mind these research priority areas. **Rajiv Shah** provided further detail on their importance during his remarks at the research forum, suggesting that the research priority areas identified in the research strategy statement would be a key determinant behind allocation of FTF-controlled research funding. He said, more specifically, that roughly two-thirds to three-quarters of FTF's research money would likely be devoted to the production of *climate resilient agricultural systems*, spanning research priority areas one and two. A particular focus will, Shah indicated, almost certainly be crop research, and especially efforts to develop what he called "climate resistant cereals." The aim is to develop breeds of maize, rice, and other widely used crops that can better withstand drought, disease, and other climate-related shocks. Shah was careful to say that these research targets are not set in stone. He promised ongoing responsiveness to the insights generated by the consultative process, and to the country-led nature of the FTF initiative as a whole.

The three priority areas described above are, then, a crucially important feature of the overall FTF research strategy. A second important feature is that the research strategy statement establishes three **cross-cutting issues** that will inform research program development, namely:

1. Gender
2. Climate Change
3. Environment

WILLIAM MASTERS/ NUTRITION CRSP

Figure 7: Agroecological Regions Targeted by FTF Research Strategy



Source: Rob Bertram and Anita Regmi, 2011

Third and finally, it was made clear at the research forum that the FTF research strategy will, in its development and implementation, focus on **four agroecological regions**. These were noted by Shah, but **Rob Bertram** and **Anita Regmi** described in detail these regions and justifications for their selection at the research forum.[33] The four zones are as follows:

1. The rice-wheat systems of the **Indo-Gangetic plain**. This region, suggested Bertram, has the potential to be a global breadbasket, though it faces serious water conservation challenges, among other concerns.

2. The maize-mixed systems of **Southern and East Africa**. Here, some 50-60 million live below the poverty line, in a region characterized by poor soil fertility and limited availability of advanced agricultural technologies.

3. **West African Sudano-Sahelian** systems. This region raises stark political and governance challenges, even as it faces soil and climatic problems that threaten the food security of an estimated 136 million people.

4. The **Ethiopian highlands**. Here, some 18 million people live in poverty, in part due to problems with persistent but resolvable crop diseases like wheat stem rust.

While these regions will be an important focus of FTF-aligned research, they do not, Bertram noted, strictly define how research support will be allocated under FTF. That is, research focused on other parts of the world, particularly in FTF Focus Countries, is also seen as critically important. The four agroecological regions described above are highlighted not just for the particular needs of their populations, but also because the regions have general characteristics that make research focused in those areas likely to have application in other places. The plan, ultimately, is to align research priorities so that the most good can be achieved in the shortest possible time given limited resources.

In sum, the FTF research strategy document promises, then:

> *Investment in international public goods while leveraging and otherwise encouraging private investment by farmers and businesses, to*
>
> *Sustainably intensify food production, with the goal of*
>
> *Rapidly and demonstrably reducing the incidence and effects of global poverty and hunger.*

Participants in the consultative process were overwhelmingly supportive of this framework. The remainder of the report examines suggestions from researchers involved in the consultative process for refining, implementing, and engaging with the FTF research strategy.

[33]Rob Bertram is Director of Agricultural Research and Technology at USAID, and Anita Regmi is Senior Advisor in the International Office of the USDA's Chief Scientist. Their joint remarks were delivered to the research forum at a panel titled "Overview of the FTF Research Strategy" on June 22.

PART III

MAJOR FINDINGS FROM THE CONSULTATIVE PROCESS

A primary task for the FTF research consultation was consideration of how to implement and operationalize the US government's FTF research strategy. To that end, the final two weeks of the e-consultation and close to a half day at the research forum in Washington DC were spent developing and refining a set of "research challenges" that, collectively, the research community believe require urgent attention if FTF is to succeed.

All told, participants proposed dozens of different research ideas. These were winnowed down over the course of the e-consultation and FTF research forum to **ten major research challenges**. Each challenge was then further developed through elaboration of centrally important research themes. The research challenges and accompanying themes are set out below.

Again, it is important to note that the process of developing research challenges was not a "blank slate" exercise. Participants were given clear guidance, to engage directly with the research strategy statement prepared by authors at USAID and USDA, and in particular to keep in mind the research priority areas established in that document. Based on this charge, the challenges described below are arranged into four categories. The first three categories correspond to the FTF research strategy statement's research priority areas, while the fourth captures additional cross-cutting concerns:

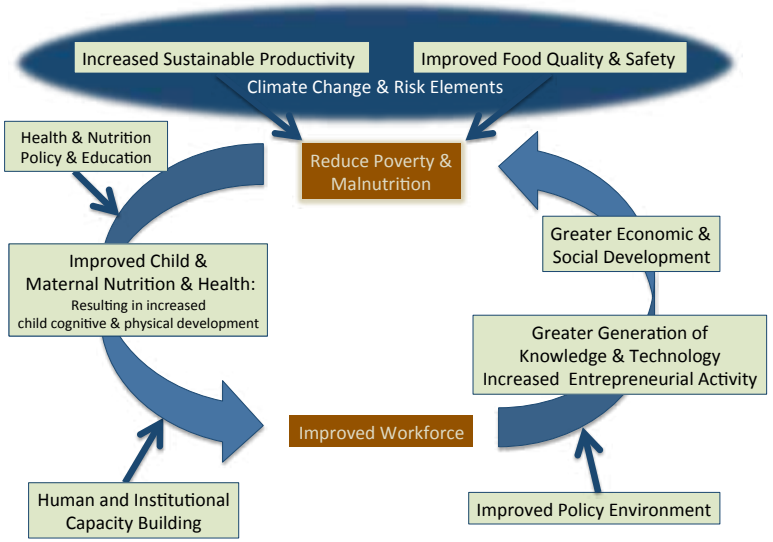
1. Advancing the productivity frontier
2. Transforming production systems
3. Enhanced nutrition and food safety
4. Cross-cutting challenges

One other thing is important to note at the outset of this section: Participants in the e-consultation and forum repeatedly suggested that while it is important to identify particular researchable challenges and problems, it is also crucial to keep in mind an overarching vision of what FTF-focused research is trying to achieve, and how different research efforts fit with one another. There is a danger that in setting out discrete research challenges, perspective on the overall goals of the FTF initiative may be lost. FTF offers a coordinated framework for action, linking sustainable intensification of agricultural production to real improvements in nutrition, health, and human development. Researchers urged that this overarching logic be kept in mind as research programs are developed and implemented.

To this end, participants throughout the consultative process were invited to refer to the following "virtuous cycle."[34] The diagram depicts the manner in which the various chief components of the FTF research strategy fit with one another. On the one hand the virtuous cycle usefully demonstrates that research of many types, directed at different challenges and problems, is needed to support the goals of hunger and poverty alleviation. On the other hand, the virtuous cycle speaks to the need for coordination of research efforts, so that no key component of research is ignored.

The virtuous cycle is a simplification, certainly, of the links between research, programming, and outcomes, but it is a

Figure 8: A Virtuous Cycle for FTF-focused Research



Source: Ann B. Carlson et al., 2011, p. 20

simplification that neatly captures FTF's intent. The diagram has as its focus FTF's main goals: the reduction of poverty and malnutrition. These goals are expected to be achieved principally through sustainable productivity gains connected in meaningful ways to improved nutrition and food safety. Even while working in an environment of climate change and other risk variables, these drivers can reduce poverty and malnutrition. Reduction in poverty and malnutrition will result in improved child and maternal health, bolstered by improved health, nutrition policy and education, that in turn increase the cognitive and physical development of children with a strong focus on the first 1,000 days.[35] The increased capacity of children can then be further augmented by improved education at all levels from public and private institutions made more relevant and effective. These efforts might then be expected to enhance the quality of the workforce that now functions in a better environment for agricultural business and science and technology, in turn creating greater knowledge and entrepreneurial activity, spurring economic and social development.

The cycle continues as nutrition improves in response to economic growth and growth increases in response to improved nutrition. The intended primary beneficiary of all of these overlapping research efforts should be the smallholder, with the expectation that innovations that work to the benefit of smallholders will likely also have wider applications. Particular attention should be given to producing technologies and practices that function where the timely and consistent availability of capital and other resources are major constraints.

Here, in turn, are the ten research challenges developed by participants over the course of the FTF research consultation, grouped under the headings provided by the FTF research strategy statement. Each research challenge is introduced with a short summary statement, followed by a set of specific research themes that participants suggested need to be tackled for each challenge to be met. Research challenges I and II are the broadest, and so received additional attention throughout the process, as reflected in the number of research themes attached to these two challenge areas.

[34]The original concept of the figure comes from Martorell, R. (1996) The role of nutrition in economic development. Nutr. Rev. 54: S66–S71 with further elaboration in: Demment et al. 2003. Providing micronutrients through food-based solutions: a key to human and national development. IN: Animal Source Foods to Improve Micronutrient Nutrition in Developing Countries. Supplement: Journal of Nutrition 133: 3875S-4061S. The concept was further modified by the FTF working group to incorporate and integrate components of the FTF strategy.

[35]Experimental evidence of the impact of improved diet on child cognitive development has been reported in, for example, Neumann et al. 2007. Meat Supplementation Improves Growth, Cognitive, and Behavioral Outcomes in Kenyan Children. J. Nutr. 137:1119-1123. There is, in addition, considerable evidence from a wide array of studies that allows for scaling up from the impact of nutrition on individuals' performance to the level of national economic growth (see, for instance, Hoddinott et al. 2008. Effect of a nutrition intervention during early childhood on economic productivity in Guatemalan adults).

ADVANCING THE PRODUCTIVITY FRONTIER

Research Challenge I: Sustainably increase the productivity potential of high priority crops and livestock

CHALLENGE STATEMENT

The world will need to produce substantially more food in coming years. Yet present rates of yield increase for the world's major crops are failing to keep pace with population increase, creating an urgent need for innovation (see *Figure 9* below). At the same time, the world faces a stressed and shrinking resource base. In addition, the Food and Agriculture Organization of the United Nations (FAO) has forecast that over the next 35 years, just 20 percent of increasing food demand can be met by bringing new land under cultivation, and at most 13 percent more via increased irrigation and other direct intensification techniques. The implication is that the remaining 67 percent of increased food demand must be met from technology-driven yield increases, and from vastly more efficient use of basic inputs, including water.[36] These interlinked problems demand research aimed at the sustainable intensification of agricultural production.

The challenge of bringing about worldwide sustainable intensification has three main components. First, researchers must develop ways to dramatically lift agricultural productivity. This will require the development of new higher-yielding crop and animal varieties, new techniques for the management of water and other agricultural inputs, the production of more efficient and effective farm management methods, and a range of other new technologies and practices. It will also require that researchers develop ways to better deploy the best existing yield-boosting technologies and techniques.

Second, researchers must simultaneously be searching for ways to maintain or, better, enhance the natural resource base and ecosystem services through agricultural production. A higher yielding agriculture that further degrades the environment is no real option, and would further entrench rather than alleviate the problems that FTF seeks to tackle.

Third, in keeping with FTF's overarching imperative, sustainable intensification of production must be used to produce real, beneficial changes in the lives of the world's most vulnerable populations. The requirement that the world produce more food in the years ahead is not something that can be ignored, nor willed away. As such, boosting food production should be considered a paramount goal of the FTF effort and a prerequisite for other forms of action. More food alone, though, is not a sufficient answer to the problems facing the world's poorest people. For agricultural intensification to be truly sustainable, it must underpin a broader drive focused on poverty reduction and hunger alleviation.[37]

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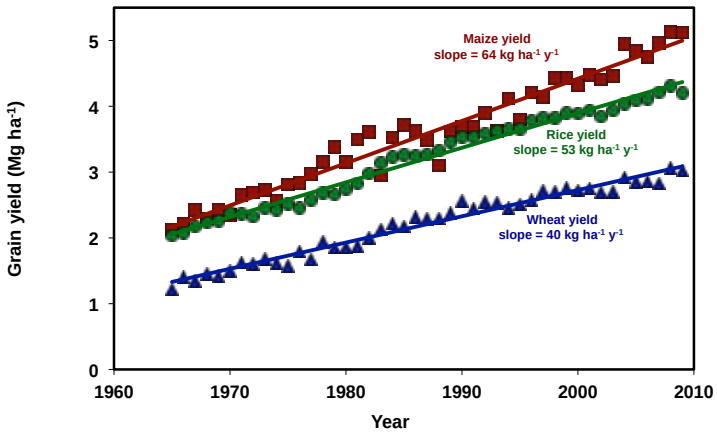
[36]See FAO, Towards 2015 and 2030 [2002] Summary Report. Rome: Food and Agricultural Organization of the United Nations. Available at ftp://ftp.fao.org/docrep/fao/004/y3557e/y3557e.pdf.

[37]Quotes contained in textboxes below are taken from written contributions made during the e-consultation. All contributions to the e-consultation are archived at the following website: http://globalfoodsecurityresearch.net.

Figure 9: Global Cereal Yield Trends, 1966-2009



THESE RATES OF INCREASE ARE NOT FAST ENOUGH TO MEET EXPECTED DEMAND ON EXISTING FARM LAND! source: FAOSTAT

Source: Ken Cassman, 2011

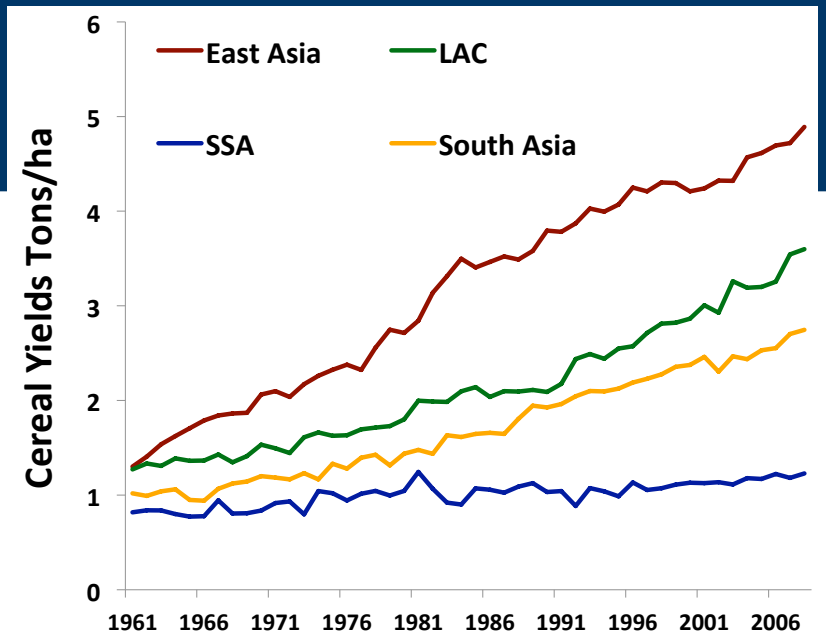
"[T]he beauty of the sustainable intensification focus is that it forces the dialogue to address the dual issues of need for increased production (food security) with the need to enhance environmental services and conserve natural resources. ... [S]uccess in meeting future food demand while protecting the environment and dealing with climate change (and helping to mitigate it, or at least avoid contributing to it) will depend on the ability of farmers in developing countries to achieve large increases in crop and livestock yields while improving soil quality, protecting water quality, increasing nutritional quality, and developing production systems that are resilient to changing and variable climate. While all scientific options are on the table for discussion, the need for sustainable intensification limits the options by requiring a focus on the key challenge, namely, developing agricultural systems that can deliver higher production to meet human food needs and a better environment over the long term."

Ken Cassman, Professor of Agronomy, Director,
Nebraska Center for Energy Sciences Research,
University of Nebraska, United States.

RESEARCH THEMES

- What are the high priority crops and animals? There was concern among some participants at the research forum that a focus on "climate resistant cereals" is too narrow. There must be work aimed at improving commodity cereals, certainly, but also on the crops and animals that matter for local and regional markets in Africa, Asia, and Latin America, and on improvements that will add not just calories, but also quality and diversity to diets and to livelihoods.

- What geographic, climatic, and social factors particularly matter in determining a region's fitness for sustainable intensification efforts? Taking these factors into account, where are the areas of the world most amenable to rapid sustainable intensification?



Source: Monty Jones, 2011

Figure 10: Cereal Yields Tons/Hectare (1961-2008)

- What real, deployable options exist today to aid sustainable intensification? How can FTF and the intended beneficiaries of the initiative best take advantage of the full menu of sustainable intensification options?

- At what scale of agricultural production is sustainable intensification best achieved, and most broadly beneficial? Under what conditions, that is, does it make sense to sustainably intensify the production of smallholder farms, and when is it appropriate to work towards farm consolidation, or to focus efforts on larger-scale farming operations?

- Work is clearly needed to produce next generation, "doubly green" crop and animal varieties, along with methods that sustainably support their cultivation and husbandry. This suggests a need to support the evidence-based evaluation of the full range of agricultural production options, from the best biotechnological to the best agroecological practices. Utilization of a particular technology should depend on context and performance, not on ideology.

- Focused work is needed to enhance the productivity and efficiency of locally adapted crop systems, particularly smallholder and rain-fed systems, recognizing that rain-fed agriculture continues to support the lives and livelihoods of hundreds of millions of the world's poorest people.

- In keeping with the FTF research strategy's goal of linking increases in productivity to human development outcomes, there is a need to develop tools of system-wide, value-chain analysis to pinpoint sites for effective programming. The goal should be yield gap analysis and diagnosis, to determine physical and social factors presently limiting yields and to indicate areas for yield-enhancing interventions.

- Undertake base-lining work to better classify the climatic, soil, freshwater, and other physical characteristics of specific geographies.

- Undertake experimental work aimed at simultaneously measuring productivity and environmental effects of sustainable intensification interventions. In pursuit of sustainable intensification, it will be critical to conduct research where the productivity gains of new technologies and their environmental impacts are measured simultaneously in the same field experiments.

- Given that there are many ways to intensify agricultural production, analysis is required to help determine which of the menu of options makes the most sense in particular locations. How can particular intensification options best be married to particular geographic and social contexts, and to the needs of target populations?

- Examine the potentials and specific challenges of urban agriculture. Research is needed to help understand the importance of quality, locally grown food that provides more than calories and is easily accessible to people living in urban areas.

CHARITY MUTEGI/ BORLAUG LEAP

TRANSFORMING PRODUCTION SYSTEMS

Research challenge II: Improve soil fertility and quality, and the quality and availability of water resources, in target environments

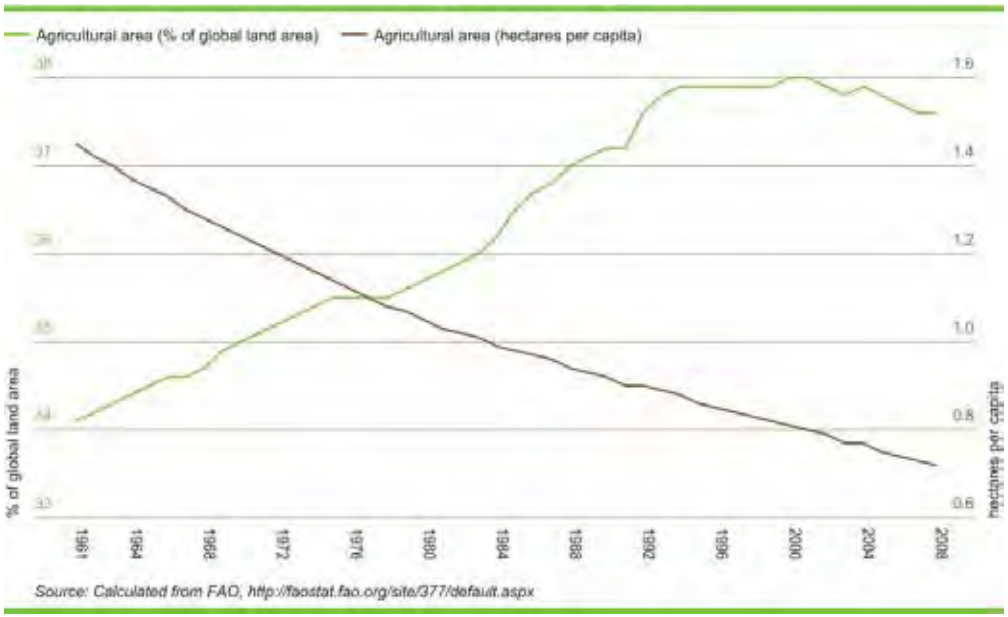
CHALLENGE STATEMENT

Poor soil fertility, particularly in Africa, is a major constraint on productivity. Sustainable intensification in all regions demands an improved knowledge of specific soil protection, remediation, and fertilization needs. In many regions, better access to the best existing fertilizer technologies will be all that is required to greatly boost agricultural output. This entails research into context-specific policy and institutional frameworks to assist with the management of risk and fiscal outlays, particularly for smallholders. Adaptive research is also essential, to be sure that existing technologies are made relevant to particular contexts.

At the same time, existing fertilizer technologies face significant shortcomings. They often suffer from myriad inefficiencies, and even when used as intended they contribute to an array of environmental problems. Research is needed, then, on next-generation fertilizer technologies that will increase production without generating environmental harm.

The quality and availability of freshwater resources are similarly in need of focused attention. Water is itself among the most basic of agricultural inputs. It is also a significant factor in determining the performance of fertilizers, such that water and soil quality should be considered in tandem.

Figure 11: The Share of Land Devoted to Agriculture



Source: Robert Bailey, 2011, p. 17

RESEARCH THEMES

- This is an area that has in recent years received far too little attention. As such, basic questions require answers. For instance, on the fertility front, what are the most promising technological pathways for a transformation of this aspect of agricultural production? What, for example, is the cutting edge research in fertilizers? What likelihood is there of enhancing nitrogen fixation via genetic modification of rhizobia, or the biotechnological conversion of common annuals to perennials? What other opportunities exist for focused, targeted research attention?

- What are the "pull" factors that in particular countries lead to demand for innovation? How can such pull factors be fostered in FTF focus countries, to ensure that new fertilizer technologies and water conservation and preservation methods find their way into widespread use?

- What does it mean to understand fertility as a system, and how can water best be integrated into system-wide analyses? It is one thing to produce more nutrient-rich fertilizer compounds, but quite another to ensure that such compounds are used to their full effect. How can existing and new data best be married to ensure that the most appropriate fertilizers are used in the most conducive contexts?

> "In Sub Saharan Africa, average fertilizer use is 7-8 kg of nutrients per hectare, less than 10% of the global average fertilizer use, and the efficiency of uptake of nutrients from fertilizers is low, on average 30-40%. For most smallholder farmers, fertilizer is a major investment and most farmers don't have the cash at hand to buy fertilizer at the start of the season, while accessing credit is difficult if not impossible. There is little doubt that a coordinated research effort can lead to new fertilizers with a higher use efficiency—smart fertilizers that release fertilizer when the plants need it. Assuming that the price of these fertilizers will not be considerably higher, this would lead to a higher return on investments in what smallholders consider expensive fertilizers—considerable productivity increases."
>
> *J.J. Rob Groot, Director,*
> *East and Southern Africa,*
> *International Fertilizer Development Center, Kenya.*

- How can best practices in the extension of credit and management of risk be replicated or adapted for farmers in FTF focus countries seeking access to improved fertilizers and water management techniques?

- Strive for widely deployable advances in environmentally sound and efficient fertilization technologies and practices, and identify soil amendments and management practices that facilitate fertilizer uptake and nutrient retention while minimizing losses.

- Strive for similar advances in systems geared to the use, conservation, and preservation of water resources.

J. BROWNLIE/ GLOBAL LIVESTOCK CRSP

- Using GIS-based mapping and other technological and methodological forms, undertake base-lining work to better classify the soil, freshwater, climatic, and other physical characteristics of specific geographies. The goals of this work would be to better understand local and regional fertilizer, soil amendment, and water needs, and to ensure that fertilizer resources are directed to their most productive ends.

- Understand and predict the impacts of soil and water conservation practices, including conservation tillage and residue management, on resource capture and crop yields and yield stability, and overcome constraints to the adoption of such practices by farmers.

- Develop rapid appraisal methodologies to identify the physical, social, political, economic, and other constraints to improved soil fertility in particular regions. The goals would be to increase access to, and the potential for meaningful adoption of, new technologies, and to ensure that any new technologies developed take into account the constraints faced by users.

- Catalogue and develop paths to the utilization of effective and appropriate soil conservation techniques, to increase soil health and provide resilience from weather shocks. System level research is required that addresses the interplay between soil organic matter, nutrient loss via erosion, nutrient and water retention via concentration of organic matter, and the productivity and environmental implications of soil fertility augmentation.

- Investigate efficient, effective, and environmentally sound forms of weed, pest, and pathogen control, to add to the net effectiveness of fertility enhancement strategies.

- Investigate land-use and fertilizer policy environments in FTF focus countries to increase access and adoption of new technologies and ensure that any new technologies are developed to take into account the constraints on users.

CHALLENGE STATEMENT

Food producers have always been faced with the need to manage and cope with risk. Farming is an enterprise that, more than most, is vulnerable to nature's vagaries. In any given year, any farmer or pastoralist faces the possibility of too little or too much rain; the appearance of pests or pathogens; and a host of other variable challenges. Human systems are also complex and often unpredictable. Many farmers and pastoralists face season-to-season variations in market access and conditions; in political and social conditions; and so forth. The success of individual farms, and ultimately the success of the entire global system of food production, is tied indelibly to understanding and dealing with these kinds of challenges. For many of the world's smallholders, strategies of risk minimization, rather than production optimization, are the rule. To increase smallholder productivity requires putting in place means to deal with risk, so smallholders can shift to a strategy that allows major increases in production.

Coming years will likely present further impacts on agricultural production from climate change; economic integration; population pressures; competition over increasingly scarce natural resources; the appearance of new diseases affecting people, crops, and livestock; and a range of problems as yet unforeseen. At the same time, risks tied to food are not just a problem for producers. The rural and urban poor face increasing turbulence from food-price fluctuations and global economic recession. While food producers deserve significant attention, so too do those who suffer in other ways from food insecurity.

All of this offers a particular opportunity for FTF. Intensification of agricultural production must not just be sustainable. It must also be *robust*. That is, agricultural systems must be intensified in ways that improve their ability to withstand shocks of various kinds, both anticipated and unanticipated. This starts with improving the abilities of farmers to access the best basic technologies: seeds, fertilizers, farm machinery, and the like. It then entails identifying and working to generate more effective, collective means of sharing risk, from insurance to farmer organizations. Human capacity building of all types is fundamental to this endeavor, through allowing people greater flexibility to respond to changing economic and environmental conditions.

SUSAN JOHNSON/ GLOBAL LIVESTOCK CRSP

"[There is a need to] 1) Determine risk management approaches that provide co- benefits across sectors; 2) Identify equitable livelihood diversification strategies that lead to an equitable improvement in family income and nutrition; and 3) Identify strategies that provide a flexible and sustainable approach for transitioning between different types of agricultural systems (e.g. mixed-crop and livestock, sedentary, pastoralist, etc) in response to different resource constraints."

Shana Gillette, Integrated Research Director,
Livestock Climate Change CRSP,
Assistant Professor of Risk Communication,
College of Veterinary Medicine and Biomedical Sciences,
Colorado State University, United States.

RESEARCH THEMES

- How can cutting-edge technologies and social innovations be brought together in ways that enable communities to better manage risk?

- What are the institutions and mechanisms in particular places that need support, as individuals and communities strive to cope with risk?

- Develop and deploy appraisal methodologies to better characterize the risk landscape faced by particular communities. This would include developing deeper knowledge about how particular rural producers and agricultural technicians presently understand and cope with risk, in order to develop effective risk mitigation and coping strategies in conjunction with the intended beneficiaries.

- Investigate best practices in providing access to credit, markets, cooperatives, and insurance. Examine integration between these economic and policy tools, on the one hand, and appropriate technologies on the other, to build resources for managing risk.

- Identify and investigate crop, educational, and livelihood diversification strategies, to add resilience to household, local, and regional economies.

- In Africa, with primary export markets in Europe, the eventual promotion and use of GM cultivars, especially horticultural crops, needs to be further studied as an effective diversification strategy.

- Devote renewed and sustained attention to the examination of risk in the context of land tenure and use issues, gender, and other social categories that drive disempowerment and deprivation, in order to better tailor policy and other forms of intervention.

Research Challenge IV: Improve the use of relevant research outputs through effective extension delivery that provides feedback from intended beneficiaries

CHALLENGE STATEMENT

New technological developments, production and management practices, and other research findings, and the best existing ideas in each of these categories, matter little unless they find their way into the right hands. Existing extension systems in the wealthy countries are designed around infrastructures and resource bases that do not currently exist in the FTF focus countries. There is significant work—both on the programmatic and research fronts—needed to ensure that research outputs find their way to those who need them, and that researchers of all types are able to better collaborate with and learn from the intended beneficiaries of their efforts.

Communication with respect to this research challenge is a two-way process. There is clearly a need for FTF to foster development of new technologies and practices, and to find effective ways to transmit those innovations to those who need them. At the same time, the pursuit of such innovations should feature sustained input from the intended beneficiaries.

RESEARCH THEMES

- Work to identify and develop dissemination strategies, including traditional extension services and emerging strategies engaging new communications technologies. The goal is to aid the spread of new, and the best existing, technologies and practices, so that they can get readily into the hands of those who can best make use of them.
- Connect agriculturalists in FTF focus countries with worldwide networks of experts, through establishment of a "virtual" extension service. One idea from a participant in the research forum was a pledge that every smallholder farmer with a mobile phone can expect an answer to any technical question within 24 hours.

> "Having worked in this field for a number of decades, I am aware of constraints to productivity which have nothing to do with lack of technology or inputs. We need to understand through social science methodologies why adoption of proven technologies by smallholder farmers is so low. If we do not address this, we shall go on generating more and more technologies without any guarantee of their adoptability. Hybrid seed is still available and viable, yet few smallholder farmers would rather use their low yielding landrace seed. That is major social science research that needs to be carried out."
>
> *Ruth Oniang'o, Editor of the African Journal of Food, Agriculture, Nutrition and Development, and former Member of Parliament, Kenya*

- Develop research and programming consultation models that better coordinate the views of multiple stakeholders. The goal is to use the best available communications research to facilitate better collaboration between researchers internationally and intended beneficiaries in FTF focus countries. The goal is to ensure that a range of constituencies in FTF focus countries have a clear and decisive hand in the establishment of research agendas and programs.
- How can existing channels and mechanisms of information flow best be used in FTF focus countries?
- How can the voices of women and youth better be integrated into research decision-making?

ENHANCED NUTRITION AND FOOD SAFETY

Research Challenge V: Improve availability of, and access to, a high-quality diet

CHALLENGE STATEMENT

Advancing the productivity frontier requires robust examination of entire food systems and value chains. Research is needed to better understand the appropriate points for targeted, high impact interventions that link increases in food production with better nutrition and increased human capital. This is particularly important for children, given recent data tied to the Millennium Development Goals that suggests that over the last few years, the poorest children have made the slowest progress in terms of improved nutrition.[38]

In addition, specific, targeted work is needed to understand how nutritional education, resource accumulation, and other interventions can build capacity and motivate populations to create a demand for high-quality, diverse diets. The need is for the creation of "pull" factors—populations working towards better nutrition because they understand the impacts on human health, child development, and human productivity.[39] Work is needed, that is, to understand how nutritional education and other targeted interventions can build demand and capacity within societies so that populations can support their own long-term nutrition outcomes.

A further challenge is that expanding areas of the developing world now face the extraordinary challenge of being, as one author has put it, both "stuffed and starved."[40] Even as many suffer from undernutrition, an increasing percentage of the world's peoples are consuming a diet that has adequate calories but is deficient in other basic ways. This is leading to a concomitant explosion in chronic diseases like type-II diabetes, heart disease, and certain cancers. What can be done to ensure that interventions undertaken in the name of FTF do not simply lead to the production of a host of new major problems?

RESEARCH THEMES

- A major set of questions exists around how best to boost nutrition in the 1,000 days between conception and age 2. What ultimately makes most sense in particular communities—biofortification strategies, supplementation, or food-based strategies that favor the development of more complete diets? Are these mutually exclusive or complementary strategies? Given the menu of options, how are decisions about the appropriate research and programmatic foci in this area to be made?

- What is the common methodology for measuring the outcomes of agricultural interventions on nutrition outcomes? How, in other words, can progress towards FTF's ultimate goal of connecting sustainable intensification to progress on hunger and poverty reduction be best assessed?

- Determine which agricultural interventions, when geographically co-located and implemented in tandem with health interventions, lead to improvements in nutritional status during the first 1,000 Days (from conception to age two). As a critical component of this research, determine current and future sources of clean and safe water for production and consumption.

- What policy framework, in particular FTF focus countries, is required in agriculture, health, and nutrition to address undernutrition and poverty at the household level (community level)?

- Investigate the most effective means to tackle chronic micronutrient deficiencies in the context of long-term poverty. This will require evidence-based appraisal of intervention strategies, along with attention to the relative benefits of biofortification versus the improvement of dietary quality, and attention to how such interventions might complement one another. Ultimately, seek out social and economic interventions that can more cost-effectively improve nutrition

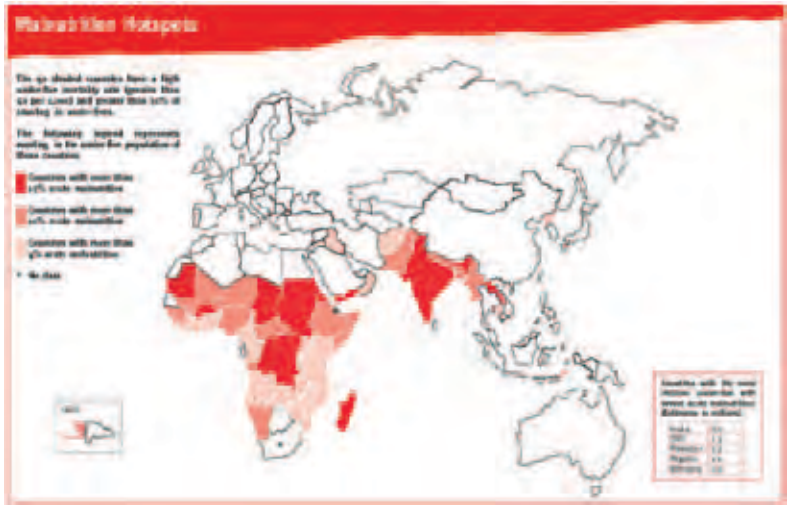
- How can value chain concepts be applied to enhance the ability of agriculture to better leverage improved nutrition outcomes? Investigate potential trade-offs and complementarities when designing farming systems for nutritional adequacy and income or designing farming systems for increased productivity and income.

> "The international nutrition community has been actively engaged over the past five years in defining and agreeing priority research gaps … The World Health Organization and Gates Foundation have also recently conducted extensive reviews of developing country capacity for rapidly implementing interventions known to be efficacious at scale. And this year, the Irish and U.S. governments recently launched the high visibility '1,000 days' initiative ... which is being picked up by many developing country governments as the framework for action for the coming decade in dealing with nutrition. … [W]e need to seize the opportunity presented here (by FTF) to engage in cross-disciplinary dialogue on priorities. While the Research Challenges ... that deal with 'enhanced nutrition and food safety' are useful, we must ask if they are consistent with what the nutrition community (and the food insecurity and humanitarian action communities more broadly) see as priorities? If yes, we should move quickly to find ways to leverage the required resources to support research that will deal with these agenda items, drill deeper into the research questions to determine how to best answer the key questions (what role for the agriculture-focused researchers in addressing core nutrition questions, and visa versa?), and consider existing empirical evidence that rigorously demonstrates ways forward."
>
> *Patrick Webb, Director, Global Nutrition CRSP - Asia*
> *Dean, The Fletcher School, Tufts University, United States*

- Develop a rapid appraisal methodology to determine specific nutrient gaps. Extend this work to determine the structure and function of food systems at the local, national and perhaps regional levels, to understand the constraints on enhanced nutrition outcomes.

SUSAN JOHNSON/ GLOBAL LIVESTOCK CRSP

Figure 12: Malnutrition Hotspots



Source: Doctors Without Borders, 2008.

[38]United Nations, The Millennium Development Goals Report, [2011], available at http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2011/11-31339%20(E)%20MDG%20Report%202011_Book%20LR.pdf.

[39]We know from general studies that maternal education on nutritional impacts does affect diets of young children. See: Variyam et al. 1999. Mother's Nutrition Knowledge and Children's Dietary Intakes. American Journal of Agricultural Economics. Vol. 81, No. 2 (May, 1999), pp. 373-384.

[40]Raj Patel, Stuffed and Starved, (Melville House, 2008).

> "I think food safety challenges are crucial problems in today's agricultural systems. But, it is not only an issue of reducing contamination of food that should be addressed. We must bear in our minds that food of animal origin would be produced with the disease agents in the live animals themselves while post harvest contamination would add to the problem. Examples could be milk produced from TB positive animals and meat produced from taenia and toxoplasma positive animals, etc. There are also numerous other widely prevalent diseases threatening animal and human health and also food safety and quality. Therefore, we should consider sanitary and phytosanitary measures across the whole value chain of livestock commodities (dairy, meat. egg, etc)."
>
> *Fisseha Abenet Tadesse,*
> *Ethiopian Veterinary Association, Ethiopia*

CHALLENGE STATEMENT

The safety of available food remains a crucial concern in FTF focus countries. Work is needed at the most fundamental level to identify the chief constraints preventing the development of safe food systems. Research is then required to develop new technologies and techniques that will dramatically improve the availability of safe and nutritious food, particularly in resource constrained regions.

RESEARCH THEMES

- An overwhelming, basic question in this area is, by what means can populations preserve the field quality level of food?

- Good Agricultural Practices have been developed for application in any agricultural setting. Similarly, good handling and general phytosanitary standards have been widely agreed upon. What particular factors stand in the way of their more widespread utilization in FTF focus countries?

- Develop or better bring to bear existing appraisal strategies that enable rapid identification of sites of food contamination, in order to better target food safety interventions and responses.

- Focused research is needed to better understand the major mycotoxins affecting food in FTF focus countries, and to identify avenues for the spread of technologies and other measures that will enable resource constrained communities to tackle them.

- Research is needed to translate best-practice sanitary and phytosanitary practices into forms that can be readily applied in resource-constrained environments.

- Research into how to help developing countries strengthen their ability to certify, assay, and notify the local populace about their own food safety issues if or when they occur.

> "I am a Food Scientist in Ghana with a keen interest in post harvest issues. I hold the view that anyone interested in the world's food and nutritional security cannot emphasize enough the importance of tackling post harvest losses. In this vein I propose more practical research attention on the development and sustained transfer/ dissemination of appropriate, efficient, ecologically sound, low-cost, value addition or preservation technologies at the on-farm level, with sufficient training and backstopping. For instance village-level solar technologies in many tropical food-producing areas hold huge potentials for safe food dehydration to reduce bulk (for ease of transportation) and preserve nutritional quality."
>
> *Evelyn Adu-Kwarteng, CSIR-Crops Research Institute, Ghana*

CHALLENGE STATEMENT

Postharvest losses remain a significant area of concern in FTF focus countries, with estimates for some countries putting postharvest losses at 30% or more of food harvests. Poor postharvest practices, in turn, can affect incomes, food quality, and the long-term abilities of families and communities to escape from poverty. There is a need for the development of new technologies and practices that tackle sites of loss and contamination throughout the postharvest value chain, and identification of avenues for spreading the best existing technologies and practices.

A core component of responding to postharvest loss must be connecting farmers to appropriate markets, so that sustainable intensification and reductions in crop loss can yield real returns. In addition, there is a need to parse out and distinguish between farm-level (harvest and post-harvest) losses, and those losses that occur post-farm. Establishing clear categories of analysis will make for better strategies of intervention. Ultimately, solving the preservation dilemma can go a long way toward ensuring there is adequate food available for all, particularly in the face of real expected challenges associated with boosting long-term yields.

RESEARCH THEMES

- Given resource limitations, FTF will need to prioritize research investments. Is it best to focus on maize, rice, and wheat as the crops across geographic regions most prone to loss? Or is it more important to focus on the particular postharvest needs of particular places? How will such assessments of priority be made, keeping in mind the country-led focus of the FTF initiative?

- Here, as in other of the challenges, education is important. What role is there for public information campaigns, for instance, alongside the other research and programmatic activities of FTF?

- Strive for widely deployable technological developments to aid with postharvest storage

and processing in resource- and infrastructure-challenged countries. Such developments must collectively address a number of pressing issues, among them contamination of food by foreign materials; crop loss due to pests or rot; challenges with shelf-life and transportation; and other, region-specific problems.

- Pair technological development with integrative research on how to better allow market access. This will include regional-level research on transportation, communications, and other infrastructure requirements, along with local-level research on the kinds of markets that make the most sense for particular communities.

- Better identify and map socioeconomic and geographic constraints to effective postharvest handling, to better target interventions.

SUSAN JOHNSON/ GLOBAL LIVESTOCK CRSP

CROSS-CUTTING CHALLENGES

Research Challenge VIII: Sustainable development through high impact investment in building human and institutional capacity

CHALLENGE STATEMENT

Research targeted at reducing poverty and hunger requires real, sustained attention to the development of human and institutional capacity. In the short-term, we can potentially increase yields of food supplies by applying existing, and developing new technologies and practices to try to keep pace with the present and short-term projected global demand increases. In the longer term, by linking research and technology development with human and institutional capacity building—primarily the products of higher education—it might be possible to create the in-country capacity to solve future agriculture problems and foster national development. Properly executed, this effort will grow economies, reduce rural and urban poverty, lower food prices, increase food supplies, and provide better nutrition for child cognitive and physical development.

This is an area where research and programmatic concerns clearly overlap. Research must be undertaken to better determine and characterize the types of capacity building in which FTF might meaningfully invest. Without building in-country capacity, FTF cannot sustain the gains necessary to achieve its goals. Research is needed to understand how to give real voice in the FTF and other development processes to all major stakeholder groups, particularly smallholder farmers, women, and youth.

RESEARCH THEMES

- A critical component of capacity building is governance, yet scant attention is paid to research in this area. As the FTF initiative looks to strengthen existing institutions and to build new ones, spur partnerships, and in other ways promote capacity development, how can the best available research on governance be integrated into these efforts? How, in turn, can capacity building efforts be properly assessed in terms of their governance effectiveness?

- Determining how best to build the capacity of agriculturalists and supporting institutions will depend on robust value-chain analysis. Yet participants struggled to identify a clear, replicable example of value-chain analysis that could be applied to this context. There is a need for a model project on a complete value-chain, followed by analysis of how best to utilize value-chain understandings to prioritize capacity building.

- Investigate and identify categories of educational models and best practices in institutional capacity building. The goals will be, in a systematic and evidence-based fashion, to determine how best to work with and, if appropriate, help equip the next generation of specialists and leaders to work on hunger alleviation and poverty reduction, and

> "I doubt the benefiting countries can fully exercise leadership unless FTF integrates research support with capacity building for the benefiting countries' institutions."
>
> *Joseph Ryan, Associate Mission Director on Education and Economic Growth USAID, Pakistan*

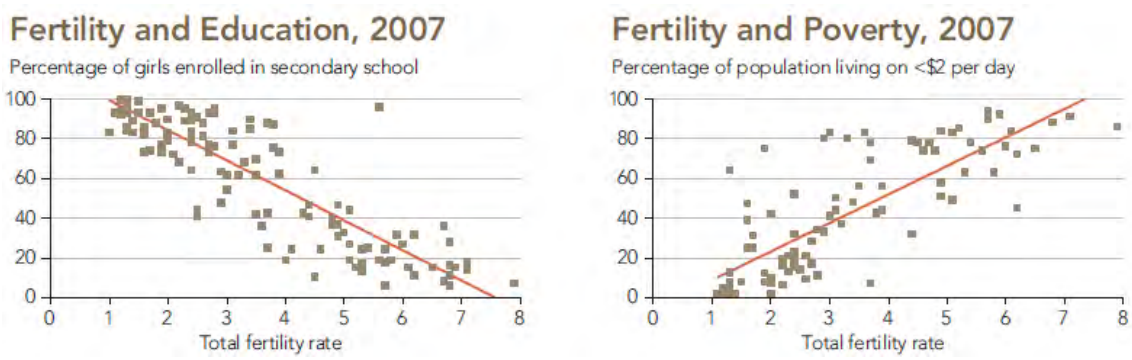
to better allow communities and institutions in the global South to tackle their own development challenges.

- Identify, characterize, and develop research capacity and education that take account of the comparative advantages of research institutions, NGOs, and private sector actors in the FTF focus country and/or region.

- Explore opportunities for using new networking technologies to improve capacity building (e.g., distance learning, online learning, cell phone applications).

- Identify pathways to agricultural success for women and youth. In particular, find innovative ways to counter and reverse the effects of gender inequality on agricultural production, productivity, and food security.

Figure 13: Fertility, Education of Women, and Poverty Rates



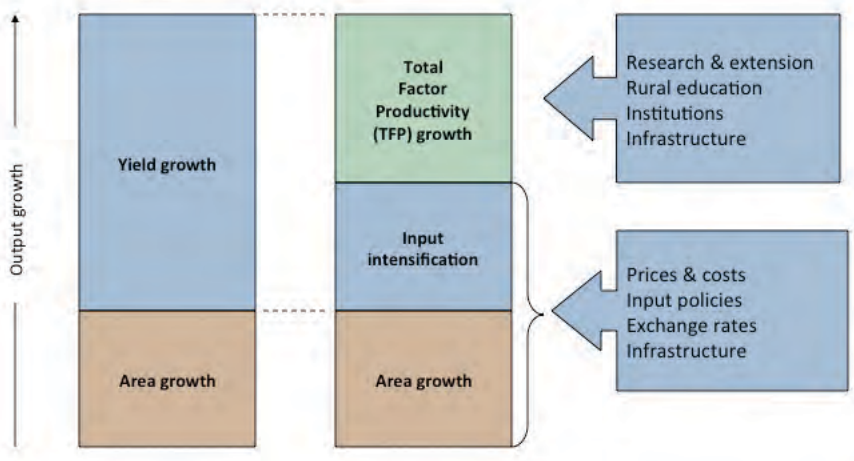
From Leslie Roberts, Science 333:540 (2011). Reprinted with permission from AAAS.

Research Challenge IX: Develop methodologies and research practices to better determine what works, and to better determine how to take new and existing technologies and programs to scale

CHALLENGE STATEMENT

FTF is a US government initiative, and as such there will rightly be accountability to the American public. But there is also a need for mechanisms of accountability that ensure those activities undertaken in the name of FTF are actually to the benefit of vulnerable populations. There is a clear need, then, for better analysis of development efforts, and clearer measures of success. What works? What can research ultimately tell us about the kinds of strategies and interventions that in demonstrable and replicable ways alleviate hunger and poverty?

Figure 14: Towards a more complete accounting of sources of agricultural growth



Source: Keith Fuglie, 2011

SUSAN JOHNSON

RESEARCH THEMES

- To reiterate a recurring theme, there is a need to build evaluative capacity for multiple impacts of research. What are the best ways to simultaneously measure the production and environmental impacts, the child nutrition impacts, and gender impacts of research and programming?

- How can historical and real-time data best be made available to those for whom it matters most?

- Building from FTF's intent to connect sustainable intensification to improvements in health and nutrition, work to develop appropriate metrics and methodologies that measure real hunger and poverty reduction outcomes. The goal is to develop tools that better enable FTF to scale-up programs that clearly work, and to effectively track the impacts of such programs. This would include streamlining and tailoring realistic reporting requirements and intervals for specific categories of investments.

- Assess before implementation, by using established methodologies to determine the expected future poverty, food security, nutrition, and environmental benefits of actual and potential FTF investments.

"FTF is pretty explicit about not wanting more 'demonstration projects'. The international nutrition community is pretty much in agreement these days that evidence-based programming at scale is now possible thanks to wide (not universal, of course) agreement on 'things that work' to improve nutrition. So it's not more pilots that we need (not efficacy trials) but an understanding of delivery science (what works at large scale in practice—with a big focus on costs and effectiveness). Where the largest gaps in our empirical evidence base exist is in knowledge of how best to design and implement multi-sectoral, integrated programs at scale that combine the positive impacts of agriculture, health and nutrition activities (through the whole value chain). That's where the CGIAR (CRP4) is focused, where USAID's Global Nutrition CRSP is focused, and where the FTF's research agenda can play an important role in advocating for, and sustaining, that kind of research."

Patrick Webb, Director, Global Nutrition CRSP - Asia
Dean, The Fletcher School, Tufts University, United States

Research Challenge X: Develop food systems that mitigate, and that increase resilience to, the effects of climate change

CHALLENGE STATEMENT

The world's climate system is changing, with potentially devastating consequences for global food production. The worst effects of these changes will likely be felt by those with fewest resources to respond. At the same time, agriculture is, worldwide, one of the most potent drivers of climate change. Greenhouse gas emissions from crops and livestock (rice and ruminant animals most notably) are one significant challenge. So too is the release of stored carbon and the destruction of long-term carbon sinks through land use change associated with food production and forestry practices. Add to this the enormous stocks of fossil fuels that are used for chemicals, transportation, and food processing in the increasingly globalized and industrialized food system, and agriculture, as a sector, is responsible for as much as one-third of global greenhouse gas emissions.

Yet there is also great potential within agriculture to work toward both mitigation (reducing the incidence of climate change by limiting greenhouse gas emissions and enhancing the sinks that absorb and hold those gases), and adaptation (helping people and groups adjust as climate change worsens). There is a need, then, for researchers to focus on work that shrinks atmospheric greenhouse gas concentrations through the identification, development, and adoption of climate-conscious agricultural systems. At the same time researchers must work on adaptation strategies, particularly for small-scale farmers and those particularly vulnerable to food price volatility.

RESEARCH THEMES

- In this area, as in others identified above, there is a serious shortfall of basic data. There is a need for development of a series of technologies and methodologies, for instance, which allows ready measurement and cost-effective management of carbon stocks.

- When do mitigation and adaptation activities overlap spatially? In other words, just as there is a need for mapping that shows the potential for sustainable intensification and the exploitation of yield gaps, so there is a need for mapping that shows where climate-focused interventions are likely to bear most fruit.

- Benchmark agricultural production systems, food manufacture, distribution, and food waste disposal systems in terms of net greenhouse gas emissions per unit of food and economic value produced.

- Develop low-cost metrics and assessment strategies to quantify environmental performance of farms and food production systems, taking into account not just climate change but biodiversity protection and other environmental imperatives.

- Identify and develop institutional, market, and technological innovations to reduce and respond to water scarcity, and to encourage water conservation, in food production, processing, transportation, and end use.

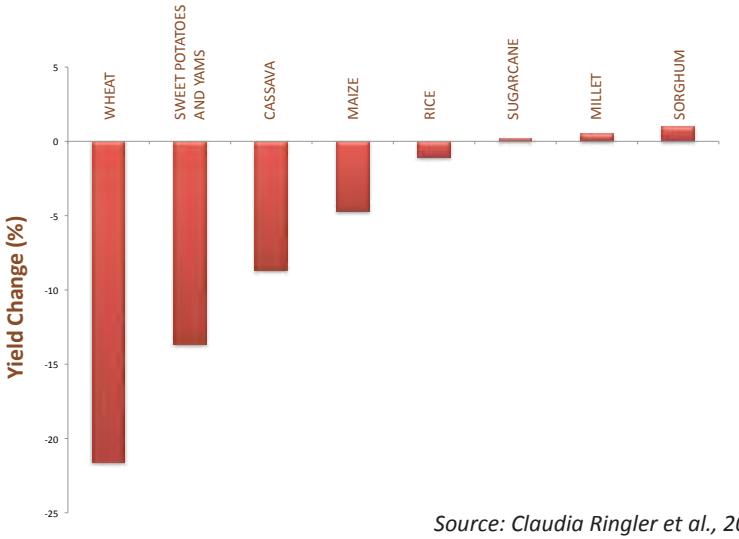
- Focus on innovations that enable agricultural productivity to increase both yields and yield stability in areas facing current and likely future effects of climate change. This will mean, depending on the region of the world under investigation, attention to the effects of increased weather variability including changing rainfall patterns, increased soil salinity, changing growing seasons and crop growing zones, and a range of other challenges.

- Identify and develop agricultural production systems that facilitate a net draw-down and storage of atmospheric carbon using practices that also contribute to increases in productivity and yield stability.

- Determine the appropriate role for biofuels production in terms of crop species, environmental impact, contribution to poverty alleviation, and food security.

> "Global climate policies (e.g, Reducing Emissions from Deforestation and Forest Degradation, or REDD) direct attention to forests as carbon sinks, and many assume a conflict between increased food production and ecosystem conservation. But soils sequester far more carbon than vegetation. Although farming currently adds as much as 30% of greenhouse gasses to the atmosphere, a growing body of research shows the potential to reduce this damage while increasing food production by means of regenerative agriculture, locally adapted and based on various combinations of 'traditional' farming practices and cutting-edge agro-ecological science."
>
> *Kathleen McAfee, Assistant Professor of International Relations, San Francisco State University, United States*

Figure 15: Projected Changes in Sub-Saharan African crop yields due to climate change, 2050



Source: Claudia Ringler et al., 2011

PART IV

RESEARCH AND FTF - BEYOND BUSINESS AS USUAL

None of these opportunities will be seized nor programmatic priorities met with business-as-usual approaches to agricultural research. For one thing, agricultural and food systems research is chronically underfunded. Public investment in agriculture has seen significant decline over the last two decades, even as new threats to food security have emerged. Now, the inadequacy of funding devoted to agricultural research means that in the face of changing climatic conditions and shrinking availability of croplands, the world will struggle simply to *maintain* current levels of productivity in the decades ahead. It is one thing to propose a set of research priorities, but quite another to develop the requisite political and financial support for that research. This is a key, overarching challenge.

There is a further tension here. Agricultural research, as **Keith Fuglie**[41] and others established in their research forum presentations, is a powerful driver of economic growth and human development. In fact, very few investments of any kind provide the scale and quality of social and economic gains that come from investment in agricultural productivity, and more broadly in tying productivity increases to human health and nutrition outcomes.

At the same time, **Rajiv Shah**, **Paul Weisenfeld**,[42] and others noted that there are great difficulties inherent in trying to maintain political momentum behind efforts like FTF. If FTF is to spark a revolution to tackle this century's food challenges, the initiative must be bold and innovative. This entails identifying the big problems, and then allowing researchers to find solutions that can be endlessly adapted, tweaked, and reconfigured for specific situations. Moving beyond business-as-usual research means driving for short-term wins, certainly, but also recognizing that many important research projects will only show real results in the medium and longer terms. In addition, there is a need to tackle massive redundancies and areas of duplication in the international research system. In part this comes from too many researchers chasing too few resources. More broadly, though, it signals a coordination problem. FTF can take the lead on refining and streamlining not just US but also international research priorities and investments.

This section of the report pulls together comments made by participants in the consultative process as they were asked to reflect on the FTF research strategy statement. Participants were invited to offer thoughts about the paper's core assertions, assumptions, and recommendations. While the feedback from researchers involved in the e-consultation was overwhelmingly positive, a number of suggestions for improvement and refinement of the strategy paper in practice were offered. These suggestions are summarized below, by way of five programmatic ideas in support of FTF's developing research agenda.

IPM CRSP

1. Focus on capacity building.

Focus on capacity building at all levels, but particularly scientific capacity in research and education at the tertiary level

Train the next generation of developing country scientists and do so in concert with others donor efforts so institutions can be enhanced to sustain the future of food security and economic growth

Capacity building was the area that received the most sustained attention throughout the consultative process. Participants were intent on making clear that all of the talk of new research priorities matters little without real investment in the institutions that support research, and in the people who are expected to undertake and make use of it. Both human and institutional capacity, particularly in the fields related to the FTF research strategy, need to be built in if the development efforts are to be sustainable and country-led. **Gebisa Ejeta**[43] made the case most eloquently during his research forum presentation. He called a devotion to human capacity development an "indispensable and enduring investment," and the "single most powerful way to effect change."

[41]Keith Fuglie is the Resource, Environmental, and Science Policy Branch Chief of the Economic Research Service, USDA. His presentation at the research forum is archived at http://www.aplu.org/document.doc?id=3406.

[42]Paul Weisenfeld is Assistant Administrator of USAID's Bureau for Food Security. He made his remarks as moderator of the final research forum panel on June 23, 2011, titled "How Will Research Forum Outputs be Used?"

[43]Gebisa Ejeta is a member of the board of BIFAD and Distinguished Professor of Agronomy at Purdue University. He was, in addition, the 2009 World Food Prize laureate. His remarks at the FTF Research Forum were made as part of a panel titled "Framing the Research Prioritization Process," on June 22.

Many participants were insistent that there is no meaningful way to separate a conversation about research from a conversation about capacity. Lack of human capacity in developing countries at any level within the sectors relevant to FTF is a major constraint on development efforts; therefore, the weak state of institutions capable of producing that human capacity is of equal or greater importance. This calls for a focus on the supporting and linking of a range of institutional partners, from private sector, to financial institutions, to universities, to sub- and transnational research institutions.

One challenge received particular attention: If the world is truly to advance towards the elimination of poverty and hunger over the next 40 years, all while stabilizing the environmental condition, creating greater equality globally, and halting human population growth, then FTF needs to take the lead on educating a whole new cohort of people from developing countries, starting now, who will carry much of the intellectual and political responsibility for achieving those goals into the future. There were calls during the consultative process for the development of regional centers of excellence and training within FTF focus countries, for the renewal of once rich links between US and developing country universities, for programs that identify rising young women in agriculture to become the future leaders of the food and agriculture community, and many other ideas. The take-home message is this: capacity building matters, and efforts to improve capacity development deserve wide support.

To this end, participants in the research forum were heartened to learn from **Rajiv Shah** of FTF's development of the new "Borlaug 21st Century Leadership" program. This program represents a $32.5 million investment from FTF and is designed to help shape the next generation of leaders in agriculture. The program "will provide mentoring and training opportunities for agriculture professionals across the globe and will help African institutions strengthen their agriculture systems and best practices to serve as premier learning institutions."[44]

2. Devote significant and sustained attention to the more effective use of data collection and mapping technologies.

> *Overcome a shortage in basic knowledge about geographic and farming systems by consolidating and making accessible existing data, and by developing new methodologies of data collection, analysis, and dissemination*

A second consistent refrain throughout the consultative process concerned the lack of basic data in many of the areas under discussion, and the difficulties inherent in collating and accessing the data that does exist. New forms of data collection and analysis, surveillance, presentation, and dissemination mean that the potential now exists for more people to have a better grasp than ever before of a given agricultural situation, and to think collectively about how best to respond. Yet there are still massive

[44]This quote is from the FTF Research webpage: http://www.feedthefuture.gov/research.html. For more information about the Borlaug Fellowship Program, see http://www.feedthefuture.gov/documents/FTFBorlaugFactSheet.pdf.

and profound gaps in basic knowledge. As **Ken Cassman's** research forum presentation made clear, collectively, we don't know, as a community of researchers, all that we need to, nor do we even know all that we *think* we know. (There are serious flaws, that is, in some of the data that are widely accepted).

There are a number of institutions and organizations already working hard to fill these gaps. The CGIAR system, and the International Food Policy Research Institute (IFPRI) in particular, is one place that prioritizes the collection of such basic knowledge. Universities are another place. How, though, will this information be made available into the future? What role can FTF play in this? Where are the major gaps and how will they be filled?

There is great hope among researchers that FTF will spark new interest in basic data collection, to enable the tracking of trends and to support evidence-based recommendations. There is a need, suggested some, for a new entity affiliated with FTF, to be given this task. Such a body need not be large, but instead would set a small, committed group to work in a clearinghouse function. There were suggestions from participants that if a body of this type were to be established, it might be housed at a major US research university or other existing large-scale research institution, in order to take advantage of supporting services and the intellectual environment of such institutions. A new body that takes responsibility for providing a clear, current, and comprehensive picture of constraints and opportunities—of what is happening, what's working and not working—would greatly assist the pursuit of all of the research possibilities outlined above.

Such a body could also take the lead on coordinating the development of new systems of knowledge development and dissemination. Many technologies already exist to expand connectivity and enhance the spread of essential knowledge, but these technologies need to be tailored for local uses. There is also an opportunity to develop new communication systems and practices, to better link resource constrained farmers in particular into relevant markets and knowledge networks.

3. Mesh globally defined priorities, Washington-generated ideas, and country-led plans.

Use FTF as a new research hub, helping direct and coordinate meaningful research and programmatic efforts

Consultation participants welcomed the fact that the FTF initiative signals renewed US leadership in the areas of hunger and poverty alleviation. Many noted, though, that leadership cannot mean the US government taking on the entire challenge. Leadership instead demands the careful parsing out of roles and responsibilities. There is a great need and opportunity for FTF to play the role of broker and disseminator. This starts with a careful mapping of existing resources in the area of agriculture-led development. Who, precisely, is doing what? Where are the gaps? Where are the redundancies? How can these resources better be aligned in pursuit of sustainable intensification and its connection to health and nutrition outcomes?

Second is the evident need for integration between a country-led initiative and a political process that is driven out of Washington DC. Field coordination of broad policy aims is an overwhelmingly complex task, as is the painstaking work of ensuring full and proper collaboration with multiple stakeholders. This highlights the need for capacity building *in the US government agencies responsible for FTF's implementation*. FTF will not fulfill its promise unless those offices asked to administer FTF are given adequate resourcing and staffing.

A third, related challenge is the danger that despite the intention of a country-led initiative, the FTF process becomes another top-down development process. This poses challenges not just in terms of programming, but also for research. **Bruce McPheron**,[45] commenting on the FTF research consultation process, put it this way:

This strategy still seems very top-down. … Surely we should be working with countries, having them identify not only their problems/challenges, but also (and perhaps more importantly?) the ways in which they want to tackle these challenges? This document [an early draft of the present report] reads as though we will have countries identify their challenges and then we will figure out how to solve their problems for them. I thought the idea was to put the power into the hands of other countries to tackle their challenges in the ways they see fit – and they then come to ask the research community for assistance in their efforts?

The challenge of how to allow true ownership of FTF by those the program is designed to help is a difficult challenge. It demands that at all levels those engaged with FTF be conscious of the country-led ethos of the FTF initiative. Such a challenges also calls for development of assessment instruments that are capable of measuring levels of engagement by key stakeholders, as well as the extent to which research and programming are driven by intended beneficiaries. The quality of country driven agendas is also dependent, as noted above, on the human capacity in and policy environment of the developing countries.

4. Develop a true whole-of-government approach.

Use FTF to spark a new era of coordination and collaboration between US government agencies, and with partners around the globe

The FTF framework calls for a whole-of-government approach to the US hunger and poverty alleviation program. This represents an extraordinary opportunity. The US government has enormous resources and talent, and in numerous agencies and offices US government employees are already conducting work that is related in ways big and small to tackling the challenges of hunger and poverty. As was evident throughout the research forum, much is to be gained from the closer coordination of these existing efforts, and the mustering of energies behind one of today's most pressing moral and social challenges.

[45]Bruce McPheron is the Dean of Penn State's College of Agricultural Sciences. He is a member of the working group established to guide the FTF research consultation. The remarks quoted here are taken from an email sent to the present report's author.

There is a danger here, though, that the promise inherent in a whole-of-government approach will fail for lack of capacity. There is not yet any clear map of *existing* government activities, making it difficult to determine just what is possible through closer collaboration. The development of such a map should be considered an essential priority. So too should the adequate financing and staffing of those offices responsible for generating a whole-of-government response. One participant in the consultative process suggested that FTF has not yet been given the capacity to generate a whole of *USAID* approach to FTF's implementation, let alone a whole-of-government effort. Unless those seeking greater levels of collaboration between US government agencies and offices are adequately resourced and supported, and unless specific people are given clear responsibility for achieving interagency collaboration, the reality of the whole-of-government approach will fall far short of its potential.

5. Develop competitive and collaborative research programs established around problems rather than the pursuit of predetermined solutions.

Set research priorities through problem statements, rather than by dictating particular solutions

Fund open competitions that embrace FTF's country-led, multidisciplinary approach

One clear hope voiced by the research community is that the US government will use FTF to support and incentivize research that brings the best available thinking from a range of disciplines and perspectives to bear to solve problems. Participants in the consultative process urged strongly that the research agenda FTF is developing be expressed as problems that must be addressed, rather than pre-determined solutions that must be pursued, to avoid limiting creativity in the actual research needed to address the challenges.

A point that came through clearly is that there are no silver bullets—no single, straightforward answers—to the challenges of global poverty and hunger. With this in mind there is a danger, worried some, that the FTF research program might become overly concerned with the pursuit of revolutionary technologies. If this were to happen, some expressed concern that this could lead to a playing-down of the complex causes of poverty and under-nutrition, leading to a research strategy that in its enactment ends up privileging grand gestures.

That said, there was also widespread agreement that there is a need for research aimed at producing potential game changers, such as efforts to increase the efficiency of photosynthesis, or to develop new varieties of drought-resistant cereals.

These ideas seem in tension. They are not, though, irreconcilable notions. Participants in the consultative process want to pursue big breakthroughs without losing sight of the fact that hunger and poverty are immensely complex challenges. Many stressed that

DEBORAH CARO/ CULTURAL PRACTICE LLC

even if breakthroughs like widely deployable drought-resistant cereals are realized, they will not alone transform the agricultural and development landscapes. And no one technology can resolve all of the myriad challenges standing in the way of a sustainable global food system. There is a hope that FTF will pay careful attention to long-term as well as short-term research projects; and that there will also be a mix of projects that pay attention to complexity along with those that seek to cut across complexity.

In addition, a principal lesson from the green revolution, and from the work of **Norman Borlaug** in particular, is that technological breakthroughs must be supported by human capacity development and the building of widespread political support. Poverty and hunger are not simply technical or technological questions. New technologies will of course be crucial to the sustainable intensification effort. But they will matter little without capacity building and extension work aimed at getting new and the best existing technologies into the hands of those who need them, development of broad social scientific understandings of the best models for governance and partnership-development, and a host of other forms of research and action. It is important not to forget the nuts-and-bolts work that connects technological improvements to real improvements in the lives of the poor.

The key message is that researchers would appreciate the chance to collaborate and innovate in pursuit of solutions to problems, rather than to tackle solutions dictated in advance. To this end, **Peter McPherson**,[46] in remarks made as moderator of the opening session at the research forum, referenced the research model provided by the National Institutes of Health (NIH). McPherson noted that organizationally and via their calls for funding, the NIH has forced a movement away from “silos” within the health sector, towards cross-disciplinary work in pursuit of answers to crucial questions. FTF offers a similar opportunity to transform agricultural and human development research.

[46]Peter McPherson is President of APLU, and former Administrator of USAID. His remarks were made as part of the research forum’s opening panel on June 21, 2011.

PART V

CONCLUSIONS AND FOLLOW-UP WORK

The FTF research consultation has produced an array of powerful ideas. The research challenges set out above indicate specific avenues for immediate, focused attention. In addition, a number of significant programmatic challenges emerged during the consultation that will need consideration in the years ahead. Still, there is work to be done to understand the full implications of FTF for research in the areas of agricultural development and poverty alleviation. Participants in the consultative process suggested that short-term follow-up work might include the following:

1. Participants in the consultative process thought it important to signal that FTF is truly a country-owned process. To this end, it was suggested that USAID missions in FTF focus countries develop a set of targeted research-oriented workshops. Such workshops might focus on the concept and practical application of sustainable intensification, for instance, and be used to promote dialogue with potential partners in an effort to flesh out country and region-specific research agendas.

2. Following from this, there is a need for swift development of a clear process by which focused research programs can be articulated for each of the FTF focus countries, and particularly for the four geographic regions that have been highlighted as especially important for FTF research efforts. USAID and other government agencies already have projects and programs underway, with others in the pipeline. How will external researchers connect with existing efforts in a meaningful way?

3. Immediate efforts should be made to map the current agricultural research landscape. This should, ideally, include mapping of work within US government agencies and offices and the programs they fund that reach out into the scientific community, to better facilitate whole of government cooperation.

4. There is hope for early attention to the establishment of a new body responsible for data collection, evaluation, and dissemination. This could be a game-changer, better allowing for research efforts of all types.

5. USAID has promised to prepare reactions to the research consultation process, and particularly to provide feedback on how recommendations contained in this report are to be used. This will be immensely useful for those who have been involved in the consultative process, and will pave the way for ongoing fruitful collaboration.

PART V

The final session at the research forum looked specifically at how the outputs from the consultative process will be used. The session featured a number of panelists representing USAID and USDA. **Paul Weisenfeld**, the panel's chair, stressed that the efforts of those who were involved throughout the consultative process will be reflected in the operationalization of the FTF research strategy. Decisions need to be made now about how to prioritize resources, how to build and support programs, and how best to tie research activities to on-the-ground programming. Weisenfeld stressed the need for FTF to demonstrate concrete, dramatic results in the short-term, in order to build and maintain broad-based political support for the initiative. This focus on generating immediate results is, he suggested, the best way to sustain support for long-term bets, and is the best way to overcome what he and **Rajiv Shah** both described as a sense of helplessness that often creeps in to conversations about how to respond to global hunger and poverty. The ultimate call is for research that is purpose-driven and impact-oriented, guided by the real, expressed needs of those that FTF has been established to assist.

It is important, in assessing the overall consultative process, to note that this report is hardly the first that has sketched an agenda for agricultural development research. Indeed, a number of other high-profile agenda-setting exercises have been undertaken in just the last few years.[47] The FTF research consultation effort, however, has been unique. For one thing, it has been built on direct engagement between the external research community and those within the US Government who will support and ultimately take much responsibility for implementation of their work. Such engagement has often in the past been difficult. Government agencies have been reluctant to engage with researchers,[48] or researchers have found it difficult to insert themselves into political processes, or shortcomings of technology and financing have limited the very capacity for open consultation and collaboration.

In the case of the FTF research consultation, the subject of this report, all of these challenges were certainly apparent, but none proved insurmountable. Most importantly, US government officials were present and supportive at every step. The process also made good use of an online consultation format so that interested parties from around the world could readily participate. And hundreds of researchers, recognizing the importance of the FTF research effort, traveled to Washington DC using their own funds to attend the June research forum. For all of these reasons and more, the FTF research consultation has resulted in an extraordinarily productive and open dialogue. Many participants have remarked that the process has set a new standard for transparent engagement between US government agencies and the researchers upon whose work they must often draw.

A second point of distinction is that throughout, this has been a synthetic exercise. It has not just focused on a single, circumscribed area of agricultural productivity, say, or nutrition science. Nor has the consultative process been confined to a specific disciplinary perspective. Rather, the process has been concerned with a systematic evaluation of the whole enterprise

of agriculture-led development, drawing insight from as broad as possible a group of participants.

This is a point worth highlighting, since it gets at one of the main reasons FTF should be considered different from past US Government agriculture programs and past agriculture-led development research efforts. FTF is not focusing just on agricultural productivity, nor just on nutrition, nor just on public health measures. It is a truly integrated program. Among the key insights that inform FTF is that while agricultural productivity is critically important, production gains alone do not offer a real solution to long-term hunger and poverty. Instead, the need is for *sustainable intensification of agricultural systems* in ways that measurably and demonstrably flow through to improvements in the lives of the world's most vulnerable people.

The architects and implementers of FTF are working, with this insight in mind, to develop a research agenda that recognizes the full contours of this complex challenge and that takes best

PAUL HASSEN/ APLU

Rajiv Shah, USAID Administrator addressed the more than 300 participants at the research forum noting that, with FTF, the US Government is signaling its intent to look once again to the long-term.

PAUL HASSEN/ APLU

Small group breakout sessions provided the research forum participants with an opportunity to further develop the research challenge statements that emerged from the e-consultation.

PAUL HASSEN/ APLU

advantage of the possibilities it provides. It bears repeating that throughout the consultative process, those involved demonstrated extremely high levels of enthusiasm for FTF. Researchers were also overwhelmingly complementary of the research structure that the architects of FTF have established, and are obviously hopeful about the potential of FTF to reenergize and reorient, in positive ways, the international agricultural and agriculture-led development research endeavors. There is a clear eagerness to work in support of the FTF initiative.

Success will take, though, more than enthusiasm. It will require careful design of truly integrated research programs and on-the-ground activities, undertaken with full awareness of the complexity of the challenges that lie ahead. Success demands bold and swift action, coupled with a willingness to pursue lines of research that may take many years to bear fruit. Success will only come from displays of true leadership, built on a willingness to listen, to learn, and to collaborate.

Alex Deghan,[49] at the research forum's final session, noted that the FTF initiative comes at a crucial time for the entire international development enterprise. Deghan stressed that if FTF is successful, it will spur and support other work tied to gender, education, democratization, economic development, the building of effective responses to climate change, and so forth. Deghan's comments also suggest that unless real steps are taken to ensure the long-term sustainability and adequacy of the global food supply, work in all of these other areas will matter little. The views expressed in this report are not, then, empty calls to action. Too much is at stake for FTF to fail.

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[47]See for example IFPRI's 2020 Vision Initiative (http://www.ifpri.org/book-753/ourwork/program/2020-vision-food-agriculture-and-environment) aimed at "a shared vision and consensus for action for meeting food needs while reducing poverty and protecting the environment; and (generating) information and (encouraging) debate to influence action by national governments, nongovernmental organizations, the private sector, international development institutions, and other elements of civil society." See also work by the New York Academy of Sciences to address the research agenda on malnutrition affecting three billion people worldwide (http://www.nyas.org/Publications/Detail.aspx?cid=82c092dc-61d8-42c1-a35b-4694038567cc), and work undertaken by FAO to set a new agenda for agricultural research for food security and poverty alleviation (http://www.fao.org/sd/fsdirect/fbdirect/FSK001.htm).

[48]It is important to note that the manner by which US government agencies can seek input from outside actors is strictly governed by a complex set of rules and regulations. The intent of these rules is to prevent outside actors with particular interests from setting government policy. This means that agencies must be extremely vigilant about the ways, for instance, in which outside ideas are incorporated into calls for research proposals or into the criteria by which research funds are allocated. This in turn explains much of the typical government reticence in engaging outside expertise. Such concerns have shaped but not constrained the FTF research consultation process. The crafters of the process have been very careful to abide by the letter and spirit of government rules, while still providing ample space for frank, productive dialogue.

[49]Alex Deghan is Director of the Office of Science and Technology, Bureau of Policy, Planning, and Learning within USAID. His remarks were made as part of a research forum panel on June 23, titled "How Will Research Forum Outputs Be Used?"

Appendices

I:	FEED THE FUTURE RESEARCH CONSULTATION WORKING GROUP	A-2
II:	AGENDA FOR FEED THE FUTURE PLANNING WORKSHOP	A-4
III:	AGENDA FOR FEED THE FUTURE RESEARCH FORUM	A-7
IV:	LIST OF RESEARCH FORUM REGISTRANTS	A-10
V:	THE ROME PRINCIPLES FOR SUSTAINABLE GLOBAL FOOD SECURITY	A-22
	LIST OF ACRONYMS	A-23
	LIST AND SOURCES: TABLES AND FIGURES	A-24

Appendix I

Feed the Future Research Consultation Working Group

WORKING GROUP MEMBERS

DeeVon Bailey
Utah State University

Michael Carter
University of California, Davis

Ken Cassman
University of Nebraska

Montague Demment
APLU/University of California, Davis

David Joslyn
Chicago Council

Julia Kornegay
North Carolina State University

Uma Lele
Independent Consultant

Bruce McPheron
Pennsylvania State University

Barbara Stoecker
Oklahoma State University

Eugene Terry
Independent Consultant

EX OFFICIO MEMBERS

Rob Bertram
U.S. Agency for International Development

Clara Cohen
U.S. Agency for International Development

Alex Dehgan
U.S. Agency for International Development

Robert Easter
Board for International Food and Agricultural Development

Gebisa Ejeta
Board for International Food and Agricultural Development

Hiram Larew
U.S. Department of Agriculture

J. Vern Long
U.S. Agency for International Development

Elsa Murano
Board for International Food and Agricultural Development

Susan Owens
U.S. Agency for International Development/Board for International Food and Agricultural Development

Anita Regmi
U.S. Department of Agriculture

Dan Raiten
National Institutes of Health

Meredith Soule
U.S. Agency for International Development

Appendix II

Agenda for Feed the Future Planning Workshop

FEED THE FUTURE PLANNING WORKSHOP: PARTNERING WITH THE U.S. RESEARCH COMMUNITY

JANUARY 11 - 13, 2011

Co-Sponsored by Purdue University, Association of Public and Land-grant Universities, Board for International Food and Agricultural Development, USAID, and USDA

Workshop Objectives:

1. Communicate the FTF Research Strategy
2. Explore modalities for working together for impact
3. Consider ways to build broad-based support for FTF goals through research and related capacity building

Tuesday, January 11

6:00 pm Welcome Dinner Hosted by President France Córdova of Purdue University

Wednesday, January 12

7:45 am Registration and Continental Breakfast

8:30 am Opening Session: Workshop Overview and Challenge
Chair: Kathie L. Olsen, APLU

Welcome President France Córdova, Purdue University
Video Remarks U.S. Senator Richard Lugar
"Workshop Objectives," Peter McPherson, APLU
"An Overview of Feed the Future," Gregory Gottlieb, Senior Deputy Assistant Administrator, USAID and Ann Tutwiler, Coordinator for Global Food Security, USDA
Question & Answer Period

9:30 am Session II: Defining the Challenges
Chair: Robert Easter, BIFAD Chairman

"Poverty and Hunger," Shenggen Fan, IFPRI
"Production and Sustainable Ecosystems," Kenneth Cassman, University of Nebraska
"Climate Change," Otto Doering, Purdue University
Question & Answer Period

12:00 pm Lunch

1:00 pm Session III: Panel: Meeting the Challenges Through Research
Chair: Tag Demment, APLU

"The Case for Research," Keith Fuglie, USDA
"Human and Institutional Resource Needs," Gebisa Ejeta, Purdue University
"Gender in Research and Food Security," Pamela Anderson, International Potato Center (CIP)
"Monitoring and Evaluation," Mywish Maredia, Michigan State University
Question & Answer Period

3:00 pm Session IV: Research
Chair: Rebecca Nelson, McKnight Foundation & Cornell University
Facilitator: Tim Mealey, Meridian Institute

"Overview of FTF Research Strategy," Rob Bertram, USAID and Anita Regmi, USDA

3:45 pm Breakout Groups: Purpose-Driven Research for FTF
Objective: Discussion around how the research community can engage towards the goals of FTF – reducing hunger and poverty

Breakout Group Leaders:
Walter Bowen, University of Florida – Room 121
Hiram Larew, USDA – Room 129
Meredith Soule, USAID – Room 206

3 Breakout Groups will address the following question:

I. Reflecting on the views expressed by earlier presenters regarding major/grand challenges, what are some of the opportunities or responses for research meeting these or similar types of major challenges in each of the FTF research themes (advancing the productivity frontier; transforming key production systems; enhancing nutrition and food safety)?

While considering major researchable challenges, each group should also consider:

II. To ensure that new technologies, innovations, and practices are being developed that address the priority needs of the poor, what modalities for working together and increasing broad buy-in to FTF goals should we consider to increase our impact on reducing hunger and poverty, while ensuring sustainable production systems and positive impacts on human nutrition?

III. How can the research community assist in addressing the key human and institutional capacity building needs in FTF focus countries?

Wednesday, January 12 (continued)

5:30 pm Read-out from each Breakout Group

6:00 pm Closing Remarks, Molly Jahn, University of Wisconsin

Video: "Hidden Hunger – The ENAM Project in Ghana"

7:00 pm Dinner: Agricultural Research and Nutrition

"Welcome," Dean Jay Akridge, College of Agriculture, Purdue University
"Introduction," Ed Knipling, USDA
Guest Speaker—Lindsay Allen, USDA

Thursday, January 13

8:00 am Session V: Engaging Feed the Future Focus Countries
Facilitator: Tim Mealey, Meridian Institute

"Linking Global Research to Focus Country Priorities," Jeff Hill, USAID

8:30 am Breakout Groups: Linking Global Research to Focus Countries
Objectives: Materials will be provided on the priority value chains, research topics, and identified capacity needs for three FTF focus countries. Breakout Groups will discuss how the research community can add value to these country plans.

Case Study 1: Bangladesh – Room 121
Leader: Sarah Tully, USAID

Case Study 2: Ethiopia – Room 129
Leader: Marvin Burns, Langston University

Case Study 3: Ghana – Room 206
Leader: Cheryl Christensen, USDA

10:00 am Readouts from Breakout Groups
Facilitator: Tim Mealey, Meridian Institute

11:00 am Session VI: Panel and Facilitated Discussion on Working Together for Impact
Facilitator: Tim Mealey, Meridian Institute

Discussion Starters (5 minutes each):
Ibrahim Shaqir, USDA
Michael Carter, University of California, Davis
Dr. Maris Apse, Arcadia Biosciences, Inc.
Uma Lele, GCARD Road Map co-author
Eija Pehu, World Bank

Facilitated Discussion

12:30 pm Lunch

1:20 pm Organizing and Working Together: Next Steps
Chair: Kathie L. Olsen, APLU

1:50 pm "Closing Remarks," Alex Dehgan, Science Advisor, USAID

2:00 pm Adjourn

Agenda for Feed the Future Research Forum

FEED THE FUTURE RESEARCH FORUM
JUNE 21-23, 2011
WASHINGTON CONVENTION CENTER

Tuesday, June 21

3:00-3:45 pm Welcome and Introduction - The Importance of Research to the Success of Feed the Future
Chair: Peter McPherson, President, Association of Public and Land-grant Universities (APLU)

Rajiv Shah, Administrator, USAID
Gayle Smith, Special Assistant to the President & Senior Director, NSC
Kathleen Merrigan, Deputy Secretary of Agriculture, USDA

3:45-5:00 pm Working Across the US Government in Support of Feed the Future Research
Chair: Julie Howard, Deputy Coordinator for Development, Feed the Future, USAID

Jill Auburn, Acting Executive Director of the Office of Chief Scientist, USDA
Jane Silverthorne, Deputy Division Director at the Directorate for Biological Sciences, NSF
Matthew Larsen, Associate Director for Climate and Land-Use Change, USGS
Van Hubbard, Director of the Trans-NIH Division of Nutrition Research Coordination, NIH
Paul Sandifer, Senior Science Advisor to the Administrator, NOAA

5:00-6:00 pm Plenary Session - The importance of research for all stakeholders
Chair: Elsa Murano, Member of BIFAD, Professor and President Emerita, Texas A&M University

Thomas Lumpkin, Director General, International Maize and Wheat Improvement Center (CIMMYT)
Lou Anna Simon, President, Michigan State University
Monty Jones, Executive Director, Forum for Agricultural Research in Africa
Jo Luck, President, Heifer International
Paul Schickler, CEO, Pioneer Hi-Bred

6:30-8:00 pm Capitol Hill Event – 902 Hart Senate Office Building

Rajiv Shah, Administrator, USAID
Catherine Woteki, Under Secretary for Research, Education, and Economics, USDA
Peter McPherson, President, APLU

Wednesday, June 22

8:30-10:00 am Plenary Session: Framing the Research Prioritization Process
Chair: Julia Kornegay, Professor, Department of Horticultural Science, North Carolina State University

Ken Cassman, Heuermann Professor of Agronomy, University of Nebraska, Lincoln and Chair, Independent Science and Partnership Council of the CGIAR
Keith Fuglie, Resource, Environmental, and Science Policy Branch Chief, Economic Research Service, USDA
Paul Dorosh, Division Director of Development Strategy and Governance, IFPRI
Barbara Stoecker, Professor, Department of Nutritional Sciences, Oklahoma State University
Gebisa Ejeta, Member of BIFAD and Distinguished Professor of Agronomy, Purdue University

10:20-11:00 am Overview of the FTF Research Strategy and Presentation of E-consultation Results/Framework for Breakout Group discussions
Chair: Malcolm Butler, Vice President, International Programs, APLU

Rob Bertram, Acting Director, Agricultural Research and Technology, USAID
Anita Regmi, Senior Advisor, International Office of the USDA Chief Scientist, USDA
Simon Nicholson, Assistant Professor—American University; E-consultation Moderator

11:00-12:30 pm Breakout Group Discussions (12 groups)

12:30-2:00 pm Lunch
Introduction: William DeLauder, Member of BIFAD and President Emeritus, Delaware State University
Keynote speaker: Catherine Woteki, Under Secretary for Research, Education, and Economics, USDA

2:00-4:30 pm Breakout Group Discussions continue

6:00-8:00 pm Reception at the Washington Convention Center
Peter McPherson, President, APLU
Julie Howard, Deputy Coordinator for Development, Feed the Future, USAID
Paul Weisenfeld, Assistant Administrator, Bureau for Food Security, USAID
Chavonda Jacobs-Young, Acting Director of NIFA, USDA (invited)
Jonathan Wadsworth, Executive Secretary, CGIAR Fund Council

Thursday, June 23

8:30-9:00 am Plenary Session – The Importance of Partnerships for Research
Robert Zeigler, Director General, International Rice Research Institute (IRRI)

9:00-10:30 am Plenary Session – Overview of Breakout Group discussions
Chair: Montague Demment, Associate Vice-President for International Development, APLU and Professor of Ecology, University of California, Davis

11:00-12:00 pm Panel Discussion: How Will Research Forum Outputs Be Used?
Chair: Paul Weisenfeld, Assistant Administrator, Bureau for Food Security, USAID

Ed Knipling, Administrator, Agricultural Research Service, USDA
Robert Cunnane, Director, Tanzania Mission, USAID
David Atwood, Director, Office of Sustainable Development, Bureau for Africa, USAID
Alex Dehgan, Director, Office of Science and Technology, Bureau of Policy, Planning, and Learning, USAID

12:00-12:30 pm Closing
Montague Demment, Associate Vice-President for International Development, APLU and Professor of Ecology, University of California, Davis
Brady Deaton, President, University of Missouri and Chair, BIFAD

Appendix IV

List of Research Forum Registrants

Name	*Affiliation*	*Position / Title*
Abbott, Sally	USAID	Nutrition and Food Security Technical Advisor
Abong', George	University of Nairobi	Tutorial Fellow
Albanese, Jeffrey	U.S. Department of Agriculture	International Trade Specialist
Alemneh, Teshome	Higher Education for Development	Program Officer, Africa
Alex, Dehgan	USAID	Director, Office of Science and Technology, Bureau of Policy, Planning, and Learning
Alva, Soumya	ICF Macro	Technical Specialist
Amaria Issoufou, SALIA	J.EXPERT International	Directeur Général
Andrade, Juan	University of Illinois	Assistant Professor
Armstrong-Gustafson, Peggy	Amson Technology	Owner
Arnold, David	ProActive Communications	Account Manager
Atwood, David	USAID	Director, Africa Bureau, Office of Sustainable Development
Avant, Bob	Texas AgriLife Research	Director of Corporate Relations
Avila, Marielsie	USDA	International Training Specialist
Ayers, Alex	Iowa State	Graduate Student
Babana, Amadou Hamadoun	Faculty of Science and Technology	Researcher/Professor
Badini, Oumarou	Washington State University	Project Associate
Baldwin, Effie	USDA	Senior Policy Specialist
Baltensperger, David	Texas A&M University	Professor and Department Head
Baquet, Zachary	USAID Bureau for Food Security	Knowledge Management Specialist
Barringer, Laura	Global Harvest Initiative	Senior Associate
Bathrick, David		Agricultural Development Consultant
Beach, Larry	USAID	Senior Biotechnology Advisor
Beachy, Roger		

Beck, DeAndra	National Science Foundation	Program Director
Beck, Mary	Clemson University	Professor
Beck, Thomas	USAID	Senior Advisor, Feed the Future
Becker, John	BIFAD/Office of Development Partners	Senior Agricultural Policy Advisor
Bement, Arden	David Ross Distinguished Professor of Nuclear Engineering	Purdue University
Bennett, Matt	ProActive Communications	Director, Digital Public Relations
Berning, Cynthia	Millennium Challenge Corporation	Agriculture Reporting Analyst
Bertelsen, Michael	Virginia Polytechnic Institute & State University	Associate Dean, International Agriculture & Associate Director, OIRED
Bertram, Robert	USAID	Acting Director, Office of Agriculture, Research and Technology
Best, Barbara	USAID/EGAT/NRM	Coastal Resources and Policy Advisor
Best, Rupert	Catholic Relief Services	Senior Technical Advisor - Agriculture
Birmingham, Tacarra	USDA/FAS	Program Assistant
Birol, Ekin	HarvestPlus, International Food Policy Research Institute	Manager, Impact and Policy
Bisht, Bharat	Institute of Himalayan Environmental Research Education	Director
Bisht, Sonali	Institute of Himalayan Environmental Research and Education	Advisor
Bittner, Gary	USAID	Higher Education and Workforce Development
Blanton, Ingrid	EARTH University Foundation	Vice President for Development
Bleggi, Scott	Bread for the World Institute	Senior International Policy Analyst
Bogale, Alemtsehay	Oklahoma State University	Doctoral Student
Bolognese, Kerry	George Mason University	Director, Government Relations
Bonner, John	CAST	EVP/CEO
Boote, Kenneth	University of Florida	Professor of Agronomy
Boren, Amy	University of Nebraska-Lincoln	Research Assistant Professor
Borlaug, Julie	Texas A&M Agriculture	Assistant Director for Partnerships
Boughton, Duncan	Michigan State University	Associate Professor
Bowen, Richard	Colorado State University	Professor, Director LCC CRSP
Bowen, Walter	University of Florida	Director, International Program, IFAS
Bowman, John	USAID	Senior International Affairs Specialist
Brazenor, Kareina	Chemonics International	Associate
Bresciani, Dean	North Dakota State University	President
Britt-Rankin, Jo	University of Missouri	Associate Dean, HES Extension

Brouder, Sylvie	Purdue University	Professor
Bryant, Dustin	The Texas A&M Research Foundation	Washington Associate
Bugusu, Betty	Purdue University	Managing Director, Intl Food Tech Center
Butler, Malcolm	APLU	Vice President, International Programs
Byrne, John	Oregon State University	President Emeritus
Camargo Neto, Pedro	ABIPECS	President
Campbell, Katie	World Food Program USA	Senior Public Policy Associate
Canahuati, Judy	USAID/DCHA/FFP	MCH, Nutrition and HIV Advisor
Carr, Harry	Catholic Relief Services	Senior Technical Advisor for Monitoring and Evaluation
Cassman, Kenneth	University of Nebraska-Lincoln	Professor and Chair, ISPC
Cavalieri, Anthony	IFPRI	Consultant
Cederstrom, Thoric	Creative Associates International	Director, Livelihoods Practice Area
Chapman, Christopher	USAID	STEP Intern
Chapotin, Saharah Moon	USAID	Acting Division Chief, Agricultural Research
Chittajallu, S Rao	Samagra Agribusiness Services Private Ltd	Director
Christensen, Cheryl	Market and Trade Economics Division	Deputy Director for International Programs and Policy Analysis
Clark, Niki	CARE	Policy Media Relations Officer
Cleaver, Jacqueline	The Global Forum on Agricultural Research	Communications and Research Officer
Cohen, Clara	USAID	Senior Science Policy Advisor
Cohen, David	David Cohen Consulting	President
Cohen, Julia	Plastic Pollution Coalition	Coalition Manager
Colas, Cynthia	LTL Strategies	Project Manager
Cole, Keith	Norman Borlaug Institute for International Agriculture, Texas A&M University	Assistant Director Administration and Finance
Cole, Remileku	Africare	Director, Office of Ag and FS
Copeland, Erica	Senate Committee on Foreign Relations	Intern
Cornick, Tully	Higher Education for Development	Executive Director
Cotton, Dan	eXtension	Director
Cramer, Gary	USAID	Senior Agriculture Advisor
Crawford, Eric	Michigan State University	Professor
Crayton, Evelyn	Auburn University	Assistant Director
Crosby, Greg	USDA NIFA	National Program Leader
Cubillos, Giselle	USDA	International Trade Specialist
Cunnane, Robert	USAID	Mission Director, Tanzania

Cuomo, Gregory	University of Minnesota, Twin Cities Campus	Associate Dean for Extension and Outreach
da Silva, Allegra	USAID	Natural Resources Management Advisor
Da Silva, Felix	Embassy of Timor-Leste	Intern
Daly, Erin	NIFA	Branch Chief, Policy and Oversight Division
Daniliuk, Jay	USAID	Private Sector Advisor
Danquah, Eric	West Africa Centre for Crop Improvement, University of Ghana	Director
Dar, William	International Crops Research Institute for the Semi-Arid Tropics	Director General
Deaton, Brady	University of Missouri-Columbia	Chancellor
DeLauder, William	Delaware State University	President Emeritus
Demissie, Meaza	CRDF Global	Associate Program Manager
Demment, Montague	APLU	Associate Vice President for Int'l Development
Diaz, Angela	Purdue University	Managing Director
Doering, Otto	Purdue University	Professor/Director, Purdue Climate Change Research Center
Donald, Samuel	Florida A&M University	Office Manager
Dorosh, Paul	IFPRI	Division Director, Development Strategy and Governance
Dosanjh, Sukhi	USAID	Program Officer
Dou, Zhengxia	University of Pennsylvania	Associate Professor
Douches, David	MSU	Professor
Duncan, Patricia	Ft. Valley State University	Director, GA Center for Aquaculture Development
Dupras, Dave	Tetra Tech ARD	Senior Associate
Easter, Robert	University of Illinois, Urbana-Champaign	Chancellor
Egna, Hillary	Oregon State University	Director, AquaFish CRSP
El mostafa, Chtaini	FTM (Food to Market)	President
Elliot, Jack	Texas A&M University	Department Head
Eric, Welch	University of Illinois at Chicago	Associate Professor
Essig, Christa	CDC	Public Health Analyst
Flora, Cornelia B.	Iowa State University	Dir, N Central Regional Cntr Rural Dev
Flora, Jan	Iowa State University	Professor/Extension Sociologist
Floyd, Don	National 4-H Council	President and CEO
Fuglie, Keith	Economic Research Service, USDA	Branch Chief for Resource, Environmental and Science Policy
Gautam, Mridul	West Virginia University	Associate Vice President for Research and Economic Development
Gavian, Sarah	International Fertilizer Development Center	Chief Economist

Geary, Steven	University of Connecticut	Professor & Department Head
Gebisa, Ejeta	Purdue University	Distinguished Professor of Agronomy
Gillette, Shana	Colorado State University	Assistant Professor
Glover, Jerry	USAID	Int'l Ag Advisor
Gomes, Raquel	Oxfam America	Research Manager, Aid Effectiveness Team
Graham, Steven	College of Agriculture/K-State Research and Extension	Assistant to the Dean and Director
Green, Ronald	University of Nebraska-Lincoln	Vice President & Harlan Vice Chancellor, Agriculture and Natural Resources
Greisgerger, John	QED Group	Food Security and Agriculture Project Coordinator- KDMD Project
Gryboski, Kristina	USAID	Technical Advisor
Gustafson, Ellen	30 Project	Founder/Executive Director
Halisch, Josina	Global Food & Nutrition Inc	Research Assistant
Hamernik, Deb	University of Nebraska-Lincoln	Associate Dean, Agricultural Research
Hamlin, Delphine	USDA	Agricultural Marketing Specialist
Hansen, David	APLU	Senior Fellow
Hansen, Eric	Meridian Institute	Project Associate
Hanson, Steve	Michigan State University	Dept. Chairperson
Hare, William	University of the District of Columbia	Associate Director
Harrison, Gail	University of California	Professor
Harvey, Jeannie	USDA	Program Analyst, Asia
Haskett, Jonathan	Independent Consultant	Climate and Development Specialist
Heinrichs, E. A.	INTSORMIL	Assistant Director
Heisel, Margaret	NASFA	Director, Center for Capacity Building in Study Abroad
Hellums, Deborah	International Fertilizer Development Center	Program Leader/Agro-Economic Program
Hendricks, Sheryl	University of KwaZulu-Natal	Professor
Henton, June	Auburn University	Dean, College of Human Sciences
Herrera, Eileen	USDA-Agricultural Research Service	Deputy Director
Hervy, Anne-Claire	APLU	Chief Operating Officer, Africa-U.S. Higher Education Initiative
Hill, James	University of California, Davis	Associate Dean, International Programs Office
Hipple, Pat	USDA, NIFA	NPL
Ho, Melissa	Congressional Research Service	Specialist in Agricultural Policy
Hobbs, Huntington	McLean Development Associates	Executive Director
Howard, Julie	USAID	Deputy Coordinator for Development, Feed the Future

Hubchen, Jonathan	Louisiana State University and A & M College	Program Coordinator, International Programs
Ike, David	Emzor Pharmaceutical Industries Limited	Business Development Manager
Imes, Tiffany	USDA	Leland Fellow
Ishmukhamedova, Aliya	J.E. Austin Associates, Inc	Economist
Islam, Yassir	HarvestPlus	Head, Communications
Ivancic, Kate	USDA-FAS	Program Analyst
Jerry, Weigel	Nutrition Consulting	Owner
Jin, Yan	University of Delaware	Professor
Johnson, D Patrick	Booz Allen Hamilton	Associate
Jones, Monty	FARA	Executive Secretary
Jones, Ticora	USAID	Senior Advisor
Jones, Wendelyn	CropLife America	Director, Human Health Policy
Joshi, Ph.D., Dr. Bhoj Raj	Nepal Agricultural Research Council	Chief Scientist, Director
Joslyn, David	Chicago Council on Global Affairs	Senior Advisor
Kagunyu, Anastasia	Kenya Agricultural Research Institute (KARI)	Research officer
Kaijuka, Christopher	FICA Seeds Ltd	Director
Kanagalingam, Sabesh	International Fertilizer Development Center (IFDC)	Senior Research Project Leader
Kantor, Paula	ICRW	Senior Gender & Rural Development Specialist
Kao, Victoria	U.S. Department of Commerce	Trade Specialist
Karanja, Daniel	Partnership to Cut Hunger & Poverty in Africa	Chief of Staff & Senior Fellow
Karpf, Sheila	EWG	Policy Analyst
Kazi, Nabeeha	Humanitas Global Development	Managing Director
Kelly, Alan	University of Pennsylvania	Dean
Kennedy, Shaun	University of Minnesota	
Kerby-Palmier, Brigitte	The World Bank/ WBI	Officer, GDLN Services Group
Kessler, James	Poultry Science Association	Executive Director
Kiefer, Allison	Global Food & Nutrition Inc	Research and Program Development Officer
Kliewer, Gabriela	Counterpart International	Program Officer
Klousia, Maggie	The Chicago Council on Global Affairs	Senior Program Officer, Global Agriculture
Knipling, Edward	USDA	Administrator, Agricultural Research Service
Kolodinsky, Jane	University of Vermont	Professor and Chair
Konate, Alpha	Embassy of Mali to the USA	Economic Advisor
Konstas, Andrianne	USAID/AFR/SD	Program Analyst

Korban, Schuyler	University of Illinois at Urbana-Champaign	Director, International Affairs
Kornegay, Julia	NC State University	Professor and Director of Graduate Program
Kraybill, David	The Ohio State University	Professor
Kuo, Kate	USAID	Chief of Staff, Bureau for Food Security
Lacewell, Ronald	Texas A&M AgriLife (TAMUS)	Assistant Vice Chancellor
Larew, Hiram	USDA Center for International Programs	Director
Lele, Uma	Independent Consultant	Former Senior Advisor, World Bank
Lesher, Bill	Global Harvest Initiative	Executive Director
Levin, Ann	Martha Stewart	Marketing Associate
Lewis, John	Terra Global Capital, LLC	Director
Li, Bian	The World Food Prize Foundation	
Linnekin, Baylen	Keep Food Legal	Executive Director
Long, Jennifer "Vern"	USAID	Senior International Agriculture Research Advisor
Lopez, Josue	NIFA	Education Program Specialist
Lubinsky, Pace	USDA/FAS	Science Advisor
Luck, Jo	Heifer International	President
Lukof, Kate	USAID	Program Analyst
Lyday, Corbin	Heifer International	Director, Government and Institutional Relations
Maaga, Jacob	ACFEX	CEO
Maajar, Mwanaidi	Embassy of the United Republic of Tanzania	Ambassador
Maïga, Kadia	University of Bamako	Research Professor
Mallepally, Rika	Global Cold Chain Alliance	Fellow
Mamo, Martha	University of Nebraska	Professor
Mani, Fostina`	Betta Grain	Group Marketing Director
Manueli, Peter	Peter Manueli	Consultant
Marsh, Dyremple	Delaware State University	Dean, College of Agriculture & Related Sciences
Martirosyan, Gayane	Vegetable-Melon and Industrial Crop Research Center	Head of Biodiversity Department
Masaba Kibuye, Joseph	NaLIRRI	Senior Technician Livestock Projects
Massey, Adrianne	BIO	Managing Director, Science & Regulatory Affairs
Masters, William	Friedman School of Nutrition, Tufts University	Professor of Food Policy
Matz, Marshall	OFW Law	Principal
Maw, Ian	APLU	Vice President, Food, Agriculture, & Natural Resources
Mazur, Robert	Iowa State University	Professor & Associate Director

McConnell, Shannon	CNFA	New Business Development
McCutchen, Bill	Texas AgriLife Research	Assistant to the Executive Director
McMurdy, John	USAID	International Research Advisor
McNary, Rick	Numana	Pres/CEO
McPherson, M. Peter	APLU	President
Mehta, Subhash	NGO association for agri research for development (AR4D) in the Asia Pacific (NAARAP)	Executive Committee Member
Meier, Nathan	Office of Research	Proposal Development Coordinator
Mendrala, Emily	Senate Foreign Relations Committee	Professional Staff Member
Meyer, Evan	USAID	Agricultural Officer
Meyers, William	University of Missouri	Interim Director, Division of Applied Social Sciences
Miles, Aaron	USAID Office of Development Partners	Program Officer, BIFAD
Miller, Andrew	Earth Institute, Columbia University	Manager, Finance & Administration
Miller, Colin	Foreign Agricultural Service	Program Analyst
Miller, Diane	American Society for Horticultural Science	V-P International Division, ASHS
Miller, Mark	USDA	Agricultural Statistician
Miller, Raymond	University of Maryland, College Park	Director, International Programs
Mistry, Amit	USAID	AAAS Fellow
Molnar, Joseph	Auburn University	Coordinator, Office of International Agriculture
Moore, Keith	SANREM CRSP/OIRED/VT	Associate Program Director
Moran, Brian	Praxis Strategy Group	Advisor
Morris, Bob	AndMore Associates, LLC	Principal
Morris, Kimberli	The Pennsylvania State University	Director of International Programs
Moss, Julie	FDA	Deputy Director, International Affairs
Moussa, Mahamane	International Relief and Development	Country Director
Mullally, Kevin	USAID	Director, USAID/Senegal
Mulugeta, Afework	Mekelle University	Asst Professor
Muniappan, Rangaswamy	IPM CRSP	Program Director
Murano, Elsa	Texas A&M University	Professor and President Emeritus
Murphy, Keely	United Nations Food and Agriculture Organization	Intern
Murphy, Meaghan	QED Group	Food Security and Agriculture Program Manager- KDMD Project
Nagarajan, Geetha	IRIS center	Research Director
Navarro, Erica	USAID	Feed The Future Budget Director
Navin, Robert	USAID	Senior Agricultural Advisor

Ndao, Abdoulaye	National Agricultural Insurance Company	Agronomist Engineer /Commercial Responsible Technical
Ndiaye, Demba	www.comengip.org	Director of International Partnerships
Ngugi, Moffatt	USAID	Climate Change Advisor
Nicholson, Simon	American University	Assistant Professor
Ninnes, Peter	ICRISAT	Director-Resource Planning
Nkongolo, Nsalambi	Lincoln University of Missouri	Associate Professor & GIS Lab Manager
Norman, David	Winrock International	Group Vice President - Enterprise and Agriculture
Okwudirichukwu Idam, Okoro	Lift Above Poverty	Clerk
Owens, Kristina	USDA APHIS	Plant Biologist
Owens, Susan	USAID	Executive Director (USAID/ODP/OD/BIFAD)
Owuor, Barack	Maseno University	Agronomist
Palmier, Harry	GFAR/FAO-OEKD	Senior Partnerships Expert
Palo, Dr Laxmikant	USAID	Senior Technical Advisor-Nutrition
Pandya-Lorch, Rajul	IFPRI	Chief of Staff and Head, 2020 Vision Initiative
Pappaioanou, Marguerite	AAVMC	Executive Director
Perez, Kari	USDA/NIFA	AAAS Fellow
Perl, Amanda	IFT	Special Projects Leader
Pettigrew, James	American Society of Animal Science	Professor
Pifer, Marilyn	CRDF Global	Associate Program Director
Pinto, Amb. Constancio	Embassy of Timor-Leste	Ambassador
Potter, Ryland	The Whitaker Group	Research and Media Manager
Prakash, Channapatna	Tuskegee University	Professor
Pratt, Orry	Animal Agriculture Alliance	Intern
Pursell, Taylor	NFT Industries	CEO
Quinn, Kenneth	World Food Prize	President
Rabatsky, Bob	Fintrac	SVP
Raghothama, K.G.	Purdue University	Associate Director
Raiten, Daniel	NIH/NICHD	Program Officer-Nutrition
Rajiv, Shah	USAID	Administrator
Rea, Harry	Office of Agriculture	Aquaculture & Fisheries
Reddy, Caroline	CNFA	New Business Development
Regmi, Anita	USDA	Agricultural Economist
Reinhart, Adam	USAID	Agricultural and Food Security Advisor

Reynolds, Matthew	Global Cold Chain Alliance	Intern
Rice, Trudy	National Association of Counties	Ralph L. Tabor Extension Fellow
Ritualo, Amy	USDA	Monitoring and Evaluation
Roe, Terry	University of Minnesota	Professor, Agriculture & Applied Economics
Rosenberg, Allison	Iowa State University	Assist. Vice President and Director of Fed Rel
Rossier, Colleen	USDA	Program Assistant
Rothschild, Jamie	USDA	International Trade Specialist
Rubin, Deborah	Cultural Practice, LLC	Director
Runge, Edward	Texas A&M University	Professor Emeritus
Ryerson-Cruz, Geraldine	World Vision	Sr. Research & Policy Analyst
Salih, Osama	King Saud University	Research Fellow
Salima, Marzouki	NGO	veterinary/farmer
Sargsyan, Gayane	Vegetable-Melon and Industrial Crop Research Center	Director, Doctor of Agricultural Sciences
Schaetzel, Tom	The Manoff Group	Senior Advisor, Nutrition and Agriculture
Schescke, Kent	National FFA Organization	Director of Strategic Partnerships
Schlossman, Nina	Global Food & Nutrition Inc	President
Schmeissner, Peter	Office of Science and Technology Policy	Senior Policy Analyst
Schwartz, Nancy	OMB, Executive Office of the President	Sr. Economist
Scott, James	University of Missouri- Columbia	Associate Vice Provost - International Initiatives/Director - International Center
Senwo, Zachary	Alabama A&M University	Interim Research Director
Shapiro, Letty	Office of the Comptroller of the Currency (OCC)	Community Development Expert
Sharma, Dhiraj	IRIS Center	Program Specialist
Sharpless, Hon. Mattie R.	Independent Consultant	International Trade Advisor
Sheikh Mohamed, Saeed	Somaliland University of Technology	Secretary
Sherrard, Daniel	EARTH University	Provost
Shipley, Ahlishia	NIFA	Program Specialist
Shrier, Jonathan	U.S. Department of State	Acting Deputy Coordinator for Diplomacy, Feed the Future
Shuck, Julia	KCE Public Affairs	Public Relations Specialist
Silitonga, Maifan	Alcorn State University	Assistant Professor & Director
Simmonds, Nii	The DAIN Network	Program Director
Simon, Lou Anna	Michigan State University	President
Singh, Dheeraj	Central Arid Zone Research Institute (CAZRI)	Researcher
Siringi M, Elijah	School of Finance and Banking	Head and Senior Lecturer Department of Economics-SFB

Sischo, William	Washington State University	Professor
Sistani, Nahid	Alabama A&M University	Professor
Smith, Charles	USDA	Senior Training Coordinator
Smith, Gayle	NSC	Special Assistant to the President & Senior Director
Speck, Janet	Consulting	International Economist
Speidel, David	USDA	Agriculture Advisor
Starke-Reed, Pamela	NIH DNRC	Deputy Director NIH DNRC
Steffen, Philip	USAID	Agricultural Recovery Advisor
Stoecker, Barbara	Oklahoma State University	Regents Professor of Nutritional Sciences
Stokes, Harley	World Food Program USA	Public Policy
Sullivan, Alexandra	CUNY - Graduate Center	Doctoral Student
Sutton, Kipp	USAID	Agriculture Officer
Swaminathan, M.S.	Chair	
Swoboda, Frank	The World Food Prize Foundation	
Szabo, Elise	USDA/FAS	Program Assistant
Szymanski, Marcella	US Dept. of State	Foreign Affairs Officer
Tablante, Nathaniel	University of Maryland College Park	Associate Professor
Tardif-Douglin, David	DAI	Chief of Party Africa Lead
Taugher, Colleen	Washington State University	Project Associate
Taylor, Ashley	USDA	Program Assistant
Teferra, Asratie	Walden University	Doctoral Student
Tengey, Davida	USDA	Program Assistant, Animal Systems
Terry, Eugene	TransFarm Africa	Senior Technical Advisor
Thacker, Eileen	USDA-ARS	National Program Leader, Animal Health
Thapa, Samjhana	World Bank	Operations Officer
Thomas, Phillip	U.S. Government Accountability Office	Assistant Director, International Affairs
Thompson, Henry	Colorado State University	Professor
Tilahun, Jessica	Global Health/USAID	Nutrition Advisor
Tomkins, Alan	US Department of State	Senior Advisor & Franklin Fellow, Office of Global Hunger and Food Security Initiative
Traoré, Diakaridia	University of Bamako	Research Professor
Traore, Mamadou	Embassy of Mali	Ambassador
Truong, Amy	The Fletcher School, Tufts University	Recent Graduate
Turk, Joyce	USAID	Senior Livestock Advisor

Turner, James	National Oceanic & Atmospheric Administration (NOAA)	Director, Office of International Affairs
Turner, Liz	SUSTAIN	Executive Director
Van Woerkom, Mindy	Iowa State University	Deputy Director of Federal Relations
Varner, Mark	University of Maryland	International Programs in Agriculture & Natural Resources
Villegas Morera, Paula	APLU	Staff Assistant, International Programs
Volenec, Jeff	Dept. of Agronomy, Purdue University	President-elect of the Crop Science Society of America and Professor
Voss, Ron	University of California, Davis	Director, Horticulture CRSP
Wabwire, Faustine	Bread for the World	Policy Analyst
Wakhu, Florence	Chepkoilel University College, Eldoret, Kenya	Lecturer (Ph.D)
Walls, Isabel	USDA/NIFA-FNS	NPL, Epidemiology of Food Safety
Wanmali, Sudhir	Sheladia Associates, Inc	Senior Associate and Director, Agricultural and Rural Development
Wasilwa, Lusike	Kenya Agricultural Research Institute	Assistant Director in charge of Horticulture Research
Weber, Lesly	Farm Journal Foundation	Director of Government Relations
Weisenfeld, Paul	USAID	Assistant to the Administrator
Weisheit, Anke	Mbarara University of Science and Technology (MUST)	Innovator, Researcher on Indigenous Knowledge Systems
Weller, Curtis	University of Nebraska-Lincoln	Professor
White, Eric	INTEGRA LLC	Managing Associate
Whung, Pai-Yei	World Bank	Science Advisor
Widders, Irv	Michigan State University	Director, Dry Grain Pulses CRSP
Williams, Anne	USAID	BFS/ART/Multi-Sector Division Chief
Williams, Tim	University of Georgia	Director, Peanut CSRP
Williamson, Handy	University of Missouri	Vice Provost, International Programs & Strategic Initiatives
Wilson, L. George	North Carolina State University	Professor
Witte, Eric	USAID	Senior International Affairs Specialist
Wood, YIbo	USDA Food and Nutrition Service	Global Coordinator
Woods, Calita	SAIS - Johns Hopkins University	Recent Graduate
Woteki, Catherine	USDA	Under Secretary
Yohe, John	University of Nebraska-Lincoln	Program Director, INTSORMIL CRSP
Youm, Ousmane	University of Nebraska	Professor, IANR International Programs Coordinator
Ziska, Lewis	USDA-ARS	Plant Physiologist

Appendix V

The Rome Principles for Sustainable Global Food Security[50]

Principle 1: Invest in country-owned plans, aimed at channeling resources to well-designed and results-based programmes and partnerships.

Principle 2: Foster strategic coordination at the national, regional and global levels to improve governance, promote better allocation of resources, avoid duplication of efforts, and identify response-gaps.

Principle 3: Strive for a comprehensive twin-track approach to food security that consists of: 1) direct action to immediately tackle hunger for the most vulnerable and 2) medium- and long-term sustainable agricultural, food security, nutrition and rural development programmes to eliminate the root causes of hunger and poverty, including through the progressive realization of the right to adequate food.

Principle 4: Ensure a strong role for the multilateral system by sustained improvements in efficiency, responsiveness, coordination and effectiveness of multilateral institutions.

Principle 5: Ensure sustained and substantial commitment by all partners to investment in agriculture and food security and nutrition, with provision of necessary resources in a timely and reliable fashion, aimed at multi-year plans and programmes.

List of Acronyms

APLU	Association of Public and Land-grant Universities
ARI	Agricultural research institution
BIFAD	Board for International Food and Agricultural Development
CAADP	Comprehensive Africa Agriculture Development Programme
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
CIP	International Potato Center
CRSPs	Collaborative Research Support Programs
FAO	Food and Agriculture Organization of the United Nations
FTF	Feed the Future
IFPRI	International Food Policy Research Institute
IRRI	International Rice Research Institute
MCC	Millennium Challenge Corporation
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental organization
NIH	National Institutes of Health
NOAA	National Oceanic and Atmospheric Administration
NSC	National Security Council
NSF	National Science Foundation
USAID	US Agency for International Development
USDA	US Department of Agriculture
USGS	US Geological Survey

List of Tables and Figures

Tables

Table 1:	Scale And Impact—Criteria For Ftf Research Investment	9
Table 2:	Potential Ftf Focus Countries	16

Figures

Figure 1:	Number Of Undernourished People In The World, 1969-71 To 2010	6
Figure 2:	World Population Growth, 1950-2050 (Medium Variant)	7
Figure 3:	Ftf Research Consultation Process	10
Figure 4:	E-Consultation Participants By Type Of Institutional Affiliation	13
Figure 5:	Us Foreign Assistance For Agriculture, 1983-2009	16
Figure 6:	Feed The Future Results Framework	19
Figure 7:	Agroecological Regions Targeted By Ftf Research Strategy	24
Figure 8:	A Virtuous Cycle For Ftf-Focused Research	27
Figure 9:	Global Cereal Yield Trends, 1966-2009	29
Figure 10:	Cereal Yields Tons/Hectare (1961-2008)	30
Figure 11:	The Share Of Land Devoted To Agriculture	32
Figure 12:	Malnutrition Hotspots	40
Figure 13:	Fertility, Education Of Women, And Poverty Rates	45
Figure 14:	Towards A More Complete Accounting Of Sources Of Agricultural Growth	46
Figure 15:	Projected Changes In Sub-Saharan African Crop Yields Due To Climate Change, 2050	49

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