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Conference Paper

Rethinking agriculture

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Global Economic Symposium

The Global Environment

Rethinking Agriculture

The Challenges

2008 began with rapidly rising food prices that threatened lives in poor countries and created massive pressures in rich economies; the year ended with a financial crisis that send food prices downwards and pushed poor countries' food problems down the policy agendas of the rich countries.

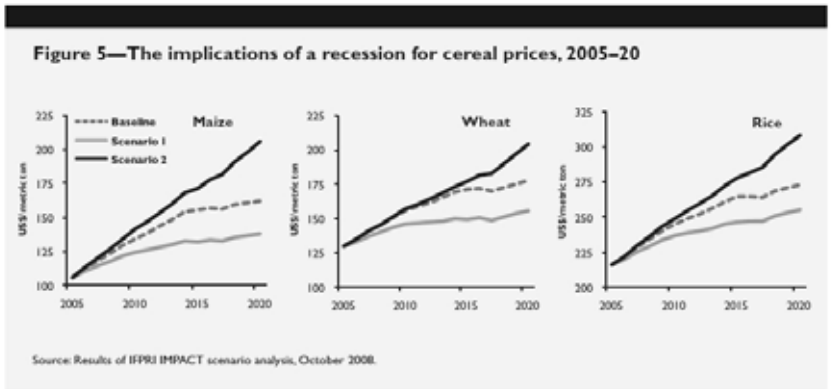
The world's food system should not remain hostage to such short-term turbulences. Producing enough food for the world's growing population and getting it to the people who need it requires rethinking global agriculture.

A long-term perspective requires that agricultural production and distribution look beyond the financial crisis and instead by guided by long-term considerations – political, economic and social.

The World Food Program's funding needs are rising. Vulnerable nations have depleted their fund reserves and, hit by the financial crisis, have no resources left to manage potential future food shortages. Once the world-wide recession is over, a combination of rising population and incomes will once push food prices upwards.

Now is the time to plan for a sustainable world food system, based on international co-operation. What can governments, international organizations and civic groups do to overcome the massive political impediments to such as sustainable system – such as agricultural subsidies in developed economies, missing property rights and corruption in food-aid-receiving countries, export quotas, and the like? How can the interest groups responsible for maintaining an inefficient agricultural status quo be dealt with and the losers compensated? How can we ensure that hungry people are fed without depriving local farmers of the incentives to become self-sufficient? What role can business enterprises play to boost agricultural yields? What policy frameworks can encourage innovation, agricultural productivity and global equity simultaneously? What are the appropriate roles of free market incentives and global governance?

Three scenarios for the impact of financial crisis on cereal prices:



Baseline: Continued economic growth and maintained productivity and investments in agriculture.
Scenario 1: Economic growth is reduced by 2 to 3 percentage points depending on the region, and wise policy choices maintain agricultural productivity and investments.
Scenario 2: Economic growth is reduced as in scenario 1, agricultural investment and productivity decline in line with the reduced economic growth – this scenario is unfortunately more likely.

Proposed Solutions

Aslihan Arslan

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Rethinking agriculture: thought for food

The most common responses to the crisis, namely establishment of safety nets and export bans, are only marginally effective in reaching the rural poor who are net-buyer smallholders. Agriculture must be at the center of medium-long term solutions at the national and international levels. Governments, international organizations, civic groups, and the business sector should envisage a broader perspective.

1. Make sure that initially established targeted cash transfers and safety net programs are coupled with policies to provide long term incentives and opportunities to increase agricultural productivity. Once the crisis fades, the immediate/short term programs should be closed in order to remove any perverse incentives.

2. Higher spending on agricultural R&D may help to prevent a longer-term food price crisis. Give incentives to private businesses that are sources of innovation in agriculture to invest in inputs suited to country-specific needs. This may include the development of non-food and multi-purpose crops, intercropping and other ways of combining food and fuel provision, alongside investment in renewable energy sources. A matching fund from governments or international organizations may be utilized for this purpose.

3. NGOs and other civil society organization should be mobilized to increase the awareness of what agriculture can do to reduce hunger and poverty. Political support should be mobilized to elevate agriculture in government and donor priorities. Engage in policy dialogues with stakeholders to ensure that the development of economic, regulatory and administrative policies that address the concerns of the private sector, and contribute to better functioning markets.

4. Establish an international body to create a concerted effort in order to improve the accuracy and timeliness of reporting of grain stocks from each country to minimize uncertainty about the state of supplies at any particular time. (Rice crisis particularly was caused by the uncertainty about the available world stocks and ensuing panic.)

5. Facilitate mutual assurance in maintenance of open markets in grains by inception of disciplines at the World Trade Organization (WTO) with respect to food export quotas and bans, to complement the WTO's current focus on import restrictions.

6. Promote improved access to markets, credit, insurance and information always as the core of agricultural and rural development policies, even if the immediate responses divert attention from these pillars of development. Invest in and improve access to agricultural inputs such as locally adapted seeds, fertilizer and pesticides. Explore the systematic development of financial instruments for agriculture that deepen markets and allow for efficient intermediation of financial risk management (e.g., warehouse receipts, parametric insurance, weather-index insurance).

Sources

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Ken Ash

Deputy-Director, Directorate for Trade and Agriculture, OECD

Alternative policy approaches

Now is a very good time to re-think agriculture, and in particular the policy environment in which the global food and agriculture system operates. While there are important challenges to be faced, there are also considerable opportunities.

The food and agriculture sector is proving more resilient than many others in the midst of the current global economic downturn, and as recovery takes hold the prospects for competitive suppliers are bright – there is clearly a growing demand for feed, food and industrial products, in particular in developing countries. At the same time, there is greater competition for scarce resources (in particular land and water), climate change is altering production frontiers and increasing the variability of primary production, and market price volatility appears to be increasing. The challenge of feeding the world's growing population is more clearly on the agenda of governments and international organisations.

Exploiting these opportunities and addressing these challenges would be made much easier in an operating environment in which policy instruments are explicitly and directly connected to the goals (whether they are challenges or opportunities) that are being pursued. The overall aim would be (i) to remove policy disincentives that might currently constrain competitive suppliers from responding to changing market signals, and (ii) to increase strategic public and private investments to enhance food and agriculture supply capacity, in particular in developing countries. More specifically:

- Reform of farm policy in many OECD countries, characterised by very high levels of support for the production of many traditional commodities, needs to be considerably accelerated. The current structure of farm policy support has its origins many decades ago, and even with recent reforms in many countries relatively little current farm support addresses the challenges and opportunities outlined above. Policies that better target these interests could improve policy performance both domestically and internationally, and at lower cost to governments and consumers.
- Such domestic policy reform would facilitate needed changes to trade policies in many OECD countries that currently constrain the flow of food and agriculture products. There would be few trade tensions, and little left to negotiate multilaterally, if more decoupled and targeted farm policies were in place. Export subsidies of various kinds to dispose of products surplus to domestic requirements would no longer be needed, tariffs would not be required to maintain domestic prices at higher than international levels, nor would domestic support measures that isolate producers from world prices changes be needed.
- OECD country farm policy reform does not imply moving to 'zero support' – it does imply shifting to alternative policy instruments. Public investments to help the sector mitigate and adapt to climate change, to encourage sustainable use of land and water resources, to manage unavoidable risks unique to the sector, to further technological progress and improve productivity growth, to ensure plant, animal and human health, etc. all warrant consideration.
- Beyond OECD country farm policies, important lessons can be learned from recent market and policy experiences: dramatic price hikes, followed by price declines and a global economic crisis, have once again highlighted the issue of access to food. Importantly, policy responses need to distinguish between the short term imperative to act in order to address the immediate needs of the hungry from the medium and long term imperatives of further agriculture development and poverty reduction in less developed economies.
- Emergency relief and safety net programs (such as in-kind food assistance, cash transfers and direct income support) clearly need to be in place. Long term financing is required to maintain the activities of the World Food Programme on a predictable and planned basis,

recognising the need for differentiated responses to the specific vulnerabilities of different groups in society. Provision or subsidy of basic inputs for production can be effective as part of a package of emergency responses, but their benefits might be greatly outweighed by their costs over the medium term. Credible exit strategies from input subsidy and other assistance programs should be a central part of the policy design. A greater focus on improving the functioning of input markets so that emergency measures are not needed at this level seems warranted.

- Government actions to restrict exports, with the aim of diverting supply to domestic markets and lowering domestic consumer prices, should be avoided. Not only do such measures not target poor consumers, they also discourage domestic producers from increasing output in response to global demand. This is exactly the opposite impact intended, dampening agriculture expansion in the country taking such actions (and contributing to instability on global markets).
- Stimulating agricultural productivity and increasing output, in particular in less developed countries, is essential. Increased investment in agricultural research, extension, market information, infrastructure and institution building are all required. In particular, there is considerable evidence that investment in agricultural research, technology development and extension has an especially high social payoff with respect to pro-poor growth. Further, many developing countries have a rich natural resource base, and there are apparent opportunities to develop globally competitive supply chains.
- In many developing countries the majority of poor people are small-holder farmers, but many of them are net food buyers as well: this implies that this group needs to be targeted, but it needs to be recognised that their pathways to development are diverse. Some will remain primarily subsistence farms, others will expand and become competitive suppliers on local or international markets, while others will find better income opportunities outside of agriculture. Development strategies must recognise and support these options.
- Investment in developing country agriculture is needed to improve global food security, but it is insufficient without progress on the wider political, social and economic framework that would stimulate overall development and associated income and employment opportunities. Poverty is the dominant cause of food insecurity; policies to improve the purchasing power of poor households through broad based economic development are essential. Solutions require, first and foremost, committed national governments.

As countries move out of recession many governments will confront more difficult fiscal situations. This will likely prompt a review of policies in many areas, including agriculture and food. This is a good time to do more than tinker with the details of existing farm policies and to address more forward looking challenges and opportunities for the global food and agriculture system.

Rachel Glennerster

Executive Director, Massachusetts Institute of Technology, Cambridge, Mass., Abdul Latif Jameel Poverty Action Lab

Rethinking agriculture and transforming the lives of the poor

Many of the poorest people in the world are farmers – with farming accounting for 64 percent of the labor force of sub-Saharan Africa. While small farmers in East Asia have managed to achieve high yields and improved incomes, not least through the use of new technologies like seeds and fertilizers, productivity of small farmers in Africa lags far behind. This productivity gap provides both an opportunity and a challenge. Boosting the productivity of small farmers in sub-Saharan Africa has the potential to dramatically improve the lives of many of the poorest people in the world with better incomes, nutrition, and health. Many African countries also have the potential to move from net importers of food to net exporters. The fact that the take

up of new technologies in Africa is so low means that there is substantial potential for improvements in productivity.

The challenges, however, are as substantial as the opportunities – there are reasons why African farmers have not adopted new technologies at the same rate as those in East and South Asia. The multitude of microclimates means that new crops have to be adapted to local conditions and how technologies should be used to be most profitable may vary substantially by area. Investment in new technology to meet local conditions is tiny in most African countries compared to Asia. Transportation infrastructure is very weak driving up the costs of inputs and reducing farmers' access to markets. Access to financial instruments and information about new technologies are also major barriers to adoption.

However, there are signs that governments in Africa and donors are refocusing attention on agriculture as they recognize its central importance in the fight against poverty. Technologies to improve not only agricultural productivity of small farmers but also to reduce wastage of agricultural produce during storage and the nutritional value of produce are all likely to be part of the solution.

Suggested solutions

Invest more in agricultural technologies for the poor

Whether it is new seeds or new farming practices, research and development of new technologies to promote the productivity of poor farmers is a global public good and as a result there is too little investment. This is particularly true for technologies specifically designed for countries with weak intellectual property rights. This type of R&D should be funded directly – as the Bill & Melinda Gates Foundation, Rockefeller Foundation, and some donors are doing, or through Advanced Market Commitments (along the lines of those being undertaken to promote vaccines for diseases for developing countries).

Cost-effective strategies to promote technology adoption by the poorest

Many existing technologies that have the potential to improve productivity have surprisingly low adoption rates amongst poor farmers. There are many potential reasons, ranging from lack of credit, to lack of information, to distorted prices, to poor transport infrastructure that raises the price of inputs. We need cost-effective scalable solutions to help promote those agricultural technologies that can improve the lives of poor farmers particularly in Africa. These strategies to promote adoption need to be rigorously tested through randomized evaluations (just as the technologies are) so that the international community and governments around the world know which strategies are the best buy.

Learning from psychology about how to promote technology adoption

All of us fail to do things that are good for us (from exercising to saving). The new field of behavioral economics is studying this phenomenon rigorously and a range of studies are using insights from behavioral economics to make better policy from the Philippines to the US. Resent research suggests that behavioral economics can be used to promote technology adoption in Africa by small farmers. The study (by Duflo, Kremer, and Robinson) found that farmers make an average of 70% returns when they use inorganic fertilizer on their maize crops. Only about a quarter fraction of farmers used fertilizer even though fertilizer is readily available, farmers know it is highly profitable, and most claim they want to use it. In line with behavioral models they hypothesized that farmers plan to use fertilizer but are tempted to spend the money on other goods. By the time fertilizer is needed they do not have money left. A simple commitment savings devise with a deadline close to harvest time allows farmers to lock in their commitment to fertilizer and dramatically increases technology adoption (about the same amount as a 50% reduction in the price of fertilizer at the time of purchase). Many have assumed that credit is the answer to promoting productive investments by poor farmers but the

world is littered with failed or failing agricultural banks and microfinance with its short repayment periods is not well designed for the agricultural cycle. These results suggest that savings vehicles (that learn from psychology) may be a better answer.

Mike Mack

CEO and Executive Director, Syngenta International AG

We have to grow more from less.

1. There's less land available because of urbanization, less water available for agriculture because of competing demands. However in nearly 20 years time, by 2030, we will have 2 billion more mouths to feed. To literally feed the world, agriculture will have to double food production. More people, increasing wealth and the implications this has on diets puts daunting strains on how we produce the food we eat.

While quite challenging, we believe agriculture can meet the demands but only with the full use of technology – not just gene technology in seeds but also crop protection and seed care technology. It is about unlocking the potential of plants.

2. We need an integrated approach to energy, food and water security and this will be totally reliant on technology. First, we need to deploy existing technologies across land currently under cultivation *world-wide* to raise the average yield. If we apply modern crop production technology across the globe, we will realize significant yield potential within the next 3 to 10 years.

- In Russia and the Ukraine, only 10% of the land surface is farmed efficiently leaving significant increased productivity potential.
- In Asia they could achieve 20% growth in productivity in ten years time but this will not happen with only the current practices and tools available to their farmers
- I applaud the G8's recent commitment at the L'Aquila Summit where the leaders of the world's industrialized nations announced a new Food Security Initiative to invest 20 billion dollars in 3 years to encourage rural development in Africa. They spoke of the "longstanding underinvestment in agriculture and food security" and the "urgent need for decisive action to free humankind from hunger and poverty." This focus on "sustainable production, productivity and rural economic growth" vs. food aid is the best path to development.

Productivity improvement is not just a case to be made for developing countries but we also need to increase the productivity of land in the *developed world*. Regardless of the type of agriculture production method – conventional or organic – it must meet three criteria: it must be safe, efficient and economic, otherwise we are not using the limited resources we have to their full potential.

Technology was at the heart of the first Green Revolution. What is needed today is no different. We must expand the use of technology. Farmers need access to the full tool box of the newest and upcoming agricultural technologies to drive yield even higher over the next 10-15 years and to kick-start a second Green Revolution. We forecast that fully applying these technologies will bring annual yield/hectare growth back to the roughly 2% p.a. that we saw as a result of the first Green Revolution. That will mean agricultural productivity will again grow faster than world population and, thus, play a central role in achieving food security worldwide.

3. Using water more efficiently will be a critical factor for agriculture.

- While there is enough water globally, many localized areas already face severe water scarcity which is limiting yields – US-$ 30 billion crop losses due to drought in 2007.
- Only 17% of all cropland is irrigated but provides 30–40% of the world's food production.
- Of the roughly 2,700 cubic kilometers water withdrawls, rice (~40%) and wheat (~10%) are the biggest agriculture users.

- Some 60% of rainfall replenishes soil moisture; drought tolerance can increase yields especially in rain-fed agriculture.
- Partnerships for water use efficiency promise the highest water savings:
  - 40% of water used for irrigation is not used efficiently.
  - 80% of all water is withdrawn in Asia, which has a high share of flood irrigation with low water use efficiency.
  - Most parts of the developing economies have economic, not physical water scarcity – the world's water crisis is not related to the physical availability of water but to social and political management issues.

4. The key factors keeping agriculture from reaching its potential.

- Investment – there's not enough R&D. The public sector basically shut down much of its agriculture research in the last decade. With increased regulation and the resulting increase in costs, industry has also had to rethink areas of research. Equally important is the lack of investment in infrastructure in the developing world. This needs to change. The G8's Food Security Initiative I hope will be a good start in this direction.
- Political considerations taking precedent over scientific facts – regulators are running scared of accepting new technology and getting it into the hands of growers as quickly as possible. Take Europe for example and their disdain for biotech. This position frankly, is keeping food out of the mouths of Africans who could greatly benefit from GM technology.
- Trade barriers – farmers must be allowed to export their products to where they are needed without barriers. Markets must be allowed to operate openly.
- Consumer opinion about the safety of production agriculture – technology can be used safely, it is happening every day.
- The real issue is not about the limitations of technology or whether agriculture can produce sufficient food, feed and even biofuels. This is about decisions governments make to get technology into the hands of farmers so they can start using it and keeping markets openly available to them.

Jerry Steiner

Executive Vice President, Sustainability and Corporate Affairs, Monsanto

Thinking outside the box when rethinking global agriculture

Most of us agree on the challenges: The world needs to produce more food in the next 50 years than it has in the past 10,000 to meet rising demand. And it must do so in the face of climate change, more stressed water supplies and limited available new land.

To me, that means practicing agriculture differently in the future. It means using every available tool and working in unexpected partnerships in order to grow more crops while more judiciously using limited and precious natural resources. We need to double production, in a more sustainable way, on every hectare that's already bearing a harvest. How? Farmer access to technology and markets will play a key role, along with addressing the challenges of infrastructure, local capacity, public policy and political will.

It will take many players each playing a part, and the parts working together. The private sector must continue to innovate, and also do more to share its knowledge and expertise to create value for society. We rely on the public sector to enable via infrastructure, working markets, and funds for public agricultural research and economic development. Philanthropy and civil society are often the best actors to get things started. However, to make more breakthroughs this all has to happen in a more integrated fashion. We need to think outside the box to formulate innovative solutions.

Our proposals are built on the belief that we can accomplish the most by creating visibility and being inventive to amplify the power of local action and actors. Here are some ideas to stimulate discussion and begin to address these goals:

- Establish an annual international award to recognize public-private partnerships that leverage the unique strengths of each partner to help solve agricultural challenges in the developing world. Projects must contribute to the overall goal of improving agricultural productivity and farm welfare, while reducing the per unit consumption of water, land, energy and other resources.
- Establish a publicly funded prize for the first developing country to double yield in a key staple crop while also achieving a significant environmental benefit (such as reducing use of water, energy, land; or adapting to conditions of climate change). The goal must be achieved on a sustainable basis. This should encourage partnerships.
- Establish an award for local entrepreneurship in the creation of effective new value chains for staple crops, resulting in the creation of functioning, competitive local economies. Background: As I have travelled, I have seen many places where subsidies (or vouchers) were used to increased productivity. However, once the incentive is taken away, productivity again falls. In several places, this problem was avoided by creative approaches that built in a model of using subsidies or vouchers to jump-start higher productivity, but then thoughtfully transitioning away from them and into a functioning local economy. This award would motivate organizations to place more emphasis on helping farmers make this transition. Winners would use the award money to enlarge their programs. Private companies and foundations could be encouraged to fund this Entrepreneurial Spirit Award.
- Establish more defined criteria to advance environmental sustainability in agriculture. I believe in the adage, "You can move what you can measure." To this end, we would form partnerships across the agricultural value chain, including the private sector and NGOs, to benchmark and monitor agriculture's environmental footprint. Create consensus around a single set of metrics for tracking progress and creating accountability in the use of land, water and energy, topsoil erosion and greenhouse gas emissions. A model for this in the US is "Field to market: the keystone alliance for sustainable agriculture;" details at http://www.fieldtomarket.org.

Joachim von Braun

Director General, International Food Policy Research Institute

Rethinking agriculture entails to use the new technological and economic opportunities of agriculture to address the current and emerging problems, especially food security, resource scarcity, climate change, and health.

The rethinking should start with *redefining agriculture* (traditionally understood as a farm based sector) as part of a broader *"bio-economy,"* i.e., the activities embracing the food value chain and its health and safety attributes, as well as the agro-raw material and biomass production and processing, and the production of regional and global public goods such as agriculture related eco-systems services.

"Rethinking" must be followed by *"redoing" agriculture*. That includes the actual use of the institutional and technological opportunities, not just their "thinking" in research, such as biotechnologies. "Rethinking" agriculture leads to a much more knowledge intensive agriculture.

The diverse structures of agriculture, globally characterized by about *300 million small farms* and a large farm sector needs to be kept in perspective. Small-farm agriculture offers opportunities and poses constraints, which can be addressed by new technologies, incl. ICTs.

The following are proposals for sustainable and strategic *solutions to overcome current and prevent future food crises, as part of the needed "rethinking" of agriculture*. Action must encompass the entire world food system to mitigate the emerging challenges of the food and

financial crises and build resiliency towards future risks. Sound policy actions in three priority areas are called for.

Reduce extreme volatility in agricultural markets and facilitate open trade

If food markets were working well also in crises, not much would be needed. But they don't. A dual approach is recommended.

Two combined global collective actions are needed to reduce extreme volatility in agricultural markets and ensure food security. First, a small, independent physical reserve should be established, exclusively for emergency response and humanitarian assistance. Second, a coordinated virtual reserve and intervention mechanism should be created to help avoid price spikes in the future (von Braun, J., and M. Torero, Implementing physical and virtual food reserves to protect the poor and prevent market failure, Policy Brief 10, Washington, D.C.: International Food Policy Research Institute, 2009).

Facilitation of rule-based, transparent, fair, and open international trade is also needed to overcome the crises. The World Trade Organization (WTO) Doha Round should be successfully concluded. Failure of the Doha negotiations would risk a spiral toward protectionism and could result in a loss of more than US-$1 trillion in world trade, reduction of world welfare by US-$353 billion, and decrease of agricultural exports in developing countries by 11.5 percent (Bouët, A., and D. Laborde, The potential cost of a failed Doha Round, Issue Brief 56, Washington, D.C.: International Food Policy Research Institute, 2008).

Promote agricultural growth with technology and institutional innovations

Enhanced productivity is key for sustainable solutions.

To enhance agricultural productivity, investments should be scaled up in the areas of agricultural science and technology, rural infrastructure, rural institutions, and information monitoring and sharing. The focus must be on total factor productivity, not just on yields per hectare. If public agricultural research is doubled and targeted at the poor regions of the world – Sub-Saharan Africa and South Asia – overall agricultural output growth would increase by 1.1 percentage points a year and lift about 282 million people out of poverty by 2020 through income and consumption effects (von Braun, J., S. Fan, R. Meinzen-Dick, M. W. Rosegrant, and A. Nin Pratt, International agricultural research for food security, poverty reduction, and the environment – what to expect from scaling up CGIAR investments and "best bet" programs, Washington, D.C.: International Food Policy Research Institute, 2008).

Institutional innovations need to strengthen contract farming, cooperatives; also the inclusion of information and communications technologies that facilitate access to information of relevance on technology, services, banking etc. along the food value chain is needed. This will also facilitate the needed structural change in the small farm economies. Step by step also the small farm sector of developing countries should be facilitated to contribute to and benefit from the opportunities of the emerging "bio-economy" as defined in the introductory remarks above.

Expand social protection and child nutrition action

About half of the hungry and food deficient poor live on the small farms of the developing world. The hunger issue can only overcome if it is addressed as part of the agriculture and rural change strategy. Such strategic action for food security must stretch the whole value chain, and include the poor who do not have effective demand in the volatile and risky food situations.

To protect the basic nutrition of the most vulnerable and improve food security, agricultural growth and reducing market volatility must be accompanied by social protection and nutrition actions. Protective actions are needed to mitigate short-term risks. These include conditional cash transfers, pension systems, and employment programs.

Preventive health and nutrition interventions are also needed to avoid long-term negative consequences. Since good nutrition is crucial for children's physical and cognitive development, as well as their productivity and earnings as adults, early childhood nutrition actions and school feeding programs should be strengthened and expanded to ensure universal coverage (Hoddinott, J., J.A. Maluccio, J.R. Behrman, R. Flores, R. Martorell, Effect of a nutrition intervention during early childhood on economic productivity in Guatemalan adults, *The Lancet* 2008, 371 (610): 411–416).

The global governance of agriculture and food systems is highly deficient, as also the G8 at their 2009 meeting in Italy have noted in their statement on food security. *"Rethinking" agriculture must include "redesigning" the agricultural governance system*, which especially at global level does not deliver the public goods it is supposed to deliver. A flexible net-work based approach is suggested that includes government to government as well as private sector players, rather than public mega-organizations. Collective action at a global scale must support the leading country level actions. That involves the participation of stakeholders including national governments, the private sector and donor agencies, and NGOs, incl. farmer organizations.