Policy Changes to Feed Nine Billion People in 2050

James W. Richardson
Regents Professor, Dept. Agricultural Economics,
Co-Director, Agricultural and Food Policy Center,
Senior Faculty Fellow AgriLife Research

Presidential Address
2013 WAEA Annual Meeting
Monterey, California
Setting

• My career has been spent analyzing policies using the alternatives and consequences paradigm
• Paradigm most appropriate for policy analysts
• For this paper I have thrown this paradigm out, stepped out on thin ice, and recommended policies to feed a hungry world
  • Policy options presented are not new
  • They are just used differently
  • Some will like the policies but many will not
• Start with the assumption of more than 9 billion people in the world in 2050
• How will the world feed this many people?
• Malthus (1798) stated that we would see a time when premature death must visit the human race due to over population
• Technology and development of farm land has staved off Malthus’ prediction, so far with
  • Improved crops, cultivation, harvesting, storage systems, and
  • Improved livestock production systems and breeds
Setting Continued

<table>
<thead>
<tr>
<th>Region</th>
<th>2012</th>
<th>2050</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>7,058</td>
<td>9,624</td>
<td>36</td>
</tr>
<tr>
<td>High Income</td>
<td>1,243</td>
<td>1,338</td>
<td>8</td>
</tr>
<tr>
<td>Low Income</td>
<td>5,814</td>
<td>8,286</td>
<td>43</td>
</tr>
<tr>
<td>East &amp; S.E. Asia</td>
<td>2,193</td>
<td>2,317</td>
<td>6</td>
</tr>
<tr>
<td>South Central Asia</td>
<td>1,823</td>
<td>2,565</td>
<td>41</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>902</td>
<td>2,092</td>
<td>132</td>
</tr>
<tr>
<td>Latin America &amp; Carib.</td>
<td>599</td>
<td>749</td>
<td>25</td>
</tr>
<tr>
<td>N. Africa &amp; W. Asia</td>
<td>457</td>
<td>748</td>
<td>64</td>
</tr>
</tbody>
</table>

• Popular solution to the 2050 food shortage has been to ask for more money to do research on crops and livestock
• Virtually no reports call for changes in policy to help feed more people in 2050
• Deans and Directors are not asking for more money to fund policy analyses or any ag economics research for that matter
Objective

- My objective is to propose alternative policies that could help feed 9 billion people by 2050
- Technological advances may arrive on time but appropriate policy changes will make technology more effective
- Policy areas I address are:
  - Free market
  - Policies for Food Insecure Countries (FICs)
  - Domestic Farm Programs for Food Secure Countries (FSCs)
  - Strategic World Food Reserve Program
  - Water Policy
  - Trade Policy
  - Animal Production Policy
  - Research and Extension Policy in FSCs
• As economists it is hearsay to propose creating polices that move away from a free market.
• My response is that the presence of FICs is evidence that there is a market failure.
  • Policy changes can help correct market failures.
• A free market does not feed FICs because they lack an “effective food demand,” so they are not included in the demand for food in a free market.
  • Policy changes can force the food demand by FICs to be included in the total demand for food and expand supply.
• So I dismiss the free market option for feeding the FICs in 2050 and look to policy changes that will augment whatever technological advances arrive.
Policies in Food Insecure Countries (FICs)

- For FICs to be eligible for food aid, they should be required to adopt the following policies:
  - Invest heavily in infrastructure
  - Adopt positive land reforms
  - Establish government supported farm credit system
  - Establish input subsidies
  - Establish agricultural extension programs
  - Fund agricultural research

- These policies will increase the local supply of food as a first line of defense.
Policies in Food Insecure Countries (FICs)

- Invest heavily in infrastructure
- Invest in roads, bridges, and storage facilities to get food to market
- Better roads from rural to urban markets have shown to lead to higher prices for food products
- Higher prices provide supply incentives to produce more food than the family needs
- Encourages adoption of technology
- Reduces food spoilage, a major cause of food insecurity in FICs
Policies in Food Insecure Countries (FICs)

• Land reform to grant ownership to resident farmers and grazers
• Land provides an asset to be used for loans to buy productive inputs and to invest in productive farming investments, such as irrigation and breeding stock
• Policy change will require major policy changes as many governments use land for personal gain
  • Example: Ethiopia is leasing land to foreign countries and displacing thousands of farmers and herdsmen for long term cash leases
Policies in Food Insecure Countries (FICs)

• Government supported farm credit system
  • Credit at favorable terms to finance investment in productive assets and technologies
  • Favorable repayment schedules for agriculture
• Input subsidies for seed, fertilizer, chemicals, credit, machinery, irrigation, breeding stock, animal disease immunization
• Establish and fund extension programs to encourage and facilitate adoption of new technology
• Each of these program changes will increase food supplies and amplify technology
Domestic Farm Programs in FSCs

- FSCs will likely be: U.S., European Union, Canada, Brazil, and Japan
- FSCs should adopt farm policies that increase production:
  - Establish stable support prices higher than market prices
  - Eliminate payment limitations
  - Remove all supply controls
  - Develop and maintain a food reserve program
  - Repeal regulations that reduce livestock production
  - Provide input subsidies
Domestic Farm Programs in FSCs

• Policies should establish support prices higher than market prices

• To increase quantity supplied by farmers need price incentives greater than the market price
  • CCC loan program
  • Marketing loan or loan deficiency program
  • Target price and deficiency payments
  • Farmer owned reserve (FOR)

• Such programs are not WTO compliant, but a hungry world will view these programs more favorably than the WTO
Domestic Farm Programs in FSCs

• Remove all supply control programs
• To the ROW, the US is a greedy country using CRP and WRP to artificially inflate world food prices
  • CRP and WRP will expire by 2050, but the U.S. will likely still have other polices to protect marginal land
• Preserving the Amazon is a supply control program that will need to be reevaluated:
  • Today 1mhe. of cropland in Brazil is worth 1.7MMT corn + 1.5MMT soybeans +132TMT wheat
  • This is the “food” shadow price for breaking out more land in Brazil
Domestic Farm Programs in FSCs

- Revise government agency rules on grazing federal lands in the West
- Public grazing lands in the Western states could provide a cheap source of animal protein for a hungry world
- Policies that should be revised to optimize animal protein production for example are:
  - FS and BLM rules on re-entry after range fires
  - Stocking rates and duration of time on the public lands
  - Restricted grazing around endangered and threatened species
Domestic Farm Programs in FSCs

- Offer input subsidies for crops and livestock
  - Fertilizer, chemicals, seed, breeding stock, etc.
- Eliminate payment limitations and program participation restrictions based on farm size
  - Encourage efficiency in food production
    - Large farms are more efficient in food production (i.e., use of scarce resources per unit of food)
- Payment limitations have been shown to reduce the supply function
- Incentivize technology adoption by large farms
- Differential input subsidies for efficient farms
World Food Reserve Policy

• Should establish a world food reserve
• Ag economists need to resolve Food Reserve issues:
  • Do we store food commodities or money?
  • What is the trigger mechanism to pull stocks out of the reserve? Who funds the reserve (FSCs or oil rich countries)? Is food aid a gift or a loan like PL 480?
• Local purchases send wrong price signals to FICs; raise prices to all consumers which makes more people food insecure
  • Short-term high prices ration food and spread the pain
• Build food reserves when prices are low to avoid unintended consequences of higher prices
Energy Policy Changes

- Prohibit production of biofuels from feed and food stocks and repeal Renewable Fuels Standard type policies in all countries

- This policy change would:
  - Increase supply of grains for human consumption
  - Reverse indirect land use changes
  - Reduce relative prices of grains
  - Reduce cost of production for animal protein
  - Provide supply response signals based on food value

- Crop residues and algae could supply renewable fuels feedstocks, if still using liquid fuels in 2050
Water Policy Changes

- Limited fresh water supplies may be as critical by 2050 as food supplies
- Policy changes for water
  - Provide water for people and food
  - Irrigation water allocated to the most efficient farms
  - Prohibit irrigation of non-food crops: cotton, fuel crops
  - Reduce or eliminate irrigation in water scarce regions: High Plains and much of the West
  - Require drip irrigation and low energy sprinklers
  - Expand research on drought tolerant food crops
  - Govt should invest heavily in desalinization technology
Trade Policy Changes

- WTO started the policy changes needed for free trade
  - Note: free trade is not the same as free market
- Allow only trade restrictions based on science and phytosanitary
- Remove policies favoring developing countries
- Eliminate outdated regulations regarding GMOs
Trade Policy Changes

• Allow only trade restrictions based on science and phytosanitary
• Remove all tariff rate quotas, quotas, import tariffs, and export tariffs
• Free trade means no more embargos and reliance on nationalism to protect one’s consumers
  • U.S. used embargos twice
  • They reduced importer’s confidence on the U.S. as a supplier, lead to expanded production ROW
• World food reserve would reduce incentive to embargo exports when short-run food deficits occur
Trade Policy Changes

• Remove policies favoring developing countries
  • This policy change will be unpopular but necessary
  • Need policies that promote transparency so comparative advantages can be observed and promoted

• WTO should force oil rich countries to provide credit to FICs to develop their non-ag sectors to generate hard currency exports and to develop their agricultural systems towards food sufficiency
Trade Policy Changes

- Eliminate outdated regulations regarding GMOs
- Change worldwide policy and attitudes against growth hormones in meat and crop GMOs
- EU’s ban on GMOs has tainted GMO crops across Africa and Southeast Asia
- GMO crops and growth hormones for livestock will likely be the technological solution for world hunger
- A hungry world will likely accept GMOs and growth hormones to increase food supply and reduce prices
Animal Production Policy Changes

- Increasing supplies of animal protein should not be overlooked for a hungry world
  - Eliminate policies that reduce production
  - Eliminate country of origin labeling
  - Eliminate policy regulations against feed additives and hormones
  - Establish global policies to balance fisheries populations with catch to prevent population crashes
  - Resist policies to restrict feeding grain to livestock
Animal Production Policy Changes

- Eliminate policies that reduce production
- For example: policies that prohibit layer cages and sow gestation crates reduce production
- In several countries and states where layer cages are required egg production costs have increased and egg production has decreased
- Sow crates used to prevent sows from killing piglets. Every dead piglet is 250 pounds of meat not produced
- Other regulations should be reviewed to maximize production
Animal Production Policy Changes

• Eliminate country of origin labeling
• USDA’s proposed regulations for COOL will greatly increase costs for: labeling, tracking, and shipping beef (particularly boxed beef)
• A hungry world will be less concerned with where their food is grown than whether there is sufficient food to eat
• To FICs the U.S. looks like a spoiled rich kid who has so much money that they want to know the details about their food rather than eat it
Animal Production Policy Changes

- Eliminate policy regulations against feed additives and hormones
- No scientific evidence that feed additives and hormones are a danger to people
- PST would have reduced grain consumption by hogs 20%, but concerns about consumer reaction prevented its introduction
- Russia and China insist on zero tolerance for ractopamine; they are effectively using it as a trade barrier
• Establish global policies to balance fisheries populations with catch to prevent population crashes
• Fish is a significant source of protein
• Ocean fish populations are suffering – likely to run out before 2050
• Policies to promote aquaculture in coastal regions would help reduce pressure on wild fisheries
Research and Extension in FSCs

- Redirect research funds to develop drought and salt tolerant grains and oilseeds
- Accelerate USDA and FDA approval of GMO crops and animal growth accelerants
- Change patent process for new plant varieties, by eliminating patents on seed
- Direct extension service to assist in adoption of resource conserving practices and new technology
Research and Extension in FSCs

• Increase and direct USDA research funds to develop drought and salt tolerant grains and oilseeds

• Water scarcity will lead to more crops being grown without irrigation so new varieties will be needed

• As salt content in water and soil increases the need for salt tolerant crops increases

• Focus should be on research that increases production with less water and nutrients (N,P,K)
Research and Extension in FSCs

- Accelerate USDA and FDA approval of GMO crops and animal growth accelerants
- Current approval process needlessly long and expensive, discourages introduction of plant and animal technology
- Current rules discourage university research following through to final products
- Large companies with lots of lawyers and deep pockets can obtain patents
Research and Extension in FSCs

- Change patent process for new plant varieties by eliminating patents on seed
- Current crop patent process has resulted in tech fees for seed
- Tech fees for stacked genes cost more than the seed in some cases
- Resulting higher costs of production, reduces supply and U.S. competitiveness in trade
- Ag. Experiment stations should be funded adequately to do the research and return to the “Social Contract” of the original Land Grant System
Research and Extension in FSCs

• Direct and fund extension service to assist in adoption of resource conserving practices and new technology

• Should increase funding so extension can do the job of helping to increase supply of food

• The system is in place, provide adequate funds to do the job
Summary

• There have always been FICs and there will always be FICs
• As proportion of world’s population that is hungry grows the call for food research will grow
• Do not expect to see calls for funding to support ag. economists
• But Ag. Economists have a role to play in a hungry world by helping establish policies to make technology more efficient
Summary

• Policy changes outlined here to expand food production will not be popular
• Needed policy changes will go against last 10 years of farm policies in the U.S. and more than 30 years of GATT and WTO policies
• FIC leaders will have to make hard choices to feed their people rather than milk them for their own wealth
• Oil rich countries will have to be forced to use their wealth to fund a world food reserve of stocks for the FICs
Summary

• Future roles for Ag Economists
  • Analyze alternatives and consequences for policy changes that increase food supply on a national and global basis
  • Educate policy makers as to the consequences of their policy actions
  • Educate farmers and consumers regarding new technology and policy changes
  • Arbitrate policy implementation issues
Wrap Up

• This presentation was prepared to get us to start thinking about the policy issues at stake in a hungry world

• Do I believe in all the policies I said “Should be” implemented?

• No, but we have to start examining the policy issues that will be facing the world as we move towards a world with increasing food scarcity

• Let’s start with the assumption that: appropriate policy changes can make crop and animal technology more effective
Discussion

Agricultural and Food Policy Center
Dept. of Agricultural Economics
Texas A&M University
(979) 845-5913
jwrichardson@tamu.edu