Agricultural Projections: A View from the FAO

Foresight in Agriculture:
A Workshop on Future Challenges and Opportunities for Latin America and the Caribbean
Co-sponsored by the Inter-America Development Bank and the International Center for Tropical Agriculture (CIAT)
Friday, 30th March 2012, Inter American Development Bank, Washington, DC

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Outline

• Framework for projections
• Illustrative findings
• Future steps
What do we do?

- Projection of supply and demand
  - 32 agricultural commodities
  - 140+ countries
  - 2005/07, 2015, 2030, 2050, (2080)

- Outputs
  - Consumer food demand, feed, seed, industrial use (incl. biofuels), waste, calories per person, hunger
  - Land use by broad land class and rainfed vs. irrigated
  - Production and net trade
How do we do it?

- Hybrid framework heavily reliant on expert knowledge and complemented by analytical framework for consistency check and deriving additional findings

- Key dynamic drivers include
  - Population (UN Population Division)
  - GDP (World Bank, SSPs)
  - Land suitability (IIASA/FAO GAEZ database)
  - Yield growth assumptions
Food consumption
(Kcal/person/day)

Source: FAO, 2011
Growth rates: food consumption per capita is slowing down

Source: FAO, 2011
Past and projected increases in global production

Source: FAO, 2011
Production growth

Agricultural production growth rates
(percent p.a.)

- World
- Developed countries
- Sub-Saharan Africa
- Latin America & Caribbean
- Near East-North Africa
- South Asia
- East Asia

Years:
- 2030-2050
- 2005/07-2030
- 1961-2007
Reinforcement of LAC’s comparative advantage

Agricultural net trade, $2005 billion

- Latin America & Caribbean
- Near East & North Africa
- East Asia
- South Asia
- Sub-Saharan Africa
Sources of production growth

Yields increases between 2005/07 and 2050
Crop intensity increases between 2005/07 and 2050
Area increase between 2005/07 and 2050

Source: FAO, 2011
Is there enough yield potential?

- **Yield growth**: avg 0.8% per year to 2050 compared to 1.7% in the past decades

- **Yield potentials**
  - bridgeable yield gaps
  - room for intensification
  - technology could increase potentials
  - R&D most needed for food-security sensitive crops, eg millet, sorghum, R&T, pulses, plantains
Is there enough land?

- [199x487] Is there enough land?
- [57x131] -
- [60x201] 100
- [60x236] 200
- [60x271] 300
- [60x306] 400
- [60x341] 500
- [60x376] 600
- [107x110] Developed countries
- [202x110] sub-Saharan Africa
- [221x110] Latin America
- [217x94] Developed countries
- [390x94] Near East / North Africa
- [492x110] South Asia
- [317x356] East Asia

Arable land in use, 2005/07

Additional land projected to be in use, 2050

million ha

Developed countries

sub-Saharan Africa

Latin America

Near East / North Africa

South Asia

East Asia
Caveats

- Water stress high in many areas, acute in Middle East, North Africa and South Asia
- Climate change
  - Perhaps near-term, certainly long-term
  - Unknown impact of carbon fertilization effect
  - Big problem is severe events
- Biofuels
  - Current mandates relatively modest effects
Several conclusions

• Resources may be sufficient for 9.3 billion people, but
  – huge investment is required to increase productivity
  – and access to food remains an issue in some areas; “Malthusian traps” may arise in countries highly dependent on agriculture, with low ag productivity and fast population growth

• Yield increases may be feasible, but management of resources needs to improve substantially to counteract overuse, degradation and competition among different uses (land, water)

• Bio-fuel development and climate change are major sources of uncertainty
Future steps

• ‘Digitizing’ expert knowledge
  – PE framework
  – Sensitivity analysis
  – Policy analysis (e.g. resource use, loss, waste and changes in food consumption behavior, 1st and 2nd generation biofuels)

• Complement with CGE analysis
  – Focus on development issues, e.g. rural livelihoods, rural/urban migration, economy-wide interactions
  – Climate change—impacts, adaptation and mitigation

• International model comparison exercise (AgMIP)