CHALLENGES AND OPPORTUNITIES FOR FOOD AND AGRICULTURE IN THE 21\textsuperscript{ST} CENTURY

Catherine Moreddu
Trade and Agriculture Directorate

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Outline

• Global challenges for food and agriculture
• Productivity and sustainability performance
• Market developments
• Policy responses
• Sector’s responses
• Concluding remarks
Global challenges

• Higher and more diverse demand from a growing and wealthier population

• Improve productivity growth sustainably along the chain
  – Increase total and partial factor productivity growth
  – Improve natural resource use efficiency and sustainability
  – Adapt to and mitigate climate change
  – Reduce food waste
  – Adapt practices, processes and products to demand

• To respond to global food security and climate change challenges
Agricultural growth challenge

Sources of growth in global agricultural output, 1961-2011

Total output growth (average annual percent change)

- Improvements in total factor productivity
- More inputs per acre
- Expansion of irrigation to cropland
- Expansion of agricultural land

Productivity growth by country

Sustainability challenge: Agriculture and natural resources

In the OECD, agriculture:

- contributes 2.6% to GDP
- uses 36% of land
- uses 44% of water
- accounts for 8% of GHG emissions
- 91% of ammonia emissions

For non-OECD, agriculture:

- contributes over 25% in LDC
- uses 30% - 55% of land
- uses >70% of water
- accounts for >17% of GHG emissions
- >94% of ammonia emissions
Global constraints on natural resources

• Reduced rate of **land** expansion, two-third in Latin America and Africa, but 70% suffers from soil and terrain constraints (IO, 2012)

• Losses in **biodiversity**, linked to land use changes

• 40% of the world population projected to live near river basin with severe **water stress** by 2050 (OECD, 2012)

• Agriculture is a major source of **water pollution** (nutrients, GHG)

• **Climate** variability and extreme weather events expected to increase
Encouraging trends: Agri-environmental performances in OECD

Average annual % change

- Agricultural production volume (index)
- Agricultural land area (hectares)
- Nitrogen balance (t)
- Phosphorous balance (t)
- Pesticides sales active ingredients (t)
- Direct on-farm energy consumption (ktoe)
- Agricultural freshwater withdrawal (m3)
- Irrigated area (hectares)
- Agricultural ammonia emissions (t)
- Greenhouse gas emissions (t of CO2 equivalent)

Encouraging *decoupling* between Agriculture growth and environmental pressures (OECD)
Encouraging *decoupling* between Agriculture growth and environmental pressures (BRICS)
But more needs to be done

• Water withdrawal decreases on average, but problems of water quality remain
• Biodiversity losses continue
• Severe erosion risk limited to some countries

• Rising concern for environmental impact of farming
• But agriculture can also provide ecosystem services
Which policy responses to improve environmental performance?

**Today:**

- Markets often do not correctly price natural resources and environmental externalities, positive or negative (e.g. GHG, water, biodiversity).

- Inappropriate or ineffective regulations, policies and governance structures can all hinder the efficient use of natural resources.

**Tomorrow? Addressing three policy sets**

- Reforming existing policies, especially when both environmentally-harmful and production distortive.

- Implementing instruments (e.g. markets, taxes) that put a correct price on natural resources.

- Finding ways to incentivise environmental services production while increasing food production.
Market developments:
Agricultural Outlook 2014-2023

• Real agricultural prices expected to decline slightly, but remain above levels before food price crisis.

• Changing relative prices:
  – Coarse grain and oilseed prices increase relative to food staples – feed and fuel demand
  – Meat and dairy prices increase relative to crops – higher incomes and protein demand

• Rising importance of emerging economies

• Demand for agricultural products to remain firm

• Growth in livestock production is expected to outpace crop production in the next decade

• Production and trade grow more slowly than in the previous decade

• Agricultural markets expected to be less volatile than in recent years due to a recovery in stocks…but that could change!
Real food prices still high but returning to levels of the mid-1990s

Source: IMF
Outlook project modest declines in real prices

Index, 2011-2013 = 1, Based on Production Value

DOI: http://dx.doi.org/10.1787/agr_outlook-2014-en
Changing regional patterns of production and trade

**Africa**
Significant production expansions are mitigated by population growth

**Asia**
Accounts for nearly half of all additional consumption and production in the world

**Latin America**
Increasingly export oriented meat and grain sectors as domestic consumption growth slows

**Major OECD economies**
Stable food consumption and growing livestock and biofuel production sectors
Changing diets imply different demand effects

- **Grains**: core of human nutrition, slow growth driven by population increase.
- **Protein**: (meat, fish, dairy): meat sector dominated by poultry, highest growth rates for dairy products
- **Fats**: (vegetable oil, butter): fast growth in developing countries based on changes in eating habits
- **Sugar**: Accelerating growth both in developed and developing countries.
Per capita meat consumed in the world 2023 vs. base period 2011-13

kg rtc, r.t.w./capita

Poultry  Pork  Sheep  Beef

Brazil  Russian Federation  India  China  Africa  Japan  United States  European Union  World

Arable crop areas and yield changes
Average annual percentage change 2024 relative to 2012-14

Latin America and Caribbean

Asia and Pacific region
Outlook assumes constant policies and “normal” market conditions, but there are risks:

• **Macroeconomic and policy hypothesis**
  - Slower economic growth in emerging economies (BRIICS)
  - Energy prices & links to commodity markets (+biofuels)
  - Agricultural and trade policies
  - Trade agreements
  - Biofuel policies

• **Long-term structural uncertainties:**
  - Rate of agricultural productivity growth (Constant)
  - Consumption patterns (including waste)
  - Natural resource constraints & environmental impacts
  - Climate change

• **Stochastic analysis**
Developing a longer-term vision

• Projections of type “how will markets develop” and search for “optimal policies” not enough
  – The future is uncertain (even if we know some elements)
  – Anticipating unknowns

• Long-term scenarios to sketch different futures
  – Requires collaboration between various stakeholders and experts from different countries
  – Models can simulate some aspects, but not all
  – Framework for strategic conversations:
    • Search for “robust policies” taking uncertainties into account
    • Guide long-term investment decisions (e.g. in R&D and education)

• The need for foresight exercises is increasingly recognised at national and international level

• OECD contribution: “Alternative futures for global food and agriculture: Developing robust strategies”.
Policy responses to prepare the sector

• Facilitate innovation, structural change and efficient use of natural resources to improve productivity growth, sustainability and resilience along the value chain

• Well-functioning trade and markets to guide industry decisions

• For agricultural policies, this implies:
  – Reducing distortions to production and trade
  – Removing impediments to structural adjustment
  – Improving the targeting of measures to outcomes

• More generally paying attention to the broader policy and regulatory environment
Agricultural policy trends: Lower and less distorting support in the OECD area

Producer Support Estimate (PSE) as a % of gross farm receipts, 1986-2013

Support based on:
- Commodity output
- Input Use
- Other payments

% of gross farm receipts

Agricultural policy trends: Conditions on production practices in some countries

Producer Support Estimate (PSE) as a % of gross farm receipts, 1986-2013

Payments with voluntary agri-environmental constraints
Payments with mandatory input constraints

Agricultural policy trends: Support levels increase in emerging economies

Producer Support Estimate (PSE) as a % of gross farm receipts. 1995-2012

Agricultural policy trends: “New” policies that subtract from world supplies (export restrictions, biofuels)

There are 28 AMIS members

Countries that impose an export restrictive measure on two separate commodities in a specific year are counted twice

Source: AMIS Policy Database
Agricultural policy trends: Others

• Specific measures targeting:
  – the adoption of innovation,
  – more sustainable practices,
  – adaptation to climate change

• But broad-based income support still important

• Efforts to improve general services to the sector (R&D, education, training, inspection, infrastructure and marketing) under budget constraints (PPPs)
Improving agricultural policy

• Move away from policies that distort markets and restrict competition
• Clearer, more efficient regulatory environment
• Reduce impediments to structural adjustment (land, labour)
• Focus on improving long-term competitiveness
  – Efficient tools for risk management
  – Incentives for the adoption of innovation
  – Outcome based measures to promote environmentally-friendly practices, adaptation to climate change, animal welfare and respond to societal demands
  – Provision of innovation enhancing services (R&D, advisory services, inspection and control, infrastructure)
  – Provision of information to improve decision-making
Looking at the broader policy environment

- **Policy environment that favours investment:** stability, trust, clear regulations, competition, well-functioning input and output markets and trade, access to credit, taxation

- **Capacity building:** rural infrastructure and services, flexible labour markets, education and skills responsive to demand

- Improve governance and funding mechanisms of **agricultural innovation system** to generate innovations adapted to demand, with wider adoption, and more efficient use of public funds – public-private roles, international cooperation to meet wider challenges
Farm-level response

• Adoption of new technologies and practices to improve economic and environmental performance
• Risk management at farm and household level to deal with uncertainties
• Farm consolidation, but dual structure
• Change in legal organisation
• Diversification of marketing strategy
• Adapting to changes in skills requirement (e.g. ICT, management):
  – Higher demand for education, training and advice
  – Role of contractors, consultants, innovation brokers
Industry’s response to remain competitive

- **Innovation:**
  - Investment in R&D, alone or with research organisations
  - Technological, but also organisational innovation
- **Consolidation**, in particular some segments (e.g. input industries)
- **Securing reliable and quality supplies:** vertical coordination, contracting
- **Market segmentation:** food attributes, labels
- **Greening,** reducing food waste, etc.
- **Information** to consumers
- **Internationalisation:** Invest in growing regions (FDI)
Conclusions

- Policy makers, industry and other innovation actors need tools to deal with uncertainty:
  - risk management,
  - foresight exercises,
  - sharing of information and experiences
- Long-term investment needed for innovation
- Develop a strategic vision for innovation policy, with all stakeholders
- Evaluation helps improve efficiency and adaptation to new challenges
For more information

• Visit our website: www.oecd.org/agriculture
  www.oecd.org/agriculture/policies/innovation

• Contact me: catherine.moreddu@oecd.org

• Follow us on Twitter: @OECDagriculture
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  [www.oecd.org/agriculture/policies/innovation](http://www.oecd.org/agriculture/policies/innovation)

• Contact me: [catherine.moreddu@oecd.org](mailto:catherine.moreddu@oecd.org)

• Follow us on Twitter: [@OECDagriculture](https://twitter.com/OECDagriculture)