

# The global food equation

Impact on developing countries

Food security is possible, even in the mid of scarcity



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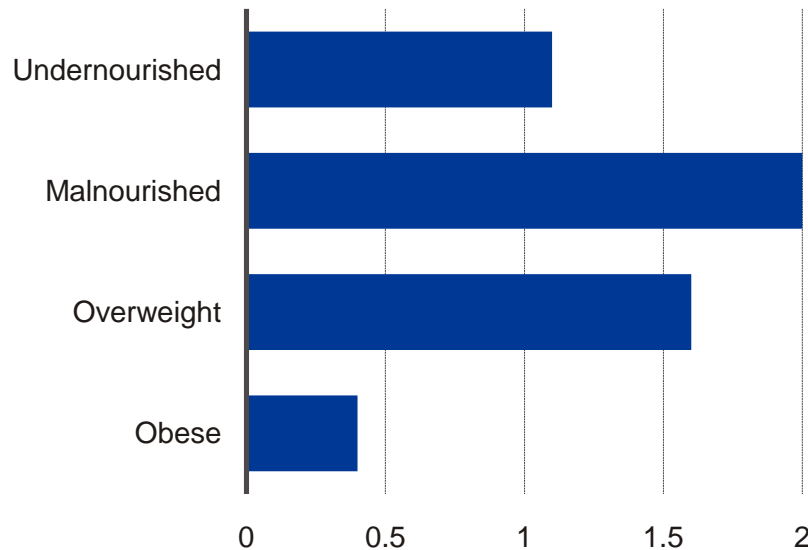
Deutsche Bank Research



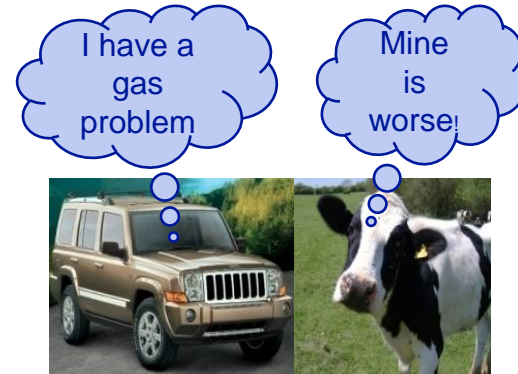
# Hunger, obesity and a damaged environment

## Scarcity and plenty

World population, bn



Sources: FAO, WHO



Source: The Environmental Magazine

- Greenhouse gases (22% of total)
- Loss of biodiversity
- Soil degradation
- Water pollution

**→ Business-as-usual is not an option**



## Outline

**A**

**Driving forces: demand, supply, access**

**B**

**Food landscape in the future**

**C**

**Actions**



## More demand for food - Different nature

- **Population growth:** 6.5 bn (2005) – 9 bn (2050)  
in developing countries, in urban areas
- **Income growth:** after slowdown, 7% (developing) vs 2% (developed)

- **The nutrition transition**

more animal proteins, esp. meat:

	1985	2003
China	20kg	54kg
Germany	97kg	84kg

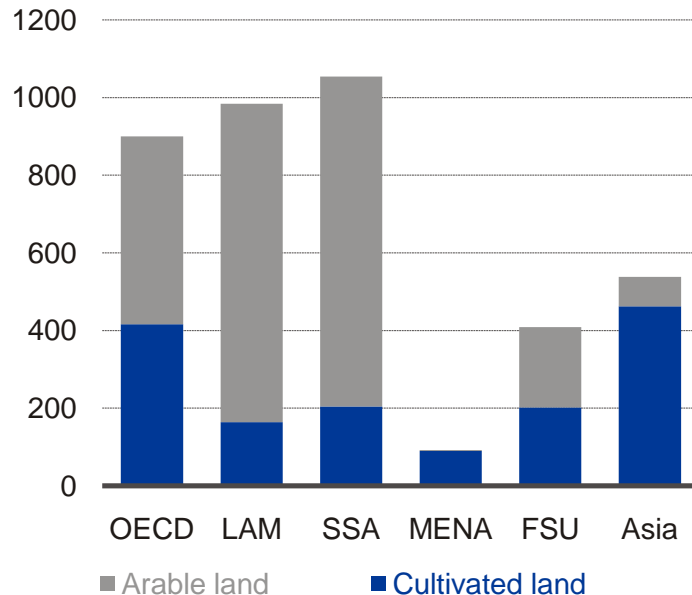
- More **convenience**
- More **health** benefits desired: wholesome/organic - functional



## Drivers of food supply - Land constraints

### Arable and cultivated land across regions

Million hectares



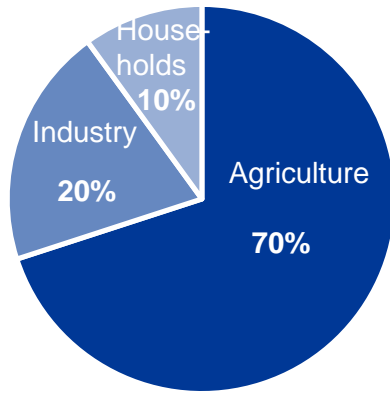
Sources: DBR, B. Dorin, FAO

- In theory, enough land but high **costs**, financial or environmental
- Constraints due to:
  - Land **degradation**
  - **Urbanisation**
    - Consistent land use planning called for
  - **Biofuel** crops
  - **Carbon** sequestration
  - **”Land grabbing”**: a potential win-win?



## Drivers of food supply - Water scarcity

### Agriculture uses most of the world's freshwater



Source: UN World Water Development Report, 2009

- **Increase in water consumption:**  
world population + per capita
- **Agriculture:** most significant user (up to 90%)
- **Higher consumption of meat and dairy**
- **Irrigation is crucial**
  - 20% of cultivated land
  - 40% of global food production
- ➔ **More sustainable water use is essential**
  - Technology improvement
  - Users' awareness
  - Pricing (local conditions)



## Drivers of food supply – Climate change

- Food production: problem and solution
- Different impacts by region and crop type, driven by:
  - temperature increase
  - water availability
  - carbon fertilisation
  - hurricanes and floods
- Agriculture **needs to adapt**, also by reducing its own emissions:
  - better livestock management
  - decreased tillage
  - cover crops
- A **huge challenge overall**, especially in the South



## Drivers of food supply – Energy

### Energy: supply and prices

- The **links** between food and energy are **strong and complex**:
  - fertilisers
  - fuel for transport
  - irrigation, drying, heating
  - processing, refrigeration
  
- Biofuels
  
- Food prices and oil **prices linked increasingly closely**



## Drivers of food supply – Technological innovation (1)

**Challenge:** produce more and better food with fewer resources

### ➤ **Life sciences and biotechnology**

■ **Biotechnology:** tissue culture, marker-aided selection, genetic engineering

■ **GM foods** controversial: safety, environmental impact, access, ethics

➔ Accelerate research on capabilities and impact

➔ Review intellectual property rights

■ **ICT** substituting information for resources:

precision agriculture and mobile phones



## Drivers of food supply – Technological innovation (2)

### ➤ **Ecologically integrated approaches**

#### ■ Working with **whole systems**:

- Integrated pest management (pest control through predators and parasites)
- Integrated soil fertility management (chemical + organic fertilizers)
- Conservation agriculture (reduced tillage, permanent soil coverage, crop rotation)
- More sustainable water use
- Livestock management (e.g. converting manure into biogas)

#### ■ **Participative** approach: power and autonomy to individual farmers

➔ A **cross-sectoral** approach to agricultural research is key,  
involving farmers from the beginning  
and specialists in agronomy, pathology, genetics, nutrition, economy, sociology



## Drivers of food supply – Investing in agriculture

### ➤ **The neglected child of aid donors and developing countries**

- Total amount of aid spent on agriculture: -58% (1980-2000)
- Public spending for agriculture in Africa: 4.5% (target: 10%)

### ➤ **R&D** Budget of CGIAR: -50% over the past 15 years

- Private-sector R&D tend to focus on major high-value crops and profitable markets

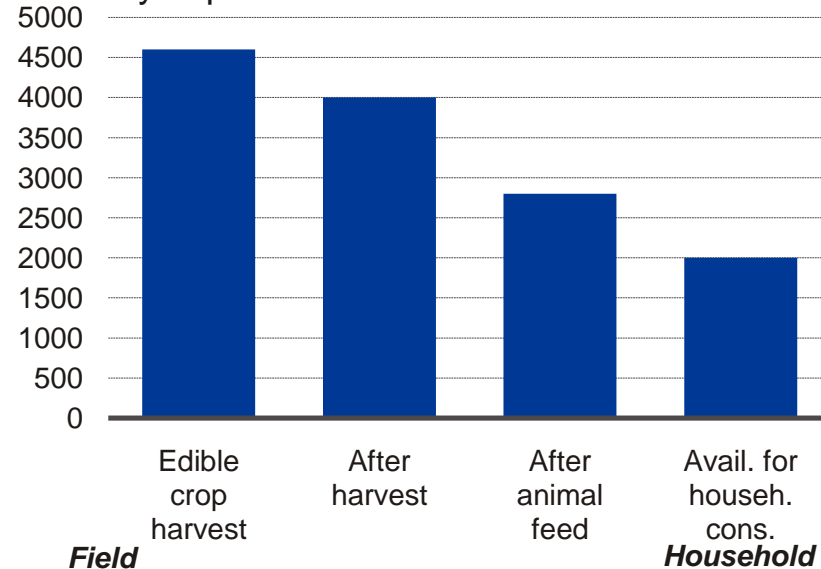
➔ Public investment in agricultural R&D is particularly important for research focused on the needs of poor countries and poor farmers (long time-horizon)



## Drivers of food supply – Waste

### Food losses: A gross estimate

Kcal/day/capita



Source: United Nations Environment Programme

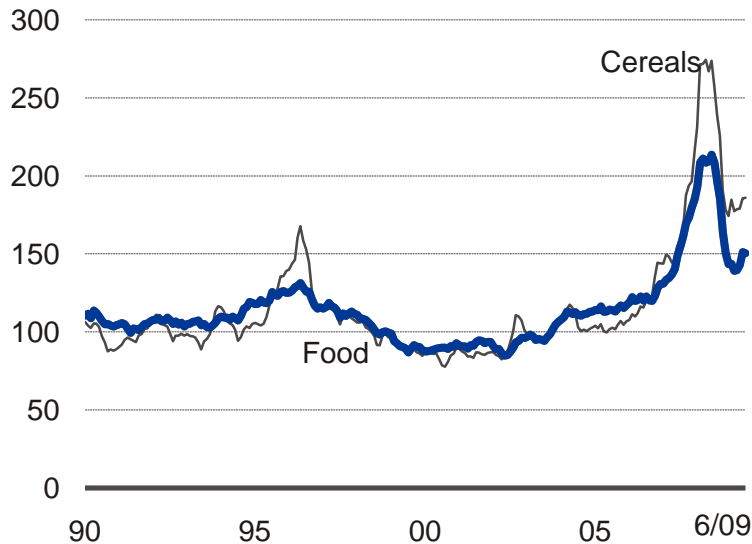
- From field to household: **less than half**
- Households throw away considerable amount of food – **up to 30% (COM)**
- ➔ Reduce or re-use
- **Waste as a resource:**
  - Substitute for cereal in animal feed
  - ➔ more food available
  - Recovering energy: biogas



# Access to food - Food prices

## The structural factors remain

### Food price index



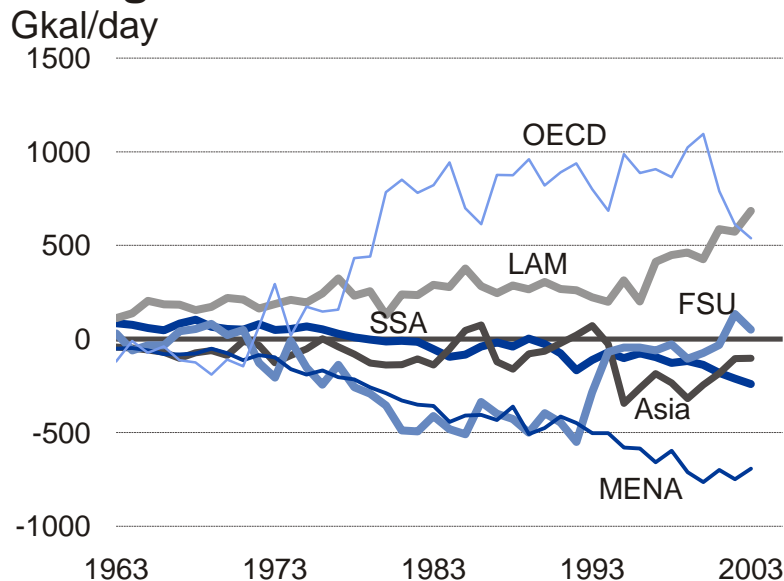
Source: FAO

- Changes in supply and demand → **imbalances**
    - increased consumption (food, biofuels)
    - weather extremes, underinvestment
  - Economic **slowdown** → lower prices
  - New and on-going **forces still relevant**
- Food prices on a **long-term upward trend**



## Access to food - Trade rules need to change

### Net trade (exports-imports) of vegetal food calories



Source: B. Dorin, computed from FAO data, Inra-Cirad, 2009

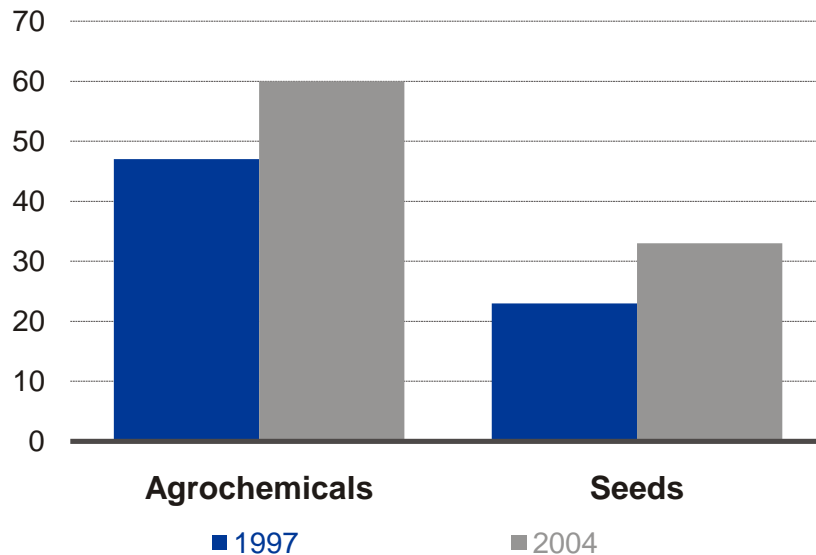
- **Economic theory:** free trade is best for all
- **Political reality:** increased dependency on overseas suppliers is too risky  
(in a scarcity context, poorer countries fear being outbid in a liberalised trade regime)
- **Biased trade rules:** designed to resolve buyers issues (market access and dumping)
- ➔ **Supply concerns** of a sellers' market (security of supply and unfair suspensions of supply) **need to be built into trade reform**
- ➔ **Future centre of gravity** away from OECD



## Access to food – The corporate food system

### Growing concentration upstream

Market share of the four major firms, %



Source: World Bank, 2007

- Economies of scale and globalisation
- **Radical change of food supply chains**
- Consolidations along the value chain
- **Concentrated market power and leverage of large international corporations**
- Increasing share of food sales by supermarkets
- - better prospects for small producers
- but also new requirements (safety and quality standards)



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## Driving forces - Summary

### **CHALLENGES**

- Population growth
- Resource-intensive diet (animal proteins)
- Land constraints
- Water scarcity
- Energy supply and prices

### **ENABLERS**

- Watch what we eat
- Waste management
- Technological innovation
- Easier access to finances
- Liberalised trade system (with checks)
- Fair competition through international anti-trust policy
- Global governance mechanism for food security



## Long-term trend - Scarcity

➤ **A scarce environment:** water, energy, land

➤ **How big an issue?** Uncertain:

■ **Unquantifiable:**

- oil prices, biofuel production, climate change

- production: technological advances, pests / diseases

- supply: population growth, food preferences, commitment to equitable distribution

■ **Interconnectedness:** food production ↔ climate change  
food production ↔ energy  
water / energy / climate change

■ **Feedback loops and human attempts to mitigate**



## Long-term trend – Sustainability: a must

**Needed: sustained growth** in the agricultural sector  
(for food, rural livelihoods, economic growth)

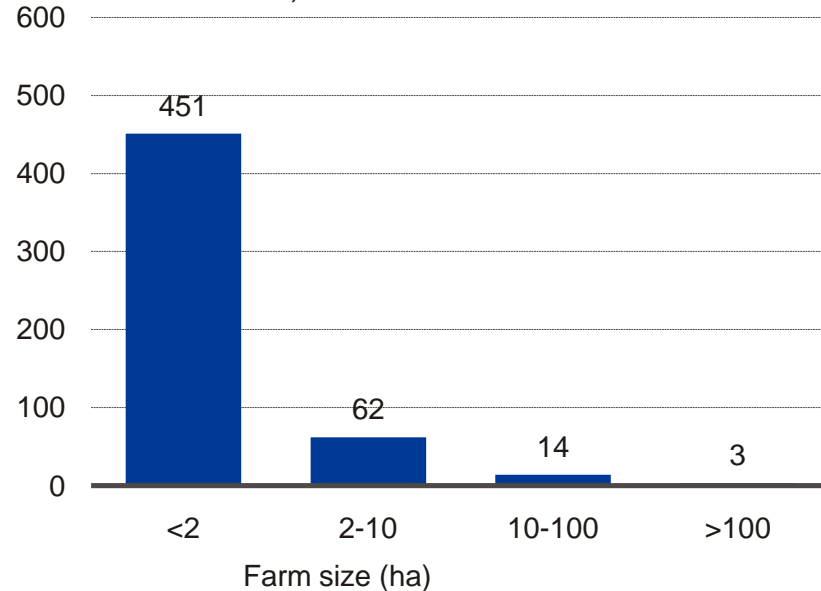
- Boost food production
- Changes in the world's systems for producing and distributing food
  - more resilience – against shocks and stresses
  - more sustainability – considerate use of resources
  - more equity – for access and entitlement to food
- No one-size-fits-all:  
each region has its own way to boost production



## Long-term trend – Small farms can and have to be more productive

### Smallholder production is key

Number of farms, million



Source: FAO Agricultural World Census

- **Access to assets** (land, water, machinery)  
→ Land reform, effective governance mechanisms
- **Access to functioning markets**  
→ Better infrastructure, organisations (co-op, PPP, etc.)
- **Access to knowledge**  
→ Technology transfer (gov. and private sector)
- **Access to affordable credit**  
→ Reshaping financial services for smallholders
- **Access to risk management mechanisms**  
→ Weather-index based insurance



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## Actions for more food security and sustainability

### In developing countries

- More spending on agriculture
- Invest in increasing yields
- More funding for (public) R&D
- Ensure farmers have access to resources
- Transfer of technology in a sustainable way –  
through partnerships
- Educate and empower women
- Promote healthy diversified diets

### Internationally

- Agricultural liberalisation (developed)
- Liberalize trade (with checks)
- More governance and transparency
- Concerted action on climate change



## Actions for more food security and sustainability

### In the EU

- Re-examine CAP beneficiaries
- Address environmental problems- Reward farmers for good stewardship
- Tackle GM food production: more research on capabilities/impacts
- Review intellectual property rights

### For the industry

- Financing agriculture - Investments
- Agricultural and food industry
  - Opportunities all along the food value chain
  - New processes of value creation (partnership)

### For all

- Watch what we eat
- And what we waste



**Thank you for your attention!**

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