



A SUSTAINABLE AGRI-FOOD SYSTEM FOR NUTRITION AND HEALTH:

Technology, policy, and
institutional implications

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Washington, DC | June 5, 2018



IFPRI

Outline

- ▣ Agri-food systems are critical for human and planetary health, but challenges persist
- ▣ Innovations in technologies, policies, and institutions are key for multiple wins
- ▣ Sharing knowledge and South-South learning are essential to accelerating progress

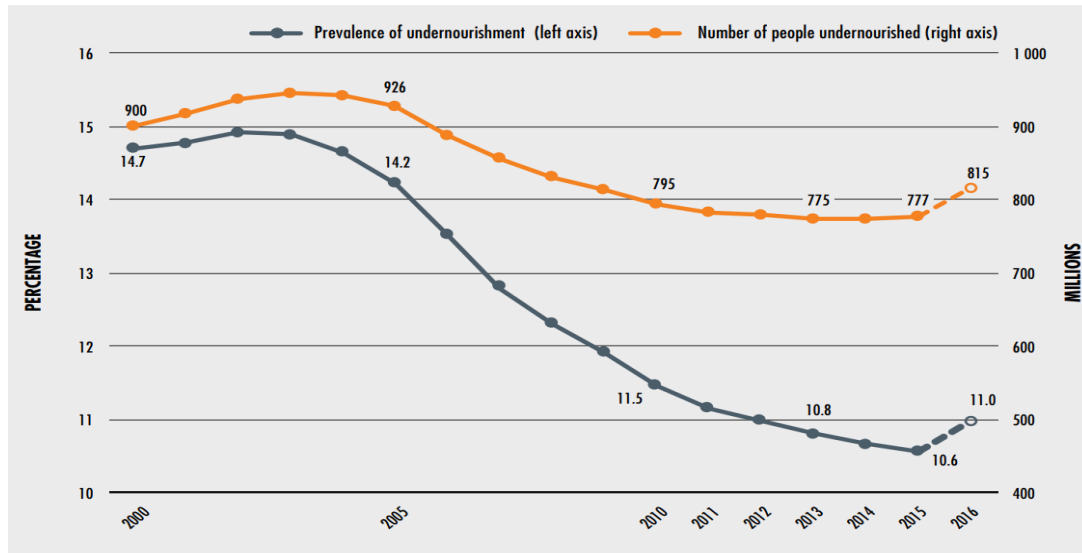
The SDGs envision a future with a Healthy Humanity and Healthy Planet



Food systems will play a critical role

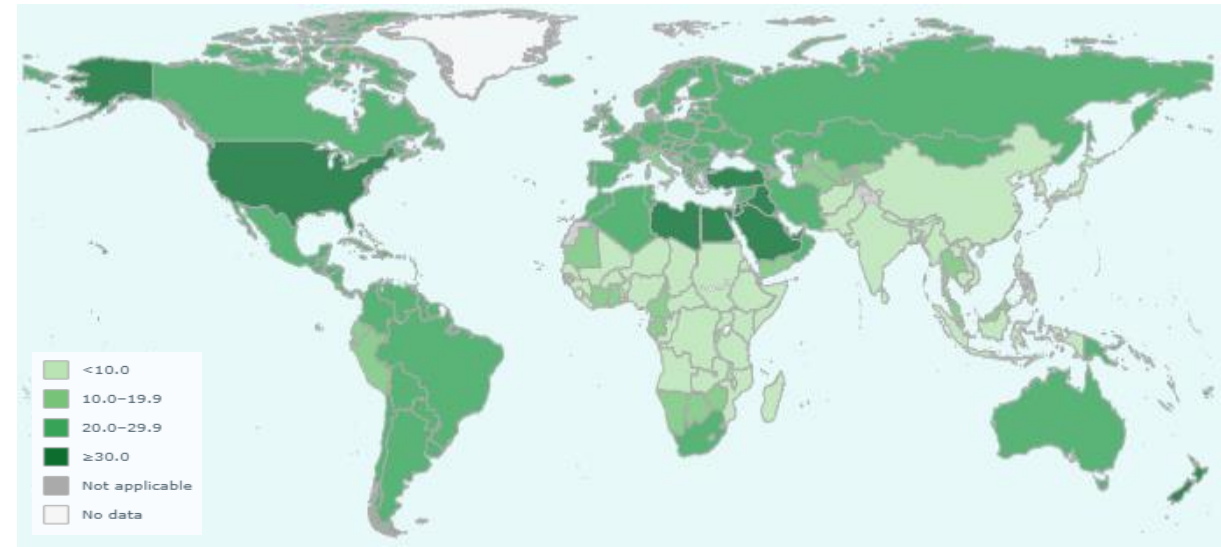
...BUT challenges to human health persist

Prevalence and number of undernourished worldwide



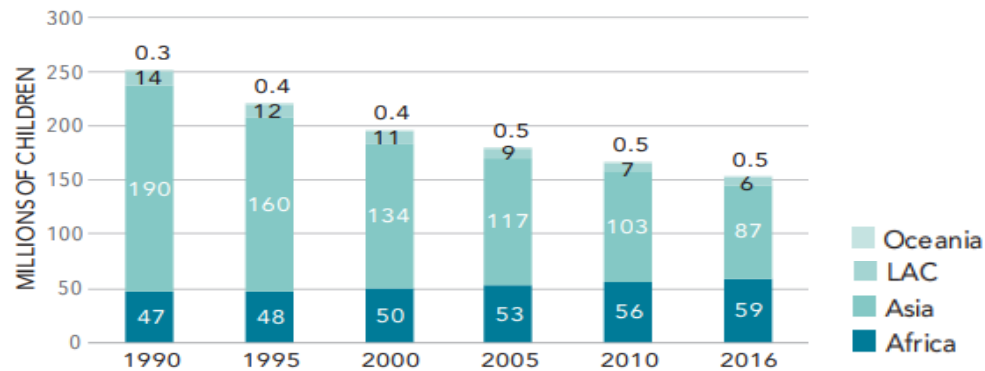
Source: FAO 2017

Prevalence of adult obesity, 2016(%)



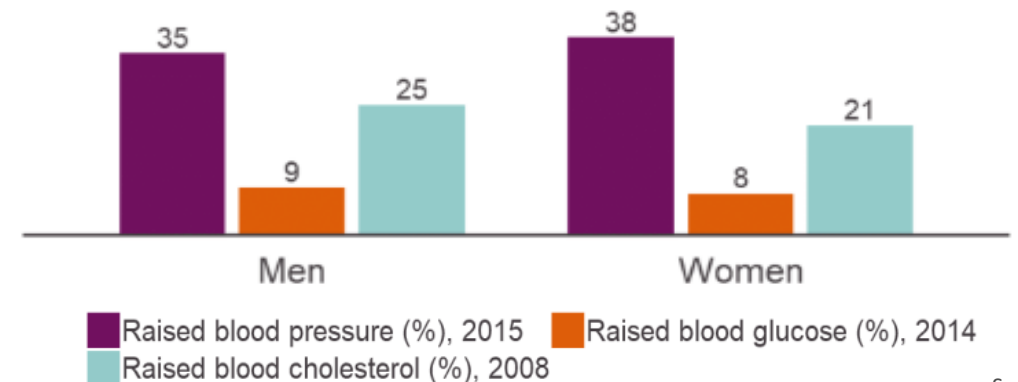
Source: WHO 2018

Prevalence of stunting in children under 5 (%)



Source: GNR 2017

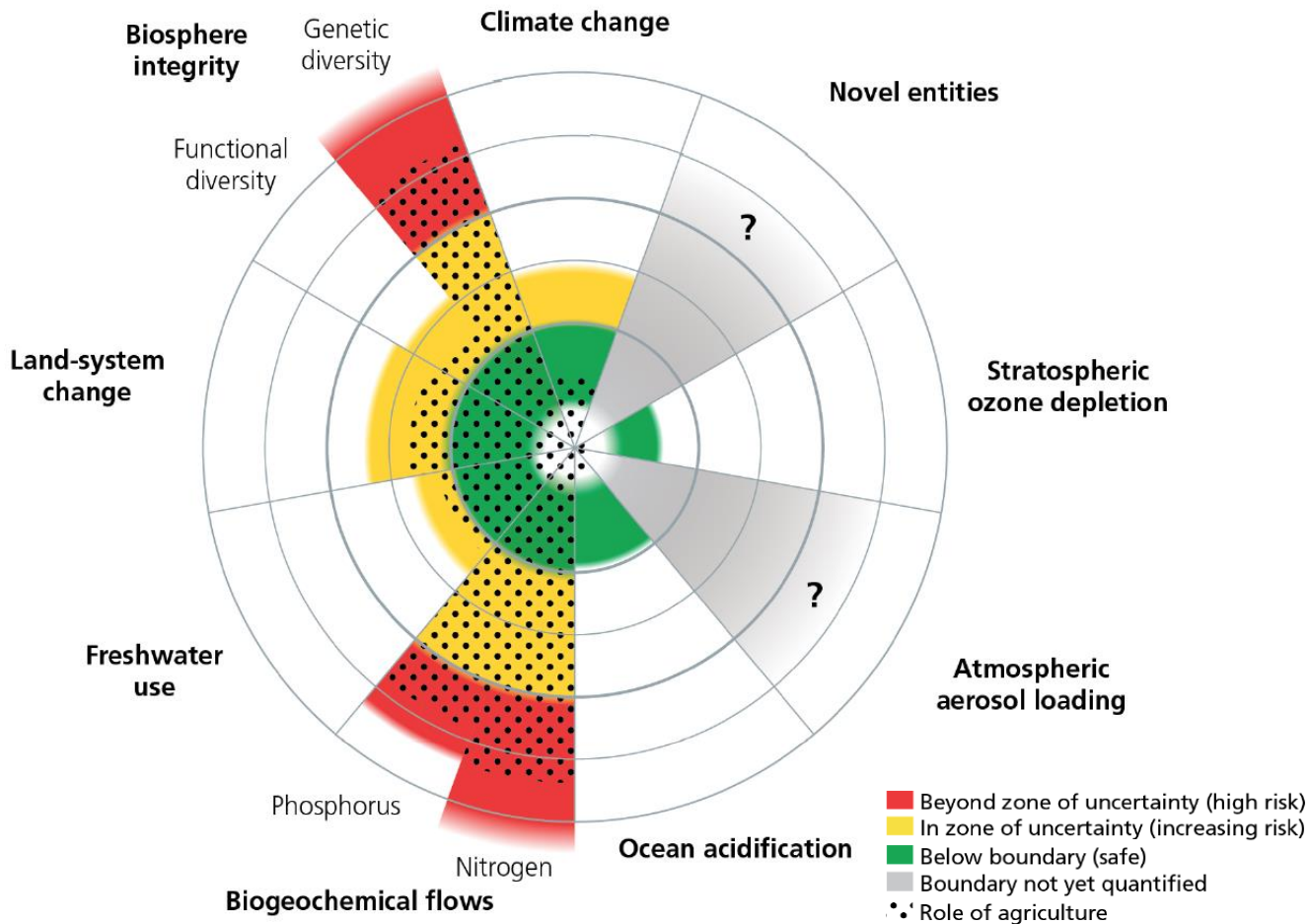
Metabolic risk factors for diet-related NCDs globally (%)



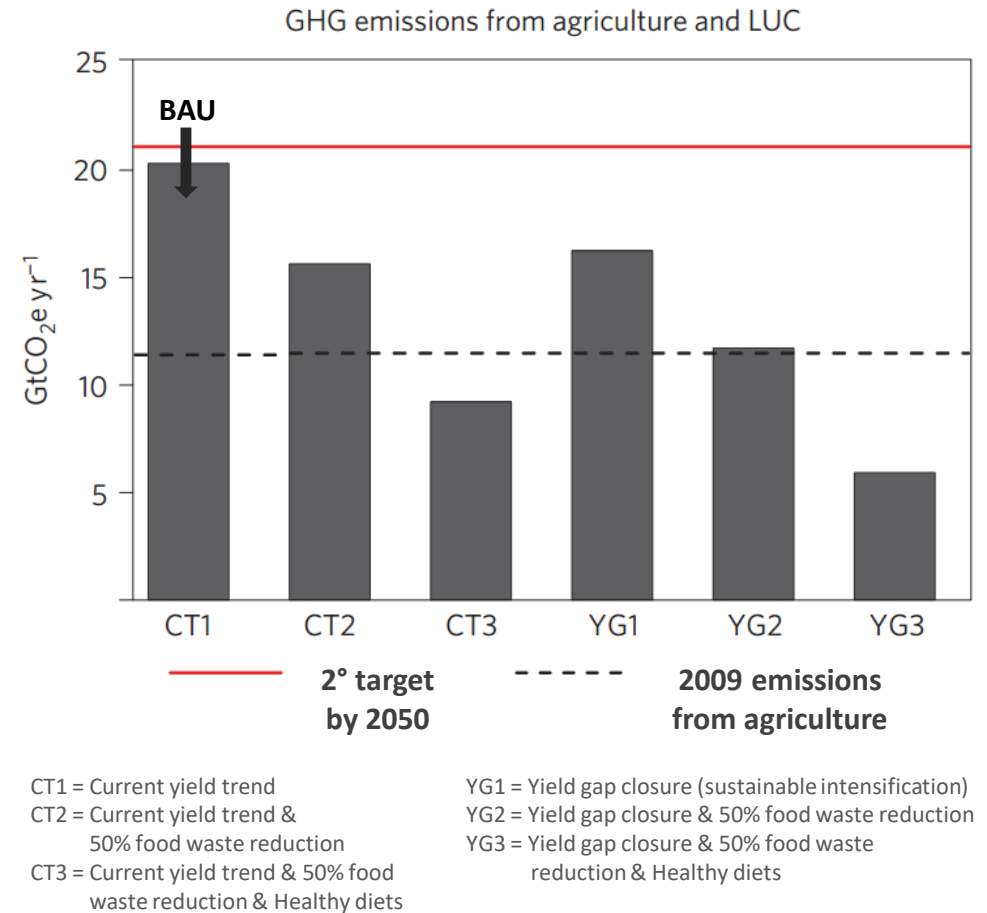
Source: GNR 2017

... AND planetary health is increasingly at risk

Agriculture pushing planetary boundaries



Drastic changes needed in agri-food systems to meet the 2°C target



A grid of white microtiter plates is shown, each containing a small green plant growing in a clear liquid medium. The plants are arranged in rows and columns, and the background is a soft-focus laboratory setting. The text is overlaid on a white-bordered box in the center of the image.

**Technological innovations are key
to achieve multiple wins**

Promote key technologies for health and environment

Yield enhancing technologies

- **Remote sensing technology:** Estimate biomass of cassava roots with ground-penetrating radar (GPR) to increase crop productivity
- **Precision agriculture:** Microdosing in Niger, Mali, Burkina Faso saw millet yields increase by over 50% & better water absorption

Improved, climate-resilient varieties

- **Cross-bred soy bean varieties in Brazil:** More tolerant of acidic soil, shorter life cycles contributes to greater yield
- **Heat-tolerant durum wheat:** Rapid growth period and tolerant of heat up to 40°C along the Senegal River basin

Nutrition-driven & nutrition-sensitive technologies

- **Increasing nutrition density through biofortification:** More than 30 million people are consuming one or more of 12 biofortified crops globally

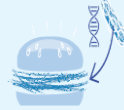


Photos: Embrapa, Ageitec, ICARDA, HarvestPlus

Source: Croplife 2014, ICRISAT 2015, Economist 2010, CIMMYT 2012, HarvestPlus 2018

Scale-up new, transformative technologies

Alternative proteins



- Can help reduce agricultural GHG emissions and fresh water withdrawals
- Also alleviate health risks associated with meat consumption

Gene editing for seed improvements



- Can help produce more crops and increase farmer incomes
- Also improve nutrition outcomes

Big data and analytics



- Lowers transaction costs and mitigates agriculture-specific risk in insurance
- Can improve monitoring and farm management

Blockchain-enabled traceability



- Enhances transparency & traceability of the food supply chain, land tenure, payments, etc.
- Reduces transaction costs

Need to consider impact on smallholders, children's nutrition, jobs, etc.

Support farmer-led innovations

- **Planting basins to conserve water and improve food supply**
 - Use of basins for maize helped a community farmers in Kenya manage the drought season
- **Ever-green farming**
 - Integrating trees into food crop systems in Kenya has prevented soil erosion, while enhancing nitrogen fixation and providing firewood, timber, and animal fodder

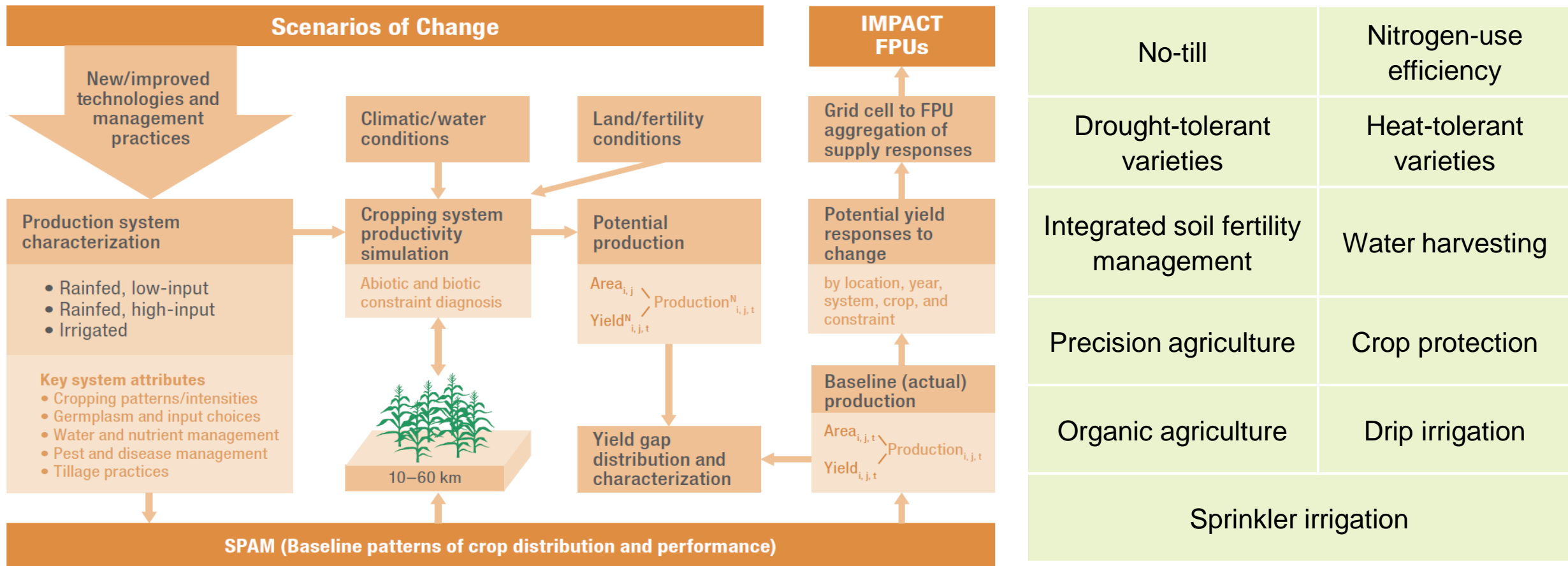


Photos: ICRAF, CCAFS
Source: CGIAR FTA 2018, CCAFS 2014

Farmer-led innovations can help reduce duration of food shortages and severity of hunger, and contribute to household welfare

Model impact of sustainable intensification technologies

Modelling system for environmental impact of 11 agricultural technologies



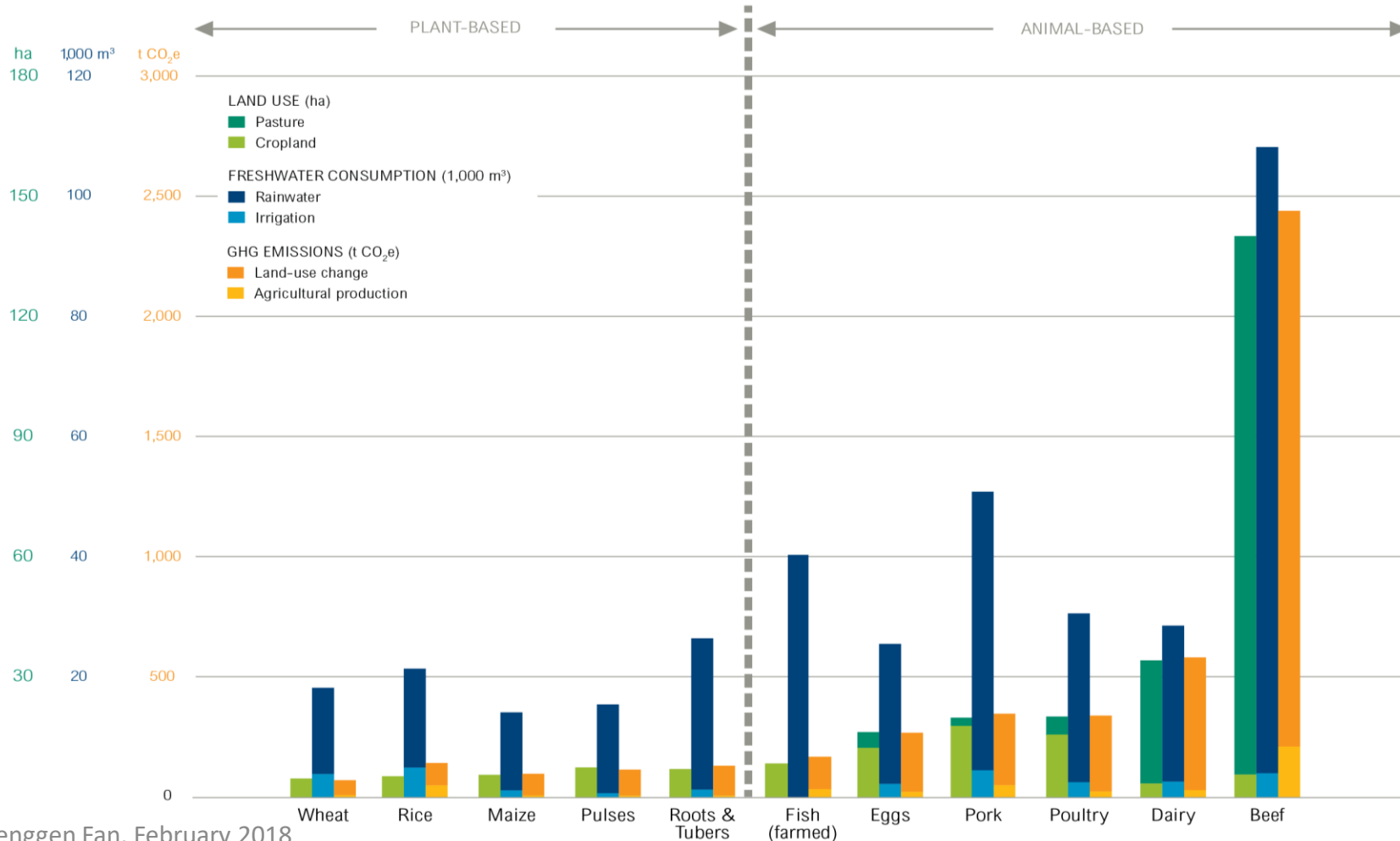
A photograph of a farmer wearing a red cap and a red and blue shirt, crouching in a field of green leafy vegetables. The farmer is holding a piece of the plant. The background shows more of the field and some trees. A white rectangular box is overlaid on the image, containing the text.

**Policy innovations can help prioritize
health and the environment**

Promote sustainable, nutritious, healthy diets (1)

Environmental footprint of various foods

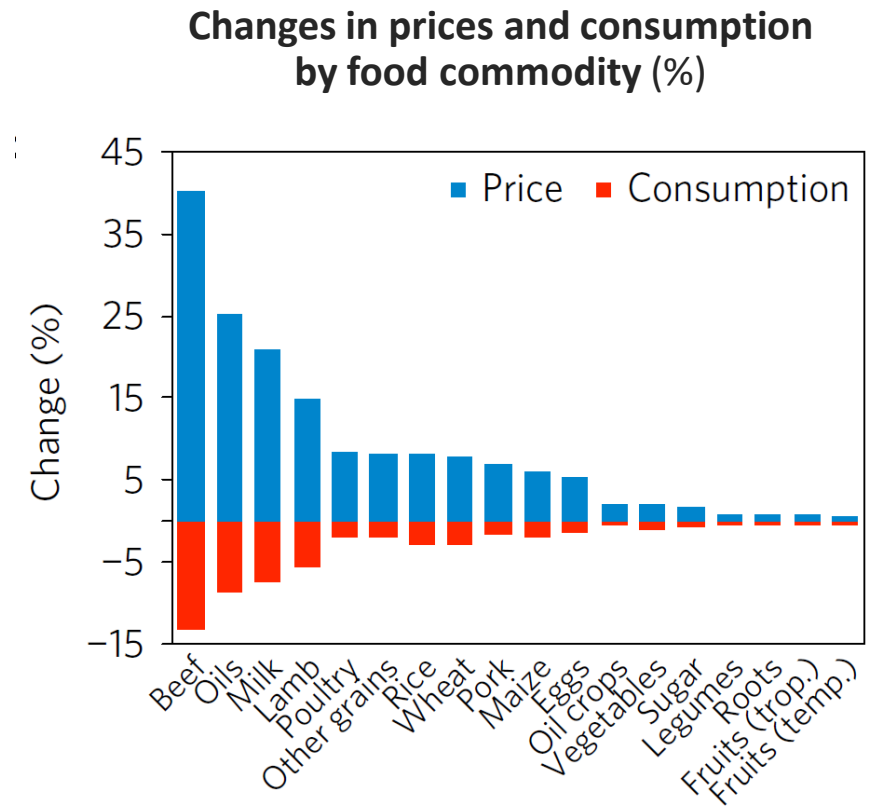
PER TON PROTEIN CONSUMED



Under usual technologies,
beef and other ruminants
 account for
20 more times
 the land use &
 GHG emissions than
 pulses per unit of protein
 consumed

Promote sustainable, nutritious, healthy diets (2)

- **Tax nutrient-poor foods and subsidize nutrient-rich foods**
 - Eliminate subsidies of nutrient-poor foods (US \$500+ billion/year) and convert to investments for more nutritious crops (e.g. vegetables)
 - Divert funds to promote carbon neutral or low carbon food production (e.g. **Brazil's carbon neutral beef**)
- **Taxing emissions-intensive foods (e.g. meat and dairy) could avoid more than 100,000 deaths in 2020**
 - Two-thirds due to changes in **dietary risk factors**
 - One-third due to changes in **weight-related risk factors**



Reform subsidies for agricultural inputs and staple crops

- **Subsidies can lead to**
 - Overproduction of unhealthy foods
 - Overuse of inputs, resulting in land degradation
 - E.g. overuse of subsidized fertilizer contributed to degradation of nearly 40% of arable land in China
- **Subsidies should not crowd out other public investments with greater returns**
- **Convert funds to**
 - Support **production of fruits and vegetables**, and other **nutrient-rich foods**
 - Provide **income support for vulnerable groups**, including smallholders, women, and youth



Institutional innovations create enabling environments

Close gender gap in agriculture

- **Ensure agricultural technologies benefit women**
 - *Ethiopia*: Women preferred solar pumps (over motor pumps) near household for irrigation due to less time burden & more control over intrahousehold allocation of income
- **Reform institutions to strengthen resource rights**
 - *Rwanda*: Participation in land registration programs increase likelihood to undertake longer-term investments for sustainability (e.g. soil conservation)
- **Improve mother's health and nutrition**
 - *Burkina Faso*: Enhanced Homestead Food Production (E-HFP) decreased prevalence of maternal underweight & enhanced empowerment
- **Enhance access to inputs and credit**
 - *Ghana*: Women's ability to make credit decisions significantly improved dietary diversity for women and girls

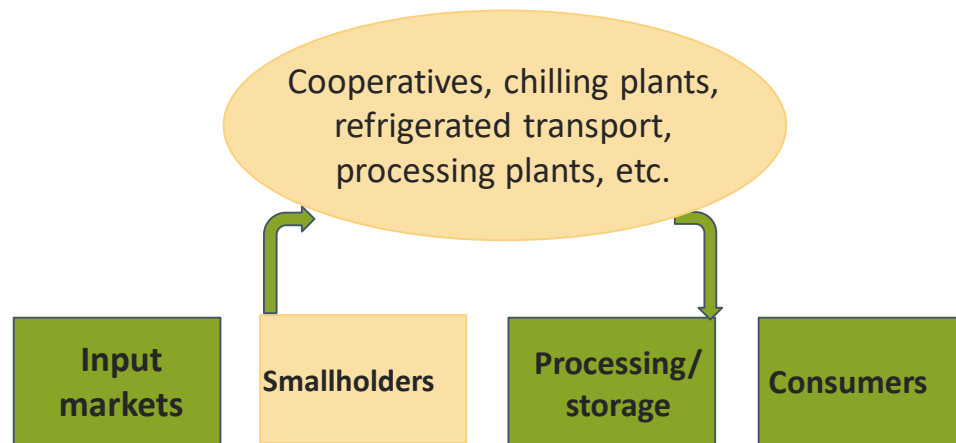


Encourage inclusive value chains

Support inclusive marketing in food value chains

- Link smallholders to modern agrifood value chains

India's improved dairy chain



- 4.5% increase in production / yr (1970-2001)
- Consumers gained more, better-quality milk

Strengthened rural-urban linkages can aid food security and nutrition

- Enhance policy coordination between rural and urban areas
- Support efficient and inclusive rural-urban value chains
- Leverage towns and intermediate cities to facilitate economic and social links
- Improve targeting of public investment

Promote effective governance mechanisms

- **Integrate and coordinate relevant sectors**

 - **Brazil's National Food and Nutrition Security System (SISAN)**

 - Brings together government sectors and coordinates policies for food security and nutrition

- **Enhance monitoring and accountability with data**

 - **Global Food system Index (GFSI)**

 - Holistic measure of food systems combining 4 pillars of food security with nutrition and sustainability
 - Provides broad, practical monitoring and tracking tool for decision makers

- **Consider a scientific platform for food systems**

 - Similar to the Intergovernmental Panel on Climate Change (IPCC)

Share knowledge to promote human and planetary health

- **Support South-South Learning**

- Share key experiences on what has worked and what has not worked
- Promote technology transfer
- Improve infrastructure in developing countries
- Enhance implementation and capacity with data and evidence (e.g. Compact2025)

- **Build evidence base for other countries and institutions**

- E.g. ReSAKSS (Regional Strategic Analysis and Knowledge Support System)

- **Enhance global and regional cooperation and learning efforts**

- Explore new modalities beyond traditional bilateral cooperation

