

REGIONS IN AGRICULTURAL DEVELOPMENT:
NARRATIVES FROM THE FIELD

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OUTLINE

1. The challenge of modern agriculture

Regional narratives:

2. Mato Grosso, Brazil: *Ramping up productivity*

3. Australia: *The R&D imperative*

4. Land Baden Württemberg, Germany: *A biomassive success*

5. Conclusions



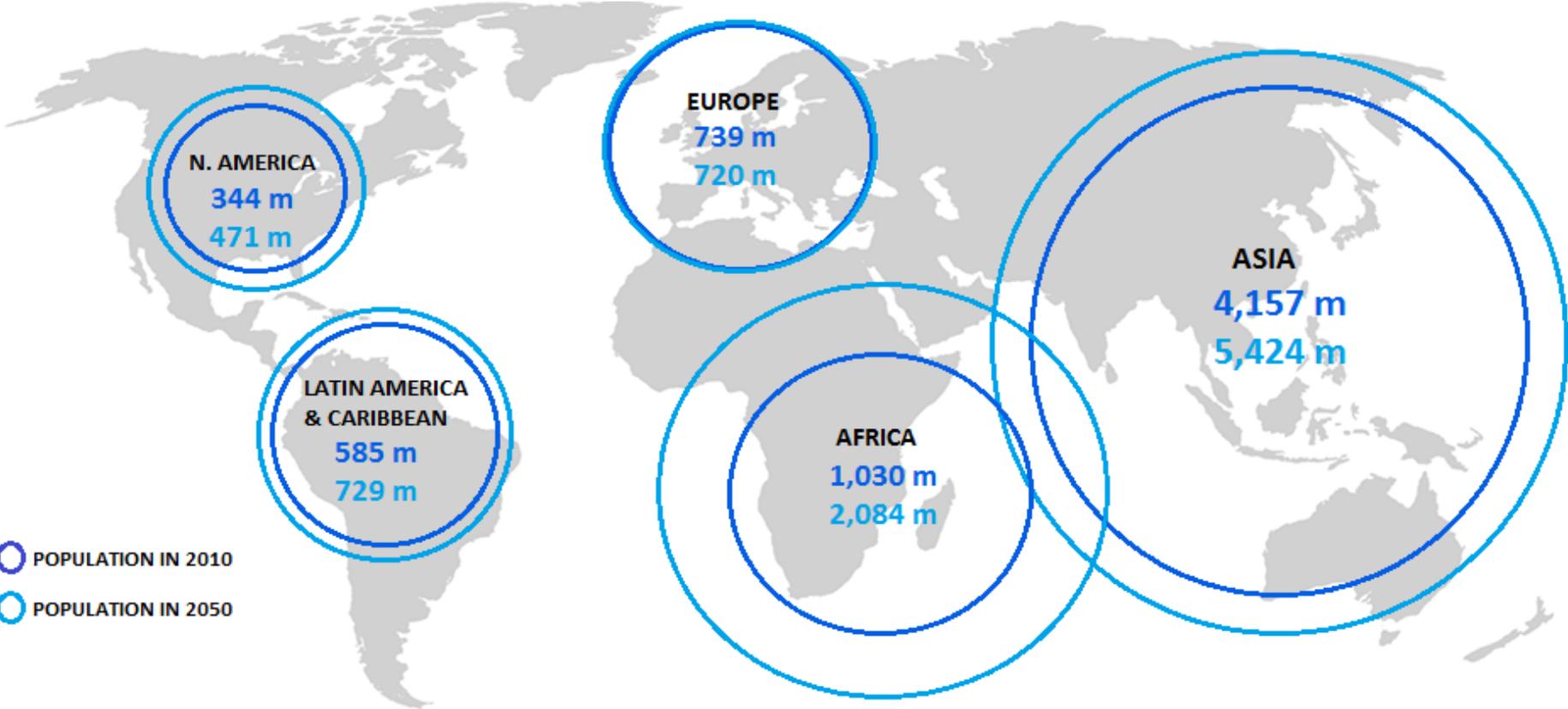
1. The challenge of modern agriculture

- Modern agriculture has to feed more and richer people, who demand additional calories and meat, with scarcer resources, less productive land and fewer emissions

→ *How can this be tackled in a regional context?*



WORLD CENTRE OF GRAVITY MOVING SOUTH-EAST



Source: Author's own

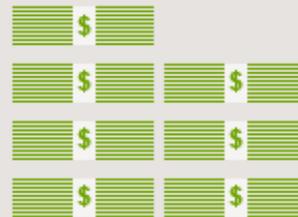
HIGHER INCOMES – MORE CALORIES

Why does global food demand for food keep on increasing?

2005, World population: 6.5 bn.



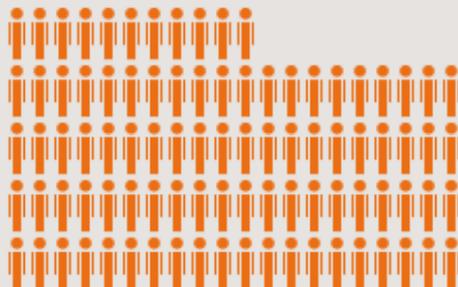
7,029 US - \$/per capita per year



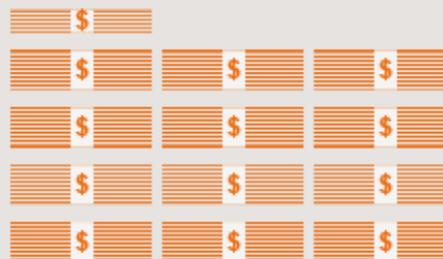
2,750 kcal/per capita per day



2050, World Population: 9.15 bn.



12,652 US - \$/per capita per year



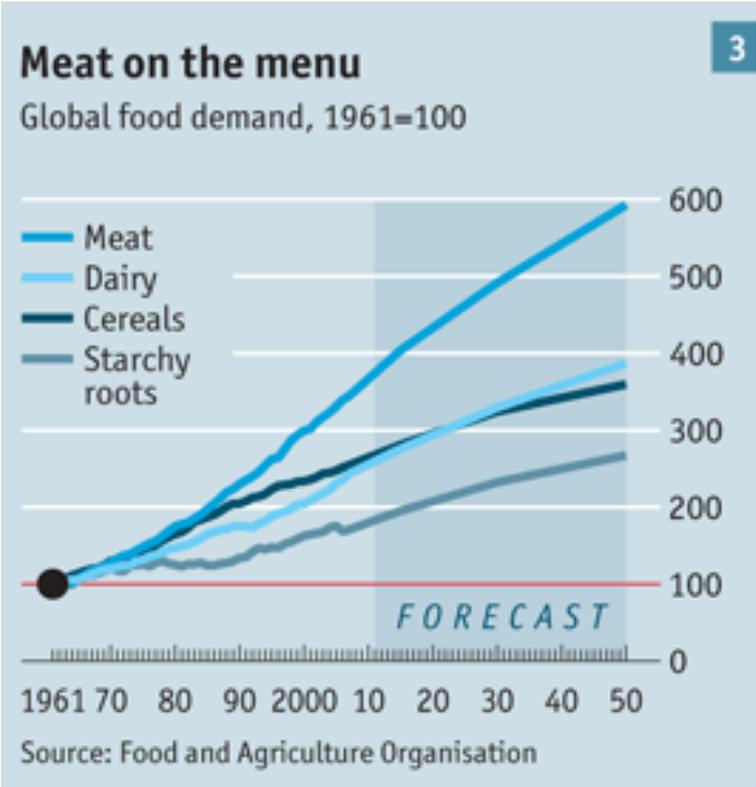
3,130 kcal/per capita per day



Source: FAO 2012

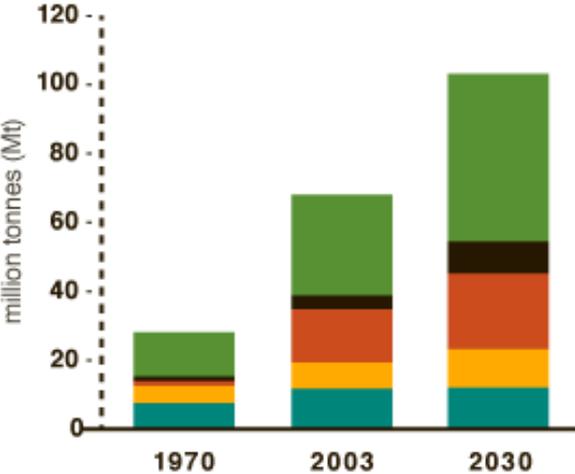
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PROTEIN DEMAND WILL SOAR...



Demand for animal protein is increasing.

- Other Countries
- India
- The United States
- China
- EU-15



Source: Kastner et al 2012

REQUIRING MORE RESOURCES

The ecological footprint of food



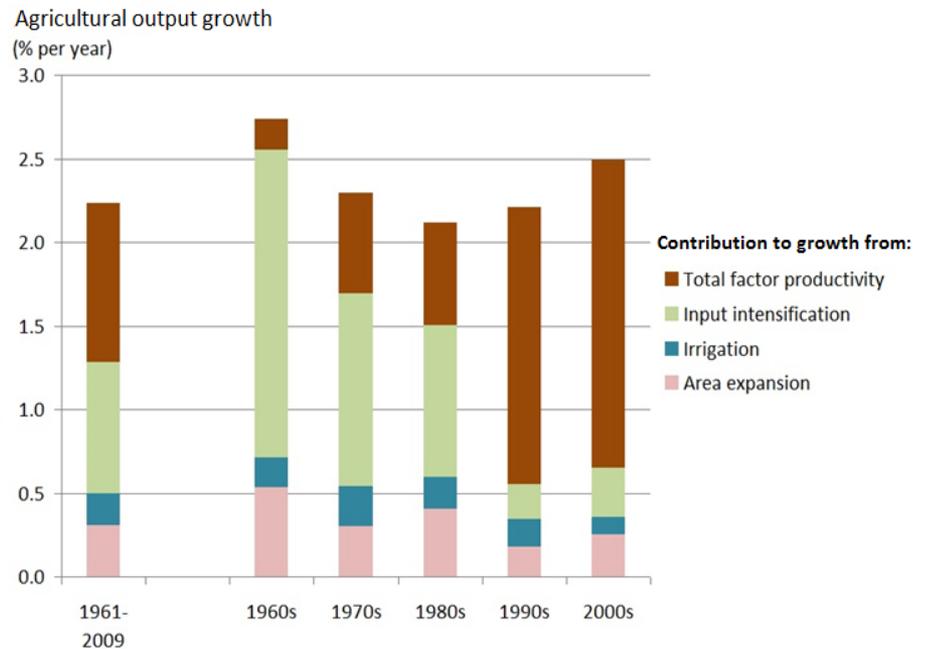
Assumes an average egg weighs 60g, and the density of milk is 1kg per litre.
¹Based on production in England and Wales
²Based on production in England and Wales, assumes all production is on land of an equal grade

TOTAL FACTOR PRODUCTIVITY (TFP)

Total factor productivity (TFP) is a measure of an economy's long-term technological progress

- ❑ TFP accounts for growth in total output not caused by growth in inputs (labor and capital)
- ❑ TFP measures the efficiency with which inputs are used
- ❑ TFP may account for up to 60% of growth within economies
- ❑ TFP cannot be measured directly but is estimated

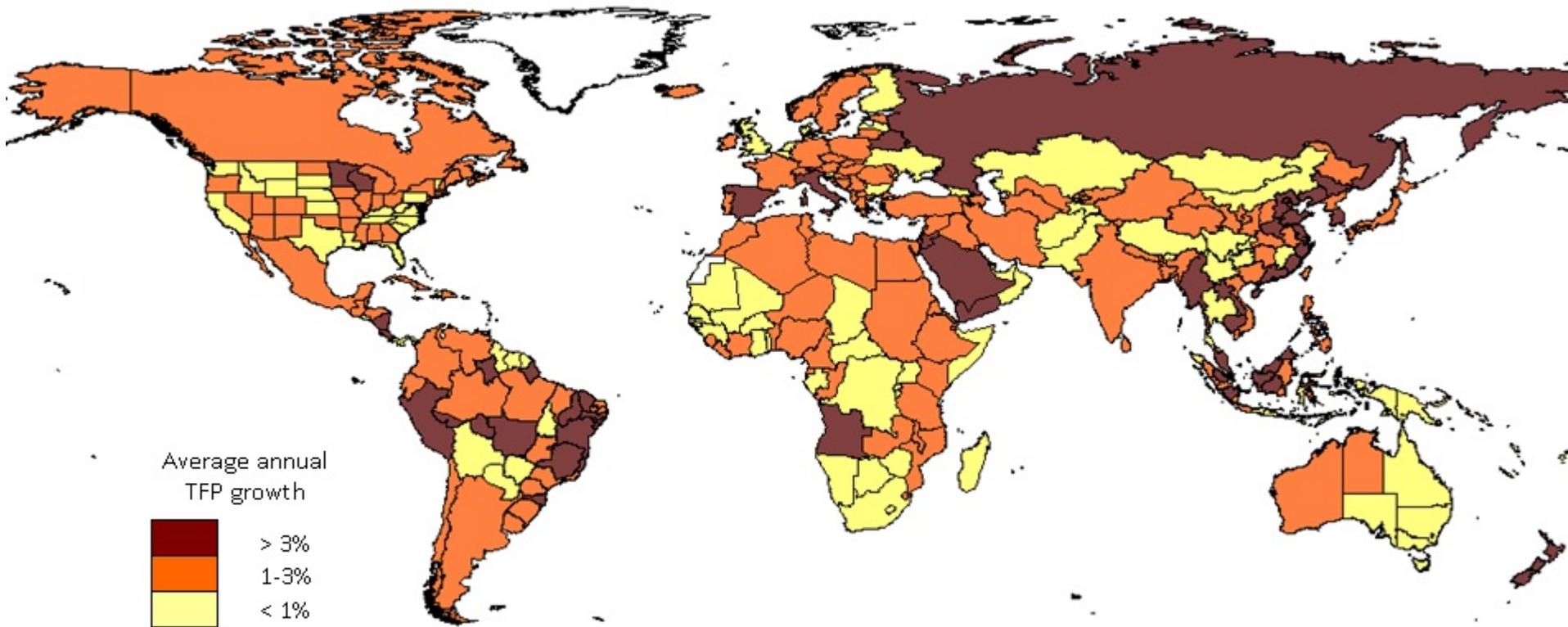
Sources of increase in global real agricultural output by decade from 1961 to 2009



Source: Fuglie (2012)

TOTAL FACTOR PRODUCTIVITY IMPROVEMENTS

Average annual growth rates in agricultural TFP between 1995 and 2009



2. Mato Grosso, Brazil: *Ramping up productivity*



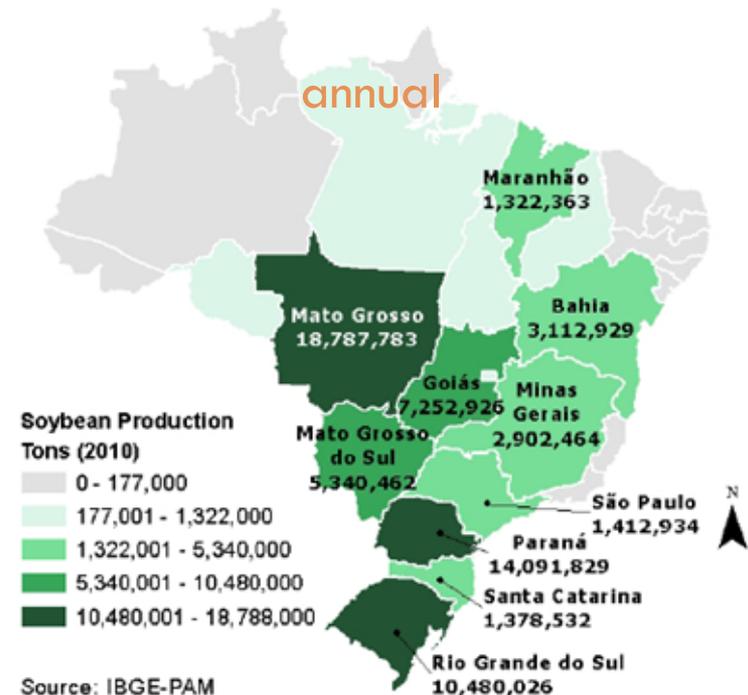
THE MAKINGS OF AN AGRICULTURAL REVOLUTION

- Importing US technology until the 1970s did not improve Brazilian agriculture
- The Brazilian Agricultural Research Corporation (EMBRAPA) set up in 1973:
 - ▣ Agricultural subsidies dismantled during oil crisis
 - ▣ Some of the money saved funnelled into EMBRAPA
- Transformed Brazilian agriculture through 4 main initiatives:
 1. Turning the vast but inhospitable *cerrado* savanna areas green by de-acidifying soils with lime → creating new farmland
 2. Cross-breeding African grass variety to improve yields, making efficient → beef herd expansion
 3. Cross-breeding soybeans to tolerate acidic soils and tropical climate
 4. Encouraging new operational farm techniques, e.g. “no-till” agriculture



THE WORLD'S NEW BREAD BASKET

- Mato Grosso (MG) is Brazil's third largest state
- Long isolated and economically underdeveloped
- Today Brazil's largest producer of soy, cotton and cattle
- Soy production has grown at an average rate of 9.5% since 1990
- MG alone supplies 7% of the world's soy



INCREASING OUTPUT WHILE CONSERVING LAND

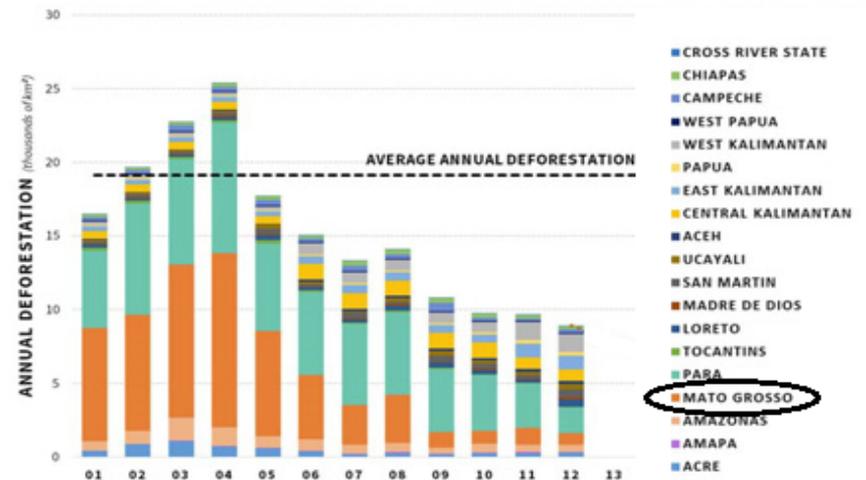


- During 1996 to 2005, MG accounted for 39% of Amazon deforestation
- Since 2005, major efforts to reverse this trend

- Today, only 0.4% of MG's soy is produced in the Amazon
- 74% of MG's soy is produced in the cerrado

(Brazilian Agricultural Research Corporation)

Historic annual deforestation of 19 tropical states and provinces



Source: Governors' Climate & Forests (GCF) Task Force

A MULTI-STAKEHOLDER APPROACH

- In 2009, Mato Grosso launched its own plan to prevent and control deforestation
- *Target:* to curb deforestation in its forest area by 89% by 2020 compared to 1996-2005

Multiple stakeholder approach:

- Agricultural sector representatives
- Researchers / EMBRAPA
- Business leaders
- Environmentalists

Initiatives:

- Continue ramping up productivity
- Greater “no-till” farming
- Registering 100 percent of soybean farms in environmental licensing system by 2010
- Creation of environmental education program for farmers
- Land management technique that produces crops for 1-2 years and raises livestock the third



Mato Grosso's entrepreneurial former governor, Blairo Maggi

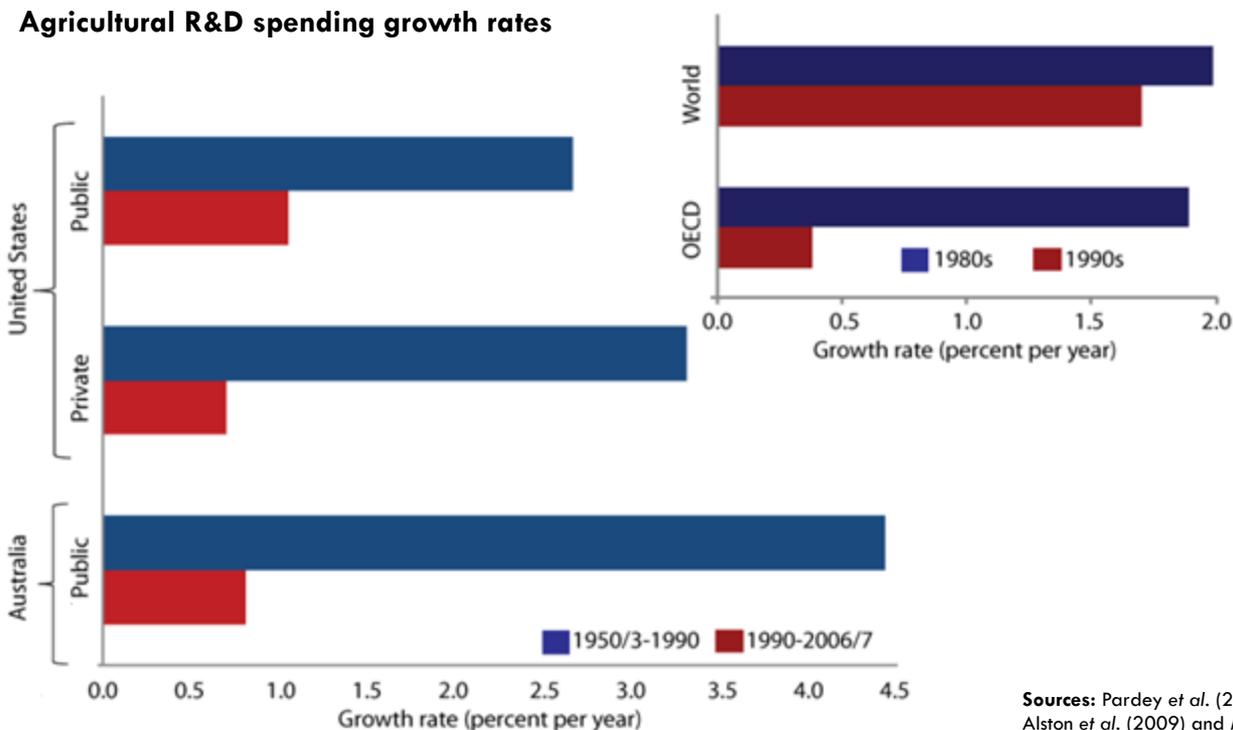
LESSONS FOR SUSTAINABLE DEVELOPMENT

- The Brazilian state of Mato Grosso has moved from an isolated, backward region to the edge of the agricultural frontier in two decades
- Output multiplication without increase in land use attributable to R&D
- *Multi-stakeholder approach to sustainable development is key*



3. Australia: *The R&D imperative*

- Australia has as a major agricultural nation historically been at the forefront of agricultural R&D, with the public sector as the dominant provider
- Yet while spending on agricultural R&D grew by 4.43% per year from 1950/3-1990, it slowed to an average 0.81% per year from 1990-2006/7



Sources: Pardey *et al.* (2006), Alston *et al.* (2009) and Mullen (2010).

RURAL RESEARCH & DEVELOPMENT CORPORATIONS

- The Australian government's primary funding bodies for rural R&D
- 15 bodies covering all the agricultural industries
- Government-industry partnership (joint funding)
- Based on identified needs, RDCs commission targeted agricultural research on a competitive basis amongst public and private research providers
- Competitive advantage of RDCs:
 - ▣ **Demand-led approach – Australian rural industries have greater influence on public R&D spending**



RURAL INDUSTRIES
Research & Development Corporation



LESSONS FOR MOVING FORWARD

- Developed-country investment in agricultural R&D has slowed, despite persistent high returns → productivity slowdown
- ***High agricultural R&D investment rates to be preserved***
 - ▣ *Public-private partnerships like the RDCs in Australia can help sustain investment by ameliorating non-excludability issue*



4. Land Baden-Württemberg: A *biomassive* success

- Reasons for successful biomass production implementation in German agriculture:
 - New economic perspectives (future-oriented market)
 - Forms of public financial incentive tools (support programs)
 - Compatibility with farmers cultural patterns (production-oriented)
 - Psychological aspects
- Decentralized on-farm plants benefit
 - Farmers more independent
 - Farmers participate in the added-value
 - Opportunity to dispose of crop residues + waste → reduces methane emissions



"Biomass is the greatest resource that we actually have and an important perspective for our national economy"

Gerd Sonnleitner
Former President of Germany's
National Farmers' Union

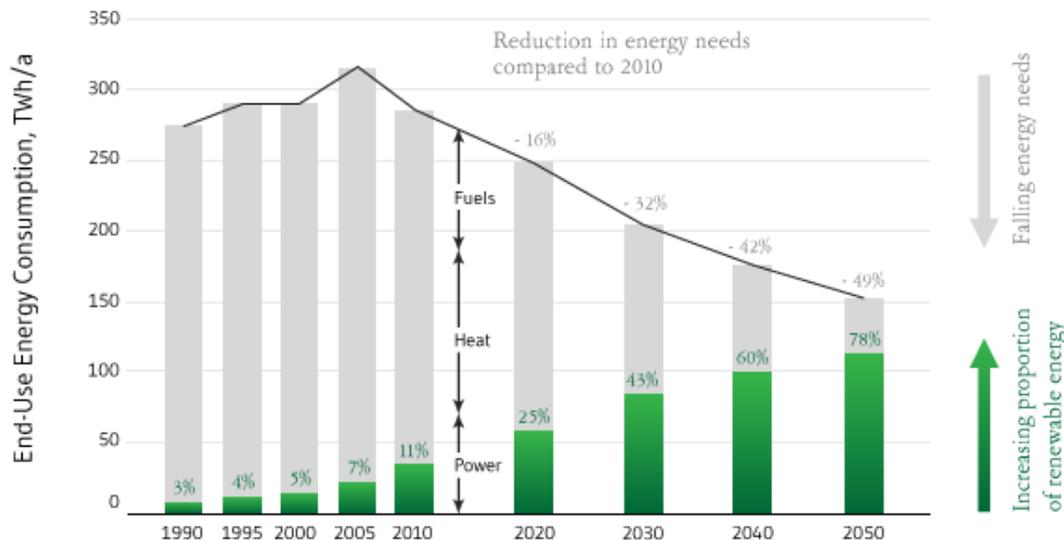
rural

animal

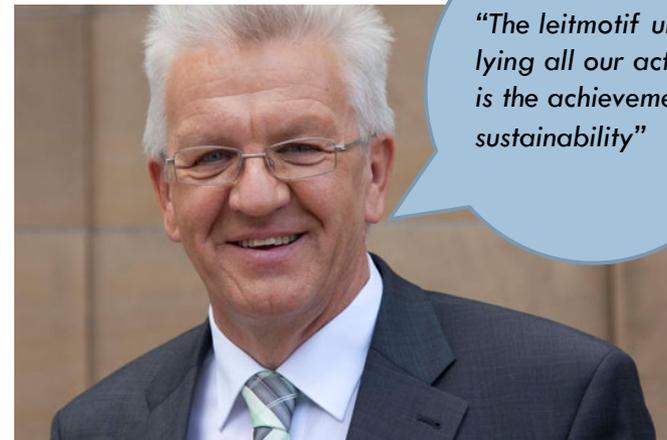
RENEWABLE ENERGY AMBITIONS

- By 2050, Baden-Württemberg plans to obtain 80 per cent of its energy from renewable sources
- To achieve this; *“Our goal is to reduce energy needs by 49 per cent and to meet 78 per cent of the remaining need with the help of renewables”*

End-use energy consumption Baden-Württemberg, 2010



Source: Energiewende Baden Württemberg, 2014



“The leitmotif underlying all our actions is the achievement of sustainability”

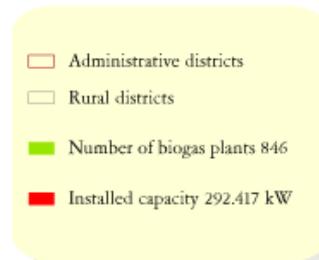
First policy statement by Minister-President of Baden-Württemberg, Winfried Kretschmann, when elected in 2011

BIOMASS IN BADEN WÜRTTEMBERG

- ❑ Baden-Württemberg adopted *the Biomass Action Plan (BAP)* in 2010
- ❑ Emphasis on waste from agriculture, forestry, municipal and industrial waste
- ❑ Currently, almost 1000 biogas plants provide 7.5% of primary energy consumption in Baden Württemberg
- ❑ Plans to expand capacity much further

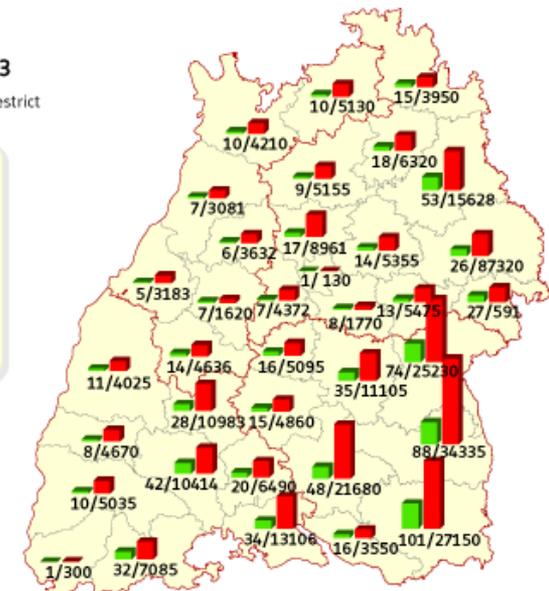
Biogas plants in Baden-Württemberg in 2013

Number of plants and capacity per rural district



State average: 346 kW/plant

Source
MLR Ref. 51 und Staatliche Biogasberatung
Baden-Württemberg 2013



LESSONS FOR BIOENERGY PRODUCTION

- Biomass production has been successfully implemented in German agriculture – with the support of farmers
- The state of Baden Württemberg has been particularly progressive in adopting a Biomass Action Plan
- *Biomass production can have a positive effect on employment creation and investment in rural areas – particularly with smaller on-farm plants*



3. Conclusions

Agriculture has to feed more and richer people, who demand additional calories and meat, with scarcer resources, less productive land and fewer emissions

Lessons of regional narratives to meet the challenge of modern agriculture:

- *A multi-stakeholder approach to sustainable development is key*
- *High agricultural R&D investment growth rates should be preserved*
- *Biomass production can have a positive effect on employment creation and investment in rural areas – particularly with smaller on-farm plants*
- *EU approach - EIP Agri and RD, combining Horiyon and CAP funds*

