

How to feed the world: Is reducing meat consumption part of the solution?



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Background

- Contrary to Malthus's prediction: world agricultural system able to feed the growing world population over the 20th century
- Food supply has increased sufficiently; real prices of agricultural products on a downward trend
- Beginning of 21st century: slowdown of agricultural supply growth facing strong rising demand for food and energy purpose
- Price spikes on world agricultural markets since 2007: perception that the era of over-supply has likely ended
- Issue of global food security: a number of scenario studies published on the ability of the world agricultural system to feed the projected world population in 2050

Background

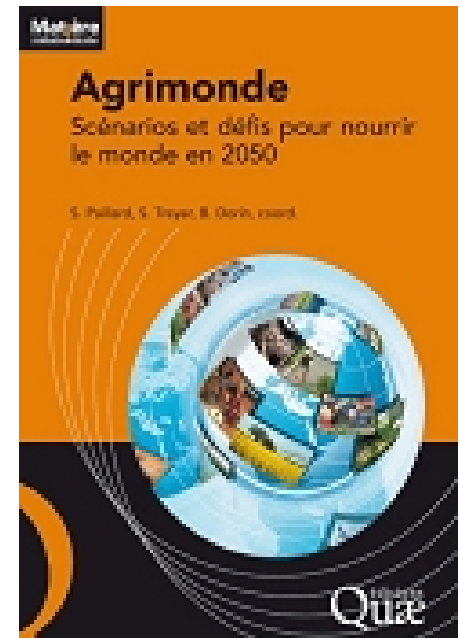
- One of the most well-known: FAO's World Agriculture towards 2030/2050 (Alexandratos and Bruinsma, 2012)
 - 60% increase in world food supply needed up to 2050
 - obtained by increasing:
 - yields (80%)
 - cropping intensity (10%)
 - agricultural area (10%)
- ⇒ Focus on food supply and the need to increase world agricultural production

Background

- There are several other levers that could be used for feeding the world in a sustainable way:
 - reduce food loss and wastes along the food chain
 - limit non-food use of agricultural products
 - decrease food consumption
 - notably of animal products which are less efficient than crops in transforming solar energy into calories

Background

- Several scenario studies along these lines: e.g., MEA (2005), Eating the planet (Institute of social ecology, Vienna, 2009), UK foresight (2011), Inra-Cirad foresight « Agrimonde » (2009)
- 2 scenarios:
 - Agrimonde GO inspired from the MEA GO scenario: a business as usual like scenario
 - Agrimonde 1: drastic conditions for a sustainable development of the planet



Background

- In the following of Agrimonde, « Agrimonde-Terra »:
 - a new Inra-Cirad foresight exercise focusing on the links between land use and food security
 - Focus on land use
 - 2 main questions:
 - How much land available to agriculture? Where is it? How using it for ensuring food security in 2050 while limiting negative impacts on the environment?
 - Who is producing? Who is owning production factors?
How is the value added distributed along the food chain?

Background

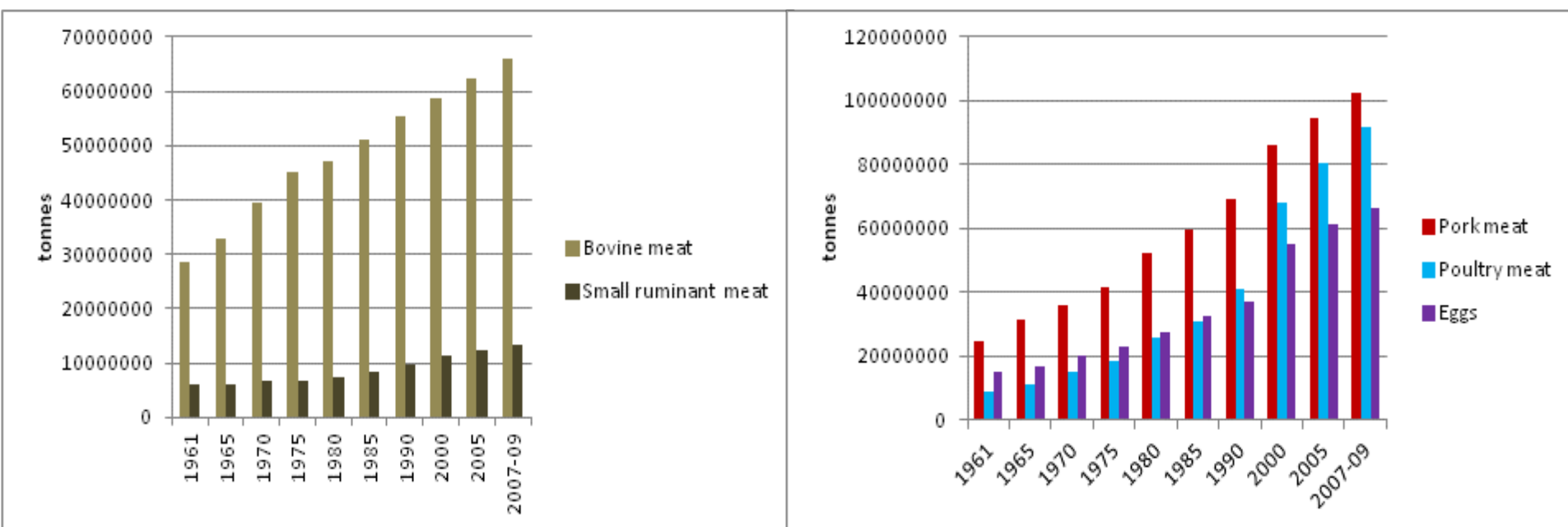
- On-going work, results available by mid-2016
- For the moment, 6 scenarios built as combinations of 7 components:
 - 3 indirect causes: Economic and energy context, Climate change, Food diets
 - 4 direct causes: Cropping systems, Livestock systems, Farm structures, Rural-urban relationships
- Storylines and quantitative illustrations
 - GlobAgri: a database (FAOStat) and a resources-utilizations balance model

Objective and outline

- On-going work shows the key role of livestock as regards land use: here focus on meat
- Show that in a « business as usual » scenario world meat consumption should continue to increase up to 2050
- Show that reducing the share of animal products in food diets in developed and emerging countries would help solving the world quantitative food equation
- Show that there are other levers that can be used as well

1. Changes in world meat production over the last decades

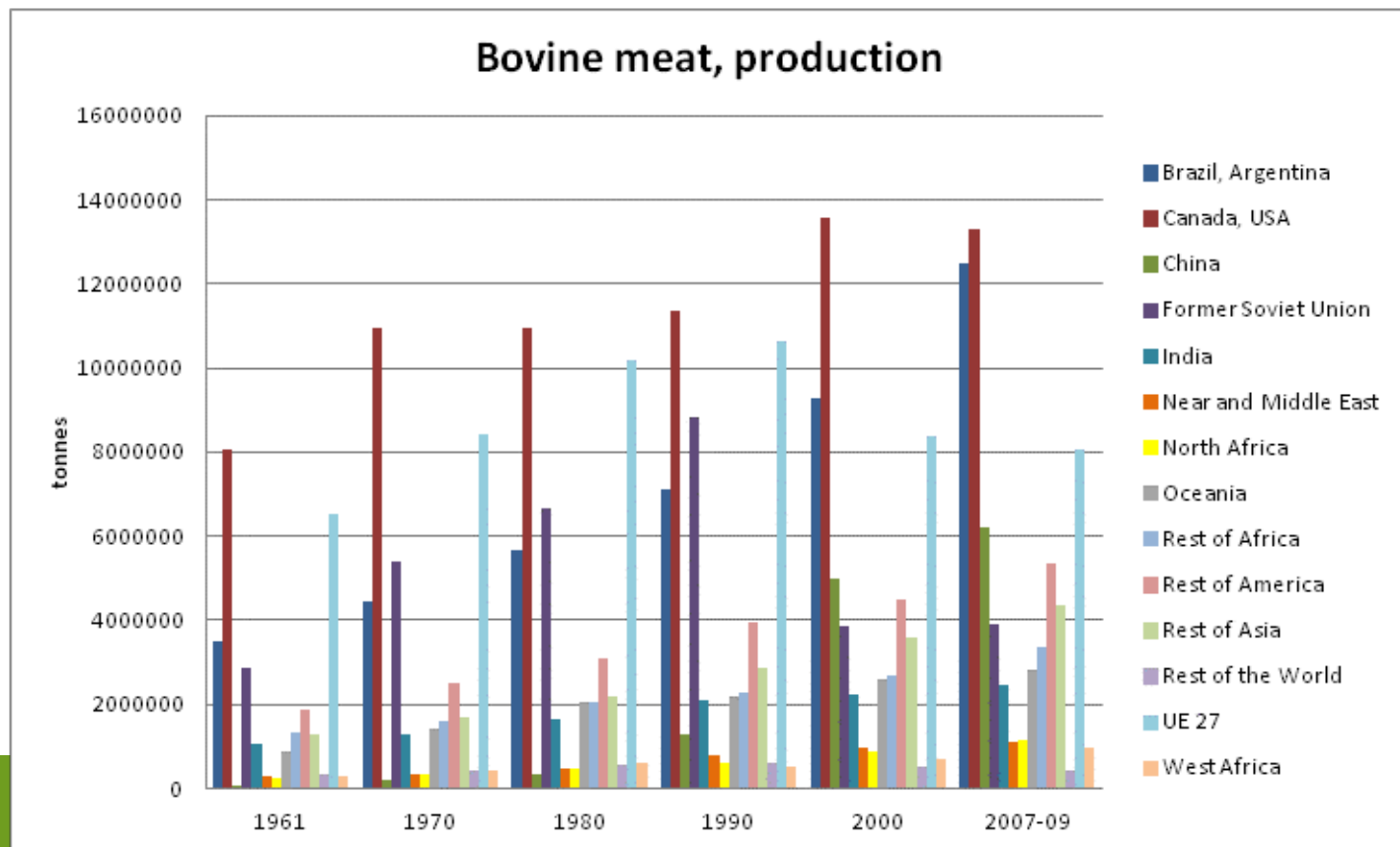
- World production 1960-2010:
Ruminant meat X2; Pork meat X4; Poultry meat X10



1. Changes in world meat production over the last decades

- World major producing zones:

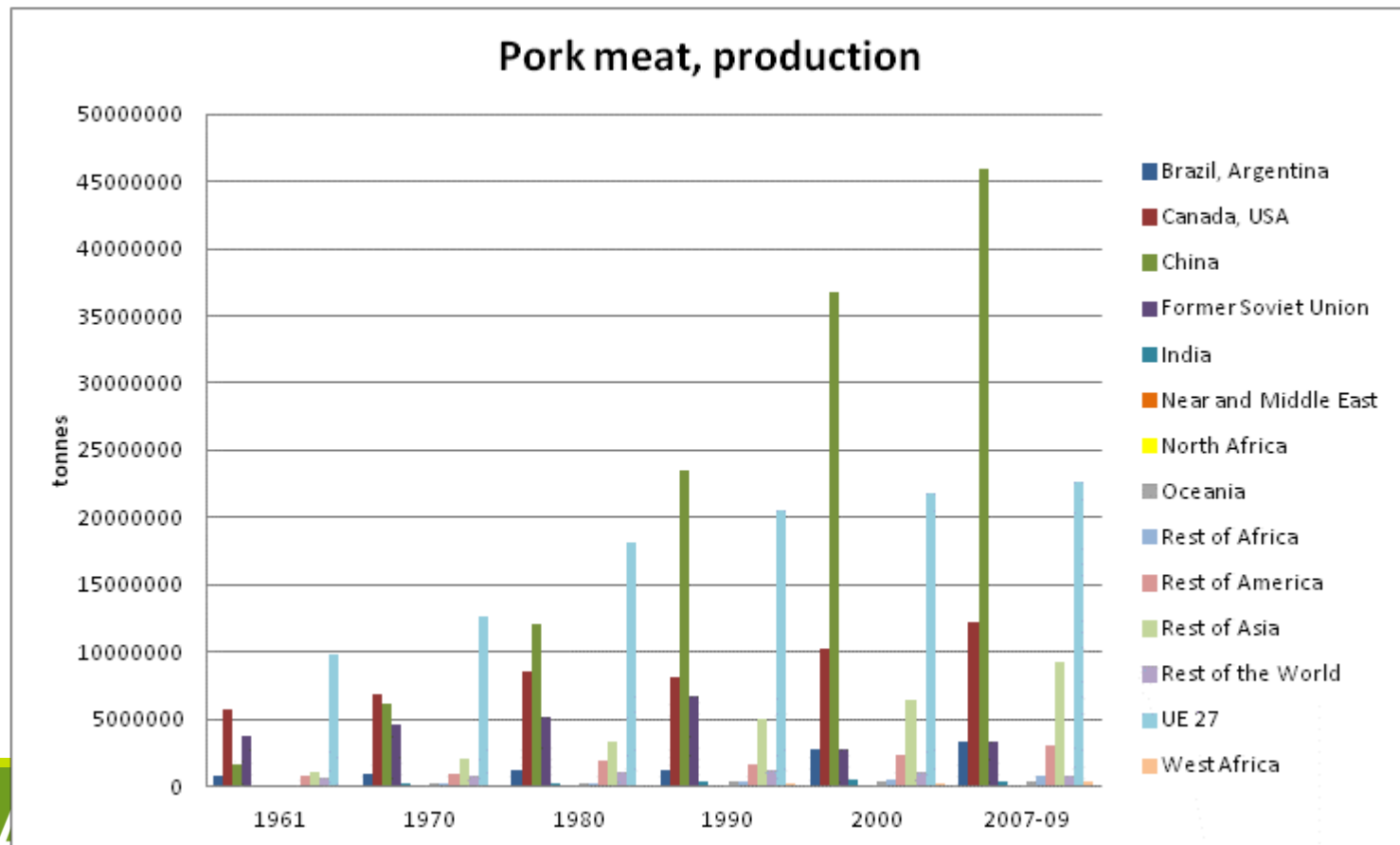
Bovine meat: increase in emerging countries (Brazil/Arg., China); collapse in FSU; decrease in developed countries (USA/Can., EU-27)



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- World major producing zones:

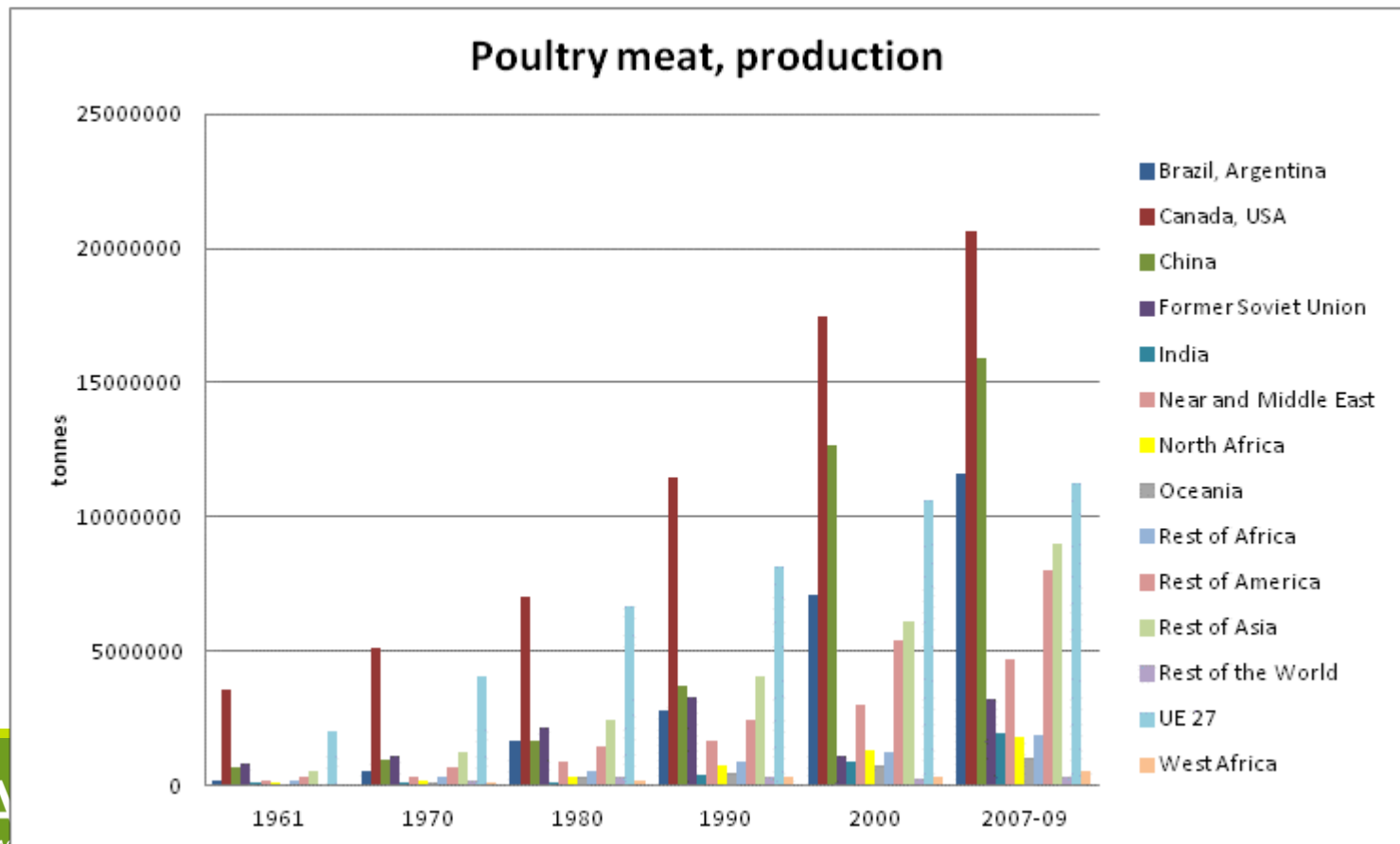
Pork meat: strong increase in China; stagnation in EU-27



1. Changes in world meat production over the last decades

- World major producing zones:

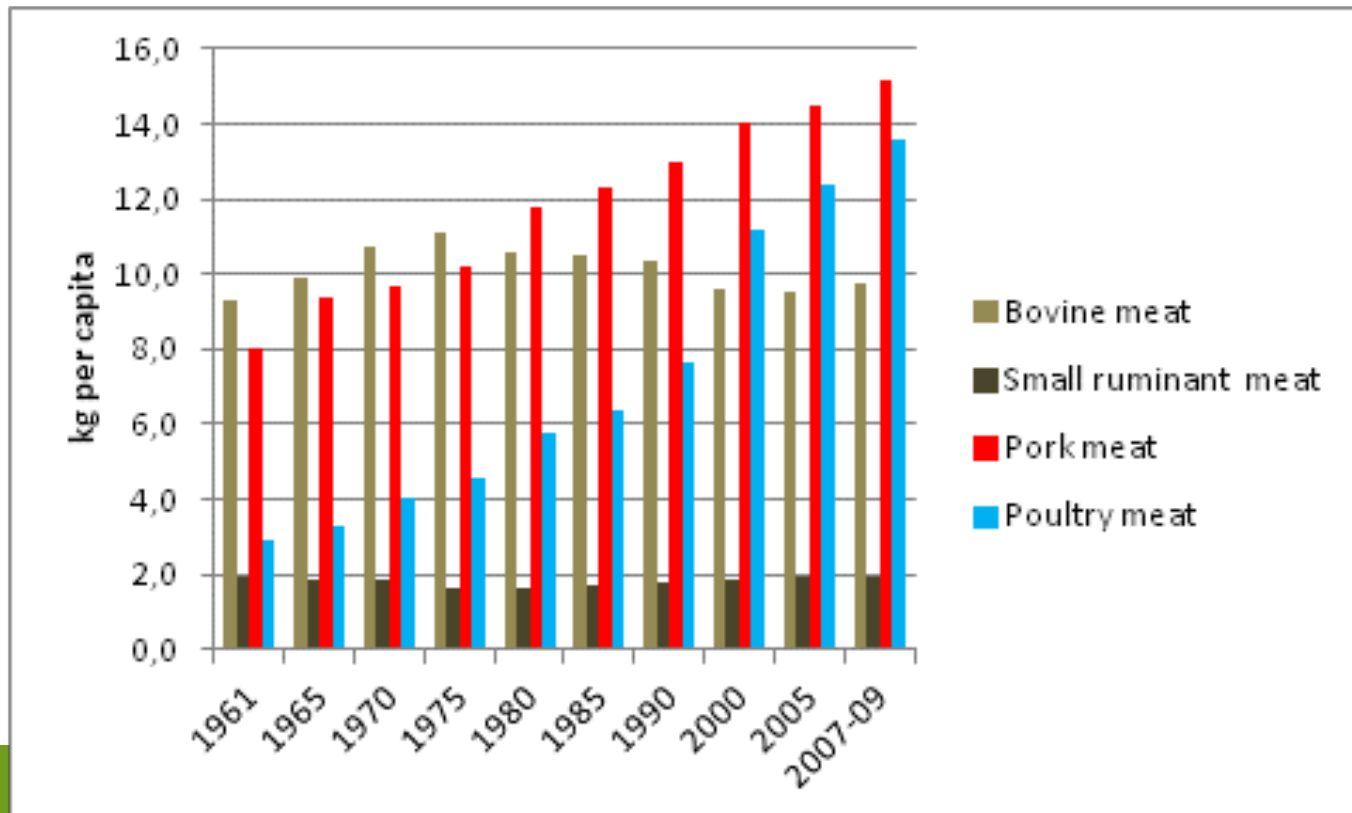
Poultry meat: strong increase in USA/Can., Brazil/Arg., China; stagnation in EU-27



1. Changes in world meat per capita consumption over the last decades

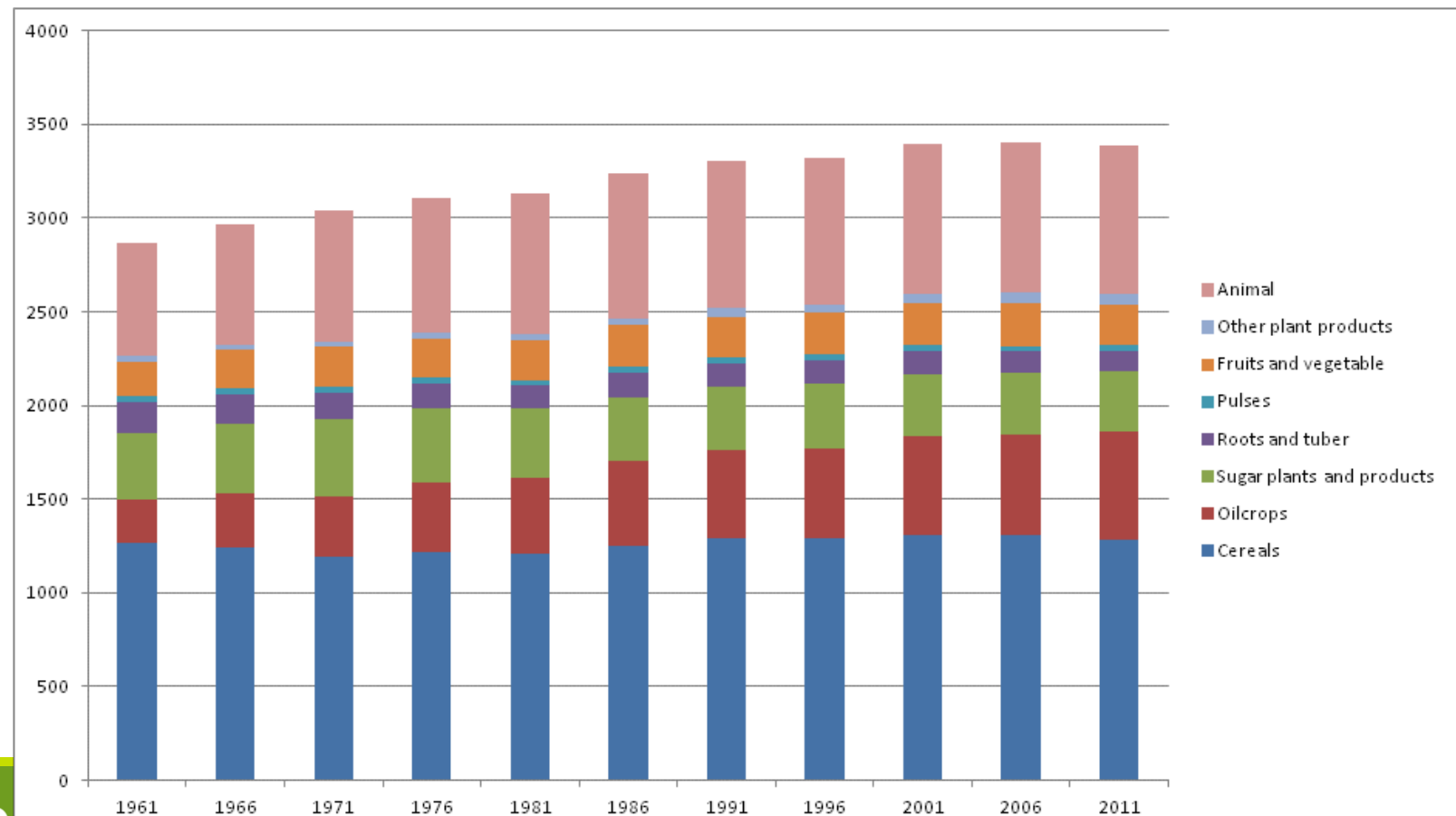
- World per capita consumption:

Stagnation for small ruminant meat; decrease for bovine meat; increase for pork meat; strong increase for poultry meat



1. Changes in food diets over the last decades

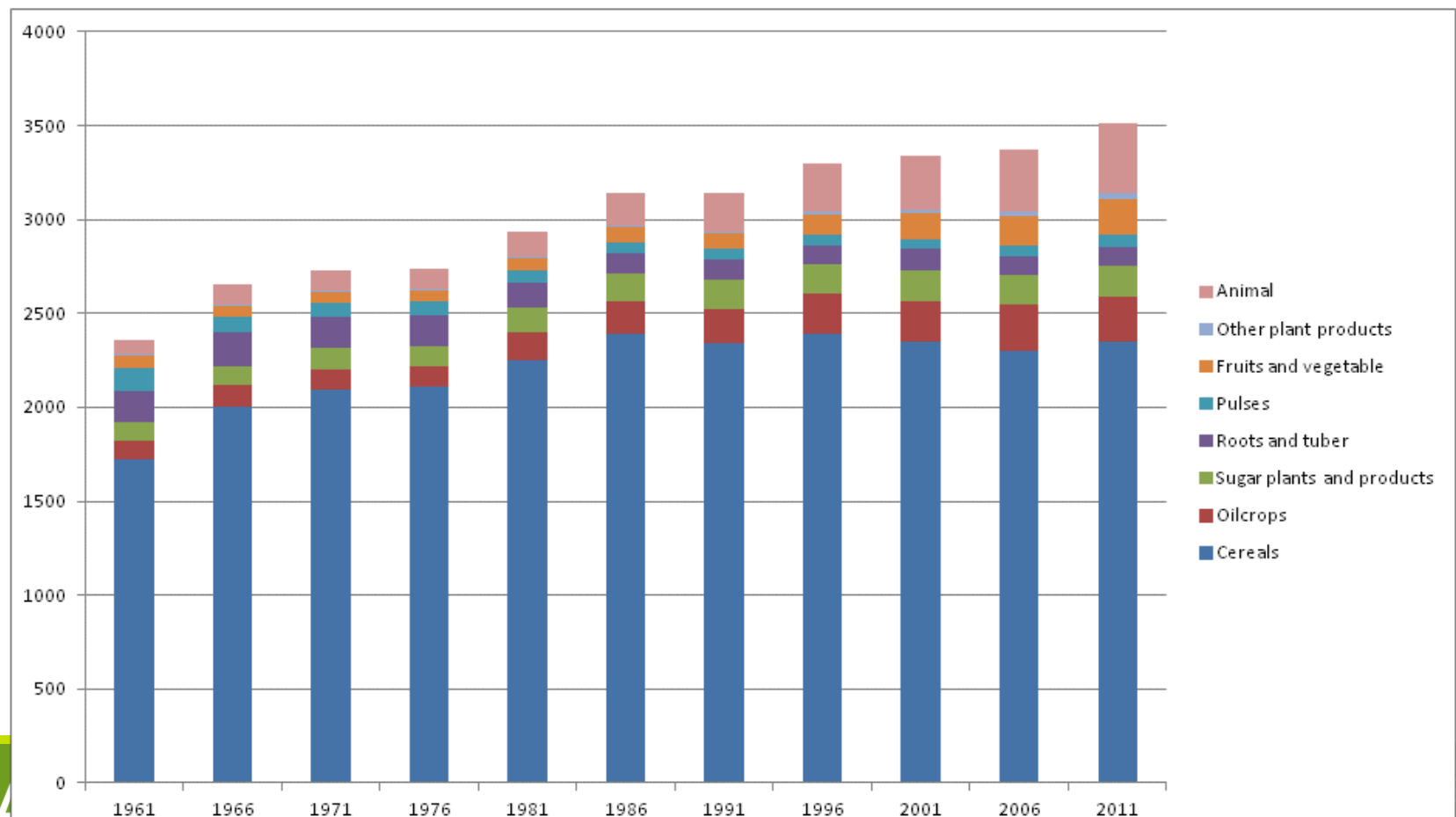
- Food availability (Kcal/cap/day):
OECD, increase in the share of animal products, stagnation over the last decade



1. Changes in food diets over the last decades

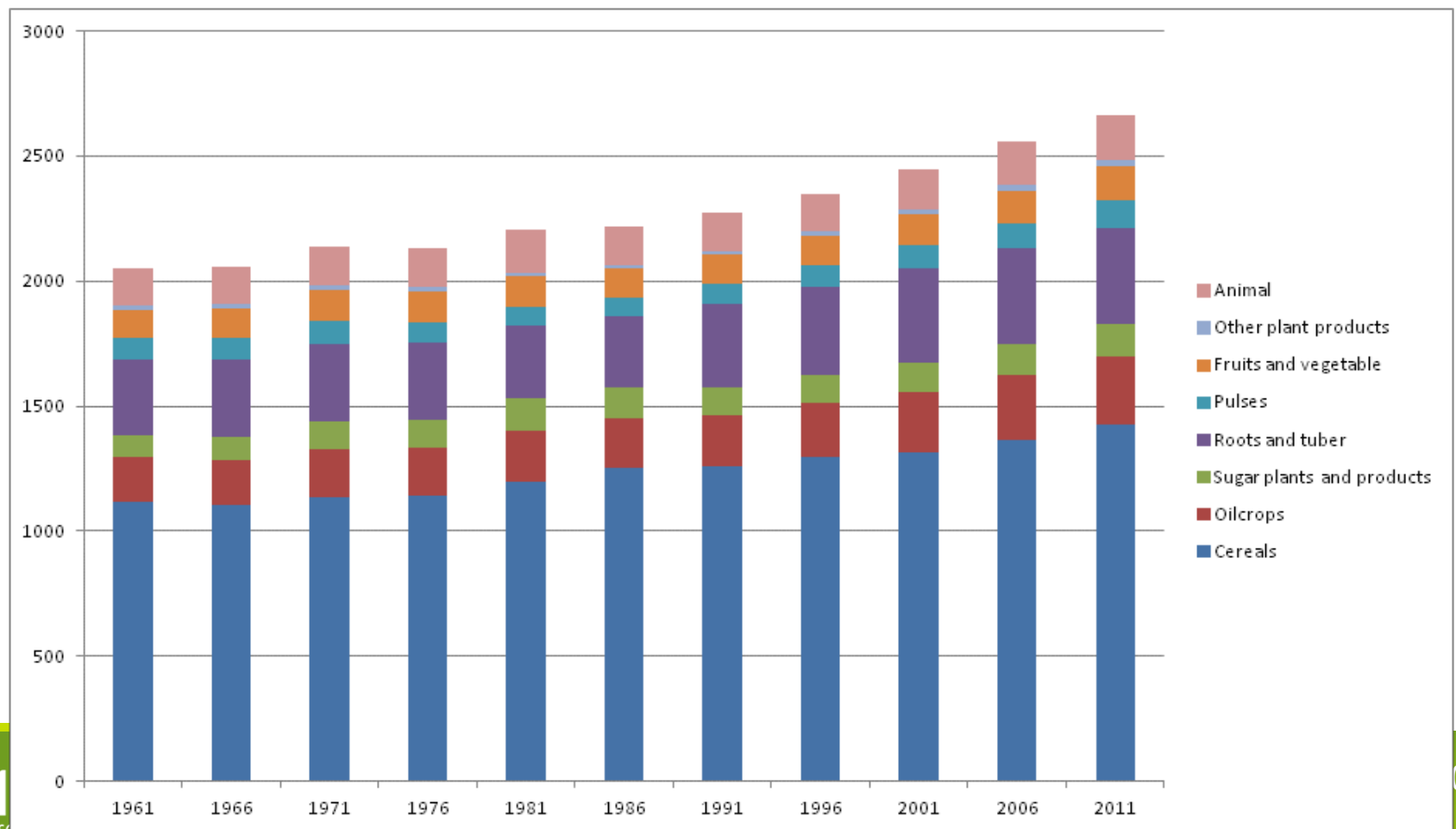
- Food availability (Kcal/cap/day):

Asia, strong increase in the share of animal products over the last decade



1. Changes in food diets over the last decades

- Food availability (Kcal/cap/day):
Sub-saharan Africa, stagnation of the share of animal products over the last decades

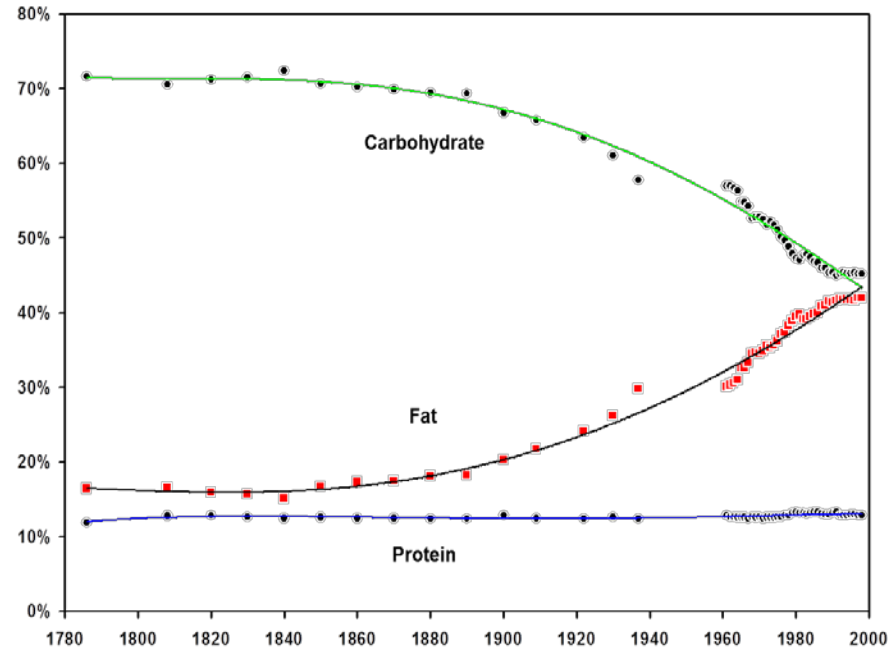
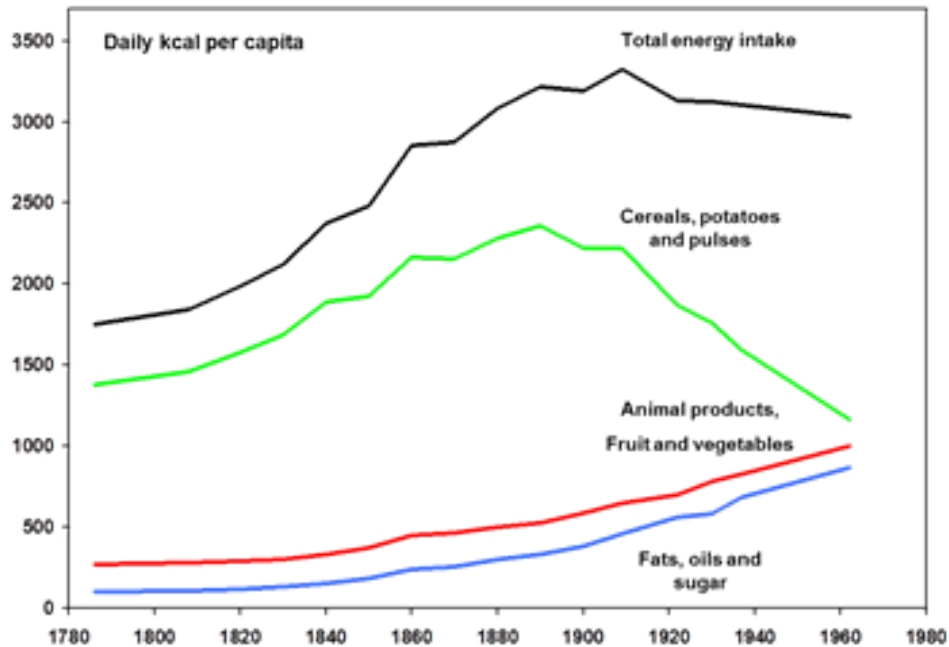


1. World meat consumption should continue to increase up to 2050

- Demography
- Nutrition transition:
 - increase in the calorie intake
 - decreasing shares of cereals, staple food and pulses
 - increasing shares of sugar, fats and oils, fruits and vegetable
 - increasing share of animal products
- Interrelated with change in income per capita-urbanization-change in food chains

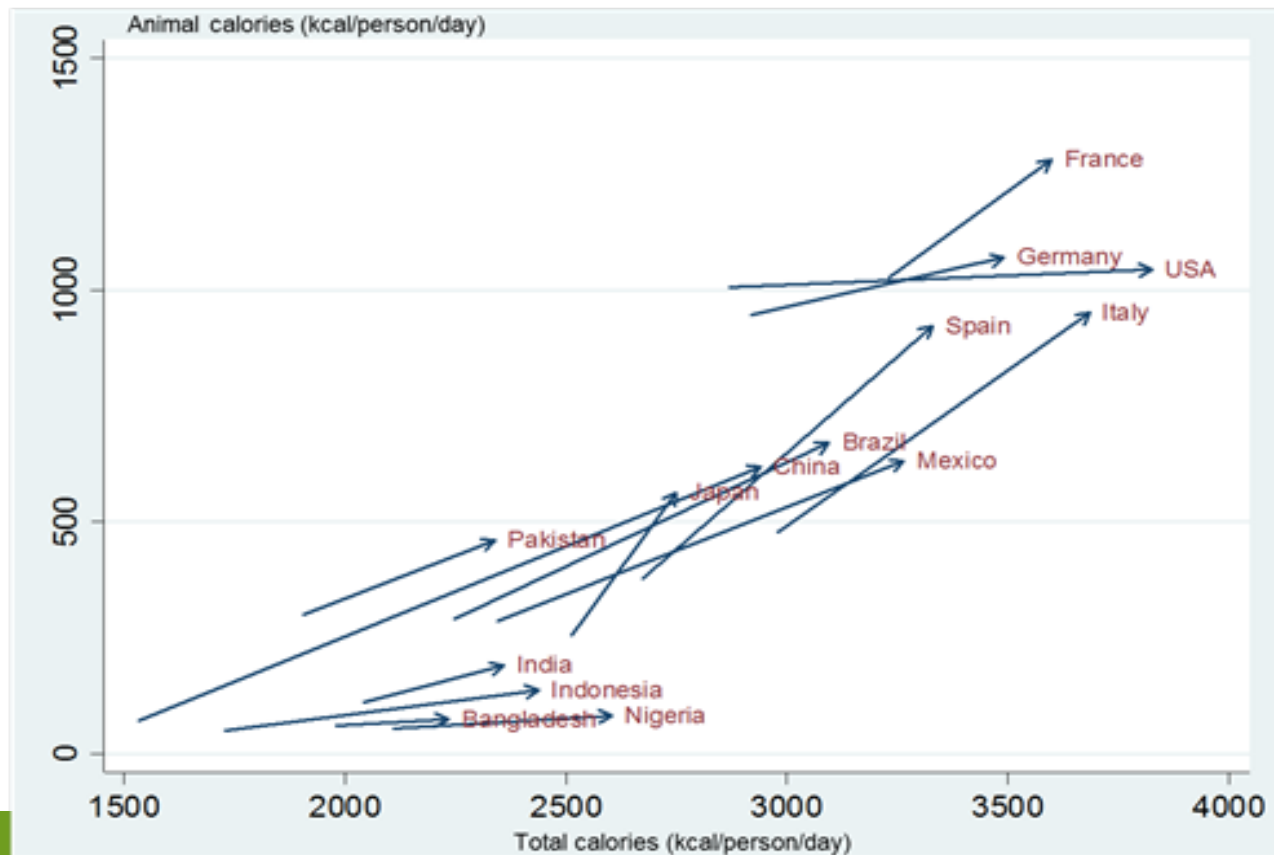
1. World meat consumption should continue to increase up to 2050

- Example of the nutrition transition process in France



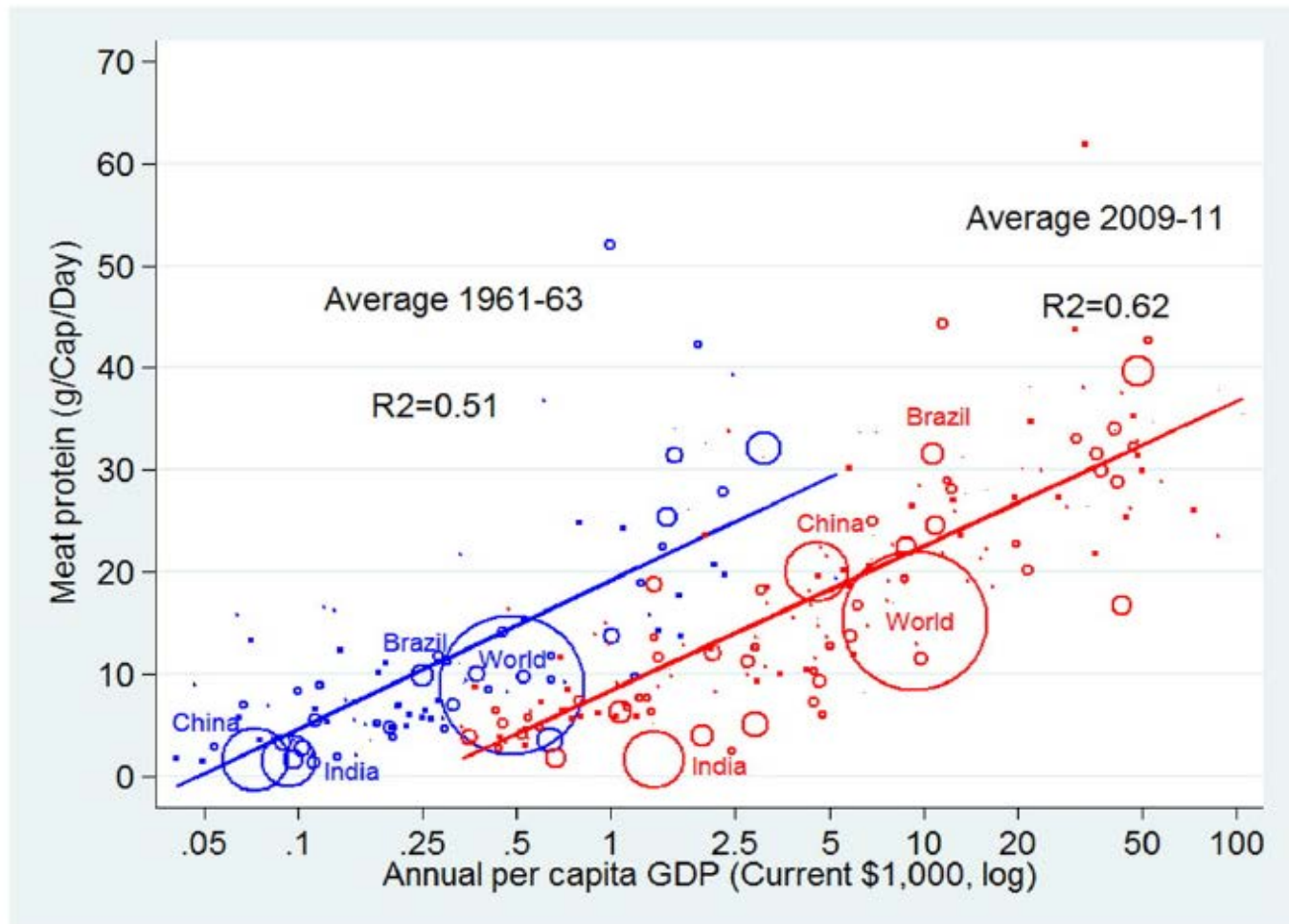
1. World meat consumption should continue to increase up to 2050

- Evolution of total calories and calories from animal products 1961-63 to 2003-05, various countries



1. World meat consumption should continue to increase up to 2050

- Change in protein from meat versus per capita GDP



2. Feeding the world: Reducing animal products consumption is part of the solution

- Inra-Cirad foresight « Agrimonde »

World		2003	Agrimonde GO	Agrimonde 1	
Utilizations	Population	6,2 Mds	9,1 Mds +47%		
	Cons.	kcal/hab/j	3000	3600 +20%	3000 convergence
		Share anim. Prod.	16%	23%	16% convergence
Resources	Cultivated area	+ 4 Mha/year	+ 23% + 7 Mha/year	+ 39% + 12 Mha/year	
			11% biofuels		
	Vegetal yields	+ 2% /year	+ 72% (+1,1% /year)	+ 4% (+0,1% /year)	

2. Feeding the world: Reducing animal products consumption is part of the solution

- **Agrimonde GO:**

- increasing consumption in all regions
- rising consumption of animal products in all regions
- increasing vegetal yields in all regions
- increasing cultivated land in all regions

- « industrial » model of agriculture
- increasing local and global environmental problems

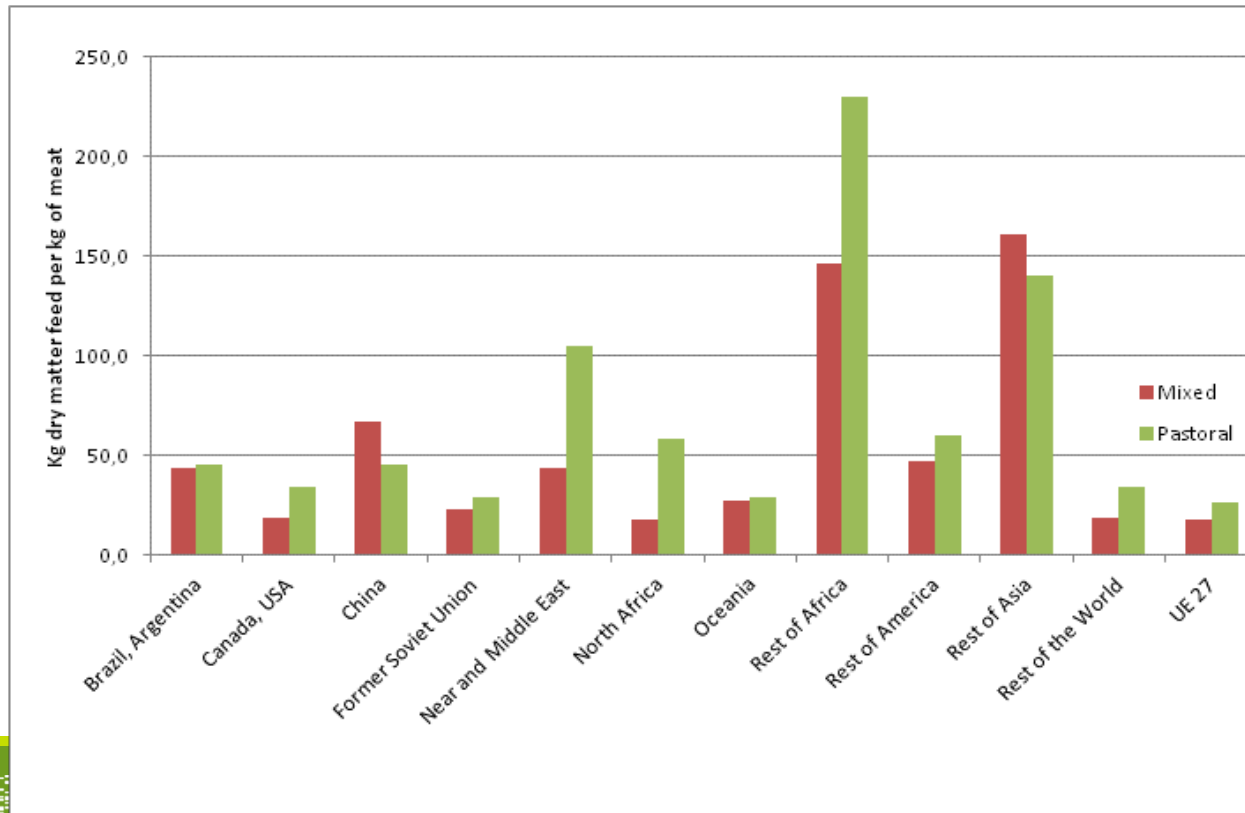
2. Feeding the world: Reducing animal products consumption is part of the solution

- **Agrimonde 1:**

- consumption decreases in OECD and MENA, is unchanged in LAM and FSU, increases in Asia and Sub-saharan Africa
- animal products consumption decreases in OECD and LAM, increases in MENA, Asia and Sub-saharan Africa
- food losses and wastes are reduced
- global needs in food calories: -30% wr.t Agrimonde GO
- moderate increase in vegetal yields
- increase in cultivated land to the detriment of pasture land
- « ecological intensification » model of agriculture
- decreasing pressure on resources and the environment
- significant increase in world trade in AG1 relative to AGO

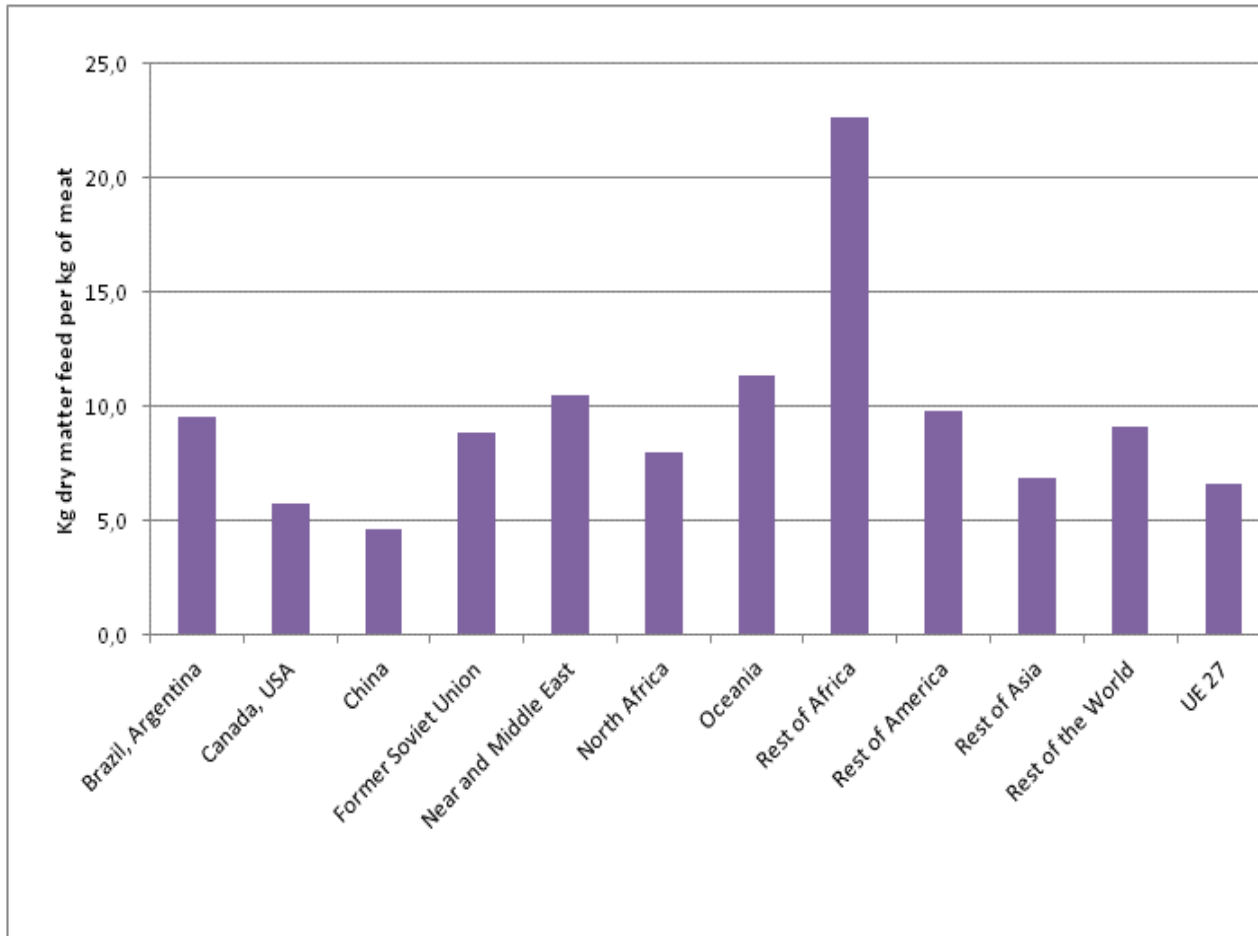
3. Feeding the world: There are other levers that could be used

- Feed conversion ratios are significantly different across regions
- Less heterogeneity for monogastrics than for ruminants
- There is room for improving livestock efficiency in some regions



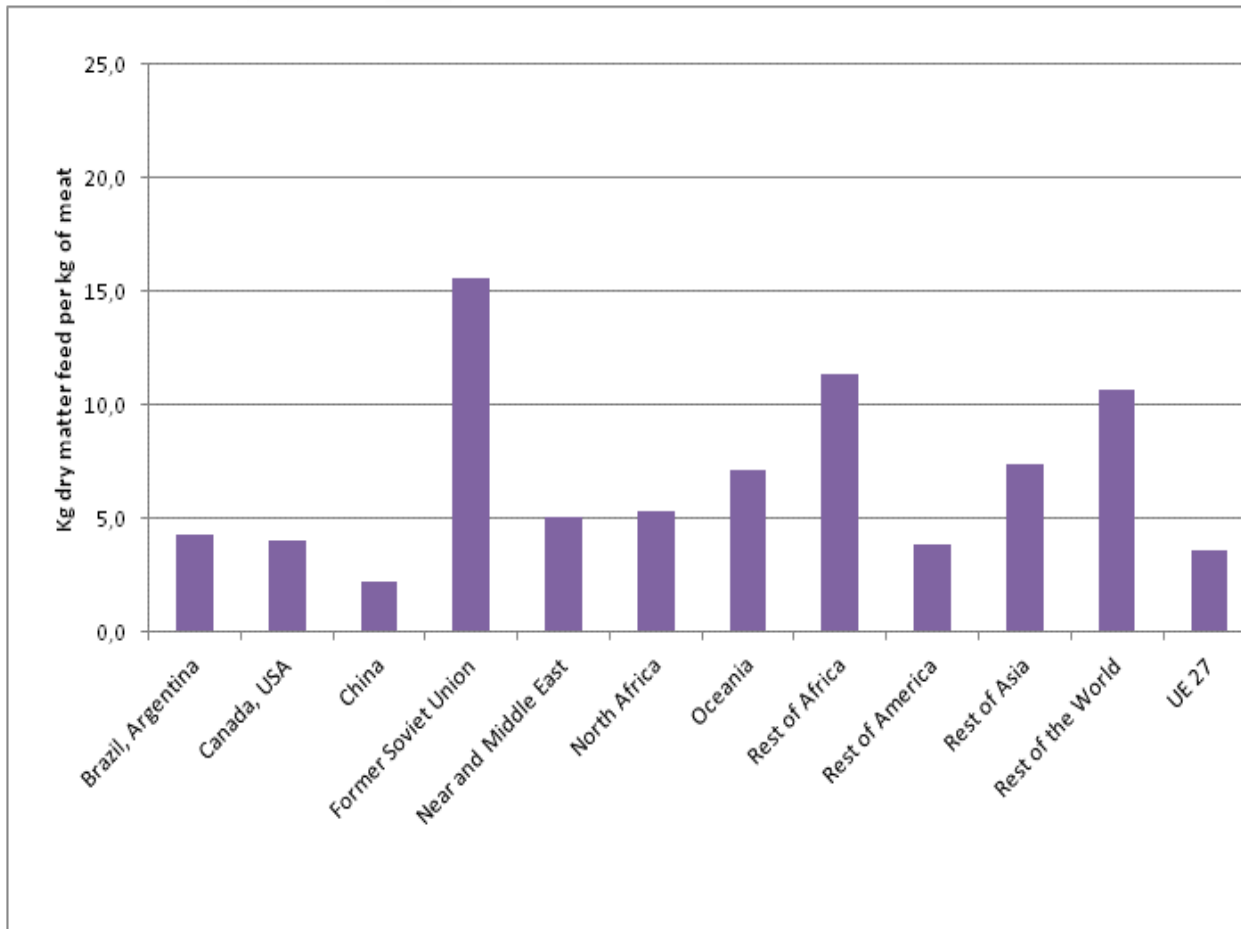
Bovine meat

3. Feeding the world: There are other levers that could be used



Pork meat

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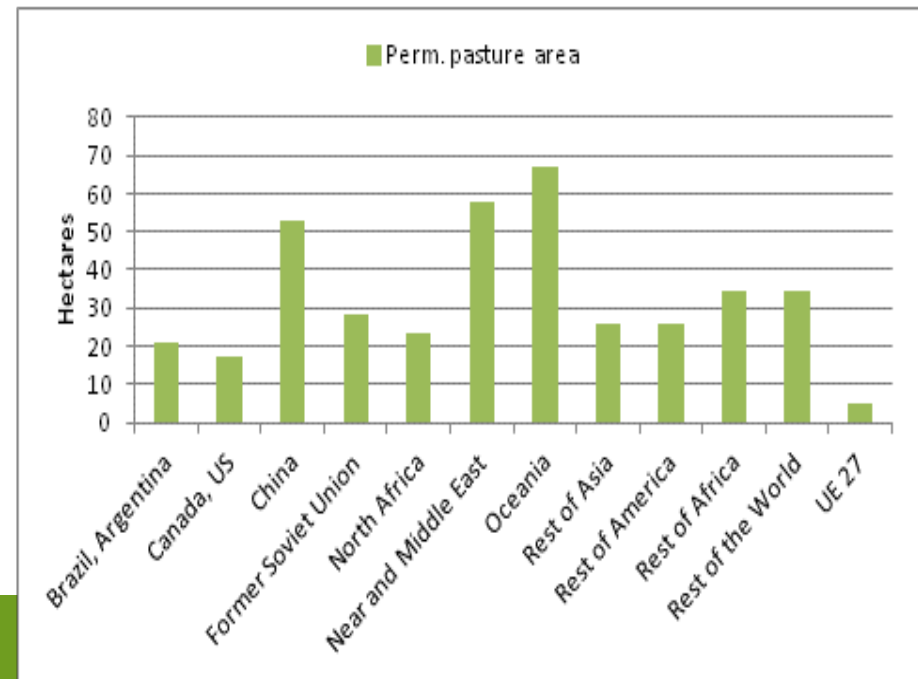
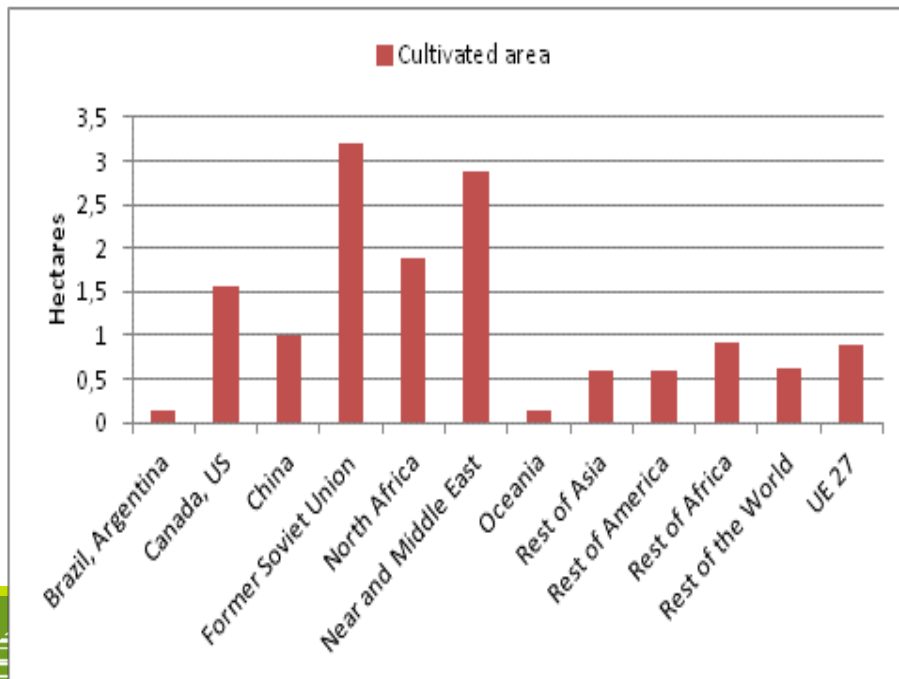


Poultry meat

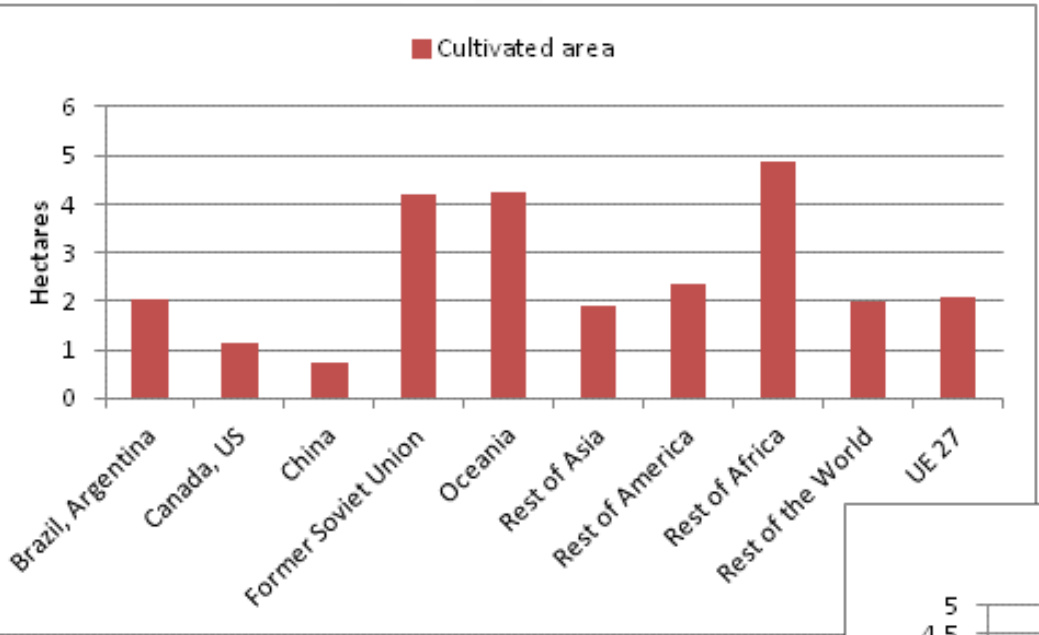
3. Feeding the world: There are other levers that could be used

- The land footprint of meat consumed in the various regions of the world:
 - additional hectares in the world induced by 1 T more consumed in one region
- Different from the land footprint of meat produced: role of imports
- Indicator for the pressure on land induced by meat consumption

Bovine meat

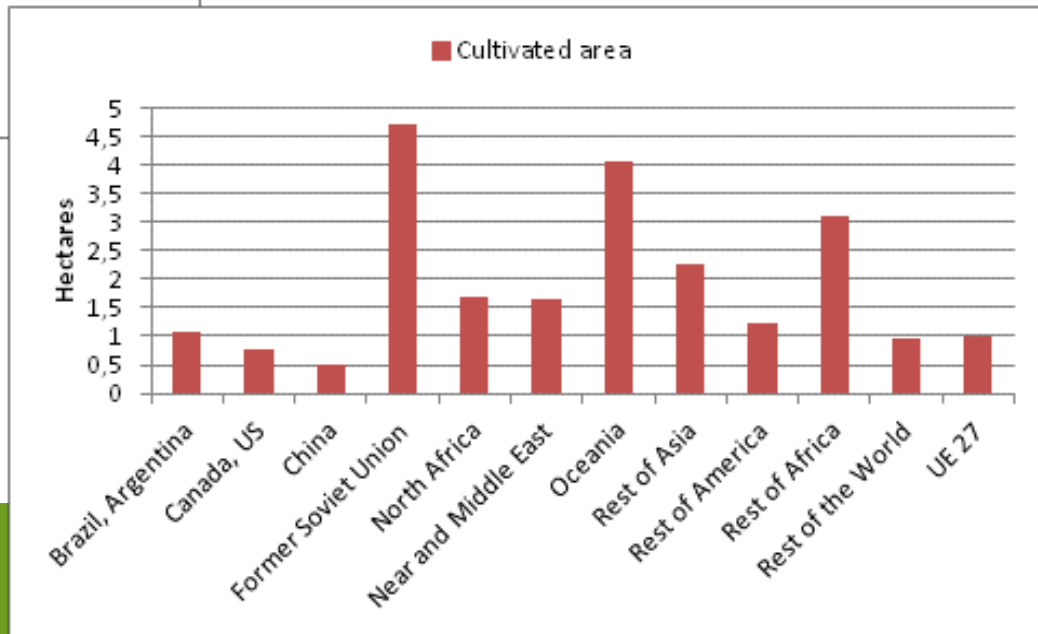


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Poultry meat

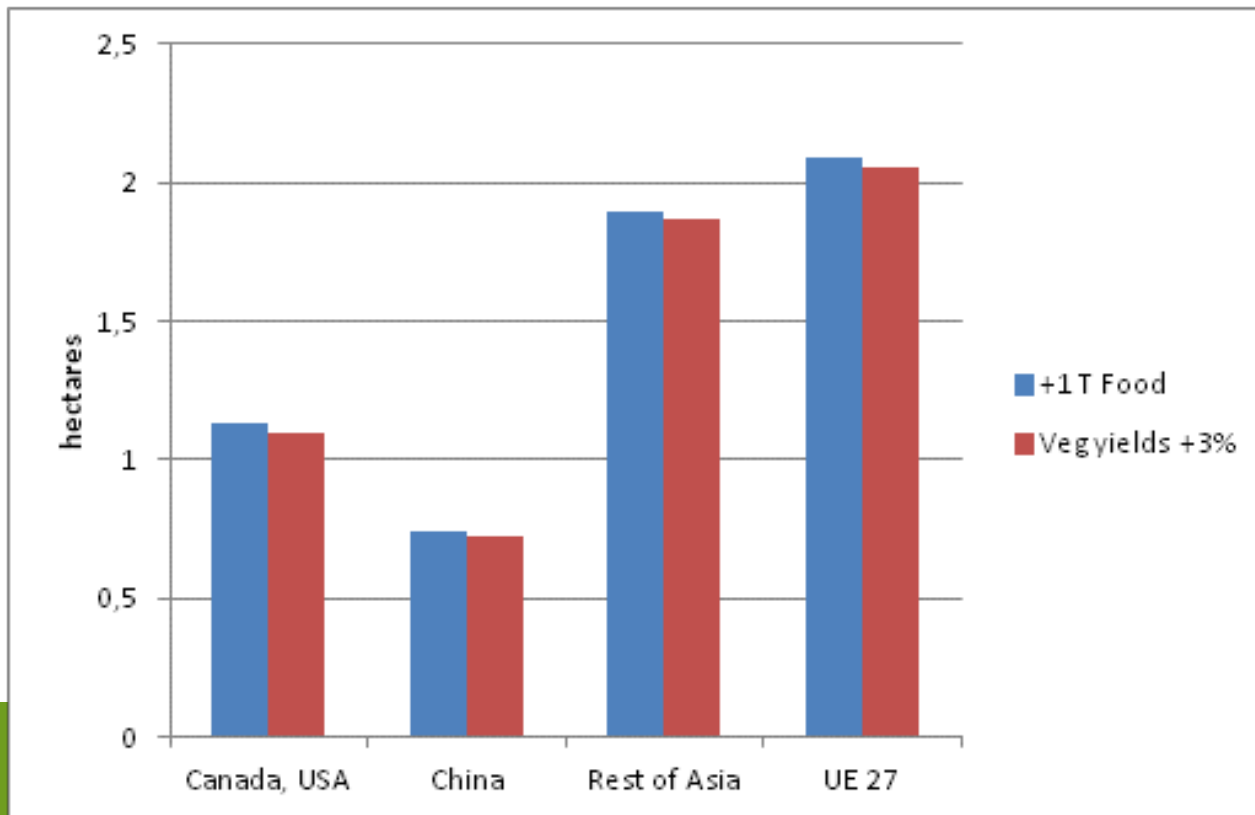
Pork meat



3. Feeding the world: There are other levers that could be used

- The land footprint of meat consumed is sensitive to vegetal yields
- Increasing vegetal yields contributes to decrease the land footprint of meat

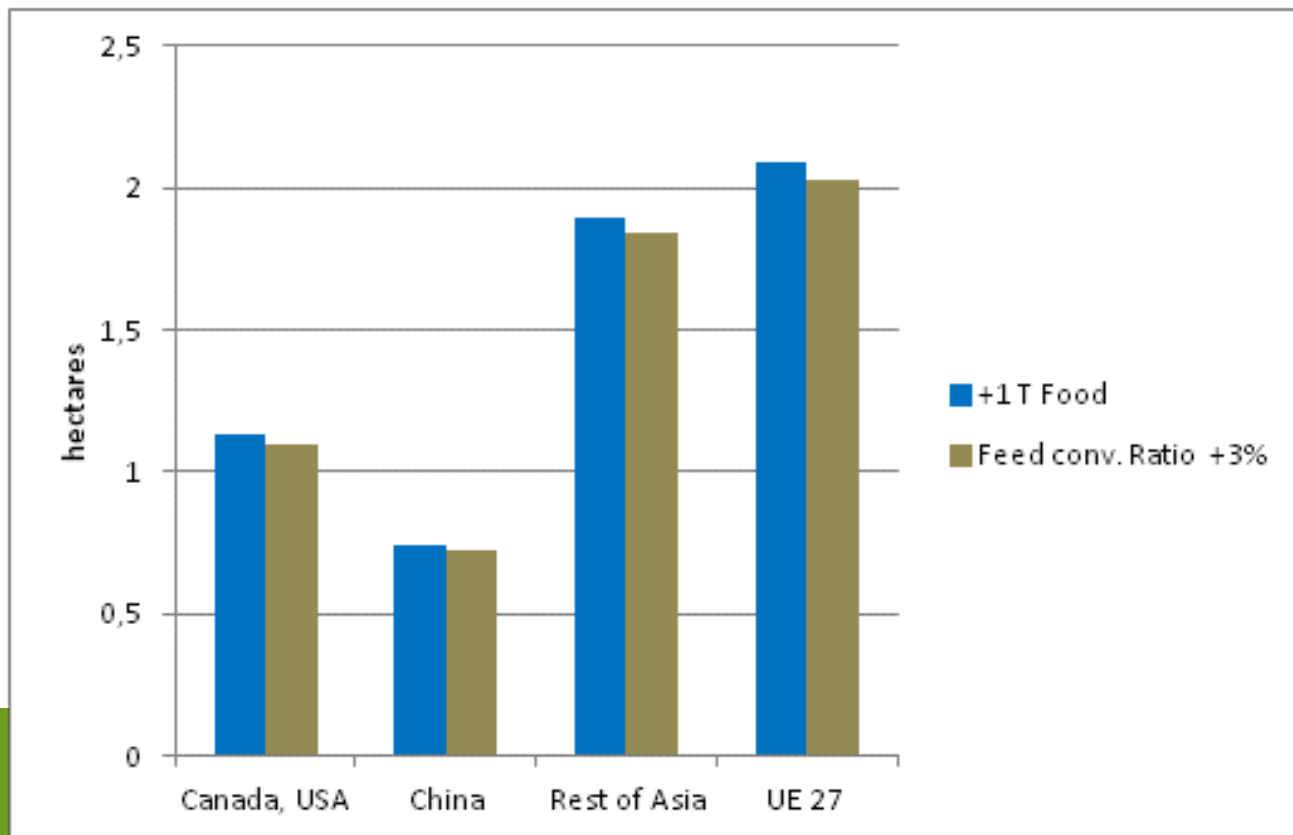
Illustration: land footprint of pork meat consumed in the main producing countries



3. Feeding the world: There are other levers that could be used

- The land footprint of meat consumed is sensitive to feed conv. ratios
- Improving livestock efficiency contributes to decrease the land footprint of meat

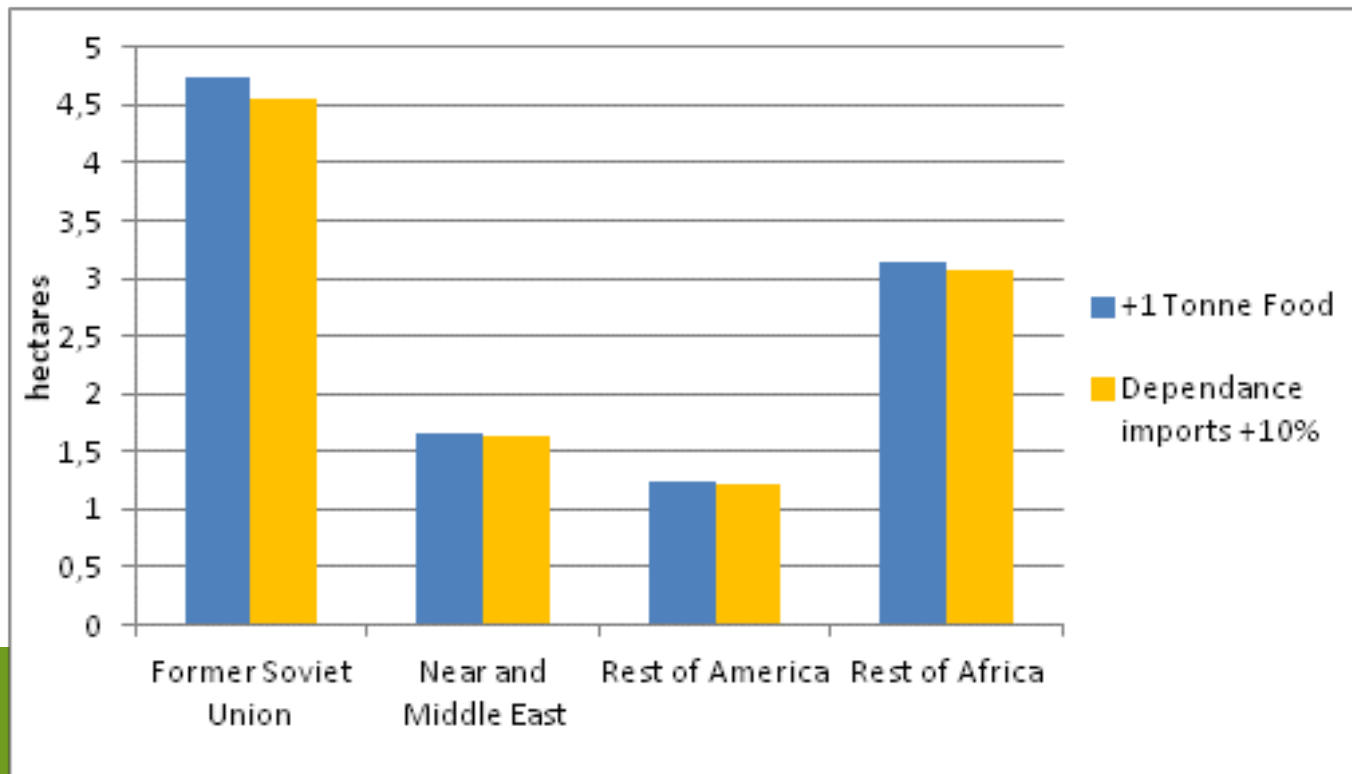
Illustration: land footprint of pork meat consumed in the main producing countries



3. Feeding the world: There are other levers that could be used

- The land footprint of meat consumed is sensitive to dependence to imports coefficients
- Increasing the share of imports in total domestic use contributes to decrease the land footprint of meat consumed in less efficient producing countries

Illustration: land footprint of poultry meat consumed in the main importing countries



Concluding comments

- Feeding the world in a sustainable way:
 - reducing meat consumption is part of the solution when dealing with calories
 - meat are also important source of proteins and other nutritional elements
 - livestock production provides additional services
- Increasing efficiency of animal production, while limiting its negative environmental impact is also part of the solution
 - vegetal yields, feed conversion ratios, but also international trade may contribute

Concluding comments

- Don't forget that:
 - reducing waste and losses along the whole food chain
 - limiting the expansion of first-generation biofuelsare also both part of the solution