Livestock in the developing world

Searching for sustainable solutions

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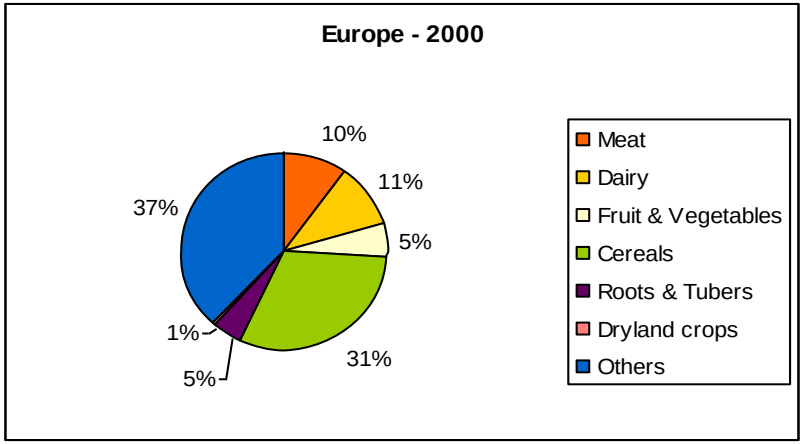
Livestock – the big numbers

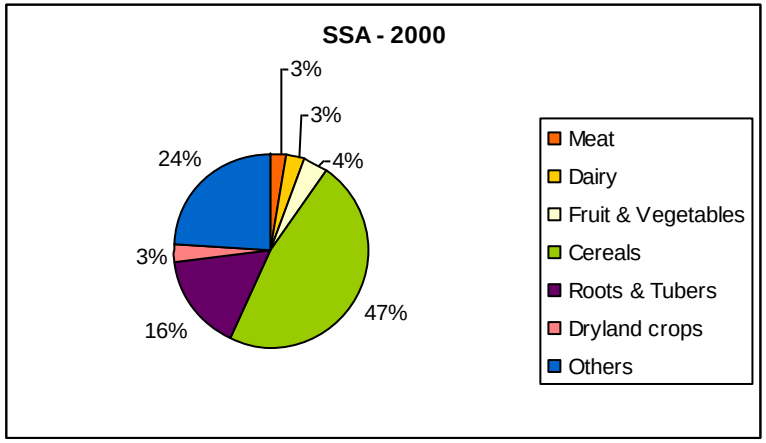
- 17 billion domestic animals globally! (SOFA 2009)
- 30% of the Earth's ice-free surface occupied by livestock systems (Reid et al 2008)
- 1/3 of global cropland used for feed production
- 8-18% of GHG emissions
- 72% of deforestation (Nepstad et al 2011)
- 32% of global freshwater consumption (Heinke et al, forthcoming)

Public perception rarely acknowledges livestock's socio-economic roles

Livestock and nutrition

- Livestock products contribute to 17% of the global kilocalorie consumption and 33% of the protein consumption (FAOSTAT 2008) – Africa 8% of calories
- Providers of food for at least 830 million food insecure people (Gerber
- Significant global differences in kilocalorie consumption but… highest rates of increase in consumption of livestock products in the developing World





Herrero et al 2008a

Livestock's economic benefits

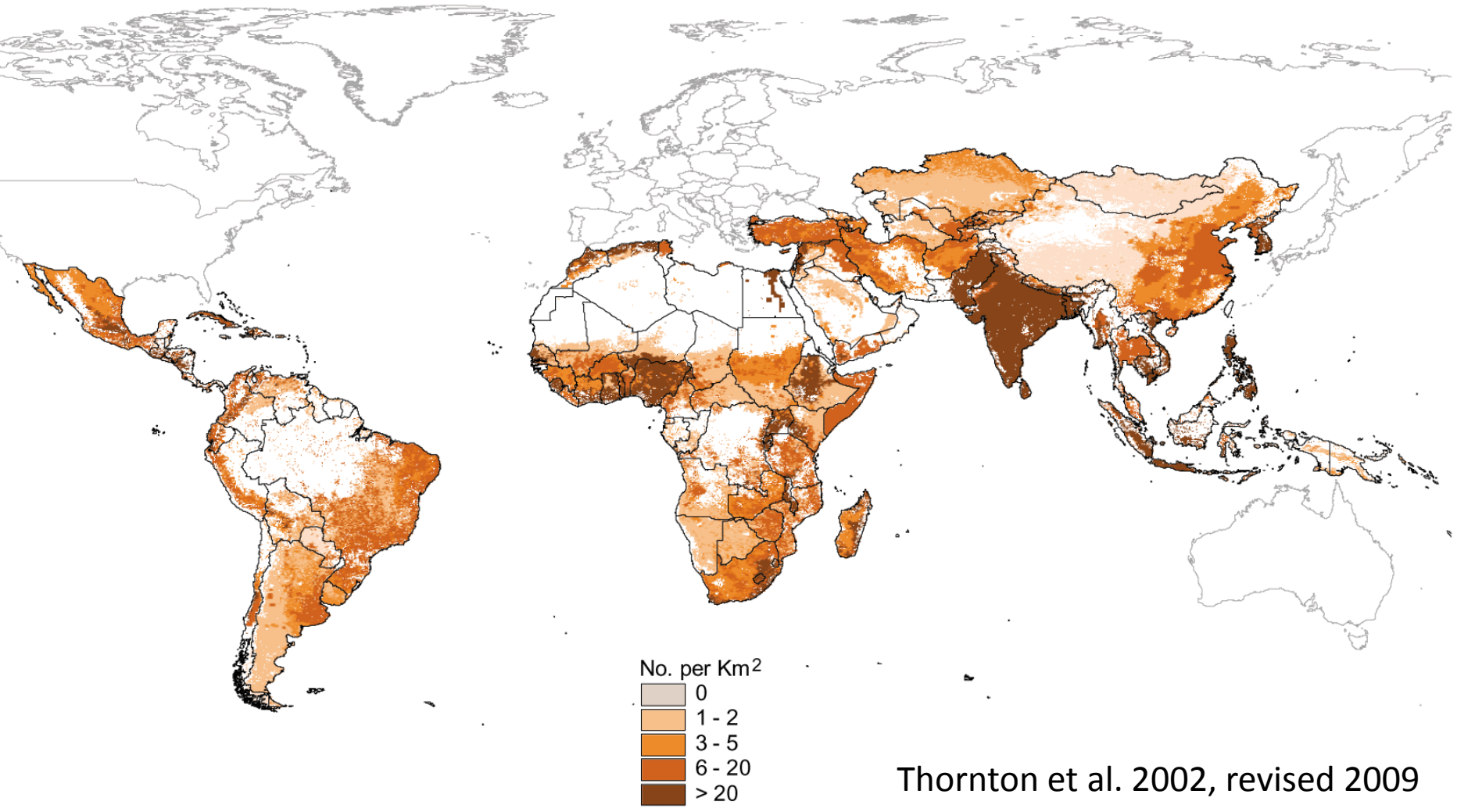
- Livestock are a significant global asset: value of at least $1.4 trillion (excluding infrastructure that supports livestock industries) (Thornton and Herrero 2008)

- Livestock industries organised in long market chains that provide incomes and/or employ at least 1.3 billion people (LID 1999)

- Livestock GDP: 20-40% of agricultural GDP

- Livestock as a risk management tool, especially for the poor

At least 600 million of the World's poor depend on livestock



Thornton et al. 2002, revised 2009

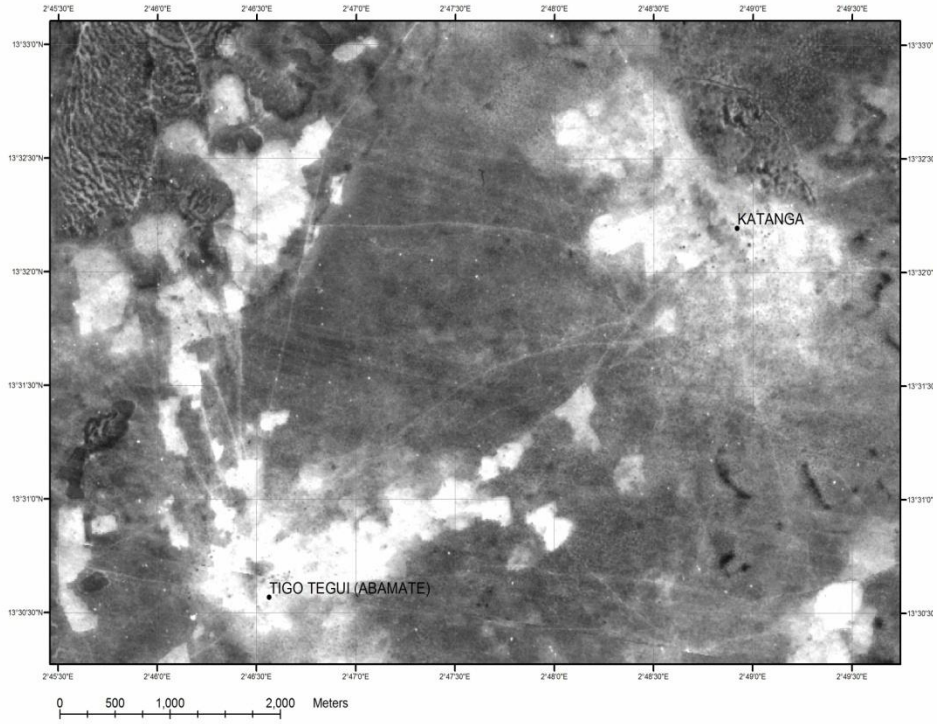
The demand for livestock products to 2050

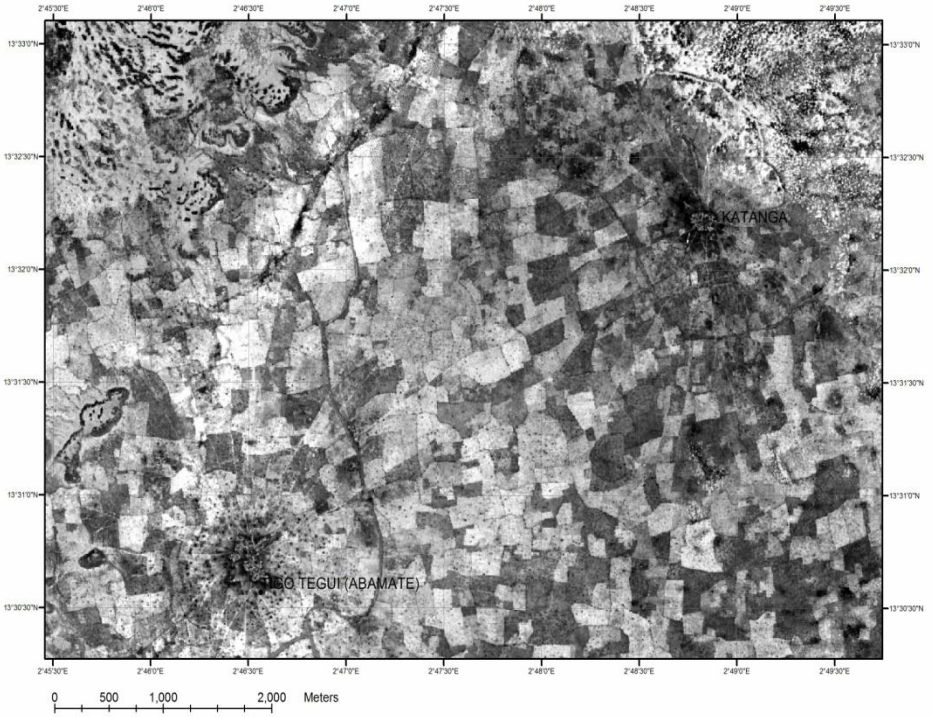
		Annual per capita consumption		Total consumption	
	year	Meat (kg)	Milk (kg)	Meat (Mt)	Milk (Mt)
Developing	2002 2050	28 44	44 78	137 326	222 585
Developed	2002 2050	78 94	202 216	102 126	265 295

Rosegrant et al 2009

What role for livestock in the future?
Systems and livelihoods in transition: the target is moving!

W. Africa 1966 – pastoral system → 2004 – crop-livestock system





Herrero et al 2009

Will we be able to feed 9 billion people if current trends continue?

- YES…..but at different social and environmental costs in different regions
- More food trade
- Increases in prices
- More land expansion, some intensification
- We will not meet key environmental goals if current trends continue (reducing greenhouse gas emissions, reducing deforestation, managing water)

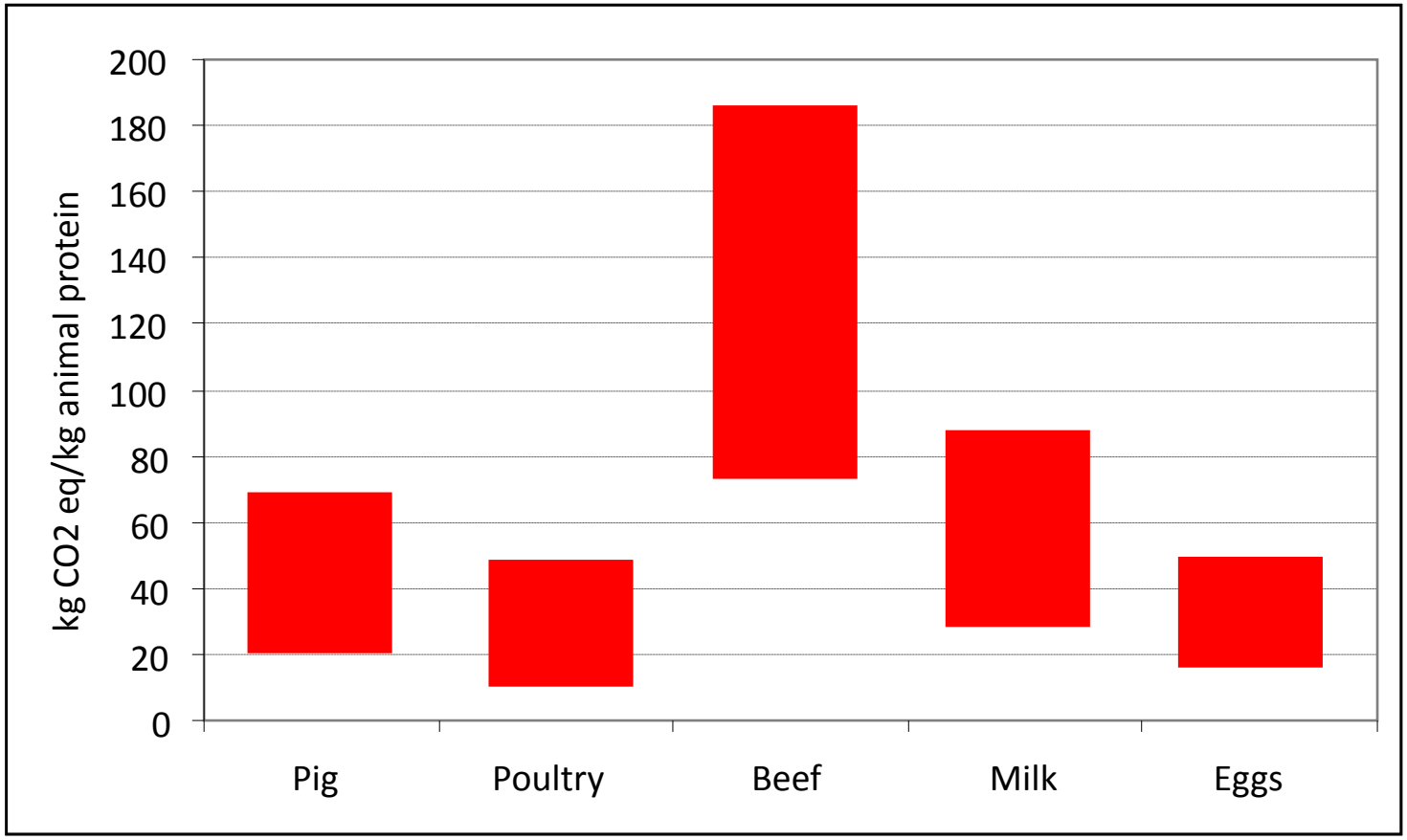
Managing livestock product demand

….towards sustainable diets?

To eat or not to eat…..meat?

- A duality
- Health problems in the developed world but need for nourishment in the developing world
- How can we differentiate this message?
- Most assessments show that reducing meat consumption could have a very positive impact on the environment
- ….but no assessment has shown what the social, economic and nutritional impacts would be, especially in the developing world

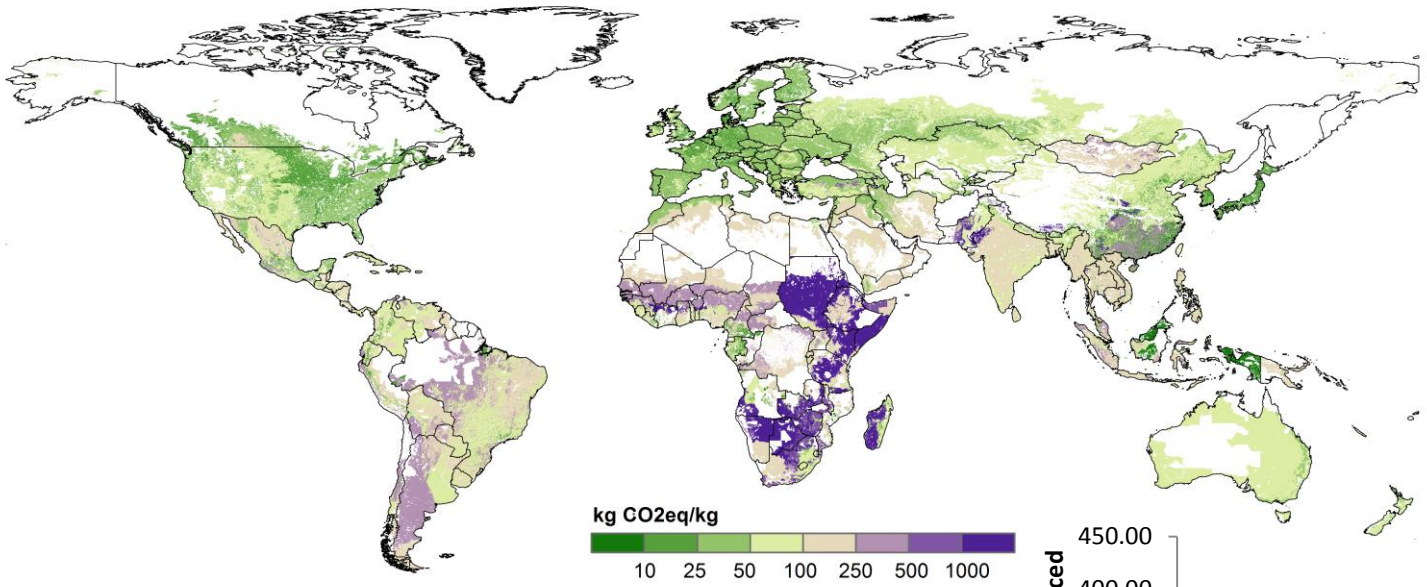
Range of GHG intensities for different livestock products

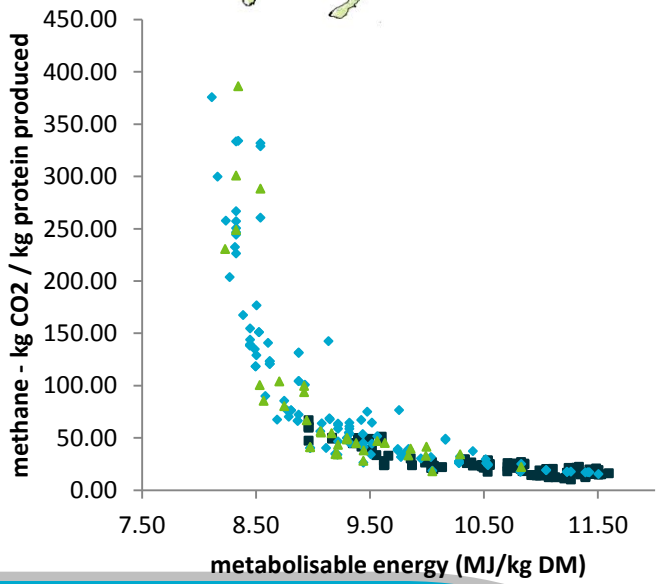


Source: DeVries & DeBoer (2008)

Is sustainable intensification a win – win solution for livelihoods, food security and the environment?

Global greenhouse gas efficiency per kilogram of animal protein produced





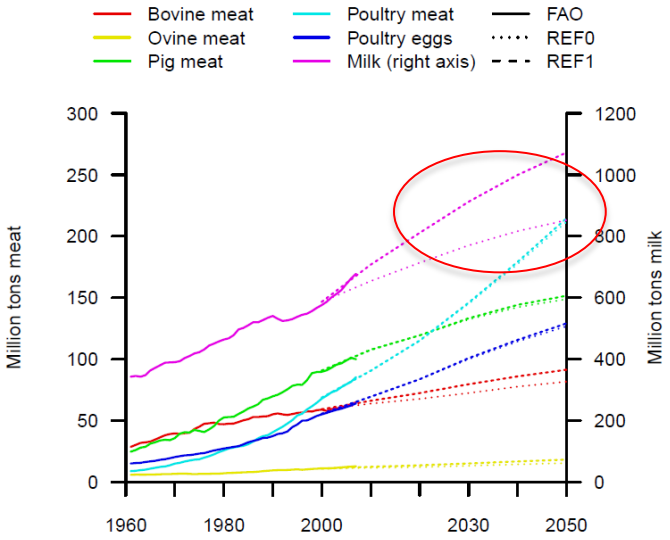
Large inefficiencies in the developing world – an opportunity?

Herrero et al PNAS (2013)

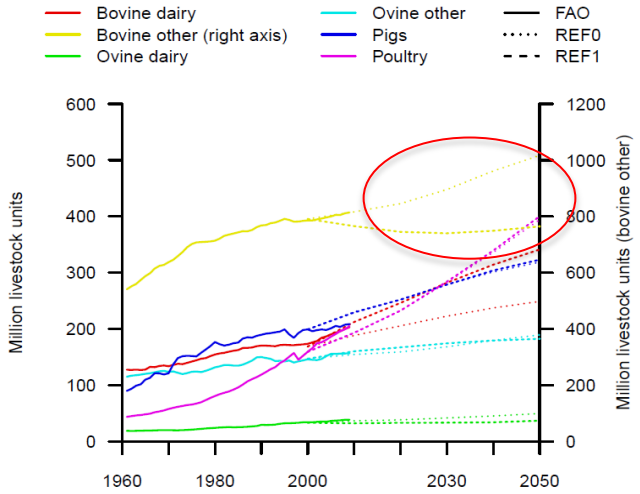
Impact of alternative feeding strategies on milk, manure and methane production (% change) (Bryan et al 2013)

District	Scenario	Milk production	Manure production	Methane production	Methane per kg milk
Garissa	Prosopis				
	1.5 kg	64	0	-2	-40
	3 kg	136	0	-5	-60
Gem	Desmodium				
	1 kg	21	5	-3	-20
	2 kg	36	10	0	-26
Mbeere	Napier grass				
	2 kg	12	11	3	-8
	3 kg	17	16	2	-12
Njoro	Hay				
	1 kg	18	-5	6	-10
	2 kg	49	-5	18	-21
Mukurweni	Desmodium				
	1 kg	9	11	2	-7
	2 kg	8	11	0	-7
Othaya	Hay				
	2 kg	9	11	2	-7
	4 kg	8	11	0	-7
Siaya	Napier grass				
	2 kg	42	0	12	-21
	3 kg	79	10	16	-35
6 districts	Average	36	6	4	-20

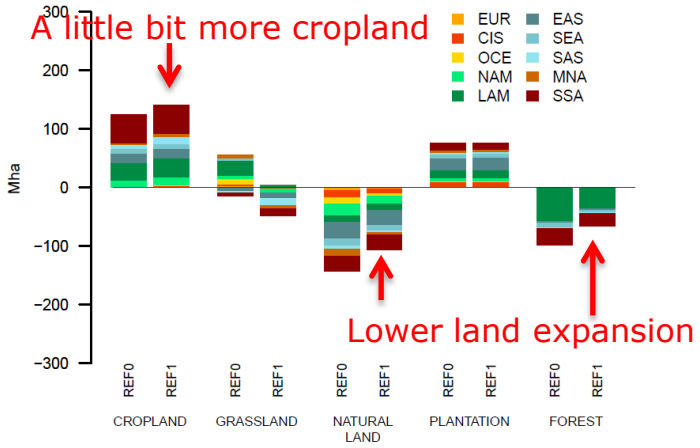
More milk production



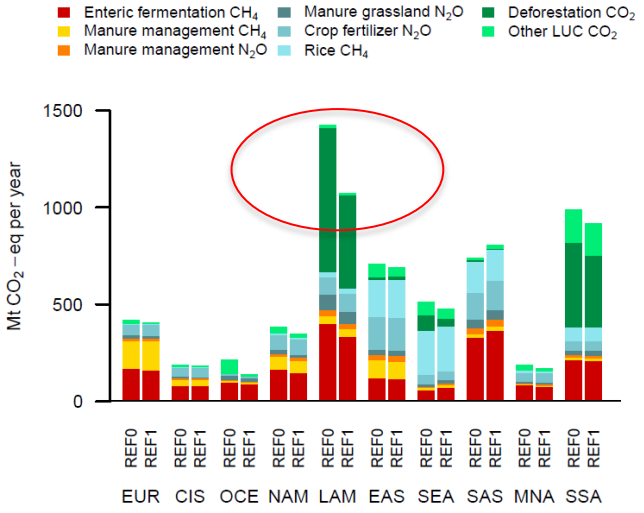
With less animals



Less land use change



Less GHG emissions



Havlik, Herrero et al PNAS (2014)

A few unresolved things….

Land consolidation vs growth and intensification of the smallholder sector

- Large commercial farms pro-efficiency (foreign capital investment)
- Smallholder development possibly more pro-poor
- Smallholders: low opportunity cost of labour
- Do diversified smallholder farms promote more biodiversity and better management of ecosystems services?
- Smallholder sector fragmented: what actors are needed to support it?

What role for rangelands?

Largest land use system

Increasingly fragmented

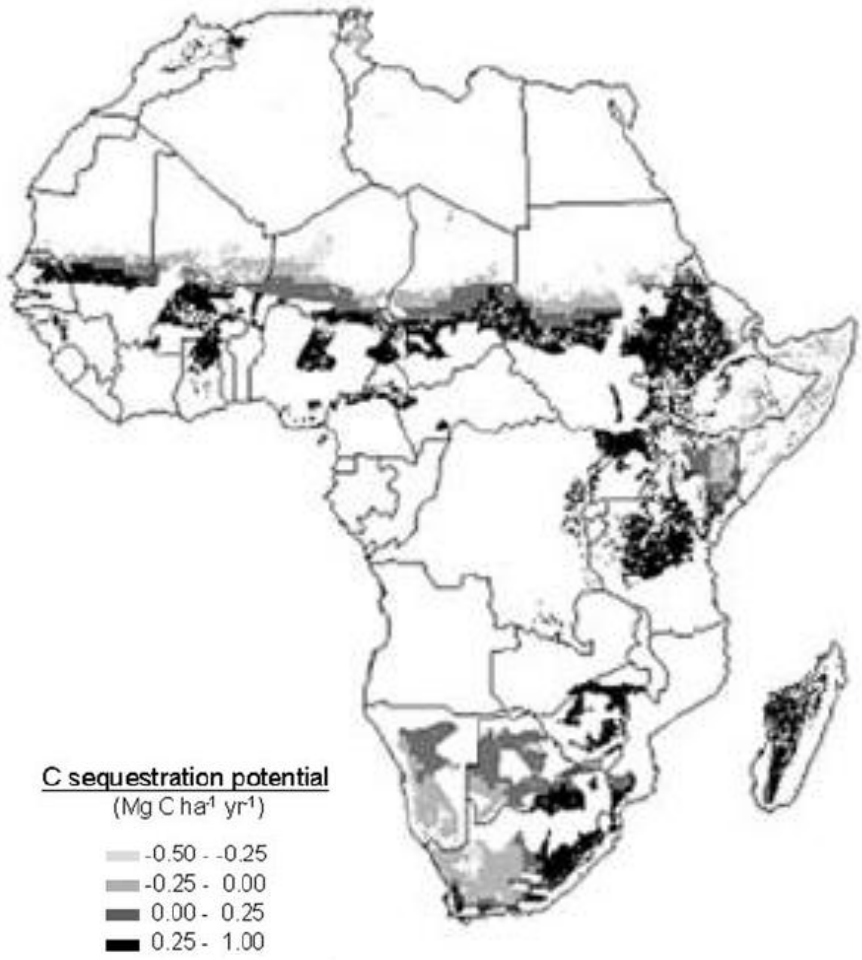
Custodians of many ecosystems services

Potentially a large C sink

Difficulties in:
Measuring and monitoring C stocks

Establishment of payment schemes

Dealing with mobile pastoralists



Potential for carbon sequestration in rangelands (Conant and Paustian 2002)

Livestock yield gaps

- Principles for improving productivity simple
- We do not know enough at global level to make informed decisions on productivity increases: synthesis needed!
- Essential to increase our understanding of productivity and production gains
- How do we upscale technology?
- Incentives for adopting best practices? Markets? Services?
- What is the magnitude of the investments required?

Breakthroughs and surprises

- Biotechnology: how much can we really alter technological change through biotechnology?
- How do we disseminate these technologies?
- Information technology
- Communications
- others

Some conclusions

- Can we feed 9 billion people? yes, we can by doing the right things
- Livestock research could have an enormous role, especially in the developing world
- We need to change investment paradigm and also start investing in the systems of the future
- Bridging yield gaps: Technology could play a key role but we need a better understanding of incentives (markets and provisions of services, amongst others)

Thank you

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