

Sustainability in the meat chain and the FAO Life Cycle Assessment

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Overview



- Background current patterns of production and future trends
- Measuring the sustainability of livestock
- Livestock Benchmarking Partnership

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Importance of livestock



- Food security and nutrition
- Economic development
- Broader social value
- Intimate relationship with the environment costs and benefits

"Satisfying the growing demand for animal food products while at the same time sustaining the productive assets of the natural resource base – soil, water, air, biodiversity – and coping with climate change and vulnerability"

Pingali and McCullough (2010, p9)

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Global food consumption patterns are changing



- Demand-side drivers:
 - Rising incomes
 - Demographic shifts (increasing urbanisation, female employment etc.)
- Supply-side drivers:
 - Technology (supply-chain management, packaging etc.)
 - Trade liberalisation

Pingali and McCullough (2010, p6)

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Food consumption (kcal/person/day)





Source: Alexandratos, 2011

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Undernourishment



	million				prevalence (percentage)			
	2005-07	2015	2030	2050	2005-07	2015	2030	2050
Developing countries	827	687	543	318	15.9	11.7	7.9	4.1
Sub-Saharan Africa	201	195	180	119	27.6	21.4	14.5	7.1
Latin America	47	38	28	18	7.4	6.0	4.7	3.4
Near East / North Africa	32	30	29	25	8.5	6.3	4.1	2.5
South Asia	331	279	211	93	21.8	16.1	10.5	4.2
East Asia	216	143	94	62	11.0	6.8	4.2	2.8

Source: Bruinsma, 2011

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Per capita Meat Consumption (Kg/year)





Relationship between meat consumption and income, 2007



Meat consumption





- 2050 (million tons) (right scale)
- growth p.a. 1970-2007 (left scale)
- growth p.a. 2005/07-2050 (left scale)

Source: Alexandratos, 2011

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These trends raise many questions

- Will India stay below the meat consumption curve?
- How will Chinese agriculture restructure, and what are the implications?
- How should producers, consumers and Governments respond?

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JOINT RESEARCH CENTRE JRC Institute for Environment and Sustainability (IES) Institute for the Protection and Security of the Citizen (IPSC) Institute for Prospective Technological Studies (IPTS) EUROPEAN COMMISSION

Evaluation of the livestock sector's contribution to the EU greenhouse gas emissions (GGELS)

- Final report -

Administrative Arrangements AGRI-2008-0245 and AGRI-2009-0296



Greenhouse Gas Emissions from the

Dairy Sector A Life Cycle Assessment

THE PROTEIN PUZZLE

The consumption and production of meat, dairy and fish in the European Union





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C)

A never-ending love affair? The Guardian, 10/9/2011



The case for cutting meat consumption has never been more compelling. Yet we remain stubbornly addicted to big protein hits in animal form. Could that be about to change?



iving up meat 1970s style



already require an area of vegetation seven times the size of Europe to keep them in feed





Simon Fairlie

How can we inform the debate?

- Lots of suggestions how do we evaluate them?
- Need to be able to measure the performance of different commodities, systems etc in robust and comprehensible ways.
- Life-cycle analysis is one approach

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What is life cycle analysis

- LCA is a technique to assess the environmental aspects and potential impacts associated with a product, process, or service, by:
 - Compiling an inventory of relevant energy and material inputs and environmental releases
 - Evaluating the potential environmental impacts associated with identified inputs and releases
 - Interpreting the results to help you make a more informed decision

http://www.epa.gov/nrmrl/std/lca/lca.html

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Why use life cycle analysis?

- Avoids simply shifting the burden
- Provides an assessment of the total burden required for a product
- Allows analysis of where burdens are arising along supply chains
- So, should be able to:
 - Improve efficiency of production
 - Inform consumer choices
 - Enable more efficient policy-making

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Modelling

ArcGIS 9.3/10

0.05 degree resolution

How do we do an LCA?





Choices: scope

Impact categories

Global warming potential

Acidification potential

Eutrophication potential

Land use

Energy use

Land use

Abiotic resource use

	Activities in livestock production include:					
Pre-farm	Feed production					
	Manufacture of fertiliser and pesticides					
	Production of electricity and fuels					
	Buildings and equipment					
On-farm	Manure management					
	Grazing and pasture management					
	Enteric fermentation					
	On-farm energy use					
Post-farm	Transport of live animals to abattoir					
	Processing into basic commodities					
	Production of packaging					
	Transport to retail point					
	Transport from retail point					
	Food preparation					
	Waste disposal					

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FAO livestock LCA



- Specific objective: Produce estimates of <u>global GHG</u> emissions and emissions intensity for the following livestock sectors:
 - Dairy and beef cattle
 - Small ruminants
 - Buffalo
 - Pigs
 - Poultry
- Scope cradle to retail point.
- Predominant production systems.
- Main world regions and agro-ecological zones.

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Development of the model



- Quantifying current GHG emissions to date
- Want to start using the model to do other things, e.g.:
 - answer "what if?" questions
 - Developing other measures of performance, such as nutrient use efficiency

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Dairy cattle nitrogen use efficiency



Source: MacLeod et al (2011)

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Current activity

- Publication of reports for (a) beef and small ruminants, and (b) pigs and poultry.
- Launch of the multistakeholder Livestock
 Benchmarking Partnership



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Rationale for the Partnership

- Avoid short-termism <u>improvement in environmental</u> <u>performance</u> requires medium-long-term strategy (in addition to short-term responses)
- Improvement the consistency of approach
- Improved co-ordination and cost-effectiveness
- Balanced and objective multi-stakeholder
- Not the easy option, but ultimately we believe that complex issues require collaboration between different stakeholders.

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Core activities for years 1-3

- Activity C1: Development of sector-specific guidelines and methods for the LCA of GHG
- Activity C2: Development of a global feed GHG database
- Activity C3: Developing measures of the wider environmental performance of livestock
- Activity C4: Developing and implementing a communication strategy for the Partnership

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Concluding remarks



- Livestock production is an important industry has a profound impact on the wellbeing of people and the planet.
- Meeting increased demand needs to be accompanied by improvements in efficiency.
- Much scope for collaboration between private sector, public sector and NGO's

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References



FAO (2006) World agriculture: towards 2030/2050 Interim report

Alexandratos (2011) World food and agriculture to 2030/2050 revisited. In Conforti (2011) Looking ahead in world food and agriculture Rome : FAO

MacLeod, M., Gerber, P., Suntken, S., Powell, J. M., Vellinga, T., Tempio, G., Opio, C., Falcucci, A. and Gianni, G. (2011) 'Extending the Worldwide Life Cycle Assessment to Water, Nutrients and Biodiversity' Report prepared for The Netherlands Minister for Agriculture, Nature and Food Quality

Pingali, P. and McCullough, E. (2010) Drivers of change in global agricultural livestock systems. In Livestock in a Changing Landscape

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