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Specificity of environmental issues related to livestock in the tropics

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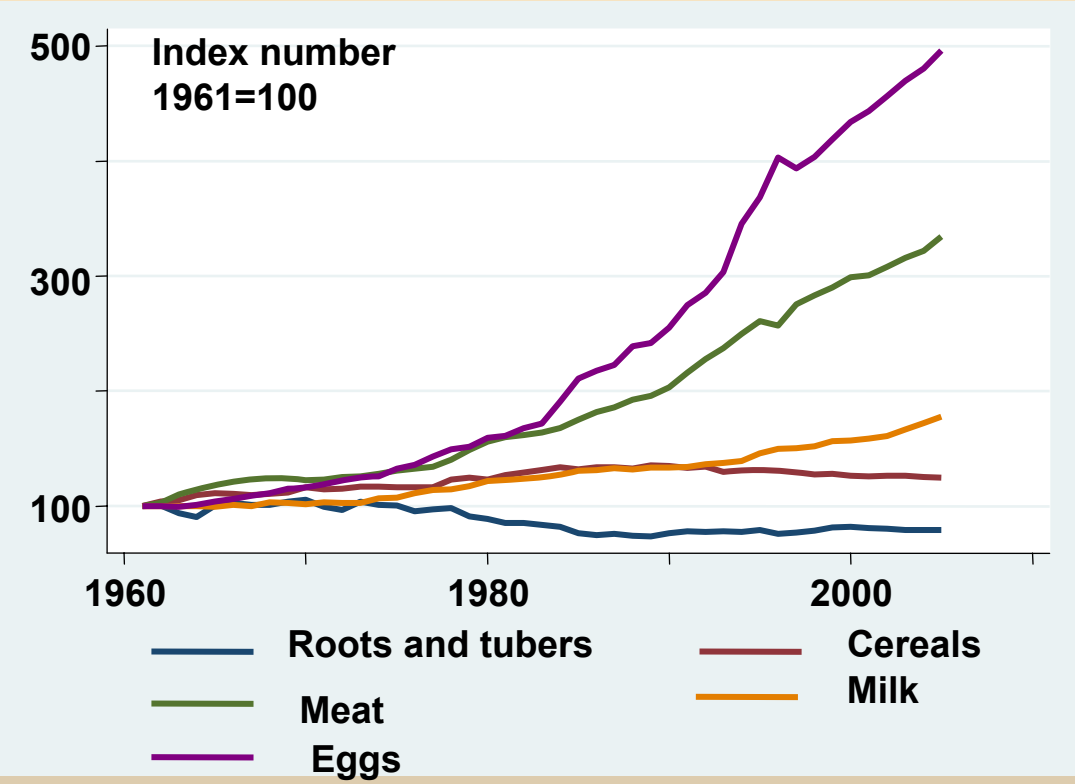
In the past :

Livestock and environment : an issue for developed countries

Other priorities for developing and emerging countries

At present :

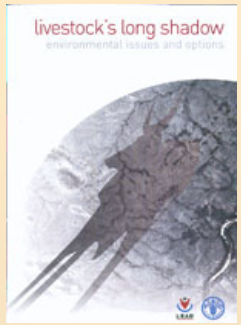
70% of farm animals in developing or emerging countries



FAO, 2009

Awareness of environmental issues by citizens
Need to find the guilty party

More and more information about environmental impacts

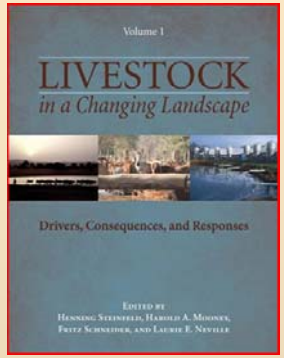


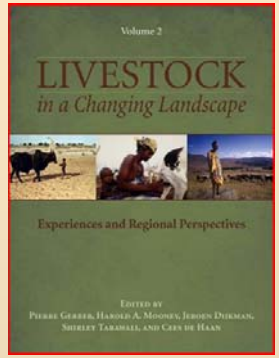
Livestock's long shadow

Steinfeld et al, 2006

Livestock in a changing landscape

Steinfeld et al, 2006
Gerber et al, 2006





Need for a multicriteria approach

Greenhouse gases
Water and soil pollution
Energy demand
Animal and vegetal biodiversity
Land use
etc.

Land degradation and loss of biodiversity

Deforestation

Main loss of biodiversity

Good news — Public policies to limit deforestation (Brazil)

In the future — How will it be possible to feed more pigs and poultry without more soybean ?

Desertification

Overgrazing — High animal density – low mobility – arid zones

→ Increase in less patalable and less nutritive plants
Erosion

In the future — Higher mobility, better management of pastures
Difficult to implement (social issues)

Livestock and biodiversity

Pasture weeds

Imperata cylindrica
Jatropha gossypiifolia →
etc.

Undergrazing: development of ligneous plants

Manure management

Extensive systems : transfer to crop parcels

Intensive systems : adequation between amount of manure and available surfaces, temporal adequation

⟶ **Need to find original solutions**

- **Industrial slurry treatment by phase separation**
  Biogas
- **On-farm phase separation :**
  solid → fertiliser
  liquid → irrigation
  (Asia)
- **Transfer to another animal species**
  The case of poultry / fish association in Asia

An environmental service of livestock : pigs are consumers of human waste

Greenhouse gases emissions

Few in vivo measurements in tropical areas

Trends:

C4 grasses produce more CH4 than C3 grasses

Archimède et al, 2010

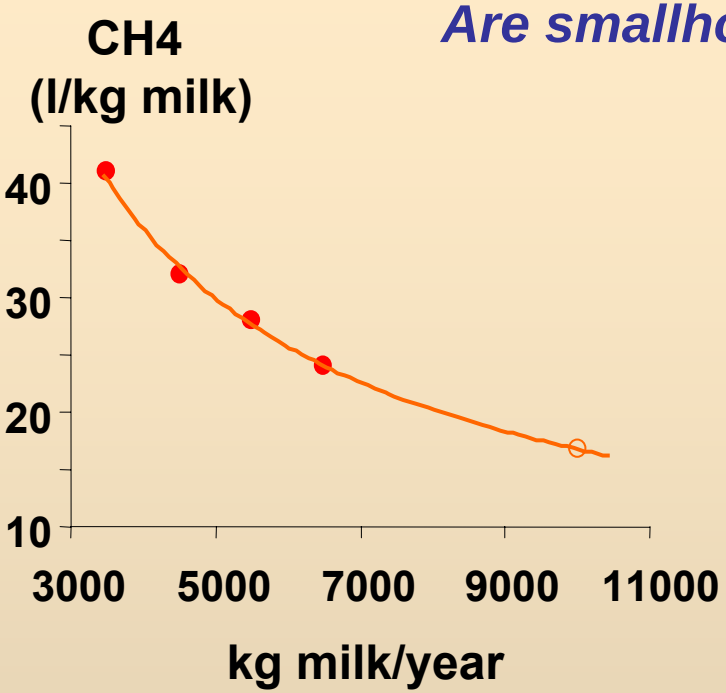
Tannin-rich plants decrease methane

Effect of level of production

	% of non-productive requirements	
	Year scale	Career scale
700-kg cow, 50 kg milk/d 1st calving 2 yr, 2.5 lactations calving interval 410 d	33	47
400-kg cow, 2 kg milk/d 1st calving 3.5 yr, 8 lactations calving interval 500 d	87	90

Greenhouse gases emissions

Are smallholders responsible of pollution?



Vermorel, 1995

More methane but less CO2

	Greenhouse gases	
	kg CO_2-eq / kg milk [1]	T CO_2-eq / ha [2]
EU	1.5	4.7
Subsaharan Africa	7.5	1.2

[1] *FAO, 2010*

[2] *provisional estimate*

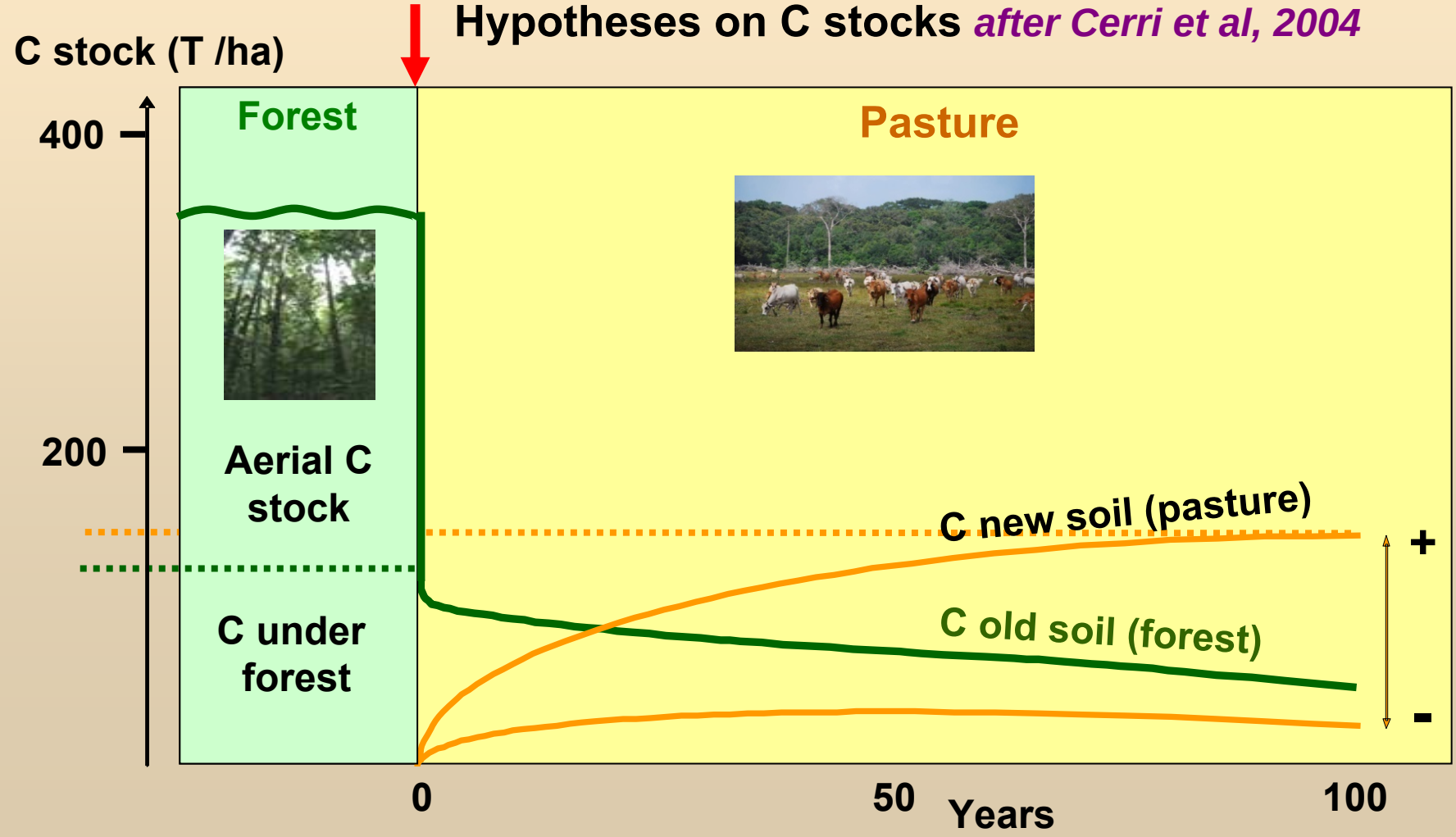
Carbon sequestration

Lack of data for tropical countries

Data to be obtained in French Guiana

After deforestation and installation of pasture

Hypotheses on C stocks *after Cerri et al, 2004*



A global approach for climate change impact using LCA

	CO_2-eq / kg product	
	High productivity	Low productivity
Methane	++	+++ to ++++
Nitrous oxide	++	+
Carbon dioxide	++	ε to +
Carbon sequestration	- -	- to - - -

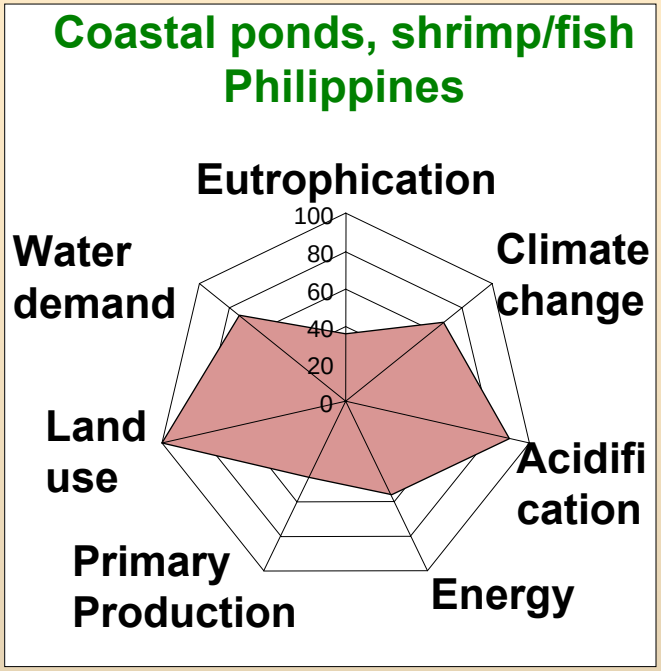
Large differences among systems

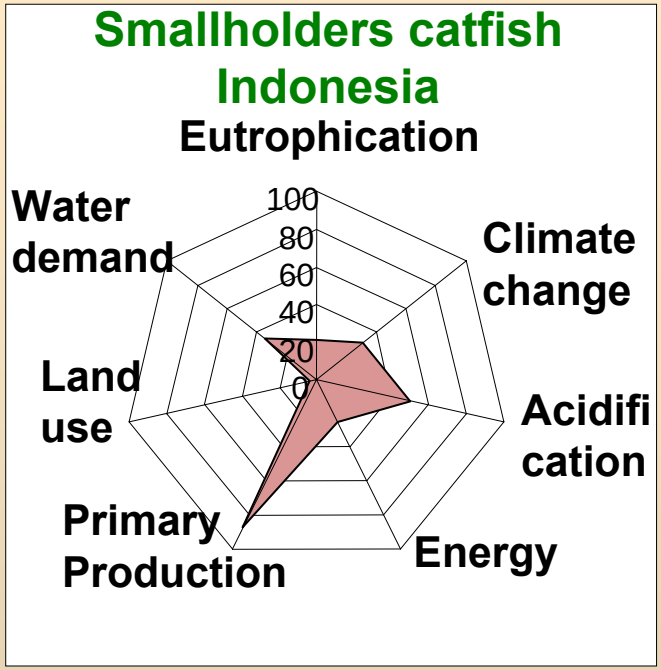
Level of productivity ≠ level of inputs

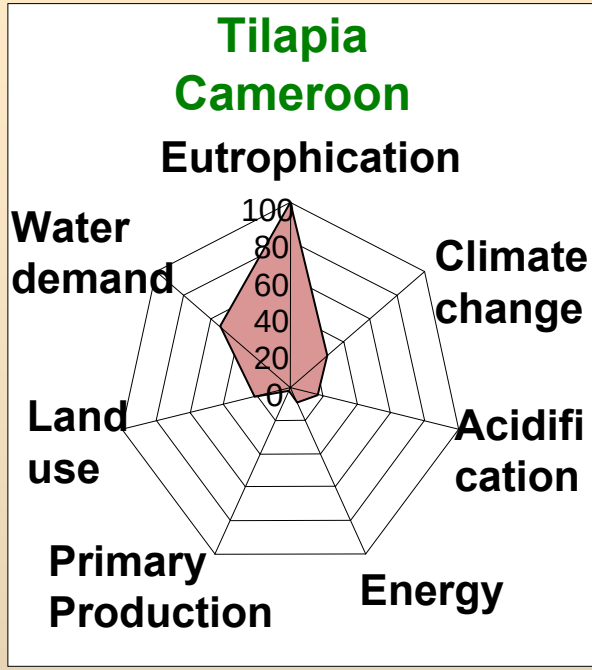
Lack of data in tropical areas
especially for N_2O emission and C sequestration

Towards a unique representation of environmental impacts ?

LCA for aquaculture







EVAD French project, unp.

Limits

The prioritary impact changes with time

with the region

This global approach leads to promote a unique solution

Economic and social issues are lacking

Conclusion

Tropical farming is extremely diverse
from intensive to extensive systems
There is the place for each system

Need to think intensification of productions
With a special attention paid to environmental impacts

Need for a multicriteria approach of impacts and services
but a unique « environmental value » is questionable

Need to combine the global approach (impact / kg product)
with the regional / local approach (impact / ha)

This report has been prepared with :

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and will appear as a publication in French in a special issue of
INRA Productions Animales
Title: Impacts et services environnementaux de l'élevage en régions chaudes
Livestock environmental impacts and services in the tropics

Thank you.