Mitigation of emissions: general options

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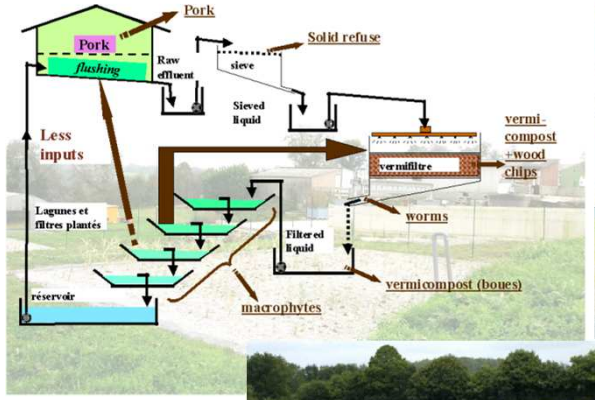


Outlines

- Introduction: emission process, negociation
- Negociation: market (image), regulation, reducers
- Process understanding: definitional & measurement
- Conclusion: which system? Which control?

Introduction

1. Process understanding

- Understanding emission
- Understanding transfer between farms

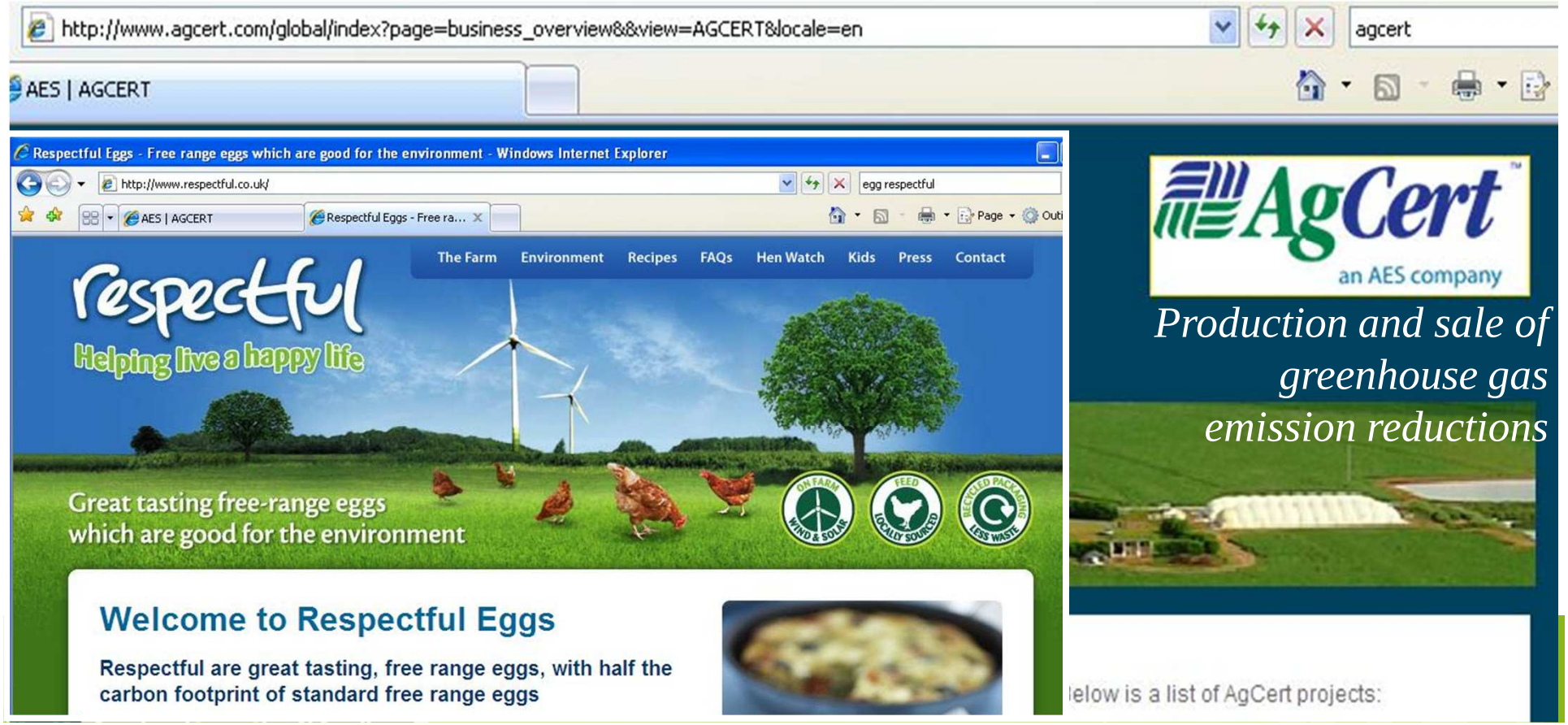
2. Negociation

- Who payes/ regulates?
- Who reduces (farm, region, company)
- Communication of results
- Risk management/traceability

Negociation

1. Market driven

- Context : « carbon credit (approved methodologies)», « green » products, brands,…
- Limit : « green washing »



Negociation

1. Market driven: DQY ecological farm (10^6 eggs per day)

DQY ECOLOGICAL 德青源

60 000 contracts with farmers

(Wenzhi Pan, 2010)

Negociation

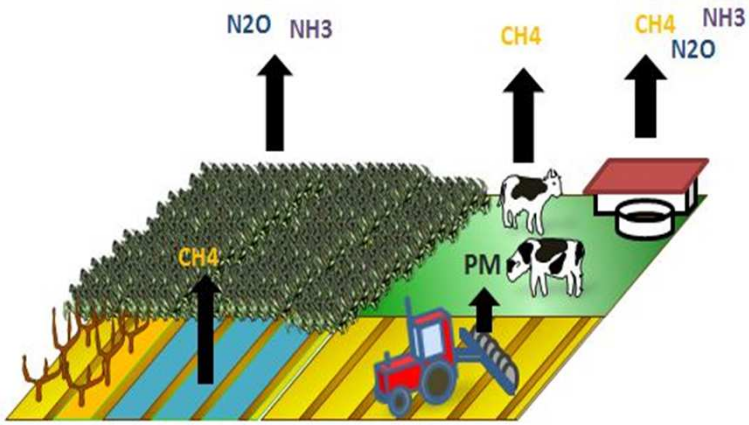
2. Regulation driven

- Pollution abatement : development of mitigation techniques, certification of the efficiency
- Policy-making : national inventories
- Certification of BAT (best available technique)

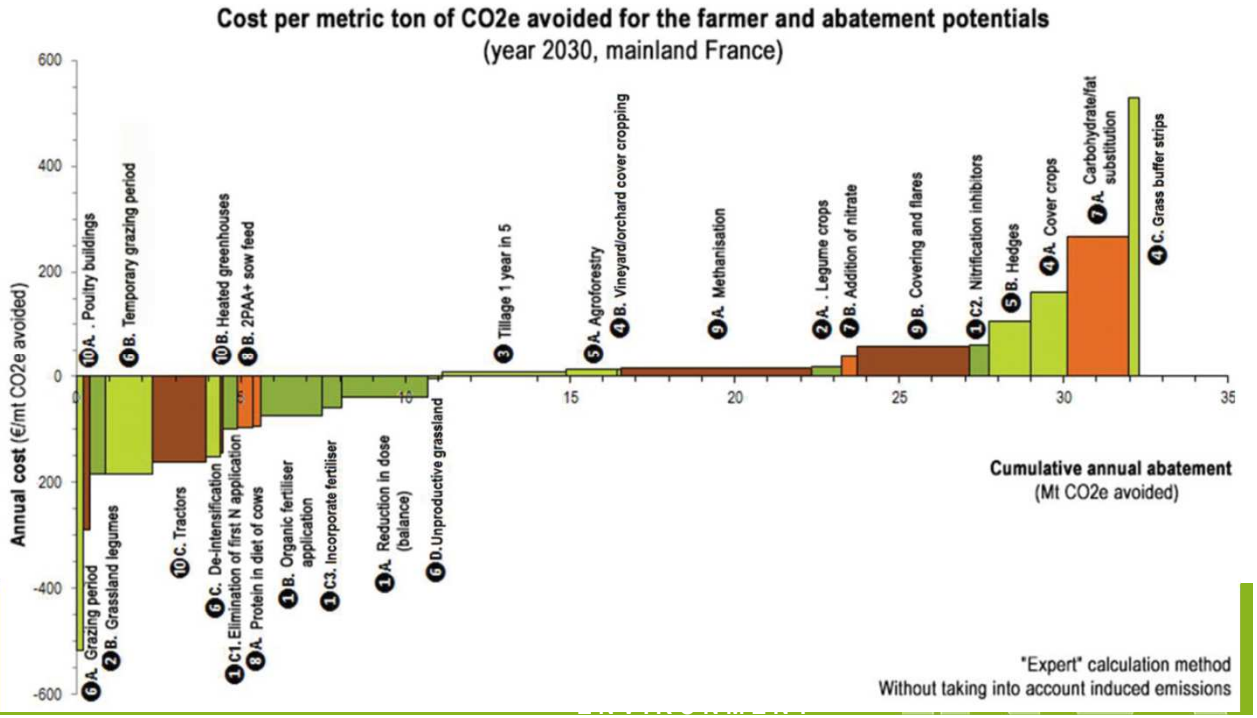
Negociation

3. Reducers (actors)

- Company: impact of activity
  => LCA
- Region: emission reduction + landscape monitoring + urban areas



Example of MACC:
Marginal abatement cost curve
(INRA, étude GES, 2014)

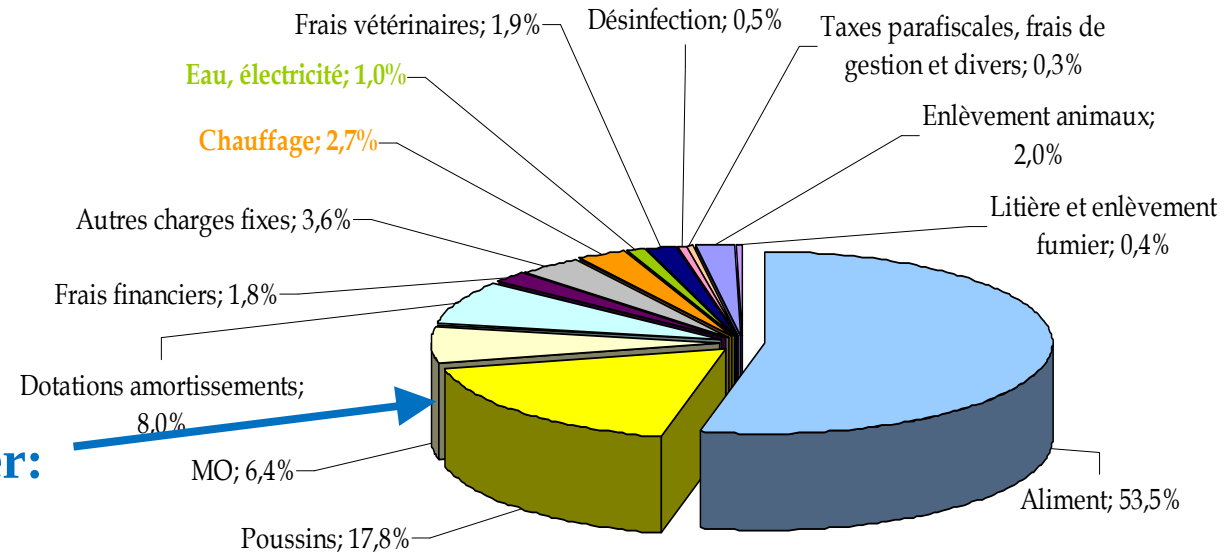


Negociation

3. Reducers (actors)

- Farm: what do they win? Who controls (farm or farm group)?

A small increase paid by the consumer can have a huge impact on the farmer salary

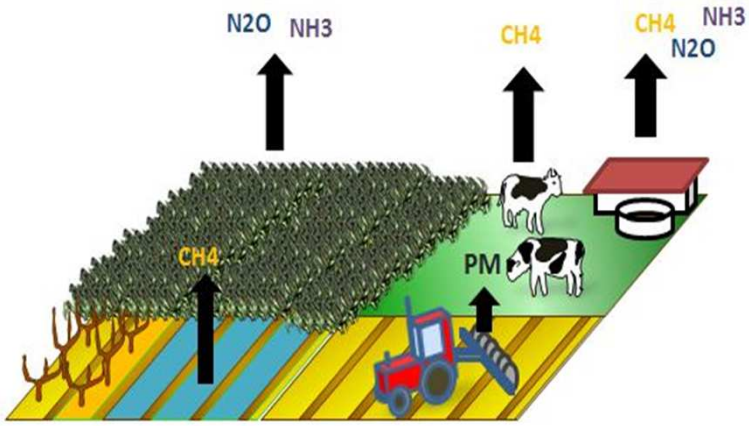


Farmer: 6,4%

Process understanding

1. Knowledge development

- Scientific research: understanding the emitting processes, kinetics, influencing parameters, optimize the nutrients use by minimizing the losses



- Transfer results to develop new processes and/or control rules to adapt to various farms

Process understanding

2. Measurement of emission reduction

environmental impact of contrasted poultry production

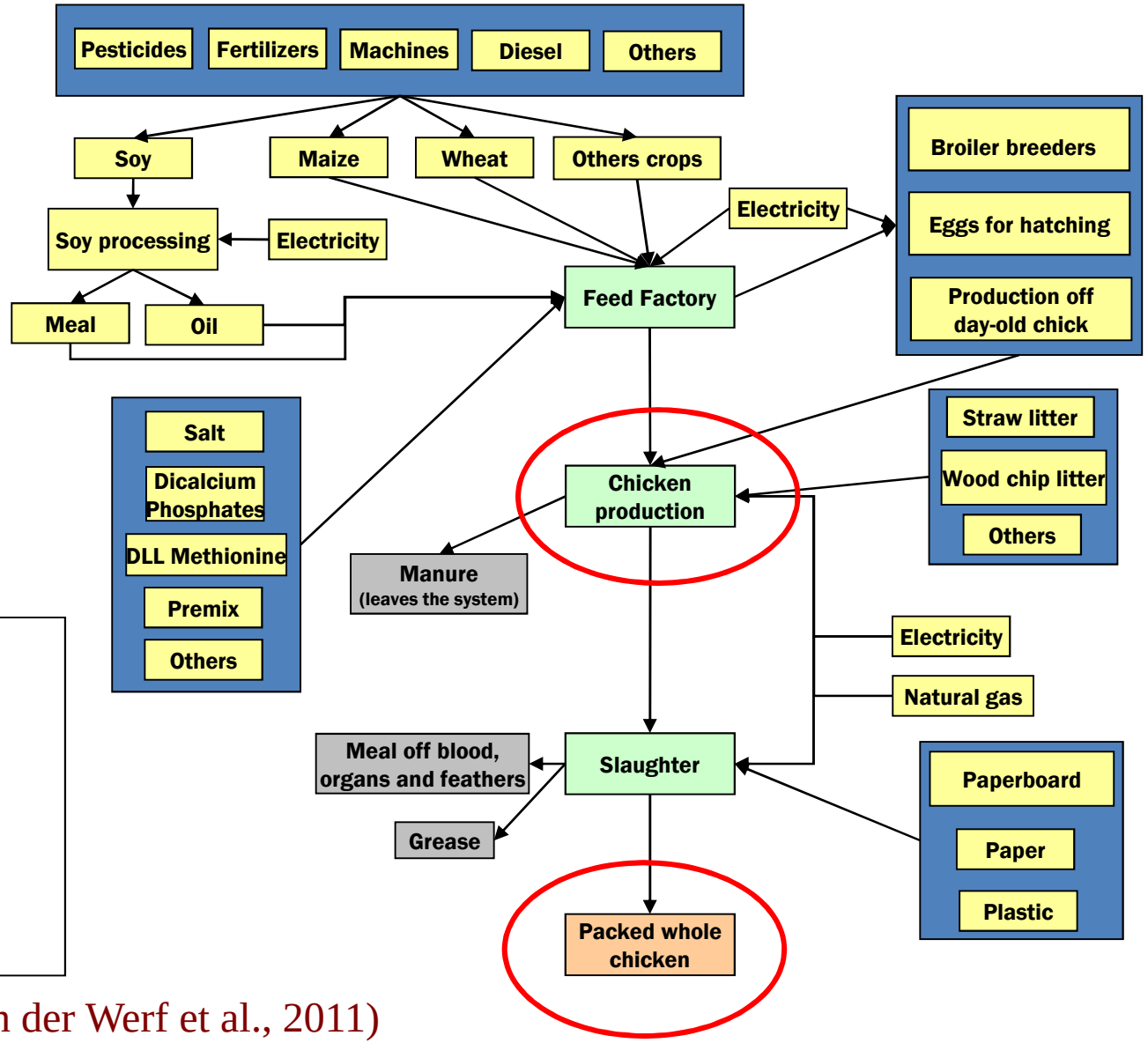
- Life Cycle Assessment
- 3 systems were compared:
  - Standard
  - Free-range
  - Organic

89 days
2,26 kg
3,09 kg feed
/kg meat

(van der Werf et al., 2011)

environmental impact of contrasted poultry production

- Method: Life Cycle Analysis evaluates direct and indirect (from inputs) pollutions
- For all processes, impact assessment



Notes:

- All stages of transport were considered

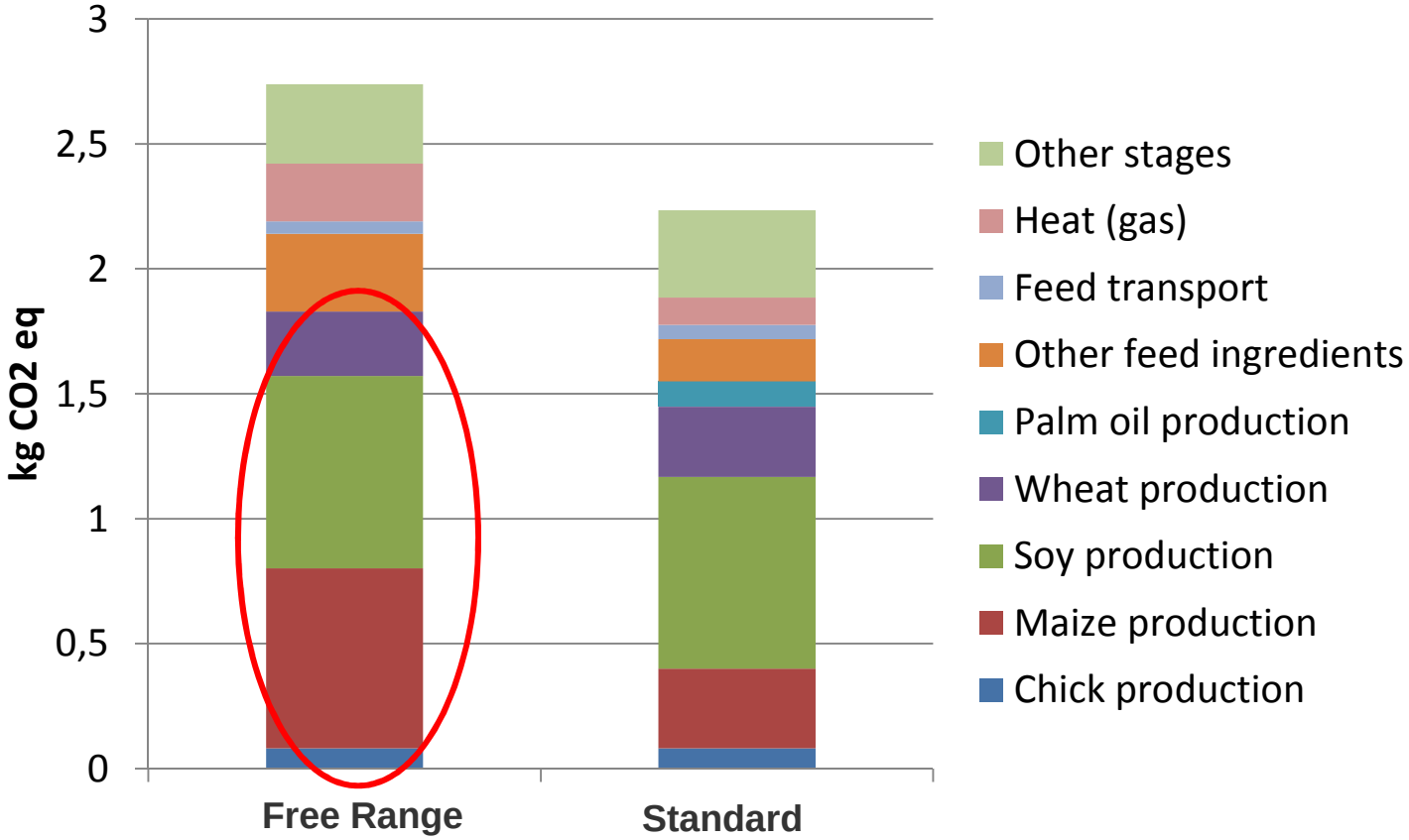
- Houses and their maintenance is not included in the system

(van der Werf et al., 2011)

environmental impact of contrasted poultry production

Contribution of two systems to the **climate change**
UF: 1 kg of chicken live weight at the exit of the farm

Most contribution comes from Soybean and Maize production



58% of the contribution of soya come from deforestation (Soya of Brazil)

(van der Werf et al., 2011)

environmental impact of contrasted poultry production

Impacts for 1 kg broiler meat at the slaughterhouse for either Organic, Free Range or Standard animal farm

Impact	Unit	Uncertainty ? Organic	FreeRange	Stand.
Acidification	g SO_2 eq	50	70	41
Eutrophication	g PO_4 eq	28	31	22
Climate change	kg CO_2 eq	2,2	4,1	3,2
Total Energy Used	MJ	32	50	34

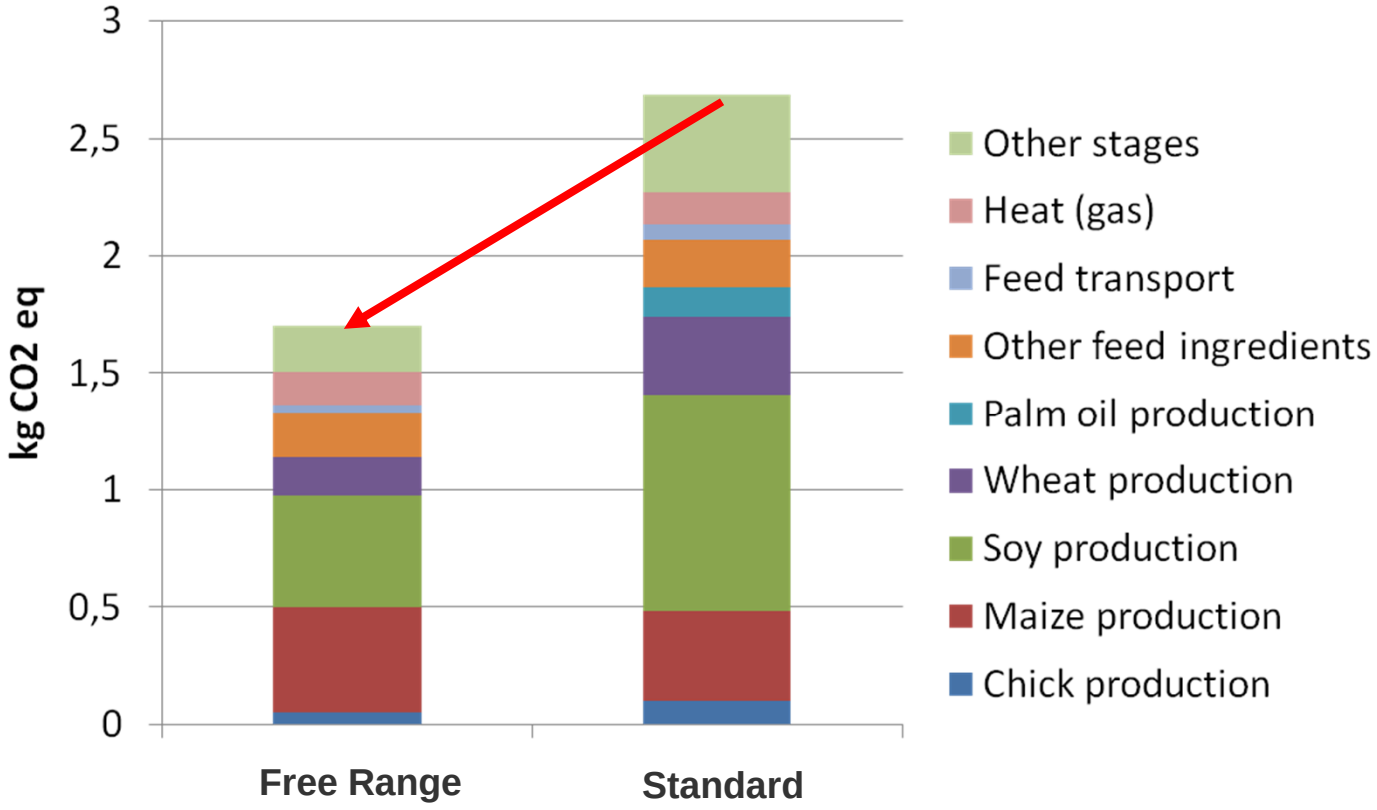
For 1 kg meat Standard animal farm has a lower impact because it consumes less animal feed

(van der Werf et al., 2011)

environmental impact of contrasted poultry production

Contribution of two systems to the **climate change**
UF: 1 euro of chicken live weight at the exit of the farm

Free range production produces less impact at constant budget (1 euro meat)



(van der Werf et al., 2011)

environmental impact of contrasted poultry production

Impacts for 1 Euro of chicken live weight at the exit of the farm
For two contrasted farming systems

Impact	Links	Free range	Standard
Acidification	G SO_2 eq	29,3	34,5
Eutrophication	G PO_4 eq	11,9	16,7
Climate change	kg CO_2 eq	1,7	2,7
Terrestrial toxicity	G 1,4-dB eq	5,8	7,1
Land use	m ² has	2,4	3,2
Total Energy Used	MJ	18,3	22,5

For all categories free range production has less impact at constant budget

(van der Werf et al., 2011)

Process understanding

2. Measurement of emission reduction

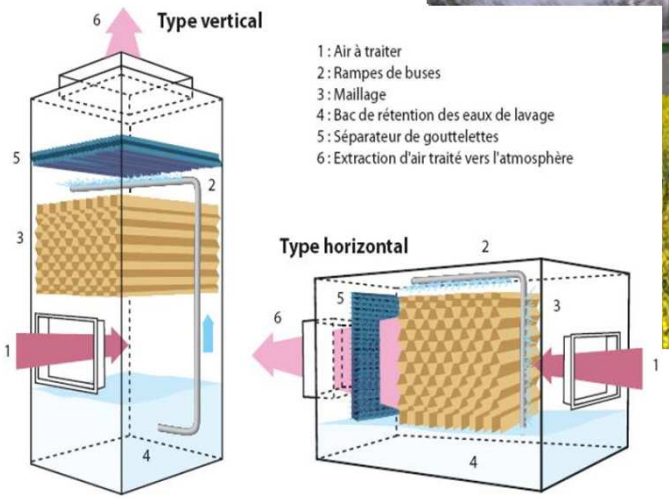
- First impact comes from feed production and transport;
- When producing high number of animals, e.g. to export, the impact is lower for standard farming system; it consumes less vegetal resources;
- When producing small number of animals, when families buy each month the same budget for poultry, the impact is lower for Free Range or organic farming systems
- Therefore, both production can coexist for distinct objectives
- In all systems, energy could be reduced by producing biomass from manure instead of excessive fertilization, management could be improved to reduce acidification, eutrophication, and climate change

Process understanding

3. Technology development

1 – treat exhaust air

2 – decrease source with manure management



(Guingand, 2011)

Process understanding

3. Technology development: compost management

Controled forced ventilation

System VALLEY' ID

Process understanding

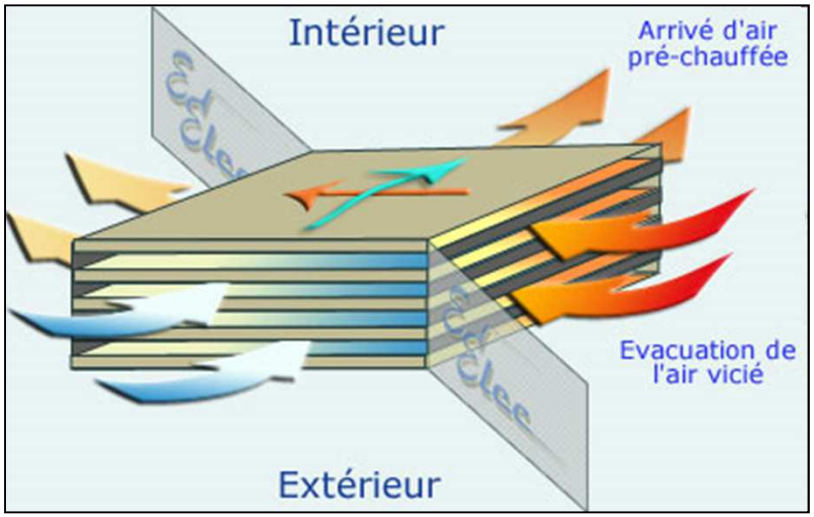
3. Technology development: slurry treatment

- Separation of phases
- Biological treatment
- Treatment on filter basins
- Aerobic treatment
- Methanisation
- Treatment by mycelium
- Lagooning

Process understanding

3. Technology development: heat recovery

- To recover heat
  - 2 managements of the exchanger of heat (in the course of experimentation)
    - **Cyclic proportioning (walk/stop)**
    - **Variator of frequency (progressive increase in air flows during time)**



(Aubert, 2011)

Process understanding

3. Technology development: insulation

- Insulation of the house

  to detect the problems quickly: Infra-red thermography

(Aubert, 2011)

Conclusion

1) Intensive or extensive animal production ?

Intensive:

- increased meat production per worker,
- increased risk of pollution,
- increased economical exchanges around the farm,
- increased dependance on inputs,
- improved knowledge on manure management

Extensive (feed, water, manure):

- Adapted to traditional knowledge and local resources
- More difficult to increase production; R&D is slow because of complexity and diversity of extensive systems
- Importance of manure recycling because feed use is higher

=> adequate to different places and to different farmers

Conclusion

2) obligation of means or performance obligation ?

Obligation of means:

An equipment is bought, if it is not suitable to the farm, the vendor is not responsible; in the case of BMP, it can be more expensive and more polluting in some farms (e.g. not suited to the climate)

Obligation of results:

An equipment is bought, if the pollution reduction is not achieved, the vendor is responsible

=> Obligation of results should be prefered; in the case of emissions (NH_3, GHG), currently official methods to control the result are collected by UNFCCC (approved methodologies

Thanks for your attention

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