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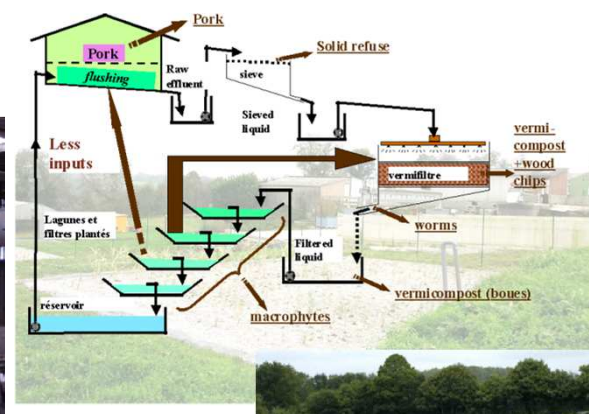
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Mitigation of emissions: general options

Paul Robin, Mélynda Hassouna



Outlines

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



12th-14th January 2015, Dakar

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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



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Negotiation

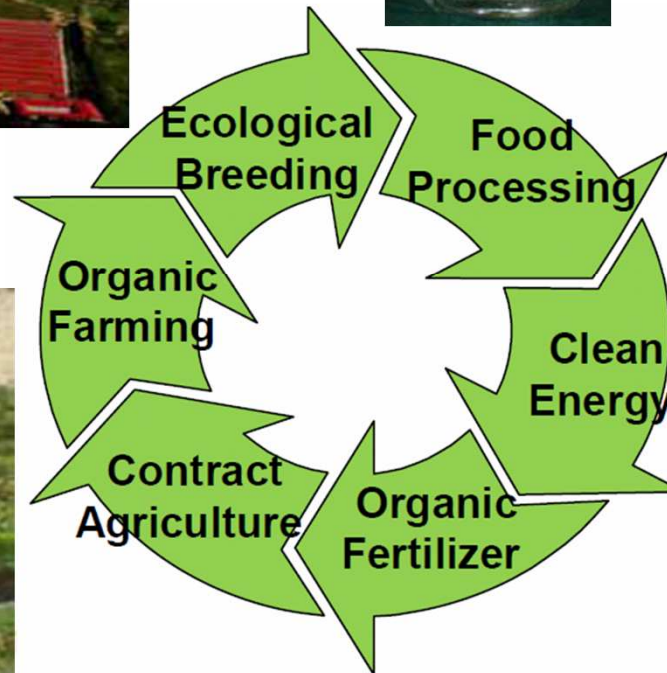
1. Market driven

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

The image shows a screenshot of a web browser displaying the AgCert website. The browser's address bar shows the URL: http://www.agcert.com/global/index?page=business_overview&&view=AGCERT&locale=en. The website header includes the AgCert logo and the text "an AES company". The main content area features a large banner for "Respectful Eggs" with the tagline "Helping live a happy life". The banner includes a navigation menu with links: "The Farm", "Environment", "Recipes", "FAQs", "Hen Watch", "Kids", "Press", and "Contact". The banner text reads: "Great tasting free-range eggs which are good for the environment". Below this text are three circular icons: "ON FARM WIND & SOLAR", "FEED LOCALLY SOURCED", and "RECYCLED PACKAGING LESS WASTE". A white box at the bottom left of the banner contains the text: "Welcome to Respectful Eggs" and "Respectful are great tasting, free range eggs, with half the carbon footprint of standard free range eggs". To the right of this text is a small image of a bowl of food. On the right side of the screenshot, there is a dark blue sidebar with the AgCert logo and the text: "Production and sale of greenhouse gas emission reductions". Below this text is a small image of a farm with a greenhouse. At the bottom of the sidebar, it says "Below is a list of AgCert projects:".

Negotiation

1. Market driven: DQY ecological farm (10⁶ eggs per day)



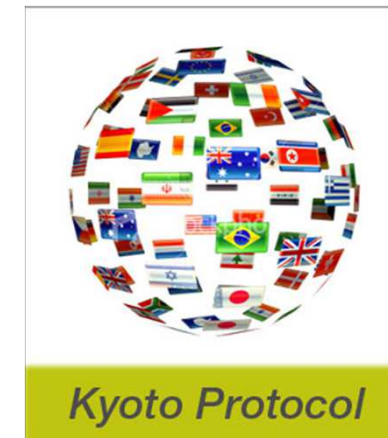
**60 000 contracts
with farmers**

(Wenzhi Pan, 2010)

Negotiation

2. Regulation driven

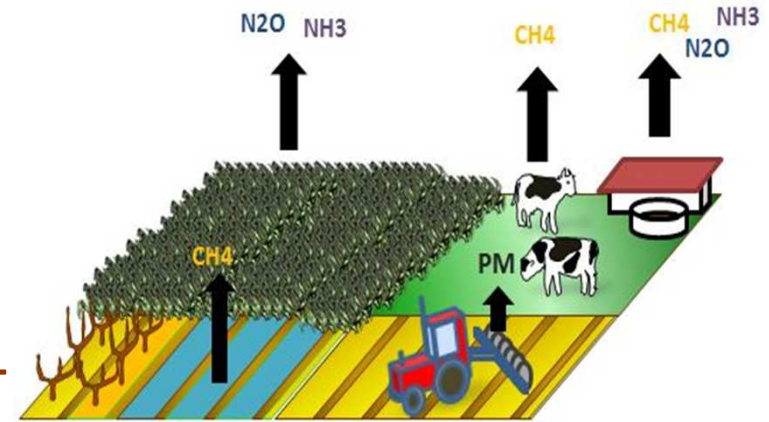
- ❖ Pollution abatement : development of mitigation techniques, certification of the efficiency
- ❖ Policy-making : national inventories
- ❖ Certification of BAT (best available technique)



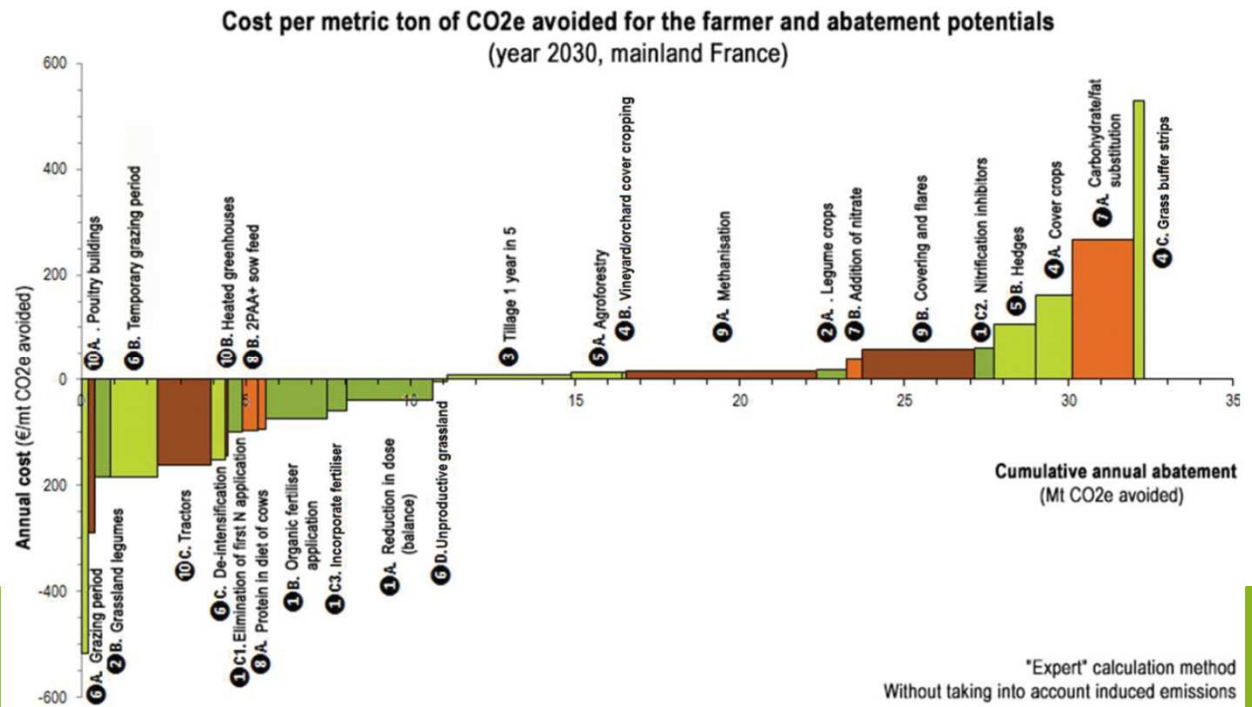
Negotiation

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)

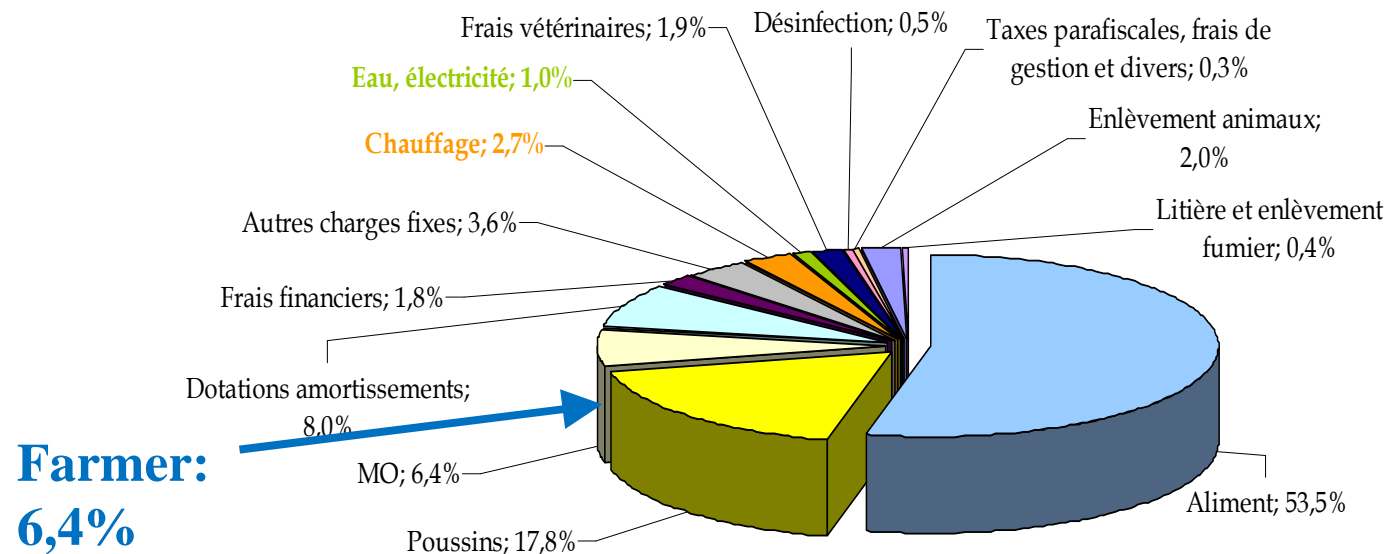


Negotiation

3. Reducers (actors)

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

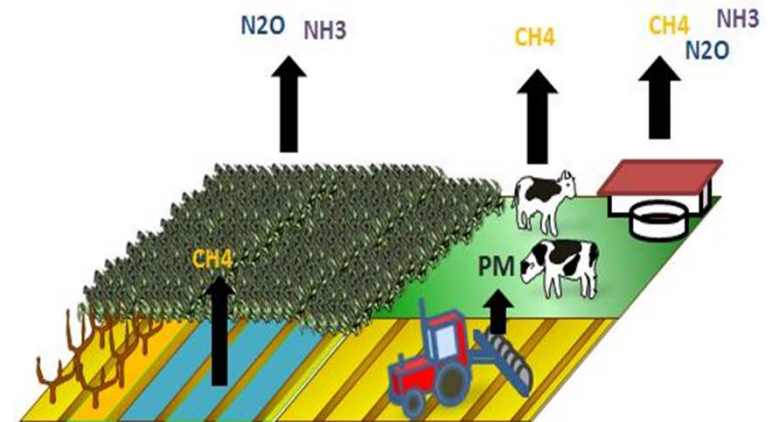
A small increase paid by the consumer can have a huge impact on the farmer salary



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

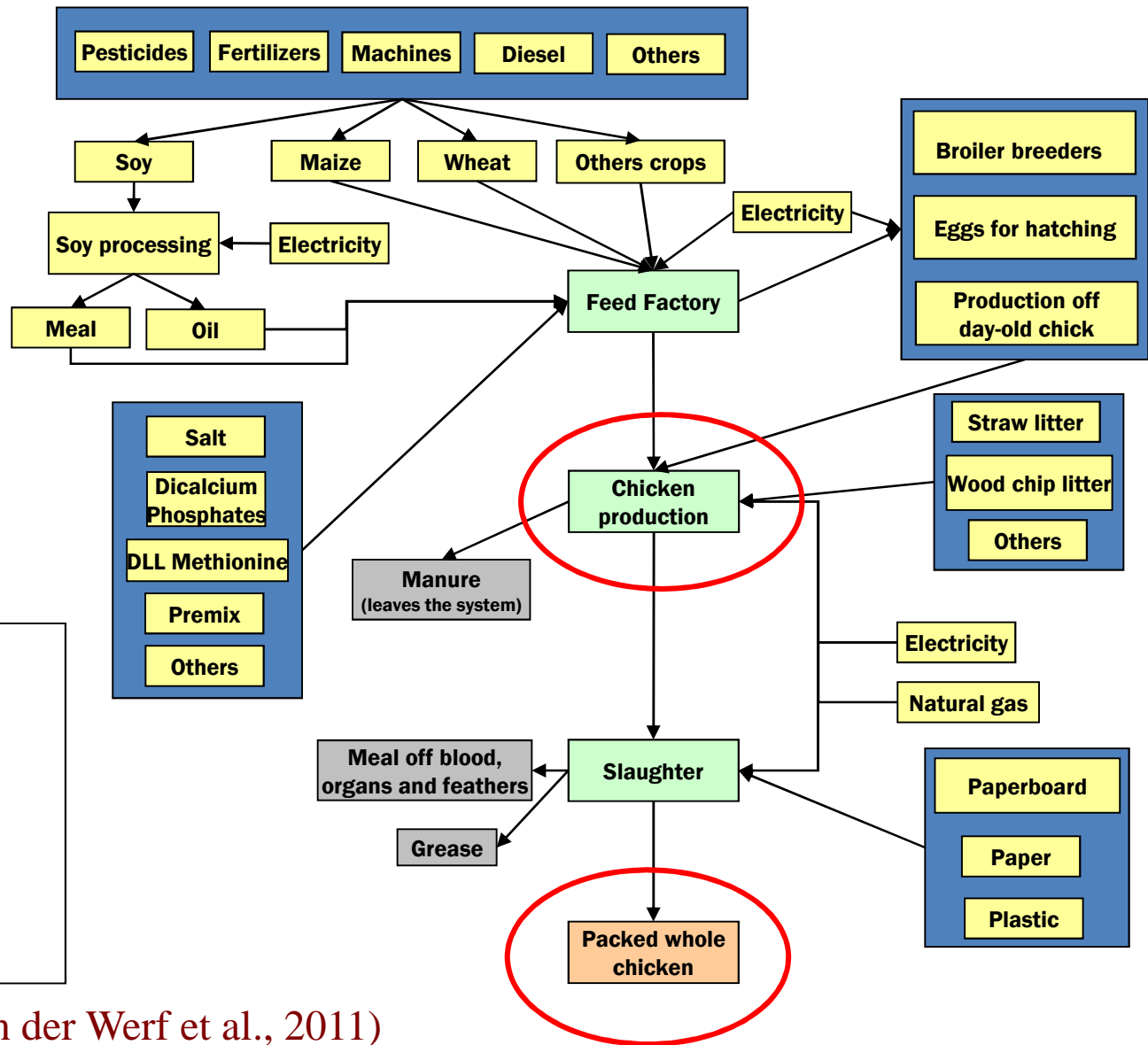
- Life Cycle Assessment
- 3 systems were compared:
 - Standard
 - Free-range
 - Organic



(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)



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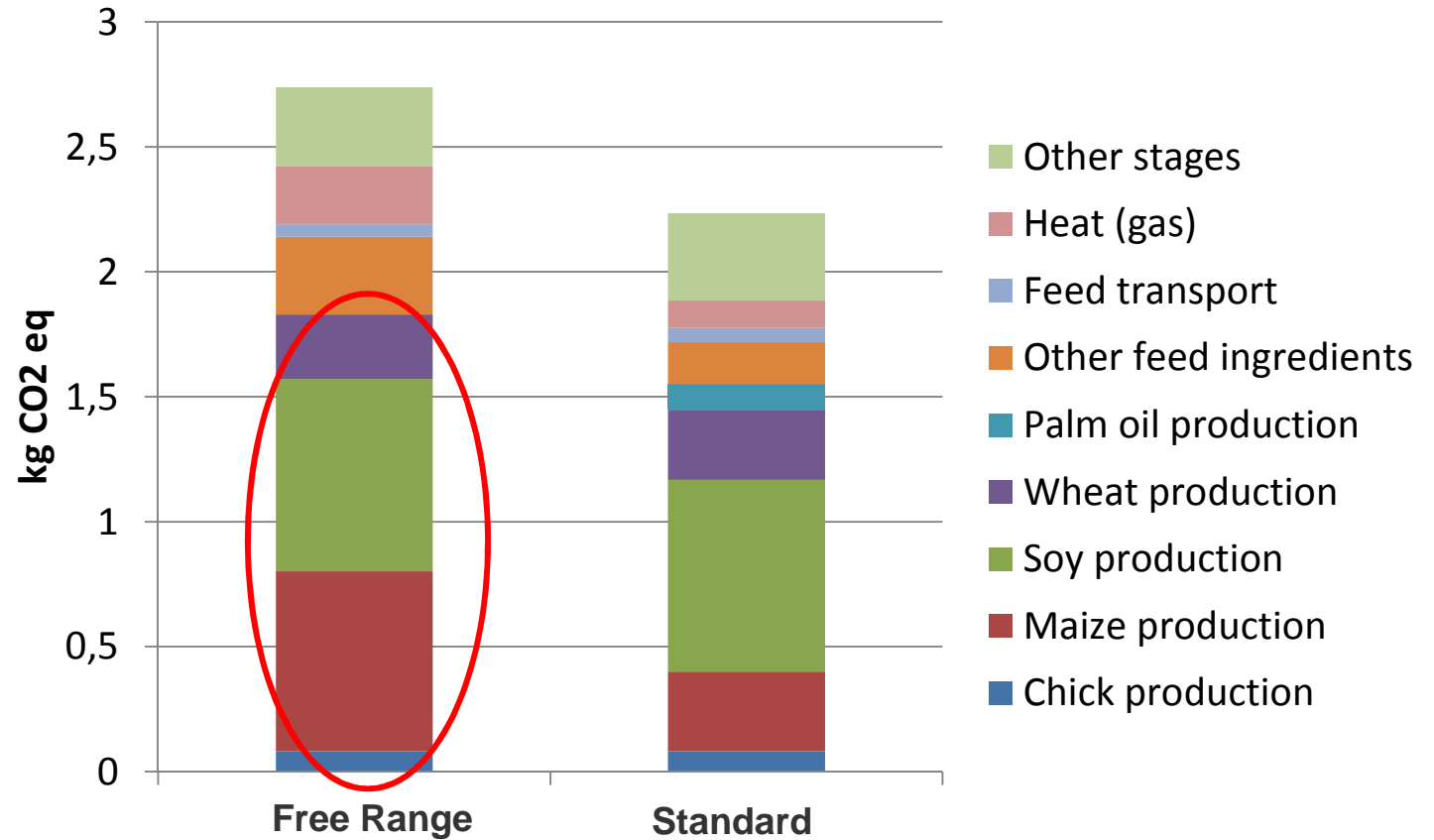


environmental impact of contrasted poultry production

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)



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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)

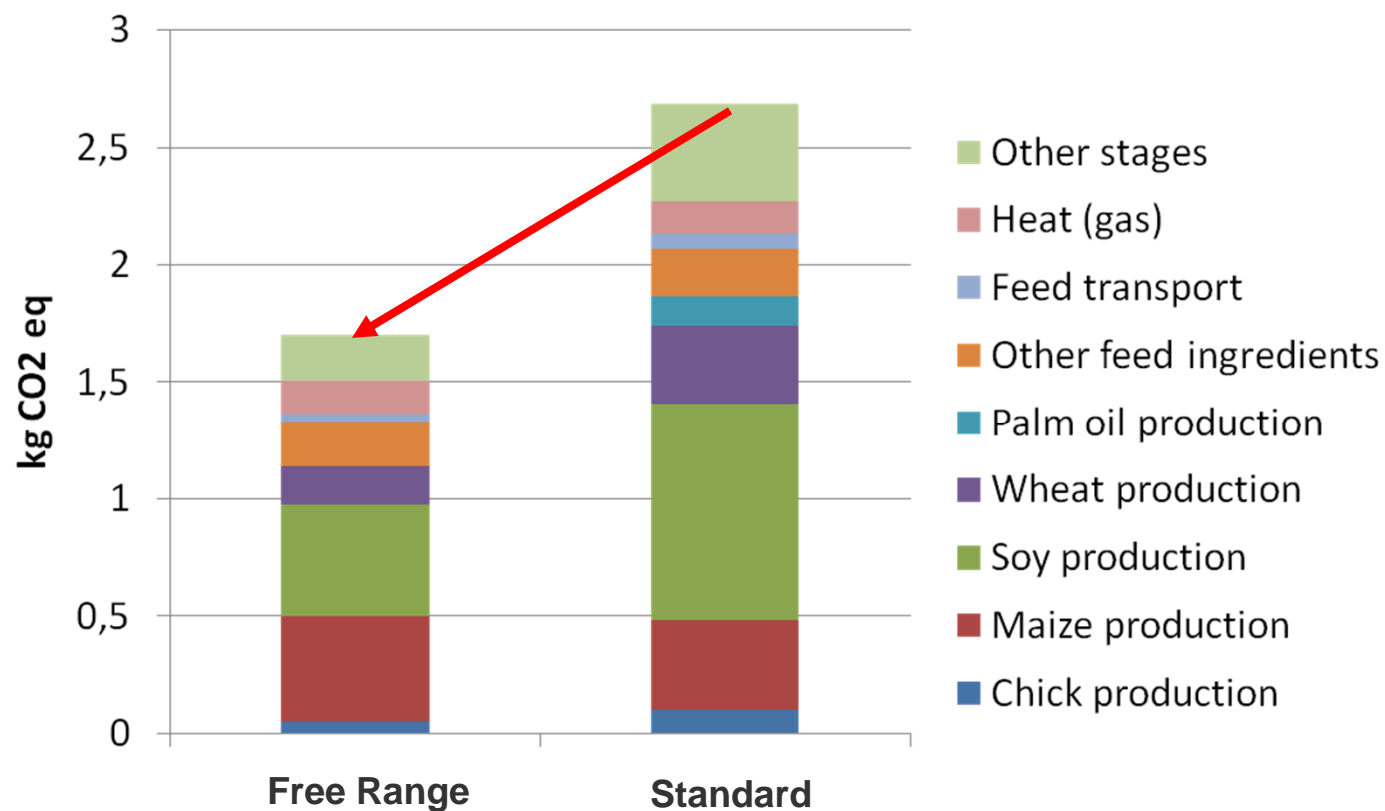


environmental impact of contrasted poultry production

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)



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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)



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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



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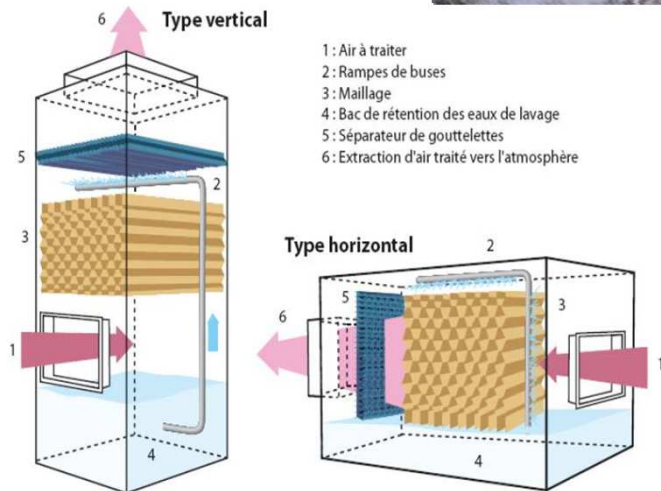


Process understanding

3. Technology development

1 – treat exhaust air

2 – decrease source with manure management



(Guinand, 2011)

Process understanding

3. Technology development: compost management

Controlled 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



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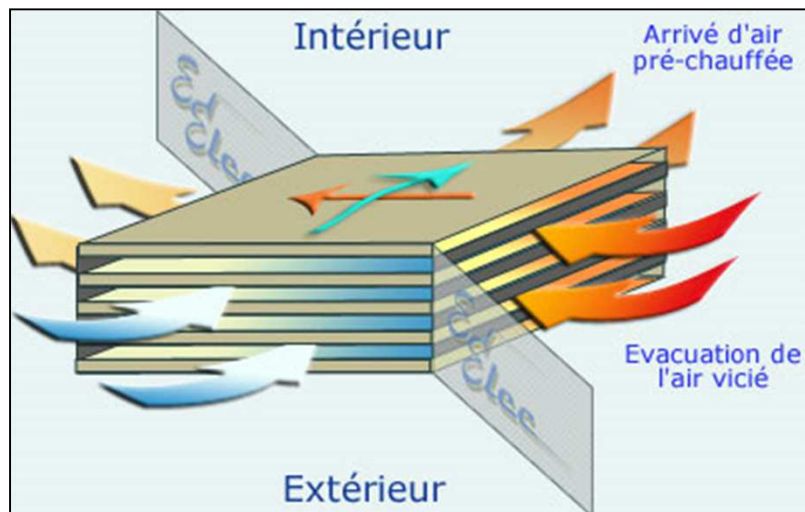
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Process understanding

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



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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 preferred; 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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International Symposium on **Emissions**
of Gas and Dust from **Livestock**

<http://www.emili2015.com.br/english.php>

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