



Overview of GHG Inventory

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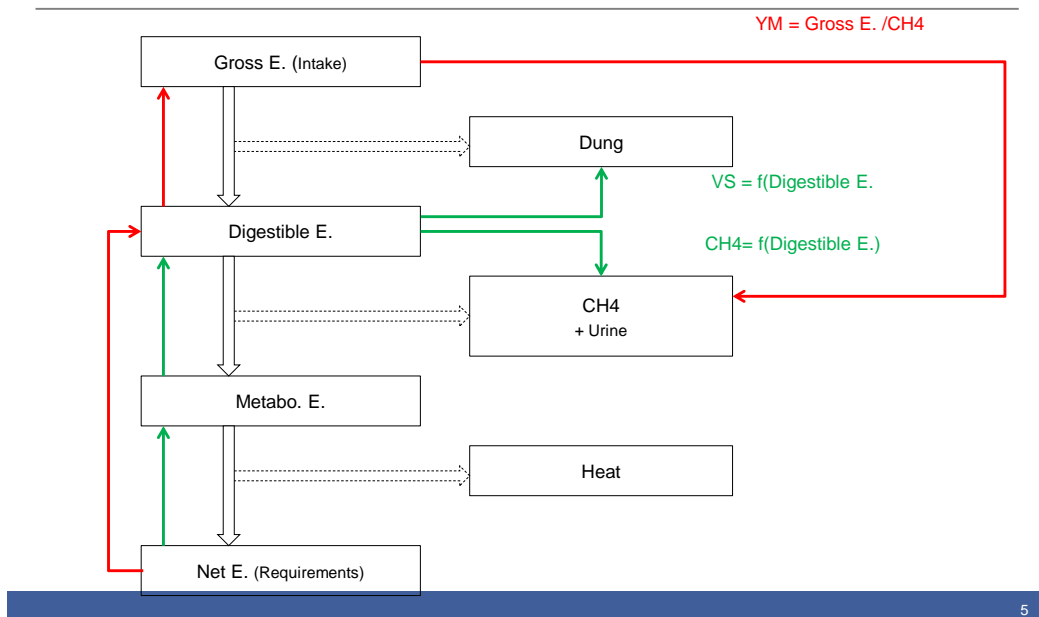
NATIONAL ORGANISATION

- CITEPA is inventory compiler (1-2 people on agriculture)
- Many organisations involved in the development of methodologies :
 - ✓ INRA (national research institute for Agriculture)
 - ✓ Professional organisations (Cattle, swine, poultry, crops, etc.)
 - ✓ Ministries of agriculture and environment involved (data providers and final users)

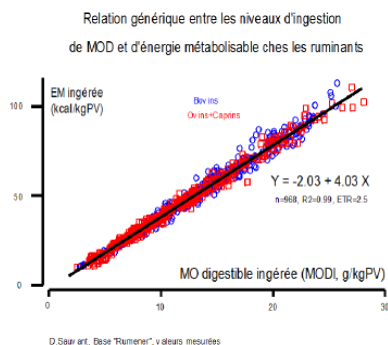
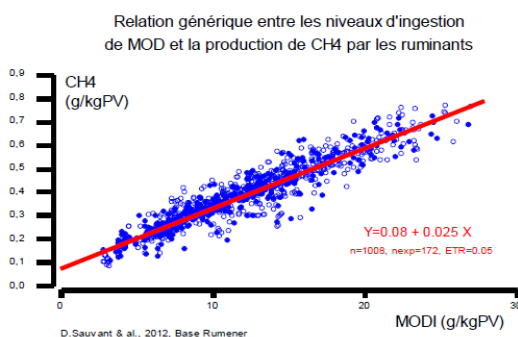
- Agricultural annual statistics based on exhaustive census every 10 years
- Specific surveys on agricultural practices
- Specific survey on fertilizer and limestone provision to farmers
- A few exotic sources to estimate to small sources (sugar scrums, histosols, etc.)

- 3A. Enteric fermentation (country specific methodology : tier 2-3)
- 3B. Manure management (IPCC tier 2 methodology based on specific nitrogen excretion and solid volatil excretion)
- 3C. Rice cultivation (tier 1)
- 3D. Agricultural soils (tier 1-2)
- 3.F Burning of residues (tier 2)

ENTERIC FERMENTATION



RELATIONS USED TO IMPLEMENT CS EQUATION



FROM TIER 1 TO TIER 2 (3A)

- Stop planning, try to implement it.
- Be aware that tier 2 will increase accuracy if and only if additional data are available with a sufficient quality.
- Long term vision is needed.
- Real involvement from inventory team is needed.

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HOUSING FOR DAIRY CATTLE (STRAW LITTER)

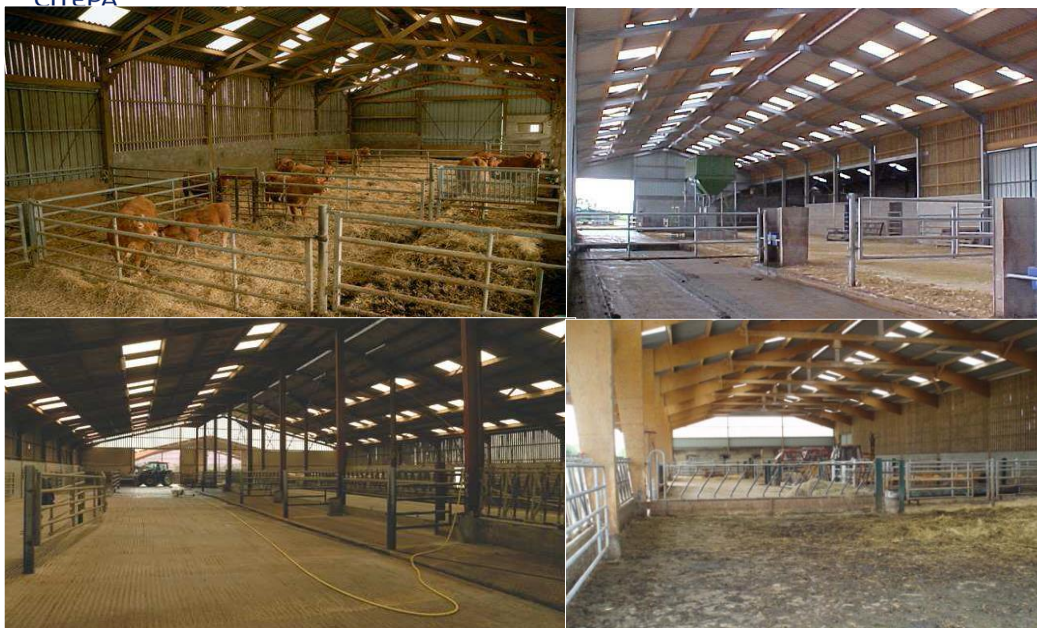




HOUSING FOR DAIRY CATTLE (CELLS)



HOUSING FOR OTHER CATTLE



A LOT OF DIFFERENT MANURE TYPES

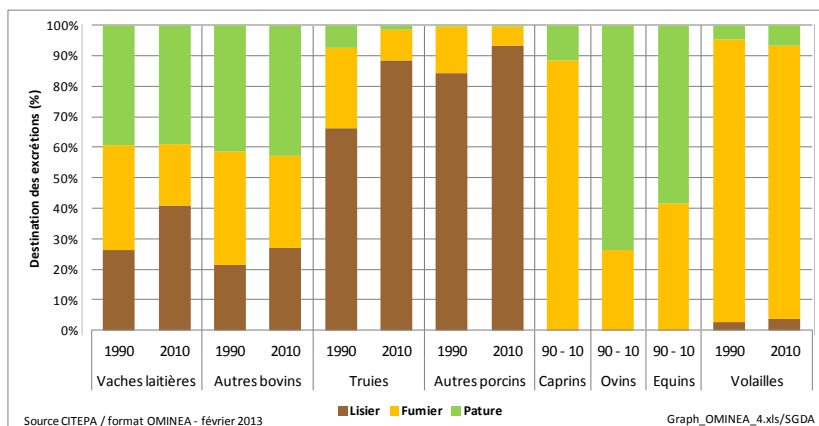
Logement	Partie concernée	kg de paille/UGB/jour					
		0	1	2	3	4	≥ 5
Pente paillée	Couloir racé couvert						
Stabulation paillée	Aire paillée						
	Caillebotis ou aire racée surélevée/aire paillée						
	Aire racée couverte au même niveau que l'aire paillée						
	Aire racée non couverte						
Stabulation libre logettes tête à tête	Caillebotis						
	Aire racée couverte						
Stabulation libre logettes dos à dos	Couloir entre rangs						
	Aire d'alimentation couverte						
	Aire d'alimentation non couverte						
Stabulation entravée							

Source : Institut de l'Élevage

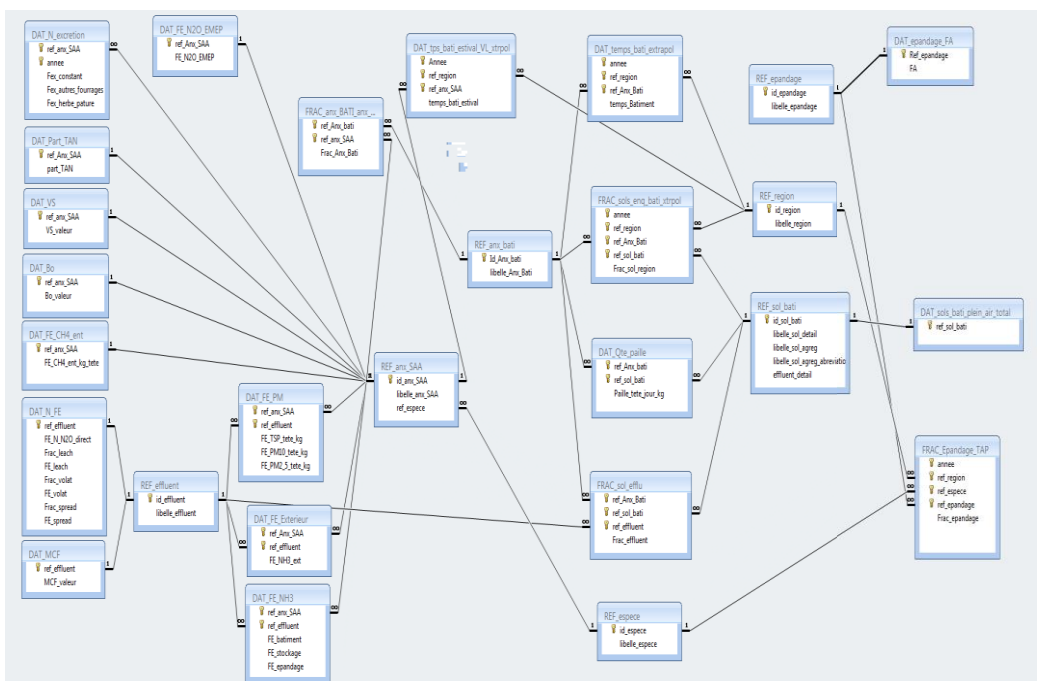
■ Lisier (L)
■ Lisier pailleux/Fumier mou (LP/FM)
■ Fumier mou compact à très compact (FMC, FC, FTC)

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MANURE MANAGEMENT SYSTEMS



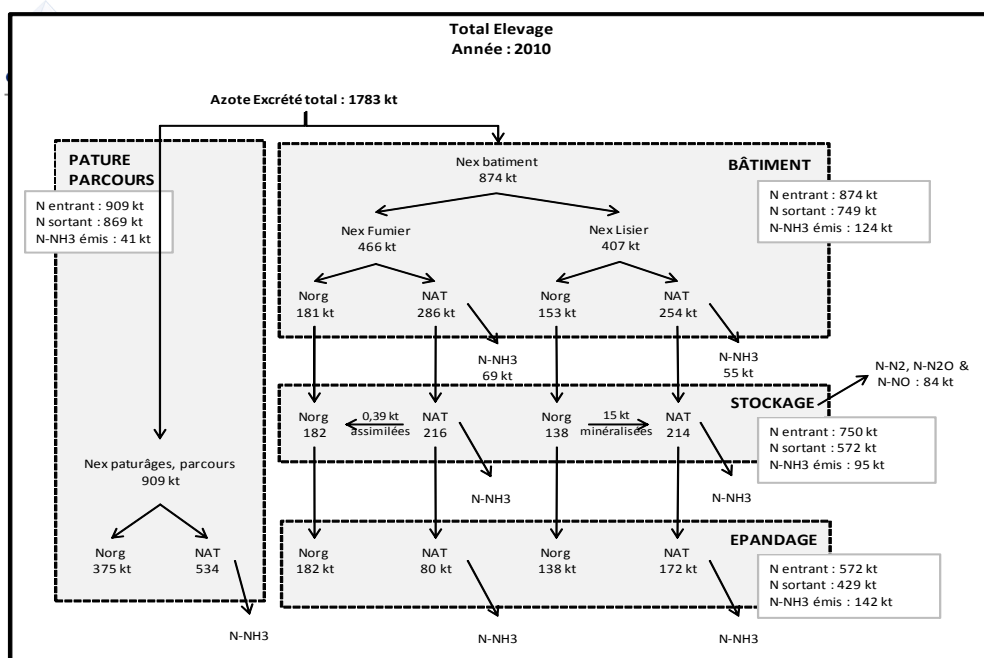
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FROM TIER 1 TO TIER 2 (3B)

- IPCC is strange on manure management because tier 1 for CH₄ is not based on manure management types although tier 1 for N₂O is based on manure management without any clear benefit (EF remain uncertain)
- It is not clear what tier 2 really means and there is no tier 2 available for N₂O (what is necessary?)
- We are not equal regarding data provision (very often data are collected for a long time for other purposes but maybe it is not reasonable to collect it just for GHG inventories)
- The challenge is to conciliate many different references and statistics.
- Focus on consistency between enteric fermentation and excretions (N and VS)

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MANURE SPREADING



MANURE SPREADING



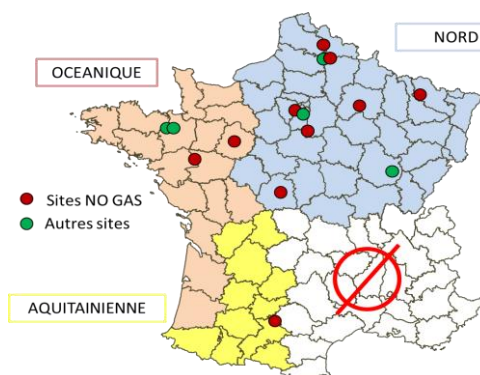


Figure 4 : localisation des sites d'essai

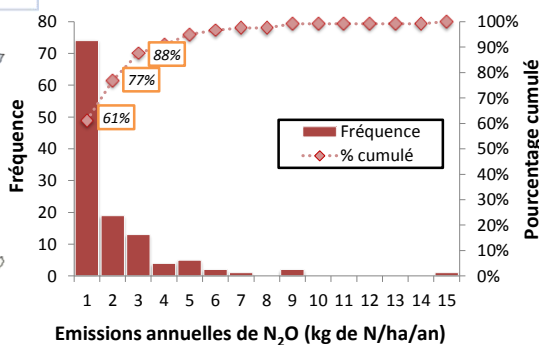


Figure 5 : distribution des flux annuels de N₂O

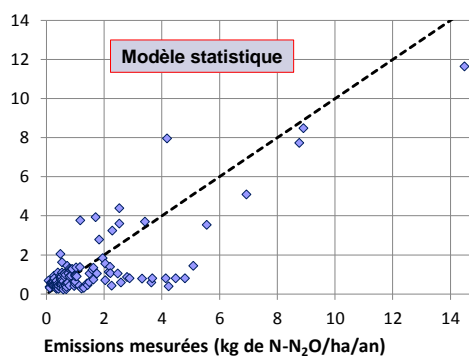
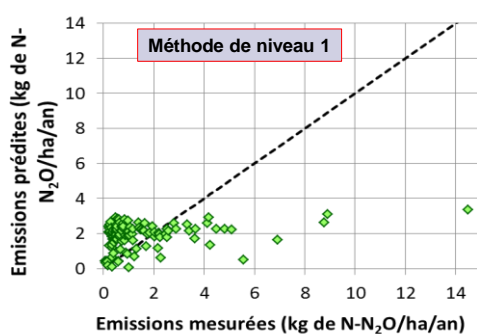
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- Pool de variables potentielles: *Tair*, *pH*, *CEC*, *pH*, *%MO*, *%argile*, *%sables*, *Pluviométrie*, *Nmin*, *Norg*, *Nrésidus*, *forme des engrais (min+org)*, *travail du sol*

$$\ln (E_{N_2O}) = \mu + \alpha \cdot N_{org} + \beta \cdot N_{min} + \gamma \cdot pH + \delta \cdot \text{Pluviométrie} + \varphi_{SITE}$$

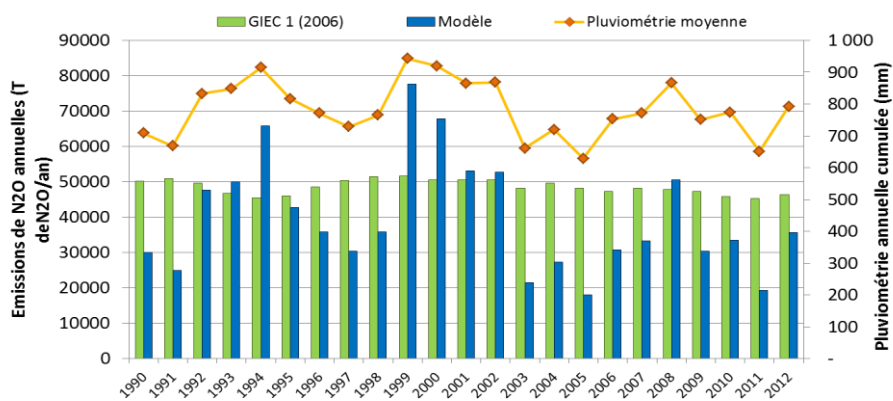
Avec : E_{N_2O} = émissions annuelles de N₂O (en kg de N/ha/an), N_{min} = quantité de N apporté par les engrais de synthèse (kg de N/ha/an), N_{org} = quantité de N apporté par les engrais et amendements organiques, (kg de N/ha/an) Pluviométrie = pluviométrie annuelle cumulée (mm)

COMPARISON WITH IPCC



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RAIN DEPENDANCE



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FROM TIER 1 TO TIER 2 (3D)

- Tier 2 mostly concern residues contribution to N_2O .
- IPCC provides rather complex methodology for residues but it not a guarantee of quality . And it often corresponds to a small amount of emissions.
- Focus on nitrogen flow.