EAAP 2012 Bratislava 27-31 August 2012

Greenhouse gases emissions and energy consumption in French sheep for meat farms *Analysis over the period 1987-2010*

Marc Benoit - Hervé Dakpo

INRA UMRH-Equipe Egeé, Centre Clermont-Ferrand – Theix

marc.benoit@clermont.inra.fr




ALIMENTATION
AGRICULTURE
ENVIRONNEMENT

Context and objectives

- Climate change
- Non renewable energy considered as limited resource
- Livestock: 18% of global GHG emissions (FAO), and importance of ruminants

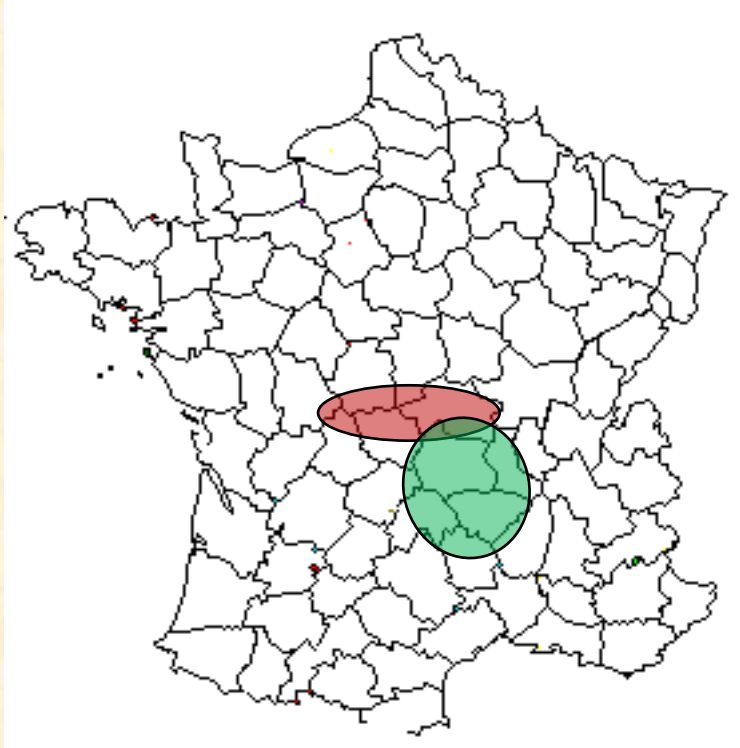
- What about **lamb production systems** (Conv/Organic…)?
- What are the **main factors** to explain?
- What changes do we observe **during the past 24 years**?

Material and methods

- Network of farms: 1180 year-farms over the period 1987-2010
- Calculation ex-post of GHG emissions and energy consumption (farm level) using technico-economic data (and modelling)
- LCA method (from cradle to farm gate)

Device

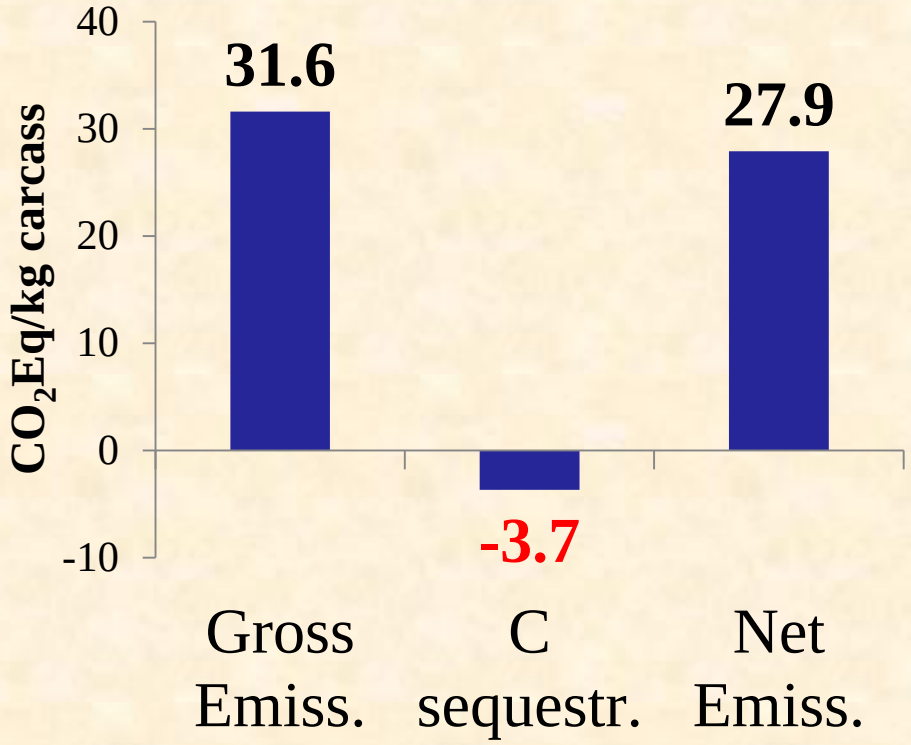
Network of sheep farms:



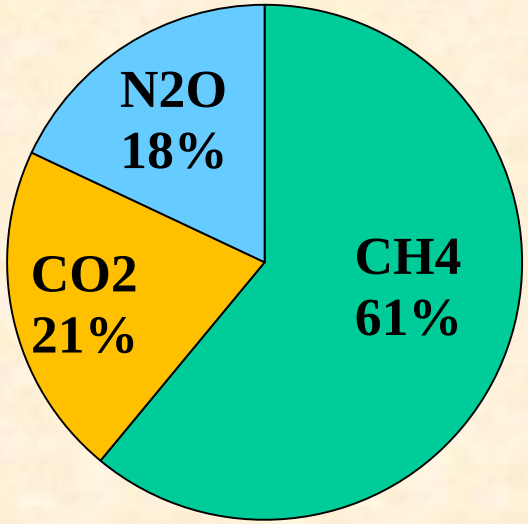
114 farms in plain and mountain areas
n = 49 per year on average (1987-2010)
Total: 1180 'year-farms' including 80 on organic farming

- **Various production systems and breeds**
- **Various technical and economic performances**

GHG emissions: average level and components



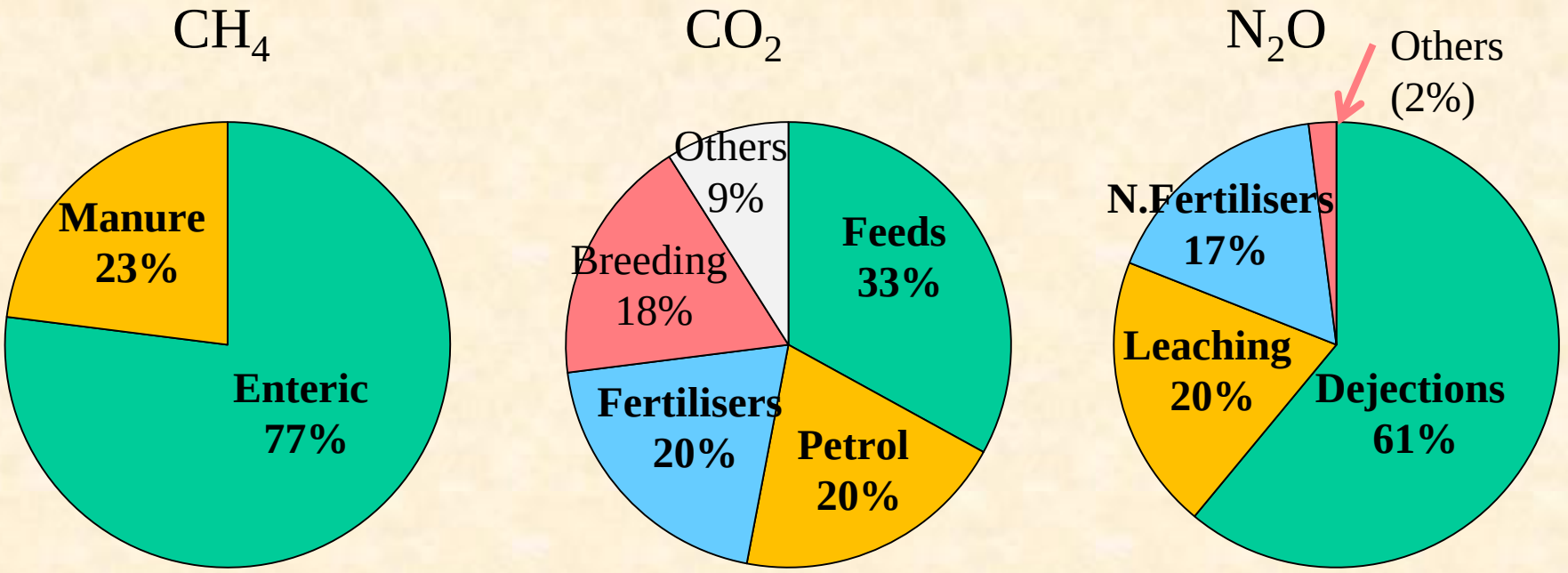
Gross GHG emissions



Carbon sequestration = **12%** of gross emissions

(Leip et al. 2010, final report JRC Europ Comm)

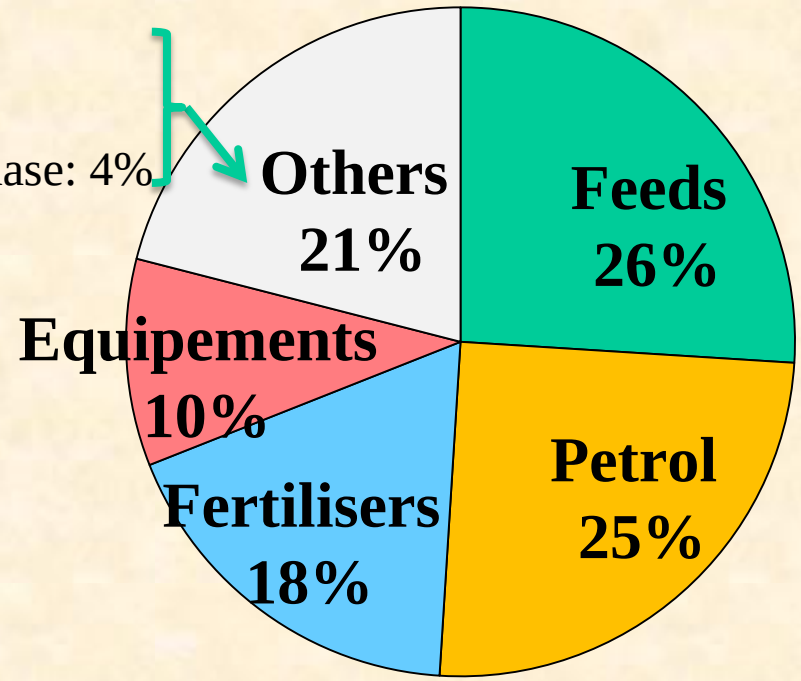
Gases: what origin?



Energy: what origin?

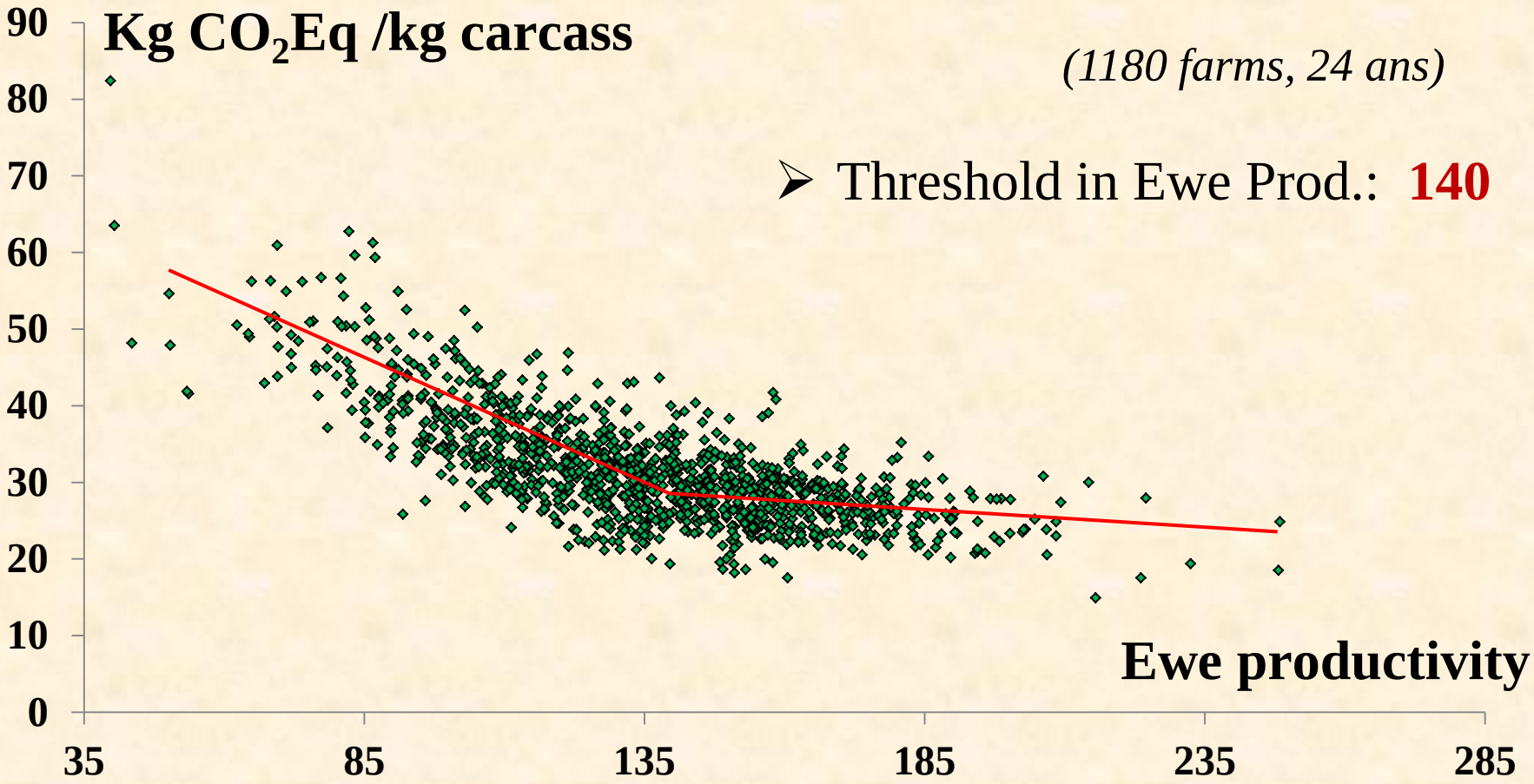
Total = 80 MJ/kg carc

Mainly
Buildings: 4%
Electricity: 4%
Breeding purchase: 4%



Variability in GHG emissions

Firslty in relation with ewe productivity



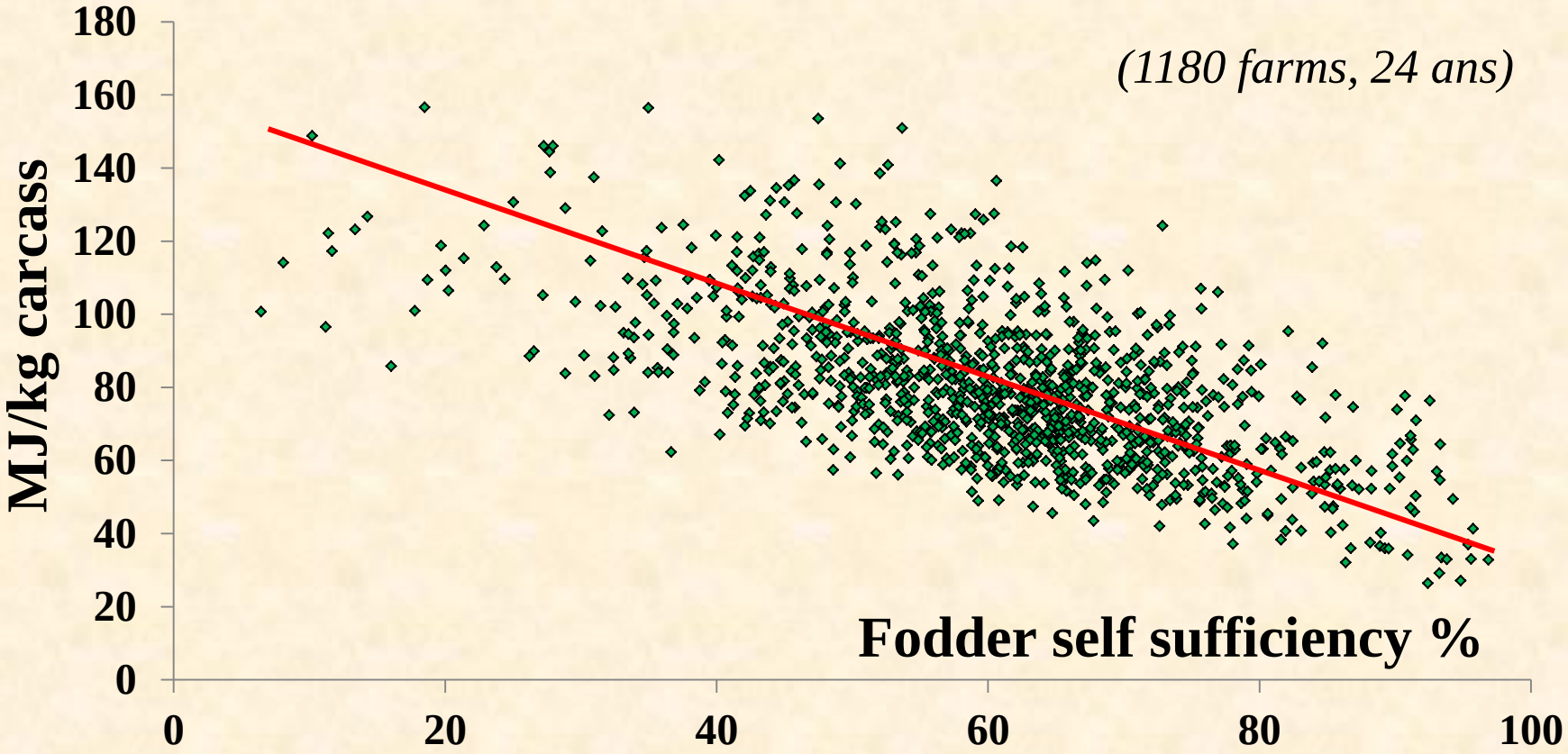
(1180 farms, 24 ans)

- Threshold in Ewe Prod.: **140**

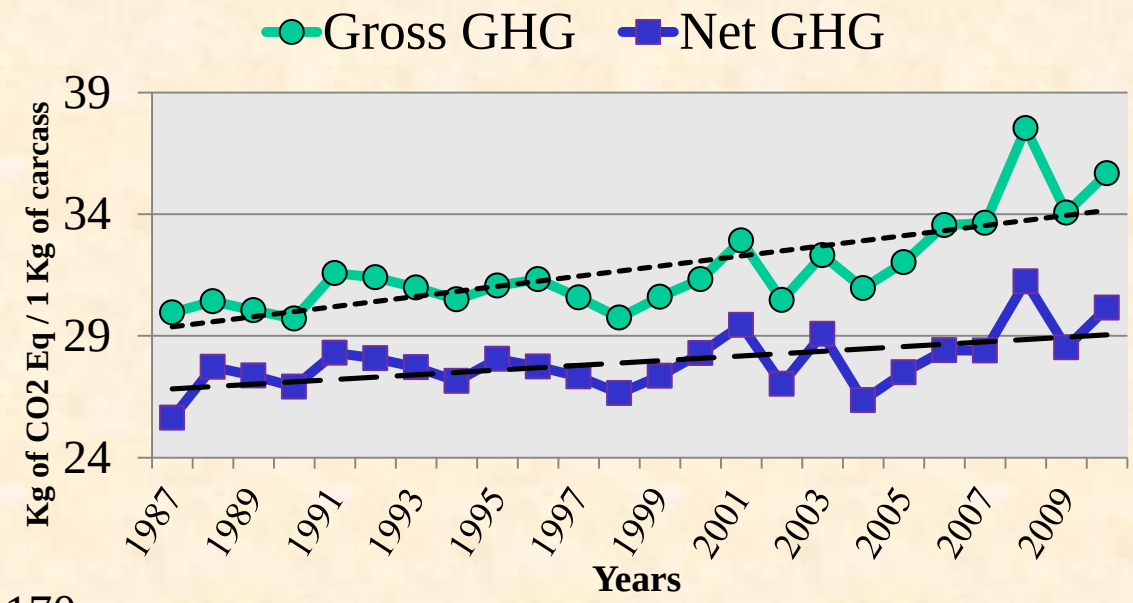
Variability in energy consumption

Firstly in relation with fodder self sufficiency

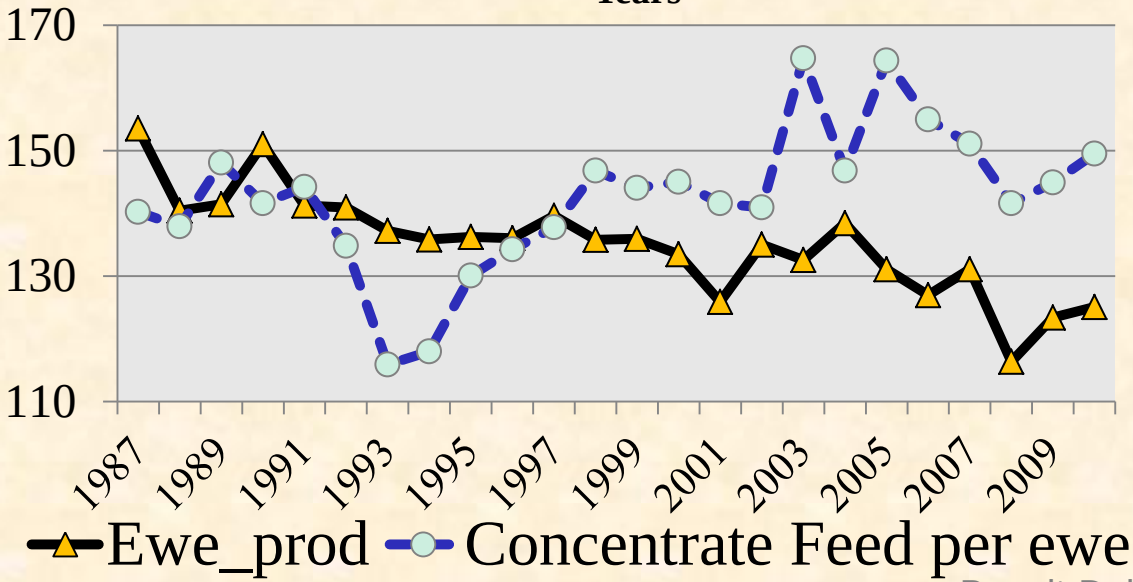
(% of meat produced after subtracting meat needed to pay all concentrates and fodder bought, in constant €)



Evolution in GHG emissions

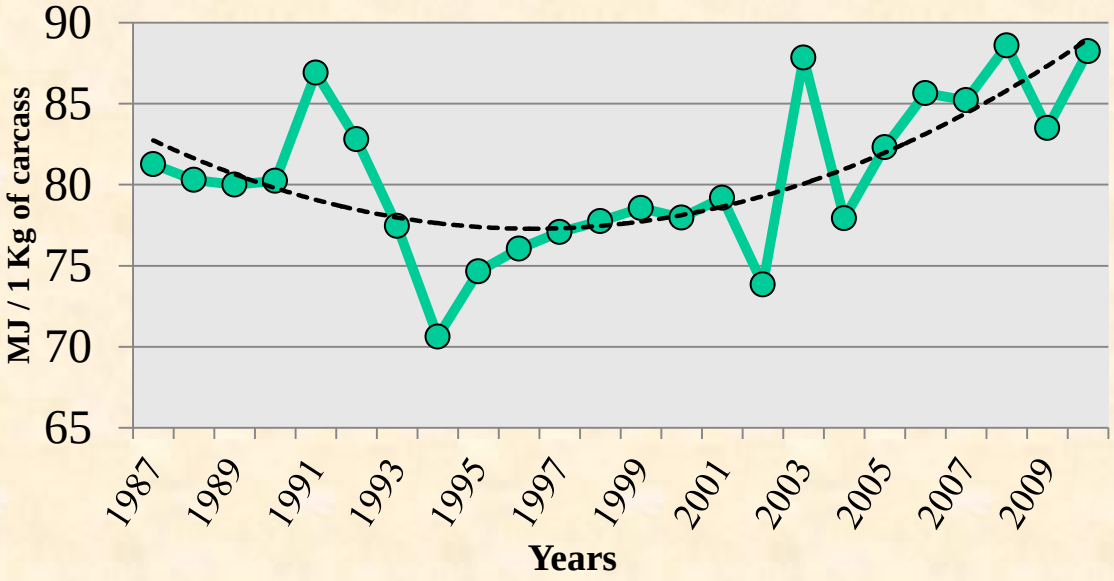


1988-2010:
Gross emissions:+17%
Net emissions: +9%
(more farms in mountain,
with more permanent grasslands)

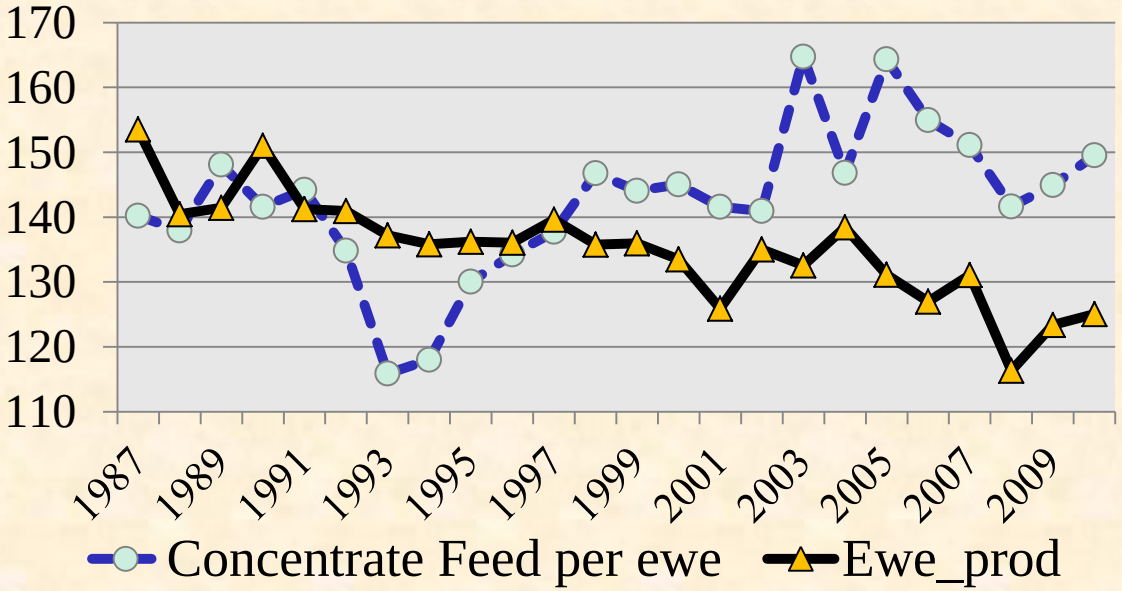


In relation with lower **ewe productivity** and increase in **concentrate** consumption

Evolution in NR energy consumption

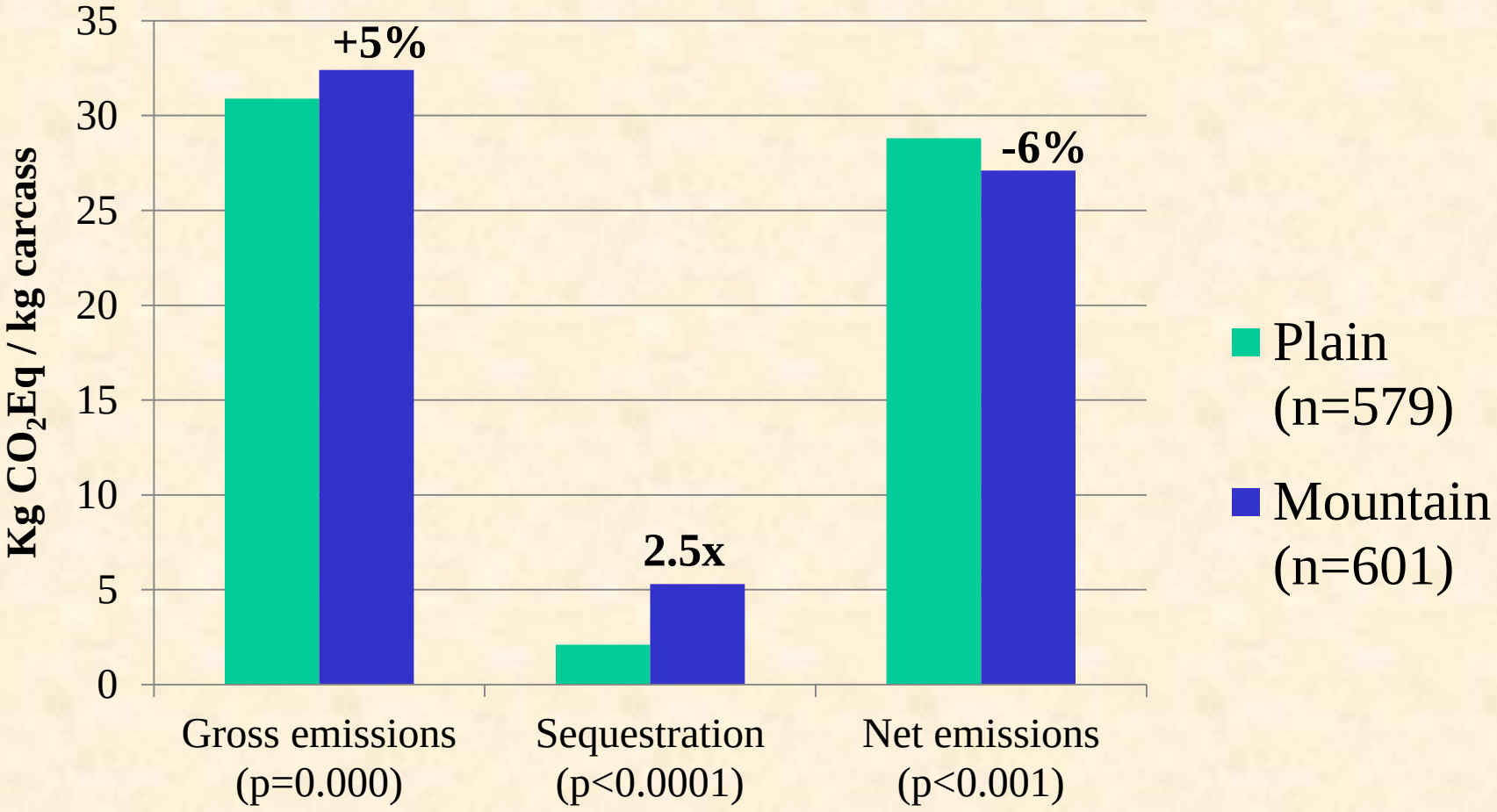


1988-2010:
NR energy: +10%

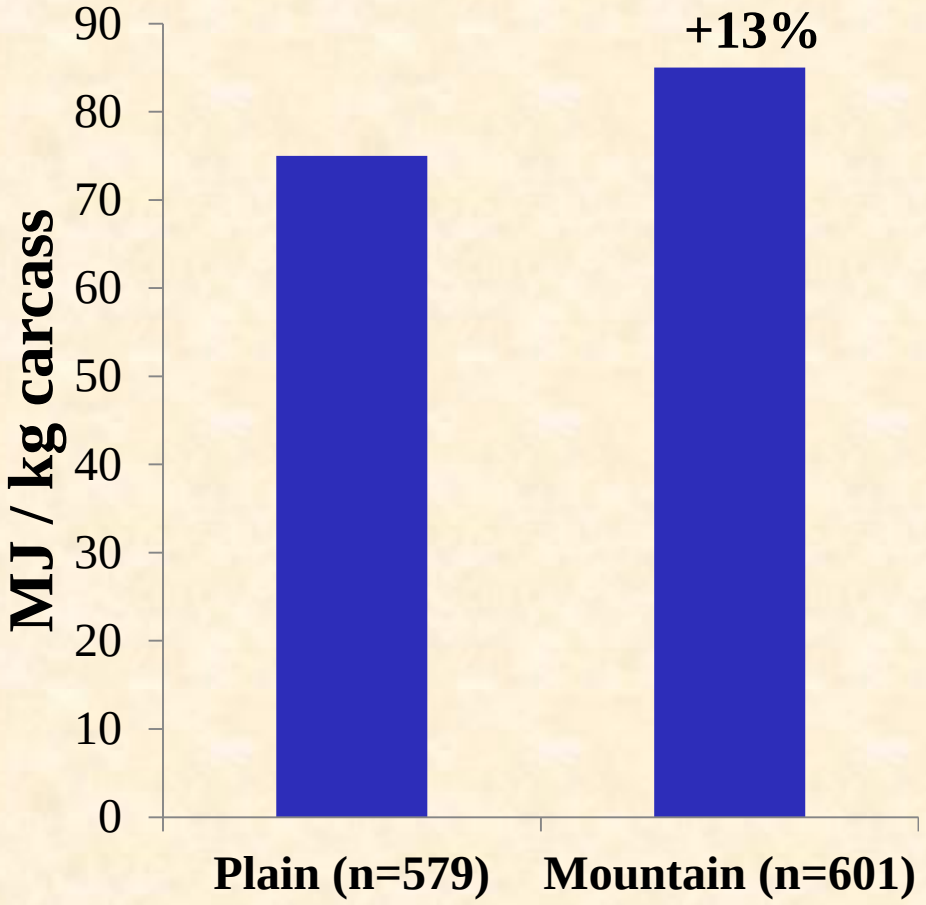


In relation with increase in **concentrate consumption** and lower **ewe productivity**

GHG: Plain *vs* Mountain



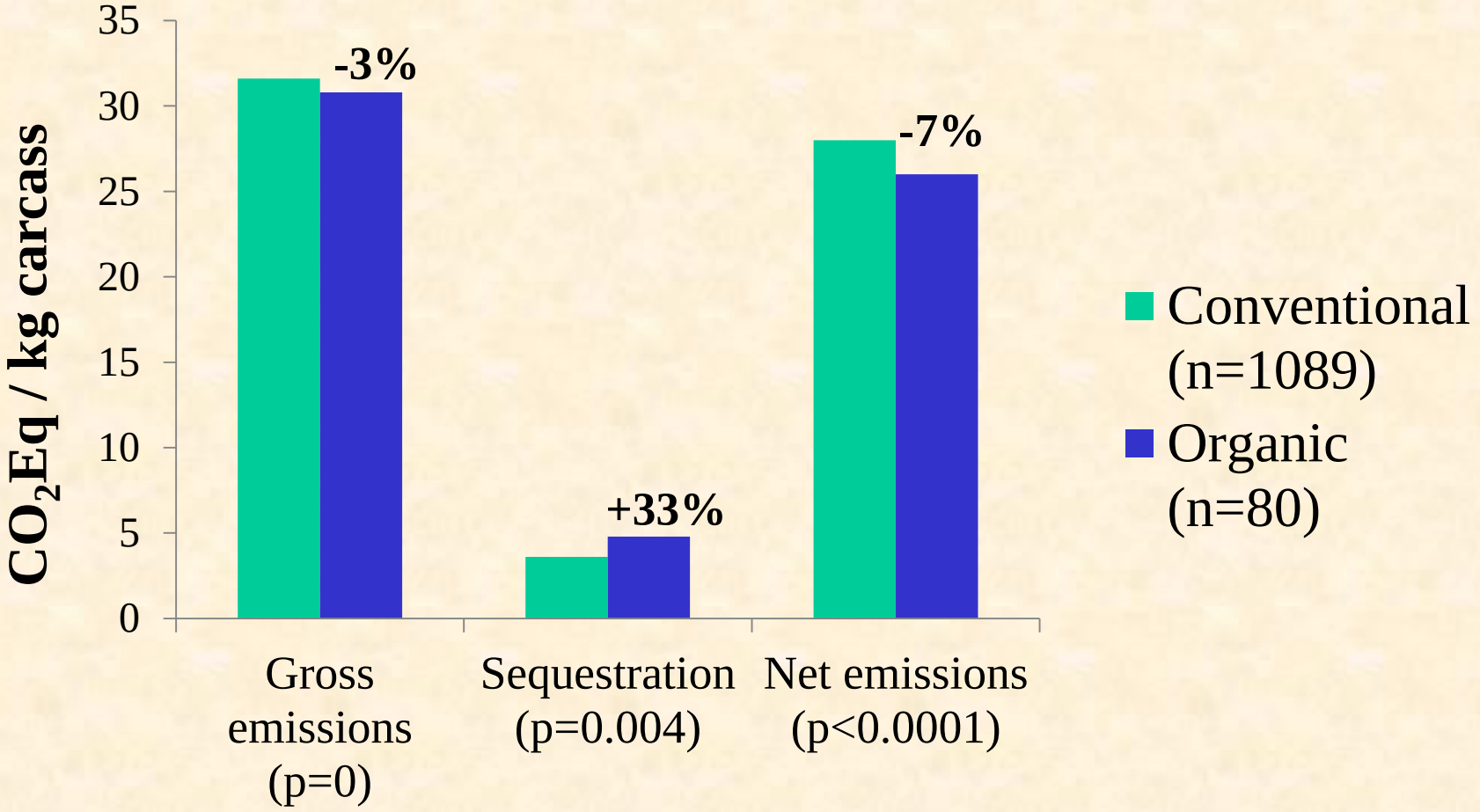
Energy: Plain *vs* Mountain



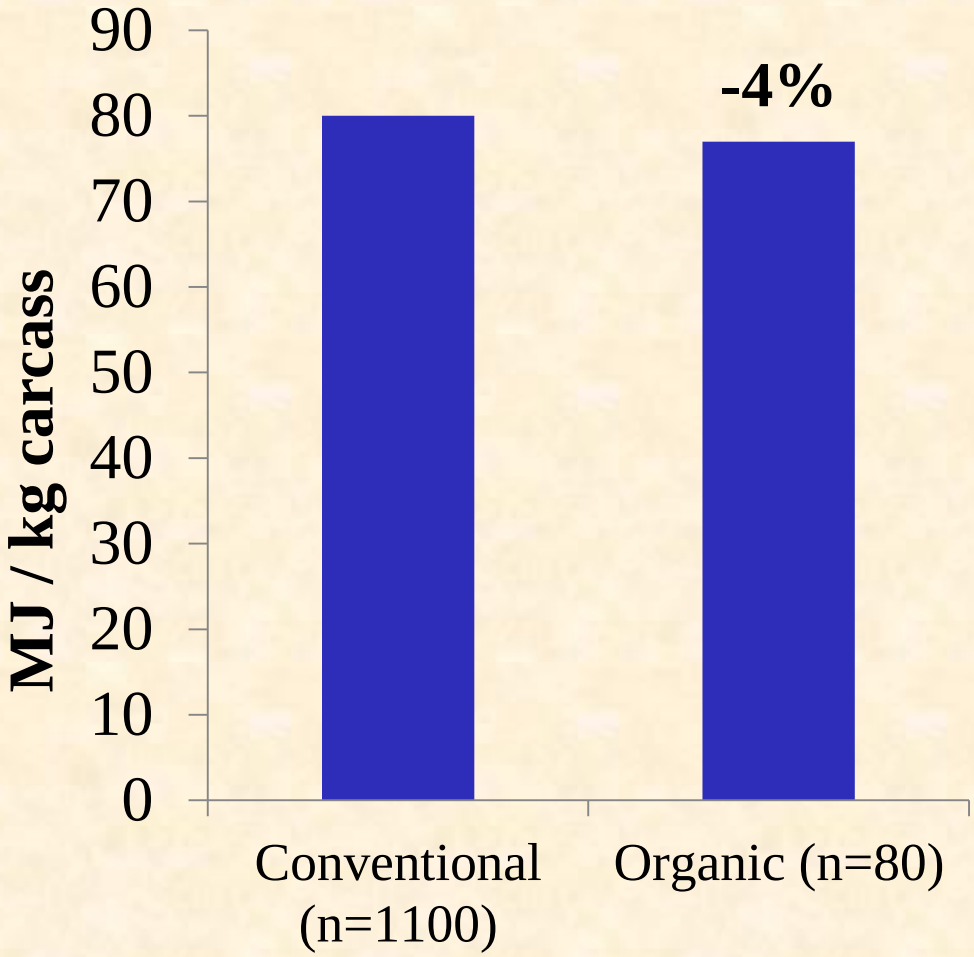
In Mountain:

more **concentrates** bought,
fuel for forages harvested

GHG: Conventional *vs* Organic Farming



Energy: Conventional *vs* Organic Farming



In organic:

higher **forage self-sufficiency**, **no synthetic fertilisers**

Conclusion

- 31.6 kg Eq CO2/kg carc ie 14.2 kg/kg alive, with a 12% offset by grassland carbon sequestration
- Ewe productivity: main factor for GHG emissions, with threshold effect
- Gross emissions: comparable with UK study (14.1, *williams 2008*) but higher than NZ (8.6, *Ledgard 2010*)
- Energy consumption: 80 MJ/kg carc, with major contribution of feeding
- We must remind that ewe productivity and feeding costs are major factors to be mastered for good economic results

Thank you for your attention

And thanks to the French ANR Systerra program for its financial support