Idele French livestock Institut

Environmental investment in ruminants farms

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The French livestock institute
A specialized R&D organization
by farmers for farmers

GENETICS
HUSBANDRY & ENVIRONMENT
FARM & PRODUCT QUALITY
ECONOMICS
FARMERS & SOCIETY

LIVESTOCK INFORMATION SYSTEMS
FARMING SYSTEMS & NETWORKS

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A hub organization in knowledge and innovation transfer
Embarking solid resources for quick responses and relevant strategies

- 12 experimental farms
- 200 Specialists (PhD, MSc)
- Network of 2,000 reference farms
- Hundreds of experts available within advisory networks & professional organizations
- Residential training facilities
- 11 Regional offices
Sharing knowledge
*a multifaceted mission*

**Expertise and audits**
- Spot diagnosis
- Studies
- Data processing
- Laboratory analysis

**Training and conferencing**
- Formal and vocational training
- Field days
- Conferences

**Project engineering**
- International technical assistance
- European scientific partnerships
- R&D programs support and project management
Disseminating information

*a flagship*

- 4,000 web articles
  - www.idele.fr
- Webzines and e-newsletters
- E-library
  - technipiel.idele.fr
- Present in 5 professional agriculture shows
- 3 economic news magazines
- 200 books published
- 9,000 participants in field days or conferences
- 1,500 trainees
Environmental issues

Jean-Baptiste Dollé, André Le GALL
Environment and Housing Department
Team:
Sylvain Foray, Elise Lorinquer, Vincent Manneville, Armelle Gac,
Syndie Moreau, Thomas Béchu, Chartier, Chambaut Hélène,
Jacques Capdeville, JL Menard, JY Blanchin, P.Michler, P.
Tresche
Livestock: negatives impacts… and positives contributions!

- Landscape
- Biodiversity
- Territory
- Ressource
- Eutrophication

Air
- GHG (Livestock = 11%)
- Ammonia (Livestock = 45%)

Élevage

Eau

Soil/Natural Resources
- Energies fossiles (Livestock = 2%)
- C sequestration

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Evolution of items

1990... → 1995... → 2013...

$\text{NO}_3$ → $\text{NO}_3, \text{NH}_3, \text{Pesticides}$ → $\text{N, P, GHG, Pesticides, Water ressources, Energie, Biodiversity}$

Territory → world
Aim: combine profitability and environnement

Herd → Housing - Storage → Forage / crops

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1992 – 2010, many studies on manure management

- To collect urine and faeces in housing systems
- To store manure
- Avoid direct water contamination from buildings
- Produce manure/slurry types adapted to soil constraints, spreadable, avoid dilution, etc.
- Better knowledge of organic fertilizers types to advice farmers in best way to use them
1992 – 2010, many studies and investments...

- In manure processing (composting, traitment)
- Manure valorization by plants
- In dirty water management
Less nitrates in breeding regions

Average nitrates concentration 1992-1993 and 2010-2011

Surface water

Decreasing: 0.8 to 1 mg NO₃/liter/year since 1995
Experimentations

28 M d’€
de budget annuel
248 salariés
80 % des ingénieurs
en régions

12 sites régionaux
7 délégués régionaux
12 stations expérimentales
2000 fermes suivies
en réseaux

Site d’implantation de l’Institut de l’Élevage
Unités expérimentales : ♂ bovins lait ♀ bovins viande ♀ veaux ♀ ovins viande ♀ caprins
Minimise water pollutions in farming systems

- Whole farm approach: NPC fluxes measurements
- Analyse nitrate leaching risk and find best management

Soil N content when drainage start

**Farm gate balance**
Emission Factors acquisition

Ammonia measurement after manure application
Emission Factors acquisition

Nitrous oxide measurement on pasture
Emission Factors acquisition

Ammonia and GHG measurement in housing

Deep Litter => FYM

Cubicles => slurry
Multicriteria Environmental Analysis
On French database

French database construct to give national **technical**, **structure**, **economic** references

Farms with same characteristics than the national typology

1420 farms **multi-species** (ex 400 dairy farms)
Energy efficiency

Optimum level, intermediate and high level of energy consumption in farms

<table>
<thead>
<tr>
<th></th>
<th>Economes</th>
<th>Intermédiaires</th>
<th>Consommatrices</th>
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<tbody>
<tr>
<td>Grass based</td>
<td>2100</td>
<td>3100</td>
<td>4050</td>
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<tr>
<td>Grass+ maize</td>
<td>2250</td>
<td>3100</td>
<td>3900</td>
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<tr>
<td>Maize mainly</td>
<td>2500</td>
<td>3500</td>
<td>4650</td>
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</table>

Farm buildings: "positive energy"and eco-conception
High variability in milk or beef Carbon emission

- No difference between systems
- 1.2 to 1.3 kg CO$_2$/liter milk
- Important variability within system

- More differences between systems
- 0.8 to 1.2 kg CO$_2$/liter milk
- C storage compensation in a range of 5 to 35%
A positive evolution of the carbon footprint!
Developpement of environmental tools for advisers and farmers
Software on environmental items

1997

**Dexel** : water pollution prevention, slurry storage adapted to spreading favorable time

**Composim** : nutrients in slurry link to animal feed and type of buildings and storage

**Methasim** : to analyse opportunity to biogas plant on farm

**Diaterre** : energetic diagnosis on farm to reduce reliance and increase of cost productions

**CAP2ER** : Cycle analysis "eutrophisation, acidification, climate warming"
CAP’2ER tool

**Simplified level**
- To be used easily by farmers,

**Complete level for advisers**
- To calculate Environmental issues
- To link environment and practices,
- To build mitigations plan
- To build national observatory,

> 15 technical parameters

> 100 technical parameters

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The French dairy production carbon plan
LIFE CARBON DAIRY 2013-2018

Task: - 20% GHG emissions in 10 years

- Bring to dairy farmers and stackholders the methodologies and tools to know the climate change problematic and modify their practices
- Promote innovative practices and sustainable dairy systems at technico-economic, social and environmental level
- Set up a national dynamic to demonstrate to farmers and stackholders the interest and the feasibility of a carbon plan
- Develop the climatic road map of the dairy production by describing mitigation techniques, innovative systems and the partnership strategy to be set up at the national level to apply this plan
6 pilots régions

- 3,900 demonstration farms
- 60 innovatives farms
- 5 technical actions

FD : Démonstration farms
FP : Innovative farms
Large french partnership

The LIFE CARBON DAIRY beneficiaries

Partners associated to the dairy production carbon plan

La volonté d’impliquer l’ensemble des acteurs de la filière pour construire la feuille de route climatique et la stratégie partenariale
European projects: 10 years of exchanges

Green dairy: N efficiency in dairy farms Atlantic area

Dairy Man: Nutrient, GHG, exchange between farmers

Cantogther: take advantage to grow crops and animals to enhance NPC cycling, and profitability

Euro dairy ...
Nitrogen efficiency
GHG Emissions

Carbon footprint kg eq CO2/tonne milk

- Belgium
- France
- Germany
- Ireland
- Lux
- Netherlands
Not only cattle farms!

Lamb carbon footprint France/ NewZealand

kg eq CO2/kg sheep LW

FR - In shed
FR - Grass Lamb
NZ

Energy use on fam
Inputs
Grazing
Fertiliser spreading
Manure at storage
Manure in housing
Enteric fermentation

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Others investigations:
Water Footprint
Biodiversity
Pesticide use...
Collaboration

Élevage

Air

Landscape

Biodiversity

Territory

Ressource

Eutrophication

Eau

Soil/ Natural Ressources

GHG

Ammonia

Energies fossiles

C sequestration

Nitrate leaching
The European project Dairyman

Grass systems

Maïze + grass system (feeding)

Maïze + grass system (pasture)
More milk/cow and less mineral fertilizer

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<tr>
<th></th>
<th>L milk/cow</th>
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<th>concentrate g/l lait</th>
<th>g CO₂ / l milk</th>
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<td>2010</td>
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