



French livestock farm as a solution to preserve high organic carbon soil in agri-ecosystem

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agriculture • alimentation • environnement



Grasslands : a multi-services ecosystem

Feeding human

Grazing = low fuel use



Open landscapes with
flora and fauna biodiversity

Soil-Air –Water Quality

Fewer pesticides than crops
and lower fertiliser use

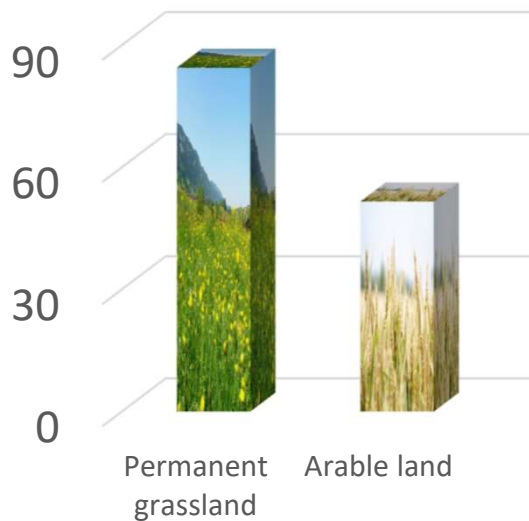


C storage /
climate change
mitigation

> 50% of GHG emission in
French cattle farms are CH₄

Grassland soils contains high organic carbon stocks to be preserved (in sustainable grass-based systems) or increased (grass duration, management)

Average C Stock in soil (0-30 cm) T. C /HA



Pellerin et al., 2019

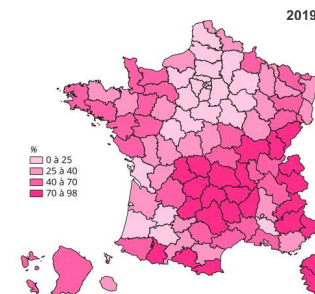
Source : RMQS



Grassland area in France

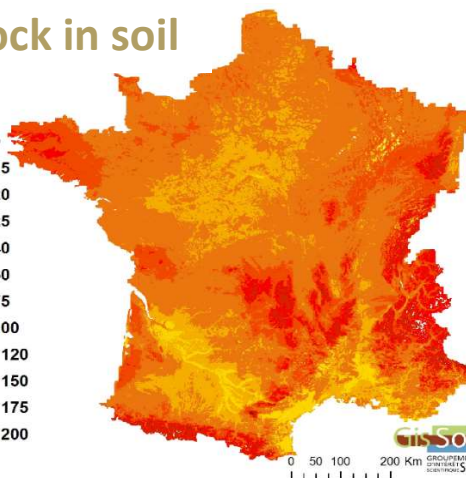
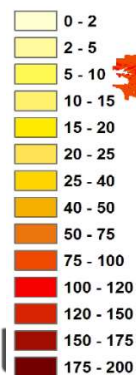
44 % AA (2019)

Part des prairies¹ dans la SAU du département
France métropolitaine : 44 %
France : 44 %



1. Prairies artificielles, temporaires et surfaces toujours en herbe.
Source : Agreste - Statistique agricole annuelle

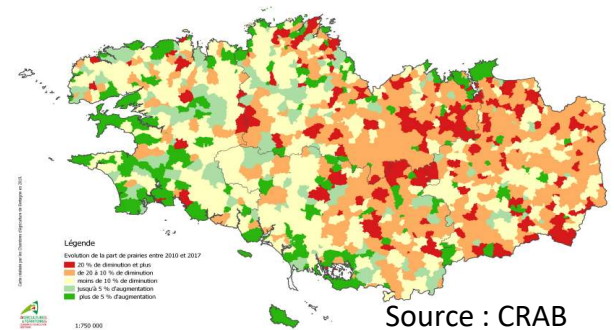
C Stock in soil



Source: Gis Sol, IGCS-RMQS, Inra 2017.

Evolution of grassland area (%AA) in Brittany from 2010 to 2017

Evolution de la part de SAU cultivée en prairie entre 2010 et 2017
Sources RFG 2010 et 2017 - données AGI



Source : CRAB

Réduction

- > 20%
- 10-20%
- < 10%

Increase

- < 10%
- > 10%



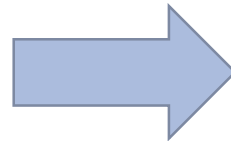
CarSolEl: a tool to predict soil C trends

Carsolel is a metamodel (statistical approach Random Forest)

based on 563000 simulations with Stics (crop – ley arable) and PaSim (perm.grass) models (Pellerin et al.,2020) *built with 80% dataset and validated on the 20% remaining*

1- Location

- Temperature, rain
- Soil type, % OM

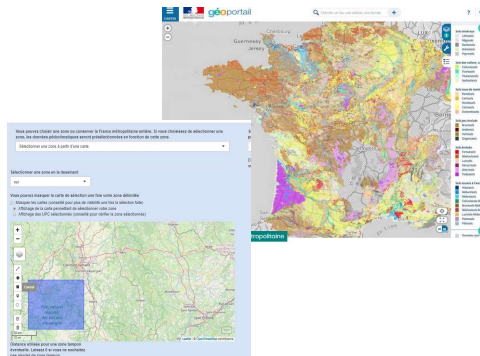


Management

- Grazing periods, LSU/Ha
- Number of cut, yield
- Fertilisation application , N fixation

Grass-Leys +

- Years crops/ grass
- Fertilisation
- cover crop
- Irrigation



Change in C soil

- Over 30 years
- Upper soil layer



Change in management
Improved Ecosystem

Prediction error: 40 to 50 Kg C.ha-1.yr-1

Embedded in LCA based tools (eg CAP2ER)

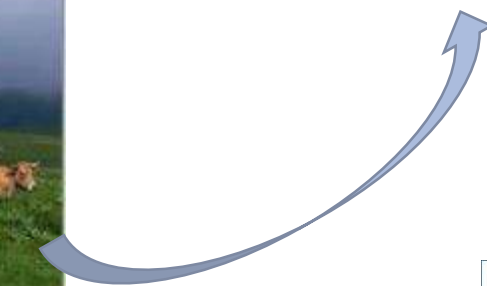
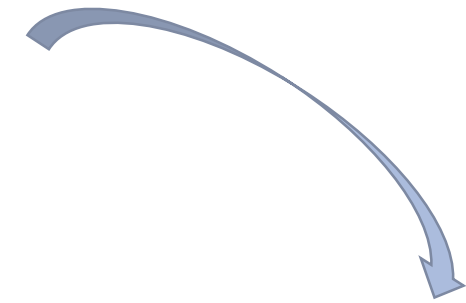
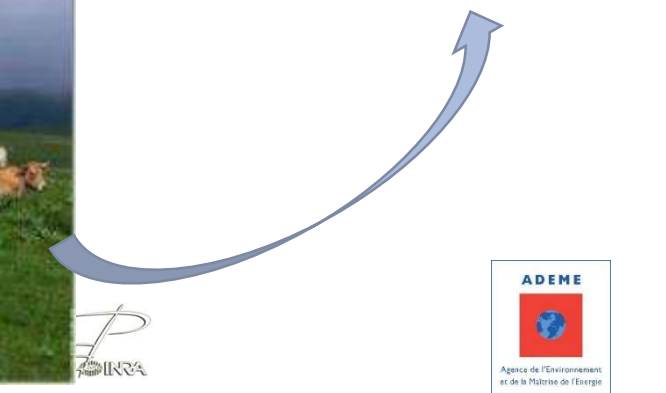
A multi-stakeholder approach to generate a global assessment tool

25 000 farms assessed in France, free access <http://idele.fr/services/outils/cap2er.html>

- Dairy low impact



- BEEF low impact



Design change in management, check, valorise the effort : Label Bas Carbone

<https://www.france-carbon-agri.fr/>



Thank you for your attention





Intensification ↔ efficiency
Émissions/unit of product

Extensification ↔ biodiversity,
Lower émissions per hectar

More crops, less animals/ha
Increase in pesticide use,
erosion risk,
Lower organic matter

Climat/soil contact
Rural developpement