Impact of Integrated Crop-Livestock Systems (ICLS) on Soil Microbial Communities and Fertility

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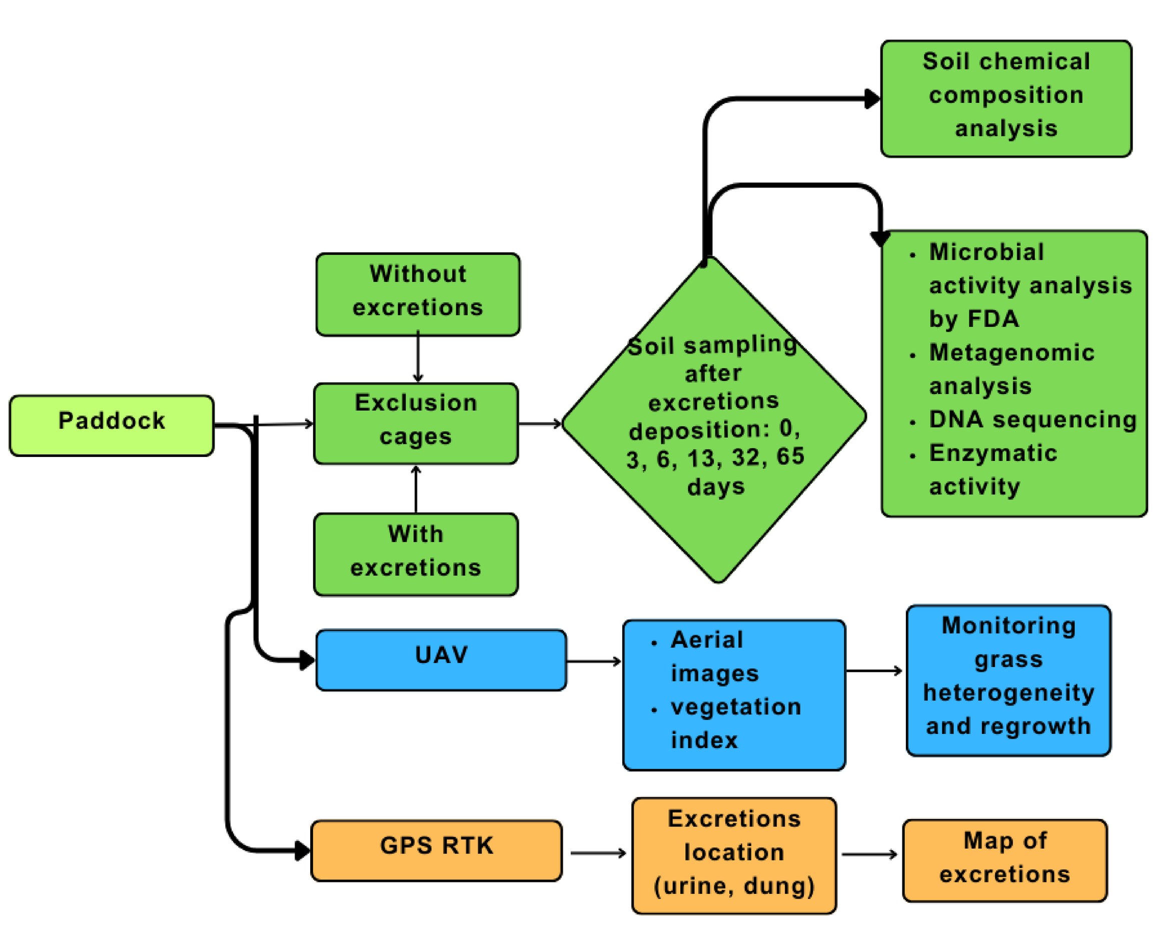
PROJECT BACKGROUND AND MOTIVATION

- **ICLS** integrates livestock into crop rotations through grazing of temporary grasslands and/or intercrops, reconnecting livestock and crop farming.
- Grazing animals improve **soil fertility** by the return of manure.
- **Heterogeneity** of droppings and urine influence soil biology and its fertility.
- Very few studies exist about the impact of ICLS on **soil microbiota** in temperate climates

QUESTION

Adopting an icls rotation, how does the integration of animals in crop rotation impact **microbial life** and **chemical composition** of the soil, and **crop yield after spatial heterogeneity in vegetation and nutrient distribution?**

PROJECT IMPLEMENTATION



Sheep excretions location

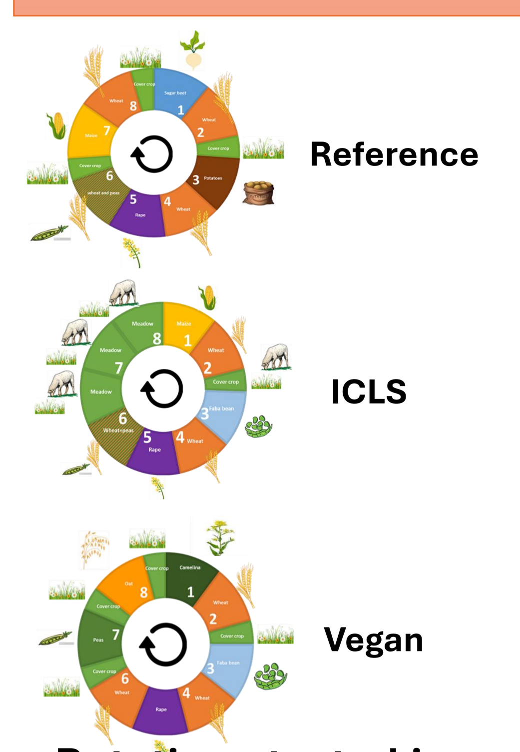
Biomass evolution monitoring

CONCLUSION

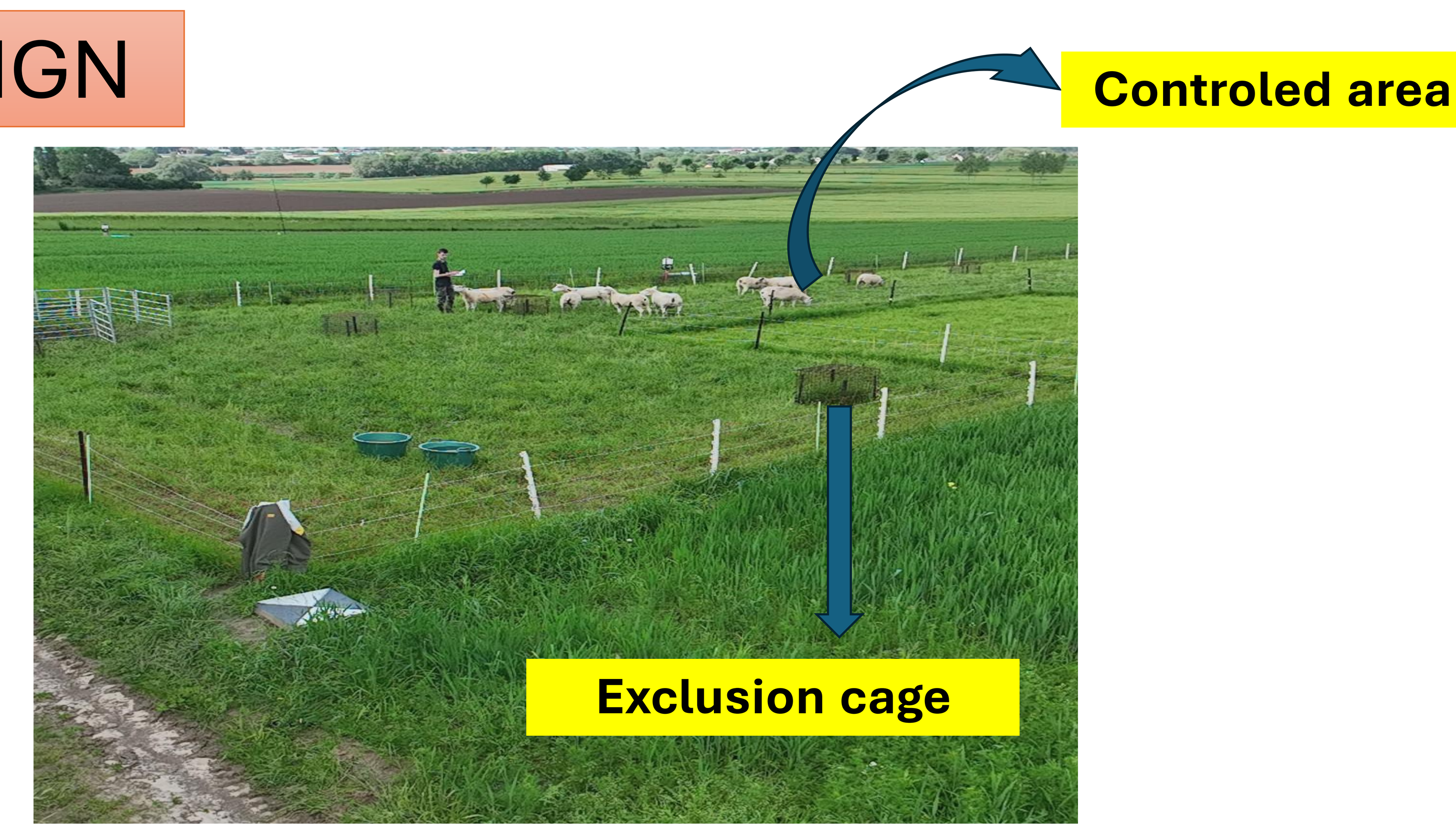
The presence of sheep droppings impacts microbial life and the chemical composition of the soil.

A more detailed analysis of the data will be carried out using metagenomic analysis with DNA sequencing to highlight the diversity and abundance of the microorganisms under the presence of droppings and urine. In 2025, the study will focus on the persistence of spatial heterogeneity and its impact on nutrient distribution and maize performance.

PROJECT DESIGN



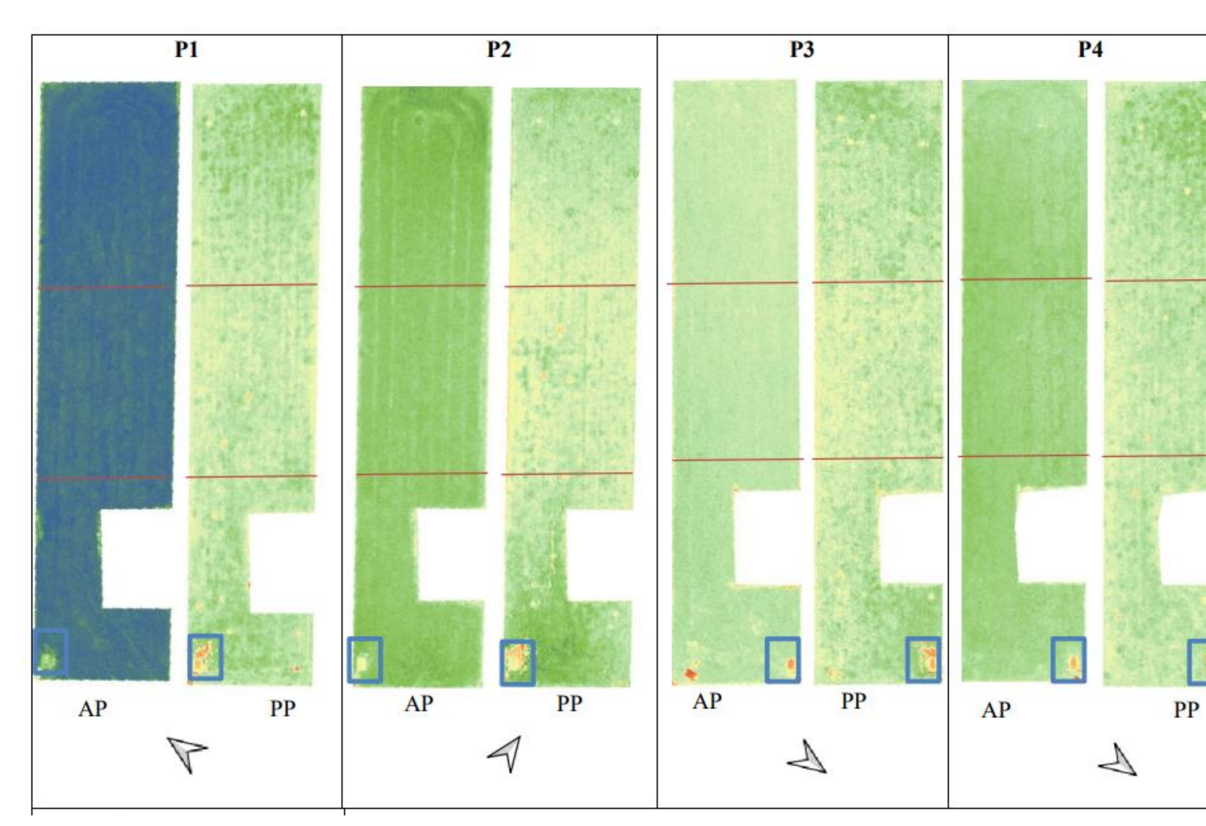
Rotations tested in Ecofoodsystem



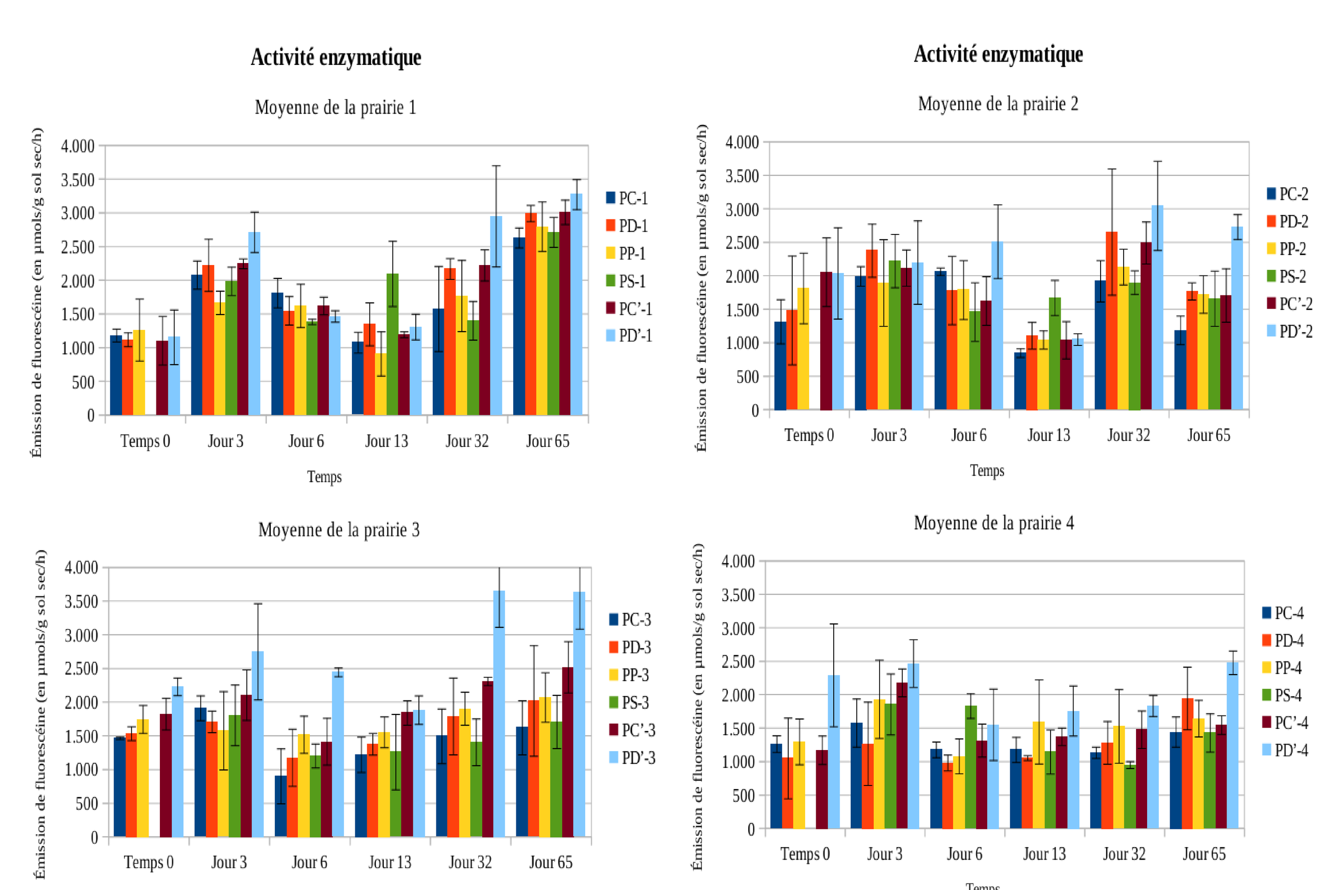
Experimental setup

KEY RESULTS

- Preliminary results indicate changes in microbial activity linked to manure deposits.
- Aerial images showed a reduction in NDVI, from 0.42–0.90 before grazing to 0.42–0.45 after.
- This decrease, associated with increased spatial heterogeneity (NDVI SD: 0.02–0.12 to 0.15–0.22), correlates positively ($r = 0.697$, $p < 0.01$) with manure density and vegetation regrowth.



NDVI evolution under sheep grazing



PC: control points; **PD**: droppings points; **PP**: grazing points

Soil microbial activities in four temporary grasslands under droppings

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