



INRAE



Master internship open on 2025

Paris or Montpellier, France

## Automatic calibration of a digital twin model of a dairy farm

### Context and objectives of the internship

As agroecosystems, dairy farms are complex systems subject to the vagaries of changing markets, climate, landscapes and societal expectations. The management of dairy cows by optimizing their feed and reproduction is a major lever to ensure economic performance, reduce environmental impact and improve animal welfare (e.g., health, longevity). This internship is part of the InSiliCow research project, which aims to develop a decision-making tool based on digital twins of dairy cattle farms adaptable to various contexts (e.g., farming system, availability of data and information). The aim of this internship is to provide a tool for the automatic calibration of the model developed by the MoSAR unit as the core for digital twins. The statistical methods to be used during the internship are based on Bayesian inference, ABC methods and recent machine learning methods (Random Forest and neural networks). The internship student will have to familiarize himself with the inference algorithms developed in the Mistea unit and adapt them to this specific case study.

### Keywords

Approximate Bayesian Computation methods, Machine Learning, Digital Twin, Dairy farm

### Required skills

We are looking for a background in **applied statistics** with a taste for applications. Knowledge in the field in agronomy is not required. Good programming skills are required (typically in R).

### General information

**Duration:** 6 months

**Indemnity:** around 600 euros/month

**Location:** Montpellier or Paris

**Application deadline:** February 2025

### Contacts

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### About the research center

The internship can be based at the [Gaillarde campus of Montpellier Institut Agro](#) or [Paris-Saclay AgroParisTech campus](#). The internship will be supervised by Bertrand Cloez, working in mathematics, and Olivier Martin, working in animal science, both researchers at INRAE (Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement).

### References

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**Martin O** & Sauvant D (2010). A teleonomic model describing performance (body, milk and intake) during growth and over repeated reproductive cycles throughout the lifespan of dairy cattle. 1. Trajectories of life function priorities and genetic scaling. *Animal*, 4(12), 2030-2047. <https://doi.org/10.1017/S1751731110001357>

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