RÉPUBLIQUE FRANÇAISE
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INRAE

INTERNSHIP OFFER

Master 2 – Dynamic modeling of cattle herds and simulation of farming practices

The French National Research Institute for Agriculture, Food, and the Environment (INRAE) is a public research establishment gathering a community of 12,000 people with more than 270 units including fundamental and experimental research, spread out throughout 18 regional centres in France. Internationally, INRAE is among the top research organisations in agricultural and food sciences, plant and animal sciences, as well as in ecology and environmental science. It is the world's leading research organisation specialising in agriculture, food and the environment. Faced with a growing world population, climate change, the depletion of resources and declining biodiversity, the Institute has a major role to play in providing the knowledge base supporting the necessary acceleration of agricultural, food and environmental transitions, to address the major global challenges.

Work environment, missions and activities

You will work in the Herbivores joint research unit (UMR). The mission of this unit is to produce, integrate and disseminate knowledge, and share expertise to design multi-performing herbivore farming systems that meet the challenges of global change (environmental, socio-economic and digital transition). The unit has 118 permanent staff and welcomes 70 non-permanent staff each year. It is organized into 4 research teams, a management team and a support team.

You will join the STARQ team (Livestock Systems, Agroecological Transition, Resilience, and Product Quality). You will also interact with researchers from the ASSET, UREP, and GABI units of INRAE.

The project you will be involved in, titled OPTI-HERD ("Which livestock farming practices help cattle herds become more resilient and efficient while limiting greenhouse gas and nitrogen emissions in the face of environmental disturbances? A modeling approach"), is funded by the CLIMAE Metaprogram (2026–2027). Its objective is to develop an interdisciplinary modeling tool to identify and evaluate agroecological practices likely to both improve herd resilience to environmental shocks and significantly reduce carbon and nitrogen emissions.

Resulting from collaboration between experts in genetics, animal science, economics, soil, and environmental sciences, OPTI-HERD aims to produce knowledge and operational tools to support stakeholders in transitioning to more sustainable and better-adapted livestock farming systems that address current and future challenges.

Your main mission will be to model the performance and GHG emissions of dairy and beef cattle herds using a dynamic approach based on population dynamics theory. Initially, an existing modeling tool from the literature–such as Godde et al. (2019), PaSim, SEBIEN (Jouven and Baumont, 2008), or another–will be selected, then adapted and enriched to meet the project's objectives.

You will be specifically responsible for:

1. Critically reviewing the literature to identify relevant existing models for the project and conducting a comparison of their strengths and limitations;

2. Adapting and expanding the selected model through coding exercises, then calibrating it using available datasets;

3. Performing a sensitivity analysis of the model.

Specific working conditions: Openness to working in a multidisciplinary team. Work primarily on screen-based tasks, with opportunities to visit experimental beef and dairy cattle facilities.

Bibliographies

Godde, C., Dizyee, K., Ash, A., Thornton, P., Sloat, L., Roura, E., Henderson, B., Herrero, M., 2019. Climate change and variability impacts on grazing herds: Insights from a system dynamics approach for semi-arid Australian rangelands. Global Change Biology 25, 3091–3109. doi:10.1111/gcb.14669
Jouven, M., Baumont, R., 2008. Simulating grassland utilization in beef suckler systems to investigate the trade-offs between production and floristic diversity. Agricultural Systems 96, 260–272. doi:10.1016/j.agsy.2007.10.001

Training and skills sought

Recommended training: Engineering or university program in animal production, agronomy, or environmental science.

Desired knowledge: Livestock systems, environment, and cattle production (beef or dairy), and knowledge of the concepts of resilience, adaptation, and mitigation.

Appreciated experience: Basic mecanistic modeling, data analysis, literature review, R software.

Skills: team work, autonomy.

INRAE's life quality

By joining our teams, you benefit from (depending on the type of contract and its duration):

- 2.5 days of leave per month worked;
- sports and cultural activities;
- financial contribution to public transportation costs
- collective catering.

Contract details

- Hosting unit name: **UMR Herbivores**
- Postal code and city workplace: **63122 St Genès Champanelle**
- Type of contract: **Internship**
- Duration: **6 months**
- Starting date: **As soon as possible**
- Remuneration: **€4.35 per hour of actual attendance**

How to apply

Please send a cover letter and CV by e-mail to:

Luciano BARRETO-MENDES – luciano.mendes@inrae.fr

And

Hieu NGUYEN-BA – hieu.nguyen-ba@inrae.fr

✖ Deadline to apply: **31/10/2025**

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