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Val de Loire Centre

Decembr 2021

INRAE





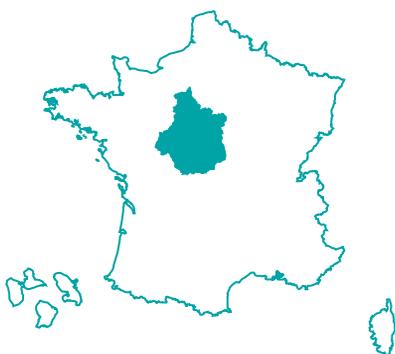
Marc Guérin
President of the Val de Loire Centre
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“With research units in Orléans, Tours, Nogent-sur-Vernisson and Bourges, the INRAE Val de Loire Centre carries out research on animal biology, trees and associated organisms, animal health and the sustainable management of livestock, forests and soils.”

THE VAL DE LOIRE RESEARCH CENTRE

With a staff of nearly 800, including 632 permanent INRAE employees, the INRAE Val de Loire Centre conducts generic research and integrated, multidisciplinary studies, which are sources of innovation for the improved sustainability of natural resources and agricultural and forestry systems, as well as the biodiversity associated with them. Thanks to its technological platforms, analyses can be carried out at the different scales of the molecule, the individual, the populations and the ecosystem. Imaging can now be used to visualize and monitor physiological and physiopathological mechanisms over time. Spread out over 1,500 hectares, the Centre's experimental facilities make it possible to develop new models and to study genetic, animal, plant and microbial resources in order to acquire exceptionally original data. They also provide the possibility to test new sustainable approaches such as the anaerobic digestion of effluents.

Focused on themes that are particularly important for the future of agriculture, and already home to one of Europe's largest animal health research facilities, the Val de Loire Centre is developing numerous international partnerships, notably through the coordination of three European projects and three international associated laboratories located in Mexico, Argentina and China.



A UNIFYING IDENTITY

Positioned around the region's areas of excellence with more than 12% of local scientific resources, the Val de Loire Centre is a leading player in regional research with significant workforces at the Tours and Orléans research sites, encouraging cooperation with both universities. To do this, it relies on its research, experimental facilities and technological platforms as well as its genetic resources and animal and forestry models.

REGIONAL COHERENCE

Positioned around the region's areas of excellence, the Centre federates research in infectiology and natural resources. Its activities are in line with four of the region's five smart specialization areas: environmental metrology and engineering for activities that consume large amounts of natural resources; biotechnologies and health-related services; and services and ICT for heritage tourism. The Centre's policy of hosting private partners is broadly supported by the local authorities in the aim of promoting economic development.

Our main partners in the region



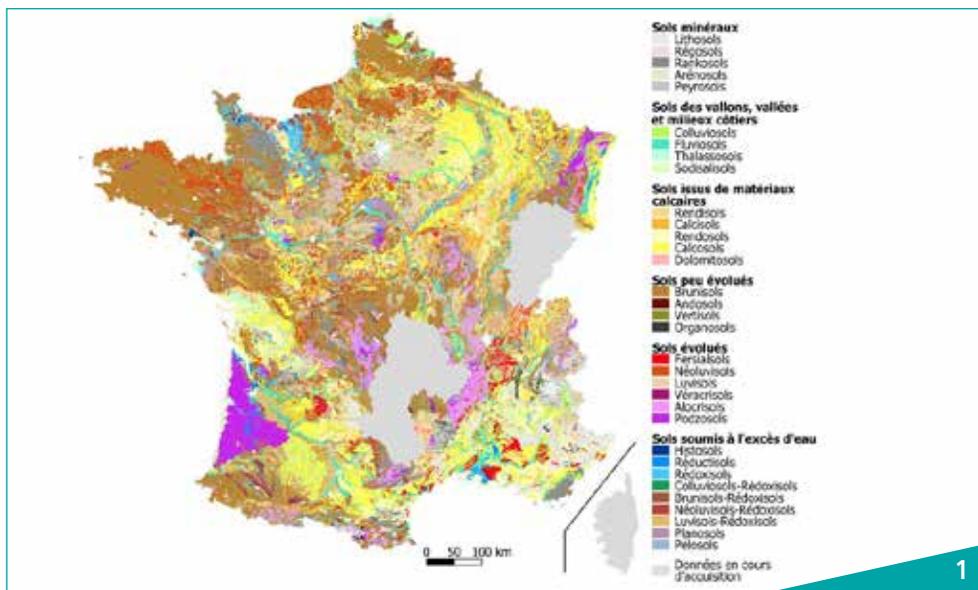
Our research priorities >

1 SOIL DYNAMICS AND ENVIRONMENTAL MANAGEMENT

2 INTEGRATIVE BIOLOGY OF TREES AND ASSOCIATED BIODIVERSITY FOR THE SUSTAINABLE MANAGEMENT OF FOREST ECOSYSTEMS

3 INFECTIOLOGY AND ONE HEALTH

4 INTEGRATIVE ANIMAL BIOLOGY AND SUSTAINABILITY OF LIVESTOCK SYSTEMS



© INRAE, GIS Sol, RMT Sols et Territoires

1

Soil plays a role in both agricultural production and environmental protection, and its study is particularly important for sustainable development.

Researchers are studying the interactions between the physical properties of soils, their greenhouse gas emissions and the quantitative management of water resources. The teams are also involved in national programmes for mapping and monitoring soil and for managing soil information systems, environmental research observatories and agricultural practices in cropping systems.

Research and service units:

- Soil Science Research Unit
- InfoSol Service Unit

Collective scientific facilities:

- European Conservatory for Soil Samples
- Rain simulator
- LabEx Voltaire
- ANAEE-S biology and health infrastructure
- Platform for studying soil-atmosphere exchanges on agricultural soils (PESAA)
- MiDi regional thematic network (Environment and Diversity)

Academic partners:

- French Geological Survey (BRGM)
- University of Orléans
- CNRS

2



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To ensure the sustainability of forest resources and the biodiversity they host, our teams study the wood formation mechanisms and integrate phenotypic and genomic measurements at different scales. Their research also focuses on the development of forest genetic resources for sustainable wood production in the context of climate change.

Research units:

- Integrated Biology for the Development of Tree and Forest Diversity Joint Research Unit (BioForA)
- Forest Ecosystems of Nogent-sur-Vernisson Research Unit (EFNO)
- Forest Zoology Research Unit (URZF)
- Biology for Woody Plants and Field Crops Laboratory (LBLGC) (contract-based unit)

Experimental unit:

- Forest Genetics and Biomass, Orléans (GBFOR)

Collective scientific facilities:

- Phenobois platform
- OPTMix experimental facility (Oak Pine Tree Mixture)
- EquipEx Xyloforest
- Genius biotechnology and bioresource project
- Connected and precision forestry project (Sycomore)
- EntomoCentre regional thematic network
- MiDi regional thematic network (Environment and Diversity)
- IN-SYLVA National Research Infrastructure for Adaptive Forest Management

Academic partners:

- University of Orléans
- University of Tours
- CNRS
- French National Forestry Office (ONF)



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Developed within the One health concept based on a global approach to animal, human and environmental health, this pole carries out research from three complementary angles:

- Understanding the host response;
- Studying the pathogen "under constraint" with a strong focus on the mechanisms of resistance to antibiotics and antiparasitics;
- Developing research to understand how pathogens evolve in the environment and in livestock, and how the infectious process develops at the population level in relation to ecosystems.

➤ **Research unit:**

- Infectiology and Public Health Joint Research Unit (ISP)

➤ **Experimental unit:**

- Experimental Infectiology platform (PFIE)

➤ **Collective scientific facilities:**

- LabEx MABImprove
- International centre for microbial resources dedicated to pathogenic bacteria for humans and animals (CIRM-BP)
- Infectiology Research Federation (FéRI)
- French research infrastructure to control infectious emerging or zoonotic animal diseases *via in vivo* exploration – EMERG'IN

➤ **Academic partners:**

- University of Tours



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Livestock systems must combine the three pillars of sustainable development: economic to ensure the competitiveness of the sector, social to guarantee the coexistence of small and large farms, and environmental to limit inputs and manage landscapes. To do this, researchers are conducting fundamental and applied research on the reproductive function and behaviours related to reproduction and social relations. The research teams produce academic knowledge and respond to the concerns of society, particularly with regard to livestock welfare, proposing innovations to improve the control of reproduction and social relations. Studies are also carried out in poultry physiology and genetics to improve the sustainability of poultry farming systems.

➤ **Research units:**

- Physiology of Reproduction and Behaviour Joint Research Unit (PRC)
- Avian Biology and Poultry Farming Joint Research Unit (BOA)

➤ **Experimental units:**

- Bourges Experimental Unit (P3R)
- Animal Physiology Experimental Unit (PAO)
- Poultry Farming Experimental Unit (PEAT)

➤ **Collective scientific facilities:**

- PIXANIM platform (Phenotyping & *in/ex vivo* Imaging from the Animal to the Molecule)

- LabEx MABImprove
- Animal biology infrastructure (CRB Anim), part of the French research infrastructure dedicated to agricultural resources (RARE)

➤ **Academic partners:**

- University of Tours
- CNRS
- The French Horse and Riding Institute (IFCE)
- Regional University Hospital Centre of Tours (CHRU Tours)

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and a research update
www.inrae.fr/centres/val-de-loire



➤ PARTNERSHIPS, RESOURCE ENHANCEMENT AND INNOVATION

Socio-economic and agricultural partnerships

The INRAE Val de Loire Centre hosts more than 30 employees of its agricultural partners and develops partnerships with chambers of agriculture.

It is home to four start-ups that grew out of its research, including two winners of the I-LAB national innovation competition co-organized by the Ministry of Research and BPIFrance. A policy aimed at strengthening these socio-economic partnerships is made possible through the support of local authorities, and has led to the establishment of an Allice team for the study of methods to aid reproduction. The centre hosts the headquarters of a number of its professional partners, such as the French Poultry and Aquaculture Breeders Technical Centre (SYSAAF) and the trade association that represents the wood sector in the Centre-Val de Loire region (Fibois CVL). It is equipped with an anaerobic digestion unit that processes animal effluents, and provides premises to accommodate scientific and economic partners wishing to benefit from the Centre's platforms.

Higher education

The Centre's research teams participate in the Master's programmes in Animal and Forest Sciences: "Infectiology, immunity, vaccinology and biologicis" and "Sustainability and quality in animal production". They also contribute to the three options of the Biology-Health Master's degree: "Reproductive biology", "Cognition, neuroscience and psychology" and "Physiopathology", as well as to the Master's degree in "Agroscience, environment, territories, landscapes and forests", under the auspices of the University of Orléans.

They coordinate the Erasmus Mundus Infectious Diseases and One Health Master's programme shared between Tours, Barcelona and Edinburgh.

Involvement in innovative projects

The centre is associated with five projects financed by the French Investments for the Future programme:

- Two laboratories of excellence that reflect the quality of its regional partnerships: MABImprove, dedicated to the improvement of therapeutic antibodies, paving the way for the development of biologicis; and Voltaire, committed to the study of exchanges, particularly gaseous ones, between soil, water and air;
- Two networked projects:
 - CRB Anim, which focuses on the preservation of animal genetic resources;
 - EquipEx Xyloforest, which studies the properties and functional genomics of wood together with the Genius molecular engineering project;
- ANAEE-S, a project devoted to ecosystem analysis and experiments.

Collective scientific infrastructures and facilities

The INRAE Val de Loire Centre has four internationally recognized facilities:

- The European Conservatory for Soil Samples, managed by the InfoSol service unit within the framework of the Sol scientific interest group (Gis Sol), which monitors 2,200 sites throughout France;
- The experimental infectiology platform, the largest experimental facility in France dedicated to infectiology, certified ISO 9001:2000, which makes it possible to carry out experiments at confinement levels 2 and 3;
- The platform, Phenotyping & *in/ex vivo* Imaging from the Animal to the Molecule (PIXANIM), certified ISO 9001, v 2015, equipped with a 3Tesla MRI and a scanner, to study the reproductive neurobiology and the behaviour or the monitoring of infectious processes on the same animal.
- The Cell Engineering Laboratory (LICA) managed by the BioForA joint research unit is a combined laboratory-greenhouse facility, dedicated to the production and characterization of trees which have been transformed or edited by cell engineering.

Zoom on...

A reference pole in the animal sciences



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The Val de Loire Centre is considered a reference pole in the animal sciences, with more than 750 people involved and a unique experimental facility capable of studying all types of livestock in both conventional and confined conditions. It is equipped with state-of-the-art imaging infrastructures. It coordinates the European network of infectiology platforms, Vetbionet, the joint infrastructure, EMERG'IN, and the joint technological unit, "Biology and Innovation for Research and Development in Regional Poultry Farming Systems". Its research and that of its partners contribute to its status as a reference site in terms of innovation for reproduction and poultry farming. Moreover, the Centre is deeply involved in the area of infectiology via the Erasmus Mundus Master's programme, "*Infectious Diseases and One Health*", and its participation in the French Infectiology Research Federation as well as the LabEx MABImprove.

It also plays an important role in the development of animal models and their multidimensional analyses.

Impact of some of the research of the Val de Loire Centre



Our research supports public policies. It has an impact on soil management and classification, and on the integrated management of animal and plant health, particularly to limit the development of invasive insect populations.

It allows agricultural professionals to develop or maintain new animal and plant genetic resources that are more resistant to disease, more adaptable and more sustainable. Targeted studies at the cellular level of physiological and physiopathological mechanisms have an impact on the development of treatments for veterinary and human medicine.

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➤ INRAE: AN OVERVIEW

Created on January 1, 2020, the French National Research Institute for Agriculture, Food, and Environment (INRAE) is a major player in research and innovation.

INRAE carries out targeted research and resulted from the merger of INRA and IRSTEA. It is a community of **12,000 people** with **267 research, experimental research, and support units located in 18 regional centres** throughout France. Internationally, INRAE is among the top research organisations in the 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. INRAE's goal is to be a key player in the transitions necessary to address major global challenges.

Faced with a growing world population, climate change, resource scarcity, and declining biodiversity, the institute is developing solutions that involve multiperformance agriculture, high-quality food, and the sustainable management of resources and ecosystems.

➤ KEY FIGURES OF THE VAL DE LOIRE CENTRE

The teams

8 research units including 4 joint research units, 5 experimental units and 1 service unit

632 permanent INRAE employees (♂ 49%, ♀ 51%)

136 contract employees (♂ 58%, ♀ 42%)

220 employees of our partners working in the centre's units

The resources

A budget of **59.9 M€** including 10.3 M€ of its own resources (contracts and revenues)

The results in 2020

25 new contracts with private partners

Coordination of **3** European projects

3 patents and **4** licenses

350 publications per year in peer-reviewed journals

➤ MAP OF THE VAL DE LOIRE CENTRE SITES



INRAE Val de Loire Centre
37380 Nouzilly
Phone: 33 (0)2 47 42 77 00

contact-vdl@inrae.fr
www.inrae.fr/centres/val-de-loire



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