Rumigen

TOWARDS IMPROVEMENT OF **RUMI**NANT BREEDING
THROUGH **GEN**OMIC AND EPIGENOMIC APPROACHES

NEWSLETTER

December 2025

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Funded by the European Union

Editorial

Eric Pailhoux

RUMIGEN Coordinator

Dear RUMIGEN Partners,

I hope you all are doing great and are still as motivated as ever to bring the RUMIGEN project to a successful conclusion as it enters its final stage. We only have a few months left to achieve the ambitious goals set at the beginning of the contract, and to prepare for the final meeting and report. The end of the project will be filled with activities designed to promote, disseminate and sustain the results we have achieved for the future of sustainable livestock farming in Europe. I am confident that our consortium will rise to the challenges ahead. The final meeting will take place in Brussels on 14 and 15 April, with 15 April shared with members of the GEroNIMO consortium. GEroNIMO is a similar project to RUMIGEN, but dedicated to monogastric animals. This day will, of course, be open to the public, who will be able to follow the presentations and discussions either in person in Brussels (limited places available) or via videoconference. I hope that we will be able to attract a large audience from a variety of fields (policy makers, stakeholders, breeders, scientists, etc.).

The year 2025 has seen many events and advances related to the RUMIGEN project. Firstly, our annual meeting in Oslo from 17 to 19 June was, as usual, an opportunity for intense scientific discussions and exchanges in a studious yet friendly atmosphere. We would like to thank our Norwegian colleagues and INRAE-Transfert for their hospitality and for organizing the event. The meeting also provided welcome relief from the heat for participants from southern Europe who were experiencing their first heatwave of the summer — a break that was particularly appreciated by our Spanish colleagues! Another highlight was preparing the scientific and financial reports for the third RUMIGEN reporting period in June and July, with the feedback meeting held on 15 September. The commission's feedback was very positive and encouraging, so I would like to thank you all once again for your excellent work and unfailing commitment at this stage.

As announced in the previous newsletter, the project's main advances in 2025 relate to the epigenetic and societal components. The RUMIGEN-EpiChIP epigenotyping tool has been validated and used on several thousand animals, and the initial results suggest improved trait predictions and greater precision in ruminant selection. Additionally, analysis of the results of citizen surveys has led to the development of a new tool, the Room of Acceptance (RoA), which should help different categories of livestock stakeholders understand societal acceptance of new technologies in this field. These advances will be among the topics presented and discussed at the final meeting on 15 April 2026.

In conclusion, I would say that the RUMIGEN project continues to excel, as evidenced by the numerous results achieved across all areas of the project during the past year. I hope that we will continue and even intensify our efforts over the next few months to bring the project to a successful conclusion and be collectively satisfied with what we have achieved.

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RUMIGEN and GEroNIMO joint session at EAAP 2025

This year, at EAAP 2025 in Innsbruck, RUMIGEN and GEroNIMO projects hosted a joint session exploring how genetics, innovation, and collaboration can help shape the future of livestock farming in Europe.
The session brought together experts from research, private sector, and policy to exchange knowledge and perspectives on:

- The role of genetics in driving sustainable and resilient livestock production
- Ensuring biodiversity in farm animal populations at both local and European scales

Read more about the session here.

EuroFAANG at EAAP 2025

This year's sessions on European Research Infrastructures put a strong spotlight on how EuroFAANG and other projects are helping to build the future of the livestock and aquaculture research infrastructure and network in Europe.
Key points from the session include:

- Europe needs a dedicated ESFRI research infrastructure for animal genomics and phenomics, a gap that projects like GenoPHEnix , which EuroFAANG is also included in, aim to fill.
- Private sector involvement is key: clearer frameworks for IP, affordable access to tools, and co-designed services will ensure infrastructures reflect real-world breeding needs.

Together, these efforts are laying the foundation for a pan-European platform that connects data, facilities, and expertise — to drive innovation, improve sustainability, and support future food security.

Read more about the session here.

New popular article

How Heat Stress Affects Dairy Cows Across Generations

Heat stress is becoming a growing concern for dairy farming; especially as global temperatures rise. The RUMIGEN project, funded under the EU's Horizon2020 program, investigated how heat stress experienced by pregnant cows affects the performance of their offspring and the next generations. This research combines livestock performance data with meteorological records from France and Spain to uncover the impacts of heatstress on dairy production.

Read the article here.

NEWS

EcoGen Webinar Series

EcoGen is a collaborative research cluster led by **HoloRuminant** in partnership with Re-Livestock, 3D'Omics, RUMIGEN, and GEroNIMO. Together, these five projects are redefining sustainable livestock production by exploring innovative breeding strategies, microbiome research, and advanced technologies.

As part of the cluster, EcoGen is running a webinar series focused on interdisciplinary collaboration, showcasing cutting-edge research, and engaging diverse stakeholders in the future of sustainable livestock production. This series highlights groundbreaking innovations that reduce environmental impact, improve animal health, and enhance productivity.

See the previous episodes 1-6 here.
Keep up to date with the upcoming webinars by registering to Rumigen's newsletter, and following Rumigen on social media.

RUMIGEN course on genetics of resilience and trade-off's

Ready to revolutionize livestock breeding?

Learn how genetics can enhance resilience in livestock while managing trade-offs in performance and health. This RUMIGEN course dives into key concepts and smart strategies to breed animals that thrive under diverse and changing conditions.

Whether you're a researcher, breeder, or just passionate about animal science, this is for you! **Access the course for free here.**

4th RUMIGEN Annual Meeting

The 4th Annual Meeting of RUMIGEN took place in beautiful Oslo!

The agenda focused on project management and a detailed overview of Work Package results, offering a clear picture of progress to date. The meeting provided a constructive space for alignment on next steps and future actions in ruminant genetics and breeding.

Thanks to all our partners, and a special thank you to NMBU - Norwegian University of Life Sciences and INRAE Transfert SAS for organising the event!

MEET THE CONSORTIUM

Jeremie Vandenplas, WUR, The Netherlands

WP8 Leader

Jeremie Vandenplas is a researcher at Wageningen University and Research, focusing on model and software development for genomic prediction. His recent work includes implementing single-step genomic approaches for large-scale evaluations and contributing to MiXBLUP software development for breeding value estimation. In RUMIGEN, Jeremie leads WP8 "Integration/modelling: towards sustainable and socially acceptable breeding programs" and participates in investigating heat stress impacts on dairy cattle (WP3) and identifying genomic regions associated with genetic load (WP4).

Map of inbreeding depression, deleterious variants and genetic load

By Gwendal Restoux (INRAE), Thierry Tribout (INRAE), Renzo Bonifazi (WUR), Theodorus Meuwissen (NMBU), Jack Windig (WUR), Anne Barbat (INRAE), Stephanie Minery (INRAE), Jeremie Vandenplas (WUR) & Pascal Croiseau (INRAE)

Inbreeding can reduce fertility, health, and productivity in cattle by increasing the chance that harmful genetic variants are expressed, a phenomenon named inbreeding depression. WP4 researchers studied this issue in five local breeds—Abondance, Tarentaise, Vosgienne (France), Meuse-Rhine-Yssel (Netherlands), and Norwegian Red—using genome-wide data.

For that purpose, researchers developed a tailor-made model of GWAS (Genome Wide Association Study) dedicated to the detection of genomic regions involved in inbreeding depression by simultaneously considering additive, dominance and runs of homozygosity effects as well as global inbreeding and individual breeding values. Then, by considering the linkage disequilibrium in contrasts estimations they aimed at more accurately locating the variants responsible for the decrease in performance. Doing so, they identified multiple putative regions responsible for inbreeding depression.

By finely identifying and locating harmful variants, these models could provide new tools for breeders, allowing them to avoid matings that increase homozygosity in high-risk regions. This is especially important in small or local populations, where inbreeding is often larger and its consequences can be dramatic. This should help design breeding programs and mating plans that improve performance while safeguarding genetic diversity and long-term herd health.

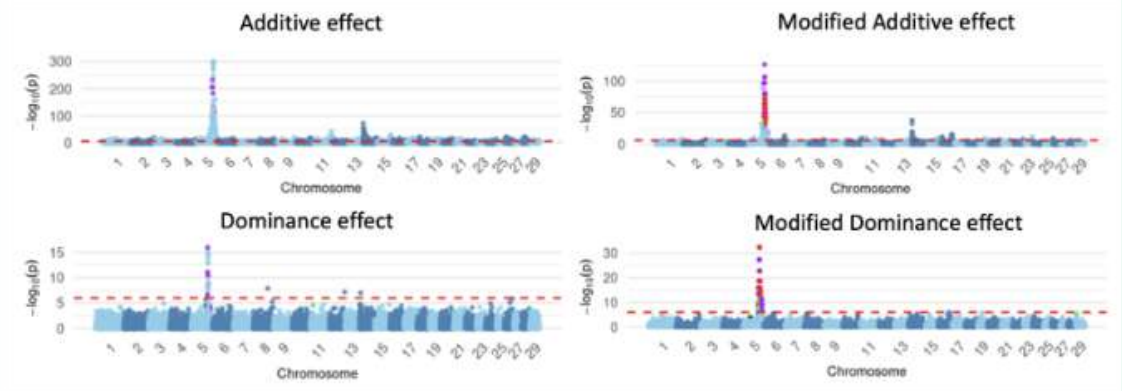

Figure 1. Manhattan plot of the QTL's detection for both additive (upper row) and dominance effects (lower row) for a milk production trait in the French Abondance breed. The left part presented the results obtained with the complete model but without considering linkage disequilibrium (LD) while right part (modified) are the results from the same model but considering LD for estimation.

RECENT EVENTS

ECOGEN Webinar 7: Innovation Beyond Traditional Breeding – Part 2

This session dives into how genome and epigenome editing could contribute to more resilient and sustainable livestock – and how these powerful tools can be developed responsibly.

We are excited to be joined by expert speakers:

- Guillaume Devailly, **INRAE**
- Matias Schrauf, **Wageningen University & Research**
- **Karel de Greef**, **Wageningen University & Research**
- Eric Pailhoux, **INRAE**

The webinar dives into:

- New frontiers in epigenome editing and what they could mean for animal breeding
- The RUMIGEN case study on PRNP goats and resistance to disease
- How to integrate gene-edited variants into genomic prediction models
- The importance of societal acceptance and responsible innovation

Rewatch the video here 👉#EcoGen webinars

EuroFAANG final conference

From 18–20 November 2025, the European Bioinformatics Institute | EMBL-EBI hosted the EuroFAANG final conference at EMBL-EBI, Wellcome Genome Campus, Hinxton, Cambridgeshire, UK.
The conference explored how collaboration and innovation can drive the future of animal science in Europe and beyond.

Find out more here.

UPCOMING EVENT

SAVE THE DATE for the joint GEroNIMO and RUMIGEN final event

The joint event will take place as part of RUMIGEN's and GEroNIMO's separate final events in Brussels, on the 15th of April.

Join us at the University Foundation (Rue D'Egmont 11, 1000 Brussels) to discuss livestock, selection and breeding strategies, epigenetics, new genomics and epigenomics technologies with a societal perspective.

For more information, keep an eye on our website event page.
Registrations are opening soon! www.rumigen.eu/events/