HoloRuminant

Understanding microbiomes of the ruminant holobiont

NEWSLETTER

ISSUE 4

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HoloRuminant
Understanding microbiomes of the ruminant holobiont

EDITORIAL

By Diego Morgavi

It has been a busy year for HoloRuminant with plenty of activity on several fronts of the project. Most of the animal studies have been completed and we are in the process of analysing and interpreting the large amount of data being generated. Tools for data analysis are being produced and partners have benefited from specific training to explore the microbiome through a meta-omics lens. Dissemination of results and discussion with stakeholders is an ongoing process that allows us to focus on the needs of end users. We are also informing the general public and farmers about the benefits of the ruminant host-associated microbiome through practical abstracts and videos, with some examples highlighted in this newsletter.

Since the last newsletter we have seen significant developments that directly or indirectly affect ruminant farming. These include legislation to reduce pollution, issues on health management, animal welfare and an increased scrutiny of how meat and milk are produced. The microbiomes of ruminants are involved on all of these aspects and we believe that the results of the HoloRuminant project can contribute to address them.

RECAP OF HOLORUMINANT'S 2024 ANNUAL MEETING

From November 19th to 21st, the 3rd Annual HoloRuminant meeting brought together 50 representatives from partner organizations in the beautiful town of Caldes de Montbui, Spain, hosted by IRTA. This dynamic event served as a platform for collaboration, knowledge exchange, and strategic planning for the year ahead.

The first day focused on fostering collaboration. Three major projects—RUMIGEN, GERONIMO, and 3D OMICS—presented their objectives and explored potential synergies within the newly established "ECOGEN" cluster. This cluster, which also includes Re-Livestock, was formed through HoloRuminant with the support of the Horizon Results Booster to promote cooperation and knowledge sharing across complementary initiatives.

The following days allowed each HoloRuminant work package to review their achievements over the past year and refine plans for the future through different interactive sessions and workshops. Early career scientists presented their impressive research, showcasing the consortium's commitment to young researchers in the field.

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RECAP OF HOLORUMINANT'S 2024 ANNUAL MEETING

The final day, the consortium organised a stakeholder event focused on calves and the role of microbiomes in their health and productivity. This session gave the floor for valuable exchanges between stakeholders and presenters, not only creating interest in our project but also building connections between different work-packages and possibilities to collaborate.

The event's success was shown through the dedication of all attendees and the outstanding organization by Lydia, our project manager (INRAE Transfert) and Yuliaxis and his team at IRTA. Their planning ensured that the meeting was both productive and interesting.

As HoloRuminant moves forward, the progress and connections built during this annual meeting highlight the power of collaboration towards ruminant health and sustainability.

Let's keep the momentum going!

Read more about the stakeholder event and access all presentations held ***here.***

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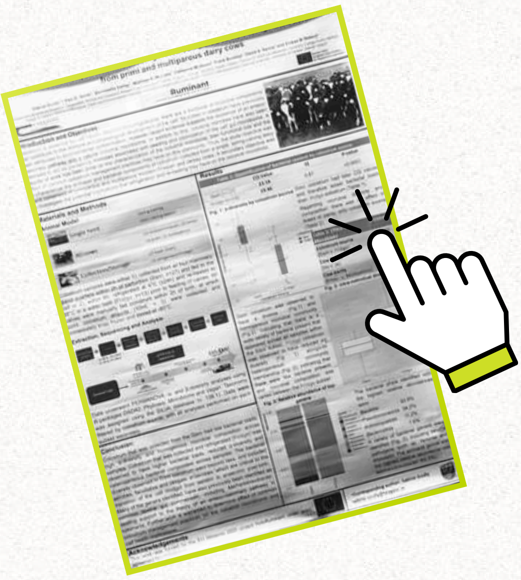
EAAP 2024 »»

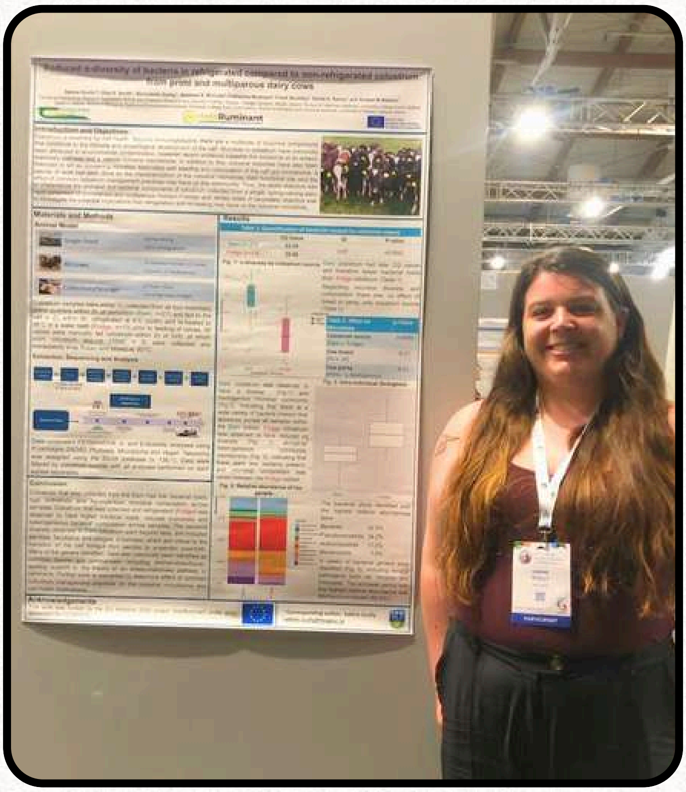
HOLORUMINANT RESEARCHER SABINE SCULLY WINS BEST POSTER

HoloRuminant researcher Sabine Scully won ***best poster for the physiology session*** at EAAP 2024 for her poster “Reduced α-diversity of bacteria in refrigerated compared to non-refrigerated colostrum from primi and multiparous dairy cows”.

The poster focused on the effects of refrigeration on the microbial diversity and composition of colostrum in dairy cows. Her research revealed that colostrum collected directly from the dam had a diverse and homogenous microbial community, including bacteria critical for calf gut development. In contrast, refrigerated colostrum showed reduced diversity, higher bacterial loads, and more variation between samples.

Download the poster ***here*** to find out more.





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STAKEHOLDER EVENT
2024 - SPAIN

At the 3rd annual meeting of HoloRuminant the project organised a workshop for stakeholders from the farming sector at IRTA in Catalonia, Spain, with presentations from researchers about microbiota and cattle health and performance. The presentations were followed by interesting discussions and a visit of the experimental farm facilities at IRTA.

Following the event, we invite all interested to join discussions online in our ***LinkedIn group*** dedicated to the communication between the HoloRuminant project and its stakeholders.
The following presentations were held during event:

- ***Use of feed additives around weaning in dairy beef calves, presented by David Yanez***
- ***Microbiota and productive performance in ruminants presented, by Marina Martínez Álvaro***
- ***Transportation of Young Calves – Study of the effect of transport on blood parameters in suckling calves, presented by Eva Romera Recio***
- ***Microbiome and Feed Efficiency in Dairy Cows, presented by Alex Bach***
- ***Consumer perspectives on interventions affecting calf microbiota, presented by Amer Ait Sidhoum***
- ***Diarrhoea and the Faecal Microbiome, presented by Sabine Scully.***

We hope to see you at the next stakeholder event and in our stakeholder ***LinkedIn group!***

TRAINING SPOTLIGHT:
Bioinformatics for Functional Meta-Omics Course

From December 9–13, 2024, the Bioinformatics for Functional Meta-Omics training course took place at the Ås campus of NMBU, Norway, as part of the HoloRuminant project's WP6 training obligations. This intensive program equipped participants with cutting-edge skills to study microbial communities.
The course explored sequencing technologies and bioinformatics tools to address the challenges of studying uncultivable microbes. Participants learned methods to analyze community structure using metagenomics and predictive genome-reconstruction and gained insights into community function through metatranscriptomics and metaproteomics.

The week-long course combined lectures and supervised computer labs, enabling attendees to design experiments, perform taxonomic binning, and integrate outputs from different omics approaches. Participants also developed a critical understanding of the limitations of these methods. This hands-on training enhanced their ability to interpret microbial community function and structure, advancing skills vital to microbiome research.

EUROFAANG G2P WORKSHOP
France, February 2025

In the frame of the ***EuroFAANG*** INFRA-DEV project, funded by the EU Commission, INRAE is organized a hybrid workshop on the potential of cellular systems and genome editing in farm animals to validate hypotheses and explore new ones while adhering to the ethical principles of the 3Rs.

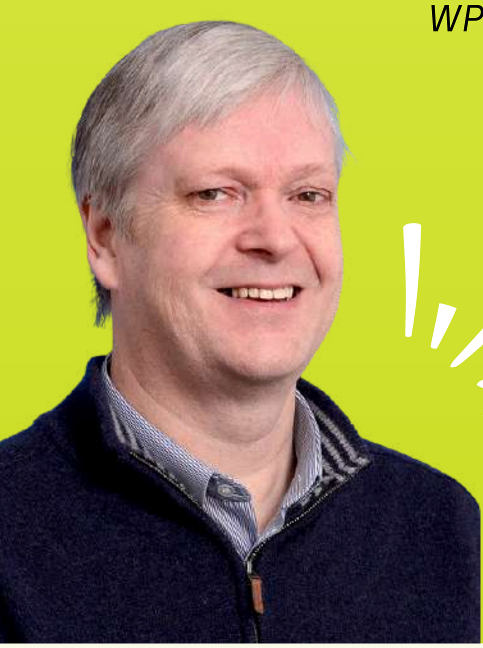
The G2P week-long workshop connected participants with experts in the field and participants in-person implemented hands-on experiments and activities to experience science in action.

Watch the aftermovie of the workshop *here*.

MEET THE TEAM

RICHARD DEWHURST

WP2



I am the Head of the Dairy Research & Innovation Centre at SRUC (Scotland's Rural College). He has I have over 35 years' research experience at the interfaces between ruminant nutrition, product composition and rumen function - working in the UK, Ireland and New Zealand. HisMy research interests span rumen function and feed efficiency, with a long series of projects on accessible biomarkers - including in milk, urine, faeces and breath. He is I am a previous President of both NZSAP and BSAS, and recipient of the Sir John Hammond Memorial Award (2008). He is I am a Fellow of the Royal Society of Biology and haves been a Co-Chair of the Global Research Alliance's Livestock Research Group since 2020.

"Ruminants are amazing animals because of their ability to create high value foods from human inedible materials like forages and co-products. It's important to study the microbial communities of ruminants, particularly the rumen microbiome, because they are so important in extending the capability of the ruminant genome."

SINEAD WATERS

WP3

I am a Senior Researcher and Lecturer in Microbiology (Host-Microbiome Interactions in the Environment) at the School of Biological and Chemical Sciences, University of Galway, Ireland. I hold a first-class honours degree in Biotechnology from the University of Galway, a PhD in Gut Microbiology from the National University of Ireland Maynooth, and a Higher Diploma in Statistics (Distinction) from Trinity College Dublin. My postdoctoral research in Rumen Microbiology at Alltech Biotechnology Ltd included a visiting scientist role at the University of Illinois, USA.

In 2005, I joined Teagasc as a Molecular Biologist, focusing on the rumen microbiome and methane emissions. Since 2019, I have been an Adjunct Professor of Agriculture and Climate Change at the Ryan Institute, University of Galway. I co-chaired the Livestock Research Group on the Global Research Alliance for Agricultural GHG (2018-2023) and was appointed by DG-AGRI to the expert group on agricultural methane emissions.

I co-lead WP3 with Dr. Ilma Tapio, studying microbiomes' role in animal performance, health, and the environment. Our research spans multiple EU countries, ruminant breeds, and dietary systems, addressing early-life health, bovine respiratory disease, mastitis, diarrhoea, heat stress, and dietary impacts on methane emissions. We design rigorous animal trials, analyze microbiomes from key biological samples, and explore their links to performance, health, and sustainability.

"This work is crucial for advancing microbiome-based strategies to enhance livestock health, productivity, and climate resilience. By understanding microbiome composition and function across digestive, nasal, and milk systems, we develop interventions to improve animal performance and sustainability."

MEET THE TEAM

PHIL POPE

WP4

I received a BSc from Griffith University (Queensland, Australia) majoring in physical mathematics, with honours in environmental microbiology (2003); a PhD in metagenomics from Griffith University (2007); and postdoc experience at CSIRO with Professor Mark Morrison (2007-2010). I moved to Europe in 2010 as a Marie Sklodowska-Curie Incoming fellow with renowned enzymologist Prof. Vincent Eijsink and started the Microbial Ecology and Meta-Omics (MEMO) group with an ERC starting grant in 2014.
In 2024, I was awarded a Future Fellowship by the Australian Research Council and relocated to the Queensland University of Technology where I am now a group leader at the Centre for Microbiome Research.

I am the leader of WP4, whose main objective is the functional characterization of host-associated microbiota (via their genome, transcriptome and proteome) across different life stages, management practices and health/disease states. WP4 will analyze samples and data from the animal studies performed in WP2 and WP3 to decipher i) how the host condition (i.e. environment), the host genome, the host-associated microbiomes and their inherent metabolic processes are connected; ii) examine the response of the holobiont to varying environmental factors and iii) test if these connections can be exploited to improve the tested KPIs.

“Humanity is under political and societal pressure to reduce anthropogenic methane emissions and improve sustainability across agricultural practices. Microbiome modulation via feeding regimes, management and breeding is a key strategy to improve livestock production but suffers from a lack of fundamental knowledge regarding the dynamic and complex microbial interactions that exist within the rumen. The chief importance of the HoloRuminant project is that it is applying the latest technological advancements to vastly improve our understanding on the rumen microbiome so that highly reproducible and predictable microbiome interventive strategies can be designed and successfully applied into the future.”

RESULTS >>>

DID YOU KNOW HOW WE COMMUNICATE WITH THE RUMEN MICROBIOME?

The HoloRuminant project aims to elucidate the role of the ruminant microbiome. It has formed an alliance with 4 other projects providing a complementary effort towards reducing the impact of livestock farming and improving animal health and welfare. The projects have teamed up as a Joint Dissemination Network (JDN) that aims to optimize and share efforts, communication materials and resources.

Watch the videos here, an initiative of the WP4 and WP6 collaboration, explaining how we communicate with rumen microbes.

CREATING SUSTAINABLE PRACTICES IN ANIMAL PRODUCTION: THE ECOGEN CLUSTER

INTRODUCING ECOGEN

HoloRuminant is proud to officially have launched the ***EcoGen Cluster*** in partnership with ***Re-Livestock***, ***3D'Omics***, ***RUMIGEN***, and ***GEroNIMO***.
Together, we are creating sustainable practices in farm animal production. Specifically, the five projects within EcoGen share the goal of redefining sustainable animal production in the EU.

The cluster aims to create a diverse set of outcomes, datasets, standardised methods, and, ultimately, a knowledge foundation for innovation.
The first fact sheet introducing EcoGen and its goals available ***here!***

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Watch video ***here***

WEBINAR SERIES – EPISODE 1: Transforming Livestock Systems Through Integrated Research

The ***first webinar*** in the EcoGen series set the stage for interdisciplinary collaboration by introducing the EcoGen Cluster and its five pioneering projects.
Speakers provided an overview of how integrated research on breeding, genetics, and - omics can drive more resilient and sustainable livestock production.
Held on 6 March 2025, the online session gathered researchers, livestock advisors, professionals, policymakers, and students eager to explore cutting-edge livestock innovations.

Watch the recording here.

Find out more about EcoGen here and stay up to date with upcoming webinars

EVENTS

BSAS 2025

The British Society of Animal Science (BSAS) Annual Conference 2025 will take place 8-10 April, in Galway, Ireland!
The conference is the flagship event for animal scientists across the UK and Ireland and beyond. It provides endless opportunities to network, collaborate, socialise, update knowledge and debate with peers.

This year's conference theme is “Animal Science: Supporting livestock's role in a global society”, highlighting the crucial contributions of animal science to the effective management and enhancement of livestock production, which is vital for meeting global demands.

EAAP 2025

The 76th EAAP Annual Meeting 2025 will take place in Innsbruck, Austria, between 25-29 August. The overarching theme of this years congress is ’Future-proof livestock farming' . Two joint sessions will be held with the RUMIGEN and GEroNIMO projects!The two session are:

- Session 78 “Trans- and intra-generational effects and epigenetic mechanisms” on Wednesday, 27 August afternoon.
- Session 15 "From Genomic Applications to Societal Perception" on Thursday, 28 August, morning. This session will conclude with a discussion focused on market uptake and will explore how these scientific breakthroughs can be applied to meet sectoral and consumer needs.

Further interesting sessions from the Animal Task Force (ATF), FABRE TP and EuroFAANG RI include:

- ATF Session 47: Livestock farming systems for the next generation: can we imagine the future? on Monday morning, 25 August
- FABRE TP Session 14: ***Future of the EU breeding sector*** on Wednesday morning, 27 August
- EuroFAANG RI Session 13: ***European research infrastructures to support livestock science: whom and how?*** on Wednesday afternoon, 27 August.

The EAAP Annual Meetings are one of the most significant forums for the exchange of information and discussion of animal science and production in Europe. More information to come soon!

Find out more here