# HoloRuminant

Understanding microbiomes of the ruminant holobiont

# NEWSLETTER

## ISSUE 5

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# EDITORIAL

By Diego Morgavi

As we move deeper into 2025, the HoloRuminant project continues to illuminate the intricate relationships between ruminant hosts and their microbial communities. This newsletter captures not only our latest scientific progress but also how that progress is being translated into real-world solutions that matter to farmers, researchers, and policymakers alike.

One striking highlight is the growing recognition of microbiome stability as a cornerstone of animal health. The work by Sabine Scully and her team on preventing scour through early microbiome support is emblematic of the shift from reactive to preventive livestock management. It reaffirms that caring for microbial ecosystems from day one is not a luxury—it's a necessity.

In parallel, the EcoGen Cluster has evolved into a vibrant forum for cross-project collaboration, exploring themes from genetic diversity to microbiome-driven health. With successful webinars and forward-thinking discussions, the cluster is building the data foundations and partnerships needed for systemic change.

Moreover, the emphasis on research infrastructures (RIs) at EAAP 2025 underscores a broader European ambition: to integrate advanced phenotyping, functional genomics, and data sharing into sustainable livestock science. The call for a new RI to bridge genotype and phenotype across species is a timely and urgent one.

As always, we spotlight the brilliant individuals who make this progress possible. From Geena Cartick's leadership in communication, dissemination and engagement to collaborative publications advancing feed efficiency and methane mitigation, the human stories behind the science remain our greatest strength.

The road ahead is complex—but it's also full of promise. Together, we are redefining what sustainable, ethical, and data-informed livestock farming can be. We thank all partners for their dedication and look forward to the innovations yet to come.

# NEWS »»

## HOLORUMINANT'S 2025 ANNUAL MEETING

The HoloRuminant consortium gathered from 2–4 September 2025 at Queen's University Belfast (QUB), UK, for its 4th and final Annual Meeting—an important moment as the project enters its concluding year.
This year's General Assembly was hosted by the School of Biological Sciences at QUB, and included a visit to the Agri-Food and Biosciences Institute (AFBI) in Hillsborough. With three days of scientific exchange, strategic planning, and community building, the meeting gave the green light to the project's final phase, consolidating progress and setting the course for impactful outcomes in 2026.

**Highlights from the Meeting**
Throughout the three days, each Work Package (WP) presented results and refined action plans for the coming year. Interactive sessions allowed deeper dives into key research areas and open discussions among partners.. Day 3 concluded with feedback from SAB members Frédérique Chaucheyras and John Wallace.

**A Time to Reflect and Appreciate**
The meeting marked a moment of pride for the consortium. The past year saw substantial progress, from multi-omics data integration to deepening our understanding of ruminant microbiomes and their impact on animal health, performance, and sustainability.
We are proud of the work done and grateful to all project partners for their dedication, collaboration, and scientific excellence.
A special thank you to our hosts at QUB—Chris Creevey, Michael Hills, John-Paul Wilkins , and Lucy Dillon—for their warm hospitality and seamless organisation. Your efforts helped create an inspiring and productive atmosphere.
We are also thrilled to welcome Iris De Cesare as our temporary co-project manager supporting Lydia Brunault, who joins us at this crucial stage to help guide the project toward a strong finish.

**Looking Ahead**
With the final phase now underway, HoloRuminant is focused on delivering results that will advance ruminant science, support sustainable livestock systems, and contribute meaningfully to the EU Green Deal and Farm to Fork strategy.
Stay tuned for updates on our Final Conference in 2026, and follow our channels as we translate research into impact.

# NEWS »»

## EAAP 2025 »»

### European research infrastructures to support livestock science: whom and how?


Research Infrastructures Session at EAAP 2025A dedicated session on Research Infrastructures (RIs) was held at the EAAP Annual Meeting on August 27, 2025, with the goal of highlighting the strategic importance of RIs for livestock science. The session featured current projects and infrastructures including PIGWEB, AQUAEXCEL, ISIDORe, EuroFAANG, AGROSERV, ELIXIR, and INFRAFRONTIER, and introduced the proposed RI GenoPHEnix—an initiative to integrate phenotyping and functional genome annotation in farmed animals.The discussion was lively and touched on several key issues:

- ***Future of GenoPHEnix:*** If not selected for the ESFRI roadmap, participants stressed the importance of continued dialogue with the European Commission and national governments. Securing support from more countries and Member States was seen as essential to build critical mass.
- ***Data sharing and privacy:*** Innovative methods for encrypted data sharing were discussed to address privacy and competition concerns, especially from industry. Examples included key-based systems that allow joint analysis while maintaining data confidentiality.
- ***Value for industry:*** Participants noted strong interest from breeding and feed companies in accessing RI services (e.g., from PigWeb and SmartCow). To secure co-funding and long-term buy-in, RIs must clearly demonstrate added value, such as testing facilities, data platforms (like FAANG and AG2P-DISC), and profit-generating opportunities.
- ***Use of RIs in EU projects:*** Attendees encouraged researchers to integrate RI use into Horizon Europe proposals to increase efficiency and cost-effectiveness.
- ***RI governance and participation:*** Drawing on examples like BBMRI, speakers stressed the importance of inclusive governance models that engage national nodes and promote co-ownership among data providers. Co-creation and long-term vision were identified as success factors.
- ***Upgrading facilities:*** Many animal research facilities across Europe are outdated. GenoPHEnix could help coordinate investment and ensure future-proofing of phenotyping infrastructure, though balancing distributed versus centralised approaches remains a challenge.

The session closed with broad support for continuing this RI dialogue annually at EAAP, promoting multidisciplinary collaboration, and addressing the strategic need for a long-term, pan-European RI dedicated to livestock and aquaculture research.

# MEET THE TEAM

## JARKKO NIEMI

*WP5*

Hi! I'm Jarkko Niemi, I am a Research Professor at Natural Resources Institute Finland (Luke). I have 20 years of experience in socio-economic research of animal production, especially on the economics of animal health and welfare, consumer and multi-actor views to animal-derived food. I have over 50 peer-reviewed and over 650 other publications. I have led socio-economic and cocreation work in EU projects such as PROHEALTH (FP7), GroupHouseNet (COST), PPILOW (H2020). I am a member of the Finnish Farm Animal Welfare Council. In the HoloRuminant project, I am leading WP5 and contributing to surveys and focus groups carried out in WP5 as well as to bio-economic modelling of microbiome applications and to WP6 activities.

## GEENA CARTICK

*WP6*

Hi! I'm Geena, I earned my Master of Science degree in European Master in Animal Breeding and Genetics from the University of Natural Resources and Life Sciences, Vienna (BOKU). I also hold a BSc (Hons) in Agricultural Science and Technology from the University of Mauritius.

Since June 2022, I've been working at EFFAB as a Breeding and Genetics Advisor. In this role, I contributed to finalizing the 7th edition of ***the Code of Good Practices (Code EFABAR)***, including the section on Ruminant Breeding. I also support the EU research projects team by helping to ensure effective knowledge exchange and transfer.

During my internship at GENOSTAR Rinderbesamung GmbH, I conducted my master's thesis research on phenotypic and genomic sperm analysis in young Fleckvieh bulls used in Artificial Insemination Stations in Austria, gaining valuable hands-on experience. To further develop my skills, I worked as a bio-production assistant at LIVINfarm Vienna, where I focused on insect breeding. Before that, I spent eight years at Avipro Co Ltd (Eclosia Group Mauritius), taking on roles such as Broiler Operations Officer and Breeding Operations Intern.

I'm passionate about ethical and sustainable practices in animal breeding. Currently, I'm leading Work Package 6 in the HoloRuminant project.

*"Communication, dissemination, exploitation, and stakeholder engagement ensure that research in projects like HoloRuminant does not remain confined to academic circles. They translate scientific insights into real-world impact—enabling uptake by industry, informing policy, fostering innovation, and building trust with society."*

# RESULTS

## PRACTICE ABSTRACT

## Supporting the Calf Gut Microbiome to Prevent Scour

*Author - Sabine Scully*

Calf diarrhoea—commonly known as scour—remains a major challenge for dairy farmers, affecting up to 50% of pre-weaned calves and ranking as the leading cause of calf mortality in the first month of life. A recent HoloRuminant study led by Sabine Scully from Teagasc and University College Dublin highlights a key factor in managing this issue: the development and stability of the calf's hindgut microbiome.

During a calf's first weeks, its immune system is immature. While maternal antibodies from colostrum offer initial protection, these start to wane by two weeks of age. At the same time, the hindgut microbiome—the community of beneficial microbes in the calf's intestine—is still developing and unstable until about one month of age. This combination leaves young calves highly vulnerable to disease.

The study found that disturbances in the hindgut microbiome, known as dysbiosis, often occur before visible signs of scour appear. This suggests that supporting microbiome development could help prevent disease, rather than simply reacting to it.

As part of the HoloRuminant project, these findings contribute to a broader understanding of how managing the microbiome supports healthier, more resilient animals. Farmers are encouraged to discuss tailored herd health strategies with their veterinarians to implement these insights on-farm.

## PRACTICAL RECOMMENDATIONS


**Immediately After Birth**

**Feed high-quality colostrum:**
- As much as possible, as soon as possible after calving

**First Hours to Day 1**

**Continue feeding colostrum beyond the first meal:**
- Supports passive immunity development

**Day 2 to Day 4+ Feed transition milk**

**Use nonsaleable milk from the 2nd to 8th milking:**
- ***Avoid*** waste milk or milk with antibiotic residues

**Throughout Early Life**

**Use antibiotics only when necessary:**
- Always follow your vet's advice.
- Overuse can destroy beneficial gut bacteria

**Milk Feeding Period**

**Feed high-quality whole milk or milk replacer:**
- If using replacer, ensure all ingredients are dairy-based

**Daily Growth Monitoring**

**Never underfeed your calves:**
- Ensure adequate milk volume to meet their growth needs

## Read Full Practice Abstract Here

# CREATING SUSTAINABLE PRACTICES IN ANIMAL PRODUCTION: *THE ECOGEN CLUSTER*

HoloRuminant is proud to officially have launched the ***EcoGen Cluster*** in partnership with ***Re-Livestock***, ***3D'Omics***, ***RUMIGEN***, and ***GEroNIMO***. 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!***

## EPISODE 1
## Transforming Livestock Systems Through Integrated Research

On 3 June 2025, the EcoGen cluster hosted its first webinar, gathering project coordinators and stakeholders to discuss the role of animal breeding in sustainable livestock systems. Despite initial technical issues, participants exchanged insights on transforming livestock production through genetics, health, and climate resilience. The webinar featured presentations from five projects: **HoloRuminant, Rumigen, Geronimo, Re-livestock and 3D'Omics.**


Key points included the need for data sharing protocols, collaborative genetic research, and close involvement of breeding companies. Next steps focus on integrating datasets, developing common metadata standards, and planning future EcoGen webinars on resilience, adaptation, and microbiome research.

## EPISODE 2
## Resilience and Adaptation: Innovative Strategies for Sustainable Livestock

The ECOGEN Webinar brought together experts from academia and industry to discuss innovative strategies for sustainable animal breeding in the face of climate change. Key topics included the central role of phenomics in livestock science, the use of metabolomics and genomics to improve resilience in pigs, and landscape genomics to identify adaptive genes in local chicken breeds. Presentations highlighted the impact of heat stress on dairy cattle performance and reproduction, emphasizing the need to adapt breeding goals to include resilience and functional traits.The value of preserving local breeds for genetic diversity and future adaptation was underscored, alongside the importance of collaboration between researchers, industry, and farmers to ensure sustainable and practical solutions for the livestock sector.

## EPISODE 3:
## Genetic Diversity and Conservation Preserving Livestock Genetic Resources

On 27 May 2025, EFFAB hosted the third EcoGen webinar, bringing together 77 participants to discuss the importance of preserving livestock genetic resources. The session highlighted local breeds' role in sustainable livestock systems and featured insights on genomic selection, precision genomics, and conservation strategies. Speakers from Wageningen University, University of Évora, Agricultural Institute of Slovenia, University of Zagreb, and KGZ Novo mesto shared examples from cattle and pig breeding, underlining the value of


structured genetic monitoring and collaboration across research, industry, and policy.
Participants appreciated the diverse, practical insights while suggesting more interactive elements for future sessions. The EcoGen series will continue fostering knowledge exchange on livestock genetic diversity.

## EPISODE 4
## Advancing Animal Health Through Microbiome Research

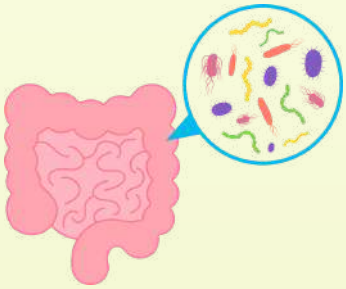
The latest Ecogen webinar explored the role of the microbiome in livestock health, featuring insights from the Holoruminant and 3D Omics projects.
Davis Yañez (Holoruminant) presented research on how feed additives influence rumen development in young ruminants. Findings showed that while additives boost microbial activity, lasting benefits depend on early-life interventions, particularly before weaning.

Brian Wang and Amalia Bogie (3D Omics) showcased spatial multi-omic methods combining microscopy, DNA sequencing, and spatial analysis to map gut microbiota in unprecedented detail. This approach reveals effects of probiotics and diets often missed by conventional tools.
During the Q&A, experts discussed protozoa absence in calves, links between microbiota and performance, and how integrating multi-omics can guide precise interventions.

The session underlined how advanced technologies and interdisciplinary research are driving innovation in animal health. Participants were encouraged to sign up for the Holoruminant newsletter and follow related projects online.

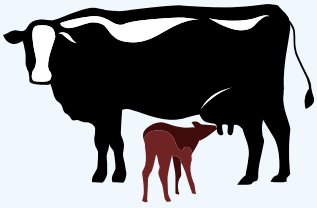
# PUBLICATIONS

**Rumen microbiota associated with feed efficiency in beef cattle are highly influenced by diet composition**.
*Abimael Ortiz-Chura, Karla Fabiola Corral-Jara, Jeremy Tournayre, Gonzalo Cantalapiedra-Hijar, Milka Popova, Diego P. Morgavi, Animal Nutrition, Volume 21, 2025, Pages 378-389, ISSN 2405-6545, DOI: https://doi.org/10.1016/j.aninu.2024.11.027. (06/25).*



**Can high-lipid concentrates offset the high enteric methane production caused by high-forage diets fed to lactating dairy cows** *N. Ayanfe, I. Tapio, S. Ahvenjärvi, M. Rinne, A. Sairanen, A.R. Bayat, Journal of Dairy Science, Volume 0, Issue 0. DOI: 10.3168/jds.2024-26108 (05/25).*


**Effects of feed additives in the diet of male dairy beef calves on physiological status and rumen microbial fermentation pre- and postweaning**. *E. Romera-Recio, E. Ramos-Morales, A. Belanche, M. Hassan, P. Romero, A. Gómez, I. Rivelli, N. Llanes, J. Torra, D.R. Yáñez-Ruiz, Animal Feed Science and Technology, Volume 321, 2025, 116243, ISSN 0377-8401, DOI:10.1016/j.anifeedsci.2025.116243. (01/25)*



for more information about the HoloRuminant project, visit our website:

# www.holoruminant.eu

HoloRuminant
Understanding microbiomes of the ruminant holobiont

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