

# Newsletter - Issue 1

October 2022



The HoloRuminant project has received funding from European Union's Horizon 2020 research and innovation program under Grant Agreement No 101000213.

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## Editorial

Welcome to the first edition of the HoloRuminant Newsletter! It is the first anniversary of the project and we just held our first annual meeting in Israel that was kindly hosted by our colleagues at Ben-Gurion University of the Negev (see News). This was the first time that partners met face-to-face and, in addition to the excellent scientific exchanges we had, it was great to meet people in person many of them for the first time.

In these past 12 months we saw the start of many animal studies in different countries. HoloRuminant is a highly integrated project involving coordinated studies across various ruminant production systems in different regions. A great effort was dedicated for establishing protocols and standard procedures that are homogenous between partners. An early start of animal studies was essential for the long-term longitudinal studies that will follow the implantation and evolution of host-associated microbiomes from birth up to the productive stages of ruminants. These studies will allow HoloRuminant to delve into fundamental questions of health, welfare and environmental efficiency of ruminant production systems. In the next newsletter we will be sharing the first results of the project with you! In the meantime, please visit our website or follow us on social media for updates. Enjoy.

## News

### *1<sup>st</sup> Annual Meeting hosted by the Ben Gurion University, Israel*

The first year of the HoloRuminant project is already behind us, which meant it was time for the first-ever Annual Meeting. The HoloRuminant project partners were kindly invited to Israel by our partners from the Ben-Gurion University in Beer Sheva.

This meeting was for most of the partners the first time they met in person. That's why we kicked off the meeting with a presentation round and some very creative icebreakers. Let's say that for most of us it is good that we haven't gone into the craft of architecture! After the icebreaker, we moved to a session that was entirely dedicated to the early-career scientists within the HoloRuminant project. The presentations focused on different aspects of microbiome research, ranging from the establishment of the microbiome to molecular and sequencing methods to quantify them.

The afternoon was packed with interesting excursions, we visited the germ-free lab which is the only one of its sort that exists up to today. After the lab, we got to learn about Israeli culture at Kibbutz.

We learned about the history of the Kibbutz and how it has evolved into what we witness today. After the history lesson, we had a nice picnic at the site before we visited the farm that belongs to the Kibbutz. It was interesting to see how the cows are kept in a climate that is quite different from what most EU partners are used to. The end of the day was marked by a wonderful social dinner, where we got to experience Israeli food and drinks.

On the second day, we hit off with an interactive session for WP1, led by Chris Creevey. This WP works on the consolidation of existing and the development of novel knowledge on ruminant microbiomes. The meeting provided an excellent platform for a discussion on the workflow and needed SOPs. After WP1, we made a leap towards WP4, presented by Phil Pope who joined us remotely in collaboration with our local organiser Itzik Mizrahi. This work package works on the integration of microbiomes for improving ruminant performance. During the first part of the session, we focused on protein network analysis and the importance and benefits of microbiome-assembled genomes (MAGs). The second part of the session was used to dive deeper into the utilisation of data generated in WP4 for use in other work packages (WP2/WP3).

After a refreshing lunch break, WP2 commenced their session under the leadership of Richard Dewhurst. This work package focuses on colonisation, persistence and consequences of ruminant microbiomes. Richard provided an update on the sampling that has taken place and the recruitments that have been done for the tasks within their work package. After a quick coffee break, Sinead Waters proceeded with updating us about WP3 progress where different trials have taken place or are in progress. We got an insight into the different activities and facilities within the project. Finally, the day was finished off by Jarkko Niemi, he took us into the activities of WP5 that revolve around innovation,



socio-economic impact and stakeholder engagement. Part of his presentation was an interactive discussion on the content for the upcoming focus and workshops. After this packed day of information, all project partners were dismissed for a restful evening.



WP6, communication and dissemination had the pleasure of kicking off the final day of the annual meeting. After a quick overview of all that was accomplished within the first year, partners were put to work with a workshop in which they selected and defined important concepts. The generated results will be used to communicate the project to a wider audience

that may not be aware of microbiome research. After a discussion on project management, the meeting was closed and we hopped into the bus for our final excursion toward Jerusalem and Tel Aviv. All in all, we had a wonderful and productive meeting. We are most grateful for the kind and hospitable organisation of our host Ben Gurion University in Beer Sheva and we thank them for inviting us to their university and country!

### *Communication package*



The HoloRuminant communication package is available. The package includes the project logo, a PowerPoint Template, a brochure, poster and a roll-up. Furthermore, an extra easy-to-distribute flyer has been developed that is translated into French, Polish and Finnish! All communication materials can be found on the HoloRuminant website. Start exploring by clicking the following link: <https://holoruminant.eu/>

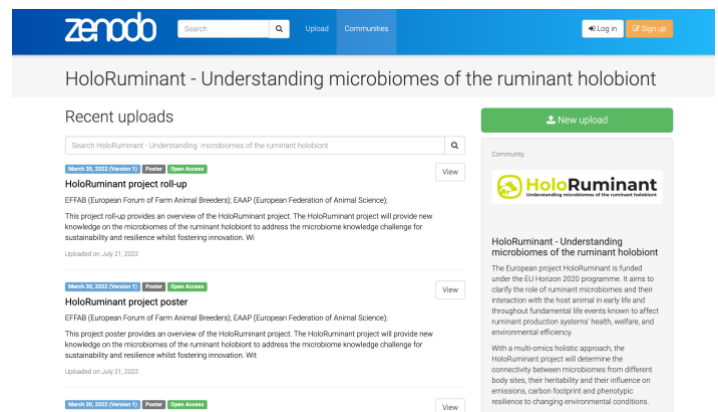
### *First meeting of the Joint Dissemination Network*

On the 13<sup>th</sup> of July, the first meeting on the Joint Dissemination Network was held. This network aims to join forces with similar projects to improve visibility, increase the reach to different stakeholders, and decrease the financial burden. The first meeting was joined by 5 projects and organisations: HoloRuminant, 3D'omics, RUMIGEN, GErONIMO and GRA. Follow-up meetings are being planned to define a common strategy.



## Zenodo Community

The HoloRuminant has founded its Community on the Zenodo Platform. The Zenodo Platform provides an open science repository that is not restricted to scientific papers but can also include presentations, videos and other communication and dissemination materials. All HoloRuminant related publications will be uploaded in the repository that can be found under the name: “HoloRuminant - Understanding microbiomes of the ruminant holobiont”. You can take a look by clicking [here](#).



## EuroFAANG

HoloRuminant has joined the EuroFAANG consortium. EuroFAANG is a coordinated effort to unravel the connection between the genetic make-up of an animal and the observable physical and physiological traits. The EuroFAANG projects aim to address challenges in farmed animal production. It comprises 6 projects: **AQUA-FAANG**, **GENE-SwitCH**, **BovReg**, **GERONIMO**, **RUMIGEN** and **HoloRuminant**, working on different groups of animals (farmed fish species, cattle, pigs and chicken). HoloRuminant is looking forward to contributing to the acceleration of genome to phenome research for farmed animals in Europe! You can learn more about the consortium on its website: <https://eurofaang.eu/about> or follow @EuroFAANG on Twitter.



## WPs' descriptions

### *WP1: Consolidation of existing and development of novel knowledge on ruminant microbiomes*

WP lead: Chris Creevey; Queen's University Belfast

Deputy lead: Hauke Smidt; Wageningen University

#### WP 1

##### Main Objective

Development of standardised protocols and analytical tools in an open-access database to gather and link existing microbiome data with host animal's health, genotype, efficiency and environmental footprint.

##### Summary of work

Establishment of standard procedures, development of the ruminant holobiont (HoloR) database & toolbox, provision of training for scientists and animal breeding and feed sector.

Expected Impacts for researchers in academia, breeding and animal feed industry

- Training opportunities
- HoloR - resources on ruminant microbiomes and toolbox freely available for further research

##### Key results to achieve expected impacts

- Standard procedures for data sampling and handling
- HoloR database & tools
- Training resources for scientists and animal breeding and feed sector



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### *WP2: Colonisation, persistence and consequences of ruminant microbiomes*

WP lead: Richard Dewhurst, Scotland's Rural College

Deputy lead: Itzik Mizrahi, Ben-Gurion University

#### WP 2

##### Main Objective

Evaluate environmental, species and genotype influences on the establishment of microbiomes and identify effects of microbiomes at different body sites which are beneficial to animal health.

##### Summary of work

Understanding the causes, effects and stability of the microbial communities establishing at different body sites of cattle and sheep.

Expected impact for feed/nutrition/breeding sector

- Early identification of host animal's health and greenhouse gas (GHG) phenotypes (biomarkers).
- Microbiome driven breeding programme (value of the stock).
- New ideas for managements to utilise long-term effects on microbiomes.

Expected impact for farm managers/farmers

- Better farm management decisions and improved economic sustainability.
- Higher resilience of livestock systems to seasonal instabilities and dietary changes.
- Nutritional interventions across the lifetime of animals

Expected impact for farm managers/farmers

- Healthier animals
- Reduced GHG emissions and carbon footprint

##### Key results to achieve expected impacts

- Baseline for the industry for the ideal microbiome.
- Identification of biomarkers for the development of lower-cost breeding tools.



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*WP3: Ruminant microbiomes and sustainable production*

WP lead: Sinead Waters, Teagasc

Deputy lead: Ilma Tapio; LUKE

**WP 3****Main Objective**

Understanding the role of ruminant microbiomes in animal health, productivity and environmental sustainability.

**Summary of work**

Addressing health, welfare and environmental phenotypes in various production and management systems, diets and environments in relation to ruminant microbiomes and sustainable production.

**Expected impact for feed/nutrition/breeding sector**

- Moving towards the creation of estimated breeding values (EBV) for methane production
- Possibilities to select animals for increased mastitis resistance
- The development of dietary and management strategies to improve animal health and productivity with a lower environmental impact

**Expected impact for farmers/veterinarians**

- Development of diagnostic tools to evaluate animal susceptibility for health threats
- Recommendations for farmers on how to handle young animals
- Improved guidelines for transport and management
- Development of feed additives and alternative feeding strategies

**Expected impact for policymakers/public**

- Recommendations for reduced environmental impact (e.g., reduced methane emissions)
- Improved understanding of the microbiome role in sustainable ruminant production and in reducing methane emissions
- Recommendations for improvement of animal health guidelines

**Key results to achieve expected impacts**

Identifying key microbes which have an impact on, or help define phenotypes for improved health, welfare and productivity and reduced environmental impact.



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*WP4: Integrating microbiomes for improving ruminant performance*

WP lead: Phil B. Pope; NMBU

Deputy lead: Dörte Becher; UG

**WP 4****Main Objective**

Identifying key microbes which have an impact on, or help define phenotypes for improved health, welfare and productivity and reduced environmental impact.

**Summary of work**

Use computational approaches to characterize the microbiomes that affect the host animals health, nutrition and overall production.

**Expected impact for feed/nutrition/breeding sector**

- Understanding of mechanisms involved in host animal effects on microbiomes and vice versa
- List of microbial biomarkers linked to host animal performance for national and international genomic selection breeding programs
- Improvement of breeding stock

**Expected impact for farm managers/farmers**

- Improved animal health, welfare and production sustainability using microbiome 'solutions'
- Critical determination of microbiome role in various diseases, animal nutrition and dietary transition across calving

**Expected impact for policymakers/public**

Improved animal health and welfare and reduced environmental impact

**Key results to achieve expected impacts**

Construction of metagenomic datasets, identification of metabolic pathways involved in microbiome interactions and keystone microbial populations, list of predictors and host animal genetic markers associated with desirable microbial signatures.



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## WP5: Innovation, socio-economic impact and stakeholder engagement

WP Lead: Jarkko Niemi (LUKE)

Deputy lead: Florence Macherez (IDELE)

### WP 5

#### Main Objective

To analyse stakeholder opinions on measures to manage livestock microbial ecosystems and to provide market and policy measures which facilitate robust and economically efficient farming practices.

#### Summary of work

Modelling work and consultations with farmers, industry stakeholders and consumers about microbiome and new ways of microbiome modulation to better understand socio-economic impact of HoloRuminant's work.

#### Expected impact for the stakeholders

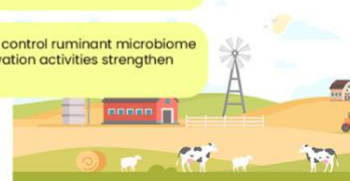
- Scientific knowledge of microbiomes utilised by practitioners
- Increased knowledge on how farmers and consumers understand microbiome and different ways of microbiome modulation, leading to tailored solutions and practices
- Better integration of the views of academia and farmers and consumers on microbiome modulation
- Better understanding how microbiome management can add value to the ruminant sector

#### Key results to achieve expected impacts

- Socially and economically acceptable approaches to control ruminant microbiome
- Involvement of stakeholders in the research and innovation activities strengthen "ownership" of results



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## Meet the project

### Diego Morgavi Project Coordinator, leader of WP7 – Coordination and project management



Diego Morgavi is a senior researcher at INRAE, the French National Research Institute for Agriculture, Food and Environment. He has a long-track expertise in microbiome research applied to ruminants. D. Morgavi has coordinated an ANR project and participated as PI in several European and ERA Net projects (MASTER, AnimalChange, SMethane, RumenStability, RedNex, etc.).

### Emna Ben Hamza – HoloRuminant project manager

Emna Ben Hamza is an EU project manager at INRAE Transfert. She holds an agricultural engineering degree and is in charge of several H2020 collaborative research projects such as the H2020 nefertiti coordinated by ACTA.



## Upcoming events

EVENT 	DATE 	LOCATION 
PAG 2023	13-18 January 2023	San Diego (USA)
ICAR 2023	22-26 May 2023	Toledo (Spain)
ISAG 2023	2-7 July 2023	Cape Town (South Africa)
EAAP Annual Meeting	28 August - 1 September 2023	Lyon (France)



**Coordinator: Diego Morgavi (INRAE)**

For more information visit our website:

**[www.holoruminant.eu](http://www.holoruminant.eu)**



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