

# *Rumen Microbial Genomics (RMG) network: Past and Future*

**David Yañez-Ruiz, CSIC, Spain**  
(on behalf of the network coordinator Sharon Huws)

***2018 Livestock Group Meeting: Vietnam***

***Twitter: RMG\_network***

***Website: <http://www.rmgnetwork.org/home.html>***



# *Origin*

The RMG Network was formed following a workshop held in NZ in February 2011 and is an initiative of the Livestock Research Group of the Global Research Alliance.

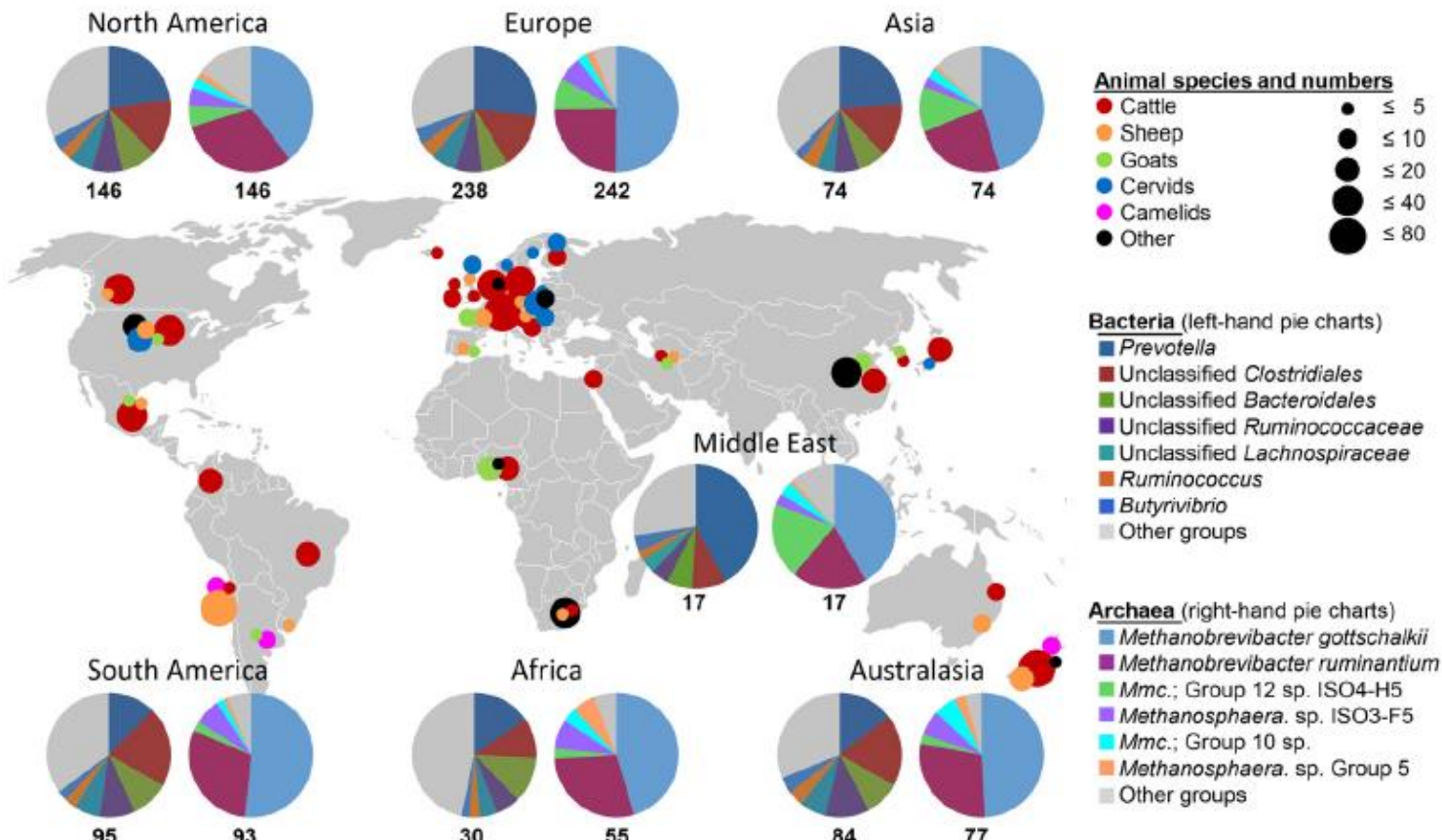
**Purpose** - To initiate support for a global collaborative network for researchers, working with common set of principles and guidelines to underpin the development of methane mitigation and rumen adaptation technologies using microbial genomics based approaches.

# *RMG Network goals*

- Enhanced **communication** and **collaboration** between research groups
- Improved ability to attract **funding** with integrated, international studies
- Streamline future RMG research to prevent **duplication**
- **Training** – exchange of students, technicians, staff
- Accelerated access to protocols, cultures, primer sets and facilitate sharing of **knowledge** and **technologies**
- Generation of **reference** datasets
- Facilitate **research** in microbial genomics, ecology and physiology

# Collaborative projects

- **Global Rumen Census** [www.globalrumencensus.org.nz](http://www.globalrumencensus.org.nz)
  - Culture-independent study based on sequencing ribosomal RNA genes to identify the extent of diversity of the microbial groups in the rumen. *Henderson et al., 2015 Scientif Reports*



# *RMG Network meetings*

## **1<sup>st</sup> RMG Network meeting**

Palmerston North, New Zealand, February 2011

## **2<sup>nd</sup> RMG Network meeting**

Associated with INRA-RRR meeting, France, June 2012

## **3<sup>rd</sup> RMG Network meeting (jointly with RuminOmics)**

Associated with GGAA2013, Dublin, Ireland, June 2013

## **4<sup>th</sup> RMG Network meeting (jointly with RuminOmics/ECO-FEC)**

Associated with INRA-RRR meeting, Scotland, June 2014

## **5<sup>th</sup> RMG Network meeting (GRC/Hungate 1000 workshop)**

Associated with the 2015 Congress on Gastrointestinal Function Chicago.

## **6<sup>th</sup> RMG Network meeting**

Associated with INRA-RRR meeting, Clermont Ferrand, June 2016 (80 attendees)

## **7<sup>th</sup> RMG Network meeting**

Associated with INRA-RRR meeting, Aberdeen, 11 June 2018

# *Long term aspirations*

- **Currently:**

- >200 scientists registered as members of the network, directory currently being updated.
- The workshops are well attended.

- **Future Vision:**

- Encourage more active involvement from postgraduate students and early-stage postdocs.
- Engage better with social media for promotion.

# *Long term aspirations*

- Encourage applications to network enabling funding resources:
  - Marie-Curie Research and Innovation Staff Exchange (RISE) applications among members.
  - Compile a list and promote use of national funding for building networks:
    - BBSRC International Scientific Interchange Scheme.
- Encourage and promote uplift projects as a consequences of RMG network interactions.

# Steps to Realising this vision

## Special research topic in Frontiers in Microbiology

The screenshot shows the Frontiers website interface for a research topic. At the top, the Frontiers logo is on the left, and navigation links (About, Submit, Journals, Research Topics) and a search bar are in the center. On the right, there are links for Login and Register. Below the navigation bar, the research topic title is displayed in bold. To the right of the title are 'Like' and 'Comment' buttons, each with a count of 0. Below these are social media sharing icons for Facebook, Twitter, Google+, LinkedIn, and a general share icon. Two buttons, 'Submit an abstract' and 'Submit a manuscript', are located below the title. A tabbed interface shows 'Overview' as the active tab, with other tabs for 'Articles' (7), 'Authors', 'Impact', and 'Comments'. A large 'VIEWS 195' badge is positioned to the right of the tabs. The main content area is divided into two columns. The left column, titled 'About this Research Topic', contains a paragraph about the rumen ecosystem and the use of metaomic-based techniques. The right column, titled 'Topic Editors', features a profile for Sharon Ann Huws, including her photo, name, affiliation (Institute of Biological, Environmental and Rural Sciences, Aberystwyth university, Aberystwyth, United Kingdom), and a 'Follow' button.

frontiers

About | Submit | Journals | Research Topics

Search for articles, people, events and more.

Login | Register

Research Topic

**Metaomic Approaches to Study the Rumen Microbiome: Challenges and Innovation**

Like 0 Comment 0

f 0 t 0 g+ 0 in 0 New

Submit an abstract Submit a manuscript

Overview Articles **7** Authors Impact Comments

VIEWS **195**

**About this Research Topic**

The rumen ecosystem is diverse and complex, with the microbiome consisting of symbiotic bacteria, archaea, protozoa, fungi and phage. The function of the rumen microbiome governs production efficiency, ruminant product quality and the environmental impact of ruminant agriculture. The use of metaomic-based techniques to study complex symbiotic ecosystems, such as the rumen, has grown exponentially since the onset of next generation sequencing (NGS). This has resulted in the generation of vast quantities of sequencing

**Topic Editors**

**Sharon Ann Huws** Follow

Institute of Biological, Environmental and Rural Sciences, Aberystwyth university, Aberystwyth, United Kingdom

### Topic Editors

- **Sharon Huws**  
Queens University, Belfast, UK
- **Stuart Denman**  
CSIRO, Australia
- **Diego Morgavi**  
INRA, France
- **Chris Creevey**  
IBERS, Aberystwyth
- **Itzhak Mizrahi**  
Ben-Gurion University, Israel

Special research topic just closed

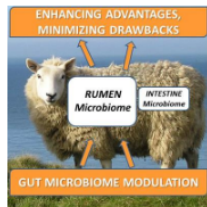
27 articles published so far but many still in review

Review about to be submitted by members of the RMG network



# Steps to Realising this vision

New special research topic in ***Frontiers in Microbiology***



Research Topic

## Gut Microbiome Modulation in Ruminants: Enhancing Advantages and Minimizing Drawbacks

Submit your abstract

Submit your manuscript



Overview

Articles

Authors **6**

Impact

Comments

VIEWS  
**236**

### About this Research Topic

Historically, the gastrointestinal tract was considered an organ solely equipped for the digestion and absorption of nutrients. However, the gut harbours the largest population of immune cells and commensal microbes that outnumber the entire host cells. Therefore, there is a general consensus that a healthy gut leads to healthy ruminants with optimal performance.

The rumen is perhaps the most diverse and complex microbial ecosystem harboured in the gastrointestinal tract of animals. This

### Topic Editors



**Alejandro Belanche**

Estación  
Experimental del  
Zaidín (EEZ)  
Granada, Spain

**24** publications



### Topic Editors

- **Alejandro Belanche**  
CSIC, Spain
- **David Yanez-Ruiz**  
CSIC, Spain
- **Amlan Kumar Patra**  
University of Animal Sciences, India
- **Diego Morgavi**  
INRA, France
- **Garret Suen**  
University of Madison, USA
- **Jamie Newbold**  
SRUC, Edinburgh

Closes 30<sup>th</sup> September, 2019

# *RumenPredict*

## *(FACCE-JPI ERAGAS)*

- Animal phenotype: host genome-rumen microbiome
- Feed based mitigation strategies
- Microbiome analysis –analytical platform-
- Key microbial genes, biomarkers
- Predict N and CH<sub>4</sub> losses

UK, Abersystwyth

Finland, LUKE

Sweden, SUAS

Ireland, Tegasc, UCD

Spain, CSIC

New Zealand, AgResearch

Netherlands, Wageningen

France, INRA

# *RumenPredict*

- Document written to develop RumenPredict into a flagship project for the GRA. Discussions required to engage partner countries and increase membership.

UK: S Huws

Belgium: V Fievez

Chile: E Vargas

China: W Yun

Italy: P Bani

Israel: I Mizrahi

Kenya: S kemp

Spain: D Yanez-Ruiz

Brazil: E Dettman

Colombia: O Mayorga

Canada L Guan, T McAllister

USA: M Hess

Norway: N Pope

Uruguay, Ghana